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Redistributive instruments in Swiss land use policy: A discussion based on local examples of implementation

Viallon François-Xavier

Viallon François-Xavier, 2017, Redistributive instruments in Swiss land use policy: A discussion based on local examples of implementation

Originally published at : Thesis, University of Lausanne

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Document URN : urn:nbn:ch:serval-BIB_E738FB9AFB2A9

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Faculté des sciences
sociales et politiques

Redistributive instruments in Swiss land use policy:
A discussion based on local examples of implementation

THÈSE DE DOCTORAT

présentée à la

Faculté des sciences sociales et politiques
de l'Université de Lausanne

pour l'obtention du grade de

Docteur ès sciences politiques

par

François-Xavier Viallon

Directeur de thèse :
Stéphane Nahrath

Co-directrice de thèse :
Géraldine Pflieger

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Prof. Géraldine Pflieger, Université de Genève
Dr. Julie Pollard, Université de Lausanne
Prof. Jean Ruegg, Université de Lausanne

LAUSANNE
2017



Soil as a Resource
National Research Programme NRP 68



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« *Redistributive instruments in Swiss land use policy : A discussion based on local examples of implementation* »

Lausanne, le 22 février 2017

Le Doyen de la Faculté

Professeur
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Summary

Value redistribution plays a key role in land use policy, not only because land use policy induces value through zoning, but also because it captures and redistributes this value through various policy instruments. Anchored primarily into article 5 of the Swiss Federal spatial planning act of 20 June 1979, redistributive goals of the institutional regime of soil range from the reduction and relocation of building zones, over the finance of land service, transport and other public infrastructure, to the implementation of other policies regulating soil uses, such as water protection, soil remediation, or energy policy. Through an actor based analysis of five case studies in Switzerland, this thesis questions the conditions of implementation of a set of land use policy instruments that impact the land's economic and ecological values in different geographic and demographic contexts, as well as the redistributive limits of the current institutional regime of soil.

Main results are that despite a growing number of *punctual* redistributive instruments, the amount of value redistributed remains limited. *Durative* instruments stemming from fiscal policy are underused, and do not specifically target revenues from land. Part of the explanation lies in the incoherence between fiscal policy and economic promotion, and land use planning and sustainability goals. Further, results show that successful implementation of instruments capturing value, or inducing value reduction, require at least a full compensation of the captured or reduced value and, in the majority of cases, the creation of additional added economic value for the landowner. In terms of ecological value, soil quality is marginally considered in new zoning processes, and there is no incentive for landowners to remediate polluted soils beyond legal obligations.

The revision of the spatial planing act in 2014 tackles some implementation problems such as value compensation, land hoarding, building zone dimensioning, and coordination between urbanisation and transport, but is unlikely to resolve the initial land use policy problems of urban sprawl and loss of fertile soils.

La redistribution de la valeur joue un rôle clé en aménagement du territoire, non seulement parce que cette politique induit de la valeur par le zonage, mais aussi parce qu'elle la capture et la redistribue à l'aide de nombreux instruments de politiques publiques. Ancré principalement dans l'article 5 de la loi fédérale sur l'aménagement du territoire de 1979, les objectifs redistributifs du régime institutionnel de la ressource sol vont de la relocalisation des zones à bâtir, en passant par le financement de l'équipement, du transport et des infrastructures publics, jusqu'à la mise en oeuvre d'autres politiques publiques à incidence spatiale, tels que la loi sur la protection des eaux, la dépollution des sols, ou la politique énergétique. A l'aide d'une analyse actorielle portant sur cinq études de cas en Suisse, la présente thèse interroge les conditions de mise en oeuvre d'une série d'instruments d'aménagement du territoire et leurs effets sur la valeur économique et écologique du sol dans des contextes géographiques et démographiques différents, et identifie les limites redistributives du régime institutionnel actuel.

Malgré un nombre croissant d'instruments captant de manière ponctuelle la valeur, la quantité de valeur redistribuée reste limitée. Les instruments de capture permanente de la valeur issus de la politique fiscale sont sous-utilisés, et ne ciblent pas spécifiquement les revenus du sol. Une part de l'explication réside dans l'incohérence entre les objectifs de politique fiscale et de promotion économique d'une part, et ceux d'aménagement du territoire et de durabilité d'autre part. En outre, la mise en oeuvre d'instruments de capture de la valeur, ou induisant une réduction de celle-ci,

requiert au minimum une compensation entière de la valeur captée ou réduite, et, dans la majorité des cas, la création d'une valeur économique supplémentaire pour le propriétaire. En termes de valeur écologique, la qualité des sols est considérée uniquement à la marge des processus de mise en zone, et il n'existe pas d'incitation pour les propriétaires à dépolluer les sols au-delà des obligations légales.

La révision de la loi fédérale sur l'aménagement du territoire en 2014 doit permettre de répondre à un certains problèmes de mise en oeuvre, tels que l'absence d'un mécanisme de compensation de la valeur, la thésaurisation des terrains à bâtir, le dimensionnement des zones à bâtir, et la coordination entre urbanisation et transport, mais il est peu probable que ces changements permettent de remédier à l'étalement urbain et à la perte de terres cultivables, problèmes initiaux de la politique d'aménagement du territoire.

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List of key abbreviations

Federal legal acts:

- Cst: Federal Constitution, SR 101
- CC: Civil code, SR 210
- CO: Code of obligations, SR 220
- SPA: Spatial planning act, SR 700
- SPO: Spatial planning ordinance, SR 700.1
- EPA: Environmental protection act, SR 814.01
- VBB_o/OSol: Soil pollution ordinance, SR 814.12
- CSO: Ordinance on the remediation of contaminated sites, SR 814.680
- StHG/LHID: Act on the harmonisation of cantonal and communal direct taxes, SR 642.14
- WPO: Water protection act, SR 814.20

Bernese cantonal legal acts:

- KV: Bernese cantonal Constitution, SR-BE 101.1
- BauG: Bernese constructions act, SR-BE 721
- GG: Bernese act on the communes, SR-BE 170.11
- StG: Bernese tax act, SR-BE 661.11

Legal acts of Canton Vaud:

- Cst-VD: Cantonal Constitution of Canton Vaud, SR-VD 101.01
- LATC: Constructions act of Canton Vaud, SR-VD 700.10
- LC: Act on the communes of Canton Vaud, SR-VD 175.11
- LI: Tax act of Canton Vaud, SR-VD 642.11
- LICom: Communal tax act of Canton Vaud, SR-VD 650.11

Technical terms:

- EIA: Environmental impact assessment / Umweltverträglichkeitsprüfung / Etude d'impact sur l'environnement
- RGSK: Regional global transport and settlement plan / Regionales Gesamtverkehr- und Siedlungskonzept. / Conception régionale des transports et de l'urbanisation. Mandatory regional structure plan that includes the agglomeration programs financed by the Confederation (Region Oberraargau and Canton of Berne 2012)
- SR: Classified compilation of federal legislation / Systematische Sammlung des Bundesrechts / Recueil systématique des lois fédérales. For cantonal acts, it is complemented with the canton's acronym (*e.g.* SR-BE)

Departments and offices of the federal administration:

- ARE: Federal spatial planning office / Bundesamt für Raumentwicklung / Office fédéral du développement territorial, part of the DETEC
- DETEC: Federal Department of the environment, transport, energy and communications / Eidgenössisches Departement für Umwelt, Verkehr, Energie und Kommunikation / Département fédéral de l'environnement, des transports, de l'énergie et de la communication
- FDHA: Federal Department of Home Affairs / Eidgenössisches Departement des Innern / Département fédéral de l'intérieur
- FOEN: Federal Office for the environment / Bundesamt für Umwelt / Office fédéral de l'environnement, part of the DETEC
- FSO: Federal statistical Office / Bundesamt für Statistik / Office fédéral de la statistique, part of the FDHA
- swisstopo: Federal Office of topography / Bundesamt für Topographie / Office fédéral de la topographie

Bernese directorates and offices:

- AWA: Waste and water Office* / Amt für Wasser und Abfall / Office des eaux et des déchets, part of the BVE
- AGR: Office of the communes and spatial planning* / Amt für Gemeinden und Raumordnung / Office des affaires communales et de l'organisation du territoire, part of the JGK
- BVE: Constructions, transport and energy Directorate* / Bau-, Verkehrs- und Energiedirektion / Direction des travaux publics, des transports et de l'énergie. Directorate of AGR until 1995
- FIN: Finance Directorate* / Finanzdirektion / Direction des finances
- JGK: Directorate of justice, of the communes and churches* / Justiz-, Gemeinde- und Kirchendirektion / Direction de la justice, des affaires communales et des affaires ecclésiastiques.
Current directorate of the AGR
- LANAT: Office of agriculture and nature* / Amt für Landwirtschaft und Natur / Office de l'agriculture et de la nature, part of the VOL
- VOL: Directorate of public economy* / Volkswirtschaftsdirektion / Direction de l'économie publique

Vaud's directorates and offices:

- CADOuest SA District heating company of the Western par of Lausanne's agglomeration*
- DGE Directorate general of the environment* / Direction générale de l'environnement
- DIREN Energy directorate* / Direction de l'énergie
- GOP Operative task force composed of members of the SDT and SPECO / Groupe opérationnel des pôles
- SDOL Master plan and planning office of the Western part of Lausanne's agglomeration* / Schéma directeur de l'Ouest lausannois
- SDT Spatial planning office* / Service du développement territorial
- SPECO Economic promotion office* / Service de la promotion économique et du commerce

*: Own translation

Introduction

1.1 The problem at stake

In 1976, the first federal legislation on spatial planning in Switzerland was rejected by referendum. Opposing parties, composed of federalist organisations, real estate milieus, the Swiss trade and crafts association, and some of the farmers' representatives, contested the restrictions imposed on private property. Further, they argued that the legal proposal consisted of a centralist threat, and expressed their loss of faith in the benefits of planning (Lendi and Elsasser, 1985). The legislation's initial rejection induced, in the subsequent legal proposal, the abatement of one of the law's core instruments: the tax on added land value created through zoning. The instrument was intended to capture part of the value increment created by authorities through zoning operations, and to redistribute these gains primarily to landowners who would suffer a loss of rights and subsequent value subsequent to a building zone reduction¹. The objective of the instrument was to decouple zoning from property rights and to provide to authorities the necessary means to use zoning without being hindered by financial considerations in case landowners claim compensation (Nahrath, 2003). The spatial planning act adopted in 1979 left the instrument's implementation to the cantons, and most did not utilize it until the act's revision in 2014.

1.1.1 Land surface changes

Increase of sealed surfaces

The instrument's initial unsuccessfulness reflects the political controversy surrounding value redistribution in land use policy. And not without cause: land use, particularly in Switzerland, is characterised by major rivalries which are intrinsically distributive and redistributive. Redistribution occurs primarily from ecological to economic value, or between surfaces dedicated to agricultural production and building zones dedicated to housing and employment. Since the launch of the federal land use statistics in 1979, spatial development trends in Switzerland have shown an increase of settlement areas, a growth in urban sprawl, and a reduction of agricultural surfaces, mostly at the expense of surfaces devoted to agriculture, which, over the same time period (1979-2005), have been reduced by close to 6% (84,081 hectares).

Continuous grow of sealed surfaces per capita

Comparing the last two periods of data collection of the *Arealstatistik* with demographic changes during the 1979-2005 time frame, settlement and urban areas grew by more than 9%, population by 8% (FOEN, 2015, 44). This means that the average amount of sealed surface used per person continues to grow. It exceeds 400m² per person², which corresponds to the upper limit defined by the Federal Council in the national sustainable development strategy (Federal Council, 2012). As sealed surfaces are one central indicator for the ecological value of land and the provision of ecosystem services (Breuste et al., 2013), the overall ecological value of soil has diminished. Soil sealing occurred despite a reduction of industrial activities (Carpataux and Crevoisier, 2000), close to already developed parts of the territory and primarily in rural peri-urban areas: whereas the average surface per person (305m²) has remained stable in urban areas, it reaches 672m² in rural peri-urban areas. Further, between 2002 and 2010, urban sprawl increased in 93 % of all Swiss communes (Schwick et al., 2013). In

¹Swiss legislation obliges authorities to pay compensation to landowners under specific conditions detailed in section 2.4.1.

²The average amount of sealed surface per person includes developed areas, industrial areas, special infrastructure areas (energy provision, sites dedicated to waste and water treatment, sites for mineral extraction, landfills, construction sites), transport surfaces, and recreational areas.

2015, the consumption of arable land for construction continues at the pace of 0.7m² per second (FOEN, 2015, 76).

These problems are not new (Häberli, 1975; Häberli et al., 1991; Jaeger et al., 2008), but have been highlighted through a renewed worldwide political and scientific interest in recent years: the United Nations declared 2015 as the international year of soil, using the occasion to produce a set of reports, effectively triggering an alarm on the status of the world's soil (Abdalla et al., 2015; Bartz et al., 2015). In Switzerland, the 2014 revision of the spatial planning act has raised interest in land use policy instruments (Estermann, 2016; Institut für Wirtschaftsstudien Basel, 2016).

1.1.2 Land price changes

The rivalries around soil use are also distributive in nature, as seen in the price differences between agricultural and constructible land. Figure 1.1 illustrates the evolution of real estate prices compared to construction costs, inflation, agricultural land prices, and the average mortgage interest rates. Three real estate price indexes are displayed: one for Switzerland, one for the Lake Geneva area, and one reflecting changes in canton Bern. These perimeters correspond to the ones in which the thesis' case studies are located. The value changes observed can therefore be retained as a reference throughout the thesis. The figure calls for the following comments:

Strong increase of land prices

- price differences between the essentially urban and internationally oriented region of Lake Geneva, and the rather rural areas with a cantonal focus in the canton of Bern has increased over the last fifteen years;
- general real estate price increase is due to an increase of land prices, as construction costs tend to follow inflation rates. Land price increase is itself partly explained by lack of housing supply (FSO, 2016);
- the real estate price reduction subsequent to the recession of the 1990's is clearly observable;
- the apparent stability of agricultural land prices is recent and has been strongly conditioned by the urgent federal decree of 1972, the adoption of the spatial planning act in 1979, and the prohibition for farmers to sell land to non-farmers (Giuliani, 2002; Giuliani and Rieder, 2003; Nahrath, 2003, 2005) (see also section 2.3.1);
- the average mortgage interest rate has dropped from over 7% in the 1990's to less than 2% in 2015, which reduces the costs of borrowing money for investments in land and real estate.

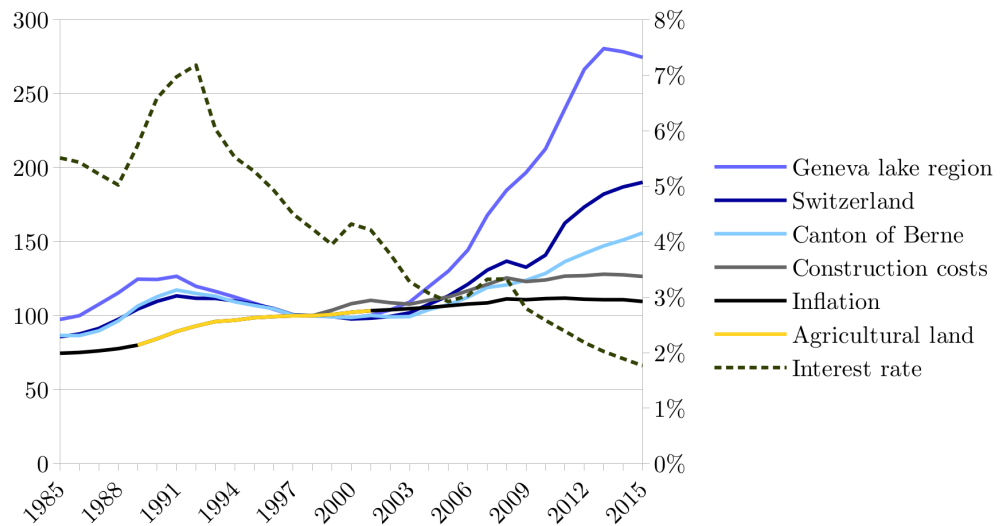


Figure 1.1: Left axis: agricultural land price index, transaction price index for owner-occupied apartments (average sized, mainstream property), inflation index, construction costs index from 1985 to 2015. 1998 = 100. Right axis: average interest rate for domestic mortgage loans in Swiss francs. Data: Giuliani (2002); Wüest and Partner (2016b); FSO (2015b,a); Swiss national bank (2007, 2016).

Dropping agricultural land prices

Comparing soil prices between agricultural and building zones, there is a high multiple between the two values: agricultural land is sold between 5 and 8 francs/m² nowadays and its price has been dropping since the 1970's, reaching a level comparable to the 1930's (Giuliani and Rieder, 2003; Neue Zürcher Zeitung, 2008). On the contrary, prices for unbuilt, serviced land for apartment buildings in the least favoured locations of Switzerland average 100 francs/m² to 4,500 francs/m² (in Geneva or Zurich) (Wüest and Partner, 2014).

Freehold housing becomes unaffordable

The observed evolution of real estate prices not only augmented rivalries between agricultural and natural areas and building land, but within other categories of housing as well. The Credit Suisse real estate report 2015, D. Fries et al. (2015, 8) states that at the end of 2014, "an average household no longer fulfils the imputed affordability criteria for the purchase of a new standard condominium." Taking into account the low vacancy rate on the rental market, in particular in cities (FSO, 2016), housing is major issue for residents in Switzerland.

1.1.3 Soil quality changes

Soil sealing and compaction as main physical threats

Rivalries on soil uses also reflect major redistributive changes in terms of soil quality: human intervention substituted the soil's ecological value by economic value. One can distinguish among physical, chemical and biological interventions on soil (Knoepfel et al., 2010):

1. soil sealing, which definitely subtracts soil from agricultural use, and prevents the infiltration of surface water (such as rain);
2. soil compaction, due to increases in the weight of machinery used for agriculture and forestry;
3. hydric erosion, linked to the reduced vegetation on steep grounds;
4. land remodelling, due for example to the preparation of ski pistes, to the construction of energy transport infrastructure and of transport surfaces in general, and to the filling of land recesses in agriculture.

Gasses and manure as main chemical threats

In terms of chemical threats, the federal office of the environment notes that all soils in Switzerland are polluted, although 90% of loose soils only slightly (FOEN, 2006). The most polluted soils are housing and transport areas, and contaminations are partly due to emissions that date back to several decades. In terms of soil pollution by heavy metals, there is an overall decline of the amount of mercury and lead

present in soils used for arable farming, vegetable and fruit crops, grasslands, forests, protected sites and urban parks FOEN (2015, 76f). However, contamination by zinc and copper has increased in soils used for arable farming and intensive grasslands, which is due in large part to the poor quality of the manure used for fertilisation.

Biological threats concern threats by genetically modified organisms and foreign organisms introduced in the natural milieu. Despite public debates on the issue, they have limited impact on soil in Switzerland.

In regards to contaminated sites, there are 38,000 polluted sites across the country. Out of these, 15,000 have been designated as requiring investigation, of which 7,000 were investigated up to 2013. Four thousand of them are considered a threat to humans, and the environment, and must be remediated. As of 2015, more than 800 of them had been remediated (FOEN, 2015, 26).

Moratorium on GMOs

Industrial brownfields and landfills

1.1.4 Policy problems linked with soil use

Considered from the angle of natural resource uses, urbanisation and soil quality challenges in Swiss land use policy are characterised by the following problems (Jaeger et al., 2008; Lambelet-Haueter et al., 2011; Valda and Westermann, 2004; ARE, 2013, 2012; Nahrath, 2003):

Challenges of soil management in Switzerland

- limitation of soil consumption per capita: since the beginning of their statistical accounting, the total amount of sealed surface per capita has been increasing, and currently threatens the sustainability objectives fixed by the Federal Council;
- reduction of oversized building zones (Bühlmann and Jäger, 2010): compared to federal requirements, a majority of Swiss communes have dimensioned their building zones incorrectly, leading to suboptimal use of space. The lack of compensatory mechanisms granting local authorities the financial means to potentially compensate landowners who would lose development rights has blocked the removal of these zones;
- unavailability of building zones (Bühlmann and Perregaux Dupasquier, 2013), creates rivalries among different potential uses of building zones, such as: hoarding, speculation, and investment versus housing and activities. The rarefaction of available building land can impact rental prices, but more importantly foster the creation of additional building zones in order to compensate the scarcity of supply;
- relocation of badly located building zones: in addition to the oversized building zones, the issue of their location has become crucial (since the beginning of the 2000's), in order to limit the environmental impact of urbanisation;
- densification within cities: combined with the limitation of soil consumption, the densification of already developed areas aims to reduce the important amounts of underused surfaces benefiting from good connection to transport infrastructure, either through additional uses or their reconversion (ARE, 2013);
- reduction of biodiversity loss: according to the Federal Office of the environment, a third of all surveyed species in Switzerland are under threat, because "the area available for valuable habitats has declined considerably, and unique regional characteristics are being lost" (FOEN, 2015, 57);
- limitation of secondary homes in tourist areas: the environmental and landscape impacts of secondary homes have been a major political issue over the past decade, culminating in the 2012 Swiss adoption of a constitutional limit of 20% of homes which may be dedicated to secondary uses;
- remediation and reuse polluted soils: urban and peri-urban brownfields require investigation, monitoring, and remediation measures in order to prevent pollution spread that can turn out to be very costly. Authorities estimate that former brownfields constitute an unused land reserve of approximately 1700 hectares (Federal Council, 2008). These areas are already serviced, and in certain cases, benefit from optimal locations (Jaccaud et al., 2008).

Complexity of soil issues

These various soil-related problems induce numerous value redistribution challenges each of which rely on specific intervention hypotheses elaborated by authorities, and whose implementation through specific policy instruments creates different winners and losers. The issue of passing on costs and capturing benefits is deemed a central role in the implementation of land use policy objectives. For example, authorities have increasingly relied on the capture of value created through zoning decisions in order to solve the mentioned soil-related problems. Searching for a bridging element between these problems, one option is to study the economic and ecological value regulation, distribution and redistribution that underpin soil-related problems. From a political perspective, understanding the allocation processes requires analysis of how various public policies dealing with soil – land use planning policy being the most prominent one – are initiated, how these issues are tackled, what redistributive processes are planned, what impact these processes have on target groups, and, in the end, in which way the identified problems are solved.

Table 1.1 provides a set of examples of value redistribution. It also shows existing trade-offs between added and reduced economic and ecological values, and the possible combination of these values.

		Ecological value	
		<i>Added value</i>	<i>Reduced value</i>
Economic value	<i>Added value</i>	<i>E.g.</i> remediation and reuse of former brownfield	<i>E.g.</i> construction of single family homes on open land
	<i>Reduced value</i>	<i>E.g.</i> non contaminated brownfield with growing vegetation	<i>E.g.</i> irreversibly contaminated brownfield

Table 1.1: Example of added and reduced economic and ecological values (Nahrath et al., 2012).

1.1.5 Research questions and steps

Value redistribution as necessary condition for sustainable land use

The fundamental question asked by scientists studying soil and land use changes are: why, despite an increase in environmental regulations, is there constantly increasing land consumption? How do soil and land regulations tackle the issue of expanding urbanisation? Why do regulations succeed or fail to provide a response to existing problems? This thesis postulates that *understanding the political conditions of redistribution of economic and ecological values are central to explaining land use changes; further, that value redistribution is a necessary condition in order to achieve a more sustainable use of soil.* The postulate leads to the following research questions:

What is the redistributive capacity of the current Swiss institutional regime of soil? What obstacles and limits does the current institutional regime of soil face in terms of redistribution? What are the consequences in terms of land use? And what are the most promising strategies for increasing the redistributive capacity of the institutional regime?

This thesis analyses first the evolution of the public problems linked to soil in Switzerland, the politically defined objectives that aim to resolve the public problems, together with the underlying logic of public intervention, and the policy instruments adopted in order to solve the public problem. The analysis of the institutional setting of land use policy in Switzerland is combined with an analysis of the economic, demographic and geographic contexts in which selected policy implementation processes take place.

Second, the thesis focus on the involved actors' interests and strategies through the analysis of *micro-political policy implementation processes*. Depending on the institutional setting and the demographic, economic and geographic contexts, actors elaborate strategies, mobilise policy instruments and policy resources, in order to reach their goals. The analysis of policy implementation processes takes place on a micro-political scale, *i.e.* on a local level, where the power games between political-administrative authorities and target groups result in effective planning and land use changes.

Third, the thesis aims to explain the redistributive effects produced in the analysed policy implementation processes. Value redistribution is assessed through the effects produced on actors, policies, geographical spaces, political scales, through the effects produced in time, and on the economic and ecological dimensions of value.

I subdivided the provision of a response to the research questions in three broad steps, which form the structure of the present thesis:

Three research steps

1. review theoretical explanations for value redistribution in soil and land policies and define a conceptual framework that allows for its analysis (chapters 2 and 3):
 - the literature review provides explanations from research on property rights and public policies in order to define the institutional structure in which land policies and land transactions are embedded;
 - I refer to socio-political theories that conceptualise actors' resources and strategies in order to explain their behaviour. These explanations are complemented by economic land theories in order to assess the land's value and integrate it into the explanation of the actors' strategies;
 - based on instrumental theory, I then draw a typology of the main policy instruments that target owners and users of the resource soil;
 - taken together, these elements allow to draw the conceptual framework used for the empirical research and formulate a set of research hypotheses;
2. analyse and compare the redistributive capacity in five local case studies and their underlying 15 redistributive processes:
 - the case studies' analyses provide historical, spatial, and socio-political data allowing for the tracing of land use policy and land use changes over the past 25 years, and identification of the factors which explain the policy outputs, as well as the redistributive effects achieved (chapters 4 and 5). They provide local examples from the field and show how actors shape the resource soil in a variety of planning and land use situations;
 - based on the case studies, I then synthesise the results into redistributive processes, compare them, test the hypotheses on them, and draw a set of factors which facilitate, restrain, and explain instruments' uses, the outputs produced, and the redistributive effects achieved;
3. discuss the postulated link between value redistribution and a more sustainable use of soil (concluding chapter).

1.2 Research gap to be filled

The genesis of Swiss land use policy has already been analysed and explained by S. Nahrath (2003), who studied the period from 1960 to 1990. The 2014 legal revision of the spatial planning act defined the taxation of added land value created through zoning as mandatory. This instrument is defined as the cornerstone of Swiss land use policy (Gmünder et al., 2017), because it compensates advantages and disadvantages created on land property through planning. The new federal law obligated the cantons to introduce a redistributive mechanism at the core of their land policies, and directly targets the rent induced by land use policy as well as its redistribution. Thus, the 2014 legal revision required an update on the way land use policy implementation has evolved since the 1990's, but more importantly, is a reconsideration of land use policy outputs and effects under the angle of value redistribution.

land use policy and value redistribution

Other issues, such as the management of contaminated sites (Alexander, 2015; Dupuis and Knoepfel, 2015), have become central topics for researchers and practitioners. In fact, the management of contaminated sites involves redistributive stakes (between ecological and economic value, and between policies like soil protection and land use planning), which have only been subject to contamination-specific case analyses (Dupuis and Knoepfel, 2015).

Reuse of brownfields

Emergence of new political-administrative arenas

Further, the coordination of urbanisation and transport initiated by the federal agglomeration policy has led to the emergence of new forms of political action on a supra-communal scale (Jaccaud et al., 2008; Pflieger, 2013b). These integrate the regulation of soil surfaces dedicated to transport, housing, and employment at a functional level, and constitutes a notable change in the use of resource-soil.

Increasing mix of instruments?

In addition, the rise of the governance concept requires researchers to consider the increased "mixture of public- and private-sector instruments" when explaining how instruments are being used (Peters, 2005, 362). Linked with the above mentioned agglomeration programs, but also other political reforms on energy planning and a tendency to centralise land use policy competencies, the rise of intermediary norms and decisional bodies has become central in the shape of land use policy in Switzerland.

Content of localised arrangements

Moreover, there is relatively little knowledge on the conditions under which land use policy instruments are implemented by local actors. Using a case study approach, I aim to shed some light on the local outputs and effects of land use policy. The knowledge provided by the analysis is not only relevant for research, but also for politicians shaping future legislation, and land use policy practitioners.

The introductory chapter has shown that for several decades, urban sprawl and soil consumption have been central issues linked to the management of soil in Switzerland. The redistributive characteristic of soil-related problems and resulting public interventions, or the challenges of imposing respectively avoiding prohibitions and obligations, of passing on costs and capturing benefits, justifies an actor-centred, local approach in order to analyse the implementation of the institutional regime of soil.

The following chapter 2 is dedicated to the literature review and theoretical framework that underpins the thesis. Once the state of the art, the Swiss policy design of the resource soil – including existing policy instruments –, and main legal incoherences have been presented, I introduce the institutional regime framework, which serves as basis for the definition of the conceptual framework exposed in chapter 3. Once the hypotheses derived from the framework and the methodology have been exposed, I turn to the five case studies of the thesis. These are subdivided into two chapters: chapter 4 is dedicated to the peri-urban region Oberaargau, chapter 5 to the urban region Lausanne. Chapter 6 presents a summary of the case studies, discusses the hypotheses' results, sums up the findings of the analysis, and discusses them along with the theories used for the conceptual framework. Finally, chapter 7 responds to the research questions, synthesises recent legal changes, and proposes a set of recommendations for a more sustainable use of soil.

Chapter 2

Literature review and theoretical framework

Rebuild the resource soil's regime

In order to grasp the redistributive questions underlying the economic and ecological value of soil, it is necessary to first look at the existing literature and at the responses it provides in order to explain value distribution and redistribution. In a subsequent step, I will describe the social problem(s) at stake and review the policy solutions provided in order to solve these problems. In turn, this allows insight into the main difficulties and incoherences inherent in current policies impacting land use. Based on this knowledge, I will then identify the stream of literature I want to contribute to, and define the knowledge gap I intend to fill. Finally, I introduce the theoretical framework used in this thesis, and show how it is able to bring together the various theoretical and practical elements presented earlier. The present chapter is structured in order to achieve the following objectives:

- provide a literature review of ecological, legal, and economic explanations of the observed distributive trends (sections 2.1 and 2.2);
- review, with help of the tools provided by policy analysis, how society conceives the problems at stake, what causal and intervention hypotheses are formulated by policymakers and what objectives are set (section 2.3);
- show how political theory explains the instrumental choices made and how these instruments regulate soil uses (section 2.3.2.3);
- present how political science conceptualises actors' strategies, behaviours and means of action in policy implementation processes (section 2.3.4);
- review known gaps and incoherences of the current legal setting and present the knowledge gaps this thesis aims to fill (section 2.4);
- present and justify the theoretical framework used in this thesis (section 2.5);

2.1 Ecological value of soil

As outlined in the introductory chapter, one way to assess the value of soil is to focus on the various uses that the resource provides to humans in terms of goods and services (see table 8.32 in the annexes). This anthropocentric approach allows us to qualitatively distinguish soils and to assess their evolution in a quantitative manner (in terms of m^2 or m^3). But this standpoint does not explain why these uses are valuable and how the goods and services' value can be compared to one another. A short literature review of the factors that make soil valuable from the angle of environmental sciences is necessary in order to reveal how the ecological value of soil can be explained.

Soil functions as basis for ecosystem services

According to environmental scholars, soil is conceived as a set of physical, mineral, chemical, and biological properties that allows for the fulfillment of several functions essential to life (de Groot et al., 2002; Adhikari and Hartemink, 2016): source of raw material, carbon pool, biomass production, storing, filtering, and transforming

nutrients and water, hosting biodiversity. From an anthropological perspective, these functions provide a set of ecosystem services on which humans activities rely. But these service are also affected by human activities (Millenium ecosystem assessment, 2005). From this perspective, "ecosystems through the lens of the services that they provide to society, how these services in turn benefit humanity, and how human actions alter ecosystems and the services they provide" (Carpenter et al., 2009, 1305). Researchers have defined four broad types of ecosystem services whose condition and use by humans fluctuate over time:

- provisioning services: crops, livestock, wild fishery, aquaculture, wild terrestrial foods, timber, agricultural fibers, wood fuel, genetic resources, biochemicals and pharmaceuticals, fresh water;
- regulating services: air quality regulation, global climate regulation, water regulation, erosion regulation, water purification, disease regulation, pest regulation, pollination, natural hazard regulation;
- cultural services: spiritual and religious, aesthetic, recreational;
- supporting services: support for human habitat.

Over the last centuries, there has been a general expansion of human use of ecosystem services and a subsequent decline of provisioning and regulating services. Decline is essentially due to "climate change, land use change, invasive species, overexploitation, pollution, population increase, and economic growth" (Carpenter et al., 2009, 1306).

In regard to soil, one issue is the extension of built surfaces and urban sprawl. The increase in construction is principally due to demographic growth, the demographic structure of the population (ageing of population and increase of flat sizes), the economic context (increase of GDP), and the amount of secondary homes. More specifically, accessibility by public and private transport, the quality of life in a given area, and public funding supporting the acquisition of homes, play major roles in the increase of housing surfaces (Schultz et al., 2003; Jaeger et al., 2008). The increase in transport surfaces is due to the extension of built areas (in surface and density), and to the degree of motorisation of individuals. In regard to the extension of industrial and commercial uses, structural economic changes play a central role in explaining land use change. Urban sprawl affects the ecological value of soil negatively (Jaeger et al., 2008): it induces soil sealing and non-reversible losses of natural soil functions. Development is particularly problematic, because it occurs mainly on agricultural lands, which, once developed, lose their original agricultural functions *permanently*. Further, urban sprawl repulses endangered plants and animal species, introduces non-local species and transforms the natural spectrum of species. It also increases noise and light in the landscape, reduces available recreational areas and increases needs for transport, which itself induces soil sealing.

Another issue is agricultural land use. Depending on the production mode and techniques used, the provision of ecosystem services through agriculture vary significantly (Swinton et al., 2007). Whereas diversified agricultural systems support substantially greater biodiversity, soil quality, carbon sequestration, and water-holding capacity in surface soils, energy-use efficiency, and resistance and resilience to climate change, intensive monoculture can create ecosystems whose services completely depend on off-farm inputs (Kremen and Miles, 2012).

An additional way to value soil in an ecological perspective is through landscape analysis (Roth et al., 2010): a growing population, growing surface requirements per person for housing and employment, increasing mobility, and tourist infrastructure in mountains contribute to the extension of built surfaces and the consumption of soil (soil sealing).

Urban development as main threat to the ecological value of soil

Although various factors contribute to determine the ecological value of soil, I chose land development (and the absence of development) as main determinant. Focusing on development implies a reduction of the qualitative assessment of the analysed land surfaces: the criteria neglects positive effects of land development (provision of

ecosystem services, or soil functions such as water filtration), as well as the negative effects of undeveloped land on ecosystem services (*e.g.* intensive agriculture). Consequently, the assessment of the soil's ecological value in the analysed cases is limited to the possibility to fulfil basic functions such as agricultural production. At the same time, the focus on the development of land provides a clear and measurable criteria in order to assess soil value, and allows to keep the lens of political science as the core approach used for the analysis.

Hence, inferring from part of the research results presented above, one certitude is that the expansion of developed surfaces reduces the ecological value of soil. Factors such as the demographic evolution, living standards, increased mobility and structural economic changes explain a wide part of soil consumption, which negatively impacts the ecological value of the resource. Soil sealing is an ecologically non reversible step that can lead to a complete loss of its ecological functions (Abdalla et al., 2015, 339), but it is also determinant for its economic value, as the price difference between agricultural land and building zone shows (see figure 1.1 in the introduction). Under this aspect, compensation efforts, such as no net loss objectives set up by biodiversity offsetting policies, appear rather illusory (Calvet et al., 2015). But there are other means to limit the impact of human action on the ecological value of soil (Valda and Westermann, 2004; OFEV, 2007): in this regard, densification policies and the reuse of already sealed surfaces can play a central role.

The determinants of the soil's ecological value used in the present analysis have put forward as land development and soil sealing as central variables for assessing the ecological value of soil. These land use changes result primarily from economic and demographic changes, from an increase of living standards and an increase of mobility.

2.2 Property rights and economic value of soil

Land prices reflect the economic value of soil. They play a central role in explaining land use changes. In order to understand the economic value of soil, it is necessary to first study the legal anchor defining the property rights on the resource, because it is through these rights that western societies define the resource holders and the exchangeable characteristic of the resource. Further, right holders play a central role in determining land use changes. Section 2.2.1 deals with the legal definition and the content of property rights in Switzerland. Section 2.2.2 presents the implications of the property rights system on the resource's uses. Section 2.2.3 presents a set of economic approaches and their contribution to the explanation of land value.

2.2.1 Legal anchors of property

2.2.1.1 Property regime and the State

A legal anchor dating back to the French revolution

The current legal anchor of property in continental Europe can be traced back to the French revolution, when property was considered an intrinsic part of the human personality (Knoepfel and Schweizer, 2014, 13). In Switzerland, a nationwide definition of property was established through the adoption of the Swiss civil code in 1907. It is defined as follows:

"The owner of an object is free to dispose of it as he or she sees fit within the limits of the law.[...] He also has ownership of all its constituent parts [and][...] of its natural fruits."¹

A legal doctrine inspired by Roman law

The definition mentions explicitly two fundamental attributes of property as inspired by Roman legal doctrine, namely the *fructus*, that is to say the right to enjoy the natural and financial rent provided by the object and the *abusus*, which refer to modification, alienation and destruction rights (Boulay and Buhot, 2013). The third Roman attribute of property, the *usus*, is implicit in the disposal rights of the notion of property. Until 2003, there was only one type of property, notwithstanding the type of object considered. It is only with the introduction of a specific property right on animals in the Civil Code that a less absolute definition appeared.

¹Art. 641ff of the *Swiss civil code of 10 December 1907 CC*,SR 210.

The definition of property cited above is a private definition, because there is no other (public) property law defining property (Leimbacher and Perler, 2000): notwithstanding the type of owner (State, collective, individual), the same and only property regime applies. In 1969, this private regime is reinforced by the introduction into the Federal Constitution of the guarantee of property/ownership². Since then, property is not only a matter of private law where one can defend his or her property against other individuals (the traditional function of private law). It is also a matter of public law, which corresponds to the recognition of a right by the State to the individual. This right is twofold: on one hand, the Constitution introduces the concept of property as such, which grants every individual the possibility to acquire a subjective right on a thing, on the other hand, property is protected against the State's intervention (Dubey, 2012, 24ff).

A single private property regime

State intervention in private property occurs primarily through the limitation of use rights or expropriation and appropriate compensation (Aubin and Nahrath, 2015, 60). However, the fact that there is only one (private) property regime leads to the emergence of policies that rely both on public and private law. This fact materialises, for example, in agricultural policy through the restriction of disposal rights on agricultural land (see table 2.3 in section 2.2.1.4), or when public authorities leasehold their land to fulfil specific objectives.

Policies relying on private law

But State action based on private law is subject to restrictions. The first is imparted by article 5 of the Constitution that specifies that the State's activities are based on, and limited by, law. This is to be understood as the requirement of a legal basis for public action. The second is that its freedom to contract is bound to public interest. Thus, notwithstanding the legal nature of State intervention (public or private law), the act could be contested by an administrative law appeal. This conception of "private administrative law" however, is rarely accepted by the Swiss Federal Tribunal (Moor, 2002, 375, 388).

Limits to State intervention through private law

An additional element that deserves attention is the distinction between public domain and other private land owned by the State. According to P. Moor (1992, 253), one has to distinguish two types of public domains: the "natural" one, which is set by the civil code and in possession of the cantons (or the communes), or in other words, high mountain areas, waters, the sky and the underground; and the "artificial" one, which "fulfils a social function of communication" and is used for transport, such as roads, squares, bridges, canals (Moor, 1992, 253). The latter is defined by a concrete legal act and usually entered into the land register. Depending on its use, what is at a certain moment in time public domain, can become private property and vice versa (Moor, 1992, 254ff).

Public domain vs private land owned by the State

This section has shown that ownership of land or soil is regulated through the legal concept of private property, notwithstanding the type of owner. However, natural, remote, and less-used areas, as well as transport infrastructure, are public domain. Although the public domain can be part of the land register, its value is not financially assessed. Further, public intervention on landownership can occur both through private and public law.

2.2.1.2 Property rights as a bundle of rights

The first conceptual developments on property, property rights, and ownership stem from legal realism, a research movement of the beginning of the twentieth century in the United States of America (Cole and Grossman, 2002). According to W. Hohfeld (1913), property is defined as a bundle of rights, *i.e.* as distinct pairs of rights and correlative obligations, combining formal and informal rules, and various sources of rights and legitimacy. These sources of rights include routines, traditional practices, standards, customary law, etc. This conception considers property not as a natural right, but as a reciprocal relation. It is "an affirmative claim against another" that others are due to respect. Thus, it implies its recognition and protection by the law and/or by others (Hodgson, 2014).

Property as reciprocal relation

Within the bundle of rights applied to natural resources, E. Schlager and E. Os-

Distinct right holder positions

²Art. 26, SR 101.

trom (1992) distinguish four different rights associated with four distinct positions³.

	Owner	Proprietor	Claimant	Authorized user
Access and withdrawal	X	X	X	X
Management	X	X	X	
Exclusion	X	X		
Alienation	X			

Table 2.1: Bundle of rights associated with right holder's position according to Schlager and Ostrom (1992).

2.2.1.3 High stability of property rights over time

Few legal changes over time

Referring to the bundle of rights approach (Leimbacher and Perler, 2000), I distinguish three types of rights that compose property rights: use rights, disposal rights (transmission and alienation of the title), and formal possession of the property title. One characteristic of property rights are their high stability over time. Table 2.2 shows the main modifications of the property rights system and restrictions through public law since its introduction on the federal level. One can observe that the formal rights associated with property have changed only marginally since the second World War: they were extended to condominiums/freehold apartments in 1963. Then, in 1969, the right to property was introduced into the constitution, together with the attribution to the federal state of a competency in land use planning (Nahrath, 2003).

³One position that is not self-explanatory is the one of the "claimant" and the associated "management rights". The authors define claimants as "individuals who possess the same rights as authorised users plus the collective-choice right of management", that is to say that they define more precisely the rules of withdrawal among users (Schlager and Ostrom, 1992, 253). Applied to the resource soil, the distinction of claimants does not appear to be very fruitful: one could, for example, consider the janitor of a dwelling as a user with management rights.

Formal rights	Disposal rights	Use rights
1911 to 1965		
1912: Introduction of the Swiss civil code	1911: Swiss code of obligations	—
1930: Federal expropriation act	1951: Revision of agriculture act and modification of land betterment provisions	
1963: Introduction of condominium property into the Civil code		
1965 to 1980: Emergence of federal land use planning policy		
1969: constitutional articles 22 ^{ter} and 22 ^{quarter} regarding guarantee of private property and principle of land use planning	—	1970: Cantonal constructions act 1971: New federal water protection act 1972: Emergency federal decree on land use planning 1979: Federal spatial planning act
1980 to today: Environmental policy, restrictions for agricultural land and foreigners		
—	1983: Federal act on acquisition of property by foreigner 1991: Federal act on rural land rights 2012: Limitation of secondary homes to 20 %	1983: Federal environmental protection act 1985: Revision of the cantonal constructions act 1987: Constitutional article 22 ^{sexies} regarding the protection of swamps (popular initiative Rothenthurm) 1999: Revision of federal spatial planning act in regard to constructions in the agricultural zone 2014: Revision of the federal spatial planning act and reintroduction of a compensation mechanism

Table 2.2: Evolution of the property rights system of the resource soil according to S. Nahrath (2003, 151ff).

2.2.1.4 Private law instruments

Beyond the various rights conferred by the property title, one element that is central for understanding land use is how the holders of rights on land can use, sell, exchange, or transform these rights. The possibilities granted to the right holders are defined in legal norms: the Civil code regulates relations between individuals; public law regulates relations between individuals and the State (Dubey, 2012, 24ff). These legal possibilities can be conceived as the instruments available to individuals, and to the government, in order to exploit, manage, exclude, alienate, and control these rights and their holders. Instruments regulating the formal, disposal and use-rights on soil constitute the entry point of this research, because I aim to explain why and how actors involved in a land use policy process use a specific instrument in order to achieve their goals, and how these instruments influence the economic and ecological value of land. Table 2.3 presents a list of private law instruments that the Swiss federal civil code provides to property title holders: buy and sale of land, easements, in particular the building right, preemption, emption and pre-emption rights as well as different types of mortgages.

The distinction between property rights (private) and public policy instruments (presented in section 2.3.2.3) has legal grounds. As there is no distinction between public and private property in Switzerland, authorities, when dealing with their private properties, that is to say the land that is not public domain but in their private ownership (Moor, 1992, 254), act as private landowners. Further, contracts have become one of the means that authorities use in order to implement land use policy (Ruegg, 2013; Adank, 2016).

Instruments as entry point of the analysis

Two legal sources define instruments

Instrument ^a	Description
Private law contract (1, 216 CO)	Can contain any obligation that is not prohibited by law. Has to be done as a public deed
Land exchange (237 CO)	Swap of land against something else that is not money. Same rules as for contracts apply
Land buy/sell (656, 666, 184 CO)	Same rules as for contracts apply.
Restriction of acquisition of agricultural land (art. 63 RLRA)	The buyer of agricultural land cannot buy land that they do not cultivate personally
Repurchase right (216 CO)	Seller's right to re-buy sold land at a predetermined moment. Same rules as for contracts apply, except that its duration is limited to 25 years and that it can only be inherited, not assigned
Emption right (216 CO)	Holder's right to buy land at any moment. Its duration is limited to 10 years and it has to be done as a public deed
Preemption right (216 CO, 681 CC)	Holder's preferential right to buy a property when the owner sells it. Can be defined by contract or by law, <i>e.g.</i> co-owner, emphyteutic lease holder, a farmer's relative under specific conditions
Easement (730 CC)	Specific right agreed on by two parties and granted to a dominant plot in favour of a servient plot
Building right/emphyteutic lease (779 CC)	Holder's right to use the land according to the conditions specified in the contract signed with the landowner. Transferable and inheritable, unless otherwise agreed. Only valid if done as a public deed
Land betterment (703 CC)	Redefinition of property geometry, service and development. Requires the approval of the majority of landowners owning more than half of the surfaces of land concerned. Cantonal legislation regulates the matter further
Real burden (782 CC)	A real burden is a monetary obligation of a landowner towards a third party for services provided to his/her land. It can be defined by contract or by law
Gift/donation (239 CO)	Can be made within the limits set by matrimonial property law and inheritance law
(Legal) Mortgage (824 CC)	Charge on immovable property guaranteeing a debt. It can be defined by contract or by law (legal mortgages). Mortgages are constituted through their entry into the land register. Bernese specificity: legal mortgages are valid without inscription into the land register (109ff EZGB ^b)
Mortgage certificate (842 CC)	Personal debt secured by a charge on an immovable property and all personal belongings. It is incorporated into an exchangeable security
Encroachment (art. 674-3 CC)	Legal right of constructions using a neighbour's land. As opposed to an easement, these rights can be imposed to the servient plot
Right for pipes (art. 691 CC)	Legal right for pipes crossing a neighbour's land
Rights of way (art. 694 CC)	Legal right to pass through a neighbour's land to access one's own land
Right to use an essential water source (art. 710 CC)	If access to water requires excessively high costs, a landowner can claim access to one's part of water that is unused
Usufruct (art. 745 CC)	Use rights of land granted to a natural or moral person that cannot exceed 100 years

Table 2.3: Property rights instruments of the resource soil. Description: Haefliger (nd); Convers (2012); Canton de Neuchâtel (2015).

^aSwiss Civil Code of 10 December 1907 CC, SR 210; Federal Act of 4 October 1991 on Rural Land Rights RLRA, SR 211.412.11; Federal Act of 30 March 1911 on the Amendment of the Swiss Civil Code (Part Five: The Code of Obligations) CO, SR 220.

^bGesetz vom 28. Mai 1911 betreffend die Einführung des Schweizerischen Zivilgesetzbuches EG ZGB, SR-BE 211.1.

2.2.2 Consequences of civil law on natural resource management

According to Aubin and Nahrath (2015, 62ss), the institutionalisation of private property in most of the world has four main consequences on the regulation of environmental and soil resources:

- the disappearance (or substantial weakening) of common property: most of what institutional economists call common pool resource institutions inherited from the middle ages are privatised or nationalised;
- incapacity to attribute property rights on common natural resources systems: environmental and land use planning policies face great difficulty to regulate use-rights regarding major common natural resource systems such as air, water, landscape, ecosystems, biodiversity, etc., because these resources cannot be owned in the current private property regime⁴;
- difficulty to regulate certain land uses, because of the exclusivity of occupation conceded by "absolute property" (Harvey, 1982, 338f). These difficulties lead to a (re)invention of multiple ownership, *e.g.* easements, building rights, community of heirs and agricultural enterprises (both community ownership), condominiums, securities on land and immovable property;
- integration of environmental and land resources in the market economy in order to give them an exchange value, in the form of a credit to the property owner or as an investment for the capital lender. Land and its subdivisions (plots) become commodities that have a use value and an exchange value.

Further, it is acknowledged that landowners enjoy a wide autonomy on how they use their plot of land, but benefit also from a privileged access to decisional processes that relate to the use and protection of the resource soil (Knoepfel et al., 2003, 335f). These privileges are, for example, the articles on neighbour's rights listed in the civil code⁵, and the consideration of existing interests in planning procedures⁶.

Submission of resource uses to monetary return

The presentation of the legal historical context aimed at clarifying the link between soil and property. The integration of soil units (plots) in the market economy and its attribution of an exchange value is of the utmost importance, because it dissociates land from the property titles that represents them (Marx (1967) in Harvey (1982, 343)).

As van Griethuysen and Steppacher (2015, 33f) put it, property titles gained an existence of their own, and grant two returns to their owner: the material return linked to the possession (and exploitation) of the resource and the immaterial return provided by the social guarantee that the rights associated with the property title are protected and can be used further.

These additional uses can occur, for example, through a credit or a mortgage. They create additional funds that can be reinvested in order to increase revenues, and thus initiate a circular and cumulative process (Veblen, 1904; van Griethuysen and Steppacher, 2015). The growth process that results from this exchange value conceded to property implies a complete restructuring of society's economic rationality (van Griethuysen and Steppacher, 2015, 41f): whereas economic decisions could, in an agrarian economy, be coordinated with ecological and social considerations, in a capitalist economy they are subordinated to the return brought by capital.

⁴According to the Swiss civil code, an object can be owned if (1) it is not a person, (2) can be physically and spatially delimited and (3) can be physically seized (Leimbacher and Perler, 2000, 30). The natural resources systems mentioned do not meet these conditions.

⁵On the effects of land property, in particular art. 667 to 712 CC, SR 210.

⁶Art. 4 of the *Spatial planning act of 22 June 1979 SPA*, SR 700; art. 3 of the *Spatial planning ordinance of 28 June 2000 SPO*, SR 700.1.

The existing property rights system strongly influences the use and exchange of land as a commodity: ownership of land entails a bundle of rights that grants significant powers to the title holder, specifically in terms of financial leverage and/or return. The economisation of land brings us to the question of its value, an element discussed for more than two centuries in economic theory and addressed in the following section.

2.2.3 Economic theories on land

Understanding what the value of land is and how it is created is a central step for the definition of the thesis's theoretical framework. According to D. Harvey (1982, 371), land value reflects "temporal and spatial considerations" of material use values of land. Land value influences, at least indirectly, the definition of land use policy problems, because the allocation of uses defined by land use policy has direct consequences on land value.

2.2.3.1 Classical perspective

Rent as means of coordinating land uses

In classical economic theory, the value of a commodity is, in the most abstract terms, defined by the labour necessary for its production (Harvey, 1982, 17). Considering that land is a commodity, this theory of value only allows us to assess the value of improvements to land (through the human labour necessary for their realisation). But raw land also has a value, and landlords can obtain payments from tenants (rent). This payment for raw land corresponds to the coordinating role of rent in the capitalist mode of production: rent helps, through the land market, to fashion the spatial organisation of activities; it determines land use and coordinates the production of surplus value (Harvey, 1982, 331).

Rent as payment to the landlord for land use

D. Ricardo (1817, 2.2) defines rent as the "portion of the produce of the earth, which is paid to the landlord for the use of the original and indestructible powers of the soil". In the words of H. George (2006, 89), rent is "the part of the produce that accrues to owners of land (or other national capabilities) by virtue of ownership"; it "is determined by the excess of its production over that which the same application can secure from the least productive land in use" (George, 2006, 92). Referring to K. Marx's *Capital*, D. Harvey defines rent as "a payment made to landlords for the right to use land and its appurtenances (the resources embedded within it, the buildings in place upon it and so on)" (Harvey, 1982, 330).

Differential and residual attributes of rent

Main explanatory models in classical economics dealing with rent such as those of D. Ricardo or H. George link the production process to three interlinked factors of production: capital, labour and land. The use of these three factors in the production process allow their respective individual retribution through interest, wages and rent. These authors emphasise the specificity of rent compared to interest and wages, because of its differential and residual attributes (Boulay, 2011, 48):

- The differential attribute refers to two elements:
 - the "difference between the produce obtained by the employment of two equal quantities of capital and labour" [on two distinctly fertile plots] (Ricardo, 1817, 2.8)⁷.
 - the difference between the produce obtained by the employment of additional capital and labour on two equally fertile plots, also named scarcity rent (Encyclopaedia Britannica Online, 2015)⁸.
- The residual attribute is due to the private property right on land which concedes any production surplus not captured by capital or labour, to the landowner. In other words, it is a consequence (and not a cause) of the transaction price, because the price is conditioned by the other factors of production. Rent takes what is left after the two other factors of production have been remunerated

⁷D. Harvey (1982, 337) mentions that K. Marx challenges D. Ricardo's view in the sense that the fertility of plots or the "indestructible powers of nature" are "as much the product of history as they are of nature", e.g. more permanent improvements such as irrigation works, levelling, buildings etc.

⁸The scarcity rent arises from the (limited) quantity of land available in a given location.

(Boulay and Buhot, 2013, 88). In regard to its distribution, the residual attribute itself has two specific characteristics (Guigou, 1982, 591):

- it is variable, because it relies on power relations between the landowner and the user;
- it exists on all plots, even on those of lower quality.

The differential and residual characteristics of rent make the value of land specific: it depends on the quality and location of the plot, the use rights associated with it, and its exclusive possession.

Specificity of land as a commodity

2.2.3.2 Marxian perspective

As opposed to the classical vision, Marxian economics do not consider land itself as a source of value (Harvey, 1982, 332ff). It is through the monopoly powers conferred by the law of private property that land becomes a commodity that can be rented or sold. Through this monopoly, landowners can require payment for land for three different reasons (Marx (1969, 245) in Harvey (1982, 335)):

1. for "it is the *element* in which production is to take place, as in agriculture";
2. for "it enters *into* production as one of the conditions of production, as in the case of the waterfall or the building site";
3. for "it is a reservoir containing use values", as mines.

These reasons can allow landowners to appropriate rent in case there is a positive "difference between the landowners' productivity and the average productivity and price or production prevailing within the industry" (Harvey, 1982, 336).

Beyond these production functions of land, land also serves "as a place and space providing a basis of operations" for all human activities (Marx (1967, vol. 3, 774) in Harvey (1982, 337)). The monopoly on portions of space conferred by the property title allows to use land plots as "units through which capital circulates" (Harvey, 1982, 339). This circulation of capital can take different forms:

- monopoly rent, which "depends upon the ability to realise a monopoly price for the product (wine, grain or housing)" (Harvey, 1982, 350); this can occur in two ways:
 - through special quality or location of land, which allows for the sale of goods above market prices and thus creates rent for the landowners;
 - through the landowners' claim to release land at a price which forces the price of the commodities the land produces above market prices (i.e. when rent becomes a *cause* of the increase in the price of the product); such barrier to the free flow of capital is referred to as absolute rent;
- differential rent, which has been presented earlier.

Marxian economics explains land value through the anticipated future revenues that the property title owners can claim. In this conception, land titles are fictitious (interest-bearing) capital (Harvey, 1982, 266).

2.2.3.3 Neo-classical perspective

As opposed to the classical theory on value that insists on the specificity of land as a production factor, or Marxian theory that considers the role of land as an "open field for the circulation of interest-bearing capital" (Harvey, 1982, 371), neo-classical or marginalist value theories explain the creation of value as the relationship between supply and demand and do not embed it into a wider theoretical explanation (Harvey, 1982, 10). With the emergence of utilitarianism and methodological individualism, the specificity of land as factor of production fades away (Boulay, 2011, 50). The argument is that both rent and profit make up the producer's surplus. Others treat land as an ordinary, scarce, and exchangeable private commodity whose value is part of the production costs. The underlying assumption is that freely determined land uses lead to the allocation of the most lucrative use for every plot of land.

Rent explained by supply and demand

Rent as monetised utility With the development of urban economics, land becomes a commodity whose price is determined by the buyer's willingness to maintain a given utility level, namely the trade off between the price paid for housing and the distance to the centre where, in the traditional North American model, employment is located (Alonso, 1964; Mills, 1967).

Spatial characteristics of rent In order to overcome this model's strong homogeneous views and reintroduce land specific attributes, the hedonic pricing method is introduced (Geoghegan, 2002; Sirmans et al., 2005). This technique differentiates land prices according to a number of characteristics such as location, view, access to transport and public services, the buildings' characteristics, etc. These characteristics are used to justify the amount of rent that can be obtained from land, and serve to determine its use. In other words, neo-classical economics overcomes the attributes specific to land by suggesting a set of empirically tested variables influencing land value and land use.

Social and time considerations linked with rent However, other aspects such as time and social constructs play a major role, as the *rent gap hypothesis* (Smith, 1979) or D. Harvey and L. Chatterjee's (1974) work on differential and absolute rent in Baltimore have shown. Further, land uses are almost never freely determined: with exception of rare cases like Houston where land use policy is deliberately kept at a minimum (Ruegg, 2000), public policies strongly influence land use by allowing or prohibiting specific uses, and taxing or subsidising these uses (see section 2.3).

2.2.3.4 Institutional economics

Specificity of land transactions Economic theory applied to land use does not limit itself to the explanation of land value. Institutional economists, for example, attempt to consider the institutional setting that constrains individual action on the land market. Transaction costs theory, developed originally by R. Coase (1937) and more recently by R. North and O. Williamson (2007), studies transactions between individuals and the costs these transactions imply within given governance structures. It postulates that actors are rationally bound and that they tend to chose solutions that minimize costs. In regard to value redistribution in land use, two authors have characterized the specificities of transactions on the land market and the underlying governance structure (Alexander, 2001; Buitelaar, 2004):

- transaction characteristics:
 - land is a highly specific asset because of its unique characteristics ensued from its topography, connection to infrastructure, surrounding construction, etc.
 - its environment is linked with relatively high uncertainty, notably in regard to future land prices and the evolution of the neighbourhood;
 - the amount of transactions of property titles is rather low and infrequent;
- governance structure characteristics:
 - the objectives pursued by collective action – land use planning processes – redefine the content of assigned property rights;
 - the provision of information and the coordination processes prior to the reassignment of rights is complex and time consuming;
 - the enforcement of rules requires high monitoring costs.

Land use planning procedures not solely oriented towards economic value The specificity of land is widely due to the underlying governance structure, that is to say, the land use planning process that regulates the attribution of use rights. The planning process focusses on other objectives than costs reduction, such as equity, legitimacy, accountability, etc. (Buitelaar, 2004). As opposed to the neo-classical perspective, transaction costs theory reintroduces the specificity of land and draws attention upon the complexity and the strong hierarchy inherent to its governance structure. But it does not consider democratic concerns in land use policy processes. Taking these concerns into account in explaining the efficiency of land use policy processes would require reliance on a set of additional criteria, not defined by the theory. Therefore, rather than the process outcome, it is more the process itself whose efficiency is to be analysed.

Another institutional economics approach to land is economic base theory (Hoyt, 1954; North, 1955). This model allows to assess the nature and amount of revenue captured by analysed territories, and thus contributes to explaining local authorities' strategies and land use. The theory focusses on employment, and establishes a distinction between *basic* production activities that are sold beyond the considered territory – the gains that are made outside and brought into the territory –, and *induced* service or residential activities that serve (are consumed by) basic activities. Over time, economic base theory has been expanded to three additional bases (Segessemann, 2016):

- public base accounts for the salaries of public servants that are not paid by local authorities;
- social base accounts for all revenues due to transfer payments (unemployment, social benefits, healthcare);
- residential base are foreign revenues captured through the residence and presence of pensioners and annuitants, commuters, and tourists.

A. Segessemann (2016, 151) argues that this model allows for an understanding of regional development by focussing on the flux of money and the joint consideration of production and consumption. Among other results, the author shows that certain bases tend to exclude each other, for example commuter and tourist bases, or agricultural and finance bases.

Before I continue with the analysis of public intervention on land use and its implications in terms of value redistribution, I provide a short synthesis of the legal and economic explanations for land value:

- through the monopoly power of private property, the legal system confers the capacity to appropriate rent on the landowner. Without this appropriation, land prices would not exist (Harvey, 1982, 371);
- land price captures simultaneously the "temporality of accumulation [...] and the specificity of material use values distributed in space" (Harvey, 1982, 371);
- price levels is determined by a plurality of factors: the rate of interest, locational aspects (distance to centre, public service amenities), view, neighbourhood, employment, transport infrastructure, etc. (Sirmans et al., 2005);
- land use is determined by the nature of revenues which chosen territories may capture (Segessemann and Crevoisier, 2016).

Now that I have shown how relevant theoretical strains of economic theory, based on property rights, conceptualise land prices and land rent, I turn to the public law elements which determine land uses. For several decades, public authorities have regulated land use through various means. As I intend to show, these interventions rely on a time-specific conception of the public problem to be solved. Public interventions operate through policy instruments which aim to control land use, shape land rights and right holders' behaviours, all of which impacts land value.

2.3 Policy design of the resource soil

Public law affecting the use of soil

The presentation of the policy design of the resource soil is an extensive work central to the analysis of redistributive processes in land use policy. The policy design contains "all of the substantial and institutional elements relative to the programming and implementation of all use and protection policies affecting the management of a resource" (Knoepfel et al., 2007, 475). It is composed of four elements analysed in detail hereafter:

1. the definition of the public problem(s) to be solved and the causal and intervention hypotheses (section 2.3.1) as well as the public problems and beneficiaries (figure 2.1);
2. the political administrative program (section 2.3.2), which includes the legal objectives of the public policies, the evaluative elements, the policy instruments (section 2.3.2.3), the political-administrative arrangement and the procedural elements;
3. the action plans as intermediary products of public action (section 2.3.3);
4. the policy outputs (section 2.3.4).

A cross policy perspective

One element that needs to be emphasised is that soil regulation is spread across multiple policies (land use planning, soil protection, environmental legislation, rural land rights, etc.) and that multiple policies have spatial impacts (agriculture, transportation, energy, fiscal policy, water protection, etc.). The concept of policy design provides an overarching framework for the main public policies that influence the management of the resource and allows for the combination of the various sectoral policies influencing soil use. For reasons of time and length, this section focusses on land use planning and soil protection policies (see also section 2.3.2).

Overarching environmental principles

In addition, one can also mention general legal principles which apply to environmental law. Several of these principles figure in the policy objectives (section 2.3.2.1), or in the procedural elements (section 2.3.2.5). I present them here together, because they underlie environmental legislation and/or the entire legislation:

- sustainable development⁹: guiding principle that applies across the entire legislation (Petitpierre-Sauvain, 2012, 97) and encompasses the protection of individuals' health and well-being, the preservation, or restitution, of the capacity of natural cycles, the preservation of the diversity of landscapes, of plants and animal species, of land surface and non-renewable resources, and of cultural and economic goods (Petitpierre, 2015, 44). The underlying aim is to satisfy the present generations' needs in a way that does not jeopardise the capacity of future generations to satisfy their own needs (Petitpierre, 2015, 47). land use policy must include the principle of sustainable land use planning since the revision of the federal Constitution in 1999 (Mahaim, 2014, 129);
- precautionary principle: preference of prevention to reparation when adapting legislation. This allows for anticipation of damage to the environment and reduction of potential irreversible consequences (Petitpierre, 2015, 44);
- polluter pays principle: the person causing the pollution is the one who bears the costs of cleaning-up the consequences of the pollution (Petitpierre, 2015, 45);
- principle of information¹⁰: grants the inhabitants of a polluted region the right to be informed; obliges the realisation of an environmental impact assessment for polluting installations; grants the possibility to appeal against the authorities' refusal to inform (Petitpierre-Sauvain, 2012, 32).

⁹Art. 2 par. 4, art. 73, art. 104 par. 1 Cst, RS 101.

¹⁰Art. 6 EPA, SR 814.01; art. 8 of the *Convention of 4 November 1950 for the Protection of Human Rights and Fundamental Freedoms*, SR 0.101.

- cooperation principle¹¹: cooperation between authorities and private entities, but also between government levels; consultation of parties prior to the adoption of new regulations, preference of contractual solutions to obligations and restrictions (Petitpierre, 2015, 46).

2.3.1 Public problem and underlying hypotheses

In order to understand the concepts adopted and described hereafter, it seems necessary to provide a set of definitions prior to entering the field of analysis. A public problem is defined in the literature as a social demand that emanates from specific social groups, leads to public debate or controversy and creates a conflict between organised social groups and public authorities (Garraud, 1990). The dominant understanding of a public problem is that it is subject to change over time (see table 2.4). In the case of soil, S. Nahrath (2003) has shown that the definition of the public problem changed in the 1980's due to the development of environmental law, and more specifically, the raising of qualitative issues regarding soil usage. A second major change can be observed in 2014 with the revision of the federal spatial planning act, when the location of building zones and the necessity to redistribute the value linked with them are defined as new, central issues.

The causal hypothesis is the result of a causal story (Stone, 1989), the most plausible story that actors refer to in the process of defining and adopting a public policy. Based on available knowledge and on the interests and values of involved actors, the causal hypothesis points out who is responsible for the public problem the public policy intends to solve (Knoepfel et al., 2006, 153ff). In other words, it defines the group targeted through public intervention, and suggests how the group's behaviour creates a public problem. Depending on the evolution of the public problem, the causal hypothesis adapts to the new target group or the new behaviour publicly regarded as problematic. Based on the causal hypothesis' conception of the problem, it is then possible to define an intervention hypothesis, which sums up the logic of intervention on which public policies rely, in order to modify the target group's behaviour.

Lack of coordination between uses and users in the 1960's

Table 2.4 sums up the successive public problems concerning soil and its underlying hypotheses over time. In the 1960's and 1970's, a lack of coordination between the diversity of soil uses and users, limited coordination between legislations, and lack of use restrictions by legislation, led to the emergence of three main problems (Nahrath, 2005):

- the development (hence the reduction) for wide surfaces of agricultural land, through peri-urbanisation in particular;
- a speculation with land and a subsequent drastic increase of land prices;
- a lack of housing policy providing a solution for the needs of the baby-boomers, which initiated an endemic housing crisis.

As a response to these problems, left wing parties, unions, environmental associations, the Swiss tenant association, family associations and protestant churches launched several popular initiatives in the 1960's and 1970's, all of which failed. These initiatives aimed to achieve better control on land prices, to capture added land values, and to widen the spectrum of public intervention through the introduction of pre-emption right and expropriation rights in favour of the Confederation.

In order to counter this questioning of cantonal sovereignty and private property, bourgeois parties, with the support of the Federal Council, proposed the creation of a federal land use planning policy, whose initiation would be funded through the inscription of the guarantee of private ownership into the federal constitution. This proposal encountered wide support, and the so-called *Bodenrechtsartikel* were inserted into the constitution in 1969. However, growing population, skyrocketing land and

Evolution of the public problem over time

Defining the target of public intervention

Unchained development and price rise

Rejection of State intervention in the land market

Compromise reinforcing property

¹¹Art. 41a EPA, SR 814.01; art. 3 SoilPO, SR 814.12.

rental prices, as well as urban sprawl, pushed the Federal Council to adopt, in 1972, a Federal urgent decree which temporarily froze zoning operations until the adoption of the federal spatial planning act.

No taxation of added value created through zoning

In order to distinguish planning from property and financial matters (due to the full compensation in case of material expropriation), the draft spatial planning act of 1974 included an instrument that taxed a portion of the added land value created through zoning in order to compensate landowners whose development rights would be withdrawn (and who would be entitled to a compensation for material expropriation¹²). However, federalist and economic interests (linked to real estate and construction) won the referendum they launched against the draft act. Subsequently, the act adopted in 1979 left the choice of implementation of the instrument to the cantons.

Segmentation of land market

The main achievement of the law was to force planning authorities (mostly the communes), through the mandatory implementation of the instrument zoning, to separate the building zone from non-constructible zones such as agricultural and protected zones. The law also imposed dimensions on the building zone in accordance to future needs. The instrument effected a direct restriction on land use (the prohibition of constructions outside of the building zone) and indirect restriction of land value (agricultural land could no longer be built on, which limited potential revenues to be obtained from this land). However, as shown by the 1991 revision of the act on rural land rights, the expected effects were only partially achieved: farmers continued to sell agricultural land to developers, who anticipated future zone changes. In order to counter this phenomenon, a sale prohibition of agricultural land to non-farmers was introduced, directly limiting agricultural landowners' disposal rights.

Lack of qualitative soil protection in the 1980's

Value redistribution in agriculture and remediation projects

The second highly problematic issue that the soil policy design faced was the lack of qualitative protection of soils (Nahrath, 2003, 165): soil erosion and pollution, and the disappearance of ecologically valuable areas such as biotopes and swamps. Soil functions such as fertility and water filtration were threatened by soil erosion and chemical substances. Consequently an extensive development of environmental legislation resulted, with particular application to the agricultural sector: use restrictions and obligations regulating fertilisation and the provision of ecological services were adopted and implemented together with payments compensating the reduced quantity of goods produced. In the same period, the (re-) discovery of contaminated sites became salient (Dupuis and Knoepfel, 2015). Legislation regulating the analysis, monitoring and remediation obligations of contaminated sites was adopted in order to limit environmental damages (in particular the spread of pollution) and force the responsible entities (disturber through ownership or through action) to pay for occurring costs. Public funds were also allocated to remediation processes in order to pay for analysis, monitoring and remediation in case the former owner did not exist anymore, or for cases in which public entities were involved. Since 2009, federal funding stems from a tax on waste paid by waste depositors.

Both the protection of agricultural land and the remediation of contaminated sites involve a value redistribution process in which collective (tax money) and private added economic value is used to create added ecological value that benefit the population and the environment. They use redistributive policy instruments such as prohibitions and obligations and compensate (part of) the economic loss endured by target groups through financial payments.

Lack of compensation for zoning in the 2000's

The 2014 revision of the federal spatial planning act constitutes a third phase of the policy design of soil. The public problem consists of a lack of compensation for the advantages conceded to landowners through zoning¹³. After a first popular rejection in 1974, the problem reappeared in 2010 in the draft act elaborated by the

¹²Case law has set restrictive criteria that entitles the landowner to compensation. Please refer to section 2.4.1 for details.

¹³The compensation for the disadvantages caused to landowners through zoning has been defined by case law since 1969. The conditions in which such compensation is due are listed in section 2.4.1.

Federal Council as counter-draft to the popular initiative for landscape (Viallon and Nahrath, 2016). The instrument was perceived as salient enough (or as involving a moderate political risk) by parliamentarians to be defined as mandatory in the revised spatial planning act. Further, soil protection was reinforced by additional quantitative soil objectives such as the promotion of densification within built areas, the fight against land hoarding behaviours, the reduction of oversized building zones, and the homogenisation of the calculation method for the dimensioning of building zone needs (Federal Council, 2010).

The successive public problems that the policy design of soil was and is deemed to have solved show that new obligations or restrictions, or the removal of rights imposed on the policy's target group, are intrinsically redistributive problems. These problems have often been accompanied by compensation measures that benefit the target group, and protect property or the production value associated with it (as shown by the examples of agricultural payments, the subsidies for soil remediation, and more recently the compensation mechanisms for added and reduced land values created through zoning).

The notion of value redistribution offers a cross time perspective for the analysis of land use policy, and for the management of resource soil in general. As Knoepfel et al. (2011, 60) put it: every public policy is "intrinsically redistributive", because it "brings about change in the material and symbolic attributes enjoyed by the different actors, by imposing costs [...] and granting privileges". In other words, analysing land use policy implementation through the lens of value redistribution allows us to grasp the most central issues of land use policy as they are linked with land property.

Legal bases	Public problem	Causal hypothesis	Intervention hypothesis
from 1972 to 1983			
Federal level: 1972: Urgent federal decree freezing zoning operations and forcing the reduction of certain building zones 1979: Spatial planning act	Cantonal level: 1964: Adoption of the constructions act (Vaud) 1970: Adoption of the constructions act (Berne) 1985: Revision of the constructions acts (Berne and Vaud)	If land uses are better coordinated and some restricted, then the protection of land is secured against overexploitation.	If land uses and user groups have to be coordinated, then policies affecting soil uses have to be coordinated and rules defining use possibilities for each plot have to be set.
from 1983 to 2014			
Federal level: 1983: Environmental protection act 1985: Ordinance on air pollution control 1986: Ordinance on dangerous substances and preparations 1987: Constitutional article 22 ^{sexies} regarding the protection of swamps (popular initiative Rothenthurm) 1990: Ordinance on waste, tax harmonization act 1991: Revision of the water protection act and act on rural land rights 1992: Revision of the agriculture act 1993: Ordinance on additional direct payments in agriculture 1996: Ordinance on payments for ecological services 1997: Revision of the environmental protection act 1998: Ordinance on the remediation of contaminated sites; ordinance on the pollution of soil; water protection ordinance 1999: Revision of the spatial planning act 2000: Dangerous substances and preparations act 2004: Partial attribution of gas tax revenues to transport and infrastructure measures in towns and agglomerations 2005: Ordinance on risks reduction linked to chemical products	Cantonal level: 1992: Revision of the nature protection act (1995 for Vaud) 1996: Revision of the water protection act (1989 for Vaud) 2003: Adoption of the waste act (2006 for Vaud) 2007: Revision of the act on the communes and development of regional transport and settlement plans (Berne) 2012: Revision of the act on the communes in order to foster communal fusions (2004 for Vaud)	If qualitative land uses are restricted – sometimes against compensation – and rare biotopes protected, then the qualitative protection of the resource and of biodiversity (as well as its sustainable use) is secured.	If soil quality needs to be better protected, then tighter use-restrictions linked with financial compensation systems need to be defined.

Legal bases	Public problem	Causal hypothesis	Intervention hypothesis
Federal level: 2012: Limitation of secondary homes to 20% per commune (popular initiative Weber) 2013: Revision of environmental protection act 2014: Revision of the spatial planning act	Cantonal level: 2016/2017: Revision of constructions act (Berne and Vaud)	Lack of compensation for the advantages and disadvantages conceded through zoning leads to a sub-optimal allocation of building zones and hampers any relocation of rights.	If building zones need to be relocated, reduced in specific areas and extended in others, mechanisms compensating added and reduced values for landowners should be implemented.

Table 2.4: Public problem, causal and intervention hypotheses related to the resource soil from 1972 to 2016. First two stages based on S. Nahrath (2003, 163ff).

Main actors concerned by the regulation of soil

In addition to the general logic of intervention exposed in table 2.4, another central element to consider in the analysis of the policy design are the actors involved in, or concerned by public intervention (Peters and Hoornbeek, 2005). A variety of actors in various configurations, and with different interests, can intervene in the field of a public policy (Knoepfel et al., 2006, 52): the target group (the ones causing the public problem), the end beneficiaries (the ones bearing the consequences of the public problem) and the political-administrative authorities (those who define the public policy and intervene against the target group). Figure 2.1 displays these different groups of actors, along with third parties, actors who bear positive or negative consequences of the public intervention and who may intervene at different stages of the policy cycle (Parsons, 1995; Knoepfel et al., 2006, 36).

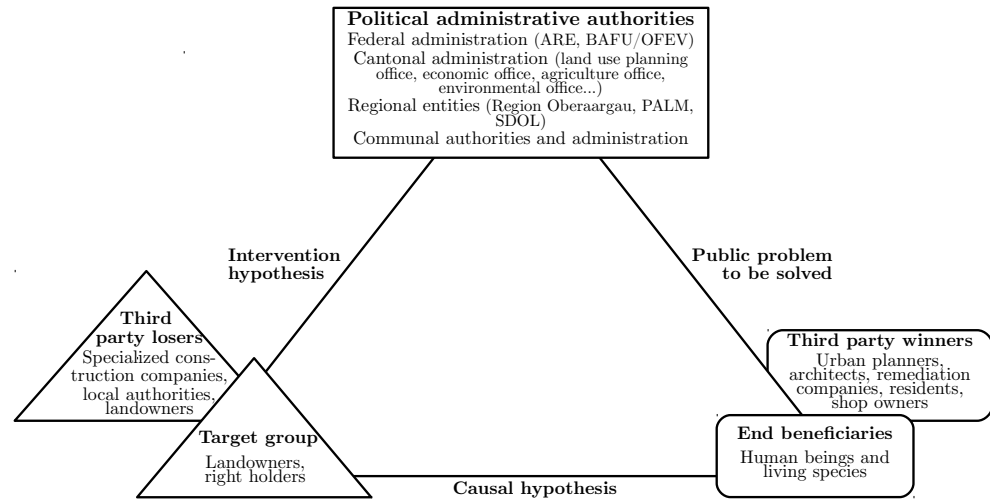


Figure 2.1: Triangle of actors of land use policy. Based on Knoepfel et al. (2006, 62)

2.3.2 Political administrative program

Acts and norms necessary for implementing a public policy

In order to more precisely apprehend the definition of the public problem(s), causal and intervention hypotheses presented above, one has to analyse in detail the legal elements on which they rely. Together, these legal elements constitute the political administrative program, *i.e.* "the set of regulatory acts and norms that parliaments, governments and the authorities charged with execution consider necessary for the implementation of a public policy" (Knoepfel et al., 2011, 151). In order to do so, I analyse the most relevant public policies that apply to the resource soil. As is to be expected, these policies are numerous¹⁴, and their relevance in land use policy processes vary according to the empirical case being considered.

Focus on land use planning and soil protection policies

Two broad categories of environmental policy (Knoepfel et al., 2010, 536): environmental protection policies, and environmental exploitation policies. Over time, the coordination among the eight traditional environmental policies (intra-policy coordination) has grown (Knoepfel et al., 2010, 511ff). This can be explained by the introduction of a unique consultation procedure for all (cantonal and federal) offices concerned by the environmental matter at stake, and by the reorganisation of offices according to the main domains of environmental legislation, or according to the target groups the policy is directed towards. A more persistent problem is the coordination between protection and exploitation policies. As the authors note (Knoepfel et al., 2010, 521ff), the logic of intervention between these two categories of policies are opposed: although they regulate one matter (*e.g.* protection of biodiversity), policies

¹⁴The eight traditional Swiss environmental protection policies are air protection, water protection, nature protection, soil protection, waste protection against dangerous substances, climate protection and noise protection (Knoepfel et al., 2010, 521f). Key environment exploitation policies are: land use planning, agriculture, energy, transport, tourism, economic promotion and defence. One can also consider that the spatial impacts of fiscal policy (Feiock et al., 2008) and forest policy.

(such as land use planning, transport, or environmental protection policies) define public problems that target different actors and define other, losing third parties.

Exposing the political administrative program of each policy that impacts the use of the resource soil has already been done for the eight traditional Swiss environmental public policies (Knoepfel et al., 2010). Presenting a summary of the entire book, adding to the exposé of the political administrative programs of the soil's exploitation policies, in addition to the financial and economic promotion policies (which also play roles in the resource's use), would be a lengthy work that would, in my opinion, only indirectly benefit the analysis. My approach is to focus on two policies that regulate the uses¹⁵ of the resource soil: land use planning¹⁶ and soil protection¹⁷. I justify this choice as follows:

1. considering land use changes provides valuable insights into the effects of land use policy implementation: the soil's ecological value is, as shown in section 2.1, widely determined by its development;
2. I take into consideration soil protection and remediation policy, which provides a qualitative valuation of the soil's chemical components. The consideration of other environmental policies would allow for the refinement of the analysis by providing additional dimensions of analysis (such as biodiversity indicators, or the ecosystem services provided by soil in a given perimeter), but this would not fundamentally change the results provided by the policies already considered;
3. in terms of economic value, land prices and land rent estimations allow for the assessment of the soil's economic potential. A more precise assessment of the soil's economic value requires real estate expert knowledge, which was not available. A detailed analysis of financial flows between actors, for example through the analysis of the implementation of fiscal and economic promotion policies (such as tax deals and other arrangements linked for example to the provision of jobs or fiscal revenues), would, for privacy reasons, unrealistic;
4. my analysis does not focus on the effective ecological and economic value change, but rather on the actors' games and the way they negotiate arrangements involving land use (see section 2.3.4 and chapter 3);
5. depending on the empirical observations made, relevant policies with spatial implications can be integrated into the analysis through a bottom-up approach: this means that the institutional regime of soil can also be constituted by studying effective land use and the constraints actors deal with, or the norms they refer to when pursuing their strategies.

The five layers of the political administrative program

Figure 2.2 shows how theory divides the political administrative program into substantial and institutional elements (Knoepfel et al., 2011, 153ff). Substantial elements contain the objectives, evaluative elements and operational elements (policy instruments) of the program. Institutional elements include the procedural elements and the political-administrative arrangements. Policy instruments are a central element of this thesis and are described separately in section 2.3.2.3. Procedural constraints and the political administrative arrangements are also discussed in greater detail in sections 2.3.2.4 and 2.3.2.5.

During the different stages of the public policy process (agenda setting, formulation, implementation, evaluation), actors can play with both substantial elements (content) and institutional elements (rules) in order to directly or indirectly influence policy products (the public problem to be solved, the political administrative program, the political administrative arrangement, the action plans, the outputs and the evaluative statements) (Knoepfel et al., 2011, 114).

Institutional and substantial elements

Actors' games on substantial and institutional elements

¹⁵The regulation of disposal and formal rights are taken into consideration through the analysis of the property rights system, which is the main source of law for these rights (see section 2.2.1).

¹⁶*Spatial planning Act of 22 June 1979 SPA*, SR 700; *Spatial planning ordinance of 28 June 2000 SPO*, SR 700.1.

¹⁷*Federal Act of 7 October 1983 on the protection of the environment EPA*, SR 814.010; *Ordinance of 1 July 1998 on the pollution of soil SoilPO*, SR 814.12; *Ordinance of 26 August 1998 on the remediation of contaminated sites CSO*, SR 814.680.

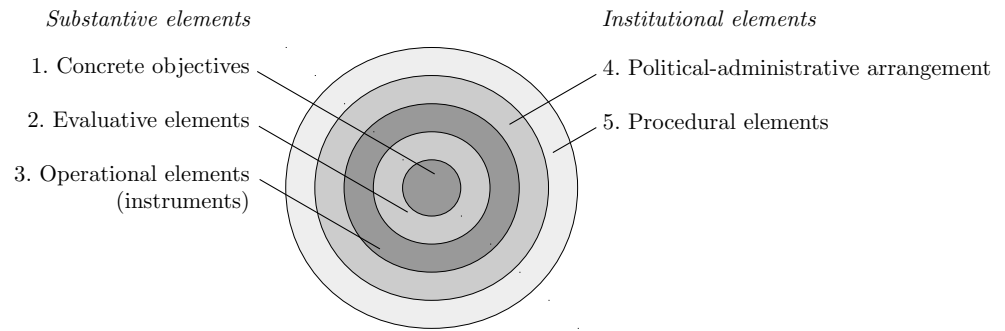


Figure 2.2: The five elements of the political administrative program according to Knoepfel and Weidner (1982).

2.3.2.1 Policy objectives

Swiss legislation aims to achieve an "appropriate" and "ordered" use of land: building zones are to be separated from non-building zones in order to ensure an moderate use of soil and preserve its ecological and aesthetic values. Locational aspects play an important role: the goal is to separate different land use types, protect agricultural uses, and occupy the territory in a decentralised manner. Regarding soil protection, two distinct objectives are pursued: one oriented towards agricultural land use, aiming to guarantee the soil's fertility for the long run; the other aimed at polluted or contaminated sites, where investigation, monitoring and remediation measures are central. These objectives shape the instruments of the political administrative program presented in section 2.3.2.3.

Land use planning

- "Appropriate and economic use of the land and its properly ordered settlement" (art. 75 Cst);
- "protection of the population and its natural environment against damage or nuisance" (art. 75 Cst);
- separation of building zones from non-building zones in order to prevent urban sprawl, preserve the landscape and reduce the loss of fertile land (art. 3 SPA);
- definition of building zones as areas fit for development according to environmental (noise and polluting substances), natural or water protection reasons^a;
- coherence between zoning and localisation of actual land uses (art. 8a SPA);
- decentralised concentration of settlement and preservation of regional equilibria (Nahrath, 2003; Bovay, 2005) (art. 1 AgricA)^b.

Soil protection

- Guarantee long term fertility of soils by monitoring chemical, biological and physical damages on soil (art. 1 SoilPO);
- prevent soil compaction and erosion (art. 33 EPA);
- ensure soil fertility while manipulating, excavating and stripping earth (art. 6 EPA);
- define additional protection measures and use restrictions if the health of humans, animals or plants is threatened by damages to soil (art. 8ff SoilPO);
- register and investigate polluted sites; monitor and remediate those posing a threat to underground and surface waters, in addition to threats to air quality (art. 8ff CSO);
- make the polluter bear the costs of the pollution (art. 2 EPA).

Table 2.5: Objectives of Swiss land use planning and soil protection policies

^aFederal Tribunal, 11 October 2005: 1A.130/2005.

^bFederal Act of the 28 April 1998 on Agriculture AgricA, SR 910.1.

2.3.2.2 Evaluative elements

One of the tools that cantons use to steer development is the cantonal structure plan (*plan directeur cantonal* or *kantonaler Richtplan*), which presents the current state of land use in each canton, and sets development objectives, and whose achievements are evaluated through regular land use reports. Cantonal structure plans are part of the political administrative arrangement, because they coordinate public intervention. But they are not policy instruments *stricto sensu*, because they do not produce direct effects on the policy's target group. However, the dimension of building zones constitute a central constraint in the use of the zoning instrument, because it sets forth spatial limits above which the instrument cannot be used to zone additional land. Since 2014, the calculation of these limits is based on a cantonal demographic growth scenario and on the median surface of building zone per inhabitant.

In matters of soil protection, the soil protection ordinance sets thresholds above which the health of humans, animals and plants can be endangered (investigation values), or is endangered (remediation values). Exceeding these thresholds induces use-restrictions for right holders. The ordinance on contaminated sites (and the water protection ordinance) also define thresholds, and can induce monitoring and remediation obligations for excess amounts.

Land use planning	Soil protection
<ul style="list-style-type: none"> – Revision of cantonal structure plans every ten years (art. 9 SPA); – building zone statistics assessing their correct dimension based on the development needs of the next fifteen years (art. 15 SPA; art. 30 SPO); – obligation to list the total amount of building zone surfaces dedicated to urbanisation, their location, and how their extension is coordinated at the regional level (art. 8a SPA). 	<ul style="list-style-type: none"> – Evaluation of soil pollution or contamination based on legal reference value, investigation value, and remediation values (annex 1 SoilPO; annex 1 CSO; annex 2 WPO^a); – Swiss soil monitoring network (NABO) measuring soil pollution and soil fertility across the country; – cartography and inventory (cadaster) of polluted and contaminated sites; – information of the Federal office for the environment and publication of site surveillance results; – for polluted sites, a preliminary investigation in case of pollution must be done in a historic-technical perspective and contain information such as type, location, quantity, and concentration of waste present, current and potential impact on the environment, as well as the location and importance of threatened areas (art. 14 CSO).

Table 2.6: Evaluative elements of Swiss land use planning and soil protection policies

^a Water protection ordinance of 28 October 1998 WPO, SR 814.201.

2.3.2.3 Instruments

Through the various public policies elaborated over time, authorities have created a set of instruments they can use to determine land use and influence land value, and attempt to solve the previously mentioned collective problems. This section aims to provide a set of answers on what policy instruments are, how they can be compared (and their effects assessed), and where they can be located in the conceptual framework of the thesis. These questions are discussed in three successive steps:

1. review how research in political science analyses policy instruments;
2. list the main instruments that stem from the policy design of soil and qualify them based on a selection of criteria driven from the literature;
3. present a literature review of known land use policy instruments' effects on land use and land value.

Focus on political science literature

The fact that I limit the literature review to research on instruments in political science and not in economics is due to the fact that I do not explain price variations or land market participants' utility level subsequent to the use of an instrument (Geoghegan, 2002; Cheshire and Sheppard, 2002; Agarwal et al., 2015), but rather dig into the conditions under which the land market is created and operates, how the allocation of resources takes place, what interactions occur between authorities, target group, and third parties, how local arrangements on land use are negotiated, and how these arrangements influence value redistribution between soil uses and users. The dependent variable is not a price nor a measurement of social welfare, but the output of the public policy implementation process and its redistributive effects (impacts on the target groups and outcomes on end beneficiaries).

Typologies and comparative approaches**Differences between strains of research**

Work on policy instruments in political science has followed various paths. C. Hood (2007, 133) distinguishes three broad categories in which research on policy instruments can be synthesised. Table 2.7 provides a synoptic view on possible typologies and comparative methods. Presenting these three categories provides an overview of what has been done, so far, in political science; it allows for the elucidation of the direction of this analysis.

Institutions-as-tools

The "institutions-as-tools" approach "includes specific forms of organisation as policy instruments, as well as (or instead of), generic modes of collecting information and shaping behaviour." (Hood, 2007, 133). The approach explores the effects of different forms of organisation or agents (public, central, independent regulator, private, local, etc.) on the delivery of public services. It conceives the State as an agglomeration of more or less differentiated entities. It also takes into consideration the various types of instruments (loan, voucher, good or service, protection, etc.) used for political intervention. C. Hood (2007) raises three analytical issues linked with this approach. The first one is due to the distinction between instruments and institutions, which results in two distinct variables that the analyst needs to account for. The second one is linked to the attributes which characterise the instruments and institutions, or rather, the theoretical or empirical foundation of their choice: are these classifications specific to government, or do they apply to any kind of organisation? The third one is linked to the explanation that instrumental change can provide. Whereas L. Salamon links "the analysis of tools with the growth of what he calls "new governance" (*i.e.*, a move away from stand-alone public bureaucracies to network structures)" (Hood, 2007, 135), P. Lascombes and P. le Galès (2007) rather conceives instruments as markers of change in the way public policies are conceived and oriented.

Politics-of-instrumentality

The "politics-of-instrumentality" approach "puts emphasis on the subjective perceptions and political processes that surround the choice of policy instruments – that is, the way policy makers and politicians conceive policy instruments, and the ideological or political considerations that lead them to prefer some instruments to others." (Hood, 2007, 136). The approach emphasises that "the choice of policy instruments and forms of organization ironically often turns out to be far more ideological and politically contested than statements about the basic purpose of government." (Hood, 2007, 137). As opposed to the previous approach, instruments, particularly how they are chosen, are clearly defined as a variable to be explained. Various authors, among which S. Linder and B. Peters (1989), have focussed on the question of why certain instruments are preferred over others. As C. Hood argues (2007), this approach is complementary to the first one, in the sense that an explanation of the instruments' choice cannot only rely on the actors' perceptions, but also requires a systematic comparison of the instruments that can be chosen.

Attributes as comparative tools

One of the main difficulties in instrument research is the difficulty of comparison between instruments (Varone, 1998, 37). The "politics-of-instrumentality" path

proposes to circumvent the problem by defining non-exclusive attributes which characterise the instruments¹⁸. The use of attributes constitutes a major theoretical input in order to compare and understand instruments' choice and implementation. The two examples mentioned in table 2.7 distinguish themselves through the following aspects:

- whereas S. Linder and B. Peters' typology refers to the sole economy of implementation, L. Salamon's compares the investment to the results obtained (input to effects);
- L. Salamon's suggestion does not distinguish between the definition of the target group (selectivity) and the efficacy of the instrument, the latter also included in the equity attribute. According to A. Schneider and H. Ingram (1990), the redistributive attribute of an instrument is expected to arouse opposition from the target group, as well as third parties, depending on the instrument's redistributive intensiveness, and thus affect their policy participation.
- the degree of constraint mentioned by S. Linder and B. Peters is broader than the strict redistributive effects as defined by L. Salamon. The degree of constraint also refers to the latter author's legitimacy of public action.

Certain factors ease the joint consideration of all instruments' attributes by policy makers: gathered knowledge on the instrument to be implemented, the consensual nature of the political regime (non-majoritarian system), and the instrument's insertion within a harmonisation strategy (Varone, 1998, 324ff).

In addition to the instruments' attributes, F. Varone (1998, 41ff) emphasises the importance of neo-institutional theses in explaining the choice of instruments. He mentions four specific points:

- the ideology of the political majority explains the degree of constraint of the instruments;
- the pre-existence of a public administration explains the amount of resources necessary for the implementation of an instrument;
- knowledge transfer and the harmonisation of public policies explain the political risk, as well as potential adverse effects of an instrument (also referred to as the convergence thesis (Kuhlmann and Wollmann, 2013));
- the political power of a target group justifies the quality of targeting.

The explanations provided by the neo-institutional paradigm are of particular relevance for this research, because they emphasise the role of existing structures and processes in order to explain reality. As our work focusses on policy implementation, these elements are central to formulating research hypotheses and interpreting the observed phenomena.

Insights from the neo-institutional paradigm

Role of existing structures and processes

Description-and-categorisation

The "description-and-categorisation" approach sums up typologies of instruments as such, putting institutions aside. Some are less bound to an explanatory framework and aim to conceptualise the tools of government action as free from institutions and technological changes, in order to enhance their comparison across time, area and policy domain. C. Hood (1983; 2007) conceptualised two broad types of instruments: detectors and effectors. Their use by authorities depends upon depletable and non-depletable resources that can be possessed by authorities. Another conceptualisation is E. Vedung's (1998) typology, which relies on a threefold classification of power elaborated by A. Etzioni : the author defines power as "an actor's ability to induce or influence another actor to carry out his directives or any other norms he supports" (Etzioni (1975, 75ff), cited in Vedung (1998)). Three methods exist to make subjects comply: coercive power, characterised by (the threat of) physical sanctions, frustrations and force; remunerative power, which controls the material

¹⁸See F. Varone (1998) for an extended literature review on instruments' attributes.

resources and their allocation; normative power, which contains the allocation and manipulation of symbolic rewards. As C. Hood notes, some of the State's activities, linked, for example, with the provision of infrastructure, are not easily classifiable in such a trichotomy. More generally, despite numerous efforts of conceptualisation and debate, there has been no consensus on a determined typology, each of them relying on different organisational or cultural theories.

These three strains of research (as presented above) overlap, but also vary in regard to three main elements:

- the phenomenon they want to explain – most notably the choice of instruments, their effects, or their ability to explain change;
- the typologies they build or rely on;
- the attributes or comparative criteria they define and use.

**Location of the variable
"instruments"**

The first element – the variance in the phenomenon to be explained –, is of central importance, because it changes the definition and the place of the variable "instruments" in the causal explanations provided by researchers. As C. Hood notes (2007), earlier research focussed on *how* policy instruments could be categorised. The analysis emphasised the effects produced by instruments depending on their type. In order to do so, one has to define a set of relevant dimensions common to the various instruments. In turn, this requires focus on common, instruments-related consequences (Salamon and Lund, 1989, 36). As the authors note:

"The key question in tools research is not whether the theory embodied in a program is correct, but whether the program utilizes a mechanism that allows that theory to be tested. In other words, it is more the impact of the tool on the functioning of the program than the impact of the program on the underlying societal problem that is of principal concern." (Salamon and Lund, 1989, 40f).

This means that the dependent variable to be measured is the public policies' impacts on the target group, rather than the resolution of the public problem, or the policies' effects on the end beneficiaries (see the "triangle of actors" (figure 2.1) in section 2.3.1).

In the 1990's, a shift to the dependent variable operated and the focus of analysis turned to the question of *why* certain instruments are selected and others are not. It hereby drew attention to the ideology and politics behind the instruments' choice (Linder and Peters, 1989, 1998; Varone, 1998). The use of instrument attributes aimed to compare instruments to each other, and explain the conditions under which certain types of instruments were favoured over others.

In the 2000's, a more socio-political perspective led by P. Lascoumes and P. le Galès (2004b, 13) enlarged the field of research by adopting a more holistic conception of instruments: they defined instruments as technical and social devices that organise social interaction between public authorities and target groups based on the representations and meanings they carry. The authors not only ask why instruments are adopted, but also consider the instruments' effects as part of the variable to be explained. From this perspective, instruments are conceived as an intermediary variable (Halpern et al., 2014, 39).

<i>Institutions-as-instruments</i>	<i>Politics-of-instrumentality</i>	<i>Description-and-categorisation</i>
L. Salamon	S. Linder and B. Peters	C. Hood
P. Lascoumes and P. Le Galès	S. Linder and B. Peters	E. Vedung
<p>Rise of network governance leads to management, accountability and legitimacy challenges. This requires the classification of tools according to their defining features and gathering knowledge on the capacity of these tools to solve public problems through comparative criteria.</p>	<p>The choice of instruments is not mechanical, but shaped by ideology and politically contested processes. Policy makers opt for an instrument based on the assessment of a set of attributes that allow for comparison and for the trade-offs implied by their choice.</p>	<p>Definition of mutually exclusive and exhaustive categories that expose the degree of constraint of instruments and classify them in a generic way.</p>
<p>Features of instruments:</p> <ul style="list-style-type: none"> - Type of good, service, or activity delivered - Vehicle used for delivery (direct provision, rule, loan, tax, subsidy) - Delivery system (organisation delivering the good, service, or activity) - Set of rules defining the relationships between entities of the delivery system <p>Comparative criteria:</p> <ul style="list-style-type: none"> - Efficiency of invested resources against achievements - Supply/targeting effectiveness: goal achievement - Equity: redistributive effects on target groups and third parties - Political support/legitimacy of public action 	<ul style="list-style-type: none"> - Resource intensiveness: administrative and implementation costs - Targeting: degree of selectivity and flexibility when defining target groups and end beneficiaries - Constraint: degree of constraint, ideological connotation - Political risk: instrument's visibility, adverse effects 	<ol style="list-style-type: none"> 1. Nodality (for communication): "property of being in the middle of an information or social network"; 2. Treasure (for exchange): disposal of freely exchangeable goods; 3. Authority (for order): "possession of legal or official power"; 4. Organisation (for action): "possession of a stock of people with whatever skills they may have (soldiers, workers, bureaucrats), land, buildings, materials and equipment, somehow arranged" (Hood, 1983, 72)
<p>Two general types of state intervention – archetypical routine intervention versus less authoritative instruments formalised by contract – together form five types of instruments:</p> <ol style="list-style-type: none"> 1. Legislative and regulatory, with three sub dimensions: <ol style="list-style-type: none"> (a) symbolic: legitimacy of power, of procedure; (b) axiological: defence of ideas, of values; (c) pragmatic: shape social behaviour, surveillance. 2. fiscal and economic; 3. conventional and incentive based; 4. information and communicational; 5. norms, standards and best practices. 		
		<ol style="list-style-type: none"> 1. regulatory (stick): rules and directives that constrain the public policy's target group; 2. economic means (carrot): handing out or taking away of material resources while the target group is not obligated to take the measures involved; 3. information (sermon): influence the addressees through the transfer of knowledge, the communication of reasoned argument and persuasion.

Table 2.7: Selected typologies of policy instruments according to Salamon and Lund (1989); Salamon (2002), Lascoumes and Le Galès (2004b, 2007), Hood (1983); Hood and Margetts (2007), and Bemelsman-Videc et al. (1998).

Perspectives of instrumental research

As G. Peters Peters (2005, 355f) suggests, future research on instruments should involve the following elements:

- it should pay particular attention to the political importance of instruments and to the multiplicity of criteria to consider in order to explain their choices. This particularly intends to avoid restraining research to its technical aspects, but to pay attention to the political coalitions (and their legitimacy) underlying the choice within the studied political context(s);
- it should consider multiple instruments, in particular their combination, rather than consider different means of achieving the same goal as redundancies;
- the third element comes close to L. Salamon's argument on third party government (2002): researchers should be especially mindful of the institutional context of implementation, particularly when several organisations are involved. The design of public or private structures that deliver public services has to be considered, as well as the organisations' experiences and habits in regard to the tools used;
- it should consider the shift towards less-direct forms of public action, for example, the increased role of soft law and other voluntary agreements, and the blurring between public and private law instruments. Soft law implies a "delegation of authority and discretion to non-public actors" (Peters, 2005, 362), or rather non-democratically legitimised actors. Voluntary agreements imply an increased role of bargaining in the instruments' use and significant changes in terms of interactions and managerial challenges (Kettl, 2002). In Switzerland, authorities rely more and more on contracts in land use planning procedures (Adank, 2016, 55).

Combination of two approaches

As I argue in the presentation of the research design (chapter 3), I opt for an approach located between the first and the second currents of research. C. Hood (2007) argues that both the institutions-as-instruments and politics-of-instrumentality approaches are valid and complementary. Within this theoretical framework, I do not directly address the general "big picture" explanation provided by the politics-of-instrumentality approach (the reasons why an instrument is adopted or not). However, the path I chose allows me to focus on actors' games and the resources they use in order to achieve their goals, as well as to provide a detailed understanding of the instruments' uses in the field, an element that the politics of instrumentality tends to put aside (Halpern et al., 2014, 49).

Instruments as the tools of public intervention

Based on this choice (which is presented in greater detail in chapter 3), the definition of public policy instrument that I adopt is a (narrow) functional one. Referring to Knoepfel et al. (2011), public policy instruments are the tools used by authorities to influence the behaviour of target groups; they specify the means of public intervention underlying the intervention hypothesis (Knoepfel et al., 2011, 156). In other words, instruments are, along with procedural elements (see section 2.3.2.5), the matter on which the negotiation with target groups crystallises, because the latter try to negotiate their implementation with public authorities, in order to adjust the instruments' impact according to their interests.

Having introduced the main theoretical elements relevant to instruments, it is necessary to introduce the policy instruments that Swiss legislation offers for guiding the use of the resource soil.

Public law instruments

Tables 2.8, 2.9, 2.10 and 2.11 present a range of existing public law instruments which influence soil users and uses. However, the list is not exhaustive, as about 158 Swiss federal public law restrictions apply to (land) property (Knoepfel and Wey, 2006). Our selection is based on a legal review and on the instruments used by the actors in the case studies analysed in chapters 4 and 5. Along with the instruments' classification based on , I provide a brief description of their functioning. Based on selected attributes derived from the literature (Salamon and Lund, 1989; Linder and Peters, 1989), I draw a short theoretical assessment of the difficulties linked with their implementation and of their impact on value redistribution. The attributes I rely upon to are:

- Redistributive capacity: the redistributive economic and ecological effects that an instrument has on the target group, third parties and beneficiaries of land use planning policy and, more widely, on the policy design of soil (Salamon and Lund, 1989, 41). I understand the redistributive capacity of an instrument in a broader sense and conceive it as a proxy for the degree of constraint it exercises on the target group (Linder and Peters, 1989);
- Target quality: refers to the instrument's selectivity when applied to the target groups and beneficiaries, and the technical feasibility of this selection (Linder and Peters, 1989). Applied to land use policy, my understanding of the criteria also includes spatial dimension, the perimeter in which the instrument produces impacts;
- Political risk: defined as the "capacity to attract the support [or the opposition] of key actors with a stake in the program area" (Salamon and Lund, 1989, 41). For S. Linder and B. Peters (1989), this attribute also comprises the instrument's visibility and potential adverse effects;
- Resource intensiveness: "the degree of ease or difficulty involved in establishing and operating a program" (Salamon and Lund, 1989, 41). S. Linder and B. Peters consider political risk and resource intensiveness as correlates of political feasibility (1989, 47), the prior addressing external concerns of feasibility, the latter internal ones. Resource intensiveness is assessed from the angle of the authorities.
- Scale of action: refers to the political-administrative level in charge of implementing the instrument. It is a correlate of the instrument's target quality, in the sense that it influences the perimeter of impact. In a decentralised policy like land use planning, the scale of action is an institutional constraint that helps to explain instrument choice, use, and effects.

Tables 2.8, 2.9, 2.10 and 2.11 list the most prominent instruments from federal and cantonal (Berne and Vaud) laws that have been encountered in the empirical analysis. Among the unlisted, are: agricultural and housing subsidies, expropriation, State pre-emption (canton Geneva), protection against water run-off, protection of flora, fauna, (and their respective habitats), and the secondary home tax (formerly commune Silvaplana in canton Grison). Based on P. Lascoumes and P. Le Galès' (2004a) and E. Vedung's (1998) classification, I distinguish prescriptive/regulatory instruments (table 2.8), fiscal and economic instruments (tables 2.9 and 2.10), and information instruments (table 2.11).

In terms of redistribution, the classification shows that few redistributive instruments exist: the land improvement syndicate, the remediation obligation (polluter pays principle), and the tax on added land value created through zoning. However, all instruments have distributive implications, they create winners and losers who clash over the definition of their content and their implementation.

In regard to the scale of action, land use planning instruments notably take effect primarily at the communal level. This is due to the subsidiary competence of the Confederation in matters of land use planning (see also section 2.3.2.4).

Instruments' description based on attributes

Categories used for instruments' classification

Few redistributive instruments

A low scale of action

Regulatory instruments

Table 2.8 presents the regulatory land use policy instruments. The table shows that cantons Berne and Vaud have similar regulatory instruments. The instruments provide the communes a wide range of possibilities in guiding land use, and effecting value distribution. The high precision of these tools makes them resource intensive: they target the policy addressees through a map and follow a long and complex elaboration and implementation process. The following remarks on the listed instruments can be made:

- zoning plans and building regulations include a wide set of restrictions which are applied with a high degree of precision (single plots). A priori, a zone applies to a group of plots and cannot target one specific plot out of many closely located ones. To define specific rules that apply to a group of isolated plots, authorities use local development plans;
- local development plans allow derogations to general zoning regulation and a contractual negotiation of value distribution and capture. It grants a high margin of manoeuvrability to authorities and landowners, but remains open to public scrutiny, at least in regard to planning aspects. The financial plan or contract accompanying the local development plan determines the amount of value captured, part of its redistribution (for example, for local land service and the construction of local public infrastructure), as well as other obligations the parties agreed upon. Its publicity currently depends upon the balance of interests between transparency laws and trade secrecy (Adank, 2016, 204).
- the cropland protection plan defines types of soils that are of superior quality for agricultural production. There is no national substantive definition of soil qualities: each canton applies specific qualitative criteria defining areas in need of protection¹⁹, and soil quality is not considered during zoning procedures. The restrictions, in terms of development, are limited to a cantonal quota defined in hectares. As long as the quota is not reached, these soils can be developed. In the canton of Berne, a higher minimal plot ratio (0.4) applies when land included in the cropland protection plan is developed;
- the “polluter pays” principle is conceived as a redistributive tool that captures economic value from the landowner or rights holder who creates a reduced ecological value in order to compensate the loss. However, the calculation of these costs does not take into account pollution costs prior to the introduction of corresponding legislation, such as those linked with contaminated sites (grandfather clause), nor does it include all current polluters. In addition, costs calculation and the effects of current cost repercussion methods such as an emissions trading system are still ambiguous (Martin et al., 2015);
- the land improvement syndicate is a tool specific to Canton Vaud. It combines the use of land readjustment and zoning through the coordination of the instruments’ procedures. It is analysed in the case study of Cheseaux (section 5.2 in chapter 5).

¹⁹Art. 26 SPO, SR 700.1.

Name	Description	Resource intensiveness	Target quality	Redistributive capacity	Political risk	Scale of action
REGULATORY INSTRUMENTS (1/4)						
Zoning plan (art. 1 SPA, RS 700; annex 1 of the geoinformation ordinance; art. 57 and 98b BauG, SR-BE 721.0; art. 43 LATC, SR-VD 700.11), coupled with building regulations	Map that attributes all plots of the commune to a specific zone that sets restrictions and obligations	Can be costly in the case of withdrawal of rights (reduced economic value) and claims of material expropriation	Applicable to (groups of) single plots (or parts of a plot) in all communes.	Distributive. In the case of development of open land, it adds economic value (but reduces ecological value); can preserve ecological value (protected areas); can be coupled with compensatory instruments like tax on added land value created through zoning, real estate gains tax or subsidies	High (<i>e.g.</i> reduction of economic value, generation of nuisances for neighbours). Democratic approval procedure	Communal level (cantonal or federal definition of specific zones (limit of forests, train and airport zones, highway limits, noise levels, ...).
Building regulations (art. 69 BauG, art. 86 LATC), coupled with zoning plan	Determine: <ul style="list-style-type: none"> – The different types of zones that exist – Restrictions and obligations applicable to defined zones (type of (non) use, plot ratios, noise restrictions) – Restrictions applicable to constructions (connection duties, height, type and profile, distances, aesthetics, parking, infrastructure) – Obligations and restrictions in regard to nature protection, green spaces, security, salubrity – Communal political-administrative arrangement and procedure for the delivery of building permits 	—	Defined for the entire commune, different specifications apply to each zone	Distributive. Ensures coherence of construction through detailed use-prescriptions (added and reduced economic value)	High (<i>e.g.</i> reduction of economic value, generation of nuisances for neighbours). Democratic approval procedure	Communal level
Reserved zone (art. 27 SPA)	Zone suspending any planning or land use activity that can interfere with future planning for a maximum period of 5 years	Depends upon upcoming planning changes	Limited to the perimeter concerned with future planning changes	Prevents or suspends any value redistributive process	Depends upon authority responsible for future planning activity	

Name	Description	Resource intensiveness	Target quality	Redistributive capacity	Political risk	Scale of action
REGULATORY INSTRUMENTS (2/4)						
Zone with mandatory planning (art. 73 par. 2 BauG)	Temporary zone used for a (group of) plots defined as requiring specific rights and obligations in matters of density, height, type of building etc. (<i>e.g.</i> historical city centre, future neighbourhood, constructions on a hillside, etc.)	—	Applicable to specific plots of the zoning plan	Not specified, depends upon subsequent development plan	Low (only obligation it entails is the elaboration of specific rules)	Communal level
Local development plan (art. 88 and 93 par. 1 let. c BauG, art. 64 and 69a L-ATC)	Zoning plan and underlying building regulations for a determined perimeter that grants exceptional rights in matters such as density, height, land use, defines a detailed plan for a neighbourhood including land service, financial plan, number, type and aspects of buildings, and future roads. Under specific conditions, it can be comparable to an architectural competition or to a building permit	Requires organisation and information; implementation has low costs if these are born by landowners	Applicable to specific plot(s) within the zoning plan of the commune	Primarily distributive. Can redistribute added and reduced economic and ecological value according to the financial plan, as well as obligations annexed to the plan	Democratic approval procedure, but financial plan remains often secret	Communal level. Existence of regional (Berne) and cantonal plans (Berne and Vaud), but limited to specific purposes such as public buildings, shooting ranges, quarries, protection of landscape and nature, recreational areas and priority development areas
Cropland protection plan (art. 1 and 3 SPA) as one of the sectoral plans	Map of agricultural land which fulfils certain criteria in terms of climate, soil quality and topography. The portion of the plan relating to soil may not be developed, unless the cantonal minimal quota of protected surfaces has not yet been reached.	Mapping of agricultural soils' quality, horizontal, and vertical coordination between administrative offices	All (parts of) plots fulfilling the technical criteria, but these are not uniform, and as long as quota is not reached, the precise location of the protected surfaces is uncertain	Distributive. Quantitative preservation of ecological value. In Berne, in case of development, distribution of added economic value is through higher minimum plot ratios	Potentially high if quota is reached	Confederation sets general qualitative criteria and cantonal quotas; cantons responsible for localisation of surfaces, definition of precise criteria and preservation of the quota
Inventories of sites of national, regional and local importance (art. 4ff NCHA)	Inventory restricting use rights and introducing obligations on historical constructions, natural sites, (<i>i.e.</i> flora, fauna, mires).	Monitoring costs can be high, <i>e.g.</i> for preventing overuse by farmers, a practice fertilisers which leads to the eutrophication of mires	Applicable to places or buildings that figure in the inventory	Distribution of ecological and aesthetic values	Risk when object removed from inventory's list or if landowner refuses inscription on list, otherwise site defined by the object's characteristics	Federal respectively cantonal

Name	Description	Resource intensiveness	Target quality	Redistributive capacity	Political risk	Scale of action
REGULATORY INSTRUMENTS (3/4)						
Building permit (art. 32ff BauG, art. 97 and 103 ff LATC)	Authorisation to develop one or several plots bound with obligations and restrictions given by the zoning or local development plan as well as other laws dealing with land use planning, water protection, environmental protection, etc. (art. 19 WPA).	Organisation of permit delivery procedure, control of documents submitted by developer	Each construction or demolition that noticeably changes the configuration, appearance or use of a plot or a building	Distributive. Materialisation of added economic value granted by planning documents	—	Communal level. Construction and excavations in vulnerable areas are subject to a cantonal permit. Berne: communes with less than 5,000 inhabitants and without special derogation share the competence with the prefects Cantonal level
Environmental impact assessment (art. 10 ff EPA, SR 814.01)	Definition of protection measures in order to protect the environment and estimate the remaining environmental damage. Part of the building permit procedure, it coordinates and integrates environmental policy internally and externally (Knoepfel and Nahrath, 2014, 754)	Born by target group. Approval by cantonal administration	Mandatory for each development project that can potentially cause major damages to the environment	Prevent and minimise the potential distribution of reduced ecological (and economic) value	—	Cantonal level
Surveillance, investigation and remediation obligation (art. 32c ff EPA)	Based on the register of polluted soils established by the cantons, the polluter/landowner, or, in case they do not or cannot comply with their obligations, the canton, has the obligation to investigate and monitor polluted sites. The polluter/landowner bear the underlying costs.	Potentially high if polluter/landowner cannot, does not, or only partially fulfils their obligations (see also subsidies for contaminated sites)	High (cantonal registers containing all potentially polluted parts of plots)	Redistribution of reduced economic value in form of added (restored) ecological value	Limited to those creating nuisances (water pollution, emanation of odours) to surrounding/downstream inhabitants	Cantonal level
Prohibition against the introduction of polluting substances (art. 6 WPA, SR 814.20)	Prohibition "to introduce into a body of water, either directly or indirectly any substances which may pollute it; the infiltration of such substances is also prohibited."	High monitoring costs, difficulties to localise source of emanation	General prohibition, no precise target	Distributive: preservation of ecological value	Low (general public support)	Federal level
Mandatory land service (art. 19 SPA) and sewer connection (art. 11 WPA)	Obligation to build on serviced land and to connect construction to sewage system. Can be coupled with land service tax	High costs of service construction and maintenance for the commune (if no cost recovery mechanism is introduced)	General prohibition/obligation for each plot of the building zone	Distributive. Value creation through land service; potential redistribution through compensatory payment by landowner	General public support	Plots and groups of plots.

Name	Description	Resource intensiveness	Target quality	Redistributive capacity	Political risk	Scale of action
REGULATORY INSTRUMENTS (4/4)						
Maximum emission and imission values (NIRO ^a , SoilPO, CSO annex 1 to 6)	Set of values above which emissions and imissions are prohibited and action has to be taken. Examples of the regulated domains are: noise, soil (<i>e.g.</i> agriculture, contaminated sites...), air, and water	Maintenance of a monitoring network, legal action against non-compliant behaviours	General prohibition	Limitation on reduction of ecological value. Redistribution in case polluter pays	Level of values defined in legislation, effective implementation of imission levels	Federal definition of values, cantonal implementation
Groundwater protection areas (art. 21 WPA)	Building prohibition in areas that are "of importance for the future use and recharge of groundwater resources"	Definition of zones according to federal prescriptions	All plots and parts of plots within a given perimeter	Preservation of ecological value	Low	Cantonal and communal level
Polluter pays principle (Art.3 WPA, Art. 20 EPA, Art. 20 CSO)	Principle applicable to anyone who causes measures to be taken under the following acts must bear the costs. No objective responsibility for damage to the environment (Knoepfel et al., 2010, 189ff)	Maintenance of a monitoring network, legal action against non-compliant behaviours	All persons above the legal values, in general industries and producers	Reduced ecological value requires economic compensation by polluter and waste producers	Implementation of imission levels conditioned by reduction of emissions	Federal definition, cantonal implementation
Land improvement syndicate (art. 55 LATC and art. 4 LAF ^b)	Legal obligation to coordinate zoning and land betterment. The assembly of landowners (the syndicate) decides by majority vote upon the creation of the public structure, the redistribution of property, and service costs. It does not replace the regular approval procedure of zoning plans but coordinates the two procedures.	Fees paid by landowners, communal planning task, cantonal surveillance	Perimeter delimiting included and excluded landowners; size/number of owners depends upon case (in general 10-15 landowners)	Redistribution of property and use rights, distribution of (additional) development rights, distribution of reduced ecological value, redistribution of (part of) land service costs	Democratic approval procedure of development plan	Sub-communal
Expropriation (Federal and cantonal expropriation acts)	Formal expropriation: transmission of private property to the State or its agent in order to obtain the necessary rights to realise a task in the public interest. Material expropriation: compensation for a planning or environmental protection measure that prohibits or severely restricts the use of property.	Full compensation of expropriated value	Plots meant to host activities in the public interest or that suffer a substantial value reduction due to public restrictions	Compensation of reduced economic value	Unpopular State intervention on the land market	
State pre-emption (art. 10F ^c)	State Geneva has a pre-emption right on all land transactions located in the development zone dedicated to industrial and mixed activities. The goal is to foster the development of this zone and to prevent excessive transaction prices.	Financial costs linked with land acquisition, judicial costs in case of contest	All plots in the development zone alienated in the past three months	Limitation of value distribution (price cap), redistribution of value to other actors	Unpopular State intervention on the land market	Canton Geneva only

Table 2.8: Regulatory instruments of the policy design of the resource soil. Content partly based on Knoepfel et al. (2010); classification based on the typology of Lascombes and Le Galès (2007); comparative criteria inspired from Linder and Peters (1998); Schneider and Ingram (1990).

^aOrdinance of 23 December 1999 on Protection against Non-Ionising Radiation NIRO, SR 814.710.

^bLoi vaudoise du 29 novembre 1961 sur les améliorations foncières LAF, SR-VD 913.11.

^cLoi genevoise du 13 décembre 1984 sur les zones de développement industriel ou d'activités mixtes LZIAM, RS-GE L 1 45.

Economic and fiscal instruments

With instruments which use money as a means of constraint (table 2.9), two broad categories of instruments are distinguished (Petitpierre-Sauvain, 2012): fiscal instruments are a source of income for public authorities. They require their own legal basis, but their revenues are not affected to a specific task and can be redistributed to solve issues not linked to the activity they capture value from. Economic instruments are incentives whose revenues are attributed to actions which contribute to the resolution of the public problem, or are distributed among the residents. Their legal basis stems from the public authority's competence to legislate on a particular matter. Following comments specific to instruments can be made:

- the wealth tax addresses wealth as a whole including land property. Its rate is set by the canton. The land tax addresses only wealth in the form of land property. Its rate is set by the commune within a range fixed by the canton;
- in regard to the real estate gains tax, agricultural and forestry properties can deduct reinvestment costs from the taxed sum. Federal law obliges also the cantons to tax short-term gains at a higher level in order to prevent speculative land transactions. Bernese tax law imposes a tax rate of 70% the first year of ownership. This rate is reduced to a maximum of 8.1% after five years. The tax rate in the canton of Vaud starts at 30% for ownership of less than one year, and is reduced to 7% for 24 years or more of ownership. The years during which the owners themselves live in their property count twice for the calculation of the tax (art. 147 StG and art. 72 LI);
- the land use steering tax is part of the Bernese draft land use planning act of 2014. It aims to increase coherence between land use planning and effective land use; it distinguishes between built and unbuilt plots within the building zone.

A key tool used in tandem with fiscal and economic instruments is land valuation. Land valuation determines the official value of land used for taxation and the implementation of other economic tools. Official land value is fixed either through a general official price evaluation – in the canton of Berne, the latest evaluation dates back to 1998 (FIN, 2009) – or when the plot is sold. These long time spans between (re-) evaluations or sale create a discrepancy between market value and official value, which in turn lowers the income that these instruments provide. Organisations such as churches, pension funds and moral persons fulfilling aims of public interest are exempted from wealth, real estate gains and land property income tax²⁰, all of which reduces the target range. Further, official values are generally lower than market values (FIN, 2009).

The resource intensiveness of these instruments essentially depends upon the cantonal tax administration. Over the last decade, the electronic and semi-automatic treatment of fiscal declaration has lowered resource intensiveness of tax collection (Cour des comptes du Canton de Vaud, 2011a). In terms of target, fiscal instruments concern all plots, but the mostly transaction-based indexation of land values and regressive tax rates lead to substantial tax discrepancies between long term and short term landowners. Further, they do not take into consideration the type of use or zone (except the future possible land use steering tax in canton Berne). Fiscal instruments are indirectly redistributive, because public authorities redistribute the revenues in various policies regardless of origin. Their scale of implementation is mixed, and tax revenues are shared among communal and cantonal levels.

Two types of incentive-based instruments

Underrated property values

Limited resource intensiveness

²⁰art. 83 StG, SR-BE 611.11 and art. 90 LI, SR-VD 642.11.

Name	Description	Resource intensiveness	Target quality	Redistributive capacity	Political risk	Scale of action
FISCAL INSTRUMENTS						
Wealth tax (art. 13 DTHA ^a ; art. 46 and 65 StG, SR-BE 661.11; art. 59 LI, SR-VD 642.11)	Tax on land property and any kind of wealth. Canton of Bern: starting at 97,000 francs, tax rate up to 1.35%; canton of Vaud: starting at 50,000 francs, tax rate up to 3.15%. Land maintenance costs and debt interests can be deducted	Part of existing administrative processes	All plots, based on official land value. Voluntary underestimation of land values by Bernese fiscal administration	Indirectly redistributive. Fiscal revenues are not bound to a specific domain of public spending	No regular re-evaluation of plot value	Federal obligation. Cantonal collection
Real estate gains tax (art. 12 DTHA, art. 126 StG art. 61 LI)	Tax on the revenues generated from the acquisition and subsequent sell of immovable property. Value adding disbursements made by the owner are subtracted from the taxed sum (Langenegger, 2002, 185ff)	Part of existing administrative processes	All plots, based on official land value, decreasing tax rate over time.	Indirectly redistributive. 150M francs of revenues in canton Vaud Canton of Vaud (2016)	Digressive taxation (legitimacy of "natural" long term gains)	Federal obligation, cantonal collection. Distribution of produce between canton (70%) and commune (30%)
Land property income tax (art. 21 DTHA, art. 25 StG, art. 24s LI)	Tax on the revenues/rent generated by land property. Taxed together with regular revenues	Part of existing administrative processes	Distinction between owner-occupied land and rented land. Basis: discounted market value of land	Indirectly redistributive	Tax competition, tax on capital gains not popular	Federal obligation, cantonal and communal implementation
Land tax (art. 258 StG, art. 19 LICom)	Yearly tax on official land value limited by Berne's and Vaud's laws to 1.5% of the property value. Debts are not subtracted from the value of the property. Land belonging to a farm or contributing substantially to the farmer's or leaseholder's income, is taxed according to the income it provides (art. 58 StG)	Part of existing administrative processes	Discrepancy between official and market values	Indirectly redistributive	No regular re-evaluation of plot value, tax competition (Dafflon, 2015)	Cantonal legal basis, communal implementation and collection
Home ownership subsidies (art. 9 DTHA, art. 36 LICom, art. 70 LI, art. 66 StG)	Wealth tax deductions for mortgage interests, maintenance, renovation, renovation works based on inventories, insurance, management, and energy saving works on the property; real estate gains tax deductions for property transfer, betterment, etc.	Part of existing administrative processes	Property owners and owners of mortgaged properties	Distributive	"Hidden" instrument	Federal and cantonal legal bases
Land use steering tax (art. 126d BauG)	Additional taxation on specific land uses, such as undeveloped building land, and secondary homes.	Identification of concerned plots, Calculation of the plot's value	Specific landowners, depending on the type of land uses targeted by the instrument	Indirectly redistributive, limitation of reduction of ecological value	High if target groups present (peri-urban or tourist communes)	Federal principle, cantonal and communal implementation

Table 2.9: Fiscal instruments of the policy design of the resource soil. Content partly based on Waltert et al. (2010) and Knoepfel et al. (2010); classification based on the typology of Lascoumes and Le Galès (2007); comparative criteria inspired by Linder and Peters (1998); Schneider and Ingram (1990).

^aFederal act of 14 December 1990 on the harmonisation of direct taxation at cantonal and communal levels DTHA, SR 642.14.

Looking at economic instruments intended to foster specific behaviours in the target groups:

- the tax on added land value created through zoning reintroduced in spatial planning legislation in 2014 captures part of the value created through the granting of new or additional development rights to a plot. Its yield is to be used for financial compensation resulting from material expropriation, and for other land use planning measures. The instrument does not formally oblige the landowner to proceed with a land use change, nor does it guarantee that the buyer will not hoard the land. Depending on when the tax is due, and on the financial capacities of the landowner, it can provide a strong incentive or even force the owner to change their property's use, or to sell the land.
- the land service tax is a central feature of Swiss land use planning policy and aims to ensure landowners' participation in the investments public authorities make to their benefit. The extent to which authorities pass the land service costs on to landowners is one core element in the negotiations linked with local development plans;
- despite public subsidies of the agricultural sector, there is a huge price gap between agricultural land and constructible land. Financially, this means that agricultural subsidies cannot compete with constructible land. As the list of private law instruments has shown (section 2.2.1.4), the act on rural land rights separates the land market between agriculture and construction by prohibiting the sale of agricultural land to non-farmers. However, in cases of inheritance or when the commune modifies its zoning plan, agricultural and development interests compete against each other;
- regional economic promotion is an ambiguous set of tools, because they partly stand against classic fiscal instruments presented in table 2.9 by conceding monetary advantages to landowners which directly deprive public authorities of revenues provided for them by law. One argument holds that there will be resulting job provision, or additional fiscal revenue due to new employees who might inhabit the commune or canton;
- subsidies for contaminated sites aim to monitor and remediate plots and thus stabilise or restore ecological value. Together with the waste tax, they constitute a redistributive instrument.

The concession is a particular type of instrument: it relies on public law, but its nature is contractual. Authorities and the concessionary use it to negotiate the terms of an agreement for an extended period of time. Its use is mainly linked with the construction and/or exploitation of major infrastructure such as dams, radio frequencies, and transport. Redistributive counterparts depend on the obligations imposed on the concessionary (*e.g.* minimum flow rates for water dams) and to the use of the revenues from the concession.

Public law contracts

Name	Description	Resource intensiveness	Target quality	Redistributive capacity	Political risk	Scale of action
ECONOMIC INSTRUMENTS (1/2)						
Tax on added land value created through zoning (art. 5 and 3 par. let a and par. 2 let. a ^{bis} SPA)	Tax capturing a minimum of 20% of the financial gains conceded to landowners through zoning operations. The sum considered for taxation corresponds to the difference of land value before and after the zoning operation. Revenues attributed to compensation for zoning operations (<i>e.g.</i> building zone reductions) and other land use planning measures	Calculation by the canton of the value created by the communal zoning operation	Each single plot that changes from non-constructible to constructible zone, application to high plot ratios non-binding	Depends on the quantity of land zoned and the tax rate applied. Potentially high	Refusal of inter-cantonal redistribution	Federal obligation, cantonal regulation and collection, revenues shared between canton and communes
Land service tax (art. 19 SPA, art. 111ff BauG, art. 50 LATC and art. 125ff ComPurA ^e)	Costs of land service such as road, water, energy and sewer connection which are passed on to landowners. Bernese legislation foresees a complete cost coverage by landowners of water provision and waste water disposal ^b and an optional cost coverage for roads and other public improvements defined in the local development plan. Legislation in Vaud obligates the landowner to contribute to equipment costs. Contributions are fixed by the commune	Categorisation of infrastructure according to their importance and definition of a perimeter of landowners benefiting from it	Pass on of land service costs to target group, which are also the main beneficiaries of land service	Variable. Depends on financial plan	Rather low. Introduction of an additional extended service tax for all communal infrastructure in Vaud in 2011	Federal principle, cantonal obligation, communal collection and distribution
Extended land service tax (art. 4b LICom ^c)	Landowner's contribution to construction costs of infrastructure required for the provision of general communal services such as schools, hospitals, public transport, squares, green spaces, road works.	Calculation based on construction costs born by commune and additional gross floor area granted to landowner	All significant land value change (zone change and additional development rights). Tax does not apply to public authorities, churches, pension funds, health care funds, moral persons etc. that pursue aims of public interest	Communal redistribution of infrastructure costs to part of end beneficiaries	Rather low in urban communes, widely introduced in Lausanne's agglomeration	Cantonal legal basis, communal implementation

Name	Description	Resource intensiveness	Target quality	Redistributive capacity	Political risk	Scale of action
ECONOMIC INSTRUMENTS (2/2)						
Economic promotion (art. 6f ARP ^a , art. 23 DTHA)	Tax discounts by the Confederation for companies in regions where the evolution of population and income as well as industrial activity is clearly under national average. Cantonal tax discounts, subventions and financial deposits for companies launching a business. Communal discounts?	Consensus (political negotiation)	Major tax contributors able to move the location of their business	Federal, cantonal (and communal?) distribution of economic value.	Effective tax deductions (and benefits of these deductions) not known by the public	Federal and cantonal definition and distribution.
Waste disposal tax (art. 32e EPA)	In accordance with the polluter pays principle, tax that finances the elimination and incineration of waste as well as the investigation and remediation of polluted sites	Low, tax rate based on weight and type of waste	Targets waste depositors/creators	Value capture and redistributive (finances OCRCS fund)	Low	Federal principle, cantonal and communal implementation
Subsidy for contaminated sites (art. 32e par. 3 let. c USG)	The Confederation subsidises investigation, monitoring and remediation measures in case the responsible person cannot be found and/or for sites that have been used as landfills for domestic waste	Cost carried by waste depositors	All sites polluted and potentially contaminated	(Re-) distributive (financed by OCRCS fund): Prevents reduced ecological value through monitoring and restores ecological value through remediation	—	Federal
Concession	Public law contract granting use rights to a concessionary on specific resources (<i>e.g.</i> water, rail infrastructure). For the delegation of public tasks, it requires a legal basis (Moor, 1992, 120). Use restrictions defined by contract and by law (<i>e.g.</i> minimum water flows requirements for rivers)	Knowledge specific to the object put into concession, consensus	Contractual parties. Inclusion of subcontractors to be specified in contract.	Distributive. Redistributive dimension depends on the amount of value captured by contract and its subsequent use	Low	Contractual

Table 2.10: Economic instruments of the policy design of the resource soil. Content partly based on Waltert et al. (2010) and Knoepfel et al. (2010); classification based on the typology of Lascoumes and Le Galès (2007); comparative criteria inspired from Linder and Peters (1998); Schneider and Ingram (1990).

^aFederal act of 20 June 1930 on compulsory purchase *ComPurA*, SR 711.

^bArt. 31ff of the Bernese water protection ordinance of the 24 March 1999, RS-BE 821.1 and art. 11 of the Bernese water provision act of the 11 November 1996, RS-BE 752.32.

^c*Loi vaudoise du 5 décembre 1956 sur les impôts communaux LICom*, RS-VD 650.11.

^aFederal act of 6 October 2006 on regional policy, SR 901.0.

Name	Description	Resource intensiveness	Target quality	Redistributive capacity	Political risk	Scale of action
INFORMATION INSTRUMENTS						
Public hearing	Part of planning procedures, it considers opposition, remarks, fears, suggestions by actors concerned by the project, integrates into the plans, responds to the claims or rejects them (art. 4 SPA)	Impact on duration of approval procedure, requires organisation	Residents and concerned interests such as inhabitants, neighbours, in certain cases environmental organisations, etc. (art. 68 BauG and art. 57 LATC)	Depends upon the plaintiff's argument and its consideration by authorities	Legal obligation	Residents and concerned interests, the latter depending on the level of the involved planning authority
Self-control of producers	Federal law foresees self-control of producers and importers of chemicals and dangerous substances (art. 26 EPA) in order to prevent the circulation of substances that endanger humans or the environment when they are used according to instructions (Knoepfel and Nahrath, 2014, 754)	Costs born by target groups	All producers and importers	Prevention of loss of ecological value depends on the target group	Low (self-control of target group)	Federal
Land price information/valuation	Spatially explicit knowledge of land and real estate prices based on land registry information and estimations made by a cantonal estimation commission;	Automatic update of land values for plots that are sold/bought; complexity of inferring land values of non sold plots	Moderate precision: applies to all plots, but indexation only in case of sale or political decision to update land values	Basis for the use of land taxation instruments	Moderate/high – hidden subsidy to landowners (overall underrating of land values)	Cantonal

Table 2.11: Information instruments of the policy design of the resource soil. Content partly based on Knoepfel et al. (2010); classification based on the typology of Lascombes and Le Galès (2007); comparative criteria inspired from Linder and Peters (1998); Schneider and Ingram (1990).

Depending on the involvement of the actors concerned by the land use policy process, and their resources, information instruments can induce value redistribution. The success of the claims depends on the way authorities make use of the instrument, as well as their resources. The nature (*e.g.* nuclear plant *v.* housing) of the land use policy project also greatly influences the political conflicts that can arise.

Information can lead to redistribution

The above tables highlight the variety of existing instruments that allow for the achievement of redistributive effects and land use policy goals. Instruments like local development plans, the land improvement syndicate, the tax on added land value created through zoning, land service tax or the waste tax coupled with the subsidy for contaminated sites, possess an evident redistributive dimension. But their goals and scale of action vary significantly. The next section offers a short literature review of Swiss land use policy instruments' main effects, as well as selected foreign instruments with a redistributive dimension. Strengths and weaknesses will be identified, and value redistributive instruments will be shown to remain rather marginal in land use policy, and the lack of research focussing on value redistribution in land use policy will be highlighted.

Few redistributive instruments

Effects

Regulatory instruments

Zoning plays a central role in determining land uses and value, but its effects vary according to the type and location of the perimeter under study, and are difficult to isolate from exogenous factors (Quigley and Rosenthal, 2005). Nevertheless, a set of elements can be drawn from the literature that studies the instrument's effects:

Zoning intrinsically linked to land value

1. a zoning gap, or a difference between potential construction possibilities and effective land use, exists (Tillemans et al., 2011). This gap shows the limit of constraint that the instrument can impose as well as that economic thinking is not the sole approach of target groups. The latter do not systematically maximise additional use rights and value that the authority has granted to their plot;
2. zoning has an ambiguous effects on prices: depending on which perimeter is studied, relaxing zoning constraints can lead to lower prices (Gyourko and Glaeser, 2003; Lecat, 2006; Ihlanfeldt, 2007) or to a counter-intuitive price increase (Ruegg, 2000; Buitelaar, 2007; Dantas, 2010). This effect can be explained by the limited fungibility of real estate goods (Boulay and Buhot, 2013, 28), *i.e.* the fact that real estate goods are not identical and are not interchangeable. Land values are not a simple relationship between supply and demand;
3. zoning has positive effects on the limitation of constructions, urban sprawl and on the preservation of ecological value (Napoléone and Geniaux, 2011). The effects of zoning have even been observed beyond the zoning perimeter;
4. on the question of who benefits from zoning, J. Ruegg (2000) and F. Walter (1986) argue that landowners accept the instrument because they benefit from it: the instrument grants them certainty on present and future surrounding land uses, limits the arrival of new users and uses, and stabilises the economic value of their property. Landowners gave up the right to use freely their plot and delegated voluntarily the definition of the content of their property right to the local authority (Ruegg, 2000, 79). Over time, zoning, as one tool (among others) to plan and organise society, has been limited to the definition and negotiation of the context-specific content of private property, to the point where planning has become merely a task of zoning and solving local conflicts of interests (Cullingworth (1993) in Ruegg (2000)). Other purposes of planning, such as social, political, economic and ecological considerations are neglected in favour of private property interests.

S. Nahrath (Nahrath, 2000, 2003, 2005) has analysed the impact of the Swiss land use planning policy which emerged in the 1960's on the uses and the state of the resource soil. Among other elements, his analysis showed the central role of private property in land use policy implementation and the difficulties that arise from the conflict between zoning and property rights. Further, the author draws attention to the importance of courts in order to solve legal conflicts due to a lack of coherence between norms and regulatory gaps created by the legislator.

**Contractual negotiation
in urban projects**

As J. Ruegg (2013) recalls, authorities and landowners or developers frequently negotiate the rights granted by zoning, and thus the amount of added value created, and redistributed. The importance of negotiation, which has been acknowledged by B. Peters (2005) in regard to policy instruments in general (see section 2.3.2.3), is particularly salient for local development plans: in Switzerland, these plans are often accompanied by a specific financial agreement, whose terms remain secret (Adank, 2016). A similar practice has been analysed in France: through his study of the definition and negotiation of local development plans, agglomerations' master plans and urban renewal projects, G. Pinson (2004) has shown how French urban projects characterise the transformation of classical land use planning instruments like zoning and taxes to a broader social coordination tools, which include mutual obligations and communitarian identities which foster the adhesion of actors to the negotiated norms.

Fiscal and economic instruments

A general phenomenon acknowledged in western countries is that taxation of land primarily addresses transactions and not possession (Guigou, 1982; Boulay and Buhot, 2013; Artus et al., 2013). In Switzerland, this fact becomes particularly visible through three elements:

- the relatively low tax rates on land;
- the anchor of absolute tax limits in cantonal law;
- the calculation of the official land value, which systematically underrates property values compared to market prices (FIN, 2009);
- the general tax rate reduction over the last decades (Dafflon, 2015).

Minimal land tax?

One of the most debated tax instruments in history is the land tax (George, 2006; Blaug, 1980). In Switzerland, the land tax refers to the value of the entire property and not just the land. Seven cantons, Canton Zurich among them, do not have a land tax; eight cantons, Basel city among them, only apply the land tax in case the sum due for the land tax exceeds the tax sum due by the landowner on their income and wealth (FTA, 2014). In most cases where the tax is applied, the basis used for tax assessment is the official or fiscal value of land, which often corresponds to a reduced market value. Further, maximum land tax rates are capped by cantonal law. Waltert et al. (2010, 35) notes that a revaluation of the basis used for the tax assessment would increase the incentive to use land according to zoning regulations and limit hoarding behaviours. Further, the tax rate could be adapted to specific (non) uses, for example to the extent to which the plot ratio is effectively used, on the type of zone where the built plot is located, and on the type of building or its occupancy (*e.g.* single family homes, secondary homes).

**Incentives promoting
property**

Deductions from the income and wealth taxes also influence land use. The political objective to facilitate access to property can be linked to the following fiscal incentives (Waltert et al., 2010, 47):

- in all cantons, the rental value of owner-occupied dwellings is systematically below market value²¹;
- mortgages and mortgage interests can be deducted from the wealth respectively the income tax. These deductions account for 30% of the deductions made from the federal tax. A study estimates that their removal would increase the federal income tax yield by 18% (Peters, 2009).

²¹ According to the Federal Tribunal (125 I 65), the rental value used for taxation should correspond to at least 60% of the rent's market value.

In regard to the real estate gains tax, the major issue in current legal dispositions, in most cantons, is the tax's decreasing rate in time, incentivising landowners to sell zoned land after a long period of time (Egloff, 2008). In addition, the basis for tax assessment on zoned land which is still used for agriculture is the provided income²², which is far below the land's market value. Further, the act on rural land rights grants co-heirs the right to inherit part of the benefits from land sale lapses during a period of 25 years²³. For the heir, this constitutes an incentive not to sell the land, as they are the sole beneficiary of the sale's yield after the delay expires. From a planning perspective, this delays the availability of land for construction.

Incentives promoting land hoarding

The tax on added land value created through zoning as it exists in Switzerland has not yet been subject to evaluation, as the federal law entered into force in 2014. A review of the literature shows that other value capture mechanisms exist, but that they are essentially used in order to finance transport infrastructure (Batt, 2001; Cervero and Murakami, 2009; Medda, 2012), and not to compensate restrictions on property due to zoning, for the protection of agricultural surfaces or to optimise land use²⁴. Prior to the 2014 spatial planning act revision, four cantons had implemented the tax:

Tax on added land value created through zoning

- Basel-city dedicated the tax's yield to parks and green spaces²⁵;
- Geneva used the money for housing, infrastructure and agriculture²⁶;
- Neuchâtel used the money for financing expropriations²⁷;
- Berne used the money to finance planning measures and land service (the instrument's implementation is analysed in chapter 6)²⁸.

In regard to the land service tax, it should be kept in mind that different types of land service taxes exist, depending on the type of infrastructure subject to fee (road, water, sewer, electricity, school, parks, fire protection, etc.). Several authors state the tax' positive influence on development control (Nelson et al., 1992; Burge et al., 2013; Burge and Ihlanfeldt, 2013). In the Swiss case, Institut für Wirtschaftsstudien Basel (2015) mentions three conditions of implementation which have, in certain cases, diluted the effects produced by the instrument:

Land service tax

- the calculation of the fee was based on average costs and not on marginal costs;
- authorities financed part of the land service (main infrastructure required for local land service, service linked to specific public interest);
- authorities financed a service that substituted to the effective land service (*e.g.* school bus in cases where walking distances are too long for the children).

The waste disposal tax and the subsidy for contaminated sites have not been subjected to joint evaluation. Regarding the waste disposal tax, its financing occurs primarily by the companies and individuals who create it (BHP AG, 2006, 130). Despite an increasing proportion of recycled waste, the absolute quantity of waste has increased almost constantly over the last decades, along with tax revenues, which reached 40 million francs in 2015 (FOEN, 2008, 29).

Waste disposal tax...

In regard to the subsidies for contaminated sites, around 10% of the 50,000 contaminated sites in Switzerland have been remediated over the last years. Estimations on the overall remediation costs are about 5 billion francs (FOEN, 2015, 41). However, the OCRCS is conceived only as a complement to the polluter's obligation to pay (in case they are insolvent or no longer exist).

...and subsidy for contaminated sites

Instruments as market creators

There are also foreign examples of redistributive instruments. M. Gmünder (2010) has shown that the creation of a market of transferable development rights forces

Transferable development rights

²²Art. 17 of the *Federal act of 4 October 1991 on rural land rights RLRA*, SR 211.412.11.

²³Art. 28 par. 3 RLRA, SR 211.412.11.

²⁴Art. 3 par. 2 let. a and par. 3 let a^{bis} and art. 5 par. and 3 SPA, SR 700.

²⁵Paragraph 120 of the *Bau- und Planungsgesetz vom 17 November 1999*, SR-BS 730.100.

²⁶Art. 30c ff., *Loi d'application du 1er août 1987 de la loi fédérale sur l'aménagement du territoire*,

landowners to integrate the ecological externalities they create through the economic use (development) of their plot:

- sending and receiving areas were defined at county scale (1,285 km² in the case of Montgomery, 557 km² in the case of Calvert);
- the owners located in the receiving area and willing to build had (or could) purchase (additional) development rights from landowners in the sending area;
- this allowed for the relocation of development rights closer to the existing transport and urban framework.

In the case of Montgomery county, the author notes that the program allowed for the protection of 188 km² from long-term development, an amount corresponding to 50% of the surface of the sending area. However, only 44% of the density bonus granted to the receiving areas was used by developers (McConnell et al. (2007, 44) in Gmünder (2010, 191)). In the case of Calvert county, where the program was non-binding for landowners, the author notes that the rights transfer mechanism allowed access to higher densities when compared to development without the optional purchase of TDR (McConnell et al. (2007, 70) in Gmünder (2010, 191)).

Biodiversity certificates

Other instruments link the creation of economic value to an obligation to compensate the ecological value destroyed. In the USA, a market-based system of transferable biodiversity certificates, also called mitigation banking, is a common instrument which allows developers to fulfil their compensation obligations through the acquisition of assets from a bank²⁹. Mitigation banks certify that the assets developers are obliged to buy correspond to effective preservation, restoration, creation or enhancement measures realised by a specialised organisation within a given perimeter (Bonnie, 1999). For example, these measures involve the imposition of use restrictions on land, the acquisition of land for protection purposes, or the artificial (re-) creation of wetlands. This instrument has been criticised in various ways (Jennings, 1997; Hallwood, 2007):

- in the case of wetland protection, the instrument does not allow for the achievement of the federal mandate of no net wetland surface loss;
- the credits are often sold before the mitigation process is effectively achieved;
- the rate of projects in which compensation processes have succeeded is between 25 and 50%;
- the banking system lacks public review.

Habitat banking

In regard to the protection of endangered species habitats, similar compensatory mechanisms known as habitat banking exist (Bonnie, 1999). However, they face challenges comparable to those of wetlands, and must additionally deal with the fragmentation of the surfaces placed under protection. In fact, a potential habitat recovery is only effective if wide and spatially coherent surfaces are protected, a constraint which is hard to achieve (Bonnie, 1999).

Uncertainty linked with ecological compensation

In France, a similar instrument has been tested: an experiment set up by a public bank (*Caisse des dépôts*) forced developers within a given perimeter to buy credits compensating the ecological value loss induced by their construction. The value of the credits corresponded to a share of the bank's investment in the ecological restoration of a former industrial orchard. Researchers who analysed the project's effects came to the following conclusions (Chabran and Napoléone, 2012; Napoléone and Calvet, 2013):

- it is impossible to evaluate and manage biodiversity in the long run. The future of this (re-) created biodiversity remains uncertain in a changing global context (Robertson, 2004);

SR-GE L 1 30.

²⁷Art. 35ss of the *Loi neuchâteloise du 2 octobre 1991 sur l'aménagement du territoire*, SR-NE 701.0.

²⁸Art. 142 of the *Baugesetz vom 9. Juli 1985*, SR-BE 721.0.

²⁹Section 404 of the US Clean Water Act.

- ecological and financial-administrative processes take place on completely different time scales – the underlying question behind these points is the technical possibility to value biodiversity economically;
- the integration of the neighbours (other farmers) in the compensation project allowed for the creation of a coalition of actors supporting the restoration and the ecological goals set by the public bank;

Based on the North-American and French experiences, one can state that the main objectives of compensation are unachievable, but such an instrument can at least help to finance protection or restoration measures which allow for the ecological preservation or restoration of given areas. As the list of policy instruments in section 2.3.2.3 showed, such mechanisms are, in Swiss legislation on soil, currently limited to agricultural subsidies and the associated ecological services that farmers have to provide.

Other instruments exist which redistribute economic and ecological values, but currently the majority of these remain theoretical: soil sealing certificates or a soil sealing tax³⁰ (European Commission, 2012; Süess and Gmünder, 2005), quotas on constructions³¹, etc. (please refer to Gmünder et al. (2017) for additional examples and references.

Combined instruments

Since the 2000's, rail and property models, transit-oriented development, and other policies which capture the value created through the development of public transport infrastructure to finance infrastructure, housing (social), or the area's redevelopment in general, have regained attention (Pflieger, 2013a): with the redevelopment of major urban public transport infrastructure, cities have been looking for means to reduce development and operational costs of this infrastructure, and have rediscovered the economic potential of the plots surrounding these infrastructure. Zoning policy fostering a dense usage of the plots, combined with a value capture instrument (or public property that by default captures the added value), constitutes a central element of contemporary urban renewal processes. Although the aspect value redistribution lies at the heart of such instruments' mixes, the question of the amount of value created, of its capture, and its redistribution often remains unclear. Depending on the property structure and on the city's political objectives, two scenarios can be outlined (Pflieger, 2013b): a corridors gentry option, where the value created, if captured, is ideally reused for public investments in transport infrastructure. This can lead to a sharp increase in real estate prices (Cervero and Murakami, 2009) and the gentrification of neighbourhoods based on their access to public transport. A second option would be the onsite redistribution of a portion of the added value through the development of subsidised housing programs, controlling, de facto, part of the generated rent. In Switzerland, such combined initiatives have mainly taken place through the federal agglomeration program. Section 2.3.3 below presents this federal program; the case study of Malley in chapter 5 presents an urban renewal process with just such an instrument mix.

Another combination of instruments used at the local scale is the land improvement syndicate. P. Weber et al. (2011) have shown the various positive effects that can result from the instrument's use: inclusion of all stakeholders (private and public), majority decision-making which imposes a high degree of constraint, redistributive aspects such as better localisation of construction, and the financing of land service through the added economic value resulting from zoning. One case where this instrument is implemented is presented in section 5.2 in chapter 5.

Lack of redistributive instruments

Rail and property models

Land improvement syndicate

³⁰The soil sealing tax had been previously introduced in the 2010 proposal of a land development act, which would have substituted the current spatial planning act. However, it was rejected during the consultation procedure.

³¹*Ordonnance du 22 août 2012 sur les résidences secondaires*, SR 702.

This overview on the effects of existing (re-) distributive instruments shows the limited role redistributive instruments play until now in (Swiss) land use policy. However, contractual arrangements, and the combination of instruments, constitute alternative ways to apply a redistributive dimension to land use policy processes. Hence, beyond the existing instruments' use, the more general question of the allocation of resources (how much value is created and who benefits from it) has to be considered.

This overview on the effects of instruments' has also shown the difficulty of valuing ecological aspects of soil, because of the different time scales which apply to legal-financial and natural interactions, and because of the difficulties linked with the restoration of ecological values. In fact, one central contradiction appears in at least partial opposition to economic and ecological values.

2.3.2.4 Political administrative arrangement

The political administrative arrangement designates "the competent authorities and administrative services (public actors) as well as all of the other institutional rules specific to the implementation of a policy" (Knoepfel et al., 2011, 159), including the competencies of the different public actors, and the policy resources available for policy implementation. In this section, I go beyond the institutional rules specific to land use planning and soil protection policies and present two general characteristics of the Swiss political system that, as I intend to show, play a significant role in the attribution, modification, and withdrawal of rights to soil: communal autonomy (Horber-Papazian, 2006) and fiscal federalism (Wälti, 2003).

With this aim of presenting two generalities regarding the Swiss political system, it is relevant to begin with the competencies of the different government levels in the land use planning and soil protection policies (section 2.3.2.4), in order to show who is responsible for what. From this point, the focus is on a case law review that synthesises past conflicts internal to the political administrative arrangement in order to grasp the scope of intervention of different levels of government in implementation processes (section 2.3.2.4 and 2.3.2.4).

Competencies of government levels

In order to make the competencies of each government level more explicit, table 2.12 summarises the competencies of each level level in land use planning and soil protection policies. Following comments can be made:

- land use planning policy is, compared to soil protection policy, strongly decentralised: whereas land use planning is a communal competency that has been progressively framed by cantonal and federal laws, soil protection has been initiated as a federal competency whose implementation is delegated to the cantons;
- at regional level, land use planning competencies are rather limited. Only the canton of Berne has defined regional perimeters, introduced formal bodies composed of elected delegates from the communes who can formally adopt regional development plans. The Canton of Vaud does not have a formal regional level. However, master plans for several communes or agglomerations can be elaborated on a legally not formalised inter-communal level (please refer to section 2.3.3.1 for additional information);
- threshold levels of soil protection policy are fixed at the federal level, and determine if and what action has to be taken in case they are exceeded. In land use planning, federal directives set the threshold levels that determine the size of building zones since 2014 (ARE, 2014), but the choice of the corresponding demographic scenario is made by the canton and the cantons are only accountable to the Confederation for a global building zone quota (see also section 2.3.3.2 for additional information).

	Federal level	Cantonal level ^a	Regional level	Communal level
Land use planning	<ul style="list-style-type: none"> – Definition of land use planning principles (art. 75 Cst) – Supervision on cantonal structure plans (art. 8f SPA) – Definition of the calculation method to dimension building zones (art. 30a SPO) 	<ul style="list-style-type: none"> – Elaboration of a structure plan steering development and binding for all authorities (art. 8f SPA, SR 700; art. 103 BauG, SR-BE 721.0; art. 31ff LATC, SR-VD 700.11) – Planning supervision: protection of communal, regional and cantonal interests and exceptional direct intervention on target group through cantonal development plans (art. 55 and art. 102 BauG, SR-BE 721.0; art. 45 LATC, SR-VD 700.11) <p>Difference: Vaud's law anticipates that the cantonal structure plan is adopted by the cantonal legislative body, whereas the Bernese procedure anticipates approval by only the executive body.</p>	<p>Canton of Berne:</p> <ul style="list-style-type: none"> – Structure plan steering development and binding for all authorities (art. 98 BauG, SR-BE 721.0) – Exceptional direct intervention on target group through regional development plans (art. 98b BauG, SR-BE 721.0) <p>Canton of Vaud: inter-communal master plans developed in urban areas which are binding for authorities, but lack formal competency.</p>	<ul style="list-style-type: none"> – Building regulations defining general and zone specific rights and obligations (art. 88 BauG, SR-BE 721.0; art. 43 LATC, SR-VD 700.11) – General and local development plans attributing each plot to a zone or local development plan (art. 69f BauG, SR-BE 721.0; art. 43f LATC, SR-VD 700.11) <p>Canton of Vaud: Existence of a regional structure plan with communal approval procedure steering development and binding for all authorities (art. 39 LATC, SR-VD 700.11), but plan is not used in practice</p>
Soil protection	<ul style="list-style-type: none"> – Definition of environmental principles; – Setting of maximum emission and imission values and definition of monitoring and re-mediation thresholds (SoilPO, SR 814.12; WPA, SR 814.12; CSO, SR 814.680); – Definition of use and disposal restrictions concerning dangerous products (art. 1, 2, 11, 13 and 16ff EPA, SR 814.01) – Financial subsidy for re-mediation costs 	<ul style="list-style-type: none"> – Inventory of polluted sites and establishment of the register – Prioritising of sites requiring investigation – Control of fulfilment of investigation, surveillance and remediation obligations by landowner or responsible person – Substitutive execution in case of emergency, in case coordination between users is necessary or if the responsible person does not cooperate – Payment of measures mentioned by the canton only in cases where the responsible person is unknown or insolvent 		

Table 2.12: Competencies of the federal, cantonal, regional and communal levels in Swiss land use planning and soil protection policies

^aBaugesetz des Kantons Bern vom 9 Juni 1985 BauG, SR-BE 721.0; *Loi du 4 décembre 1985 sur l'aménagement du territoire et les constructions du canton de Vaud LATC, SR-VD 700.11.*

Communal autonomy in a general legal perspective

Limited relationship between Confederation and communes

Whereas the old Federal Constitution (until 1999) only sparsely referred to communal autonomy, the current one guarantees it within the limits set by cantonal law³². According to R. Kägi-Diener (2008), the reason leading to this change was the will of politicians close to the Swiss union of cities, to foster the role of the commune as a member of the federal State and as a partner at two other State levels. Currently, this partnership remains separated in two parts: between the federal State and the cantons, and between the cantons and the communes. The federal State is supposed to involve the communes in earlier stages of the decision-making process in order to respond to growing internationalisation of society and the economy.

Limited judicial control

A infringement of communal autonomy is subject to constitutional complaint³³. In order to respect cantonal competence in defining communal autonomy, the Federal Court only checks the arbitrariness of implementation of cantonal law (Kägi-Diener, 2008, 930): they ensure that the cantonal enactment is based on serious objective reasons, not severely incoherent or frivolous (Tschannen and Zimmerli, 2005, 166).

Communal autonomy in land use planning

Wide decisional autonomy for the communes

In regard to land use planning, federal law states that the planning authorities have to grant to subordinate authorities the needed discretion to fulfil their obligations³⁴. This guarantee also figures in the Bernese cantonal construction law, where the discretion granted to subordinate authorities (communes, prefects), communal autonomy and individual freedom, in terms of construction, can be restrained only when public interest (*Gemeinwohl*) requires it³⁵. Furthermore, article 65 BauG states that the communes are, within the limits of the law, free to define their own building regulations. In case they fail to do so, the cantonal authority can refuse their approval, set a deadline for adapting them, and then act through substitutive execution. In the Canton of Vaud, the land use planning and constructions act contains similar dispositions (Bovay et al., 2010, 13): art. 2 and 26 LATC mentions that the canton has to grant the communes the required discretion to fulfil their tasks. Thus, the cantons can only intervene if the land use planning matter is of regional or cantonal competency or importance – an issue determined by law, or when a commune does not fulfil its planning obligations³⁶.

Few judicial conflicts between canton and communes

Both in Berne and Vaud, few cases of opposition to a cantonal decision by a commune can be cited³⁷. Most cases concern effective uses of zones, the conformity of building or exploitation permits to zoning regulations (with the exception of land hoarding, which had not been a legal issue until 2014). In matters of zone uses, communes enjoy wide decisional discretion within the limits of superior law. They are allowed to define their own zones and regulations, and also to interpret the norms which they decree, as long as their argument is legally defensible³⁸.

Limited cantonal intrusiveness

One of the few Bernese cases where a conflict emerged, dates from 1988: the canton established a reserved zone³⁹ in the middle of a constructed area still being used for agriculture. The cantonal goal was to impose a higher density for future constructions in the concerned area of the commune. The commune contested the cantonal decision, arguing that it unduly restricted its autonomy, and the court ruled that the establishment of a reserved zone in this area contradicted the purpose of

³²Art. 50 par. 1 Cst, SR 101.

³³Art. 189 par. 1 let. e Cst, SR 101.

³⁴Art. 2 and 3 SPA, SR 700.

³⁵Art. 54 par. 3 BauG, SR-BE 721.0.

³⁶As examples of tasks of regional or cantonal importance, one can mention the cantonal competence of delivering building permits outside of the building zone, and the definition of cantonal waste storage sites. On this matter, see ATF 117 Ia 352.

³⁷Cases where the canton opposes a communal decision are handled by administrative land use planning procedures. The conflict becomes judicial only if the commune opposes a cantonal decision (for example if the canton refuses communal building regulations submitted for approval), or if the cantonal spatial planning office appeals against the decision of a cantonal court (art. 34 SPA).

³⁸BVR 2000.109.

³⁹A reserved zone (*Planungszone*) is a localised restriction prohibiting any use that could hamper the future use of the concerned perimeter. It is used *temporarily* while the regular zoning and building regulations are being modified.

a reserved zone, (which is to protect agricultural land), as well as the decisional autonomy of the commune⁴⁰.

A similar case can be mentioned in Vaud, where the densification of a zone for single family homes was opposed by a commune against the will of three landowners. The cantonal tribunal took a position in favour of the owners, arguing that their location within Lausanne's agglomeration spoke in favour of higher densities. Nevertheless, the federal Tribunal rejected the cantonal tribunal's decision, arguing that it was beyond its jurisdiction to impose a higher density on such a limited amount of plots, and that the effective gains in terms of density were negligible⁴¹.

Another case⁴² recently opposed the federal spatial planning office, ARE, and Canton Vaud: the federal office appealed the cantonal decision to extend a local development plan by 4 hectares into the 25 hectare industrial zone. This plan was established on agricultural land as part of the cropland protection plan. The federal intervention took place at a very specific moment: since the entry into force of the revised federal spatial planning act in 2014, the cantons have been subject to a zoning moratorium: they are obliged to compensate any extension of building zone for an equivalent zoned surface. The moratorium applies until the cantons have revised their land use planning legislation and meet the new federal requirements.

Federal zoning moratorium

However, the canton can exert an important control on the definition of new communal building zones which do not conform to demographic growth objectives. For example, in 2012, the cantonal tribunal of the canton of Vaud rejected a landowner's appeal against the communal rejection of a local development plan that would have created excessive building zones for a commune as compared with the expected population growth⁴³.

Cantonal population growth criteria

In general, the hierarchy of plans is a central element of Swiss land use planning policy. The cantonal structure plans (see section 2.3.3) are based on the obligations defined in federal law and on the federal sectoral plans such as the cropland protection plan (see section 2.3.2.3). They are approved by the federal authorities. Communal and regional plans have to conform to the cantonal structure plan and are approved by cantonal authorities. In turn, building permits follow the communal structure and zoning plan or development plans, and are approved by the commune (or by the cantonal authority (prefects in the canton of Bern) for rural communes).

Hierarchy of plans

This legal review shows the wide autonomy that communes in the cantons Berne and Vaud have in matters of land use policy. Until 2014, cantonal authorities could only stop excessive zoning pretensions formulated after the entry into force of cantonal land use planning legislation in 1985. Federal control is limited to gross infringement of federal prescriptions, such as a zoning moratorium, and to the approval of cantonal structure plans, which are more reflective of the development aspirations of a canton than effective policy targets. However, since 2014, cantonal structure plans are required to include the sum of communal building zones and their future evolution according to a federal calculation technique (see section 2.3.3.1).

Fiscal federalism

Fiscal federalism is relevant for the present research, because it is a factor that contributes to explaining the attractiveness of a given area and sets general conditions under which the financial levies exposed in table 2.9 can be used as capture tools. In accordance with the subsidiarity principle⁴⁴, each canton and commune can, within the limits of the law, determine their own tax rates. The Constitution states that the Confederation sets out harmonisation principles on direct taxes imposed by the three government levels⁴⁵. In matters of land property, federal law obliges the cantons to collect a wealth tax and a real estate gains tax. But the far-reaching cantonal and

Communal primacy

⁴⁰BGE 114 Ia 295.

⁴¹ATF 137 II 23.

⁴²AC.2014.0345.

⁴³AC.2012.0093.

⁴⁴Art. 5a and art. 47 Cst, SR 101.

⁴⁵Art. 129 Cst, SR 101; *Tax harmonisation act of 14 December 1990 DTHA*, SR 642.14.

communal autonomy grants them the competence to fix the tax rate on income and property, which amounts to 70% of the total tax paid by citizens (Ladner, 2010).

**Simultaneous competition
and per-equation**

In order to limit the negative effects of tax competition, such as the reduction of public services, the redistribution of tax burdens between different socio-economic groups (rich and mobile vs. poor and immobile), and the creation of loopholes, an equalisation formula redistributes funds between the cantons according to various criteria (Brülhart, 2014b). In practice, it means that the cantons of Bern and Vaud do not benefit in the same way from the equalisation formula (EFV, 2015): in 2015, both cantons had an absolute fiscal potential of 23 billions francs, but because canton Bern has 260,000 more inhabitants than canton Vaud, Bern is the biggest beneficiary of the equalisation in absolute terms, whereas Vaud is a net contributor.

Joint-decision trap

Despite the per-equation, the increase in government activities and legal restrictions on the federal level have led to an increased mix and spillover of policy regulation, financing and implementation across government levels (Ladner, 2010), blurring the division of tasks.

**Reduced mobilisation of
fiscal instruments over
time**

Further, the federal conception of the tax system has led to a general fiscal competition between cantons and communes. In his study of the Swiss tax systems, R. Dafflon (2015) synthesises the consequences of fiscal federalism and changes over time as follows:

- from 1960 to 2013, the horizontal fiscal competition has led to a general decrease of corporate and income tax rates;
- despite the decreasing tax rate, the overall produce generated by corporate and income tax has increased due to economic growth (increase of the number of contributors, increase of revenues of individuals and of profits of companies);
- a tax rate reduction by one canton has been generally mimed by neighbour cantons (in order to keep the same tax rate difference), which has led to an erosion of the entities' fiscal basis, without allowing regional redistribution of tax revenues (through the relocation of companies for example);
- a harmonisation effect: despite competition, the modalities of taxation used by cantons have become more similar;
- a centralisation effect: over time, the tax yield benefiting the Confederation has increased.

In terms of policy instruments' use, these trends can be interpreted as a reduced mobilisation of fiscal instruments over time, and as a reduced amount of fiscal revenues available to communes, if these are not able to attract economic and/or demographic growth.

2.3.2.5 Procedural elements

The fifth layer of the political administrative program contains the procedural elements, including the administrative procedures, specific forms of interactions, as well as the general legal provisions authorities must respect when interacting with each other, and with those affected by public intervention (Knoepfel et al., 2011, 161). Procedural elements also include legal remedies granted to actors concerned by environmental policies in order to oppose or support public decisions taken during the implementation process. The procedural elements of environmental policies include three types of procedures (Knoepfel et al., 2010, 125): control procedures (control of implementation of legal norms), authorisation procedures (for example, for polluting activities), and remediation procedures (for contaminated sites). The means of actor intervention can be divided into two broad categories: general public information and consultation procedures, and legal remedies granted to specific groups. As P. Knoepfel et al. (2010) notice, the right of appeal granted to environmental organisations in the implementation of environmental law is a procedural rule that has increased the intervention of environmental policies on economic development.

Land use planning	Soil protection
<ul style="list-style-type: none"> – Public information on, and participation in, land use planning procedures (art. 4 SPA); – Designation of dedicated authorities who examine and coordinate the approval procedures of development plans and building permit (art. 25a and 26 SPA); – Public enquiry on development plans and other cantonal and federal enforcement provisions; right of appeal against these provisions (art. 33 SPA); – Right of appeal of environmental organisations (art. 55 EPA; art. 12 NCHA^a); – Conciliation procedure when the cantonal structure plan cannot be approved by federal authorities (art. 12 SPA); – Cantonal right of appeal against: compensation due to property right restrictions, communal zoning decisions, building permit issues with construction located outside the building zone (art. 34 SPA); – Right of appeal of the federal agriculture office against decisions concerning surfaces protected by the cropland protection plan (art. 34 par. 3 SPA). 	<ul style="list-style-type: none"> – Obligation to assess the environmental impact of installations susceptible to modification, (notably the environment), and report on the assessment (art. 10a EPA; art. 12 NCHA); – Principle of information transparency regarding the environment, as well as energy related to the environment (art. 10g EPA); – Publicity of the register of polluted soils (art. 32c par. 2 EPA), information of the landowner prior to the inscription of their plot into the register (art. 5 par. 2 CSO); – Right of appeal of environmental organisations against the installation and introduction of organisms (art. 55ff EPA); – Right of appeal of federal and communal authorities against decisions taken by cantonal or federal offices (art. 56f EPA); – Expropriation right, applicable if required by the implementation of the law (art. 58 EPA); – Mutual information between levels of government (art. 41a EPA; art. 3 par. 2 SoilPO); – Cantons are in charge of surveillance measure (art. 4 par. 3 SoilPO).

Table 2.13: Procedural elements of Swiss land use planning and soil protection policies.

^a *Federal act of 1 July 1966 on the protection of nature and cultural heritage NCHA*, SR 451.

The four layers (objectives, evaluative elements, political administrative arrangements and procedural elements) of the political administrative program of land use planning and soil protection policies have set the aims and conditions of State intervention on the resource soil from a quantitative (soil consumption or development through land use planning) and qualitative perspective (preservation of soil functions through soil protection). However, these elements do not directly make clear how land uses and values are determined. It is necessary to discuss the layer that this thesis places at the centre of attention: policy instruments.

2.3.3 Action plans

Section 2.3.2.4 on the political administrative arrangement has shown the high degree of decentralisation of Swiss land use policy. However, during the last decade, land use planning regulation has increased and the communal margin of manoeuvrability has been reduced. These changes have not occurred through a formal transfer of competencies, but rather through the progressive introduction of action plans. P. Knoepfel et al. (2011, 198) defines action plans as a "set of planning decisions considered as necessary for the coordinated and targeted production of administrative services (outputs)"; they are "management instruments" used at infra-national level as intermediate implementation acts. In order to grasp the importance of these action plans for the management of the resource soil, the current section presents the main action plans initiated during the past twenty years in land use planning policy:

- the cantonal structure plan as overarching action plan, and the underlying calculation scheme for the dimensioning of building zones;
- regional global transport and settlement plans (canton Berne), agglomeration and inter-communal master plans (cantons of Berne and Vaud);
- action plans to control excessive ambient air pollution levels.

Cantonal structure plan

The cantonal structure plan is a planning document elaborated by cantonal authorities showing the current state of spatial development and the state of development they seek to achieve over 15 years. It also shows which activities with spatial impacts are not coordinated yet, what authorities will do about it, and which activities could have an important impact on land use planning, but are not defined precisely enough in order to be coordinated⁴⁶. In canton Bern, the structure plan is adopted by the cantonal executive body, whereas in canton Vaud, it is adopted by the cantonal legislative body. The structure plan is composed of several sets of measures that aim to steer urbanisation and transport, create the necessary conditions for economic development, protect nature, and foster cooperation between authorities (in particular between the cantonal administration and communes).

2.3.3.1 Dimension of building zones**Calculation scheme for building zone dimensioning**

The calculation scheme for building zones is a tool introduced in 2014 by the Confederation that allows for the calculation of the surface of building zones each commune needs for development in the near future. It is based on art. 15 par. 1 SPA which states that building zones dedicated to housing have to meet the foreseeable needs of the next fifteen years. Following parameters are taken into account⁴⁷:

- the current population, which is multiplied by a cantonal population growth factor based on demographic forecasts from the Federal statistical Office;
- the prognosticated population growth is multiplied by a median surface consumption rate per person⁴⁸

Margin of manoeuvrability remains high

With the new federal calculation method introduced in 2014, a cantonal land use coefficient – a ratio between the sum of communal building zone capacities and demographic and jobs forecasts⁴⁹ – is used for determining future building zone needs. It is similar to the former Bernese calculation method, because it relies on a median value of surface use per inhabitant, (which is in fact a density coefficient based on the socio-economic characteristics of the commune), and on federal demographic prognostics. However, this technique allows cross-communal and cross-cantonal comparison, which is intended to provide incentives for cantonal and communal authorities to conform to legislation (Flückiger, 2014, 49). According to Flückiger (2014, 90ff), the directives can be appraised as follows:

- only three types of zones are taken into account in the calculation of the correct building zone dimension⁵⁰, which excludes land consuming activities, such as economic development areas and tourist areas from the calculus;
- the cantonal land use coefficient as sum of communal host capacities in the three different zones taken into consideration does not reflect the real size of building zones;

⁴⁶Art. 5 SPO, SR 700.1.

⁴⁷Art. 30 SPO, SR 700.1.

⁴⁸This surface consumption rate depends on the type of commune (determined by the typology elaborated by the Federal statistical office (FSO)) and on the type of zone (housing, mixed, central). For the Bernese calculation method that applied prior to the 2014 spatial planning act revision, please refer to section 4.1 in chapter 4.

⁴⁹Building zone capacity is to be understood as the amount of inhabitants and jobs a defined surface of building zone can host. One job is considered to be equivalent in terms of surface to one inhabitant.

⁵⁰Nevertheless, these three zones account for 70 % of all building zones and host 79 % of all inhabitants and jobs.

- a wide margin of manoeuvrability is left to the cantons, as no absolute limits in terms of surface or density are determined by federal law (*e.g.* minimum density coefficient). Only the median density of each category of communes⁵¹ is used as a relative limit;
 - in this sense, the current Bernese calculation method is stricter, as it fixes an absolute minimum density coefficient;
 - instead of the median density value as reference value, one could have also taken the top quartile as reference value;
 - no solution is provided for the problem of the location of the building zones;
- the cantons are free to opt for optimistic demographic scenarios, leaving a wide margin of manoeuvrability when calculating the correct size of building zones;
 - as the case studies' analysis in chapter 4 shows, the use of a single cantonal growth scenario is also problematic, as it attributes equal zoning rights to communes with opposite demographic evolutions;
- the restriction of urban sprawl is limited to the reproduction of past urbanisation patterns: low density communes will remain low density, whereas a densification process in the centres can be relevant for all communes;
 - however, limits of urbanisation, valid for 20 to 25 years, have to be defined in the cantonal structure plan;
- cantons and communes can define their building zones below the required capacity necessary to face employment and demographic changes.

2.3.3.2 Agglomeration programs

Other types of action plans which have played a central role over the last decade, are the agglomeration programs developed by cities in reaction to the 2001 federal agglomeration policy. The federal levy for contemporary urban value creation and potential redistribution was provided 6 billion francs, to be allocated to the cities' most effective programs. The possibility to obtain up to 40% of federal funding for development of transport infrastructure and mobility networks led to the elaboration of entire master plans for agglomerations including hundreds of transport and urban development measures, a realisation schedule, regular updates on the progress of implementation, etc. (*i.e.* agglomeration programs). In the agglomeration of Lausanne, the urban perimeter (where two of this thesis case studies are located: see chapter 5), a set of action plans at different scales has been elaborated and approved by ad-hoc inter-communal bodies:

Nested action plans

- the most comprehensive one is the agglomeration's master plan *Projet d'agglomération Lausanne Morges PALM*, which has been handed in to the Confederation in order to obtain federal funding. Once approved, a contract between Confederation and canton has been signed which lists the measures to be taken, the schedule of realisation and the financial contribution of the Confederation;
- on inter-communal level, the PALM has been subdivided into four sectors covering each one part of the agglomeration, so called *schémas directeurs*. They provide a higher degree of detail in targeting the perimeters subject to urbanisation and/or transportation measures and are also co-signed by the mayors of the involved communes;
- the perimeters subject to transformations have been further planned by a set of *chantiers d'étude* and master plans. These are the results of planning and architectural competitions, approved by the concerned landowners and the mayors of the communes concerned. Like all previous action plans, these were submitted to public hearing.

⁵¹Categories defined by the typology of the communes used by the FSO.

The cases of Malley and Cheseaux in chapter 5 analyse the role of these plans in the land use policy implementation process. Compared to regular land use planning procedures, the ad-hoc inter-communal bodies and their adopted plans have restructured the land use policy coordination and implementation process: as opposed to regular land use planning procedures, where a commune (or the canton) submits a development project to cantonal authorities, and the plan is adopted by the communal legislative body, the agglomeration master plans have been signed only by the communes' mayors and cantonal representatives (as well as landowners for the small-scale plans), reviewed by the canton and by the Confederation. Once approved, cantonal and communal authorities proceed to the required legal changes (adoption of new zoning and development plans and vote on various lines of credit corresponding to the planned transport and urban development measures). But the choice to realise the urbanisation and transportation measures has already been made, because the federal funding is conditioned on the realisation of these measures.

Emergence of a functional regulatory space

These changes in the coordination and implementation of urbanisation and transport means that the political administrative arrangement has been modified in order to span several policy sectors (urban planning and transport), several institutional territories (27 communes in the agglomeration of Lausanne), and three levels of government. The emergence of such "new form of State action" is comparable to what F. Varone et al. refers to as functional regulatory space (Varone et al., 2013).

Bernese regional governance

A similar and institutionally more profound transformation has occurred in canton Berne, where the elaboration of agglomeration programs was placed under the purview of the canton. In 2011, they were integrated to regional global transport and settlement plans called *Regionale Gesamtverkehr- und Siedlungskonzepte RGSK* (Region Oberaargau and Kanton Bern, 2012). As opposed to agglomeration programs which focussed on cities and their suburbs, global transport and settlement plans cover an entire region. In 2012, the global transport and settlement plans were integrated into a new institutional structure: the regional conferences. The principle of these regional structures was approved by a popular vote on the cantonal level in 2007. These conferences are public law structures with a set of competences, such as the elaboration of the regional structure plan and a transport and settlement plan (RGSK). The regional conferences can also treat matters linked with culture, regional politics or energy policy. They constitute a new political and institutional structure, as they have an executive and a legislative body composed of all the communes within their perimeter. Members have voting rights proportionate to the population of their commune and can adopt lines of credit for the tasks they fulfil (which is not the case in canton Vaud). Their perimeter is based on the administrative regions which have been defined by the Canton.

Air pollution control

An additional action plan that steered the development of the agglomeration of Lausanne is the one including measures to control excessive ambient air pollution levels. Due to excessive imissions of nitrogen dioxide, a set of binding measures for authorities were instituted. These concern the development of public transport and environment-friendly mobility, the reduction of motorised individual vehicles through speed and parking constraints, the reduction of energy needs for buildings, and the optimisation of use of heavy goods vehicles (Etat de Vaud, 2005). The compatibility of the agglomeration's master plan qualified with the measures foreseen by the OAPC⁵². However, as Knoepfel et al. (2010, 291) note, the overall effects of these plans have been limited by their lack of mandatory constraints on the polluters.

Each plan has its function

The increase of action plans in land use policy over the years, shows the growing regulation of activities with spatial impacts and coordination between and across communal boundaries. The cantonal structure plan aims to set long-term objectives and general development trends that the vast majority of actors can agree on. Project-bound action plans are meant to coordinate and stabilise the expectancies of the involved actors, and thus enhance the projects' technical, environmental, financial, and social feasibility. Action plans already define the areas subject to future changes and can set broad zoning options and density ranges, two elements which greatly

⁵²SR 814.318.142.1.

influence economic and ecological outcomes.

At the same time, these action plans also create an obstacle to popular control, because, unlike zoning or local development plans, only some of them are adopted by a formal legislative body (canton Vaud's structure plan is adopted by the cantonal parliament, and Bern's regional plans by the regional conference, if the latter exists). Part of the explanation lies in their recent introduction, which faces an institutional vacuum: for the first time in Swiss land use policy, zoning intentions have been defined on the regional level. The regular land use planning procedure (used for communal plans and building regulations) was not feasible, because it would have required all communal legislative bodies to vote on and approve the regional plan. As of 2016, only the canton of Berne has created a fourth institutional level in Switzerland.

A new form of State action

Considered from the angle of (economic) value and policy instruments, action plans are management instruments with indirect impact on landowners' rights and thus, on value. They allow anticipation and coordination of land use changes by proposing new uses, densities, transportation network configurations, and redefining public spaces, in a chosen perimeter. They do not include any legally binding measure for landowners, but authorities (and landowners) refer to them in the subsequent elaboration of local development plans. This reference shows a decisional shift where communal legally binding instruments are preceded by inter-communal or cantonal non-binding instruments which already set forth broad land use options and expectable economic value.

Centralisation and anticipation of decision-making

2.3.4 Output and local regulatory arrangement

Beyond the ecological, legal, economic, and technical-mechanical aspects of soil management, there are actors with strategies and resources, who implement the rules and shape the results of public action. This section presents theoretical political-sociological aspects which offer explanations for actors' behaviour in policy implementation processes and for the observed gap between the political administrative program, action plans, policy outputs, and the concrete economic and ecological redistributive effects on the resource soil.

The actors involved in the implementation processes are defined by the fact that their behaviours contribute to the structure of the studied object (Friedberg, 1997, 209). Therefore, "every individual or social group concerned by the collective problem addressed by a policy can be considered as a potential actor capable of being part of the "arena" (Knoepfel et al., 2011, 40). Referring to literature from political science and sociology (Bachrach and Baratz, 1963; Lascoumes, 1990; Bourdieu, 1986; Aubin, 2011), R. Schweizer (2015, 139) deconstructs the policy making process (the political games played by actors) into three elements:

Potentially a wide number of actors...

- their configuration (who takes part in the game);
- their power relations and the policy resources they have (which cards do they hold?);
- the strategies they pursue (what do they want to achieve?).

The triangle of actors (exposed in section 2.3.1) accounts for the actors involved in (or excluded from) the political games. The resources which actors possess (or not) and use (or not) account for the cards they hold. R. Schweizer (2015) identifies five ideal typical law activation strategies that actors can adopt:

...pursuing a strategy...

- concretisation/implementation: strategy to implement a rule as closely as possible to its intent;
- innovation/complementation: strategy to develop an ad-hoc solution that goes beyond what is provided by law.
- passivity: strategy not to act, or not to refer to an existing rule;
- circumvention: strategy to resist the implementation of a rule by invoking another rule, or simply not implementing it;
- diversion: strategy to activate a rule for other means than intended by the rule;

Actors' strategies have been studied and defined in various ways (Crozier and Friedberg, 1977; Scharpf, 1997; Jessop, 2001). For the purpose of this research, I use the bridging definition of strategy given by R. Schweizer (2015, 140): "the intentional conduct by which actors evaluate, select and constantly adapt the course of their action to their environment, and to the behaviours of other actors". According to the author, "the gaps between legal rules and environmental outcomes are the result of political processes, within which actors adopt competing strategies with regards to the rules that structure their action" (Schweizer, 2015, 133). Hence, actors' strategies contribute to explaining the outcome of political processes. The author identifies five dimensions inherent to all strategies:

- intention: actors opt for a strategy based on specific intentions, or references and motivations. These can be ambiguous or contradictory and do not have to be (economically) rational;
- selection: actors chose among various courses of action;
- dynamism: the chosen strategy evolves constantly, based on changes in the actor's perception, beliefs and anticipation, unforeseen events, and other actors' behaviour;
- interaction: strategies consist of relational exchanges and are linked to the dynamics of power and domination, two elements where actors' capacities are not equivalent;
- environment: the context in which strategies are pursued is internalised and weighed by the actors, and determines their behaviours.

...and endowed with
policy resources

The actors are endowed with policy resources that they can produce, manage, exploit, combine, substitute or even exchange in order to gain influence on the process of public policy implementation (Knoepfel et al., 2011, 63). Figure 2.3 shows the ten policy resources as identified by the authors⁵³:

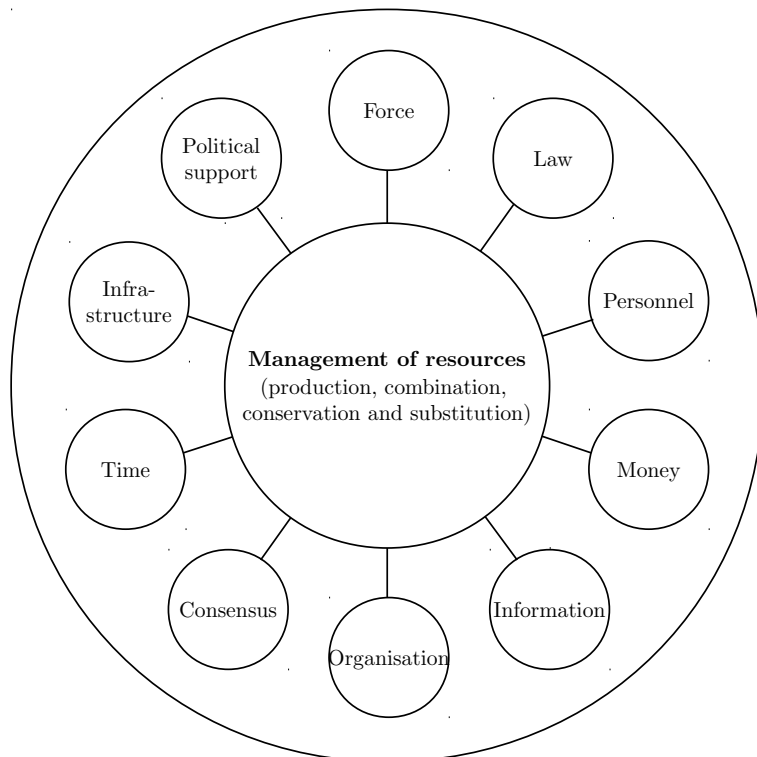


Figure 2.3: Policy resources according to Knoepfel et al. (2011).

Local regulatory
arrangement

The type of law activation strategy chosen, as well as the policy resources available

⁵³An extensive literature review of existing resources' typologies has been done by Knoepfel (2017).

to actors, affects the negotiation process. The result of the actors' configuration (who is present?), of the strategies they pursue (what do they do?) and of the resources they use (how do they do it?) is formalised in the policy output (Knoepfel et al., 2011, 206), the "end products of the political-administrative processes which, as part of the scope of its implementation, are individually aimed at the members of the defined affected groups". Because this output is the result of political games between the political-administrative authorities and the policy's target group on an issue in a given situation or specific place and in a specific moment in time, it is referred to as a local regulatory arrangement (Schweizer, 2015; Bréthaut, 2013; Aubin, 2008). It can contain formal and informal rules (Bréthaut, 2013). As opposed to the "rules in use" defined by E. Ostrom (1990, 47), the local regulatory arrangement does not require the crafting of new institutions in order to overcome the regulation problem; it reflects the temporary compromise that actors have agreed upon. Based on the strategies of actors that have been "successful", the local regulatory arrangement can be qualified according to the five ideal-types used in order to qualify the strategies adopted: implementation, innovation, passivity, circumvention, diversion. The local regulatory arrangement helps to explain, on a local scale (commune, development project), the cooperation mechanisms set up to reinforce or weaken the existing policy design (Knoepfel et al., 2001, 342).

Institutional constraints to actors' behaviours

It should not be forgotten that the explanatory capacity granted to actors' behaviours and resources is also conditioned by institutional and organisational factors. In this regard, an analysis conducted on the strategies of big landowners in Switzerland (communes, the Swiss railways, banks and pension funds, the Swiss army) provides a set of insights (Nahrath et al., 2009a,b):

- the organisational characteristics of the landowner reflects the internal decision rules applying to the owner's land property strategy:
 - organisations with a fragmented power structure and an important veto position by a legislative body face more difficulties to implement a coherent, reactive and effective land property strategy than organisations with centralised or outsourced competences;
 - actors who struggle to pursue their strategy and cannot guarantee their use rights through land markets compensate their difficulties by influencing public policy arenas; they also proceed to a reorganisation of their internal division of competences (see previous point);
- the organisations' types and objectives influence the orientation of the organisations' land management strategy:
 - communes that combine a public policy approach through zoning and a property rights approach through ownership are granted a wide margin of manoeuvrability in urban development projects, but face risks of adverse effects such as poorly located urbanisation, public land speculation, discontinuity of public action if the political majority changes;
 - there is an increased use of public policy by private landowners seeking to guarantee their soil use rights. This is partially due to (1) the increase of land prices that put a strain on the actors' budget and to (2) the (relatively) reduced return on investment provided by formal property;
- the organisations' land management strategy influences effective land uses:
 - actors (managers and tenants) increasingly rely on indirect property titles (shares of companies owning the land);
 - substitution of the traditional patrimonial conception of property through spatially distributed and temporally unstable relationships with investors;
 - landowners can circumvent the rules if they don't fit their own objectives, if their attempt to influence zoning has failed or if planners do not succeed in imposing their rules on the landowners;

A margin of manoeuvrability does exist

These results underscore the complexity of (democratic) decision procedures faced by public authorities in the implementation of the policy design of soil. By contrast, one can see that public and private landowners, developers or investors look for increased flexibility when dealing with land property. Independently of the owner, the use of both private and public law appears to be common in order to achieve the desired outcome. In case the interests of the involved parties diverge too strongly, one can observe circumventions of the established rules. A coherent research framework for our study needs to take into account the margin of manoeuvrability possessed by actors, and how they use it to achieve their goals (de Buren, 2014, 117f).

The present section has shown that beyond the legal context, the type of actors involved and their interactions, the resources they have in order to reach their goals, and the strategies they pursue, influence the policy output, which characterises a temporary arrangement for the implementation of various regulations applying to a specific local situation. The arrangement's degree of coerciveness and discrimination produces, in a further step, economic and ecological effects. I hypothesise that the (expected) creation and redistribution of economic value plays a central role in the negotiation of these arrangements. And because policy instruments are means by which economic and ecological values are created and redistributed, the conditions and modalities of their implementation constitute, together with the policy resources of the actors, the core means actors use in order to achieve their goals.

2.4 Legal incoherences

Prior to the presentation of the analytical framework appearing to offer the most adapted tools for the analysis of the management of the resource soil, it is necessary to review a set of elements that have been outlined in this chapter, and have played a central role in understanding past and present issues of soil management in Switzerland. Further, I need to situate the contribution of this thesis within the wide range of literature presented in this chapter.

2.4.1 Guarantee of property and material expropriation

A Swiss specificity

The most central incoherence in the legal dispositions is between the guarantee of property as defined by the Civil code and the Constitution, and the compensation mechanism in case of material expropriation (Nahrath, 2003). The notion of material expropriation is typical of the Swiss context (Jomini, 2008): as opposed to formal expropriation where the landowner loses their property title, a material expropriation is linked with a public intervention (by the canton or the commune) where the owner loses the ability to make an economically valuable use of its property. The payment of compensation for material expropriation has to be claimed in court by the landowner.

No compensation of lawful acts

As A. Jomini (2008) states, lawful acts of the State are normally not subject to compensation, except in cases explicitly foreseen by the law. With the constitutional revision of 1969, land use planning and private property were both integrated into the federal constitution, the latter together with a paragraph stating the requirement to fully compensate restrictions to property. With the adoption of the federal spatial planning act in 1979, the compensation principle is reiterated in the spatial planning act:

"A fair compensation is granted when land use planning measures restrict the property right in a way equivalent to an expropriation."⁵⁴

Compensation criteria

The political compromise from 1969, reiterated in the 1979 spatial planning act, left two questions open:

1. the source of the funds to be used for paying compensation in cases of material expropriation: after the referendum against the first spatial planning act in

⁵⁴Art. 5 par. 2 SPA, SR 700. Own translation.

1974, the act adopted in 1979 no longer demanded a mandatory compensatory mechanism, but left the choice of implementing the instrument to the cantons. Since 1979, only a small minority of cantons implemented the tax on added land value created through zoning, (mandatory only since 2014). Most communes did and do not have the financial means to pay potential compensation, which has restrained authorities' use of the zoning instrument, and leaves unanswered the question of the financial means available for compensation;

2. the conditions under which compensation is due: the federal legislator delegated to the courts the responsibility to define the conditions under which a landowner whose rights to the economic valuation of his plot had been restricted could claim compensation. The criteria defined by case law are (Moor, 1982; Jäger, 2006)⁵⁵:
 - there is a restriction of use rights, generally the right to development;
 - this restriction applies on a present use or on a use that will occur in the foreseeable future; it can be the consequence of a zone change (building zone to agricultural or protected zone), of patrimonial protection measures, or various other reasons, but not due to police restrictions, (such as the prohibition to build in an avalanche corridor);
 - the plot is located in a building zone compliant with federal law:
 - if the building zone in the communal zoning plan is sized according to the commune's needs for the next fifteen years⁵⁶, the situation is considered an effective "out-zoning" (*déclassement* – *Auszonung*) which can lead to compensation;
 - if the communal zoning plan does not comply with federal law, the situation is classified as "non-zoning" (*non-classement* – *Nicht-Einzonung*);
 - when the restriction is adopted, the plot is legally constructible⁵⁷, connected to the sewer, it does not require clearance or the adoption of a local development plan;

Material expropriation was conceived as an incentive for the landowner to comply with the zoning plan (Ruegg, 2000, 15). The persistent problem of oversized, undeveloped building zones shows that the *carrot* did not work as intended. Landowners benefited from the situation in two ways:

Landowners won three times

1. their property received a substantial added value if zoned as building zone;
2. they were not required to pay a tax (except the real estate gains tax in case of alienation);
3. they are also constitutionally protected against the reduced value their property would suffer if it is zoned.

In 2014, the tax on added land value created through zoning was reintroduced as a compensatory instrument whose gains are primarily to be used for compensations⁵⁸. But the question of the availability of funds for compensation remains salient for several reasons:

Compensation issue remains acute

- since 2014, there has been a moratorium on all building zone extensions in place until the adoption of the cantonal structure plan as new federal law (or an obligation to compensate the building zone extension by a building zone reduction of the same surface);
- as a consequence, the cantons will not have the necessary funds to proceed to the necessary zoning for several years, because this requires the accumulation of funds through several extensions of the building zone prior to any "out-zoning";

⁵⁵See also ATF 91 I 329.

⁵⁶Art. 15 par. 1 SPA, SR 700.

⁵⁷ATF 105 Ia 330.

⁵⁸art. 5 par. 2 SPA, SR 700.

- only a portion of the funds accumulated are collected on a cantonal scale (at least in the canton of Berne and Vaud), because communes and canton share the tax revenue. In case compensation is due, the question of the amount paid by each level of government still needs to be solved;
- the cantonal definition of the instrument (or the lack of a cantonal per-equation for funds dedicated to compensations) is problematic, because of the unequal distribution of oversized building zones between cantons (*e.g.* urban cantons like Geneva compared with rural cantons like Valais and Fribourg). As such, cross-cantonal payment of compensations are not possible;
- finally, even with available funds, the correct dimension and location of building zones remains uncertain, because of the high reluctance of communes to proceed to “out-zoning” operations (see the cases of Huttwil and Cheseaux);

Until 2014, landowners often successfully opposed public intervention, as the relation between unconditional private ownership and increasingly restrictive public intervention remained ambiguous (Knoepfel and Nahrath, 2014, 771). It is not currently possible to anticipate if and how the problem of oversized and badly located building zones will be solved.

2.4.2 Economic freedom and sustainability

The balance of interests

Another wider problem of coherence is linked with the constitutional principle of sustainability⁵⁹, which is also a core concept of spatial planning (Mahaim, 2014, 121). The finite character of the resource soil and its non-renewability (or limited re-usability) makes the economic use of soil (*mesurée – haushälterisch*) the guiding principle of its use and implies a shift towards a resource oriented (environmental) law (Mahaim, 2014, 139). The incoherence between economic freedom and sustainability materialises, for example, when the cropland protection plan and the regional economic promotion collide (see for example the case of Niederbipp, section 4.3 in chapter 4).

Economic freedom and resource management

With the adoption of the revised Constitution in 1999, both sustainability and land use planning have become more closely integrated. Currently, this restriction is not conceived as an absolute limitation, but as an equilibrium between nature and its use by humans. However, the balance of interests is often checked when the “competitiveness” criteria stemming from economic freedom is taken into consideration: according to J.-B. Zufferey (2001), this distortion is acceptable as long as the primary aim of the land use planning measure is not of economic nature. However, the specific nature of soil – the fact that it is not an ordinary commodity (it cannot be destroyed and a plot’s location has unique attributes)– creates *de facto* a distortion of competition (Mahaim, 2014, 181) and turns every land use planning measure into a restriction of economic freedom⁶⁰. The inverse is that economic freedom becomes reality only through the land use planning process itself, which grants a place to exercise this freedom.

The question, therefore, is the relevant degree of economic freedom needed to implement sustainable resource management. In order to establish this limit, consideration of the economic, social and environmental dimensions of sustainability are necessary, and, based on a set of criteria, a movement towards a balance of interests (Mahaim, 2014, 173ff). This precision of this balance of interests justifies the importance of studying redistributive processes in land use policy. The hypothesis underlying the research of this thesis is that a more sustainable solution requires a limitation of the expected value of the economic, social and environmental dimensions, (the redistribution of the created value– particularly the economic one), in order to achieve this balance.

⁵⁹Art. 2 and 73 Cst, SR 101.

⁶⁰ATF 99 Ia 604.

2.4.3 Economic promotion and land use policy

Economic promotion occurs primarily through cantonal and communal initiatives (Waltert et al., 2010): authorities advertise in neighbour countries, and advise and financially support the creation of new companies or the extension of existing ones within their territory. Economic promotion plays a significant role in land use policy, because it is correlated with the development of open land and the extension of industrial land (Waltert et al., 2010, 42). Although industrial land accounts for a small portion of urbanised surfaces, it has grown substantially over the last decades (FSO, 2014a).

Between 2005 and 2015, canton Bern budgeted 11 million francs per year for economic promotion. Until 1997, canton Bern combined economic promotion with a land fund, which provided land to interested companies⁶¹. The latter was dissolved in 2008 (Kanton Bern, 2012).

In 2007, canton Vaud dedicated 6 million francs to similar tasks (Canton of Vaud, 2009b). In 2015, 17.5 million francs were budgeted for deposits and direct financing of investments in industrial production, research and development, and 11 million francs of subventions to private companies were paid (Canton of Vaud, 2016).

In combination with economic promotion, both cantons defined priority development areas, which aim to develop pre-defined perimeters for industrial or other economic activities. These building zone extensions, much like zones dedicated to employment in general, were often zoned by the canton or were under cantonal supervision, and, until the 2014 spatial planning act revision, not included in the calculation of the building zone needs of the next fifteen years (Kanton Bern (2011, 35,57) and Canton de Vaud (2013, 198ff)).

2.4.4 Grandfather clause

The grandfather clause (*Besitzstandsgarantie – garantie des droits acquis*) is a legal principle embedded in the constitutional order. It relies on the guarantee of ownership (art. 26 Cst) and the principle of non-retroactivity of legislation: according to the Federal tribunal⁶², in land use planning issues, the grandfather clause limits the implementation of more restrictive legal dispositions (compared to former law) to cases where an important public interest exists and as long as the principle of proportionality is preserved.

Cantonal legislation on the application of the principle differs: canton Vaud allows the renovation of existing buildings as long as buildings meet the purpose of the zone they are located in; however, they prohibit the extension or reconstruction of existing construction. Canton Bern allows for the transformation and extension of existing construction, as long as these works do not increase the illegal character of the construction in question.

The grandfather clause implies that a reduction of use rights is limited to specific cases in which public interest requires such reduction, and that any case potentially implying a redistribution of access and use rights requires compensation. However, as it was shown earlier, in the case of material expropriation, the payment of compensation depends on a set of criteria whose fulfilment is to be considered individually for each case.

2.4.5 Acuteness of redistributive issues

Existing research on economic and/or ecological value redistribution and its effects on soil uses are rarely centred on redistributive issues. As section 2.3.2.3 on the instruments' effects has shown, several research areas exist. A significant amount of the research in Switzerland stems from economics and focus on market or incentive-based instruments such as transferable development rights and the land service tax (Winkler, 2005; Gmünder, 2004; Cavailhès et al., 2004; Süess and Gmünder, 2005; McConnell et al., 2007; Gmünder, 2010; Menghini, 2013). Legal scholars have studied the legal compatibility of such instruments within the existing legal framework (Epiney, 2003). Another research area we have drawn attention to deals with ecological

Primacy of economic approaches

⁶¹Art. 17 of the *Wirtschaftsförderungsgesetz vom 12. März 1997*, SR-BE 901.1.

⁶²ATF 113 Ia 119.

compensation mechanisms. Their authors primarily take an economic approach and tend to focus on the instruments' mechanism, rather than on legal or actor-bound aspects (Napoléone and Geniaux, 2011; Napoléone and Calvet, 2013; Chabran and Napoléone, 2012).

Analysis of single instruments

Other redistributive instruments such as land readjustments or the land improvement syndicate have also been analysed from a planning perspective: research has shown that these instruments can be used as a value capture tool (van der Krabben and Needham, 2008), but also to supply land for development at the right time and place (Weber et al., 2011).

Apart from instrumental research, socio-political approaches to urban projects (Pinson, 2004; Pflieger, 2013a) emphasise changing actors' dynamics in urban renewal processes. The Swiss legal framework that characterises the management of the resource soil, its evolution and effects have already been analysed in detail (Nahrath, 2003).

The research gap I intend to fill

The research gap I intend to address consists of a combination of approaches through a legal, economic, and socio-political analysis of the actors' use of (combined) public and private law instruments, and of these uses' redistributive effects in terms of economic and ecological added and reduced values. In recent years, economists have increasingly dealt with the question of the allocation of resources. But resource (re-) allocation is determined by the State. This makes the question of redistribution a more fundamental question of power: allocation and redistribution of value is achieved through political processes in which actors fight in order to obtain their share. Economics explains the allocation of resources through the price system, but limits the analysis to a comparison between a current situation and a more desirable situation, which is supposed to be achieved with specific types of instruments. But prior to suggesting market-ready solutions for power issues, it is necessary to reveal what the actors' negotiations on and surrounding soil or land are about. Redistributive issues linked to soil, but also more generally to wealth, are more acute than ever in the twenty-first century (Piketty, 2013, 247f). Swiss legislative changes have set objectives for coming closer to a sustainable use of resource soil. The project within which this thesis is written aims to provide knowledge on past and potential achievements in regard to the resource's use, and provide insights on what does and does not work, how it works, and what effects it produces. The present thesis tackles this challenge by analysing past actors' behaviours and interactions regarding existing policy instruments, and the effects produced in terms of economic and ecological value redistribution.

2.5 Institutional resource regime

2.5.1 Institutional economics and public policy analysis combined

Section 2.3 on public policy and section 2.2 on property rights and economics have shown that public and private law are relevant in order to understand how actors' uses of the resource soil is framed by legal institutions. Further, in order to explain the produce of State intervention and fill existing literature gaps, policy instrument scholars have emphasised the importance of considering instruments' mixes as well as indirect forms of public action (Peters, 2005).

A resource oriented approach

As P. Knoepfel et al. (2007, 471) argue, public policy analysis gives us the tools to analyse State intervention and products (political-administrative program, action plans, outputs, effects) as well as conceptualise joint resource uses (different users with different uses of the same resource). But it also tends to neglect the various policies' potentially opposed influences on the use of a natural resource and ignore general market and State regulations. Further, a public policy perspective only marginally considers the disposal and use rights linked with property titles, (which are at the core of institutional economics), together with notions of the goods and services that a natural resource provides. Notions of exclusion and subtractability are central to the Ostromian conception of natural resource (Ostrom, 1990, 30ff). Through the combination of both approaches, the institutional resource regime (IRR) framework diagnoses the current state of regulation on a resource system: it analyses the causal

relationships between the institutional setting, the actors who own and/or use the resource, and the goods and services derived from the resource (Nahrath, 2003, 28).

Further, the IRR framework allows for the integration of the three main conceptions of sustainability (Knoepfel et al., 2007, 460ff):

- traditional environmental policies, which restrict the emission of pollutants, without any consideration of the absorption capacity of the resource. In the case of the resource soil, the absence of absorption capacity of the resource is conveyed by the obligation to dimension the building zones according to future needs, focussing on development needs and neglecting others;
- sustainability policies: regulate the sustainable use of the goods and services produced by the resource, and "take for granted that it is possible to obtain a sufficient quantity of resource units in the form of goods and services; yet this is far from evident." (Knoepfel et al., 2007, 462). In the case of resource soil, an example of how this conception applies is found in the agglomeration programs, which coordinate housing and employment with the transport infrastructure (see also the discussion of the empirical findings in chapter 6);
- the sustainable development postulate, which focusses on the reproductive capacity of the resource via the definition of a global quota: this conception requires the definition of an extractable amount of resource units in a given time and space that do not threaten the renewal of the resource (Knoepfel et al., 2007, 465). In the case of the resource soil, this conception applies for example to natural and biodiverse areas or close-circuit farming land.

As shown in figure 2.4, the institutional resource regime framework distinguishes two sources of regulation:

Combination of private and public law elements

1. the property rights system, which is defined as "all of the formal property rights, as well as all of the rights of disposal and use arising from them, that apply to a resource" (Knoepfel et al., 2007, 481). Property rights define the rules of ownership on the resource and the appropriation of the goods and services derived from it;
2. the policy design: the sum of "the substantial and institutional elements relative to the programming and implementation of all use and protection policies affecting the management of a resource." (Knoepfel et al., 2007, 475). Public policies influence the rules of ownership and appropriation of the goods and services derived from it by defining use rights, regulating the access to the resource for non-owners, and imposing exploitation and/or protection constraints (Varone and Nahrath, 2014).

Based on this twofold distinction, the framework proposes four modes of regulation which apply to users and/or owners of a natural resource (Knoepfel et al., 2007, 478ff):

Four modes of regulation

1. regulation through public policies without repercussions on property rights, *e.g.* through informational or incentive-based instruments such as, subsidies, taxes, or minor prescriptions (*i.e.* limits between construction);
2. regulation through public policies with repercussions on property rights, (for example zoning and or building regulations), which prohibit certain uses and limit the dimensions of construction;
3. regulation through the definition of the use and disposal rights inherent to property: this was the case with the introduction of condominium property in 1965; the prohibition of acquisition of agricultural land by non-farmers; easements;
4. regulation through the definition of the structure of distribution of property titles (definition /change of the rights holder): it includes contractual agreements such as sale and acquisition, but also expropriation, nationalisation or privatisation of property titles.

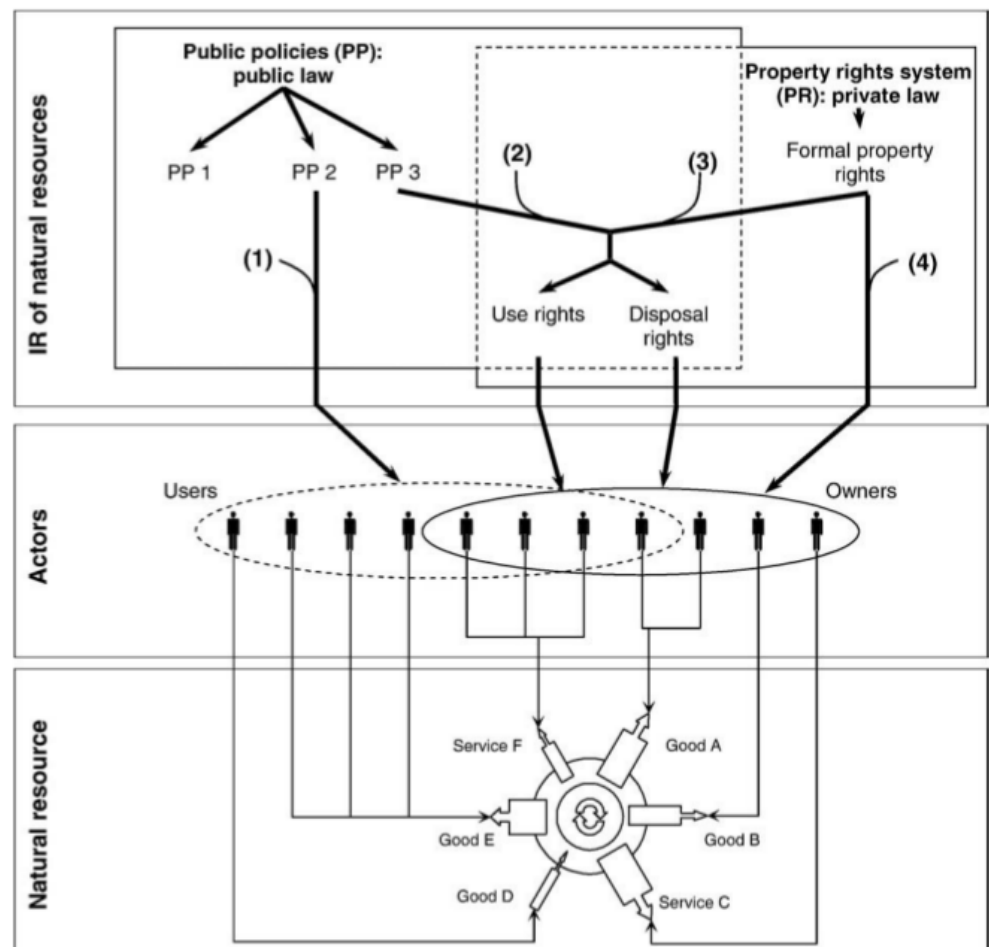


Figure 2.4: Institutional resource regime framework combining regulation by the policy design and the property rights system (Gerber et al., 2009).

These four modes of regulation allow for the classification of the instruments affecting soil users and owners. Table 2.14 shows how and if instruments impact use and disposal rights of a resource. The first logical observation is that private law instruments re-define property rights with an impact on the scope and content of use or disposal rights (3) or by re-defining the structure of distribution of property title (4); public law instruments work through policies with (2) or without (1) impact on use and disposal rights.

As table 2.14 shows, a wide range of public policy instruments do not impact use and disposal rights, although one could argue that the various tax instruments can, in specific cases, force the owners to sell if they do not have the necessary funds to pay the tax on added value created through zoning. One instrument, the land improvement syndicate, combines two methods of intervention – public policies and property rights – joined in a public law legal basis. Another element is that a couple of instruments are anchored both in private and public law, (such as mortgages, or concessions). Other instruments that modify disposal rights are only anchored in public law, such as pre-emption right (in Canton Geneva only). The rail and property development models, or more generally public private partnerships, entail a mix of instruments composed of both public (zoning, plot ratio, development obligations) and private law (concession, building right, contracts) instruments that can cover the four modes of intervention. Their impact on value creation and redistribution depends on the modalities negotiated between authorities and landowner/developer (Pflieger, 2013a).

Private law instruments use a contractual basis: they mix obligation and voluntary agreements. They allow definition of most various restrictions on private property, as long as they do not contradict public policies. To mention a few examples: an emption right can oblige the landowner to provide a given use (development, land service) within a given period of time, easements can oblige the landowner to provide a right of way or pipes on their plot; a building right can oblige the lease holder to use the land for a specific use (craft activities, social housing, etc.) and at a fixed price. Private law instruments offer a full range of possibilities that do not exist in public law. The increased mix of instruments in development projects constitute a basis in order to formulate hypotheses on authorities' use and combination of instruments in the implementation of land use policy.

Four types of instruments

Few public policy instruments impacting disposal rights

Instrument mix as turnkey solution?

Instruments	(1) Public policy instruments with no impact on property rights	(2) Public policy instruments with impact on property rights	(3) Property rights instruments with impact on use or disposal rights	(4) Property rights instruments with impact on the distribution of property titles
Land exchange				X
Land buy/sale				X
Restriction of acquisition of agricultural land			X	
Repurchase right			X	
Emption right			X	
Preemption right			X	
Easement			X	
Building right			X	
Land betterment				X
Real burden			X	
Gift/donation				X
(Legal) Mortgage			X	
Mortgage certificate			X	
Encroachment			X	
Right for pipes, right of way, right to use a water source			X	
Usufruct			X	
Zoning/local development plan		X		
Building regulations	X	X		
Land valuation	X			
Inventories of sites	X			
Cropland protection plan	X			
Expropriation		X		X
State pre-emption		X		
Building permit	X			
Environmental impact assessment	X			
Surveillance and investigation obligation	X			
Remediation obligation	X			
Prohibition to introduce polluting substances	X			
Mandatory land service and sewer connection	X			
Maximum emission and imission values	X			
Groundwater protection areas		X		
Land improvement syndicate		X		X
Concession			X	
Wealth tax	X			
Real estate gains tax	X			
Land property income tax	X			
Land tax	X			
Land use steering tax	X			
Tax on added land value created through zoning	X			
(Extended) Land service tax	X			
Waste disposal tax	X			
Economic promotion	X			
Home ownership subsidies	X			
Subsidies for contaminated sites	X			
Public hearing	X			
Self-control of producers	X			
Polluter pays principle	X			

Table 2.14: Impact of land use policy instruments on soil use and/or disposal rights.

2.5.2 Qualification of the institutional regime of soil

The two sources of regulation – public policies and private law – create coordination issues and require the resolution of contradictions between legal sources, as well as within legal sources. In order to characterise institutional resource regimes, the authors distinguish three criteria (Knoepfel et al., 2007; Gerber et al., 2009; Dupuis and Knoepfel, 2015):

- coherence refers to the degree of clarity and coordination between the regulations of the regime. One can distinguish between:
 - internal coherence of the policy design: the coordination between public policies which govern the use and protection of the resource considered;
 - internal coherence of the property rights system: "the clarity of the definition of the property titles or the use rights arising from them" (Knoepfel et al., 2007, 487);
 - the external coherence between the policy design and the property rights system refers to the connection between the target group of the public policy and the holders of rights as defined in the property rights system;
- extent refers to the "proportion of goods and services regulated in relation to those actually in use" (Gerber et al., 2009, 805), a criterion that allows for the assessment of which goods and services derived from the resource are currently regulated (or not);
- strictness "is a measure of the coercive force represented by the institutional regime. A strict regime has a considerable number of obligations that impose defined and detailed behavioural norms [...]. [It] leaves little scope for manoeuvrability to the actors of the management process [...] [and] has the advantage of being more predictable and comparable." (Dupuis and Knoepfel, 2015, 25f). This strictness can be observed within a public policy when it comes to the link between the objectives of a policy, the instruments that are foreseen and their effects on the target group, as well as between public policy and property rights, (for example when public policies lack coercive power to actually restrict the use rights of users on a resource).

Until 2014, the Swiss institutional regime of soil could be qualified as complex (Nahrath, 2003, 178):

- the extent of the regime is wide, as most soil use is both quantitatively and qualitatively regulated. The 2014 revision introduced a cantonal building zone quota defining the overall amount of surfaces of unbuilt building zone available to each canton for development during the next fifteen years. These quotas gave a higher precision to the 15 years rule established in 1979. Over time, increasing use of both the underground and the air have challenged the vertical limits to property. These limits remained vague until recently, and now pose new regulatory challenges (Carrel, 2015);
- before 2014, the regime's coherence was moderate, because there was no mandatory coordination between property rights (or the principle of compensation in cases of material expropriation) and land use policy. Since the 2014 revision of the spatial planning act, the regime's coherence can be qualified as moderate: the missing link between property rights and land use policy has been filled, but at the cantonal level, which prohibits the proper relocation of zones across cantons. Further, the increase in public policies pose additional restrictions on soil use rights and blur the link between target groups and property title, as well as use-right holders (Nahrath, 2003, 178). Considering the acuteness of redistributive issues discussed in the previous section (2.4), the question of coherence should be reconsidered from the angle of value and its appropriation;
- in terms of strictness, actors have various policy resources and instruments at hand, and can adopt various strategies. Depending on the regime's strictness, there are various ways to implement regulation, and actors might follow one

2014 legal revision enhances the regime's coherence

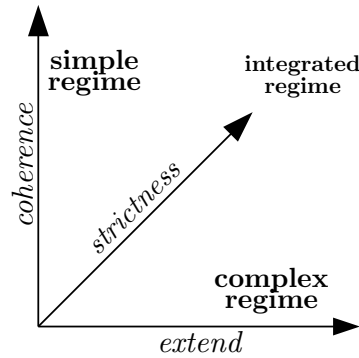


Figure 2.5: Coherence, extent and strictness of the institutional resource regime theoretical framework (Gerber et al., 2009; Dupuis and Knoepfel, 2015).

or another, depending on the predictability of the outcome, the coerciveness of implementation (Dupuis and Knoepfel, 2015), and the margin of manoeuvrability at their disposal (de Buren, 2014). This recent theoretical addition to the resource regime framework has been analysed by Dupuis and Knoepfel (2015) for the policy of contaminated sites; the institutional regime of soil still needs this analysis.

Both before and after the 2014 spatial planning act revision, the institutional regime of soil qualifies as complex, because it uses and goods and services derived from the natural resource regulated by a set of public policies and property rights that pursue partially contradictory objectives and do not prevent an overexploitation of the resource. Although the 2014 revision has resolved some contradictions, the question of redistribution is more acute than ever.

2.6 Conclusion

In this chapter, I have presented a set of ecological, legal, economic and political explanatory factors that constitute the theoretical framework of this research. The main insights gained through this review of the literature can be synthesised as follows:

1. ecological knowledge on soil displays a lack of consensus in the literature on how to measure the ecological value of soil, not just because the creation of a synthetic indicator is highly complex, but also due to the fact that the soil's ecological value depends upon the services it provides to humans, which change over time. Further, certain land use are practically irreversible, because the renewable dimension of soil takes place on a completely different time scale than those of human interactions. However, one rather easy, measurable criteria to assess the ecological value of soil in a generic/polar way exists: its consumption, seen through its development or sealing. For polluted soils, the degree of pollution (according to the legally defined maximum values or the possible spread of pollution) can function as an assessment tool;
2. the legal basis of property are central to analysing land use, because they reflect and define how society currently conceives soil, (primarily as a commodity), and how the use and appropriation of this commodity is regulated, exchanged (through a market) and valued beyond its use (through a mortgage);
3. economic theory has provided a set of explanations on the specificity of the resource analysed: the differential and residual attributes of rent make land a specific good compared to other commodities. In addition to the exchangeable and mortgageable characteristics of the property title, it confers the capacity to appropriate rent on its owner. Hedonic pricing models have provided a set of explanatory variables seeking to justify the price of land;

4. public policy analysis has shown the emergence and the evolution of the public problems that regulations on soil intend to solve. The three public problems all contain redistributive implications, in terms of economic and ecological value, an angle from which (policy) instruments are considered and possess the two analytical dimensions that this thesis uses to assess the effects of land use policy processes. Further, the concept of local regulatory arrangement allows for qualification of the output of the policy process by comparing the results of actors' games to the legally defined objectives.
5. instrumental theory has shown that the tools are at the core of public and private action and that the study of their characteristics, of their implementation and withholding by actors, can provide fruitful insights on actors' privileged types or combinations of instruments, and on the effects produced in reality. Further, their situation in the implementation process – "between" authorities and the policy's target group –, constitutes a fruitful field of research for political science, because it allows for the unveiling of how public policy results are produced;
6. the analysis of the main conflicting issues in the soil's regulations has shown that certain contradictions have been reduced over time, but others, more fundamental ones, have been brought to the centre of attention: the link between economic freedom and land use regulations, as well as general redistributive issues and ecological problems (*i.e.* the loss of fertile soils, biodiversity and subsequent climate change);
7. the institutional resource regime framework has proven to be the framework most adapted for considering the entire legal setting regulating the resource soil: it combines a property rights approach focussing on the resource's disposal and use rights, and a public policy approach that considers all public policies regulating the studied resource. By adding an analysis of actors' games, strategies and the policy instruments they mobilise, and the resources they use and exchange, I have a robust theoretical setting for formulating hypotheses and analysing the empirical findings of the case studies.

Having set in place the cornerstones of the analysis, the next chapter presents the consolidated conceptual framework adopted, and the hypotheses I formulated. These elements constitute the scaffold for the conduct of the empirical analysis and the comparison of the results obtained.

Chapter 3

Conceptual framework, hypotheses and methodology

Answering the research questions defined in the introduction with the help of the theoretical elements exposed in the literature review (chapter 2) requires the definition of conceptual framework (figure 3.1), the definition of research hypotheses (section 3.2), and the elaboration of the methodological approach (section 3.3) which guides data collection and analysis.

3.1 Conceptual framework

A precise definition of the research object requires us to set a starting and an ending point for the analysis. The research process first consisted of categorising the dynamics behind land use policy in distinct steps. Relying on conceptualisations of the policy cycle (Parsons, 1995; Knoepfel et al., 2011), as well as on existing literature on Swiss land use planning and environmental policies (Nahrath, 2003; Knoepfel et al., 2010), I categorised soil related policies in four broad steps: the definition of a public problem, the programming of a public policy, the implementation of the policy, and its evaluation.

Second, based on existing research on Swiss land use planning and environmental policies, I identified past and existing public problems linked with soil (see section 2.3). Their variety required to concentrate on a reduced number of issues persistent in time, which would also be present in the different perimeters to be analysed (see section 3.3.1). Based on existing research on land use policy in the Swiss context (Jaeger et al., 2008; Schwick et al., 2013; Nahrath, 2003, 2005; Nahrath et al., 2009a; Knoepfel and Nahrath, 2014; Dupuis and Knoepfel, 2015), I opted for an analysis focussing on economic and ecological value redistribution. In a political science perspective, the focus on redistributive stakes put actors at the center of the analysis, because redistribution questions the winners and losers of public policy processes (Knoepfel et al., 2011, 60). Focussing on the redistribution allows to narrow the analysis to the implementation stage, when public-administrative authorities intervene on target groups in order to modify their behaviour. Another possibility would have been to focus on the programming of public policies (Linder and Peters, 1989; Varone, 1998), which would reflect actors' perceptions on the instruments' potential effects and explain the choice of instruments. The perspective adopted here aims to understand in detail policy instruments' use in the field and explain the arrangements negotiated with target groups (see section 2.3.2.3). Consequently, the implementation stage is the main step to be analysed.

Third, in order to explain the phenomenons to be observed, the analytical framework to be set up has to account for various elements, as the literature review in chapter 2 suggests: the institutional setting embedding policy processes (Gerber et al., 2009; Radaelli et al., 2012; Kuhlmann and Wollmann, 2013), contextual factors that condition the uses of land plots (Sirmans et al., 2005; Quigley and Rosenthal, 2005), actors, their resources and interactions (Knoepfel et al., 2011), and the results produced by the policy process (Bussmann et al., 1997; Salamon, 2002). The combination of these elements allow to elaborate a new conceptual framework to be used in this

thesis (figure 3.1). Reading from the right to the left – moving the causal chain upwards –, the conceptual framework (figure 3.1) is composed of the following variables:

Dependent variables

In policy evaluation literature (Bussmann et al., 1997; European court of auditors, 2015), consequences of the political processes on target groups and end beneficiaries are often referred to as impacts and outcomes. I consider outcomes or expected outcomes – in case these only exist in the form of a binding output – in order to measure the potential gap between policy objectives and the results of implementation processes (Schweizer, 2015, 142)¹. The measurement of this gap has been at the centre of research using the institutional regime (IRR) framework (Dupuis and Knoepfel, 2015; Schweizer, 2014; Bréthaut, 2012; de Buren, 2014). Referring to R. Schweizer (2015, 142), the concept of local regulatory arrangements (LRA) is used in order to qualify this potential gap based on five ideal-types: innovation, concretisation, passivity, diversion, circumvention.

The LRA as gap between policy objectives and outcomes

Beyond the policy implementation outcomes that allow us to characterise the LRA, I define the variable "redistributive effects" in order to describe the value transfers that occur between actors. I classified the redistributive effects into *features* that characterise theoretically and empirically identified aspects of value redistribution (see table 3.1 below): the redistribution among actors refers to the actors identified by policy analysis, the spatial dimension refers to the geographical implications of value redistribution, the value dimensions refer to transfers among ecological and economic value dimensions.

6 features of value redistribution

I focus on the economic and ecological dimensions of value, in accordance with the main public problems linked to land use policy since the 1970's (see their successive definitions in section 2.3.1). Other dimensions of value, such as social and cultural dimensions, are considered indirectly: redistributive effects across actors analyses the redistribution of economic value, that is to say capital flows, between actors. These capital flows are then reinvested in order to achieve land use change, which in turn impact other value dimensions: the provision of housing, employment, and sports facilities create social value, nature protection or restoration creates ecological value, public infrastructure such as schools, museums, and theatres create cultural value. In other words, the behavioural change of actors induced by the analysed land use policy processes impacts a variety of public problems meant to be solved. Taking into consideration these behavioural changes (such as the provision of housing, or the construction of a museum) allows to account for the impacts on the social and cultural value dimensions.

I hypothesises that for the intermediate variable the redistributive effects create a feedback loop, because actors expect these redistributive effects and negotiate the arrangement continuously during the implementation process in order to minimise them. The dashed arrows that connect the redistributive effects with the independent variables are less observable feedback loops, which represent the redistributive effects' longer-term influence on the model's explanatory factors.

Feedback loop as anticipated effects

The "definition of the public problem" stage is not represented in the conceptual framework, because it is defined prior to the public policies that constitute the institutional regime of soil. However, for purposes of understanding, it is described in the case studies (chapters 4 and 5) and sketched in the cases' summaries (chapter 6). As suggested by L. Salamon and Lund (1989, 40f), the goal is not to test the theory behind the program, but to identify whether the program utilises mechanisms that allow to test the program's theory.

How do tools impact the program's functioning?

Intermediary variables

The intermediary variable "actors' configuration, instruments' use and strategies" constitutes the core of the analysis, because it determines the implementation of rules (institutional regime) in a given context (contextual factors). It is composed of three elements:

¹Please refer to chapter 2 for a presentation of policy objectives (section 2.3.2.1) and of the policy outputs (section 2.3.4).

1. the actors involved in the implementation of the institutional regime's public policies, and their position in the institutional implementation process. Their configuration varies depending on the implementation process analysed. The involved actors are: the political administrative arrangement, the target groups, the third parties (winners and losers), and the end beneficiaries;
2. the strategies of these actors, the objectives they pursue as compared to policy goals, and how they pursue these objectives. As analogy to the output of each political process (the local regulatory arrangement), the strategies adopted by actors can be qualified according to five dimensions;
3. the type of instruments they use and the resources they have (or lack), mobilise (or not), and exchange (or not) in order to achieve their goals.

Independent variables

Regime as marginally varying variable

The variable "institutional regime of soil" contains all public and private law regulations that apply to the management of the soil natural resource. This "variable" only marginally varies, because the institutional context is similar in the cases analysed. However, it serves as a point of reference for variations observed in the local regulatory arrangements. Further, I put a particular emphasis on the type of instruments used to regulate the actors' use and disposal rights on the resource, because these instruments influence the actors' games, the local regulatory arrangement and the redistributive effects of the implementation process. As seen in chapter 2, theory distinguishes four different types of instruments, depending on their legal basis (public or private law) and their effects on the use and/or disposal rights of the resource users and owners (Gerber et al., 2009). The variable is independent, because the institutional regime is considered a contextual element of particular importance in a political system based on the rule of law (Gerber et al., 2009). Further, from an institutional perspective, these rules change marginally over longer periods of time.

Long time factors

The variable "contextual factors" contain various explanatory factors provided by the literature, such as: past demographic evolution, land prices, the ecological value of soil and its physical structure, available transport infrastructure, travel distances to centres and locational characteristics derived from hedonic models (Sirmans et al., 2005). These factors are given elements which either change marginally, or over periods of time that exceed those of individual policy implementation processes.

Choice of a functional perspective

The chosen approach focusses on the implementation of instruments and on the games actors play in the course of negotiating local regulatory arrangements. I opt for a functional perspective that defines instrument as a tool to achieve policy objectives. Based on the political construction of the public problem to be solved (the lack of coordination between the diversity of uses and user groups that hampers a quantitative protection of soil), I study in given contexts how public and private actors, that have specific resources and are embedded in power relations, interact with the existing institutional regime of soil in order to fulfil, innovate, circumvent, or divert land use policy objectives. The results of these interactions are summed up in local regulatory arrangements, *i.e.* the policy output specific to chosen land use planning processes. These arrangements produce redistributive effects that I categorise along a set of theoretically and empirically defined features.

Summary of the variables' operationalisation

Based on the conceptual framework exposed in figure 3.1, table 3.1 presents an operationalisation of the variables used in the empirical analysis. Except for the redistributive features, which are commented on in chapter 6, the variables' indicators have already been detailed in the theoretical framework (chapter 2). Therefore, I do not comment on them further here.

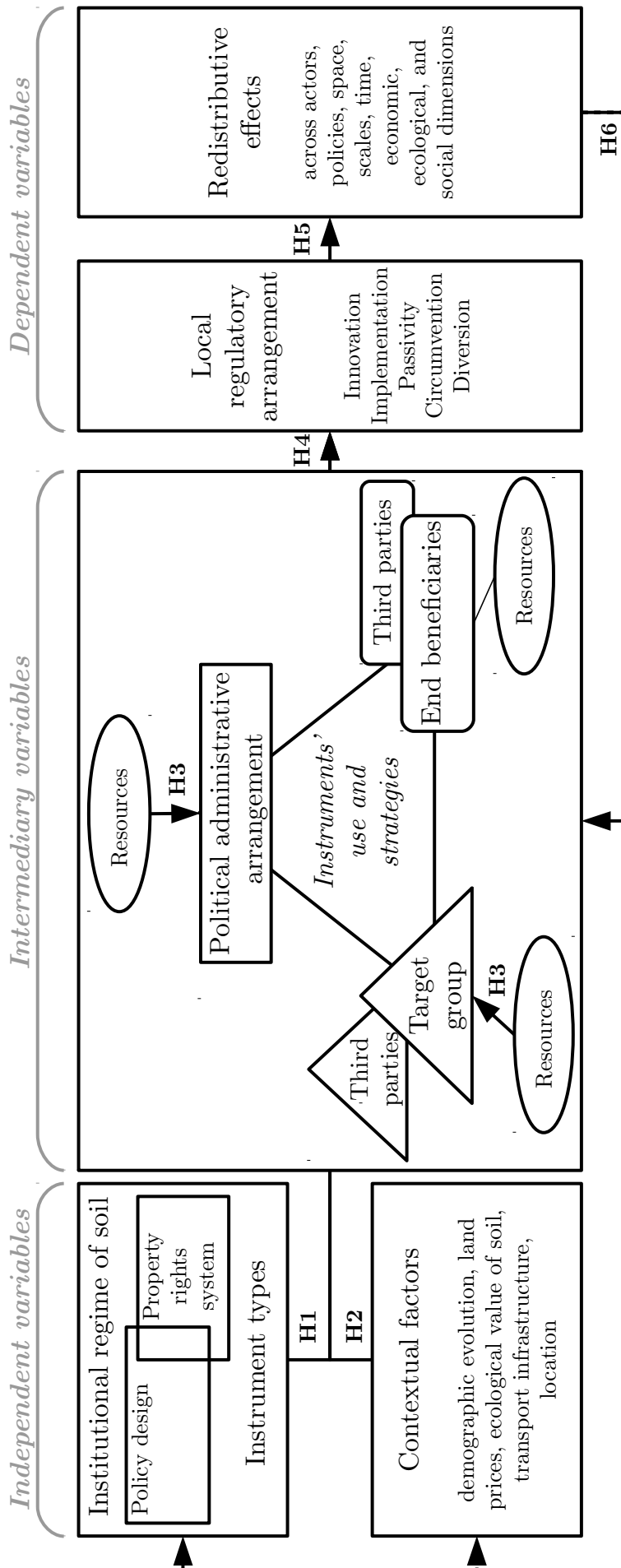


Figure 3.1: Conceptual framework.

<i>Variable</i>	<i>Indicator</i>
Second dependent variable – redistributive effects	
Across actors:	Economic value redistributed among political-administrative authorities, target groups, end beneficiaries, and/or third parties: who benefited or lost from the added and reduced values created in by the redistributive process' LRA
Across policies:	Economic value redistributed among policies and property rights that constitute the institutional regime of soil: what policy or property right created, reduced, or redistributed value to what other policy or property right
Across space:	Spatial relocation of economic or ecological value, extension and/or reduction of the perimeter affected by the LRA (contiguous plots or not, or plots in the same or in another commune)
Across scales:	Capture and/or distribution of economic value between levels of government
Across time:	Duration of the redistributive effects: punctual, for a determined time period, permanent
Across value dimensions:	Redistribution of economic, ecological or social value to another value dimension(s)
Dependent variable	
Local regulatory arrangement:	Comparison between the institutional regime's rules and objectives and the (expected) outcomes of their implementation and qualified according to five ideal-types (Schweizer, 2015): implementation, innovation, passivity, circumvention, or diversion
Intermediary variables	
Actors, coalitions and oppositions:	Identification of actors with common or diverging objectives and/or strategies, providing support to each other or involved in a conflict
Actors' strategies:	Identification of the means chosen in order to achieve their objectives
Policy resources:	Identified lack, mobilisation, or exchange of one or several policy resources out of the ten resources defined by Knoepfel et al. (2011). In order to avoid the overlap between the resource "law" and policy instruments, I limit the content of the resource to opposition and appeal procedures.
Policy instruments:	Identification of the instruments mobilised in the policy process. The instruments include the implementation of the resource "law" on the target groups, with the exception of opposition and appeal procedures.
Independent variables	
Institutional regime of soil:	Public policy and private law regulations that apply to the resource soil (Gerber et al., 2009) and their incoherences
Instruments type:	Classification of available policy instruments according to their impact on use and disposal rights (Gerber et al., 2009)
Contextual factors:	Demographic evolution, land prices, ecological value of soil and its composition, connection to transport infrastructure, location

Table 3.1: Operationalisation of the conceptual framework's variables.

3.2 Hypotheses

Based on the conceptual framework (figure 3.1) and the arrows that connect the different variables used, I define a set of hypotheses which constitute the scaffold of the theoretical framework and subsequent analysis.

H1: Effects of the institutional resource regime of soil on the LRA

The first hypothesis is derived from the classic institutional regime hypothesis drawn from Gerber et al. (2009), which conceives that an integrated regime is a necessary condition for a sustainable management of the natural resource analysed. The hypothesis adopted here focusses on the link between the independent variable "institutional regime" and the policy output (LRA) produced:

Derivate of the IRR's main hypothesis

H1: If the institutional regime of soil is simple or complex, then the LRA consists in a passive implementation, circumvention, or diversion of land use policy objectives. This can be explained by the high margin of manoeuvrability that a simple or complex regime grants to actors in the implementation of existing rules. Actors use this margin of manoeuvrability in order to achieve their own specific goals that do not match federal objectives.

Considering the ideal-typical classification of the Swiss institutional regime of soil exposed in the theoretical chapter – a complex regime (Nahrath, 2003), the observed local regulatory arrangements should *predominantly* consist of passive implementation, circumvention, or diversion of the objectives of the institutional regime of soil.

Solely deviating LRAs?

Figure 3.2 illustrates the first hypothesis: it postulates that the margin of manoeuvrability possessed by actors is inversely proportionate to the degree of integration of the institutional regime.

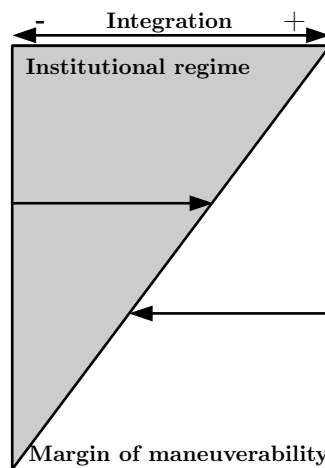


Figure 3.2: Degree of regime integration and margin of manoeuvrability of actors (de Buren, 2014, 104).

H2: Effects of contextual factors on the LRA

The second hypothesis aims to assess the general impact of contextual factors (demography, land prices, soil pollution, transport infrastructure, and distance to centres) on land use policy processes. These factors are assessed as a bundle, because I do not aim to quantify their individual explanatory power, but rather extract relevant contextual characteristics in the studied processes which potentially play a role in all processes.

H2: If there is stagnation of demography and land prices in the local context, a low degree of access to transport infrastructure, and a significant

distance to urban centres, then the LRA consists of passive implementation, circumvention, or diversion, of the institutional regime of soil. This can be explained by the limited economic value that authorities can create through zoning and use in land use policy processes.

Conversely, a local context where demography and land prices increase, where soil structure is adequate (not steep, and not polluted), where accessibility is high and distance to centres low, the LRA consists of an implementation or innovation of land use policy objectives.

H3a: Effects of property structure on instrument use

Hypothesis H3a establishes a link between a contextual factor, the property structure, and the strategy and instruments' use by the actors. The idea is that, depending on the property structure, public authorities and target groups will develop specific strategies and define the modalities of the instruments they use in specific ways.

H3a postulates a link between the property structure on which the land use policy process takes place, and the type of instruments that authorities mobilise in order to implement land use policy goals:

H3a: If the property structure is highly fragmented or unordered, then authorities combine public law and property rights instruments to redistribute value. This can be understood through the constitutional requirement to treat all target groups equally.

H3b: Effects of "information" on instrument use

H3b postulates a link between the policy resource "information" possessed by authorities or target groups (and the fact that it may or may not be shared with the other party), and the elaboration of a joint strategy in order to implement land use policy goals. This hypothesis has two parts: one hypothesising a joint strategy and instrument implementation (in case authorities and target groups share information); the other hypothesising diverging strategies and instrument implementation involving conflict (in case authorities or target groups do not share information). The hypothesis is formulated as follows:

H3b: If the resource information is shared between authorities and the target group, then these actors define a joint strategy and establish together the modalities of the instruments' use. This can be explained by the reduced power asymmetry between actors and by the enhanced (public) accessibility of the shared resource, which compels actors to find a compromise.

H3c: Effects of public "infrastructure" on instrument use

H3c postulates a link between the policy resource "infrastructure" possessed by authorities, and the strategy and instruments' uses adopted by authorities:

H3c: If the resource "infrastructure" owned by authorities is involved in a land use policy process, then authorities tend to define their strategy and the modalities of the instruments' uses in accordance with the resource's uses they seek. This can be explained by their double role as both regulator and owner of the resource soil.

H4a: Effects of sole public policy instruments on the LRA

Instrument mix as condition of policy implementation

The third hypothesis goes into greater detail than H1: instead of referring broadly to the institutional regime of soil, it focusses on the type of instruments used by authorities. The general hypothesis underlying the instrument types' effects on the LRA, is that only a combination of different instrument types allows for the implementation of the institutional regime of soil. In order to test the hypothesis, the analysed redistributive processes are divided among those which involve only type 1 and type 2 instruments (H4a), and those that involve a mix of different instrument types (H4b). As a reminder:

- type 1 instruments are public policy instruments that do not impact use or disposal rights;
- type 2 instruments are public policy instruments that have an impact on use and/or disposal rights;
- type 3 instruments are property right instruments that impact use and disposal rights;
- type 4 instruments are property right instruments that impact the distribution of property titles.

Hypothesis H4a is formulated as follows:

H4a: If authorities only use type 1 and type 2 instruments, then they will not implement the institutional regime of soil. This can be explained by the limited strictness and the incoherences of the institutional regime of soil, which grants to actors a significant margin of manoeuvrability for the implementation of public policy instruments.

H4b: Effects of instrument mix on the LRA

Based on the distinctions between type 1/2 and type 3/4 instruments referred to, I now test the effects of the analysed processes that involve a mix of different instrument types on the LRA:

H4b: If authorities combine different types of instruments, then they will be able to implement the institutional regime of soil. This can be explained through the additional restrictions and/or obligations that these instruments impose on landowners, which allow for the enhancement of the institutional regime's strictness and for the reduction of its incoherences.

H5a: Redistributive effects of public policy instruments

The general hypothesis underlying the redistributive effects of policy instruments is that only a mix of instruments allows for the redistribution of value. In order to test the hypothesis, the redistributive processes analysed are divided among only those that involve type 1 and type 2 instruments (H5a), and those that involve a mix of different instrument types (H5b).

H5a is formulated as follows:

If authorities use solely type 1 and type 2 instruments, then they do not redistribute value. This can be explained by the complex institutional regime that does not provide authorities with the necessary tools to impose value redistribution.

H5b: Redistributive effects of instrument mix

Based on the distinction between type 1/2 and type 3/4 instruments referred to, I now test the redistributive effects of the analysed processes that involve a mix of different instrument types:

If authorities use a mix of instrument types, then they *can* redistribute value. Value redistribution is only a possibility, because the complex institutional regime does not provide authorities the tools to impose value redistribution. However, authorities tend to redistribute value in order to implement their own strategies.

H6: Effects of expected added economic value on the LRA

The sixth hypothesis focus on the feedback loop drawn in the conceptual framework:

If a land use policy process is expected to produce redistributive effects, then target groups successfully use available policy instruments and resources to obtain full compensation for their anticipated loss of economic value. This can be explained through the capacity of land use policy to create added economic value that authorities can use for compensation and redistribution.

land use policy as cash machine

In addition to the hypothesised necessity to compensate a reduction or capture of value, this hypothesis states that the added value required for compensation is granted through land use policy instruments, which greatly facilitates compensation, but also blurs the limits of what is actually to be compensated, and to what extent. The underlying thought is that the economic levy of land use policy is a cash machine that actors mobilise in order to solve most land-related problems they might encounter.

3.3 Methodology

Having presented the thesis' hypotheses, I introduce the methods used for the selection of the perimeters, as well as the analysed case studies. This is in addition to those used for the subsequent data collection and analysis.

A four steps procedure

Policy research requires an understanding of complex behaviours, needs, systems and cultures (Ritchie and Spencer, 2002). The methodological approach I refer to in this section has been developed in the context of applied policy research, which is also the domain of research of this thesis. According to Ritchie and Spencer (2002), applied policy research aims to provide answers to the following objectives:

1. defining the concepts at stake: the review of soil related public problems in Switzerland (sections 1.1.4 and 2.3), and the choice of a value redistribution perspective (section 3.1), implied a set of choices concerning the extend of the concepts used for the analysis. As mentioned in section 2.1, I opted for a narrow definition of ecological value of soil. This leaves room for the analysis institutional changes, as well as for the analysis of actors' strategies and resources, as well as effective land use changes (such as land development, or the recycling of formerly developed land or soil). Further, the question of the sustainability of the observed resource uses has not been addressed. I limit the analysis to the redistributive effects produced by the arrangements analysed. The definitions of the concepts used across the thesis are listed in the annex;
2. mapping the phenomena: the broad range, nature and dynamics of soil uses have been described in the introduction. Chapter 2 on the literature review provided a set of explanations from ecology, economics and political science for soil uses and the drivers of added and reduced economic and ecological value creation in land use policy processes. Chapters 4 on Oberaargau and 5 on Lausanne present the five case studies analysed and explain how the respective local regulatory arrangements identified are achieved. Each case study considers the influence of the identified contextual and institutional factors, and combines their explanatory power with the one of the actors' analysis in each case study;
3. creating typologies, finding associations and patterns, and providing explanations: in chapter 2, I classified available policy instruments in Switzerland into two different typologies, one classification aiming to present the variety of tools available (Lascoumes and Le Galès, 2004b), and one based on the types of impact instruments can have on property rights (section 2.5.2 in chapter 2); this classification has been used for the formulation of the hypotheses H3 and H4. Chapter 6 synthesises the case studies and subdivides the cases into redistributive processes. These processes are then compared and discussed in the light of the hypotheses formulated in the present chapter. The discussion of the hypotheses allows for the description of a set of observed patterns, and provides explanations for the observed phenomena;
4. developing strategies in order to solve the problem studied: this last aspect is discussed in the conclusion of this work (chapter 7), but it is not an explicit goal of the thesis.

In the following sections, I expose the methodology adopted in this research in order to map the phenomena observed and provide explanations for these observations. The main research steps are:

1. select the perimeter of study and the case studies within these perimeters (sections 3.3.1 and 3.3.2);
2. implement the research protocol adopted for data collection and analysis (section 3.3.3);
3. based on the adoption of the conceptual framework, identify the variables explaining the policy outputs observed in each case study. This part of the work is the main goal of the empirical analysis. The case studies are divided into two chapters – chapter 4 aggregates the peri-urban case studies and chapter 5 to the urban case studies –, and is then subdivided into redistributive processes (chapter 6).

3.3.1 Selection of perimeter

Three main types of areas constitute the living environment for a vast majority of Switzerland's population, and generate different, representative land use policy issues (Nahrath et al., 2012):

Three type of living environments

- rural peri-urban regions, which face broad low-density building zone extensions, and where the communes have important building zone reserves;
- urban regions, which face densification challenges, land reconversion and remediation issues;
- mountainous tourist regions: these tend to have a high rate of secondary homes, vast building zone reserves, and ecological challenges linked to tourism and sports.

I have analysed one rural, peri-urban region – Oberaargau in canton Berne –, and one urban region – Lausanne in canton Vaud. Although, due to time restraints, the third perimeter was not addressed, some of the value redistribution issues faced in mountainous regions are comparable to those of peri-urban ones: reduction of oversized building zones, extensive soil use (due to the construction of numerous secondary homes), and nature protection issues linked with tourism (Canton de Vaud, 2011).

Consideration of two types of environment

In terms of methodological challenges to be addressed in an infra-national comparison, C. Dupuy and J. Pollard (2012) identify three main elements. Although the authors' publication focusses on international comparisons – which is not the case here, as all cases are Swiss – these elements are still relevant for the present analysis:

Challenges of comparison

1. the choice and the number of units to be compared: how are they to be selected without bias? And how are local differences to be accounted for? First, the regions/perimeters must be defined. I relied on the *mobilité spatiale* regions defined by the Federal statistical office (2000), which correspond to "functional units based on economic interaction and geographical mobility of labour workforce" (Becker et al., 2010). Within these perimeters, a set of elements was selected which represent the selected regions:
 - the classification used by the Federal statistical office (Schuler and Joye, 2000) and shown in figure 3.3 show that most communes in the region of Oberaargau are peri-urban, rural, or agricultural communes. In the region of Lausanne, these are either big centres, secondary centres within big centres, or suburbs of big centres;
 - table 3.2 sheds light on the economic structure and differences between the two regions: it shows the relative significance of commuter-based revenues in Oberaargau, as compared with Lausanne: commuter revenues are revenues brought in from the outside by inhabitants who work in another region. The data also emphasises the size of the agricultural and industrial sectors in Oberaargau, as compared to both the Lausanne and Swiss averages;

- the two selected regions belong to different linguistic areas, but the cantons to which they belong have significant historic, institutional, geographic and socio-demographic similarities. Vaud’s inhabitants are commonly considered French-speaking Bernese;
 - these sets of distinctive characteristics in very similar institutional environments make Oberaargau and Lausanne ideal perimeters for a comparative analysis. Yet, cantonal and local specificities are taken into account during the analysis, as well as (*e.g.* specific institutional settings, instruments, and rules);
2. data analysis and the identification of similarities and differences between cases; how is a generalisation of the cases’ results achieved? These difficulties particularly apply to research involving different nation-States, and therefore different institutional contexts, which is only marginally the case². However, the diversity of land use policy problems analysed, along with the different contextual settings require the definition of a comparable unit of analysis – their subdivision into redistributive processes, as exposed in section 3.3.4 below;
 3. interdependency between cases: the authors underline the importance of policy diffusion and increased interdependencies in a global world, which reduces the explanatory power of a comparison, all cases being potentially explained by the same factors. The conceptual framework minimises this problem by accounting for the common explanatory factors (*i.e.* the institutional regime of soil) separately. This separation allows precise emphasise on the differences in the observed cases (contextual factors, actors, used instruments, resources). Further, as the next section shows, the stakes inherent in the selected case studies are distinct.

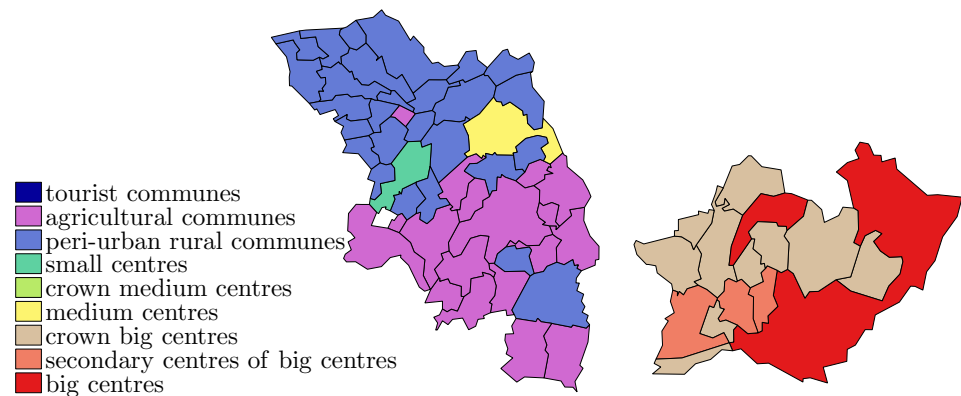


Figure 3.3: Typology of the communes in the regions of Oberaargau and Lausanne. Data: FSO (2014b). Methodology: Schuler and Joye (2000).

Bases	Oberaargau	Lausanne	Switzerland
Commuter base	8,925	5,976	11,594
Annuitant base	8,704	12,742	9,230
Productive base	7,899	8,149	7,845
Agriculture	1,111	60	908
Industry	4,117	1,329	2,994
Public base	879	3,180	1,334
Tourist base	210	877	3,243
Total (CHF/inhab.)	26,617	30,924	33,246

Table 3.2: Distribution of basic income in francs per inhabitant in the regions Oberaargau and Lausanne in 2010. Data: Segessemann (2016).

²Institutional differences and instrumental specificities relevant for the policy processes analysed are discussed in chapter 6 in the analysis section.

3.3.2 Selection of case studies

Within the two regions selected, I defined a small number of case studies as the object of analysis. The goal is to trace land use planning and land use processes within narrower perimeters in which policy implementation takes place, over a time period of approximately three decades. This is meant to allow for the reconstruction of a causal sequence of events, and to write a narrative for each case describing contextual, intermediary and dependent variables, as well as their interactions.

Qualitative small n analysis

The narrower perimeters are defined based on the political-administrative entities in charge of land-policy implementation (the communes), in canton Bern and canton Vaud. They show land use policy issues characteristic of the studied region, the interactions between involved actors, and the implementation of land use policy instruments. The following criteria have been used for their selection:

Selection criteria

1. important changes in land use planning and land use over the past 25 years;
2. presence of oversized building zones (see figure 6.5 in section 6.4.3 in chapter 6);
3. different property rights settings (private, public, reshape of plots, etc.);
4. major land use changes;
5. important issues around ecological and economic added/reduced value;
6. presence of conflicts;
7. use of a specific land use policy instrument.

A case law review of land use policy decisions in Bern (Viallon, 2016a) provide an overview of conflictual land use policy implementation processes. A keyword analysis of national and regional newspaper archives brought up land use policy issues that attracted media attention. Based on this information, and a review of the land use policy archives of canton Bern (referring to Oberaargau), I constituted an index of potential cases.

Press analysis

Based on a set of preliminary interviews and on the selection criteria, I chose the communes of Wiedlisbach, Huttwil, and Niederbipp. Wiedlisbach was of particular interest, because the commune had recently undergone major land use policy changes. These changes encountered opposition from inhabitants, attracted media attention, and involved the implementation of innovative policy instruments. Huttwil was chosen for their vast building zone reserves, and the conflict that emerged from their reduction. Niederbipp was chosen, because of the vast building zone extensions they have made during the last decades, and their reconversion of a former polluted landfill during this extension process.

Cases' specificities

Case selection occurred similarly in the region of Lausanne: a case law review, a keyword analysis of the regional press, and pre-established contacts with the cantonal spatial planning office provided an overview of potential cases. Further, the list of criteria used for the case selection had not yet been exhausted, which oriented the case selection towards Malley. The urban reconversion project offered the opportunity to analyse a set of joint urban restructuring issues involving public and semi-public landowners. The case of Cheseaux was determined by the use of an instrument specific to canton Vaud: the land improvement syndicate. This instrument is of particular interest, because it intervenes against target groups through the combination of public policies and property rights, issues at the heart of hypotheses H4 and H5.

The use of the mentioned selection criteria led to a pre-selection of cases oriented towards the built and constructible environment, rather than agricultural and natural land uses. First, this is due to the fact that current political debates on soil management in Switzerland polarises soil issues on developed land against agricultural land. The ecological value of agricultural land and natural areas also play a significant role, but this issue loses some relevance when relying on more simple indicators such as soil sealing (see section 2.1).

Second, I granted significant attention to the economic dimension of land use policy processes: the price difference between constructible and agricultural land, the flow of money between involved actors, as well as value creation and value capture

issues, pushed me to investigate the direction of capital flows. Of course, there are also wide flows within the agricultural sector, but these are dependent upon State subsidies, and are linked to a more complex apprehension of ecological value that I did not consider.

Further, I did not select any remote rural case with limited land use changes. I also did not choose any case that focusses on the agricultural zone, or on natural and recreational areas. Therefore, the representativeness of the described cases hint at a cautious application of the hypotheses' results for other land use situations, (such as those in tourist areas, or in the agricultural sector). Further, the transposition of the results to cases outside Switzerland will have to be done in simultaneous consideration of the legal specificities in each country in which the results are used for comparison.

3.3.3 Research protocol

Combination of two tracing techniques

The research protocol for each case consisted of a detailed description of land use policy changes and of the markers of the theoretically induced explanatory factors. The aim of these descriptions is to identify "trajectories of change and causation" (Collier, 2011, 823) through the focus "on sequential processes within a particular historical case" (George and Bennett, 2005, 13). The method used for providing explanations is a mix between what P. Hall (2006, 25) calls multivariate and theory-oriented explanation: the former refers to the identification "of a small set of variables that can be said to cause such outcomes in a general class of times and places"; the latter tests a theory and attaches special importance in order to "identify the most important elements in the causal chain generating this class of outcomes".

Case studies as first level of observation

The aim of the two empirical chapters (4 and 5) is to explain land use policy and land use changes within each of the five case studies through the study of contextual factors, of policy and property rules shaping the output, of actors and the strategies they pursued, of the instruments and resources they possessed and mobilised, of the arrangements reached, and of the redistributive effects created in each case. The case studies constitute the *first level of observation*: they synthesise, in case-specific, narratives the results from document research, from the respondents' answers, and from the cartographic analysis together with the observations made through the lens of public policy analysis. The narratives are structured according to the conceptual framework and the sequential steps of public policy implementation:

1. tracing of land use planning and land use changes over the past decades;
2. identification of contextual factors influencing the local regulatory arrangements and redistributive effects;
3. presentation of the "constraints of superior law" influencing the output;
4. analysis of the actors' games, the strategies they pursue, the resources and instruments they mobilised;
5. description and qualification of the arrangements and of their redistributive effects.

3.3.3.1 Data collection and sorting

Reconstitution of the soil's regime

Before starting with the case studies, I proceeded to an analysis of the past and present institutional regime of soil. Based on S. Nahrath (2003), I reconstructed the legal framework (public policies and property rights) applicable to the resource soil through the lens of the institutional regime framework (Gerber et al., 2009). This provided an overview of existing regulations, which was completed in a back and forth process when investigating the empirical field (de Buren, 2015).

Cross-time document analysis

Then, for each case study, I conducted document research, consisting of a review of all land use policy documents elaborated by the commune over the past 25-30 years. Among these documents, one could find:

- preliminary exam documents, or planning documents submitted by the communes to the canton prior to any revision of their building regulations. Among these documents:

- (preliminary) reports on past and future communal development;
 - new building regulations as proposed by the commune (structure plans, construction prescriptions, zoning plans, landscape and nature protection plans, equipment plans);
 - reports on the new building regulations justifying how the context changes and how the revised regulations are tackling these changes;
 - relevant protocols and presentations of the communal executive body and legislative body modifying and approving the new documents;
 - oppositions raised by landowners, organizations and other persons allowed to and the relevant protocols of following negotiations (if available);
 - reports of the cantonal planning office and other offices involved in the approval procedure;
 - written correspondence between the canton, commune, urban planner and other actors and notes relating to given phone calls;
 - report on public consultation procedure;
- approval documents such as approval decisions or decrees of the cantonal authority, final building regulations;
 - potential oppositions and appeals against communal and cantonal decisions;
 - grey literature published by communal, cantonal services, or federal offices (spatial planning offices, water protection office, finance department, audit reports, etc.);
 - professional literature, for example, for the evolution of land prices in the analysed perimeters.

The quantity and level of detail in the documents increased over time: the first communal building regulations present in the Bernese archives dated from the end of the 1970's and, in most cases, included only a zoning plan. Later revisions included reports, as well as correspondence between the actors, and other documents (listed above). The data analysis provided an overview of the zoning evolution and instrument implementation in the commune, as well as the main reasons behind the changes over the considered time period. These documents also named the involved actors, and allowed for the identification of coalitions in favour of, or opposed to the observed land use policy processes. They also named the instruments used and revealed a portion of the mobilised policy resources.

First stage of data collection

3.3.3.2 Actors' interviews

A subsequent step consisted in conducting 35 interviews with persons directly involved in the planning process, and influencing the local regulatory arrangement's dynamics: communal and cantonal actors from the political-administrative arrangement, target groups (landowners), other stakeholders (NGOs, soil experts), and journalists. These were mainly:

Second stage of data collection

- the planner contracted by the commune for establishing the local development plans and revising the building regulations;
- the chief of the communal executive body and/or the communal administrator in charge of planning and construction, (general administration of the commune);
- the cantonal planner in charge of approving communal land use planning documents and her/his co-workers (legal officer, planner from the section dedicated to cantonal or regional land use planning);
- other cantonal offices involved (office for water protection, economic promotion, energy, etc.);
- third parties, such as environmental organisations, landscape protection associations, and journalists.

Pyramidal structuring of research questions

The formulation of the questionnaire relied on the methodology of the European court of auditors (2015, 25): in order to systematically collect the necessary evidence from the data at hand, and keep the research within the defined scope, the Court's manual suggests subdividing the general research questions into sub-questions, which are in turn converted into lower level questions. These questions should be "both mutually exclusive and collectively exhaustive (so that together they are sufficient to answer the immediately preceding higher-level question)" (2015, 25). The Court suggests that the questions be posed as yes/no answers in order to focus on the end-product of research (the response to the general research question) and "enhance a disciplined approach" to the questions. The elaborated pyramid of questions served as basis for the elaboration of the questionnaire, and is available in the annexes.

Data indexation

Based on the interviews' transcripts and/or notes, as well as the administrative documents and reports at hand, I indexed the data according to the research questions. Then, I grouped the responses and cross-checked answers provided by actors with other actors' responses and available written documents.

3.3.3.3 Statistical and cartographic analysis

Inclusion of geo-localised data

Available cartographic information and techniques allowed to increase the data used for the research. Four geographic information systems³ provided various information on each case study, such as:

- zoning prescriptions (type and size of zone, noise levels, ...);
- type (individual, company, association, etc.) and names of property title holders (only for canton Vaud);
- the "journey through time" function of swisstopo maps made it possible to trace the evolution of land use (construction, in particular) in short time intervals (five to seven years), and thus identify correlations between zoning and actual land uses;
- soil drilling and soil pollution reports (in some cases, only meta data was available);
- water protection zones as well as the location of water boreholes, which is particularly relevant in regard to water protection policy;
- the soil's potential in terms of geothermal energy (an information relevant in the case of Malley);
- the measurement of plot sizes or any other perimeter, including distances to transport infrastructure;
- existence of building rights on a given plot;
- shape files (vector files) of the property structure (land register), which were used for cartographic production.

3.3.4 Subdivision into redistributive processes

Second level of analysis

In order to enhance the focus on actors, policy instruments and resources, and in this way facilitate between-case analysis (Ritchie and Spencer, 2002), I have subdivided the five case studies into 15 redistributive processes (section 6.1 in chapter 6). These redistributive processes are the *second level of observation*: they list the redistributive phenomena observed through the lens of the variables defined in the theoretical framework. This allows for their presentation and comparison in a compact and systematic way. As we have seen in the introduction, land use policy processes can be defined as implementation cases of land use policy, where authorities, in a specific context, intervene on a target group and mobilise a set of policy instruments and resources, in order to achieve a specific goal or to solve a specific policy problem. The subdivision of the analysed case studies in redistributive processes is based on:

³<http://geo.admin.ch>; <http://map.apps.be.ch>; <http://regiogis.ch>; <http://geo.vd.ch>.

- the identification of a distinct problem/matter to be solved;
- the involvement of actors and the mobilisation of instruments specific to that problem;
- the negotiation of an arrangement/solution specific to the problem.

Now that I have presented the theoretical knowledge referred to, built a conceptual framework based on this knowledge, elaborated a set of research hypotheses framing the changes we intend to observe, and defined the methodology as applied to the empirical research, we can turn to the empirical observations made in the five case studies identified.

Chapter 4

Oberaargau

Case studies' objectives The objectives of this chapter are threefold. First, the aim is to show how the creation of added and reduced economic and ecological values occur in empirical land use planning processes and their subsequent impacts on land use value creation processes. Secondly, to understand and explain actors' formal and informal instrument implementation strategies and arrangements in regard to redistribution issues. Thirdly, the results from these analyses are meant to help us qualify the redistributive capacity of the Swiss institutional resource regime of soil between 1990 and 2014. In order to reach these objectives, I analyse three case studies with important and specific redistributive challenges:

1. A building zone transfer in Wiedlisbach in section 4.1;
2. Oversized building zones in Huttwil in section 4.2;
3. The reuse of polluted soil in Niederbipp in section 4.3.

Three peri-urban cases The three selected cases are located in the peri-urban region of Oberaargau (see figure 4.1). Wiedlisbach (1) and Niederbipp (3) are two communes located at the bottom of the Jura in what is referred to as "Bipperamt." These communes are on the east-west axis of the Swiss Mittelland, and are well-connected to transport infrastructure. Huttwil (2) is located in a hilly landscape, and is more remote than the two other case studies.



Figure 4.1: Regional overview map highlighting the three selected case studies. Map: swisstopo (2014a).

4.1 Transfer of building zone in Wiedlisbach

4.1.1 Introduction

This case study analysis of Wiedlisbach demonstrates how from the end of the 1970s on, the commune building zones were oversized and badly designed, which contributed to a disorganised process of urbanisation. After a significant period of demographic growth during the 1990s, the commune faced a sudden stagnation since the 2000s. Currently in Wiedlisbach, building zone reserves are fragmented, and land hoarding is a widespread phenomenon, effectively leaving very few plots available for development. Wiedlisbach's main land use planning challenge was to rationalise its building zone through the mobilisation of existing development rights. In order to do so, the commune used an innovative "green zone" in order to temporarily suspend unused and hoarded development rights. Authorities showed creativity in the combined employment of existing land use planning instruments: they achieved to spatially relocate development rights and contractually guarantee their development. Further, they reduced the amount of hoarded through various strategies: threat of temporary de-zoning, land service costs recovery through a mortgage, and the use of an emption right. Communal objectives were countered by landowners, who mobilised policy instruments such as building permit and plot ratio and partly managed to circumvent communal strategies.

The case study is structured as follows:

- section 4.1.2 introduces land use planning and land use changes in Wiedlisbach over the past 25 years;
- section 4.1.3 presents the contextual factors that influenced land use policy and land use;
- section 4.1.4 identifies the constraints of superior law that played a role in determining land use policy outputs;
- section 4.1.5 shows how actors have mobilised policy instruments and resources in the local context in order to achieve their goals and what arrangements they have negotiated;
- section 4.1.6 presents the variables' impact on economic and ecological value redistribution.

4.1.2 Land use planning and land use changes

Located in the northern part of Oberaargau, called Bipperamt, Wiedlisbach is a small Bernese commune delimited in the north by the Jura mountains, and the Canton of Solothurn, and in the south by the Aare river. As shown by figure 4.2, the mountainous northern part of the communal territory is covered with forest and grazing lands and remains – with the exception of a hospice center and a farm – undeveloped. The central part of the commune consists of agricultural land and settlement. A train line connecting Solothurn to Niederbipp and Langenthal crosses the village. Three small widely-piped brooks converge at the southern limit of the village. From there, the waters flow towards the Moos, a flat land close to the Aare. The Moos is bisected by the N1 motorway and a slip road, (this slip road grants access to Attiswil, Wiedlisbach and Oberbipp in the north and Wangen an der Aare and Herzogenbuchsee in the south). An important part of the Moos is a military zone designated by the Canton as a (future) strategic working zone. The communal territory also includes a widely developed island on the Aare. The south-eastern part of the commune is covered with forest, whereas the western part is primarily dedicated to agriculture.

The last revision of Wiedlisbach's building regulations (in 2013) introduced two main transformations which led to the emergence of conflicts (AGR, 2013b,a): the temporary suspension of development rights for certain landowners and the planned extension of the housing zone in two potential locations. Both elements produced controversy among the inhabitants and 34 oppositions were filed. The opponents feared increased traffic, obstructed views, and a cost increase born by a tight communal budget (Commune of Wiedlisbach, 2013; AGR, 2013a). Dozens of landowners refused

**Confictual revision
process**

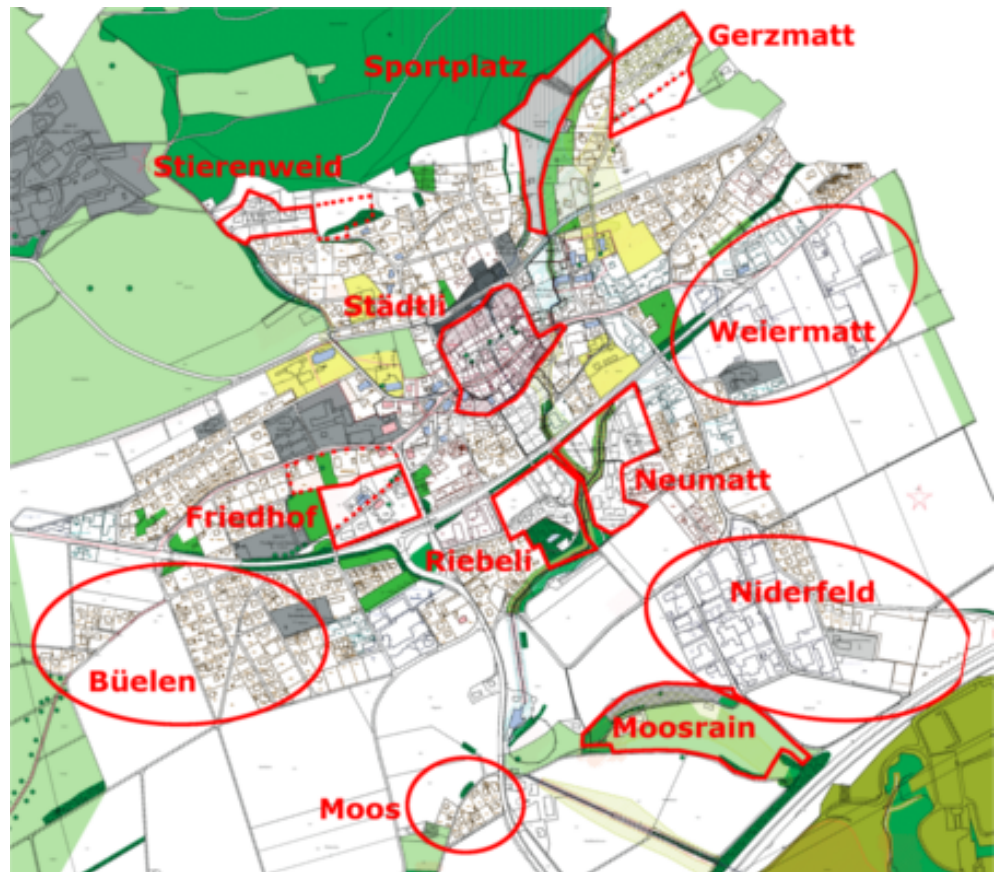


Figure 4.2: Main neighborhoods of Wiedlisbach. Dot lines correspond to former ZPP perimeters. Yellow marked zones are farms; grey zones correspond to zones dedicated to public use and green zones include forests, agricultural protected areas, and groups of trees, vegetation, or land temporarily excluded from the building zone. Map: Commune of Wiedlisbach (2013).

to allow (a portion of) their plots allocated to a green zone which would prohibit development. This reaction led, in turn, the communal executive body to reduce the number of plots affected by the temporary suspension of development rights and to withdraw temporarily the two building zone extension projects. However, these were inscribed into the non-binding communal structure plan. The revision process was continued finally approved by the canton in 2013. In 2014, a partial revision was started in order to realise one of the planned building zone extension. It was submitted to popular vote, and accepted by the inhabitants in June 2014.

Diversion of the instrument "zoning"

One of the main reasons for selecting Wiedlisbach as a case study is the diversion of the instrument zoning, transformed to meet the local challenges of unused building zone reserves and land hoarding: a green zone was introduced during the 2013 revision of the building regulations. This green zone temporarily suspended the development right from an undeveloped or partially plot located in the building zone. Then, the reduced surface of building zone reserve was subtracted from the overall communal building zone reserves, which, according to the cantonal authority, exceeded the upper limit. This allowed to gain a margin of manoeuvrability towards the canton in order to create a new building zone in a future revision of building regulations.

In order to understand how the revision of a zoning plan created such a high level of conflict and how the situation was finally resolved, it is necessary to trace the evolution of land use and land use planning policy over the last decades. The following analysis focuses on the core of Wiedlisbach's village and excludes the previously mentioned island and hospice center, as these areas were not affected by the issue of building zone transfer.

Figure 4.3 shows the described land use planning evolution from 1978 to 2013, the state of land use before 1979, and its evolution from 1978 to 1987 and 1987 to 2011. The years considered for tracing the evolution of land use were chosen according to

Year	Land use planning changes	Land use changes
1979	Revision of the building regulations and repeal of the provisory protected areas established by emergency federal decree in 1972 (AGR, 1979b)	Partial development of Büelen and Niderfeld
1989	Revision of the building regulations: reductions of building zone (AGR, 1989)	Construction of the bypass road, development of Neumatt and Riebeli, partial development of Büelen
1995	Extension of the southern working zone in Niderfeld	Progressive development of Niderfeld
2002	Partial revision of the building regulations: modification of the map of protected areas, modification of the inventory of protected buildings, delegation of small building permit authorizations to the administrative and buildings commission (mentioned in AGR (2013b)), approval of the local development plan Stierenweid	Development of Stierenweid in the following years, partial development of Büelen
2010	Partial revision of the building regulations: implementation of the hazard map, adaptation of building regulations regarding the old town (mentioned in AGR (2013b))	–
2011	Launch of the revision process of the building regulations and zoning plan. Conflict over the creation of a green zone and the extension of the building zone	–
2013	Approval of the revised building regulations by the canton: creation of the green zone, and temporary suspension of development rights (AGR, 2013b). Refusal by inhabitants and neighbours of two building zone extensions in December 2013.	–
2014	Partial revision of the building regulations and zoning plan: adoption of one building zone extension (Gerzmatt). Approval by cantonal authority blocked by federal moratorium in April of that year.	–

Table 4.1: Main land use planning and land use changes in Wiedlisbach since 1979.

the Federal Office of Topography’s map actualisations, and as as a way to correlate with zoning plan revisions. The fine dot line on the right side of figure 4.3 shows the communal border between Wiedlisbach and Oberbipp. As one can observe, the two settlements are nearly joined. The following paragraphs refer to the map in order to describe land use planning and land use changes over time.

4.1.2.1 Major land use planning changes in 1979, and land use changes from 1979 to 1987/1989

The oldest available zoning plan dates back to 1979. Compared to established construction, the zoning plan shows wide building zones (brown surfaces on the map) with already scattered buildings. In fact, from the 1960s on, the settlement area extended significantly, and had already delineated some of the current limits between developed and undeveloped land. Construction (dark grey on the map) is spread along the roads and the railway lines, downhill and southwest from the core of the village and uphill in the Gerzmatt. The working zones of Niderfeld and Einisbüel were created during the development period of the 1960s.

A sprawl that dates back to the beginnings of land use planning policy

4.1.2.2 Major land use planning changes in 1989, and land use changes from 1989 to 2013

With the zoning plan revision of 1989, three building zone reductions occurred simultaneously (marked light purple and numbered "1" on figure 4.3). With the exception of the zoning outside of the Moosrain (southwards from town in the direction of the motorway), the size of the building zone did not change substantially. According

One zoning out decision

to the scarce available data,¹ the success of law suits and potential compensation were improbable. At the same time, on the western hillside in the upper Moos, in an already partially-developed location, the commune zoned a patch of building zone. However, the owner of two of the plots threatened to file for compensation if his development rights were removed. The cantonal authority considered the communal decision "not inadequate" (AGR, 1989, 4).

One compromise?

Additionally to the Moosrain, the cantonal authority suggested, during their preliminary exam, an additional building zone reduction in Stierenweid, located on the hillside at the northern border of the settlement area. However, the plots located on the west part of the zone (area that is developed today) were already serviced (AGR, 1988), only the eastern land stripe was taken out of the building zone².

In addition to the building zone extensions, (marked **light brown** and numbered "2" on figure 4.3), there are several "filling of gaps" within the existing building zone, a small extension of the sports zone (up north along the forest) and a rather important (approximately 2 ha) extension of the working zone east of Weiermatt.

In terms of land use, the main changes up until 2011 (**light grey** on figure 4.3) were: the construction of the village's bypass road, the development of the housing area Neumatt (at the junction of the piped brooks), the development of Büelen (in the south western part of the settlement area), and the development of Stierenweid (on the north-western hillside). All of this housing construction occurred in un-built building zones.

4.1.2.3 Land use planning changes until 2013

Building zone extensions
that match existing land
use...

With the last minor revision (1995) and the last major revision (2013) of building regulations, a minor extension of the building zone is observable, (marked **yellow** and numbered "3" on figure 4.3), but initiated in order to match retroactively the zoning plan with pre-existing uses. The extension up north of Wiedlisbach at the limit of the forest was for the sports zone, the extension of Stierenweid (on the hillside) was due to the recently modified local development plan, and the extension at the western settlement boundary extended the small, preexisting working zone. In 1995, another important extension of the building zone occurred in Niderfeld, close to the motorway (to host a garden centre and a swimming pool).

... and reduce building
zone reserves

Of particular interest are the **dark purple** surfaces numbered "4" on figure 4.3:

- two of these purple surfaces correspond to effective zoning (and a return to an agricultural zone): the slim purple rectangle under the Gerzmatt (north east) and a smaller purple rectangle from Niderfeld (northwards), the major industrial zone. Both occurred with consent by the owners and were meant to reduce match zoning with effective land use and thus reduce "fictive" building zone reserves;
- another dark purple area in the Neumatt, next to the brooks, is now zoned as a park;
- all other dark purple areas were part of the building zone and not built on; they are now, in accordance with the owners, designated part of the newly created green zone.

One zoning "hole" (numbered "5" on figure 4.3) is present between Weiermatt and the historical town centre: this plot was never put into the building zone and is now part of the green zone.

The free plots (**beige** on the map) include only undeveloped plots (according to the map elaborated by the communal planner and the commune, and submitted during the building regulations revision procedure in 2013). All plots have been serviced and

¹Archive documents (AGR, VVYY) the original developer wanted to build a giant complex including: two 15 story towers, a dozen houses, several flats and around fifty single-family homes. However, the area was minimally connected to roads, and entirely outside of the settlement area.

²As the recently developed area remaining in the building zone required the construction of an access road, the communal decision was to zone only some of the plots. This decision does not appear to have taken into account the eventuality of compensating the landowner for a withdrawal of rights, but rather on a compromise negotiated to prevent opposition during the building zone revision process.

are within the building zone. They do not include the potential for densification on already developed plots.

4.1.2.4 Gab between zoning and actual land use

The comparison between actual constructions and zoning plans shows that as an instrument, zones which separate constructible area from non-constructible area works: all construction dedicated to housing or working has been built in the building zone. Further, one can infer an overall will to match zoning with effective land use. However, a deeper analysis of the 2013 situation is needed to more fully understand the existing gap between zoning and actual land use.

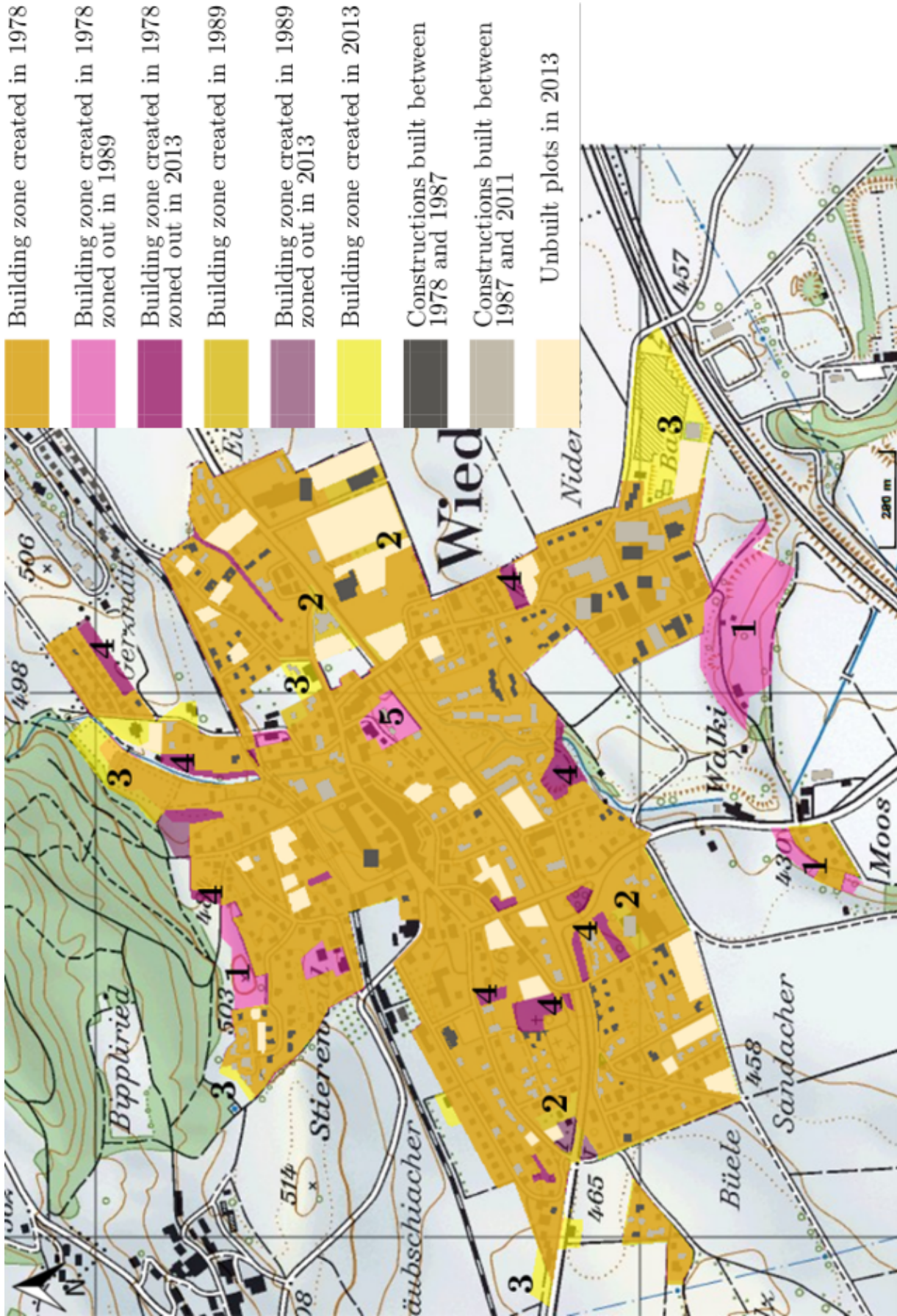


Figure 4.3: Evolution of zoning and construction in Wiedlisbach from 1978 to 2013. Data: AGR (1979b, 1989); Commune of Wiedlisbach (2013). Map: swisstopo (2014b).

4.1.2.5 Progressive fill of the building zone

The cross time comparison shows that development mainly "filled the gaps" between previously established settlement limits: land for housing developed during the last 35 years has remained in the building zone, or in other words, no major residential zoning occurred during this period.

Development that fills the gaps

The spread of construction began before data on zoning is available. However, with the revision of 1978, the new zoning plan drew a large line around existing construction, so that huge, oversized building zones were created, (sometimes even against the landowners will)³. During the 1980's and 1990's, only marginal building zone reductions were made, and portions of the zoned plots were built without local regulation exceeding the communal zoning prescriptions. The primary form of construction was the single family home, (with exception of the Neumatt area where several three floors buildings were erected). The working zone of Niderfeld also experienced strong development over the last decades.

Urban sprawl within the building zone

The remaining un-built portions of the building zone are strongly fragmented, and spread across the entire building zone. Un-built housing plots accounted for 5.7 hectares of the building zone in 2013⁴. According to cantonal calculations, this corresponds to the upper allowable limit (AGR, 2013a). As the map shows, these plots are scattered across town⁵, some of them with unconventional shapes or limited access hindering their full development. However, this concerns only a minority of the plots.

Numerous un-built surfaces

The hoarding phenomenon can be explained by different factors. One landowner, the Burgergemeinde, explicitly states their intentions to save land for future generations. More generally, the organisation conceives land as a heritage, referred to as *Kulturgut* (Burgergemeinde Wiedlisbach, 2014). These plots are located in the middle of already developed plots, so they cannot be rezoned as agricultural. For the Burgergemeinde, sale of land occurs in very few cases, the preferred disposal being long term leasing through the attribution of building rights. During the information session on new building regulations, inhabitants argued that they save land for future generations; others consider it their personal retirement fund (Berner Zeitung, 2011).

Land scarcity as a main reason for not building

A 1996 survey of these owners sought to determine whether owners building intentions (Commune of Wiedlisbach, 2011b, 50). A brief look at the un-built plots in 1996 and 2014 shows that the owners who stated their intent to build in 1996, have still not built. Thus, it appears these owners did have the necessity themselves to construct a home.

Hoarding behaviour

In addition to these considerations, one can also find explanations for undeveloped plots within the development process itself: the construction process in the building zone took the form of a small sprawl of construction: time after time, plots are sold and houses are constructed. Land service followed the needs of construction and there was not always a coordination with the land property structure. Consequently, a group of plots where for example land betterment measures would have been necessary in order to optimize land uses are now impossible, as some owners have already built their homes. In certain cases, local development plans have been adopted, but the lack of coordination with underlying property rights and thus never implemented⁶.

Urban sprawl within the building zone

Even for constructible plots (where no further land betterment measures are necessary), authorities cannot force the owners to build, and this creates a paradox: building reserves exist within the current building zone, but they cannot be used. In order to circumvent this problem of availability, the only option left to local authorities willing to grow – regardless of their motives⁷ – is to zone new land.

Non available building land

³R. Grogg, journalist for Berner Zeitung, interviewed in Langenthal 25 March 2014.

⁴If plots of the working zone are taken into account, this totals 9 hectares

⁵Here the **beige** and the **dark purple** surfaces (with the exception of the cases of building zone reduction and the creation of a park) should be considered building zone reserves, as both are un-built and within the building zone.

⁶The case of the Friedhofsweg is a good example, where several successive development plans were adopted, but never put into practice. One should take note of the partial construction of the local development plan Ribeli in the Neumatt (see figure 4.3).

⁷Press articles mention the contested communal growth strategy aiming to attract new rich inhabitants in order to higher tax revenues and better the financial situation of the commune (Berner Zeitung, 2011).

As federal and cantonal legislation prohibit new land zoning as a “strategy”, the only solution to the current problem is to transfer unused rights to locations where landowners are willing to build. This leads to the search for the most appropriate instrument to solve the problem. As section 4.1.5 below shows, the solution chosen by Wiedlisbach is quite innovative, but hardly fulfills federal land use planning objectives. Prior to the in-depth analysis of the used instruments, section 4.1.3 presented contextual factors, and section 4.1.4 presented the legal constraints that have been identified as most relevant.

4.1.3 Contextual factors

In regard to the context, I analyse the case of Wiedlisbach in terms of demographic, economic and topographic aspects.

4.1.3.1 Demographic evolution

Strong demographic growth in the 1990s

Over the last 22 years (1991 to 2013), the commune’s population increased from 1,927 to 2,181 inhabitants, an overall increase of 13.2% or 0.6% annualised (FSO, 2015c). Compared to the surrounding communes, this growth falls between that of Oberbipp, Niederbipp and Wolfisberg on the east (between 23 and 28% over the same period or 1.3% annualized), and the slight decline in Attiswil or Farnern in the west (around 3% over the total period). Compared to the regional, cantonal and Swiss average, Wiedlisbach is far above regional and cantonal growth rates (7% and 6.2% respective total growth or 0.34% and 0.28% annual growth) and near the national average of 17.5% (0.8% annual growth).

Demographic stagnation in the 2000s

Over the last 15 years – the time period considered for the revision of the building zone regulations (1997-2012), nominal population growth has equalled 40 inhabitants: 1,8% over the whole period for an annual growth rate of 0.12%. These numbers are under the regional (3,46% overall and 0.23% per year), cantonal (5,75% and 0.38%) and national averages (13.28% and 0.89%). From 2001 to 2011, the vacancy rate remained around 2%. Low construction rates during 1995-2005 contributed to a stagnation in growth, a pace which persists, as seen in an almost total absence of housing construction between 2005 and 2011 (swisstopo, 2014b).

4.1.3.2 Economic and fiscal evolution

Middle class commune

Compared to other communes of the region, inhabitants of the commune have an above average fiscal capacity⁸ (925CHF per month compared to an average of 825CHF per month). With almost one job for every two inhabitants, the job supply is also above average (30 jobs for each 100 people regionally). Tax rates for natural persons corresponds to the regional average (1.59) (FIN, 2014), and the land tax rate is also slightly above average (1.2 instead of 1.12) (FIN, 2015).

Overall decreasing land prices

In terms of land prices, no local data is available for Wiedlisbach. I can only rely on regional numbers which show an overall price decline of serviced building land for single family homes from 300CHF/m² in 1999 to 200CHF/m² in 2014 (Wüest and Partner, 2016a). If one considers sale prices of single family homes of 5 rooms, a price drop from 605,000CHF in 1994 to 539,000CHF in 2012 is recorded (Wüest and Partner, 2016a). This downturn is put in perspective when compared to other price data (SRED, 2014): based on transaction prices of single family homes between 2003 and 2014, the SRED data shows a slight price increase (from 620,000CHF to 700,000CHF). These moderate or shrinking prices are one factor in explaining the blocked construction of single family houses in the commune (single family homes are the main type of construction on the communal territory). An alternative explanation provided by the *Herdgemeinde* is the landowners’ intentions to “keep land for future generations” (Herdgemeinde Huttwil, 2014).

⁸I understand fiscal capacity as the potential

4.1.3.3 Topographic and spatial characteristics

Wiedlisbach has been considered a town since 1386 when it was granted the right to host a weekly market as compensation for its services during the war of Sempach against the House of Habsburg (Commune of Wiedlisbach, 2014). Its historical centre is well preserved and its roofs are among the last of the region without any skylights⁹.

Well preserved historical centre

The location of Wiedlisbach is attractive in terms of housing: views are desirable, in particular for houses on the hillside of the Jura. The accessibility by public transport is, for a large part of the housing zones, ranked in category C or D by the cantonal structure plan (meaning most inhabitants have a train connection every half an hour to Solothurn, Niederbipp and Langenthal). A dedicated motorway onramp offers connections within less than an hour to Bern, Basel and Zurich.

View on the Alps and good transport connections

On a whole, the statistics show Wiedlisbach as a rather attractive location for middle to upper income families looking for private individual housing.

4.1.4 Constraints of superior law

Another central factor contribute to explain the land use planning process resulted in such an oversized and scarcely used building zone: the cantonal constraints and their implementation.

4.1.4.1 Building zone calculus of the 1989 revision

Documents on the 1989 revision of building regulations do not offer any demographic growth calculations¹⁰, mentioning only previous building zone capacity (1,000 inhabitants) (AGR, 1988). Without further precision in the calculation methods, no detailed comparison can be made. The lack of data limits the conclusion to the fact that the effective nominal population growth of 254 persons that took place during the 15 years after the revision fell well short of the building zone's capacity. Even with growing surface needs for individuals and lower occupancy rates of flats, the current building zone remains oversized.

Conscious cantonal approval of oversized building zones

4.1.4.2 Cantonal building zone calculus in 2013

In the 2013 revision, the following parameters were used in the calculation of the building zone size. They are combined as follows:

- *Current population*: the data used in the revision documents differs slightly from official data (2,227 inhabitants according to the commune, 2,181 inhabitants according to the canton);
- the current population is multiplied with the *cantonal growth factor*: According to the revision documents (Commune of Wiedlisbach, 2011a), the population growth over the last 15 years is 7.6%, which differs from the growth data presented above (4.1.3);
- the prognosticated nominal population growth is divided by the *average flat occupancy rate*: 1.7 for central communes, 2.1 for all the other communes. This shows the *number of flats needed to absorb growth*;
 - because statistically the average flat occupancy rate tends to decline (2.28 persons per flat in the year 2000, 2.2 in 2020), additional housing is needed to maintain current population level. Therefore, the future population per flat ratio is subtracted from the current population per flat r to obtain the *number of flats needed to maintain the current population*;
 - both numbers of flats are then added together;
- the number of total flats is then multiplied with the average gross floor area per flat: 140m². This gives the *overall needed gross floor area*;

⁹In 1974, Wiedlisbach was granted the Wakker price by the Swiss heritage society for its exemplary care of the historical center site.

¹⁰The communal report and calculation elements could not be found in the cantonal archives.

- the overall gross floor area is then divided by the minimum density coefficient¹¹: 0.3 for rural communes, maximum 0.7 for central and agglomeration communes. This gives the *surface of land that is needed for housing development*.

Exceeding reserves block any further development process

In Wiedlisbach, the calculus results in housing zone needs of 5.7 ha for the next 15 years. From this area, one has to subtract the existing undeveloped housing zone. Undeveloped surfaces smaller than 500 m², plots with complex geometry, banks of trees as well as buildings, are not considered as reserves. In Wiedlisbach, 7.7 ha of the housing zone is currently undeveloped, of which 2.7 more hectares remain undeveloped on partially developed plots. This results in an oversized building zone of approximately two hectares. In this situation, cantonal practice is to match new surfaces to be zoned in by an equal amount of surfaces to be zoned out (AGR, 2013a). The other until now unused possibility is to develop these land reserves.

4.1.4.3 Priority development areas

No zoning bonus is granted by economic policy

Although located on a cantonal and regional development axis, Wiedlisbach does not enjoy looser development regulations, as only the centre (Niederbipp) of the priority development areas do. Only a vast field between the motorway and the Aare, currently property of the federal army, has been designated by the canton as "strategic working zone". Nevertheless, the development process in this area is under cantonal supervision¹² and does not concern communal zoning or development restrictions.

4.1.4.4 Cropland protection plan

Cantonal criteria applying to plots that are part of the cropland protection plan require:

- a justification that the location is the best among others (implies a search for alternative locations);
- a connection to public transport;
- an economic use of soil *e.g.* constructions with a minimum density coefficient of 0.4 for rural communes (Kanton Bern, 2011).

4.1.4.5 Regional planning

A rather flexible landscape protection plan

The regional landscape protection plan defines landscape protection areas (their exact dimensions and location are subject to communal interpretation). These protected areas can also include regional urbanization limits and corridors for animals. The current plan includes several landscape protection zones and urbanization limits, as in the east of the Gerzmatt, precisely where the foreseen extension area of the housing zone is located. Despite the plan, local authorities have a room to manoeuvrability in implementing the regional plan (AGR, 2013a): they can adapt the perimeter of the protected area to fit their development aspirations.

No regional compensation possibilities

The regional global transport and settlement plan locates regional housing and working centres, but Wiedlisbach doesn't have any of these. When a commune wants to create a building zone in such a regional centre, they have the possibility to compensate zoning operations on regional level (another commune has to reduce its building zone at the same time), an unused opportunity for now¹³.

4.1.4.6 General considerations regarding constraints of superior law

Cautious cantonal control

The two building regulation revisions analysed lead me to formulate the following remarks: In 1989, the content of cantonal objections concerning zoning and density was – at least in its written form – strictly advisory. Comments employed the construct, "in our opinion," or diverted responsibility for the decision to the commune by relying on its discretionary power in terms of land use planning (AGR, 1988, 5). For

¹¹The density coefficient is the ratio between the gross floor area and the total surface of a plot. A minimum density coefficient of 0.3 requires that for a 500 m² plot, at least 150 m² of the gross floor area are developed

¹²Use of a cantonal development plan as zoning instrument.

¹³See regional governance structure in section subsubsec:regional governance.

example, the prohibition of apartment buildings written in the construction prescriptions (family homes with more than two flats) was criticized but accepted without further comments. Further, a 50% population growth potential in the building zone reserves "blasts any demographic growth prognosis" (AGR, 1988, 2), but does not otherwise hamper the approval process; additional artificial reduction of capacity through the lowering of density, and prohibition of several family homes in certain zones were criticized, but did not block the review process .

During the approval procedure¹⁴, the office of agriculture criticized the size of the building zone, but acknowledged that it is mostly located in already built areas and thus probably serviced. The office of economic development supported the extensions of the working zone and pushes to extended zoning close to the motorway as well as a more "active land use policy" in order to gain control over the effectiveness of regulations (AGR, 1988).

No veto from other cantonal offices

During the 2013 revision, an extended building zone calculation method was used where (partially) undeveloped plots were individually listed with their respective constructible surfaces. The cantonal authority used the results, along with their demographic prognosis, to approve or reject building zone extensions. Additional criteria, in particular the connection to public transport, is another means (used by both sides) to either justify the acceptability or the irrelevance of a new building zone. However, as the example on building zone transfer in subsection 4.1.5 shows, tighter criteria for defining building zone reserves leads to more precise building zone definitions, which in turn increases the technicity of the legal process, and opens up new potential loopholes.

Increased technicality with potential for new loopholes

The 2013 preliminary exam of building regulations by the canton provides a set of elements that contribute to revealing the nature of power relations that exist between the actors. In the reports of the cantonal offices involved in the procedure, the agricultural office focussed on the future zoning extension in the Gerzmatt, part of the cropland protection plan. The office deplored the "very rudimentary balance of interests" made by the commune, in particular the absence of consideration of agricultural interests and the approximate consideration of federal criteria (AGR, 2013a). The agricultural office appears resigned to accept the loss of agricultural land: they do not set any additional requirement (for example in terms of density) nor oppose the zoning process. The office in charge of economic promotion, part of the same directorate, was, as opposed to the 1989 revision process (AGR, 1988), not involved in the consultation procedure. The nature protection office pushed also towards a more detailed zoning plan including all types of natural elements worthy of protection such as hedges, shore groves, individual trees and groups of trees.

An involvement with limited effectiveness

4.1.5 Local use of instruments

4.1.5.1 Legal and contractual building obligation

In order to overcome the problem of land hoarding, during the 2013 revision of its building regulations, the commune introduced the notion that the development of undeveloped plots in the building zone were of public interest¹⁵. After a period of fifteen years, landowners do not have the right for their plots to remain in the building zone. Using new legal basis, the commune negotiated with landowners who do not want to develop their plots. In certain cases, a contractual building obligation arose between the commune and landowners: several owners promised to build their land within the next ten years. However, the implementation of such a rule has been contractual; its signature by the two parties relied on the landowner's will to cooperate, or accept to be put in the green zone. Some owners, resistant to both solutions, asked for a building permit in order to keep their plot in the building zone and gain some time, although they did not intend to build¹⁶.

Communal implementation of contractual building obligation

According to communal and cantonal authorities, the building obligation had until the implementation of the revised federal law limited validity in a court, but this is now very likely to change: according to art. 15a of the federal spatial planning act, cantonal legislation must, in case of public interest, find a way to ensure that

Enforcement of building obligation for previously zoned plots

¹⁴Only the offices taking position on building zone issues were mentioned.

¹⁵Art. 3 par. 2 of the *Building regulations of 30 July 2013 of the commune of Wiedlisbach*.

¹⁶R. Grogg, journalist for Berner Zeitung, interviewed in Langenthal 25 March 2014.

a plot is constructed within a defined period of time. In the future, the commune could rely on the signed contracts in order to force development. But in case the landowner fights the communal decision, the commune would need to prove that the plot's development is of public interest. Despite its communal recognition, it is not certain to be recognised as such by a court for single plots in Wiedlisbach.

Building obligation for plots to be zoned

This tricky situation only applies to plots already in the building zone. With plots remaining in the agricultural or protected zone, the commune has the possibility to use an emption right. An example of the exercise of this emption right would be commune acquisition of land at a predetermined price if it is not developed within a given time span. In the case of the Gerzmatt perimeter, adopted by the commune as a new building zone, the commune has negotiated this change of status with the landowner¹⁷.

4.1.5.2 Transfer of building zone

"On the border of legality"

The main instrument studied in the commune of Wiedlisbach is zoning. The commune uses the instrument in an innovative way that aims towards the spatial transfer of development rights. The cantonal authority qualifies this strategy as "on the border of legality"¹⁸. The strategy behind the building zone transfer is to reduce the building zone in the inner village on (partially) undeveloped plots and use the "development credits" gained through this reduction in order to zone an area outside of town.

4.1.5.3 Step 1: Temporary suspension of development rights

Operation of the building zone transfer occurred in two steps. The first step was to conduct individual negotiations with all landowners who owned undeveloped or partially developed plots considered building zone reserves by the canton. The aim of these negotiations was to obtain landowner consent to remove (a portion of) their unused plot from the building zone¹⁹. The owners who agreed to the communal proposal were placed in what was referred to as a "green space and garden zone"²⁰. According to the building regulations, this zone aimed to "ensure the existence of green spaces, gardens and orchards within the settlement area"²¹. The zone change was comprised of three main components, all mentioned in art. 54 of the communal building regulations:

1. a removal of their development rights for a minimal period of 8 to 10 years, or until the next building regulations revision process;
2. a priority right to be zoned when the commune begins subsequent revisions of its building regulations;
3. an exemption from the tax on added land value created through zoning when the plot is put back in the building zone.

The underlying objective of this green zone was to reduce the amount of communal building zone reserves²². As mentioned in section 4.1.4.6, the size of the building zone reserves do not allow for further zoning procedures.

An instrument lowering density temporarily

In terms of usage, the green zone allows for underground construction, whereas surface construction can only occur if linked to the care and use of a garden or orchard. The new zone does not affect the use rights of third parties: for example, public access is not granted to these areas. It merely ensures that very limited development will take place. In fact, the green zone can be considered a de facto regulation for the lowering of density. In the future, when the zoning plan will be revised, (at least eight

¹⁷M. Allemann, president of the commune of Wiedlisbach, interviewed in Wiedlisbach 24 June 2014; D. Ott, architect and planner, member of the executive committee of Badner Partner AG, interviewed in Solothurn 1 April 2014.

¹⁸A. Schnyder, head of communal and regional planning, S. Bleuel, head of main development centres, R. Siegenthaler, urban planner, *Amt für Gemeinden und Raumordnung, Justiz-, Gemeinde- und Kirchendirektion* of the canton of Berne, interviewed in Berne 24 April 2014.

¹⁹One alternative mentioned in the previous paragraph was to make them sign a contractual building obligation.

²⁰Art. 54 of the *Baureglement der Gemeinde Wiedlisbach vom 30 Juli 2013*.

²¹*Ibid.*

²²D. Ott, urban planner, co-director of Baderpartner, interviewed in Solothurn the 1st April 2014.

to ten years after a zone change), owners of plots in the green zone willing to build (or to sell) will have rezoning priority over landowners outside the building zone.

The potential consequences for landowners of plots in the green zone should be addressed. For those whose plot has been placed entirely within the green zone and have no intention to build or to sell in the medium term, there are almost no consequences. Subsequent revisions arise every 10 to 15 years, and owners can ask to be zoned back in and, after modification of the zoning plan, development rights are restored. In case of communal refusal, owners can oppose the decision during the revision process and have the possibility of seeking compensation for material expropriation. However, as this phenomenon has not yet been observed it seems likely that the landowner will have to prove their intentions to build prior to rezoning.

Trivial consequences for long term hoarders?

For the owners of plots located partially within the green zone, their zone change involved (in most cases) a reduction of the unused development rights. However, the reduction depended on which part of the plot had been put into the green zone. In certain cases, the green zone was located where no construction was permissible (e.g. if accessibility from one side did not meet necessary requirements, or if a forest or river bordered the plot). Thus, the use right restriction equaled zero. However, certain owners were effectively restricted in their rights. Among these owners, some negotiated with the commune for looser building regulations regarding the timeframe for when their plot could be rezoned²³. Thus authority cedes their legal resources for the landowner consent on and support to the zoning plan revision. The result is change in the communal building regulations and zoning plan and contracts signed with the green zone landowners that negotiated specific in kind compensation.

Temporary development rights reduction traded against additional development rights

For the communal authorities, the green zone permits influence over the amount of building zone counted as reserve. According to current cantonal practice (AGR, 2013a), the number of square meters taken from the building zone and designated as green zone can then be used to zone in new land somewhere else. Along with this ability to transfer land, another subtlety has been exploited by the commune: undeveloped plots or part of plots smaller than 500 m² are not counted as building zone reserve. Thus, any reserve bigger than 500 m² that can be reduced through green zoning to less than 500 m² no longer counts as a reserve, which allows for further reductions of excessive communal building zones (see section 4.1.4.2). This technique was applied to several owners' backyards: one owner had, for example, a 700m² of building zone reserve in his backyard that counted as 700m² building zone reserve for the commune. The commune put 250m² of the backyard's reserve in the green zone. This left the owner with a building zone reserve of 450m², but reduced the commune's building zone reserve to 0m².

Diversion of the zoning instrument

4.1.5.4 Step 2: Transfer of building credits

In Wiedlisbach, the building zone surface gained through the green zone was then transferred to the perimeter Gerzmatt on the northeastern communal border. In fact, prior to the transfer, a smaller part of the perimeter was already defined as building zone. But because its shape did not suit proper development (and was not serviced yet), the communal executive body and the landowner negotiated the definition of a new, broader perimeter. As the parties could not agree on a compromise prior to the end of the building regulations revision (ended July 2013), the extension of the building zone was postponed (AGR, 2013a).

Conflictual transfer at the settlement border

In December 2013, after having signed an agreement with the landowners, the communal executive body proposed to zone two perimeters: Gerzmatt and Moselen. But the public inquiry proved too contentious²⁴. In the end, the subject was withdrawn from the communal legislative body's agenda.

In June 2014, the communal executive body made a second legislative attempt, and submitted just the zoning of Gerzmatt for adoption. The communal assembly

²³As the analysis of oppositions of individual landowners to the zone change and the transcriptions of negotiations with the commune have shown (AGR, 2013b), simple persuasion is not always enough to gain owner approval. Compensation in the form of higher density or a reduction of the perimeter of the green zone has been conceded by the communal authority.

²⁴Criticisms were made regarding the additional traffic that the new construction would generate, and on the potential obstruction of neighbours' views (Commune of Wiedlisbach, 2013; Berner Zeitung, 2014).

approved the modification – 38 persons in favour, 20 against (Commune of Wiedlisbach, 2014). One opposition against the cantonal authority's decision to approve the zoning was made, and is currently being examined by the cantonal supervisory authority.

**Federal moratorium
suspends approval**

In the meantime, with the entry into force of the revised spatial planning law, a federal moratorium on uncompensated zoning decisions has entered into force²⁵. This moratorium is valid until the cantonal act is revised and the cantonal structure plan approved by the federal government. Thus, the approval of the zoning operation in Gerzmatt might be delayed, as federal law requires that any extension of the building zone must be compensated by an equivalent amount of surface rezoned as agricultural. In the case of Wiedlisbach, the recognition of the transfer as proper compensation has been called into question.

**Costs reduction through
urban expansion**

One might ask why the commune wanted to put new land in the building zone. The official response was that the commune intended to overcome the general land hoarding phenomenon and make land available for development. If one looks at the numerous negotiations conducted with the landowners during the 2013 revision of building regulations, (as well as those begun already in the 1990s), this official argument certainly provides part of the explanation. But then why does the commune want to make land available for new development? This question can in turn be addressed with a complementary hypothesis: the commune hopes to raise revenues and lower infrastructure costs per inhabitant through the zoning of land for development. The subsequent arrival of new inhabitants will further lower these infrastructure costs (Commune of Wiedlisbach, 2014). As the discussions prior to the adoption of the zoning plan show, Wiedlisbach has had financial issues for several years. According to the regional press (Berner Zeitung, 2011), Wiedlisbach is not the only commune in the region to pursue such a strategy. Its fiscal effectiveness has still to be proven, as new inhabitants also require additional services such as kindergartens, schools and sports facilities.

4.1.5.5 Implementation of the tax on added land value created through zoning

**No fixed taxation
percentage**

Since the 2013 revision of building regulations, the tax on added land value created through zoning has been part of the communal "tool box". The regulations state that the communal executive body is obligated to negotiate restitution with the landowners, seeking an "adequate amount" of the added value created through zoning²⁶. As recommended by the commune's urban planner²⁷, the legal dispositions do not foresee a fixed tax level. Thus, the local authority keeps a wider margin of negotiation in the amount of the added economic value it captures.

**Tax on added land value
and land service in one
single contract**

The above mentioned transfer of development rights in Gerzmatt was the first occasion to apply the instrument. The commune signed an agreement with the landowners (the so called *Infrastrukturvertrag*) including the amount of tax on added land value created through zoning and detail land service costs to be paid by the owner. As foreseen by law (109 BauG), the portion (infrastructure: i.e. roads and pipes) of the land that has been serviced becomes ownership of the commune once realised. In order to ensure the development of the new area, a purchase right was also included in the contract: the commune has an emption right on the land for ten years at a fixed price. However, the commune's ability to buy the land if the owner does not meet their obligations after the fifteen year period remains an open question.

**Commune has an
important discretionary
power**

The applied tax rate was 20 % (Commune of Wiedlisbach, 2014). It would have been necessary to access the contract in order to see if the land values used for taxation correspond to market price values and to determine the proportion of land service costs that has been passed on the landowner. The study of other contracts between communal land authorities and landowners has shown that even with a fixed tax rate, the effectively taxed amount is still variable and tends to be in the landowner's interest (see section 4.3.5.3). As a matter of fact, the fixation of land price before and after the zoning operation lies entirely in the discretionary power of the communal authority and their negotiation partners. Further, as land service costs, and the tax

²⁵Art. 38a of *Federal spatial planning act of the 22 June 1979*, SR 700.

²⁶Art. 69 of the *Building regulations of 30 July 2013 of the commune of Wiedlisbach*.

²⁷D. Ott, *op. cit.*

on added value created through zoning (in case the instruments are implemented) are negotiated together, the amount of taxes levied is used to pay for land service that directly benefits the landowner (see also section 4.2.5.1).

The wide margin of manoeuvrability granted to communes in the implementation of both the land service tax and the tax on added land value created through zoning allowed a diversion of the instrument from the purpose that it was conceived for, that is the payment of compensations due in cases where a material expropriation took place. The Bernese cantonal construction act defined two distinct instruments, but left a wide margin of implementation to local authorities that frequently favoured a lump sum taxation and simultaneously recovered the costs of land service (Metropolitankonferenz Zürich, 2013).

Diversion of the tax on added land value created through zoning

4.1.5.6 Mortgage as payment guarantee for infrastructure

The eastern part of Wiedlisbach called Weiermatt is a rather important working zone (2 hectares) that remains un-serviced and un-built. While the first portion was zoned in 1979, and a second in 1989, the owner did not service the land in that lapse of time.

Long standing non serviced working zone

After negotiation with the landowner and approval of the land service plan of the working zone by the communal legislative body in June 2010, it was agreed that the commune would finance the land service and be reimbursed no later than ten years, or in the event of a sale of the land. Currently, further proceedings are temporarily blocked by opposition (Commune of Wieblisbach, 2013, 2014).

Commune takes over to unblock situation...

The signed contract between commune and landowner foresees that the public authority will, with public money, service the whole area in one go. This will occur after having recorded in the land registry that the amount of money paid for land service is due as a first rank mortgage or, at the latest, ten years after the land has been serviced.

... and ensures reimbursement through mortgage

This financing method has advantages for all the involved parties. For the landowner, it is convenient because there is no need to take care of land service and no money to disburse. There is also a strong incentive to sell the land, as in the medium term, a large amount of money is due. Companies are the ultimate beneficiaries of this policy, because they can move in more quickly and easily; further, they look for already serviced land²⁸. The commune finances the project through the leverage that the mortgage they impose on the concerned plots provides. They also have a guarantee that they will recover the investment, because the mortgage contract expires in case of sale, development or at the latest after ten 10 years. Further, the commune can decide upon the schedule of land service.

A win-win situation for both the commune and the landowner

4.1.5.7 Revocation of local development plans

The interviewed mayor²⁹ mentions that during the 2013 building regulations revision, several local development plans were abolished: the development they planned involved a betterment of land that could not be done any more, because some of the plots they regulated had been developed in the meantime. As a consequence, the local development plans lost most of their relevance.

In other cases, the abolishment of local development plans aimed to reduce the restrictions to development, *i.e.* on the type or aesthetics of constructions, garden trees and hedges, specific measures for cars, bikes or pedestrians, etc., because they were perceived as impeding construction. Officials and planners mention several times the inadequacy of the types of building considered in the local development plans with current housing demand³⁰. From the landowners' viewpoint, the low construction activity can also be explained by an insufficient added economic value that the sale of land would grant. As shown in the next case study, solutions to the economic value issue can be an increase of the land use coefficient in order to gain a higher return – this has to be in accordance with aesthetic considerations and is subject to approval

Low rent as critical factor?

²⁸M. Allemann, *op. cit.*

²⁹M. Allemann, *op. cit.*

³⁰M. Allemann, *op. cit.*; M. Jampen, head of the communal administration, and H.-J. Muralt, mayor of Huttwil, both interviewed in Huttwil the 13 August 2014; R. Suter, head of planning in Niederbipp, interviewed in Niederbipp 8 July 2014.

by local inhabitants (section 4.2.5.2), or a reduction of the expected economic return (section 4.2.5.3).

4.1.6 Impact on value redistribution

Value redistribution leads to urban expansion

The case of Wiedlisbach has shown a value redistribution process that goes against the constitutional land use planning principle of an economic use of soil. The transformation of undeveloped plots in the village centre into unbuildable green zones, allows the commune to reduce two hectares of surface counted by cantonal authorities as undeveloped building zone. The withdrawn surfaces are either entire plots, parts of plots, or remaining reserves. Remaining reserves are reduced to surfaces smaller than 500m², which allows complete subtraction from the building zone calculus. As a counterpart to this reduction, additional development rights are negotiated by specific landowners, including additional constructible surfaces or garages. This micro-zoning approach leads to a (temporary) crystallization of "construction holes" within the building zone.

Reduction of ecological value in the middle run

In 2014, the commune has gained through the subtraction of unused building zones a margin of manoeuvrability towards the canton. Afterwards, it launches a new zoning process of approximately one hectare outside of the current settlement limits where it reuses part of the "economised" building zone. Such an operation results in small scale urban sprawl. The ecological value of non built plots in the village centre (some of which are orchards) preserved through the green zone is compensated by the development of agricultural land outside of town.

A rather favourable market after all?

As seen in section 4.1.3.2, market conditions have been more favourable for the construction and sale of individual houses: there has been a significant price drop for single family homes over the last 20 years. But this value change does not stop the village's expansion process, as the landowners concerned by the new zoning process pressure the commune to be included in the building zone (many are even willing to sign an emption right on the zoned land). This fact limits the explanation provided by the supposedly unfavourable housing market.

Creation of medium-term economic value

The economic outcome of the building zone transfer creates two distinct economic effects:

1. a partial and *a priori* temporary reduction of value on the plots in the green zone. It is partial, because for some landowners zoning does not modify their construction potential (no effective reduction of the plot ratio), others have negotiated a compensation in kind (an effective extension of the plot ratio) that will apply when their plot will return to the building zone. The value reduction is temporary, because if the landowners of the green zone want to build in the future, they can ask the commune to be put back into the building zone when the next revision of building regulations occurs (approximately every ten years).
2. an increase of economic value in the new building zone of the Gerzmatt: (1 hectare * 260CHF/m²) - 20%³¹ = 2,000,000 francs³². Therefore, an overall added economic value is created.

Reduction of medium-term ecological value

In terms of ecological value, the building zone extension creates a net loss of 1 hectare of fertile land protected by the cropland protection plan. The effects of the green zone are considered equal to zero, because the green zone only maintains the existing ecological value of the orchards. In the middle time frame, part of the plots in the green zone will be developed and the ecological value of these plots will decrease.

Extensive use of resources

The case has shown an extensive exchange of resources between the involved actors (law, consensus, political support): through the negotiations conducted with the landowners and the instruments created in the 2013 building regulations, a consensus was achieved on a temporary suspension of development rights. However, the political support of the inhabitants was obtained only after a reduction of the commune's zoning ambitions. Nonetheless, the commune managed to pass on all land service costs linked with the extension of its building zone to the landowner and capture part of the added value they had created.

Combination of public and private law instruments

In order to achieve its building zone extension strategy, the commune combined the

³¹Tax on added land value created through zoning applied according to M. Allemann. *op. cit.*

³²Land price estimation based on Wüest and Partner (2014); a plot ratio of 0.4 and an initial land value of 8CHF/m² are hypothesised; land service costs and benefits are not considered.

use of public and private law instruments: they traded new legal obligations created by the green zone against additional development rights and several “guarantees” (an exemption from the tax on added value, priority zoning rights). The commune proposed an innovative solution: a "voluntary building obligation" to landowners reluctant to be included in the green zone. Further, the commune used the added value created by the building zone extension to ensure payment by the landowner of (1) the land service and of (2) the tax on added value created through zoning. The commune also secured the area’s development through the signature of an (3) exemption right.

4.2 Reduction of oversized building zones in Huttwil

4.2.1 Introduction

Over the past twenty years, Huttwil has experienced moderate urban growth and maintained a high ratio between employment and inhabitants despite a small demographic decline. The limited regional attraction of Huttwil makes it hard for the commune to compete with more central locations as well as to retain inhabitants. Over the past decades, the commune dealt with a lack of available building zones, a need to reduce oversized building zones, and the difficulty to pass on development costs to landowners. In fact, for a long time, land service was entirely paid for through public funds. Landowners expected a higher rent from their land than what the land market offers³³, so they blocked development in existing building zones. Local authorities tried to reduce these oversized building zones, but faced a lack of political support and had no financial mean to pay a potential compensation. At the same time, they mobilised public land and reduced expected land rent compared to market prices. This allowed development, and thus contributed to communal objectives of fighting demographic decline (Commune of Huttwil, 2009b, 7).

The case study is structured as follows:

- section 4.2.2 shows land use planning and land use changes that occurred in Huttwil over the past 25 years;
- section 4.2.3 exposes the contextual factors that contributed to land use policy outputs and land use changes;
- section 4.2.4 presents the legal constraints of superior law that contributed to land use policy outputs;
- section 4.2.5 analyses how actors have mobilised policy instruments and resources in order to achieve their goals and exposes what arrangements they have negotiated;
- section 4.1.6 presents the variables' impact on economic and ecological value redistribution.

Located in the southern Oberaargau, Huttwil is, along with Herzogenbuchsee and Niederbipp, one of the three regional centres. It is located in the upper Langete valley, 15 km southwards of Langenthal and at the western border of the Canton of Lucerne. The communal territory is marked by a river bed, along which the settlement area is developed, but also by various smaller valleys and other tributary rivers. The hills around Huttwil do not exceed 750 meters, and are mostly dedicated to agricultural use. The train line that crosses town connects the commune with Langenthal in the north, and Lucerne in the east. The canton's main road connects to Burgdorf in the west and Sursee in the east.

³³C. Schneider, architect and urban planner, Schneider Partner, interviewed in Burgdorf 16 September 2014; M. Jampen and H.-J. Muralt, *op. cit.*

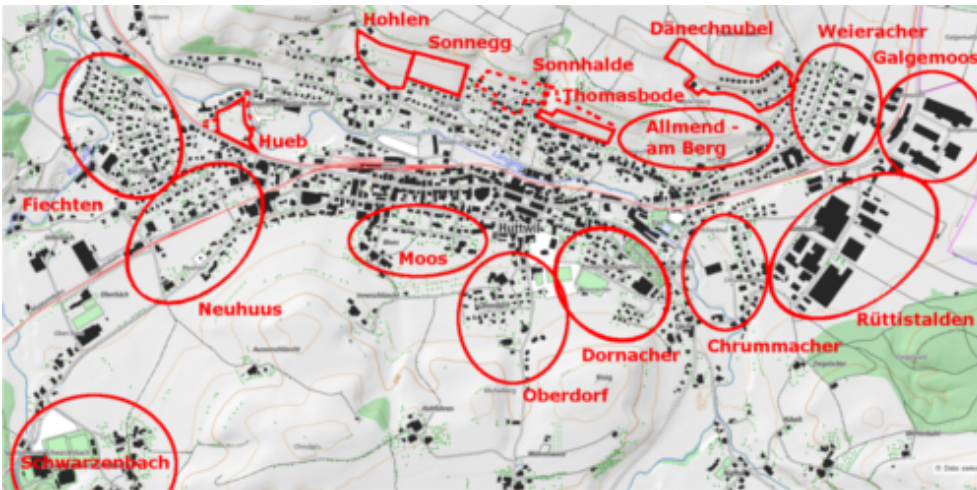


Figure 4.4: Overview map of Huttwil and its neighbourhoods. Map: swisstopo (2014a).

4.2.2 Evolution of land use planning and land use

4.2.2.1 Zoning changes in 1977 and their effects from 1977 to 1994

The oldest available zoning plan dates back to 1977, and shows a series of slight modifications made until 1981. The approval procedure was subject to major negotiations between landowners, the commune and the cantonal planning office (AGR, 1977), because important land surfaces at the limits of the urbanized area were zoned out (not shown on the map). This reduction of building zone happened at the request of a single landowner who cultivated his land, had no intention to develop it, and therefore asked the commune to pu this plots out of the building zone. The commune, under pressure from the canton as well as the Confederation (due to the enactment of the emergency federal decree in 1972), negotiated a 15 year building prohibition easement on the plots of several landowners in the building zone.

A farmer's desire to get their plots zoned out...

According to the cantonal planning office, the use of building prohibition easements is limited by the cantonal legislator for the fulfillment of planning purposes. Its use should remain temporary and exceptional. The cantonal office judged the communal implementation of the instrument for a 15 year period inadequate and asserted that a zone change to agricultural zone is more opportune. They removed several plots at the border of the settlement area from the building zo based on the following two arguments (AGR, 1977):

... used as argument to zone other owners out

1. land in the building zone should be used within the next 10 to 15 years;
2. one of the concerned farmers refuses to keep his plots in the building zone; for reasons of equal treatment between landowners, other plots in a a similar situation also have to change zone.

As a counterpart to this decision, the canton cancelled all reserved zones established by the federal emergency decree. For the landowners, this meant a removal of use restrictions on the concerned plots and for the commune, it meant regaining its planning autonomy.

Despite these important zoning operations, huge building zone reserves still exist (numbered "1" on figure 4.5). These reserves date back to a time of tight inter-relatedness between communal and landowners' interests³⁹. These reserves allowed

Important housing and industrial development

³⁴The first trace of a local development actually dates back to 1961 (AGR, 1977), when a common development plan was established for Sonnhalde and Thomasbode (AGR, 1985, 1998b, 2011).

³⁵Decision of the 18.09.1997 (AGR, 1997)

³⁶Revision dates collected from overview table established by the cantonal planning office. The only accessible decision was the Decision of the 10.12.2012 (AGR, 2012), which foresees the development of the still undeveloped upper part of the zone.

³⁷Decision of the 07.08.1998 (AGR, 1998b).

³⁸Revision dates collected from overview table established by the cantonal planning office. Only accessible decision was the Decision of the 18.09.1997 (AGR, 1997).

³⁹C. Schneider, *op. cit.*; M. Jampen and H.-J. Muralt, *op. cit.*

When	Land use planning changes	Land use changes
1977	Approval of the revised building regulations and repeal of the provisory protected areas established by the emergency federal decree in 1972. Revision of the local development plan of Thomasbode ³⁴	Part of Dälechnubel already developed
1979	Adaptation of zoning plan in Chrummacher and Rüttistalden (AGR, 1979a)	Partial development of Chrummacher and Rüttistalden in the following years
1985	Approval of the revision of the local development plan Thomasbode	–
1994	Approval of the revised communal building regulations (AGR, 1994a)	–
1995	Extension of the local development plan Dälechnubel;	Development of Dälechnubel in the following years
1997	Approval of revised local development plan for Sonnegg ³⁵ ; approval of revised local development plan for Sonnhalde east (AGR, 1997); revision of the the local development plan for Dälechnubel ³⁶	Development of Sonnhalde east in the following years
1998	Revision of the local development plans of Sonnegg ³⁷ , Revision of the local development plan for Dälechnubel; revision of the local development plan for Thomasbode	–
2000	Revision of the local development plan of Dälechnubel.	Progressive development of Dälechnubel
2001	Approval of local development plan for Sonnhalde west	–
2002	Revision of the local development plan for Sonnhalde west ³⁸ .	Development of Sonnhalde west
2011	Approval of the revised building regulations; following adaptation of local development plans of Thomasbode, Sonnegg and Hohlen	–
2014	Revision of the local development plan of Sonnegg ^a	–

Table 4.2: Main land use planning and land use changes in Huttwil since 1977.

^aThe revision has yet to be approved according to the interview of communal representative M. Jampen, *op. cit.*

several developments between 1975 and 1994: one can notice the construction of the industrial zone that occurred in Rüttistalden. Further, entire housing neighbourhoods were erected in Weieracher, Lochmüli, Neuhuus, Dornacher and between Rüttistalden and Chrummacher. Most construction was single family homes, except in Weieracher (east) where single family homes and three storey apartment buildings are interspersed.

Development of building zones depends on landowner

Not all building zones are developed, and a gap between zoning and effective land use persists. This hoarding is seen in the case of four wide housing zones, designated at the end of the 1970s, and undeveloped at the time of data collection in 2014 (numbered "2" on figure 4.5): Sonnegg, Hohlen and Thomasbode in the centre north; the fourth area is the Hueb in the centre west of the commune. But this hoarding is not a general phenomenon: in the area of Weieracher in the east, where the land is owned by the *Herdgemeinde*, a semi-public owner, one can observe only a single undeveloped plot remains – the wider free plots in Weieracher are part of the working zone.

4.2.2.2 Building regulations revision of 1994 and land use changes from 1994 to 2011

Availability already a central issue...

The 1994 revision aimed to coordinate landscape, development and transport infrastructure by "simple land use planning means" such as building regulations and zoning plans (Commune of Huttwil, 1992, 20). As mentioned in the objectives regarding to land development, the availability of undeveloped building zone is a central issue, as well as the parsimonious use of land (Commune of Huttwil, 1992, 21). Similar to the

other case studies, the revision is also conditioned by the new cantonal construction and land use planning law, in particular the mandatory participatory mechanisms⁴⁰. Willingness to increase densification was also central, as the occupation coefficients have been elevated in each zone, and the minimal distances between buildings have been reduced. The introduction of the ZPP in the new building regulations and the creation of seven zones alike indicate a shift towards enhanced coherence and aesthetics, and reduced land consumption of new housing zones.

The Huttwilberg (ZPP Holen, Sonnegg and Thomasbode – numbered "2" on figure 4.5) and the area of Dälechnubel (numbered "3" on figure 4.5) were considered the most promising locations for future housing, as the land has a low agricultural value due to its steepness, and immissions (i.e. street noise) are low (Commune of Huttwil, 1992). However, the determining factors remained the willingness of landowners to develop their land. Although this fact was acknowledged as a central issue in the revision documents, no remedy was proposed or suggested (Commune of Huttwil, 1992; AGR, 1994a). Nevertheless, the 1994 revision brought the following changes:

... that remains untackled

No extension of the housing zone

- firstly, the land located in the Allmend/am Berg is unzoned (numbered "4" on figure 4.5 – **light purple**). This zone change is similar to the other important unzoning processes of 1977 where the land was still used for agriculture⁴¹;
- secondly, the zoning plan is defined more in detail: protected areas and certain danger areas along the Langete river are now recorded into the map, and specific areas less fit for development have been placed within a green zone;
- thirdly, other modifications around the industrial zone were made (numbered "5" on figure 4.5): the southwest part belonging to the housing zone was unzoned because it was considered too exposed to noise. Further, important extensions of the industrial zone were made on land owned by the *Herdgemeinde*, one of the town's statutory corporations.
- fourthly, a wide area in the south west is zoned in as institutional zone for a school and a sports centre (numbered "6" on figure 4.5);

In matters of construction, when compared to the period 1974–1994, a clear reduction in building activity is observable: only two new neighbourhoods were erected: Sonnhalde and the first part of Dälechnubel (respectively numbered "7" and "3" on figure 4.5). All plots are owned by the *Herdgemeinde*. Three plots currently remain undeveloped and, at the time of writing, available on the housing market. Further, several non built plots scattered across the urbanized areas were developed, but there are still important differences between zoning and land use:

The *Herdgemeinde* as the only active landowner

- the extensions of the industrial zone remain undeveloped until 2014 (**beige** squares)
- the three zones on the Huttwilberg and the one of Hueb remain not built (numbered "2" on figure 4.5).

4.2.2.3 Building regulations revision of 2011

During the 2011 revision of the building regulations, several small changes occurred: The first was the extension of the industrial zone in Galgemoos (**light yellow** on the map). The second change concerned two zoning out procedures (numbered "8" and in **dark purple** on figure 4.5): the first zoning out concerned the plot north of the Langete, that has become part of the institutional zone. The adjacent construction up north is the town's hospital. Therefore, no compensation was due. The second was the a plot in Neuhuus, but no further information could be obtained on this matter.

Limited changes in terms of zoning

The third change concerns the local development plans of Thomasbode, Hohlen and Sonnegg (numbered "2" on figure 4.5). The underlying development plans and prescriptions for these zones have been revised because communal regulations now anticipate passing all land service costs on to landowners. Additionally, the ground's

Local policy change passing on land service costs to landowners

⁴⁰Art. 58 BauG, SR-BE 721.0.

⁴¹However, no information could be found in regard to the underlying negotiations.

steepness makes land service difficult. Communal authorities raised the density coefficient of these three zones in order to compensate for the additional costs for landowners and the reduced constructible surface of Thomasbode. This case is analysed in section 4.2.5.2.

**Tax for advantages
conceded through zoning**

The commune is granted the possibility to ask landowners that benefit, via zoning, from increased land value to contribute to land service costs⁴². The adopted solution grants a wide margin of negotiation, as it does not fix a minimal amount, and practically returns the taxed amount to the landowner in the form of land service and improvements. The creation of added economic value is contractually redistributed to the landowner.

**"Voluntary building
obligation"**

In order to foster land availability, planning documents refer to the possibility of signing agreements with landowners in anticipation of an exemption right if the landowner does not develop their plot within a certain timeframe (Commune of Huttwil, 2007, 21ff).

⁴²Art. 27-4 of the *Building regulations of 8 December 2010 of the commune of Huttwil*.

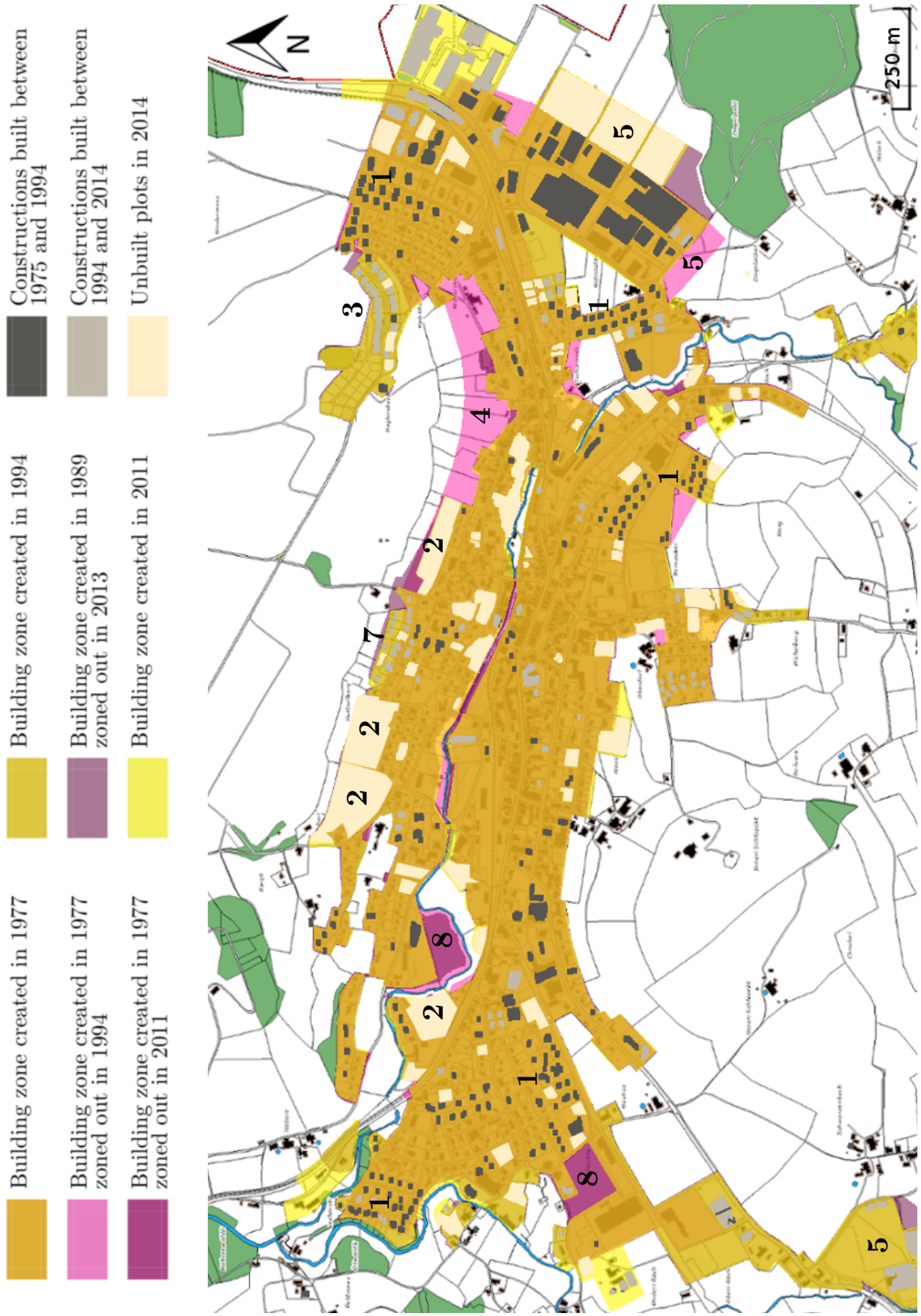


Figure 4.5: Evolution of land use and land use planning in Huttwil from 1977 to 2014. Data: AGR (1979a, 1985, 2011). Map: OSTAG Ingenieure AG (2014); swisstopo (2014b).

4.2.3 Contextual factors

4.2.3.1 Demographic evolution

Slightly shrinking population

The case of Huttwil is of particular interest to the research, because it is a commune whose demography is in decline, yet whose settlement area continues to grow. Over the last 21 years (1992-2013), Huttwil's population has shrunk by 55 inhabitants, (from 4757 to 4702), a reduction of 1,2% (FSO, 2015c). Compared to the neighbour communes, Huttwil shows stronger resistance to population emigration than Wyssachen, Eriswil, Rohrbachgraben or Gondiswil (these communes lost, on average, 10% of their population).

Change goes against regional and cantonal tendencies

Compared to regional, cantonal and Swiss averages, Huttwil is far below regional, cantonal, and national growth rates (7%, 6.2% and 17.5% total growth or 0.34%, 0.28% and 0.8% annual growth, respectively).

Over the preceding 15 years considered for the revision of the building regulations (1991-2006), nominal population decline of 108 inhabitants, corresponds to -2,2%. Over the whole period, this represented an annual decline rate of -0.15%. These numbers are under regional (3,46% overall and 0.23% per year), cantonal (5,75% and 0.38%), and national growth averages (13.28% and 0.89%).

In terms of housing, the communal vacancy rate between 2001 and 2011 increased slightly, but remained rather low at 2.3% in 2011 (FSO and Kanton Bern, 2015). This low occupancy rate contrasts with the demographic decline, and may be explained through the progressive vacancy of existing homes, as well as a lower occupancy rate of new homes. As shown for the case of Wiedlisbach (see section 4.1.4.2 and section 4.2.4.1 below), the cantonal building zone calculus takes into account the increase of gross floor area used per inhabitant over time.

4.2.3.2 Economic and fiscal evolution

High concentration of jobs

Compared to other communes of the region, inhabitants of the commune have fiscal capacity above regional average (910CHF per month compared to an average of 825CHF per month). With approximately one job per two inhabitants, the job supply is also far above average (30 jobs per 100 persons regionally). Huttwil hosts the electric bike producer Biketec, which accounts for 125 jobs.

Tax level above regional average

Tax rates for natural persons is slightly above the regional average (1.65 in Huttwil and 1.59 on average), like the rates of the other communes in southern Oberaargau (FIN, 2014). Land tax rates are also slightly above regional average (1.2 instead of 1.12) (FIN, 2015). Despite the fact that Huttwil has lowered both the revenue tax (from 1.89 to 1.65) and the land tax (from 1.5 to 1.2) over the last decade, the commune's rates remain above regional average, which points to a lower competitiveness⁴³.

Relatively low land prices

In regard to the evolution of land prices, only a region wide analysis can be made. Interviewees have confirmed the relatively low land prices estimated by Wuest and Partner (2014): between 180 and 300CHF/m² for serviced land intended for single family homes. If I refer to other price data (SRED, 2014) that uses transaction prices of single family homes, (between 2004 and 2013), there is a slight price increase from 620,000CHF to 700,000CHF.

4.2.3.3 Topographic and spatial characteristics

A rather hilly landscape

Located in a hilly landscape, Huttwil's shape is profoundly marked by the Langete valley in which it is located. The Huttwilberg marks the northern border of the settlement area with a altitude difference of 100 meters between the river and the plateau uphill. The slope on the southern side of town is less steep, and grants access to two hills of similar height as the Huttwilberg.

Longer commuting distances than in northern Oberaargau

In terms of access, Huttwil is crossed by a regional train line that connects to Langenthal (20 minutes ride) every half an hour and to Lucerne (1 hour ride) almost every half an hour. Thus, the center of Huttwil is classified as "C" in the cantonal public transport access categories. In terms of individual transport, distance to the closest motorway entry is about 30 km, which, compared to the other regional centres

⁴³M. Jampen and H.-J. Muralt, *op. cit.*

of Oberaargau, is far. Driving to Berne takes approximately an hour, Lucerne 50 minutes and Solothurn 40 minutes.

4.2.4 Constraints of superior law

4.2.4.1 Cantonal building zone calculus

The revision documents of 1994 (AGR, 1994b) mentions a growth objective of 0.75% per year, which corresponds to 36 additional inhabitants. This objective is based on the population difference between 1960 and 1970, the difference being extrapolated for the estimate (Commune of Huttwil, 1992). The 1980s were a decade of stagnation for the commune, with the years 1988, and 1989, constituting an exception (2% growth both years).

Optimistic growth objective

The building zone calculus of 2011 and 1994 are similar. Nonetheless, two elements change: the population growth estimate now relies on a canton wide estimate which unifies the regional demographic disparities. Secondly, there is now a zoning bonus granted to regional centres (such as Huttwil) designated as "strategic growth factor" if they are willing to raise the minimum plot ratio of their building zones.

Same building zone needs as 20 years ago...

In 1994, the building zone needs were estimated between 11.7 and 12.8 ha with a population growth of 11.25% over 15 years, which corresponds to a yearly growth of 0.75% (Commune of Huttwil, 1992, 26). Calculated with today's formula (4% population growth over 15 years, centrality bonus and higher gross floor surface per inhabitant), the size of the needed building zone is approximately 11 ha, a surface very similar to the results provided by the old calculation formula (11.7 ha). In other words, if Huttwil were a rural commune, and had no higher density requirements, and no centrality bonus⁴⁴, it would be allowed almost as the same surface of new building zone than 20 years ago. Consequently, the evolution of the calculation method has only had a marginal impact on the Huttwil's building zone quota, (between 0.7 to 1.8 ha less building zone is now allowed) despite an actually shrinking population.

... despite a shrinking population

In 2011, the building zone needs were still around 11 ha, despite a population level corresponding to the one of 1988 (Commune of Huttwil, 2006; FSO, 2015c) and moderate construction activity (**light grey** surfaces on figure 4.5). The land that has been developed between 1994 and 2004 corresponds to approximately one third of existing building zone reserves (Commune of Huttwil, 2007, 12)⁴⁵.

4.2.4.2 Position of the cantonal offices

Similar to the first Case study analysed, cantonal offices involved in the building regulations procedure rarely question the relevance of communal policy. As an example, the agricultural office remarks that some building zone extensions (working zone in Rüttistalde and cantonal sports centre in Schwarzenbach) occur on protected cropland. Further, the office of economic development's main purpose is to service plots in the building zone and lower building restrictions in the working zone in order to foster its development. The cantonal planning office notices that the commune's growth prognosis is optimistic and that the calculations in regard to building zone capacity "are characterized by important imprecisions" (AGR, 1994b, 5f), but does not interfere in the definition of the zoning perimeter.

Limited intervention in communal policy

In the 2011 revision, the other cantonal offices involved in the revision procedure did not comment on building zone capacities or calculation (AGR, 2011).

⁴⁴According to the cantonal structure plan (measure C02), the regions define so called regional centres of fourth level. These centres have the task of attracting employers, be multifunctional suppliers (in terms of public services for the surrounding communes), and become central traffic junctions (Region Oberaargau and Kanton Bern, 2012, 5). These responsibilities usually lead to them being granted a "wider margin of manoeuvrability while determining the size and location of zones" (Kanton Bern, 2011, measure C 02) which is then implemented in the form of a strategic development factor part of the building zone needs calculus.

⁴⁵The planning report of 1992 estimates 18,6 ha of housing zone reserves (Commune of Huttwil, 1992, 50). According to the 2007 planning report (Commune of Huttwil, 2007), 5.5 ha have been built since then.

4.2.5 Local use of instruments

4.2.5.1 Implementation of the tax on added land value created through zoning as land service tax

Conflict between growth objectives and rent capture

In the initial works linked to the revision of the building regulations of 2006, the main problem for communal authorities is the availability of building land (Commune of Huttwil, 2006, 14). As interviewees⁴⁶ and planning documents mention, communal priority is to foster development, growth and construction (Commune of Huttwil, 2007, 21).

Interviewees argue that the introduction of a tax on added land value created through zoning would have been a threat to these objectives, because it would have placed additional financial constraints on the landowners (who are already resistant to land service costs)⁴⁷. This difficulty is due to the fact that until the 2000s, land service costs were fully paid by tax money. However, the worsening of communal finances led to a change of practice: newly approved local development plans have been accompanied by a contractual agreement (*Infrastrukturvertrag*) that passed on part of the land service costs to the landowners. Further since the revision of building regulations in 2011, article 27 par. 4 states that the communal executive body can require financial participation in land service from landowners who benefit from planning measures. The commune uses added value created through zoning in order to require landowners' financial participation to land service they benefit from.

This formal transfer of costs required the elaboration of new local development plans for all remaining undeveloped perimeters. As the costs division between commune and landowners are transcribed into a contract that both parties have to sign, some of the landowners simply refused to approve them if they judged the conditions of the new agreement not favourable enough⁴⁸.

Change of plot ratio to ensure the pass on of service costs

As the case of Thomasbode shows (see section 4.2.5.2 below), it is only through the adoption of a higher plot ratio that certain landowners agreed to carry a major part of the land service costs. But in order to lower the land service costs to be carried, commune and landowner have agreed in two recently signed contracts that part of the roads foreseen in the local development plans would remain in private property. This allowed for the application of lower and thus cheaper construction norms than if they were to be transferred to the public domain after development⁴⁹.

4.2.5.2 Land hoarding and the case of Thomasbode

A central challenge for the commune was and is to deal with the availability of land in the building zone (Commune of Huttwil, 1992, 11). The area of Thomasbode illustrates the problem at stake. The areas of Sonnegg and Hohlen further west are characterized by the same hoarding issue: land kept in the building zone for decades and their owners making little effort to improve or develop it.

No will to pay for land service

Located on the southern hillside of the Huttwilberg, at the northern border of the settlement area, the area of Thomasbode was zoned in the 1970s. Since then, at least two local development plans were approved, one in 1985 and one in 1998 (AGR, 1985, 1998a)⁵⁰. The plan from 1998 was linked to a land service contract signed between the commune and the landowners. The contract stated that the commune would finance the major part of the land service. However, the landowners did not engage in any planning measure until 2006, where one of the three owners launched a planning procedure and formally asked the commune to fulfill its obligations and service the land.

Transfer of plots into medium danger zone

The land's development was subject to two major difficulties. First, nine water catchments (to which private and public use rights are attached) were located within the designated perimeter, and the construction of the connecting road might have destroyed several of them (Kellerhals and Haefeli AG, 2010). Second, upon implementation of the communal hazard map in 2009, the entire zone was defined as a medium hazard area (level 2 out of 3) where construction is fundamentally allowed,

⁴⁶M. Jampen and H.-J. Muralt, *op. cit.*

⁴⁷M. Jampen and H.-J. Muralt, *op. cit.*

⁴⁸C. Schneider, *op. cit.*

⁴⁹C. Schneider, *op. cit.*

⁵⁰It could not be confirmed that no previous plan existed.

but subject to protection measures ensuring the safety of humans, animals, and major valuables (art. 6 BauG). Therefore, the area of Thomasbode could not be developed solely based on the local development plan from 1998.

As the revision of the communal building regulations went on, uncertainty on how to deal with Thomasbode persisted: the canton stood in favour of taking the area out of the building zone, arguing that no compensation would be due because of the hazard zone in which it was located. The local planning revision committee disagreed: despite the legal restrictions imposed by the danger zone or the difficulty to service the land, the commune had an obligation to compensate landowners for their rights (Commune of Huttwil, 2011). The communal executive body, initially in favour of removing the area from the building zone (Commune of Huttwil, 2009a), was stuck in between the local planning committee and the cantonal authority's opposed positions.

Potential zoning out

In order not to delay the ongoing building regulations revision process, the communal executive body decided, in 2009, to transform the building zone into a reserved zone⁵¹. This zone change allowed to suspend planning and land service activities in the concerned perimeter for a minimum of two years. This delay granted the commune the necessary time to mandate a constructibility study that would confirm or infirm the technical feasibility of developing the area of Thomasbode (Commune of Huttwil, 2011, 2). When the report was handed to the commune in 2010, the constructibility of the perimeter was confirmed and the zoning out option vanished.

Establishment of a reserved zone

In 2011, the reserve zone was replaced by a smaller building zone with modified proportions adapted to the new future construction – conceived as so called *Ter-rassenhäuser*. This new zone facilitates development, and guarantees a similar level of return on investment, even with a new contract between commune and landowner where the latter bears all land service costs⁵². The plot ratio has been raised in order to compensate the surface loss, and transfer the costs of land service fully to the landowner. What I observe here is the use of the commune's legal authority to compensate for the economic reduced value carried by the landowners and the commune's executive body aversion for fights with elected representatives and landowners, an attitude that is can be observed frequently in the canton of Berne when it comes to building zone reductions⁵³.

Third local development plan

The underlying third local development plan is currently being elaborated, and uncertainty about the actual development of Thomasbode remains. Indeed, no building obligation applies and the commune has no legal remedy to force the owner to build.

4.2.5.3 Building rights

The case of the *Herdgemeinde* is an example showing landowners' rent expectation as a factor of land development. The *Herdgemeinde* is a major landowner of the commune and one of Huttwil's two *Burgergemeinde*⁵⁴. The *Herdgemeinde* has ownership titles on the entire eastern part of the city, namely the entire industrial zone, the neighbourhoods of Weieracher and Dälechnubel, and on most of the fields and forests located north of town (for a total of approximately 300 hectares, of which 38 hectares are part of the building zone) (Herdgemeinde Huttwil, 2014).

An important part of the commune's territory in semi-public hands

The land use policy of the *Herdgemeinde* is to keep formal property rights on land and to issue 60 year building rights on plots (Herdgemeinde Huttwil, 2014). This is true for agricultural land as well as building zones. In terms of housing, current rent price for single family homes and apartment buildings is around 3.25CHF/m² per year, adapted every five years to the Swiss consumer price index. The building right holder can sell and transmit their rights to a third person. At the end of the contract, if not renewed, the landowner buys the construction erected by the right holder at approximately 80% of the average of capitalized income value⁵⁵ and real value con-

Cheap building land available

⁵¹A reserved zone is a non constructible zone used for a limited period of time in order to ensure the fulfillment of planning objectives. See also art. 62 BauG, SR-BE 721.0.

⁵²According to M. Jampen, *op. cit.*

⁵³S. Ghioldi, lawyer, communal and regional planning, *Amt für Gemeinden und Raumordnung*, interviewed in Berne 27 July 2014.

⁵⁴Basically a commune without territory

⁵⁵Capitalized income value is the potential return in the form of rent that can be obtained from the buildings; real value corresponds to the value of buildings over time, in addition to their improvements

sidered jointly. For industrial land, rent price is 3.15CHF/m² per year, adapted every five years up to 80% of the Swiss consumer price index. The contract is signed for a renewable period of 60 years. If zoning plans have changed or new construction is anticipated, building destruction costs are subtracted from the purchase price of the house, (effectively carried by the building right holder/home owner).

Limited price fluctuations

However, the risk of a price drop, in case the house is sold, is carried by the landowner and not the building right holder, because the building right holder only sells the produced part (the house and the land service) based essentially on effective construction costs and not on land prices⁵⁶. Table 4.3 shows the differences between the acquisition of a building right and of a formal property title:

	Building right	Formal property right
Land property tax	Paid by the <i>Herdgemeinde</i>	Paid by land/home owner
Land service	Paid by building right holder/home owner	Included in total price if plot is serviced
Land	No transfer of property title	Property title included in price
Construction	Paid by building right holder/home owner	Paid by land/home owner
Duration of ownership	60 years renewable	Unlimited
Disposal	Transferable and inheritable	Transferable and inheritable
Property transfer tax	1.8%	1.8%
Rental costs/benefits for 10 years landownership (based on a 500 m ² plot in Huttwil from 2004 to 2014 without construction and land service prices)	-16,300CHF , thus an annual rent of 1.625% ^a	Based on regional land prices (Wüest and Partner, 2014): -44,200CHF ^b Based on constant land prices: -9,200CHF ^c Based on lake Geneva prices: +516,800CHF ^d

Table 4.3: Legal and economic comparison of the cost of land based on building rights and formal property rights in the case of Huttwil from 2004 to 2014. Data: Commune of Huttwil (2014); Wüest and Partner (2014). Own calculations. Calculations do not consider building depreciation.

^aBased on a land price of 195CHF/m². This corresponds to the accumulated rent over the 60 years of the building right. It also corresponds to current land price estimates by Wüest and Partner (2014).

^b **95,000CHF** (sell price 2014: 190CHF/m²*500=95,000CHF) **minus 130,000CHF** (acquisition price 2004: 260CHF/m²*500=130,000CHF) **minus 1,600CHF** (land property tax: 130,000CHF*1.2%*10 years=1,600CHF) **minus 1,700CHF** (property transfer tax: 95,000CHF*1.8%=1,700CHF) **equals -38,300CHF**

^c **130,000CHF** (acquisition price 2004: 260CHF/m²*500=130,000CHF) **minus 130,000CHF** (sell price 2014: 260CHF/m²*500=130,000CHF) **minus 1,600CHF** (land property tax: 130,000CHF*1.2%*10 years=1,600CHF) **minus 2,300CHF** (property transfer tax: 130,000CHF*1.8%=2,300CHF) **equals -3,900CHF**.

^d **825,000CHF** (sell price 2014: 1,650CHF/m²*500=825,000CHF) **minus 275,000CHF** (acquisition price 2004: 550CHF/m²*500=275,000CHF) **minus 3,300CHF** (land property tax: 275,000CHF*1.2%*10=9,300CHF) **minus 14,900CHF** (property transfer tax: 825,000CHF*1.8%=14,900CHF) **equals 516,800CHF**.

Building rights as an opportunity for middle class families?

Taking into consideration the lowering of land prices over the past ten (or twenty) years in Oberaargau, the building rights model is economically more profitable than the full property rights model. However, as soon as land prices stabilise, the full property rights model is slightly more profitable. In comparison with the evolution of land prices from around Lake Geneva, the instrument provides a good counterexample of how the instrument building can neutralise rent. With the building right price of

(Federal Chancellery, 2014).

⁵⁶In a central highly asked location, building right prices will also grow according to the demand, but this growth will be more limited than in a full property model, because the building right ends in the medium/long term, but not the property title.

3.25CHF/m², the *Herdgemeinde* offers cheaper housing possibilities for middle class income families that can afford a 500,000 francs loan in order to build their house but not a 630,000 francs loan. Further, the building right model is also financially more stable and predictable, because it is unaffected or marginally affected by land price variations. In the full property model, land prices can turn a household’s investment into a financial black hole or a winning lottery ticket.

But perhaps more relevant are the different housing costs of various housing models as shown in table 4.4: for a ten year period, without considering capital requirements for contracting a loan, the building rights model as it is structured in Huttwil is the cheapest solution. As soon as land prices slightly increase – the 1% price growth chosen here is purely hypothetical, the full property model becomes economically less costly. In comparison to the property models, the rental model is among the costliest way of housing, but the only one that people with low savings can afford; renting is the most prevalent form of housing in Switzerland (FSO, 2016).

Small price increase favours the capital intensive model

Housing model	10 years housing costs
Full property (Oberraargau prices)	158,300CHF ^a
Full property (1%/year price increase)	59,200CHF ^b
Building right	94,500CHF ^c
Rental housing	130,000CHF ^d

Table 4.4: Comparison of housing costs in rental, building right and full property models over the 10 years between 2004 and 2014 in Huttwil. Data: Commune of Huttwil (2014); Wüest and Partner (2014); FSO (2016); FSO (2016). Own calculations.

^a **630,000CHF** (acquisition price) **minus 105,000CHF** (mortgage interests based on a 420,000CHF mortgage (2/3 of 630,000CHF – 1/3 owner’s capital, 2/3 mortgage), which is composed of the price of land (130,000CHF) and of the house with land service (500,000CHF), at an average interest rate of 2.5%) **minus 10,700CHF** (property transfer tax 1.8%) **minus 7,600CHF** (land property tax 1.2‰) **plus 595,000CHF** (sell price) **equals -158,300CHF**.

^b **630,000CHF** (acquisition price of land (130,000CHF) and of the house with land service (500,000CHF)) **minus 105,000CHF** (mortgage interests based on a 420,000CHF mortgage (2/3 of 630,000CHF – 1/3 owner’s capital, 2/3 mortgage) at an average interest rate of 2.5%) **minus 12,500CHF** (property transfer tax 1.8%) **minus 7,600CHF** (land property tax 1.2‰) **plus 695,900CHF** (sell price) **equals -59,200CHF**.

^c **500,000CHF** (acquisition price of the house with land service) **minus 83,800CHF** (mortgage interests based on a 335,000CHF mortgage (2/3 of 500,000CHF – 1/3 owner’s capital, 2/3 mortgage) at an average interest rate of 2.5%) **minus 10,700CHF** (property transfer tax 1.8%) **plus 500,000CHF** (sell price) **equals -94,500CHF**.

^d Average 10 year rent for a five rooms flat in a rural commune of the canton of Berne between 2000 and 2014 (FSO, 2016).

Through the ex-course on the emphyteutic lease, I wanted to show that a demand for housing in the region of Huttwil can exist, as the land of the *Herdgemeinde*’s building land has been largely developed. Therefore, if the landowners in the other parts of town do not develop their land, other interests prevail, such as the will to save land for their children (see *Burgergemeinde* of Wiedlisbach in section 4.1.2.5, or the expectancy of a higher financial return⁵⁷.

Various explanations for land hoarding?

4.2.6 Impact on value redistribution

The case of building zone reduction in Huttwil illustrated the limited margin of manoeuvrability of the communal executive body when it comes to decide upon a withdrawal of development rights. The communal executive body used the commune’s obligation to establish a hazard map in order to suspend the planning process. It then depoliticised the zoning issue by delegating the decision on the land’s constructibility to external experts. Despite the legal feasibility of the outzoning operation – the plots were not serviced, a withdrawal of development rights without compensation is not acceptable for local actors. The communal authority does not risk to decide against its planning committee (and the communal legislative body?) on the

Local factors as main explanation

⁵⁷M. Jampen and H.-J. Muralt, *op. Cit.*; C. Schneider, *op. cit.*

removal of the building zone in Thomasbode (or Sonnegg, Hueb or Hohlen), despite the canton's support on the issue.

**Densification as value
compensation mechanism**

The result of the building zone reduction is that a limited value redistribution takes place where the commune resorts to an external expert in order to decide on the land's constructibility and elaborate an additional plan for the development of Thomasbode. This renewed legal document brings two advantages to the commune: the local authorities' participation in land service costs is reduced and allows a reduction of approximately one third of the constructible perimeter (10,000m²), whereas it increased the economic value on the landowners' side. Rough estimations show that the plot ratio changed from approx. 0.15 to 0.64⁵⁸. In a future local development plan, there will be an ecological gain compared to previous plans, as a smaller surface will be developed and part of the water catchments potentially preserved from destruction.

**Collectivisation of private
costs**

An element that highlights the tight margin of manoeuvrability for the commune, concerns the implementation of the land service tax and the tax on added land value created through zoning. The shrinking land prices over (at least) the past fifteen years⁵⁹ worked against the landowners' ambitions to value their property, despite the communal financial support. For a long period of time, the commune financed the land service.

**Low rent favours cheap
housing**

But as the building rights model has shown, a morose land market does not exclude development. It only reduces the rent that landowners can obtain from land. As semi-public landowner, the *Herdgemeinde* managed to create an amount of added economic value they deemed sufficient (annual rent of 1.625% of a land value around 200CHF/m²) as well as attract new inhabitants into town.

⁵⁸As it was not possible to access the architectural plans, I can only provide a rough estimate based on the specifications from the local development plan. The perimeter's size is of 220*45 meters) and the distance between buildings has to be more than 4 but less than 8 meters (Commune of Huttwil, 2011). According to the local development plan, each house has a maximal size of 35*35 meters and consists of 2 floors. Consequently, five houses can be built in the perimeter. Each house totals a surface of 2*35m*35m = 2,450m². If one takes into account the difference between size of building and gross floor area (reduction coefficient of 0.8 (Ordre des architectes de France, 2012)) and reduces by one third the gross floor area due to the structure of construction (Terassenhaus), the density coefficient can be estimated as follows: 5*2,450*0.8*0.66/10,000 = 0.64.

⁵⁹I could even argue that prices have been constant or slightly declining for the past 25 years, because of the real estate crisis in Switzerland during the 1990s.

4.3 Reuse of polluted soil in Niederbipp

4.3.1 Introduction

Over the past fifteen years, Niederbipp has experienced significant growth in terms of both population and jobs. It is one of the three regional centres of Oberaargau (Region Oberaargau and Kanton Bern, 2012). The development of a regional industrial zone is, in this thesis, of particular interest, because it involves the case of a polluted field – a former communal landfill – transformed into an important logistics centre almost without public financial support. The fact that it does not require remediation turned out to be the determining factor for the project's success. Further, Niederbipp provides another example of implementation of the Bernese tax on added land value created through zoning, which is of particular interest, as it shows that the applied land price is of central concern to the tax's effective implementation.

The case of Niederbipp is structured as follows:

- section 4.3.2 shows land use planning and land use changes over the past 25 years in Niederbipp;
- section 4.3.3 presents the contextual factors that shaped land use policy outputs and land use changes;
- section 4.3.4 presents the legal constraints of superior law that shaped land use policy outputs;
- section 4.3.5 analyses how actors have mobilised policy instruments and resources in order to achieve their goals and exposes what arrangements they have negotiated;
- section 4.3.6 presents the previously exposed variables' impact on economic and ecological value redistribution.

4.3.2 Evolution of land use planning and land use

4.3.2.1 Zoning changes in 1984

Figure 4.7 shows the evolution of zoning and actual land use. The first revision taken into consideration is from 1984, the previous one from 1956. According to the canton (AGR, 1984, 3), main drivers for the revision are the reduction of the building zone and the definition of a new industrial zone, the latter linked to the commune's connection to the N1 motorway. However, the only planning documents available do not show where and how the building zone reductions occurred. Furthermore, there is no calculus concerning the availability and needs of building zone⁶⁰ nor in the negotiations or opposition documents. The cantonal decree approves the zoning plan without specific comment and only mentions that areas marked for placement into the building zone in the future are "generous" in comparison to the existing building zones (AGR, 1984, 6): the extension of the industrial zone is planned in two different locations, in the north where the existing industrial zone is located, and in the south-east, along the motorway. Important extensions of the working zone in the south-west are also foreseen. Besides the extension of institutional zones (hospital, kindergarten), no important changes are discussed or subject to contest, which implies that the previously mentioned reduction of the building zone has been settled during the revision process.

1984 revision hardly documented

4.3.2.2 Land use changes between 1984 and 1993

Land use evolution during the following decade is rather modest (dark grey on the map), although the time period considered is short compared to the other two case studies⁶¹. Changes occur mainly in terms of public infrastructure (schools, retirement homes), light industry up north, as well as individual housing construction scattered across the existing settlement.

⁶⁰By the time of approval of the building regulations, the Bernese spatial planning act had not been revised according to the federal act yet.

⁶¹The time periods are based on the time maps provided by swisstopo (2014b).

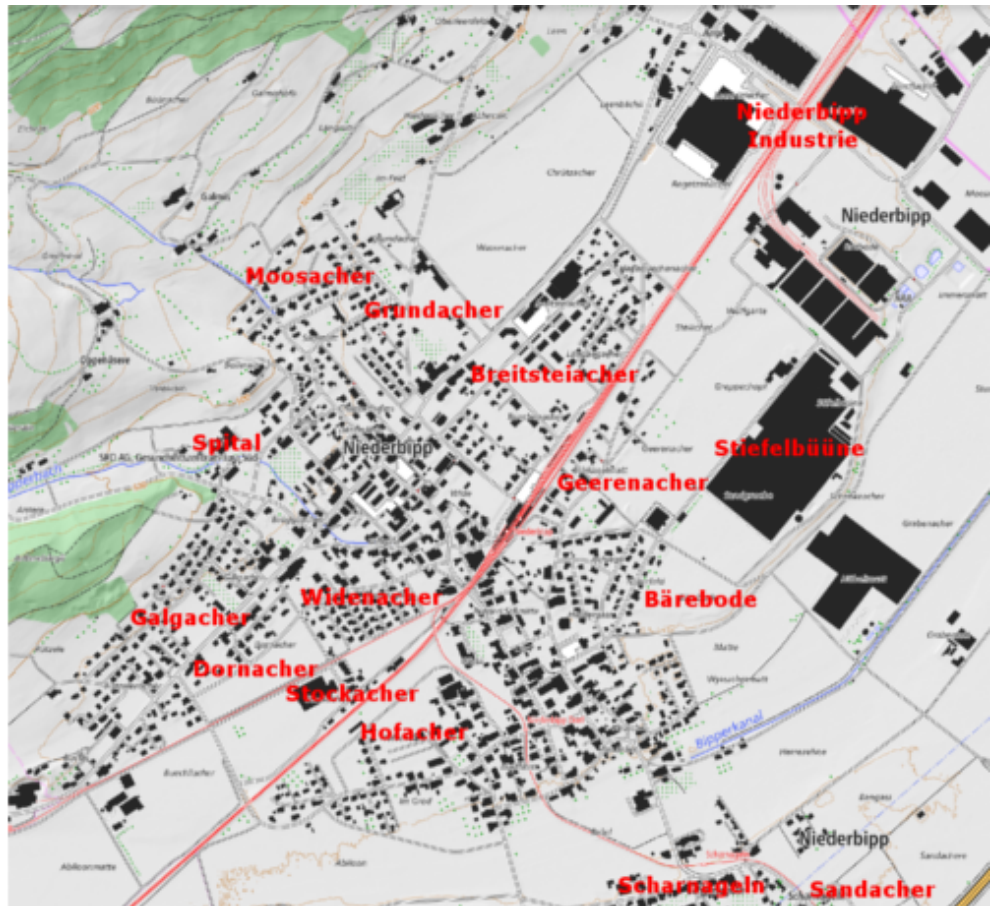


Figure 4.6: Overview map of Niederbipp. Data: (AGR, 1984; Commune of Niederbipp, 1993b). Map: swisstopo (2014a).

4.3.2.3 Zoning plan revision of 1993

Several zoning operations

The building regulations revision of 1993 faced important issues: several perimeters were zoned, only one of the anticipated building zone extensions was realised, and numerous opposition was formulated by landowners against the commune's zoning projects. Another important hurdle was the implementation of the cropland protection plan, a central concern for Niederbipp and its wide, flat agricultural plots.

The zoned areas, (light purple, numbered "1" on the map), consist of several plots in Sandacher close to the motorway, one important plot in Grundacher up north, four developed plots close to the Spital in the north west, a bigger plot in Hofacher (centre south) and three smaller plots in the west.

Outzoned plots hardly constructible

The justification for placing the plots around Sandacher were put into the agricultural zone was that they are traversed by high voltage lines, which severely restrict their development. There were two opponents to the decision. One opponent sought only the reimbursement of the land tax paid in excess, and the other did not justify his position, so the procedure came quickly to an end. The plot in Grundacher was designated as agricultural zone after the canton inserted it into the cropland protection plan. As the owner had no intention to develop it, their opposition was rejected. The plot in Hofacher is part of the institutional zone (extension of the cemetery) in the former plan. It was therefore designated as agricultural zone without any demand of compensation. The partially-built plots close to the Spital are part of an actual farm, which makes their zone change unproblematic. In regard to the three smaller plots in the west, one of the owners did not object to the decision. The two others, who own plots on the boundary of the building zone, do not have the right to oppose the communal decision, as their plots are not serviced and their lower constructible parts towards the road have been already developed and sold in the past.

Minor adaptations and first extension of the industrial zone

In matters of building zone extension (light brown, numbered "2" on the map), one can observe several small peripheral extensions, mostly created to adapt planning

Year	Land use planning changes	Land use changes
1966		Construction of the Tela Papierfabrik AG, only industrial plant of Niederbipp until 1997
1984	Approval of the revised building regulations, the old ones dating back to 1968 (AGR, 1984)	Few housing and industrial constructions
1993	Approval of the revised building regulations: minor building zone reductions (AGR, 1993)	
1996	Approval of extension of the industrial zone <i>Industriezone Ost</i> (Commune of Niederbipp, 1996)	Progressive development of the industrial zone. Accidental fire and destruction of the paper plant. Reconstruction of the plant.
2004	Partial revision of the building regulations: introduction of the tax on added land value created through zoning and extension of the industrial zone	Development of housing, industrial and agricultural constructions (greenhouses)
2005		Construction of the Dentressangle logistics centre
2007		Construction of the Galexis logistics centre
2012	Approval of the revised building regulations (Commune of Niederbipp, 2012)	Extension of the greenhouses
2014		Extension of the Galexis logistics centre

Table 4.5: Main land use planning and land use changes in Niederbipp since 1984.

to actual use and release building and renovation restrictions in the given areas. In fact, the construction changed from a protected zone with tight regulations into a regular building zone. Wider extensions concern the industrial zone in the north, which intends to welcome an additional building of the existing paper company Tela (AGR, 1993, 10), and Geerenacher – close to the recently built school, which is zoned as institutional.

4.3.2.4 Land use changes from 1994 to 2014

Between 1993 and 2014, construction in Niederbipp increased significantly: major development occurred in the northern part of the industrial zone (see section 4.3.5.1). In terms of housing, entire neighbourhoods were erected: eight homes hosting several apartments in Breitsteiacher, over 40 single family homes in Widenacher, about 20 single family homes around Galgacher, twelve double-family homes in Sagimatt, and around 20 single family homes in Moosacher.

Important development of housing and industry

4.3.2.5 Zoning plan revisions between 1996 and 2014

Besides the massive extension of the industrial zone described below, there is no other significant zoning change, except a slight reduction of the building zone in Stockacher (**dark purple** on the map) – which was excluded from the local development of Widenacher – and a minor extension near Scharnageln (**yellow**, numbered "3" on the map). Further, the important changes linked to the creation of industrial zones were made in specific procedures.

4.3.2.6 Gap between zoning and land use

Similar to Wiedlisbach, the building regulations revision of 1984 was approved with a huge building zone reserve, which explains a significant remaining gap between the use foreseen by regulations, and the actual land use. Construction occurs almost exclusively within the building zone, demonstrating the efficacy of zoning as a means

of delimiting constructions. There are two wide grey squares in the east of the settlement area (numbered "4" on the map): these are greenhouses used for hydroponic agriculture, considered an agricultural land use.

4.3.2.7 Sudden fill of the building zone

Niederbipps development occurred in a shorter time span and more abruptly than the previous two cases. In the 1980s until the end of the 1990s, nohousing investors appeared. Between 1995 and 2000, Widenacher and Galgacher started to develop, whereas the other construction essentially began in 2005 and is still ongoing. According to the communal head of administration of constructions⁶², a construction boom began in 2008 and has not subsided.

4.3.2.8 Remaining not built plots

Hoarding remains an significant phenomenon

As one can read from the map, significant building zone reserves (in terms of housing) still exist. The most important reserves are in Stockacher and Hofacher, both attributed to a mixed zone, the latter being part of a local development plan. With exception of the remaining undeveloped plots in Breitsteiacher, meant to host single-family homes, most of the other building zone reserves are zoned as two or three storey residential zone. The fact that construction activity recently experienced growth speaks against the hoarding behaviour of landowners. This evidence alone, is not enough to justify the remaining important gaps: discussions led by the communal executive body to convince the landowners to develop were not followed by behavioural change. Vehement opposition by landowners dissuaded the commune to take further legal action against them⁶³.

⁶²R. Suter, *op. cit.*

⁶³R. Suter, *op. cit.*

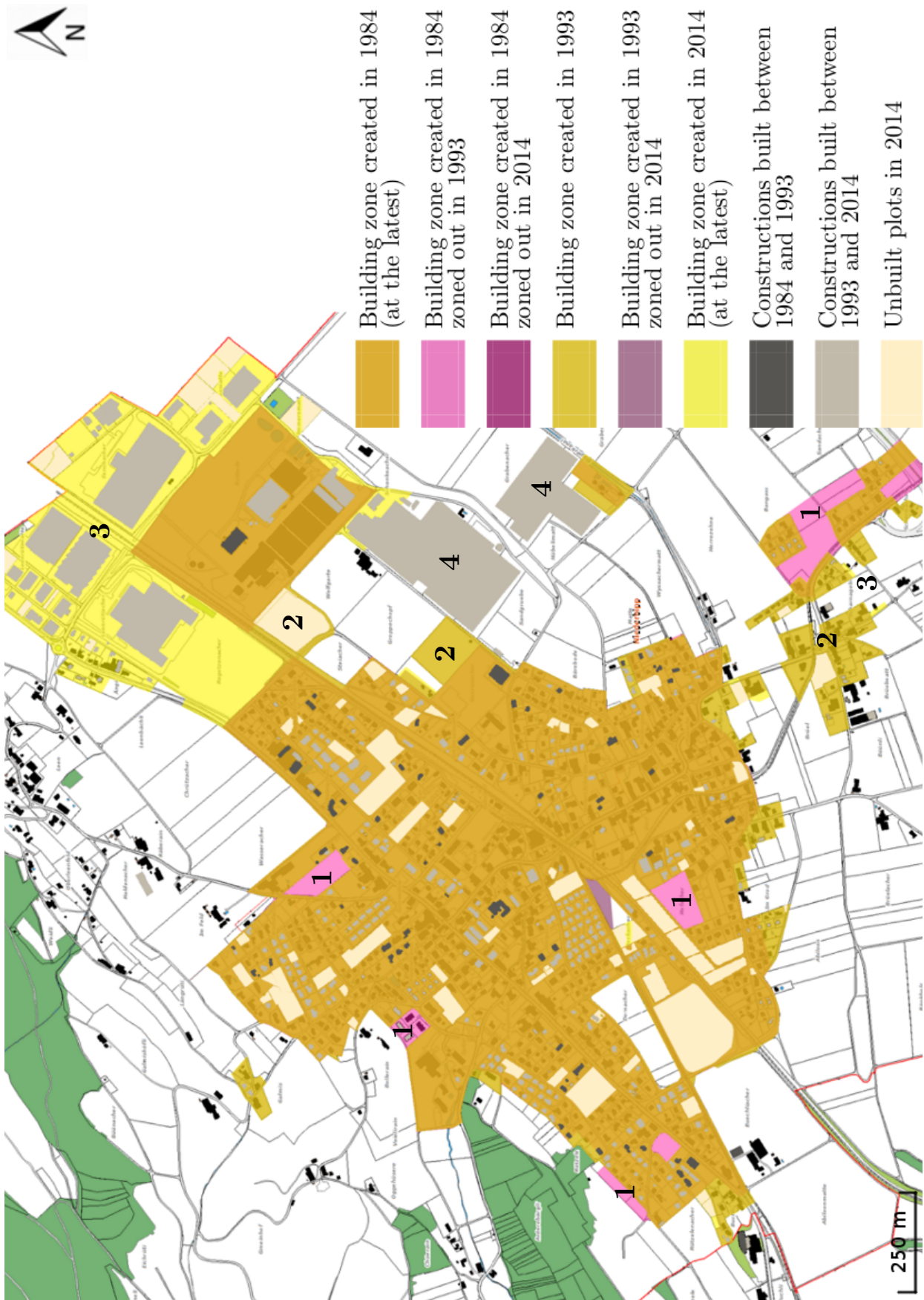


Figure 4.7: Land use planning and land use evolution in Niederbipp from 1984 to 2014 (Map: OSTAG Ingenieure AG (2014a); swisstopo (2014a); Commune of Niederbipp (1993b)).

4.3.3 Contextual factors

4.3.3.1 Demographic evolution

25% population growth over 20 years

Over the last 20 years (1993-2013), Niederbipp experienced a population growth of 25.5% (from 3,482 to 4,371 inhabitants), an average annual growth rate of 1.28% (FSO, 2015c). Compared with the neighbouring communes, it is in the upper tier of growth. Over the same period, only Oensingen (5850 inhabitants) in Canton Solothurn, and Schwarzhäusern (500 inhabitants) experienced high growth. Between 1993 and 2013, Oensingen experience a population increase of 43.8% (2.19% per year on average) and Schwarzhäusern 28.1% (1.4% per year on average). Oberbipp (1650 inhabitants, 18.0% growth or 1.0% growth per year) and Kestenholz (1750 inhabitants, 20.7% growth, 0.9% growth per year) in canton Solothurn are also fast growing communes. In comparison to these communes, other surrounding communes have a slow growth: Balsthal 2.7% (5836 inhabitants), Laupersdorf 2.7% (1682 inhabitants) and Bannwil 0.9% (691 inhabitants).

1.28% yearly growth in Niederbipp, 0.84% in Switzerland

Compared to regional, cantonal and Swiss averages, Niederbipp is far above regional, cantonal and national growth rates (respectively 4.9%, 6.4% and 16.8% total growth or 0.25%, 0.32% and 0.84% annual growth).

In terms of flat vacancies, the available data does not allow us to draw any conclusion, as there has been high construction activity over the last decade. In 2011, the vacancy rate was around 3%.

4.3.3.2 Economic and fiscal evolution

High job supply

Inhabitants of the commune have a fiscal capacity above regional average (932CHF per month compared to an average of 825CHF per month). Since 2001, the number of jobs increased from 1,450 to 2,250. With slightly more than one job for two inhabitants, the job supply is also far above average (30 jobs per 100 people regionally).

Low taxes

Tax rates for natural persons have been lowered over the last ten years and are among the lowest in the region (1.35 in Niederbipp and 1.59 on average) (FIN, 2014). These rates compete with those found in Schwarzhäusern (1.39) and Langenthal (1.38). The land tax rate is also below average (1 instead of 1.12), as in Schwarzhäusern and Langenthal (FIN, 2014). The communes further west (Oberbipp, Wiedlisbach) however, have a higher rate. It is difficult to directly compare the tax levels with the neighbour canton of Solothurn. However, according to Brühlhart (2014a), combined cantonal and communal taxes are, on average, higher in Solothurn than in the canton of Berne. Nevertheless, as the commune of Oensingen has a tax rate clearly under cantonal average (Amt für Finanzen, 2003, 2013), it has a higher fiscal attractiveness than the neighbouring Bernese communes (Brühlhart, 2014a).

No price data available

In regard to land prices, it was not possible to find data specific to industrial land, which is the type of land use that is studied in the present case study.

4.3.3.3 Topographic and spatial characteristics

Agricultural land ideal for construction

Located further east of Wiedlisbach, the commune is on the border of the canton of Solothurn. The commune's northern border is delimited by the Jura mountains, and its southern border by the Längwald forest. While the central and biggest part of the communal territory is flat land of high quality, principally devoted to agriculture (swisstopo, 2014a), it is also where settlement and the entire industrial complex is located.

In terms of transport, the train network grants direct connections to Olten (22 minutes away; departing every twenty minutes) and to Solothurn (15 minutes away; departing four times per hour). Travel time to Zurich or Berne is approximately one hour with connections every half an hour to Zurich and four times an hour to Berne. In terms of individual transport, the N1 motorway crosses, approximately, the middle of the commune, and has an interchange granting access to Berne in approximately 40 minutes and to Zurich in an hour.

4.3.4 Constraints of superior law

4.3.4.1 Cantonal land use planning policy

Starting with the building regulations revision of 1993, the main constraints of superior law become evident. In order to implement the federal cropland protection plan and protect Niederbipp's high quality agricultural land, the canton defined several reserved zones on the the commune's agricultural land zoned as building zone. The removal of the reserved zones required the commune to revise their zoning plan and to reduce their building zones in the most sensible areas (**light purple**, numbered "1" on figure 4.7). Despite these building zone reductions, the building zone dedicated to housing remains massively oversized (AGR, 1993, 8f). The commune has 16 hectares that are zoned as housing zone an remain not built (in regard to a maximum of 11 hectares allowed), whereby the needs are calculated generously:

- maximum plot ratio of 0.4 – despite the fact that several local development plans foresee higher ratios (up to 0.85);
- mixed use of the housing zone with up to 40% of non-housing uses, whereas usual calculation standards foresee 20
- an average flat size corresponding to the 2014 standards;

Reasons mentioned for the difficulty to reduce the building zone are the numerous "holes" within the settlement area. In the long run, agricultural production on numerous plots is not sustainable. Further, the fact that part of these plots are serviced hampers the zoning process. In addition, part of the landowners' objections to the cropland protection plan had been accepted by the canton in 1987. For matters of legal consistency, the 1993 building regulations revision that implemented the cropland protection plan, had to take into account the objections formulated in 1987. Despite more than 40 oppositions voiced against the new building regulations, no objection was filed against the planned extension of the industrial zone (AGR, 1990).

Limited zoning out procedures

With the creation of the cantonal priority development areas program in 1989, the industrial zone of Niederbipp was about to become a cantonal priority. This policy allows the canton to grant planning subventions to the designated areas, and facilitates specific measures and derogations to authorized street capacities, noise, and pollution levels (ARE, 2003, 14). During the 1993 building regulations revision, the office of economic development supported the first small extension of the industrial zone (**light brown**, numbered "2" on the map) and underlined the cantonal political support that the planned industrial development benefits. The future industrial development is extensively mentioned in the cantonal decision approving Niederbipp's building regulations. Further, the cantonal decision approving the communal building regulations is signed by the Minister of the Department to which the spatial planning office belongs.

Economic development about to begin

4.3.4.2 Remediation of contaminated sites policy

Because our case involves polluted soil, I briefly explore the main constraints set by environmental legislation in regard to these sites. Legally⁶⁴, the remediation or redevelopment of a brownfield is conditioned by the type of pollution, the level of pollution of soil and by its spread through the nearby soil and groundwater. If the legal pollution levels of soil are exceeded, extended analyses have to be conducted to establish need for further intervention. If the toxic material is spreading and the legal maximum values for one or several toxic substances is exceeded in the immediate downstream of the plot, remediation becomes mandatory⁶⁵.

Extended ground analyses required

The technical ordinance on waste⁶⁶ distinguishes three types of landfills: landfills for inter materials, land fills for stabilized residues and bioactive landfills. The landfills have to be registered and an inventory of their content (types and quantities of waste stored) must be kept up to date. In the case of the landfill *Müllergrube* presented

⁶⁴Art. 16 of the *Federal ordinance of 26 August 1998 on the remediation of polluted sites*, SR 814.680.

⁶⁵Art. 9, 10, 11, 12 of the *Ordinance of 26 August 1998 on contaminated sites CSO*, SR 814.680.

⁶⁶Art. 22 of the *Technical ordinance on waste TOW*, SR 814.600.

in section 4.3.5.4, the content of the land fill was partially unknown and extensive analyses had to be conducted to establish its content.

Monitoring obligation

Remediation can be achieved in two ways (art. 16 CSO): either through remediation, (elimination of the environmentally hazardous substances), or through securitisation of the site, (the prevention and monitoring of the diffusion of environmentally hazardous substances). In order to further secure the site, the pollution level around the contaminated site (*e.g.* nearby soil, groundwater up- and downstream) must be monitored. This obligation is part of the confinement prescriptions (art. 16 CSO).

4.3.4.3 Regional coordination of development

Regional policy

In terms of regional planning, the communes of Wiedlisbach, Oberbipp and Niederbipp, since the 1990's, have been in the perimeter of the priority development area policy, which means that the canton can subsidise planning activities, grant funds to development projects and offer travel credits (AGR, 2000)⁶⁷. Since 2007, under the supervision of the cantons of Berne and Solothurn, an intercantonal study between Oberbipp and Oensingen was launched, later extended to Wangen an der Aare. This study led to the signing of an agreement between the five communes and the two cantons to coordinate development and establish a list of criteria that allows to evaluate future settlement areas (Solothurner Zeitung, 2014). The agreement's effects on the implementation of land use planning policy, namely the inter-communal definition of new housing, commercial and industrial zones could not be observed yet. In 2012, Niederbipp was defined as a working area of regional importance by the regional structure plan, which obligated the commune and the canton to make land available for development by the means they deem appropriate (Region Oberaargau and Kanton Bern, 2012).

4.3.4.4 Building permit prescriptions

Length limit for piles

The central issue for the development of a polluted site that is not undergoing remediation, is to prevent the spread of the hazardous substances. Prevention is especially important during the construction phase, considered the most sensitive (AWA, 2005). The nature of contaminated sites can make them a challenging place for construction, particularly for landfills. The landfill ground consists of different types of wastes, of various solidity, density and toxicity, all of which stands in contradiction to solid basement requirements. In construction, a frequently used technique to ensure the stability of a building is to put pillars in the ground to prevent movement. In the case of a polluted site, this pillar technique is problematic, as it might pierce the waste deposit, and facilitate the exfiltration of toxic liquids.

Additional planning measures

The building permit required an emergency plan in case pollution spreads during the construction process (Prefecture of Wangen, 2005). Further, a plan in regard to the reuse of the excavated ground during the construction process must be submitted (FOEN, 1999). In addition, an adequate permanent gas drainage system must be set up in order to safely evacuate ascending landfill gas (Prefecture of Wangen, 2005).

4.3.5 Local use of instruments

4.3.5.1 Context of development and actors' positions

An industrialisation wave coming from the east

Until the major extension of the industrial zone *Industriezone Ost*, one single factory existed in Niederbipp: the Tela paper plant. However, the adjacent commune of Oensingen, part of Canton Solothurn, has established a growing industrial zone over the past decades. The success of their neighbour may have provided Niederbipp the will to develop, and the will to shed their rural status. Interviewees⁶⁸ mention a temporal shift between the construction of the motorway in the 1960's and development pressure coming from the east, (Aarau, Olten and Oensingen), a transformation that progressively takes over the Bipperramt.

⁶⁷Travel credits are part of the Bernese *Fahrleistungsmodell* which is not presented further here. Please refer to <http://www.vol.be.ch/vol/de/index/luft/luftreinhaltung/verkehr/fahrleistungsmodell.html> for further information.

⁶⁸R. Suter, *op. cit.*; R. Wyss, heritage and landscape activist, interviewed in Attiswil the 26 March 2014.

The *Industriezone Ost* project was born in the mid 1990's when the commune, petitioned by Tela for their proposed expansion⁶⁹, decided to extend the industrial zone by 2 hectares. However, in order to comply with the requirements of the extension's underlying environmental impact assessment, the construction of a new road, and an underpass crossing the train tracks was required⁷⁰. As these costs were high, a general extension of the zone was put on the table by the commune and, which would make it possible to divide land service costs among the different landowners⁷¹.

Environmental requirements induce wider industrial development

Ongoing discussions between the commune, the planning authority, and the cantonal office of economic development on the current project's maturity (negotiation with landowners, land service plan, costs division, approval by the communal legislative body) lead to a separation between the ongoing revision of building regulations, approved in 1993 (AGR, 1993), and the future extension of the industrial zone, approved in 1996.

Separation between regular building regulations revision and industrial extension

Within the cantonal administration, the office of economic development strongly supported industrial development, and offered a credit of 1.5 million francs for servicing the zone, reimbursable within 10 years (AGR, 1990). The office of economic development cited the high degree of commune accessibility to the motorway, proximity to the existing industrial zone of Oensingen and Tela's desire to expand, as justification for the industrial development. The department of the cantonal spatial planning office supported the development through the priority development areas program mentioned in section 4.3.4.

Political and administrative support

As the totality of land taken into consideration is part of the cropland protection plan, the agricultural office was opposed to any extension. However, the agricultural office shares the same directorate with the office of economic development and was aware that their opposition would not be supported by the responsible cantonal minister⁷². In fact, the minister offered a 1.5 million francs credit for the land service of the new zone and personally signed the support letter addressed to the commune (Commune of Niederbipp, 1993a)⁷³.

Agricultural considerations politically out weighted

4.3.5.2 First stage of development of the industrial zone

The perimeter considered is composed of 15 plots located at the eastern border of the commune: they consist of flat agricultural land and include the former communal landfill. Twelve plots are privately owned, one plot is owned by the Canton of Berne, and one by the commune of Niederbipp. Another plot is property of the Flurgensossenschaft Niederbipp, a cooperative composed of all landowners of the commune, whose main function is to maintain roads and paths across the communal territory. This cooperative is financed by the rent obtained from member's properties. In regard to the privately owned plots, the biggest is owned by Tela, the paper company already present on site. Six further plots were bought by the company before the actual development.

Property fragmentation

The total constructible surface is approximately 16 ha, the part north of the rail tracks 6 ha, and the southern part 10 ha (the site of the Tela factory). The SBB tracks connect Solothurn to Olten (Jurasüdfuss line) and the Aare-Seeland-Mobil tracks connect Solothurn to Oensingen and Langenthal. The nearest motorway access (N1 Berne – Zurich) is less than 2 km away.

Wide, flat and optimally connected area

At the heart of the development operation was a land service contract⁷⁴ (*Planungs- und Infrastrukturvertrag*) signed between the commune and the landowners. It preceded the zoning operation. In order to ensure that the zoned land will be effectively developed, and that the commune does not bear all development costs, an agreement defining the financial contribution of each landowner to the service of the perimeter and ensuring the payment of these contributions was signed. The contract contained

A detailed land service contract

⁶⁹Tela is a paper company employing 300 people in Niederbipp since the 1960's.

⁷⁰Art. 2 of the Draft contract *Planungs- und Infrastrukturvertrag zwischen der Einwohnergemeinde Niederbipp und den Grundeigentümern im Perimeter der Überbauung "Industriezone Ost"*.

⁷¹The contract signed between the commune and the different plot owners estimates road and underpass construction at 4.5 million francs in total.

⁷²It is not the same minister who approved Niederbipp's building regulations!

⁷³*Letter of the 3 August 1993 from public economy directorate of the canton of Berne addressed to the executive of the commune of Niederbipp concerning "Industriezone Niederbipp / Erweiterung und Erschliessungshilfe"*.

⁷⁴Contract of civil law, as defined in the *Code of Obligations*, SR 220.

the following main elements:

- the local development plan (*Überbauungsordnung*) with building restrictions such as type of use⁷⁵, maximal building sizes, minimal distances to other buildings, a minimal "green coefficient" as well as the detail land service plan of the plots;
- the amount charged to each landowner in regard to planning costs, base land service costs and detail land service costs;
- the date of payment of these fees;
- the payment guarantee through first rank mortgages;
- the party bearing exceeding and additional costs (notary, geometer, land registry) which is in the present case the commune.

Total land service amounts to 500,000CHF/ha

The contract foresaw that 100% of the detail land service costs would need to be paid by landowners. These costs amounted to approximately 7.4 million francs and included land service in terms of electricity, table water, sewer, rainwater drainage, and the construction of small streets. The basic land service costs amounted to approximately 3.6 million francs. Eighty percent of these costs were paid by the landowners (20% by the commune); this percentage corresponds to the legal maximum⁷⁶. The planning costs amounted to 180,000 francs; 2/3 were paid by the commune, and 1/3 by the landowners (divided proportionally according to the amount of land they own). Divided by the entire surface (approximately 22 hectares) that was serviced, the total land service costs amounted to approximately 500,000CHF/ha.

4.3.5.3 Second stage of development of the industrial zone and tax on added land value created through zoning

Contractually defined tax amounts to 30%

In 2007, the industrial perimeter was extended by 11.2 hectares on the northern side of the railway tracks. For the first time since the partial revision of building regulations in 2004, the tax on added land value created through zoning was implemented on a large scale. The formula was as follows: the original land price is set at 15CHF/m², the new land price at 90CHF/m², which results in an added value of 75CHF/m². This added value is taxed, according to the signed agreement, at a 30% rate, which amounts to 22.5CHF/m².

Vague regulatory specifications

Communal building regulations do not specify the percentage of added value to be taxed. They mention that "equality in front of the law" and "specific cases" have to be taken into consideration, and further, that the taxed amount should be "appropriated"⁷⁷.

Effective tax rate is closer to 21%

The zoned plots have basic service, but no detail service⁷⁸. Based on the cost calculation made for the first part of the industrial zone, detail land service costs of approximately 3.5 million francs would apply⁷⁹, *i.e.* 35CHF/m². If more realistic land prices before and after the zoning process are taken into consideration – *e.g.* 5–10CHF/m² for agricultural land and 150CHF/m² for industrial land⁸⁰, the actual added value is as follows: 150CHF (new value) - 10CHF (old value) - 35CHF (land service) = 105CHF. Therefore, the actually applied rate is more around 21%.

The calculation method for the tax on added value created through zoning presented above shows the degree of manoeuvrability that the commune had in implementing their new instrument. It also shows that the implementation of the instrument is

⁷⁵Commercial centres exceeding 500m² are prohibited. Certain areas closer to housing areas are exclusively dedicated to tertiary uses (Commune of Niederbipp, 1998)

⁷⁶Art. 112 par. 1 let. 2 BauG, SR-BE 721.0.

⁷⁷Art. 47, *Building regulations of 11 June 2012 of the commune of Niederbipp*.

⁷⁸R. Suter, *op. cit.*

⁷⁹As no access to the land service contract was given, I apply the detail land service costs per hectare calculated for the development of the first part of the industrial zone.

⁸⁰The industrial land price is the one applied to land during the development of the first part of the industrial zone.

recent. With its introduction in 2004, the commune seized the opportunity to capture over 2.5 million francs while adopting the second extension of the industrial zone.

If the instrument would have been implemented earlier, it could have been applied solely to the first extension of the industrial zone (no other extension of building zone has taken place since the introduction of the instrument in cantonal legislation in 1985). But the instrument's use would have either required a specific revision of building regulations in order to adopt the necessary legal basis, or its implementation during the 1993 revision. Given the short time span between the building regulations revision of 1993 and the elaboration of the land service contract in 1996 as well as the high controversy of the last building regulations revision (on the implementation of the cropland protection plan), both options seem highly improbable.

No earlier implementation of the tax possible

4.3.5.4 Development of the polluted plots

Several companies established themselves in the new industrial zone which served to raise awareness of the location⁸¹. Different buyers were interested to develop the former communal landfill, but their projects were checked by geotechnical and financial constraints. The development of the plot could be authorized by the cantonal waste and water office (AWA) only after detailed ground analyses were made (paid by the future developer) and the definition of a precise construction technique set.

The cantonal land registry provides the following information in regard to the polluted site: the *Rotboden/Müllegrube*, object number 09810014, is currently divided into six plots⁸² for an approximate surface of 79,003 m². The volume of the contaminated material buried in the ground is estimated to 1,550,800 m³⁸³. The landfill was opened in 1960, and closed in 1992; the first presumptions that the site was polluted were reported in 1995 (AWA, 1995); the entry in the registry of polluted sites was made on 29 September 2005. As sample analyses show, the site contains (in addition to excavation residues and rubble), the following toxic elements: organochloride, chemicals, solvents and polycyclic aromatic hydrocarbon (AWA, 2014).

Entry into registry of polluted soils

According to the AWA and the Geotest AG (AWA, 2005), several development projects were already in line before, but cancelled for financial and geotechnical reasons. In fact, two issues are problematic for the development of the site: the soil structure and the proximity of a water catchment:

Unstable soil structure and proximity of a water catchment

- the soil structure is unstable in the sense that the deposited waste varies in terms of density and consistency within the deposit volume. The litter is somehow dispatched across the landfill and subsequently threatens the construction's stability;
- the proximity of a major water catchment⁸⁴ (700 meters) makes potential drainage of waste liquids into the groundwater highly problematic, as this would pollute the water and severely restrict the catchment's use. Two main external factors can lead to such infiltrations: the drainage of water from the surface through precipitation, and a physical intervention into the landfill through the construction of foundations, particularly deeply-rooted pillars, greatly facilitate the spread of liquids, as they hold the potential of piercing the entire mass of litter (which would greatly facilitate the spread of toxic liquids into the ground)⁸⁵.

From a legal point of view, the owner has no obligation to remediate a plot, as long as the thresholds of pollutants in nearby waters do not exceed legal boundaries. Therefore, in order to minimize changes in the deposit's structure and prevent infiltration into groundwater, one solution is to cover the concerned perimeter, rendering it impermeable to potential infiltration. As no intervention is legally required

Cover to prevent future infiltrations

⁸¹According to the communal planner, Zellstoff-vertriebs-GmbH, Ophardt, and Ducati were the first companies to establish themselves in the industrial zone.

⁸²Plots number 282, 984, 2108, 2092, 2091 and 2072 (AWA, 2014).

⁸³For a gross comparison, the landfill *Kölliken* in canton Aargau contains approximately 475,000 m³ of contaminated material. It is currently being entirely remediated. Overall costs are estimated to 800-1000 million francs (FOEN, 2016).

⁸⁴The catchment provides an important part of the drinking water for Oensingen; between 1,000 and 5,000 liters per minute are subtracted from the groundwater.

⁸⁵J.P. Clément, Head of the Research Department on groundwater and contaminated sites, interviewed in Berne 14 Max 2014.

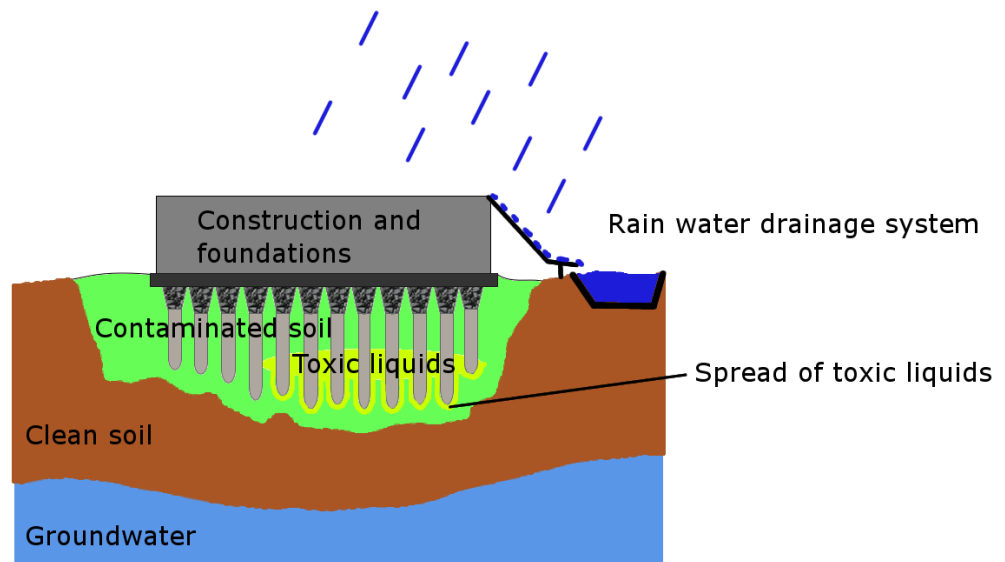


Figure 4.8: Constraints of construction on the landfill *Müllergrube*. Own representation.

by the current situation, the construction of a cover would only be effective in case of development.

Limited risk of exfiltrations

In 1998, first analyses were conducted by the cantonal water protection office showed a low level of pollution in the groundwater downstream of the landfill (AWA, 2005). In 2000, further analyses produced similar results, once even exceeding the legal limits, qualifying, in theory, for remediation. In order to determine if there is an actual need for remediation, and if the plot could potentially be developed, an extensive study had to be conducted including dozens of boreholes and various sounding techniques (AWA, 2005, 66). Further, an exfiltration model was conceived in order to calculate the probability of exfiltrations in case of development. These analyses showed that the risk of pollution was low, and that the chances for groundwater contamination were rather low and temporary.

A logistics centre as lid

The construction of a logistics centre on top of the landfill is a suitable cover for the waste pit, as its surface (30,300 m²) covers more than a third of the landfill's estimated surface. The weight it has to support and the depth of the pillars can be problematic: the pillars cannot exceed the height of the buried waste, as otherwise toxic liquids would drain through and spread. The cantonal office sets a minimum of 5 meters between the bottom of the pillar and the bottom of the landfill (AWA, 2005). Contrary to other, higher precision industries, soil instabilities are less important for a logistics centre. In order to support the building weight, 8,000 pillars of concrete, combined with gravel columns on top, are drilled into the ground.

10 years financial guarantee against potential contamination

In order to reduce risks in case of groundwater contamination, an emergency plan with intervention measures had to be elaborated by the new owner. As the groundwater is located at a depth (25-30 meters from the surface), and the aquifer is composed of significant quantities of water (the standing water can reach a height of 40 meters), intervention measures are technically and financially limited to the securitization of the existing catchment. For this purpose, the developer deposited, for ten years, a significant financial guarantee (AWA, 2005, 66). If contamination does occur after the 10 year warranty, or within the 10 year warrants, and the remediation costs exceed the owners deposit, public authorities bear the additional costs.

Analyses and additional construction costs passed on in transaction price

The analyses conducted to assess and minimize risks, the boreholes and sounding techniques used and the additional construction costs that the developer had to support were passed on to the former plot owner through a discount on the land price. Instead of a price approximating 150CHF/m² as for the other plots of the industrial zone, the price of the landfill was set at approximately 120CHF/m². The difference of 30CHF/m² was supposed to cover the additional expenses supported by the logistics company and the fact that the plot was not sold but leased through a building right. The initial sale price of 150CHF/m² has been recommended by the commune to the

various owners in order to ensure a quick development of the area⁸⁶.

4.3.6 Impact on value redistribution

Considering the analysis of the past sections, I can draw a set of conclusions, specifically regarding the value redistribution process implied by the polluted site's development.

Conducting in-depth studies to assess the risk of contamination is a hurdle for the reuse of polluted soils, as potential developers bear additional costs of analyses, impact assessments, and further securitisation and prevention measures and pass on part of it to landowners. This follows the general legal principle that the polluter should bear the costs of their pollution⁸⁷, but can block the site's redevelopment.

The potential reuse of a polluted plot is tightly linked to both the remediation obligation and the underlying costs: if there had been an obligation to remediate the landfill, the remediation costs would greatly exceed any profit use⁸⁸. In the case of the landfill, the creation of a lid on the landfill solved the cost issue via a 20% price reduction on the lease (compared to other land sale prices in the industrial zone). This reduced transaction price only reflects the costs linked with the ground analyses, the financial guarantee in case of pollution spread, and the development of the plot, but is minimal compared with what a remediation would cost. In the end, the added economic value created through zoning remains mostly in the hands of the landowner. In matters of ecological value, the lid reduces the probability of water infiltration and limits potential future value loss, but also limits any future remediation measure, as it seals a wide part of the area.

Local geophysical constraints make the management of the each contaminated site a specific case: the case of Niederbipp is particularly sensitive, because of groundwater and the nearby water catchment's proximity. The water pollution act of 1972 forbade the establishment of landfills close to catchment locations (Dupuis and Knoepfel, 2015, 93), but the *Müllergrube* was already in use by that time. The fact that the maximum legally allowed value for ammonium was only exceeded once seems fortuitous. If other exceeding values would have been measured, remediation would have been mandatory, and the private redevelopment of the site would not have been possible.

The present case has shown how development of polluted soil can be a good deal for both the buyer (if willing to bear a temporary risk), and the seller (who keeps the major part of the added value). Reflecting on the land's uses over time, it is possible to state that the seller is paid by the land in four ways: they rented the land surface to a farmer for agricultural production, they sold the gravel excavated from the soil, they sold the storage volume for the landfill, and finally they leased the plot itself to the logistics company.

Further, the obligations set by the environmental assessment report required important investments in land service. In order to reduce the land service costs (that would otherwise exceed the value of the land intended for zoning), the commune decided to extend the perimeter of the industrial zone, distributing the costs among a wider number of landowners. This decision shows how the constraints set by environmental legislation have contributed to an extension of the industrial zone.

The fact that the main employer (who is also the main landowner) planned to extend their activities was, for the commune, a sufficient reason to orient its communal strategy towards industrial development. Together with the canton's legal and financial support for economic development, a growth coalition which included communal and cantonal authorities, as well as the landowners was created. The land sale price negotiated between commune and landowners made rapid development of the industrial zone possible. A noticeable fact is, at the time of writing (2014), the plots that the paper company initially intended to develop, the starting point of Niederbipp's entire industrial development, remain undeveloped. One explanation could be the 1996 paper plant fire. This fire likely had a financial impact on the company's strategy. Additionally, the company was bought by Kimberly-Clark in 1999 (Kimberly-Clark, 1999). The change of ownership from a Swiss company to a multinational owner likely led to organisational changes.

Costs of analyses as hurdle to development

The costs of analysis as hurdle for redevelopment

Either everything or nothing

Specificities of the case determinant

Land sold four times

Environmental legislation leads an extension of the industrial zone

Emergence of a growth coalition

⁸⁶R. Suter, *op. cit.*

⁸⁷Art. 2 of the *Federal act of 7 October 1983 on the protection of the environment*, SR 814.01.

⁸⁸J.P. Clément, *op. cit.*

Chapter 5

Lausanne

5.1 Urban reversion in Malley

5.1.1 Introduction

Objectives of the case study

The urban reversion process in Malley is of central interest for the study of value redistribution, primarily because it provides an example of the creation and appropriation of rent by public authorities; in fact, this case study involves almost exclusively public actors in the planning stage. Secondly because it deals with soil pollution, transport and energy issues (the latter having become highly relevant in recent land use planning policy¹) that all have important effects on land value.

Structure

This case study is structured as follows:

- section 5.1.2 presents the major land use planning and land use changes that have taken place over the last three decades in order to provide a temporal and spatial overview on the case study;
- section 5.1.3 presents the contextual factors specific to the studied perimeter that forge the project's environment;
- section 5.1.4 deals with the general constraints of federal and cantonal legislation on the local regulatory arrangement negotiated between the actors;
- section 5.1.5 shows how legal instruments have been used by the involved actors, looking at their influence on local regulatory arrangements;
- section 5.1.6 analyses the previously presented factors' impact on economic and ecological value redistribution.

Two local development plans at stake

The present analysis focusses on two of the four local development plans displayed in figure 5.1: the *Malley-gare* (10,600m²) located on the southern side of the train station along the railway tracks, and the wider *Malley-gasomètre* (approx. 60,000m²)², also in the southern part of the master plan's perimeter. Local development plans are areas where building regulations diverge from the commune's general development plan. The resulting constraints become binding for landowners.

The two local development plans on the northern side of the train tracks (the construction of a new ice rink and sports complex, and the development of further tertiary and housing activities) are of less interest to the present study, because they imply more limited land use changes and redistributive stakes – the ice rink of the first plan is transformed into a wider sports complex – and in the second plan the negotiation process is still in an early stage.

5.1.2 Land use planning and land use changes

Planning context

Table 5.1 shows the main steps of Malley's renewal process. To understand the case's

¹On cantonal level, since the energy law's revision in 2014, the planning authorities are obliged to consider and coordinate energy issues during planning processes (art. 3 of the *Loi cantonale du 16 mai 1996 sur l'énergie*, RS-VD 730.01).

²As the development plan is not yet published, its surface has been approximated with the help of the GIS software used to make figure 5.1.

context, one must know that during the 1980's and 1990's, a rather uncoordinated wave of development took place in the eight communes constituting the western part of the agglomeration of Lausanne (SDOL, 2003). With the federal Ordinance on air pollution control³ coming into force in 1995, the communes adopted a set of urbanisation measures that aimed to reduce the amount of pollutants in the air, which, in response to the pressure exercised by cantonal authorities, was followed by a general moratorium on construction in 2000. The aim of the moratorium was to gain some time to coordinate the area's future urbanisation prior to any further development. An intercommunal planning unit named *schéma directeur de l'Ouest lausannois (SDOL)* was commissioned to elaborate an intercommunal master plan (also named SDOL) for the eight western communes and the western parts of Lausanne's territory.

During the transitional period of the 1990s, the slaughterhouse, public infrastructure owned by Lausanne and rented to butchers and larger meat processors, faced a decline of its activities. The cost reduction policy of the Swiss sector's dominant actors – Bell, Migros and Suter – led to an overall concentration process of the slaughter industry and to a dismissal of secondary activities (*i.e.* the processing of intestines, fat and skins)⁴. What was in the 1940s the most modern slaughterhouse of Switzerland had by the end of the 1990s to be renovated in order to comply with European standards (Commune of Lausanne, 1998), a process that the commune was ready to finance⁵. Despite cost reduction efforts, the slaughterhouse's major clients transferred their activities to their own respective houses and left the public slaughterhouse without work⁶. Despite the reduction in clients, a new animal waste processing center was necessary for the commune to fulfil its public duties, and was built on the site of Malley's future train station.

Land use context

Shortly after the closure of the slaughterhouse, the first intercommunal master plan was signed by the authorities and published. This established the first milestone of a planning process that is currently unresolved. In fact, the chronology (table 5.1) shows that fifteen years have passed between the first study conducted on the area and the approval of the first local development plan. In order to deepen our understanding of the planning process, it is necessary to interrogate which factors have contributed to the process' time span. The interviews conducted and the documents analysed suggest the following explanations:

A 15 year planning process

1. One explanation is linked to the separation of landownership and planning authority: Lausanne's property is located outside of its political ground, on the territory of the communes of Renens and Prilly (see figure 5.1 below). Therefore, the area does not yield any political reward to the landowner (*i.e.* votes). This explains also that Malley is the historical location of necessary but unwanted activities. The area is considered as Lausanne's "backyard"⁷ and as a "playground for the industrial works of Lausanne"⁸.
2. The use conflicts that arise in the planning process provide a complementary explanation: Lausanne's industrial works enjoyed for more than a century exclusive use rights⁹. As one can imagine, the societal and political will to develop housing and tertiary activities in Malley will at some point clash with the industrial interests already present on site:
 - the industrial works of Lausanne, one of the seven departments of the city's administration, represented by two of their units:
 - the Office for electricity¹⁰;
 - the Office for gas and district heating;
 - the Office for sanitation through the waste sorting centre;

³RS 814.318.142.1

⁴J.-L. Grivet, former employee of the slaughterhouse, member of the executive of the Commune of Etagnières, interviewed in Etagnières 21 May 2015.

⁵However, the city's slaughterhouse Office collects a tax on each animal killed and checked for sanity and weight which, until this day, has entirely financed the slaughterhouse's maintenance and renovations

⁶J.-L. Grivet, *op. cit.*

⁷P. de Almeida, architect of the commune of Renens, interviewed in Renens 15 May 2015.

⁸A. Baillot, head of the planning office of the commune of Lausanne, interviewed in Lausanne 28 May 2015.

⁹The first gasworks were established in 1911 (Fantoli, 2006, 18).

¹⁰An electrical transformer is located alongside the communal logistics centre.

- the Office for purchases and acquisitions through the logistics centre.

Referring to the chronology (table 5.1), we see that some part of these interests have been present on site for a long time and have managed to implement the construction of the thermal plant (located between the logistics centre and the theatre) and the waste sorting centre despite the moratoriums in force at the time. The thermal plant will be expanded in the near future¹¹. Several interviewees have pointed to a reluctance by established users to share their space and allow the industrial zone to become a residential and commercial zone¹².

3. An additional factor : it was only with the construction of the train station (whose 50% funding was approved by the Confederation in 2006 as "urgent project") that the effective planning works began. In fact, the elaboration of the first master plan started in 2007 and was followed by the first financial analysis and by an agreement between landowners on the future property structure of the area. A factor that strongly encouraged the site's development was the development of regional infrastructure by the canton (Canton de Vaud, 2005, 12). This point was also underlined by several interviewees¹³.
4. Conflicts that the division of land service costs and remediation costs among the actors have created offer further explanations. These issues are discussed in sections 5.1.4 and 5.1.5.

The industrial vocation of Malley has not vanished, but has adapted to the agglomeration's changing needs, which in the case of the slaughterhouse and the gas works, are largely conditioned by the industry's rationalisation processes, with the substitution of polluting, dangerous and morbid industries for essentially urban activities: a bus depot, a thermal plant, a waste sorting and a logistics centre. Having examined the main land uses and land use planning changes, the next subsection will deal with contextual factors such as property structure, soil characteristics, centrality, and their impact on the policy output.

¹¹A. Bartolomei, Head of the western district heating network, interviewed in Prilly 21 August 2015.

¹²C. Jemelin, head of supply development and member of the directorate of the *Transports lausannois*, interviewed 29 July 2015 in Renens; E. Krebs, head of office for housing and real estate management, interviewed 17 July 2015 in Lausanne; P. de Almeida, *op. cit.*

¹³N. Wisnia, project manager of Malley at the SDOL, interviewed in Renens 20 May 2015; T. Maystre, member of the communal executive body of the commune of Renens, interviewed in Renens 28 July 2015.

Year	Land use planning changes	Land use changes
1977		Closure of Lausanne's gasworks (Fantoli, 2006, 18).
1979		Inauguration of the theatre <i>Kléber-Méleau</i> .
1994		Construction of the communal logistics centre.
1995	Implementation of the Ordinance of 16 December 1985 on Air Pollution Control via an agglomeration wide action plan	Construction of the <i>Transports lausannois (TL) bus depot of the</i> .
2000	Intercommunal moratorium on constructions, launch of analyses for a master plan of the west of Lausanne, planning of a new thermal plant for distance heating.	
2001		Inauguration of the commercial centre <i>Malley lumières</i> ; construction of a thermal plant.
2002		Closure of the slaughterhouse; commissioning of a new animal waste processing center.
2003	Approval of the intercommunal master plan SDOL, city council of Lausanne adopts moratorium on constructions, except for the waste sorting centre, European 7 architecture competition on Malley.	
2004	Formal agreement between Lausanne, Renens and Prilly on the site's future development, beginning of urban analyses for sector 2 of the SDOL.	
2005	Federal inquiry on urgent agglomeration projects (<i>i.a.</i> station of Malley), approval of guidelines for sector 2.	
2006	Approval of test analysis for Malley, approval of urgent agglomeration projects by the federal Parliament.	Construction of the intercommunal waste sorting centre.
2007	Elaboration of first local master plan (PDL).	
2008	First financial analysis, convention on land sell for station by Lausanne to CFF, prospective analyses on distance heating, risk analysis on major train accidents (MAO)	Beginning of the construction of the train station, destruction of the animal waste processing center, end of exploitation of gas storage station.
2009	–	Excavation of polluted soils (carcasses) close to future train station.
2010	First report on soil pollution, second financial analysis.	
2011	Second report on soil pollution, creation of an intercommunal corporation for distance heating, convention on land exchange between Lausanne and CFF.	
2012	Results of architectural competition on public spaces and approval of modified master plan (SDIM).	Partial destruction of former slaughterhouse and soil remediation, opening of the train station.
2014	Preliminary exam of the local development plan <i>Malley-gare</i> ; Adoption of the cantonal energy law	
2015	Adoption of the extended land service tax in Renens	Destruction of the former slaughterhouse.
2016	Approval of the local development plan <i>Malley-gare</i> by the territorial communes	
To come	Approval of the local development plans gasometer and viaduct	Extension of the thermal plant.

Table 5.1: Main land use planning and land use changes in Malley since 1995.

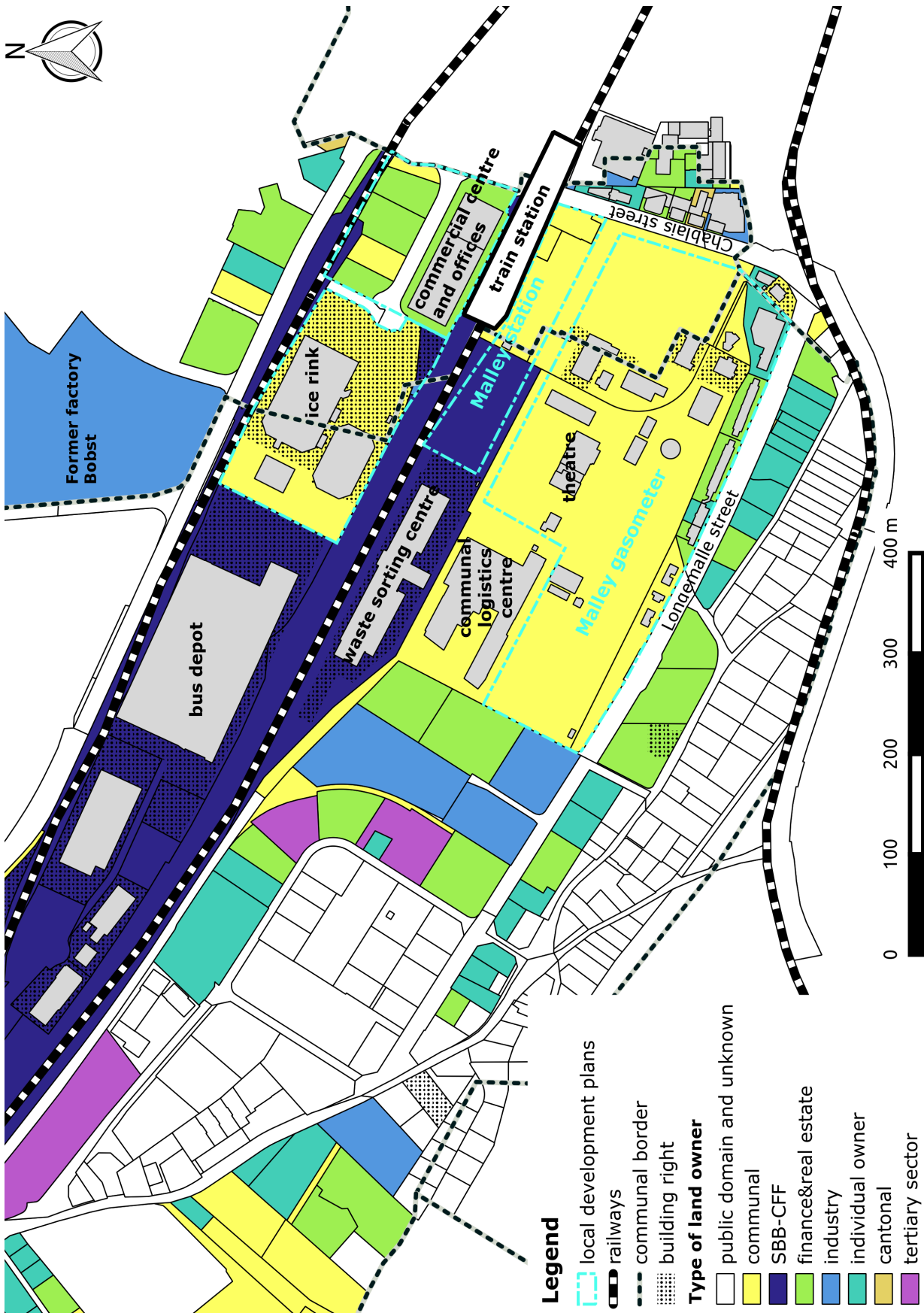


Figure 5.1: Property structure, main land uses and local development plans in Malley

5.1.3 Contextual factors

5.1.3.1 Property structure

Figure 5.1 shows the property structure of the area, the type of owner (and the type of land use), and the main infrastructure and buildings. The overall displayed plots correspond roughly to the perimeter of the master plans elaborated in 2007 and 2012. As one notices, the perimeter subject to urban renewal is considerably reduced relative to the scope of the master plans: whereas the latter's initial perimeter included a net surface of 390,000m², the four local development plans being elaborated only consider 96,000m² (Bauart and Raderschall, 2012, 36ff). A second salient element is that the public (commune of Lausanne) and semi-public (Swiss railway company SBB) ownership represents an important part of the neighbourhood's area, and precisely the one that is designated to be redeveloped in the following years.

In comparison with the more scattered ownership as is the case in the west of Malley, this specificity implies a reduction of the number of actors involved, which simplifies the negotiation around the planning and development processes as well as the land exchange procedure (described in section 5.1.3.1.1 hereafter). Both the SBB and the commune of Lausanne are familiar with major construction projects, possess internal expertise and share joint interests in cost reduction.

Lausanne's executive has "minimal profit rates below which it does not proceed"¹⁴. For the SBB, such type of transactions fit entirely in the company's strategy and mandate, as the federal government obliges the SBB to generate profit from its properties¹⁵. The fact that the SBB's decisions, in particular those of SBB Real estate (the company's department in charge of the management of its land and real estate properties), is not bound to a council's approval eases the operation for the owner (Nahrath et al., 2009a, 118).

Lausanne and the SBB position themselves as developers in the sense that they budget the entire cost linked with the plots' development, as well as propose leaseholds on their land which allow them to maximize their gains while remaining attractive for private developers (see section 5.1.5.4 for more details). Lausanne fulfils the role of the planner by proposing a detailed plan of the future neighbourhood including the precise shapes and sizes of the public spaces and buildings, the type and location of services and infrastructure, etc.

This case study shows the tight interweaving of public actors: Lausanne and the SBB combine the functions of landowner, planner and developer. These roles and relationships transform Malley's development into a public-public partnership where public landowners act and negotiate in the manner of private actors, negotiating with planning authorities who are, in fact their public counterparts.

5.1.3.1.1 The land deal Over the last decade, the property structure has been subject to one major change, central to the achievement of the area's redevelopment: a land exchange worth 34 million francs between the commune of Lausanne and the SBB in the perimeter of the local development plan of *Malley-gare*. As it turns out, this exchange is conditioned by a quite external factor (Commune of Lausanne, 2011b): Lausanne's desire to provide a home to the new cantonal cultural complex (composed of the cantonal museum of fine arts, the museum of photography, the museum of applied arts and further cultural activities).

The construction of this vast cultural complex is intended to enhance the national and international reputation, increase the cultural offerings, and foster economic development (Commune of Lausanne, 2011b). As the future museums' site selection process put Lausanne in competition with other locations in the canton (Canton of Vaud, 2009a), it was necessary for the commune to put forward good reasons to be chosen. The provision of free land was a strong argument¹⁶. However, Lausanne's first proposed museum location along the lake was rejected by referendum (Conseil d'Etat du Canton de Vaud, 2010, 6), thus requiring the proposal of another outstanding site in its ownership.

Redevelopment of public land

Limited number of actors involved

A powerful and unified ownership

A new cantonal cultural centre

Free land as facilitating factor

¹⁴E. Krebs, *op. cit.*

¹⁵Art. 6 par. 4 of the *Convention sur les prestations entre la Confédération suisse et la société anonyme des Chemins de fer fédéraux, pour les années 2013 à 2016*.

¹⁶Y. Deillon, head of the coordination and land registry office of the commune of Lausanne, interviewed 16 June 2015 in Lausanne.

A central plot with major development constraints

This is where the SBB stepped in: its locomotive depot located aside Lausanne's rail station was unsuitable for the new train maintenance process which had been relocated outside of the city¹⁷. This turned a 21,000m² of land in a most central location out of use. Still, its redevelopment for housing or commercial purposes is highly difficult:

- the hall is part of the patrimonial inventory and considered of regional importance, which requires the integration of outstanding physical elements of the hall (such as the vaults) into the future construction. If the SBB wants to redevelop new building for financial purposes, it would require the hall's removal from the patrimonial inventory, a long and complex procedure;
- the plot's location (stuck between a row of residential buildings located directly above it and the noisy train tracks immediately before Lausanne's main station) and limited access (only two small roads, also stuck between existing buildings and connecting to the station's already overcrowded roundabout) limit its future use and overall economic value¹⁸. Therefore, no density comparable to Malley can be reached.

A well timed land exchange

These elements are development constraints and the SBB seizes the opportunity of the future cultural complex is an ideal opportunity to get rid of this problematic plot and obtain a better suited one that allows high financial returns. However, these constraints are not problematic for the commune of Lausanne, because noise, height or access constraints have less relevance to the future museums than for housing. Further, the patrimonial obligations that were initially considered as a financial burden have become a challenge for the museums' architects. Thus, after having estimated the plots' values, the SBB and the commune of Lausanne agree to a land exchange. The transaction is effective once the local development plans that secure the building rights on the respective plots are approved. A cash transfer balances the difference of value (Commune of Lausanne, 2011b).

Resources such as the concentration of ownership (infrastructure) and expertise can provide a decisive advantage in a land use planning negotiation process. Combined with what appears to be a coincidence of the calendar, Lausanne manages to turn a defeat due to a referendum into the successful establishment of a cultural centre through fine-tuned land management. Having seen the main aspects linked to the property structure, the next section turns to the territorial dimension of Malley.

5.1.3.2 Territorial structure**A communal border that crosses the perimeter**

An additional specificity of the neighbourhood is that both the local development plans of *Malley-gare* and *Malley-gasomètre* span two different communes – Renens and Prilly¹⁹. This complicates the negotiation process, because two communal executive bodies are involved in the planning process and two communal legislators must vote on these plans. The double territorial affiliation of the plans brings up two matters:

- the first one concerns the localisation of the different buildings on one commune or the other's territory. In order to prevent the division of single buildings among two different communes and thus two different fiscal regimes, the communal borders that cross the two local development plans have to be adapted to the area's new urban configuration (Communes of Prilly and Renens, 2015a).
- the second matter is linked with the type of residential buildings and the localisation of public spaces. Despite contrasting political views²⁰, both communes

¹⁷M. Béguelin, former Member of Parliament and member of the Swiss delegation to the European Parliament, interviewed 17 November 2015 in Lausanne.

¹⁸The financial reports estimate the 25,768m² of the locomotive hall plot at 33.36 million francs (1,295CHF/m²), the 10,060m² of the local development plan of *Malley-gare* at 34.4 million francs (3,419CHF/m²) (Commune of Lausanne, 2011b).

¹⁹The ice rink development plan is of cantonal rank and therefore subject to cantonal approval only.

²⁰Prilly is a proportionately more right wing and wealthier commune than Renens, a left wing bastion with a particularly high proportion of foreigners.

are interested in retrieving fiscal income from the future inhabitants and the creation of jobs. Future subsidized housing will yield less fiscal revenues than freehold apartments. This point is further discussed in section 5.1.5.3.

5.1.3.3 Soil structure and view

Linked with the territorial aspect are the soil structure and pollution present in it. The location (as detailed on figure 5.1) is of unstable nature, because it consists of glaciolacustrine silts from a former lake located between two moraines (Nägeli, 2006, 12): one located along Longemalle street and the other along the main train line. These two moraines make the studied perimeter comparable to a flattened basin where the view is partly blocked on both sides. In particular, there is no view further south on Lake Geneva. The basin was flattened in the 1940s prior to the construction of the slaughterhouse (Fantoli, 2006, 21).

Limited view

The location to be developed has geothermal potential (Nägeli, 2006, 35), but several areas of the soil are polluted with numerous remainders of hydrocarbons dating back to the former gas cracking plant (CSD SA, 1999)²¹. Two of the main plots are classified as requiring remediation in case of development (State of Vaud, 2015). This classification implies important additional costs in terms of soil remediation and use restrictions that are one of the main elements of negotiation; they are discussed in section 5.1.5.2. But most importantly, the actors exclude from the beginning the development of the area where the former gas plant was located. Already in the master plan published in 2012 (Bauart and Raderschall, 2012, 86f), the park – or as one interviewee called it the "green area" – has been located precisely on the most polluted site, because of the excessive costs a remediation process would imply.

Major soil pollution

An additional element related to the soil are the district heating pipes that the industrial works of Lausanne installed from the 1990s onwards to service all plots owned or used by Lausanne in Malley (Commune of Lausanne, 2011a). They furnish energy to the surrounding buildings displayed on figure 5.1, but also to housing units owned by Lausanne's pension fund on the southern side of Longemalle street²². The pipes also run through Chablais street, the south-north axis in the eastern part of the perimeter and important extension projects exist in the west and the north (Commune of Lausanne, 2011a). This energy network is of crucial importance for the future development of the area for two reasons:

Existing heating infrastructure

1. Lausanne invested more than 12 million francs²³ in the pipes and 4 millions francs in the heating plant whose capacity will double in the near future (see section 5.1.5.1). Such investments are aligned with a long term strategy that influences most major land use planning projects of the commune and, potentially, those of the agglomeration;
2. In 2011, the communes created a common ownership company for the pipes and any future extensions of the network. The process seems to have been initiated by Prilly's original connection request to replace their old communal buildings' gasoline heating system (Commune of Lausanne, 2011a). Only when enough clients requested to be connected did the industrial works agree on the network's development.

What I observe here is that the district heating system became part of the land service, but a service of particular nature, namely one conceived to generate profits. In fact, the investments made by the three communes became a commercial service sold to customers. Relying on the air pollution plan elaborated with the agglomeration plan in 2005, its extension was pushed forward by Lausanne's industrial works whose financial plan for district heating forecast a yearly consumption increase of 3.5% for the next ten years (Commune of Lausanne, 2000) and additionally promised dividends to the shareholders (Commune of Lausanne, 2011a). Through the creation of the

Heating as land service

²¹As no access was granted to the two pollution reports, the available information is limited to earlier drilling results published in the cantonal cadastre of geology (State of Vaud, 2015).

²²A. Bartolomei, *op. cit.*

²³The invested amount is based on the value of the district heating society created in 2011 and have therefore been written off

common company, Prilly and Renens could push for the development of the district heating to make their investment profitable²⁴.

As it was briefly shown, energy infrastructure is heavily developed in Malley and the presence of industrial works makes it an important actor in the area's redevelopment. As the next section shows, existing and future transport facilities are an additional structural factor shaping Malley's future.

5.1.3.4 Accessibility

Outstanding accessibility

In regard to motorised private transport, Malley has privileged access to the motorway (1.3 km away from the closest entrance and exit) and thus can be easily accessed by car from the entire Lake Geneva region as well as more remote areas. In matters of public transport, figure 5.1 shows the presence of vital rail infrastructure in and around the area. In contrast with the northern tracks (mostly used for waste transport) the central tracks are part of the national east-west rail connection. Since the inauguration of the train station of Malley in 2012, they also have served as the backbone of public transport within the agglomeration of Lausanne and along Lake Geneva. A train currently stops every 25 minutes in each direction and is set to stop every 15 minutes in the near future (SBB, 2014, 6). The trains grant access to Lausanne's central station within 4 minutes and to Renens' within 3 minutes. The southern tracks (the locus of Lausanne's first metro line) grant access to Flon, Lausanne's second public transport hub, (within 6 minutes) and to the University of Lausanne campus (within 9 minutes). Three bus lines currently cross the area, but the frequency will be extended along with the area's development: a tram line will pass along the northern limits of the area, and the bus supply will be broadened²⁵.

Cantonal initiative

The contribution of the train station to the neighbourhood's redevelopment plays a pivotal role, but leads to the question of the initiator of the station's construction. The chronology elaborated in table 5.1, I note that first urban analyses on a wide perimeter (approximately 5 kilometres length and 500 metres width) along the train tracks between Lausanne and Renens that includes Malley started in 2004 (see also table 5.1). When the federal enquiry on urgent agglomeration projects was launched in 2005, the canton pushed forward the project of building a train station in Malley in order to obtain federal funding. This required its integration into the cantonal transport strategy and the station's mention in planning documents. The first evidence of the station is found in a preliminary version of the cantonal structure plan (Canton de Vaud, 2005), published shortly before the application to federal funding. It then integrated into the agglomeration's planning documents – the above mentioned urban analyses on sector 2 analyses published the following year (SDOL, 2005). As several interviewees mentioned²⁶, it was the canton's development strategy of the regional express network that allowed the construction of the station and its subsequent development. Neither the SBB nor Lausanne initially believed in the area's redevelopment.

Temporal shift of land uses

Despite an initial lack of general support, the waste sorting centre was still to be built (2006), thus creating a temporal shift between transport planning works on cantonal level and surrounding land uses planned on communal level that still correspond to the existing industrial zone. This shift is also made evident by the 2002 construction of the animal waste processing center (subsequently dismantled in 2008 when the train station's construction began).

Property, territorial, soil structures, as well as accessibility have demonstrated several elements that should be kept in mind for the rest of the analysis:

²⁴A. Bartolomei, *op. cit.*

²⁵C. Jemelin, *op. cit.*

²⁶P. Hassler, Head of the planning office of the commune of Prilly, interviewed in Prilly 19 May 2015; N. Wisnia, *op.cit.*; Y. Deillon, *op. cit.*

- concentrated public ownership is managed as private property by Lausanne and the SBB, and considered as such by the the planning authorities (Renens and Prilly);
- the site’s industrial vocation has not vanished, but is becoming a mixed area where housing, secondary, and tertiary activities coexist;
- the territorial split among two different authorities led to the anticipation of future revenues as well as constraining the distribution of building rights;
- the importance of the existing energy infrastructure and of the industrial works’ investments and forecasts;
- the development constraints created by the pollution of soils;
- the outstanding accessibility to the entire area.

5.1.3.5 Demographic evolution

Between 1991 and 2013, the district of Ouest lausannois²⁷ experienced a population growth of 21% (from 57,700 to 69,900 inhabitants), an average annual growth rate of 0.96%. Compared with cantonal growth rates, the district, as well as the commune of Lausanne, are in the lower tier of growth. Over the same period, canton Vaud experienced a population increase of 27% (from 577,500 to 734,350), an average annual growth rate of 1.23%. However, population growth in the district is above national average growth rate (18.9% total growth, or 0.86% annual growth).

5.1.4 Constraints of superior law

This section deals with the impact of legislation on the local regulatory arrangement/policy output. It synthesises the major constraints that apply to the redevelopment project, and shows how they shape the implementation process and illustrates the final arrangement negotiated between the actors.

5.1.4.1 Cantonal approval procedure

Several cantonal offices are involved in the elaboration of the master plan, either as members of the executive committee approving the plan, or as members of the technical committee elaborating it²⁸. As there is no formal procedure for the master plans’ elaboration and approval, it is difficult to trace specific elements put forward by the cantonal authorities. Nevertheless, a concomitant evaluation of the first master plan’s elaboration mentions the proactive role of the canton in regard to environmental and security norms as wells as in regard to the division of land service costs between the involved public authorities, be it as planning authorities or landowner (Lawrence et al., 2009a). As the negotiations on service costs are still ongoing six years after the mentioned report, I note that the financial issue has been trickier than initially expected. And as this is a matter to be solved between landowners and planning authorities, the financial involvement of the canton withdraws in the following procedural stages²⁹.

In the preliminary exam, as well as the approval stage of the local development plan of *Malley-gare*, the administrative arrangement is slightly modified: the consulted

Strong initial involvement by the canton

Transportation and land service costs as main issues

²⁷The district is composed of eight communes that form the western part of the agglomeration of Lausanne: Crissier, Prilly, Renens, Bussigny-sur-Lausanne, Chavannes-près-Renens, Ecublens, Saint-Sulpice and Villars-sainte-croix.

²⁸These entities are the office for communes and housing (*service des communes et du logement*), the office for mobility (*service de la mobilité*), the land use planning office (*service du développement territorial*), the office for economy and tourism (*service de la promotion économique et du tourisme*), the office for environment and energy (*direction générale de l’environnement*), the office in charge of roads (*service des routes*) and the service in charge of architecture, patrimony and logistics (*service immeubles, patrimoine et logistique*).

²⁹J.-P. Dind, project manager for the cantonal land use planning office and the office for economy and tourism, interviewed 13 July 2015 in Lausanne.

offices change³⁰. As neighbour of the plots to be developed, the SBB is involved in the consultation. The agglomeration's public transport company is also consulted in regard to the future buildings' connection to the agglomeration's transport system. Both companies' positions are fully backed by the office for mobility (SDT, 2014).

Main aspects underlined during the preliminary exam were linked to:

- the obligation to elaborate the financial plan that divides the service costs among the actors' plan before its final approval by the communes;
- the enlargement of access roads to both the waste sorting centre and the logistics centre;
- the coordination of planning with the public transport network, in particular the location of bus stops and bike parks;
- the definition of public spaces and the inscription of legal guarantees for their open access;
- the time horizon for the construction of a tunnel crossing the railways, whose financing depends on the financial plans of the two local development plans;
- security aspects involved in both access and air vents linked to the Ordinance on protection against major accidents³¹;
- the organization of a public information session³².

The oppositions to the local development plan led to two main conflicts:

1. financial issues between landowner and planning authorities on two points of contention: the lack of a financial plan, the approximate definition of public spaces and the railway crossing;
2. use conflicts between the former industrial uses and the forthcoming residential and commercial uses: preliminary planning by the spatial planning office of the commune of Lausanne did not consider the road requirements of the waste sorting and logistics centre, even though these offices are in the same department.

Additional delay for the submission of a financial plan

By law³³, the approval of a local development plan is conditioned on the elaboration of a financial plan dividing land service costs among the landowners and planning authorities. In the case of *Malley-gare*, the cantonal authority makes an exception, citing financial aspects intrinsically linked to the second development plan of *Malley-gasomètre*, still under negotiation. They explain that the costs division has been one of the main sources of conflict since the elaboration of the first master plan (Lawrence et al., 2009a, 125). As this issue had to be solved between landowners and planning authorities, which are both public authorities, an additional term was granted (expiring prior to the plan's final adoption by the communal councils).

5.1.4.2 Air pollution ordinance

As mentioned in section 5.1.2, one of the causes leading to the elaboration of the master plans for the western part of Lausanne's agglomeration was the implementation of the Air pollution ordinance³⁴. By the end of the 1990s, the threshold set by the ordinance were blatantly exceeded by far and the air quality was so poor that authorities agreed on a moratorium on construction in order to try to solve the problem. Thus, the redevelopment of Malley was partially initiated by the air pollution problem. It is designed as a remedy: its central location, its density and the high

³⁰Neither the office for economy and tourism, nor the office for communes and housing are involved in the procedure, although they were consulted prior to the master plan's approval. The cantonal office for insurance against fire and natural hazards and the office for consumption and veterinary affairs take part in the approval procedure of the local development plan of *Malley-gare*, but do not formulate any specific comment.

³¹SR 814.012.

³²Art. 3 LATC, SR-VD 700.11.

³³Art. 49, 50 and 55 of the *Loi du 4 décembre 1985 sur l'aménagement du territoire et les constructions* LATC, SR-VD 700.11.

³⁴RS 814.318.142.1.

connectivity to public transport and the reduced number of parking spaces (compared to Swiss standards: see section 5.1.5.1) limit the use of individual motorized vehicles. This implies a modal shift that goes beyond Malley's redevelopment and extends to the creation of the regional train network launched in 2004. The expected effect is a reduction of local CO₂ emissions despite an expected increase of 4,100 inhabitants and jobs and a potential overall increase in the entire of Malley of 16,100 inhabitants and jobs (Bauart and Raderschall, 2012, 36).

5.1.4.3 Energy policy

According to the cantonal legal provisions adopted in 2014³⁵, authorities now have the obligation to plan and coordinate energy provision and use together with land use planning procedures. Both Lausanne and Renens aim to develop new neighbourhoods that comply with the 2000 watts society (Commune of Lausanne, 2013; Commune of Renens, 2013)³⁶. In the case of *Malley-gare*, a document analyses two possible scenarios of energy provision and consumption, the latter depending on the share of housing in the overall project. However, this is not a binding document. The building regulations applicable to local development are binding, and they stipulate that the communal executive bodies, within their competencies, take all measures that encourage the development of zero energy buildings (Communes of Prilly and Renens, 2015b). This leaves the door open to a wide range of possible applications.

The cantonal energy law³⁷ further mentions that new buildings (and those whose boilers are slated to be renewed) are obligated to connect to the district heating network if they are located within the network's coverage area, and do not already use mainly renewable energies (this point will be discussed in section 5.1.5.1). Additionally, it grants a 5% bonus of development rights if the anticipated construction exceeds the energy standards fixed by law. As this bonus is only granted when the building permit is submitted, it is not known if this development bonus will be used or not.

Mandatory coordination of planning with energy provision

Mandatory connection to district heating

5.1.4.4 Priority development areas

The fact that Malley is one of the priority development areas defined by the Canton has led, beside the central involvement in the train station's development, to the financial participation of the canton in preliminary studies and master plans. The canton's focus is on the provision of initial, mainly financial, support in order to launch a development project³⁸.

The law says³⁹ public authorities are granted an expropriation right on areas of public interest, a criterion which applies to priority development areas. As Malley's landowners are public entities, it could only be used to expropriate two leasehold lands in the local development plan of *Malley-gasomètre* (see figure 5.1). According to interviewees, this instrument only applies to those parts of the priority development areas where economic activities are developed⁴⁰. This is due to the fact that current cantonal legislation does not recognize housing as a matter of public interest. The surfaces of *Malley-gasomètre* where the leases are located will host housing and/or parking lots, so the expropriation right cannot be used and a compromise will be negotiated with the lease holders⁴¹.

Financial support for planning

An instrument limited to economic activities

5.1.4.5 Remediation of contaminated sites policy

As mentioned in section 5.1.4.1, the impossibility of access to pollution reports means that I cannot see the analyses' results, nor assess the costs linked with the land's development. According to the cantonal cadastre of polluted soils (State of Vaud, 2015), the polluted plots do not require remediation, as the pollution does not spread to nearby waters. However, one plot requires surveillance. In any case, the area's

³⁵Art. 16a of the *Loi du 16 mai 2006 sur l'énergie LVLEne*, RS-VD 730.01.

³⁶For a presentation of the concept, please refer to <http://www.2000watt.ch/>.

³⁷Art. 25 LVLEne, RS-VD 730.01.

³⁸J.-P. Dind, *op. cit.*

³⁹Art. 76a of the *Loi du 4 décembre 1985 sur l'aménagement du territoire et les constructions*, SR-VD 700.11.

⁴⁰A. Baillot, *op. cit.*

⁴¹Y. Deillon, *op. cit.*

redevelopment necessitates the treatment of excavated soils and possibly prohibits drilling through the polluted layer of soil to prevent exfiltrations (Viallon, 2016a, 103). The use of geothermal energy might be limited. As there is no obligation to remediate the site, the amount of soil to treat depends on the depth of future construction (soil depth is not regulated in the local development plan).

5.1.4.6 Protection against major accidents

Restrictions on use and thus value

The federal ordinance on the protection against major accidents⁴² has led to several restrictions in regard to land service and the type of land use:

- creation of a safety access between buildings and railways, and construction of building exits only on the opposite side of the railways;
- prohibition of land use causing high traffic (*i.e.* commercial centres, cinemas and schools) and limited to a maximum of 13% of the overall gross floor area dedicated to sales;
- prohibition of land use dealing with vulnerable persons such as retirement homes and daycare centres, because of the additional difficulties to evacuate the occupants in case of emergency;
- maximum of the overall gross floor area dedicated to housing – at most 40%.

Conflicting interests within the SBB

These restrictions translate into a land use conflict within the SBB: on one hand, the company's function is to transport passengers and freight (some of which consists of dangerous goods) and must fulfil a set of safety obligations in order to prevent and minimize risks. On the other hand, it should maximize the economic output of its properties⁴³ and thus foster their efficient development. This conflict has translated into practice as follows:

- the current publication of the report which assesses ordinance implementation has led to development restrictions on the landowners just before the first master plan was to be approved and has subsequently led to its suspension (Lawrence et al., 2009a, 132);
- the report's results have been contested by landowners, who did not want to lose part of their building rights. The SBB's representatives⁴⁴ argued that the calculation method used in the report ordered by the canton would apply stricter norms than the one used in their own report (Lawrence et al., 2009b, 88).

A stricter implementation over time

This interruption of the planning process shows that the SBB's double conflictual role has been solved internally since the ordinance's approval in 1991. The former cantonal lack of expertise left until recently a rather wide margin of manoeuvrability to the railway company in the ordinance's implementation process. The inconsistency of the canton's implementation is apparent in the northern side of Malley's station: the commercial centre and cinema built in 2001 are exactly the type of uses that the environmental impact assessment (Ecoscan, 2015, 44) and the regulations of the local development plan of *Malley-gare* (Communes of Prilly and Renens, 2015b) now advise against.

5.1.4.7 Agglomeration policy

Federal subsidy for the train station

In June 2006, the federal Parliament approved the creation of a 6 billion francs fund for transportation projects in agglomerations, among which 2 billion francs were dedicated to projects listed as urgent (Federal Council, 2005). Supported by the government of the canton of Vaud, the station of Malley was among the chosen projects (see also section 5.1.3.4). It was granted a 50% subsidy (40 million francs) for the construction of the train station of Malley, which gave in turn a major push to the area's redevelopment.

Other federal subsidies linked to urbanisation measures

The remaining four billions francs were dedicated to other transportation measures

⁴²SR 814.012.

⁴³Art. 6 par. 4 of the *Convention sur les prestations entre la Confédération suisse et la société anonyme des Chemins de fer fédéraux, pour les années 2013 à 2016*.

⁴⁴One representative of the Real estate department, one representative of the Infrastructure department (Lawrence et al., 2009b, 111).

within agglomerations. In order to compete for federal funding, Swiss agglomerations had to elaborate a master plan that developed the agglomerations' transportation networks (foot, bicycle, public transport, motorised vehicles) and coordinated them with urbanisation measures (constructions dedicated to housing and activities). In the case of Lausanne, the canton wrote the first draft of the agglomeration's master plan in 2005. In 2006, the communes' executives approved and signed the master plan. In 2008, the federal and cantonal transport ministers signed the agreement in order to finance the planned measures. The link between the agglomeration policy and the redevelopment of Malley is indirect, because it is the canton that signed the agreement, but the communes that have to modify their building regulations and development plans according to the master plan they signed. In the case of Malley, the agglomeration policy subsidised the railway crossing for pedestrians and bicycles and part of the land service of the two streets to be created in the neighbourhood. Confederation and canton paid 5.92 million francs out of 25 million francs (Communes of Prilly and Renens, 2016). Table 5.3 in section 5.1.6 sums up the different costs and benefits linked with Malley's redevelopment.

An additional condition to which the federal subsidies were linked are the realisation of the infrastructure within a fixed time period. The first agglomeration program approved by the Confederation in 2008 planned the end of realisation of all measures by 2020, and fixed the end of planning works by and the beginning of development for Malley in 2010 (Agglomération Lausanne-Morges, 2008, 80). The schedule of the second agglomeration program delayed the end of planning works to 2014, and beginning of development to 2017, leaving two years for the detailed planning of the project (Canton de Vaud and ALM, 2012a, 45). In their evaluation report on the second agglomeration program, the Confederation insisted on the importance to respect the delays mentioned in the program, as otherwise their financial support might be reduced (ARE, 2014, 27). This factor put local authorities under pressure, as they possibly lose part of the federal funding associated with the project.

**Territorial communes
under time pressure**

5.1.4.8 Master plans

The master plans⁴⁵, because they analyse the locational and topographic contexts (*i.e.* in terms of view), make suggestions in terms of future uses and point out specific locations for these uses. Additionally, they set overall density values in accordance with existing and future connections to public transport. Sector 2 studies consider densities above 400 inhabitants and jobs per hectare for the plots adjacent to the station as desirable (SDOL, 2005, 27), an objective that is very well achieved despite the legal constraints. In fact, the local development plan of *Malley-gare* reaches a density of 519 inhabitants and jobs per hectare.

**Definition of density
criteria**

These plans are theoretically not binding, because they are not formally part of the land use planning policy implementation process and are not approved by legislative bodies, unlike zoning and local development plans⁴⁶. However, during the legal check⁴⁷ of zoning and local development plans by the cantonal supervisory authority, the latter requires the zoning or local development plans' conformity to the agglomeration's master plan (SDT, 2012). This procedural subtleness allows the communal executive bodies (and the cantonal heads of administration) to fix a set of elements such as foreseen density and land use that communal legislative bodies have to adopt later on in binding local development plans. This entails a redefinition of the political administrative arrangement: the communal legislative bodies' margin of manoeuvrability is reduced in favour of the inter-communal assembly of communal executive bodies that pre-defines the density and land services in specific zones that are to be renewed. When the communal legislative body modifies zoning and development plans and submits them to the canton for approval, the cantonal authority reject the local development plans that do not meet the master plans' criteria.

Change of planning scale

⁴⁵The master plans of the western part of the agglomeration (SDOL, 2003), the master plan on the industrial areas along the train tracks (SDOL, 2005), the agglomeration's master plan (Agglomération Lausanne-Morges, 2008; Canton de Vaud and ALM, 2012b) and the master plan specific to Malley (Bauart and Raderschall, 2012).

⁴⁶Art. 58, SR-VD 700.11.

⁴⁷Art. 56, SR-VD 700.11.

In order to sum up the content of the present section, one can list the following elements of cantonal and federal law that have an impact on the redevelopment project:

- the air pollution ordinance, which initiates reflection on the areas of the western part of the agglomeration that should can be redeveloped;
- the agglomeration policy, which co-financed the train station’s construction and thus shaped Malley’s redevelopment;
- the ordinance on polluted soils, which restricts the development of the area’s underground due to the costs the soil’s remediation implies;
- the ordinance on protection against major accidents, which restricts the types of possible uses for constructions close to the train tracks;
- the obligation to elaborate an energy concept, although its realization is decided only at the stage of the building permit, which leaves a wide margin of manoeuvrability to the landowners and developers.

Some of these regulations have provided an incentive for the area’s redevelopment, and some of them have created constraints. The next section, dedicated to the local regulatory arrangement shows how these restrictions have clearly not impeded the urban renewal process.

5.1.5 Local regulatory arrangement

5.1.5.1 Energy supply

High energy objectives set by the master plan

Energetic aspects play an important role in the transformation of Malley. One factor are the high energy standards set into the local master plan: these require a careful examination of the energy sources used for the construction and operation of the new neighbourhood. In fact, the master plan sets forth an objective of fulfilling the standards of the 2000 watts society (Bauart and Raderschall, 2012, 66). Elaborated by the Federal polytechnic schools in the 1990s, this has been committed to by the communal authorities of Lausanne and Renens (Commune of Lausanne, 2013; Commune of Renens, 2013).

Lack of renewable energy source for district heating

The current input sources for district heating are: 60% burned waste, 33% gas or gasoline and 4% sewage sludge (Commune of Lausanne, 2011a). Since the energy source determines the sustainability of the district heating system, a dilemma appears between the utilised energy inputs and the further extension of the network (a network in which the current input of renewable energy sources are limited). The search for alternative sustainable energy sources has been a political issue since the 1990s. An example of proposed alternatives is the substitution of gas by wood for district heating (Commune of Lausanne, 2005b, 2014a). Wood heating has not seemed feasible until recently.

Planned extension of district network

Important investments have been made over the last decades to foster district heating (with more to come). The thermal plant of Malley itself is an important energy provider for the heating system and its capacity will be doubled in a near future⁴⁸.

Reduced energy needs of new buildings

Another issue is that with the evolution of technology and construction standards (better isolation of buildings and alternative energy sources such as geothermal energy), the heating needs of new buildings have been drastically reduced. This threatens the network profitability, because it requires the industrial work to provide heat to a higher number of clients and thus lay more pipes in the ground, which increases the network’s development costs.

More transparency in energetic planning

Further, the obligation to take energetic aspects into account in the elaboration of local development plans (as in the case of Malley: see section 5.1.4.3) contribute to make decisions such as the choice of energy source more visible and further upstream in the decision process. Possible alternatives have to be considered and a public report is written. Until recently, these were mostly in the discretionary power of developers

⁴⁸A. Bartolomei, *op. cit.*

and/or the industrial works, who even benefit from a legal obligation to connect to the district heating network if no other renewable source of energy is used⁴⁹. Today, the underlying rationale in reducing the emission of pollutants and heat losses generated by individual heating systems through a centralized source is not questioned, but the temporal shift between long term investments in district heating, the recent evolutions of technological possibilities, and the legal obligations to coordinate planning with energy provision lead to an intra-policy conflict that is hard to resolve.

Several other elements exacerbate the tensions between the provision of future buildings with a more sustainable energy source and the development of the district heating:

Gas as a privileged source of income

- Lausanne’s monopoly on gas distribution along the entire coast of the Geneva lake from Nyon to Lausanne (SIL, 2012, 22);
- the important revenue gas provides to the commune: sell price to final individual consumers by the industrial works of Lausanne is at least 25% more expensive than the Swiss average (Price supervisor, 2012).
- the absence of a boiler and other heating equipment in the connected building (only a heat exchanger is required) allows the developer or landowner to reduce installation and maintenance costs linked to heat provision;
- the supply of an all inclusive offer (installation, provision of heat, maintenance) by the industrial works of Lausanne simplifies the installation process for the developer or landowner and allows him to pass on these costs to the final captive consumer;
- with the creation of an intercommunal district heating company with Prilly, Renens called *CADOuest*, Lausanne has included two of its territorial neighbours as shareholders of the heating distribution company (in the western part of the agglomeration). These neighbours participate in the investments, and have a share of the rent that is limited to the network’s profitability, *i.e.* around 3-4% over 60 years (Commune of Lausanne, 2011a, 9). In this way, the communes themselves have become captive clients.

The achievement of nearly zero energy buildings is linked with the reduction of energy consumption and with the local provision of energy (from the sun, the air, the soil or nearby waters). In the local development plan of *Malley-gare*, the energetic concept written in accordance with new regulations (see section 5.1.4.3) anticipates only a limited use of geothermal power (Commune of Lausanne, 2014b). The actors’ preferences are for district heating, which, combined with solar power and the buy of electricity from renewable sources and heat exchangers around the foundation works, does not incentivise the drilling for additional geothermal energy (Commune of Lausanne, 2014b, 19). Nevertheless, the sustainability of the energy concept relies on the purchasing of electricity from renewable sources, a condition that might be difficult to impose on developers (made particularly difficult because the regulations in the local development plan do not address it) and consumers. Further, it considers district heating as a partially renewable source, but its share of renewable energy is precisely going to be reduced because of the network’s extension.

Costs passed on captive end consumers

The actors do not intend to make Malley an example of a sustainable neighbourhood. The SBB focus on the price of alternative energy sources as opposed to district heating and emphasizes the "illogicality" of not using available power⁵⁰; Lausanne, in particular the industrial works, wants to ensure the profitability of the investments made in the thermal plants and heat distribution pipes. Renens and Prilly originally claimed a connection to the district heating: they anticipated economic and ecological gains compared with old, oil-fired boilers that serviced their communal buildings and would need to be replaced soon. The development of district heating and the underlying financial investments seemed, at the time, the best option. However, Lausanne initially refused to fulfil Prilly’s request to extend the network further west, arguing a lack of potential clients. Only due to the interest shown subsequently by Renens and

Inclusion of neighbour communes in the district heating coalition

⁴⁹Art. 25 of the *Loi du 16 mai 2006 sur l'énergie LVLEne*, SR-VD 730.01.

⁵⁰G. Dekkil, project manager at SBB Real estate, interviewed 8 June 2015 in Lausanne.

the upcoming redevelopment of Malley is the network's extension back on the negotiation table and the intercommunal district company created (Commune of Lausanne, 2011a).

Adding up of rents

Through the monopoly on heat provision and the establishment of a district heating network, the district heating company links the rent due from zoning with the rent due from energy supply, and more specifically from the provision of gas. The rent due is secured by captive customers, a phenomenon already observed in a recent study by Nicol and Knoepfel (2014). The energy rent is divided amongst the district heating company's shareholders (the three communes involved in the redevelopment of Malley) and the industrial works of Lausanne, who distribute and burn the gas, produce and sell the heat to the district heating company. From an ecological perspective, the landowners' choice to use gas as a primary energy source offers reduced ecological benefits when compared with renewable sources. Its ecological advantage was relevant mainly in comparison with heating oil (which has not been considered). However, the choice of heat source has also been determined by the heating pipes already present on site. Further, geothermal energy is associated with higher costs that developers are reluctant to carry. In the case of Malley, a geothermal energy source would have been additionally problematic because of the existent soil pollution.

Limited use of fossil energies through a reduced number of car spaces

Linked with the air pollution regulations (see section 5.1.4.2), an additional levy that the actors use to reduce energy consumption is the reduction (compared to Swiss standards) of planned parking spaces for motorized vehicles (Communes of Prilly and Renens, 2015b). Coupled with high public transport connectivity, this limitation reduces the proportion of inhabitants using or having a car and thus reduces the share of fossil energy used by future inhabitants.

The energetic dimension is characterised by a path dependent behaviour of the landowner who fulfils simultaneously the functions of energy and heat provider. The owner has managed to integrate clients as shareholders of the heating network to share the network's development costs and ensure the future extension of the service. These intertwined economic interests reinforce the existing inertia (Goldthau, 2014) and argue against the actors' will to foster the use of renewable energies and to implement the 2000 watts society (Bauart and Raderschall, 2012; Commune of Lausanne, 2012; Commune of Renens, 2013)⁵¹.

5.1.5.2 Pollution of soils

A central cost linked to redevelopment

Soil pollution causes other restrictions in terms of development. According to the interviewed actors⁵², the financial costs of excavating the polluted soil and treating it according to legal prescriptions was one of the major elements influencing the location and shape of buildings in the case of the local development plan *Malley-gasomètre*.

Transfer of development rights within the local development plan

In the case of soil excavation, polluted soil requires transport and treatment (which implies important financial costs), and generates non-negligible amounts of grey energy. The solution negotiated by the actors minimizes excavations, soil transport and treatment and thus reduces costs and energy consumption.⁵³ Underground floors are minimised, surfaces that would normally be used for commercial or housing purposes are partly dedicated to car parking spaces (parking spaces will thus be on the ground floor and in a dedicated four stories building in the middle of the neighbourhood). In order to compensate the loss housing surfaces induced by the parking spaces, the amount of surface dedicated to parking is "transferred" to adjacent buildings in form of additional floors⁵⁴.

A pond as sales argument?

In regard to public spaces, the winning project in the competition on public spaces includes a park and a rainwater collecting pond serving the entire neighbourhood (Bauart and Raderschall, 2012). These two elements (the park and the pond) will

⁵¹As a counter example, one can refer to the future neighbourhoods of *Les plaines du loup* and *Blécherette*, which could have also been connected to the district heating network but for which a geothermal solution has been chosen (Commune of Lausanne, 2012).

⁵²G. Dekkil, *op. cit.*

⁵³E. Krebs, *op. cit.*

⁵⁴E. Krebs, *op. cit.*

be located on the site of the former gas cracking plant, gasometer and gas pressure reducing station. Various old and new gas pipes as well as district heating pipes are still present. This area is highly polluted and thus considered non constructible⁵⁵. It seems quite astonishing that the competition's results only marginally consider this element in their planning mandate. The suggested plan is likely to be severely modified by the financial constraints (due to pollution) that neither the landowner nor the territorial commune wants to carry. The pond's future seems rather compromised.

The policy of polluted soils steers the creation of economic value in the sense that remediation costs are too high to be borne by landowners. This fact leads the actors to follow a cost minimization strategy that limits the amount of remediated soil to a strict minimum. Further, soil pollution is a determinant of the location of future construction, the park being located where the most polluted soils are. From an ecological perspective, this represents a low added value and impossibility to provide additional goods and services such as a clean park, deeper basements and in an ideal situation even a pond. However, this low ecological added value is not likely to change, because of the high distance of underground waters and the soil's composition (Nägeli, 2006) that limits the spread of pollution.

Another element on which soil pollution has an impact is energetic provision of the neighbourhood. If the new construction is intended to be self-sufficient, this autonomy requires a wider remediation process in order to capture geothermal energy. Without proper remediation, ecological value creation through renewable energy is impeded. But these questions have never been asked in such terms, because the district heating infrastructure is already on site.

Soil pollution determines the location of constructions

Restriction of energy sources

5.1.5.3 Spatial distribution of building rights

Another important element in the negotiations regarding the pollution of soils (previous section) and the territorial structure (section 5.1.3.2) is the spatial distribution of building rights. The communal borders cross-cut the planning perimeters and thus add an additional constraint on the distribution of rent. The owners, as well as the territorial communes have financial claims in regard to the future land use and users. Additionally, it is worth noting the rental differences between offices, commercial activities and housing⁵⁶, but also between the types of housing. In fact, the expected fiscal revenues or subsidies to be paid vary drastically depending on the category of housing that will be built (*i.e.* condominium apartments, apartments rented according to market prices, regulated or subsidized housing). Thus, the future location of the different uses as well as the respective proportions of different housing types were an important element in negotiations. As I had no access to the convention specifying these elements, it is not possible to provide an overview of the expected financial returns for each actor.

Anticipation of future inhabitants' income

However, following elements can be mentioned in regard to the contract that will bind the landowners (SBB and Lausanne) and the developers: in accordance with communal practice (Cour des comptes du Canton de Vaud, 2011b; Nahrath et al., 2009a) and the subjects of interviews⁵⁷, the development of Lausanne's and the SBB's land will be subcontracted to a developer in the form of leasehold land. The price of the future building rights will probably equal 4–5% per year of the land's market value, a rate applied by Lausanne and the SBB for most of their leases (Cour des comptes du Canton de Vaud, 2011b, 29). The Court auditor's report further notes that rent discounts can be granted during the first years for specific reasons such as the compliance with specific environmental criteria or additional costs linked to the terrain's structure. As the contracts have not yet been established, it is not possible to quantify the effective redistribution of value, but it can be stated that Malley's development will be an important source of revenue for Lausanne (see table 5.3).

Land development through leasehold

In regard to the type of housing, landowners argue that the neighbourhood's partial industrial use and its overall location might be less suitable for freehold apartments and thus limit future rents. Therefore, the project's profitability might be lower than in an exclusively residential neighbourhood. Recent studies on French agglomera-

Limited future land rent?

⁵⁵P. de Almeida, *op. cit.*

⁵⁶In 2013, average sell price for a square meter of office in the region of Lausanne is 3,080 francs and housing 2,500 francs (Wüest and Partner, 2016b).

⁵⁷E. Krebs, *op. cit.*; A. Baillot, *op. cit.*

tions (Boulay, 2011; Guérois and Le Goix, 2009) show an homogenisation of the rent between neighbourhoods of the same agglomeration: a general catch-up phenomenon is observed, with a particularly strong price increase in neighbourhoods with initially low rents. Nonetheless, a reduced price gap between the neighbourhoods remains. At this stage of the project, it is only possible to speculate on the future evolution of prices. I do not possess land or real estate prices for neighbourhoods within the agglomeration, and I do not know the developers' contractual obligations regarding the proportion of apartments that can be sold or which must be rented (nor do I know the future duration of these rental agreements). Assuming that the neighbourhood's price increase only takes place five to ten years after the development is finished (Boulay, 2011, 295ff), it might be more profitable to initially rent most of the apartments and then sell them once the rent gap is filled.

Impact of subsidised and regulated housing on rent

One has to keep in mind the contractually defined duration of the subsidised and regulated housing regimes. These contractual durations impact the future rent: for example, the leasehold might restrict the period during which subsidies are paid for subsidised housing to twenty years, or the leasehold might restrict the period during which the rents are regulated to ten years; after that, the flats are rented on the regular market. This aspect also plays an important role in the calculus of the future financial return of the buildings. Thus, the amount of expected rent is used by the communes in order to attract the most profitable uses, but also by the landowners who tend to minimize future income that they can obtain from the developers through the leasehold land. In this way, another element that plays a key role in the negotiations are the land service taxes detailed in the next section.

5.1.5.4 Land service costs

Three types of land service taxes

In the negotiation and approval process of the local development plans, the main conflict between landowners and territorial communes is over the extended land service tax (the amount of money that the landowners pay to the authority in order to finance the territorial communes' public infrastructure also beyond the neighbourhood's borders). Table 5.2 shows the different taxes linked to land service.

Tax	Description	Costs division
Connection tax:	Costs of connection between private buildings and local infrastructure like roads, energy, water and sewage system (entirely paid by the landowner) ⁵⁸	100% of effective costs paid by the landowner
Land service tax:	Costs of construction of local infrastructure which is publicly accessible, but primarily benefits a neighbourhood (local roads, local energy and water provision and sewage system).	50% of effective costs paid by landowner, 50% by planning authority
Extended land service tax:	Insurance value of socio-cultural infrastructure (non-financial assets) that a commune requires in order to fulfil its general obligations like education, health, public transports, parks, etc. divided by the number of inhabitants divided by the average surface use of one inhabitant (50m ²)	Up to 50% paid by landowner

Table 5.2: Types of taxes linked to land service in Canton Vaud.

Disagreements on land service

Both the land service tax and the extended land service tax are of contractual nature and capture an additional part of the added economic value created by land service and general communal infrastructure. In the case of Malley, its application is the source of four main problems:

- it is unclear if a public owner has to pay the tax or not: the legal basis⁵⁹ specifies that public authorities and private entities working in the public interest are exempted from the tax. However, the fact that the public owner acts as a

⁵⁸Art. 50 of the *Loi du 4 décembre 1985 sur l'aménagement du territoire et les constructions LATC*, SR-VD 700.11.

⁵⁹Art. 90 of the *Loi du 4 juillet 2000 sur les impôts directs cantonaux*, RS-VD 642.11.

private owner on another commune's territory is subject to debate. After both the owner and the territorial commune received contradictory legal advice⁶⁰, it was agreed to negotiate the amount that would be paid instead of going to court.

- the amount of tax depends on the future use of the building: according to Renens' communal regulations (Communes of Prilly and Renens, 2016), the territorial commune is owed an amount of 144CHF/m² for housing and 33CHF/m² for commercial use. However, as the actors negotiate other elements with financial implications (*i.e.* the proportion of housing in the future buildings, public spaces, remediation costs and other use restrictions), the effective sum due in land service tax and extended land service tax remain part of the whole deal;
- the delay of payment: most landowners want to pay once the permit has been delivered and stagger the development process in order to maintain control over the process and to temporally divide the amount of money handed out for service costs. However, the territorial communes want to get paid when the local development plans are adopted, so they have to dispense a lower amount of money to service the land;
- the spatial distribution of the tax: though the tax's aim is to finance general public infrastructure within the entire communal territory, the landowners contest the absence of a link between the amount of money levied and the public infrastructure costs induced by the neighbourhood's redevelopment.

As both authorities and landowners bare costs, the redistribution of economic value created by the redevelopment process is the main issue for the process' actors. However, the planning authorities do not know exactly how much profit they leave to the landowner and future developer, because they do not have the resources to calculate all costs and benefits of the negotiated solution (particularly in regard to the remediation costs). This lack of the resource "personnel" lends to the landowners an advantage in the negotiations⁶¹. In order to overcome this complex situation, several solutions have been considered:

Asymmetric information on remediation costs

- one proposed solution was the creation of a society with territorial communes and landowners as shareholders⁶². This society holds the land of the two local development plans, borrows money from the bank, and pays for all infrastructure. This model is comparable to the land improvement syndicate presented in the case study of Cheseaux (Viallon, 2016b). The complexity of the process that the creation of such society would involve (its approval by the communal legislative body, the time it involves) has led to the abandonment of the solution;
- another possibility was to dispatch the different development tasks between the involved actors and their respective contractors⁶³: each landowner and commune takes the responsibility for some construction (roads, parking lots, squares, park, etc.) and compensation is made for the extra amount paid by one or another actor based on the financial agreement reached;
- the solution adopted in the end is to share the payment for some elements of the land service (road works and and railway crossing) according to the cantonal legal dispositions⁶⁴ and leave other elements (squares) to the landowners. As shown in table 5.3, the amount paid by landowners are estimated around 12.6 millions francs for the land service tax and 700,000 francs for the extended land service tax (Communes of Prilly and Renens, 2016, 24f). The former covers the costs of the railway crossing (see section 5.1.4.1) and of the adjacent roads, the latter is the result of negotiation and depended upon the share of housing

⁶⁰Interestingly, one of the commune's advisors is the cantonal deputy who brought the motion to parliament which led to the introduction of the tax.

⁶¹E. Krebs, *op. cit.*; T. Maystre, *op. cit.*

⁶²N. Wisnia, *op. cit.*

⁶³G. Dekkil, *op. cit.*

⁶⁴Art. 129 of the *Loi du 25 novembre 1974 sur l'expropriation*, RS-VD 710.01.; art. 4b of the *Loi du 5 décembre 1956 sur les impôts communaux*, RS-VD 650.11.

included in the future buildings⁶⁵. Once the first building permit is delivered, a five year delay is granted for the payment of the above mentioned contributions (Communes of Prilly and Renens, 2016, 24f).

Time pressure

Further, as mentioned in section 5.1.4.7 on the federal agglomeration policy, the approval of the local development plans could not be delayed much longer, as the territorial communes might have lost part of the funds granted by the Confederation for the realisation of the infrastructure. Further, the plans adoption processes had to be coordinated between the two communal legislative bodies that had to approve the plan in the same time frame.

5.1.5.5 Transport

Cantonal subsidy for planning

The canton has a leading role in Malley's redevelopment, as seen through their financing of the the train station construction (see section 5.1.3.4). In the ensuing planning steps, the cantonal authority intervention is limited and decreases over time⁶⁶: despite the creation of an office dedicated to redevelopment projects⁶⁷, cantonal actions are confined to the supervision of the plans' elaboration and to the co-financing of the project manager's salary (employed by the intercommunal coordination office SDOL). The project manager is responsible for development projects in the western part of Lausanne and the implementation of the 2012 master plan for Malley.

Conflict on the implementation of the risk ordinance

The supervision of the plan's approval led, in 2008, to a major conflict linked to the implementation of the ordinance on protection against major accidents: the commissioned report severely reduced future use rights. This led to a clash between landowners and the report's writers. The central object of contest was the method used to calculate risks. In the end, the canton, responsible for the ordinance's implementation, solved the issue by granting additional building rights that corresponded to approximately 15% of the projected building rights in *Malley-gare*⁶⁸ (see table 5.3 in section 5.1.6 below). Thus, the reduced value resulting from limited uses was compensated for by additional gross floor area.

Mutual benefits from public transport

All actors agree that Malley's development must ensure a high proportion of public transport users in the neighbourhood. This allows both the railway and the agglomeration's public transport companies to fulfill their financial objectives, and caps the subsidy that the communes pay to supply a public transport service. For the agglomeration's public transport company, the division of costs among the communes is calculated on the basis of:

- the number of inhabitants in the commune;
- the number of kilometres driven by the transport company's buses on the commune's territory;
- if the total sum paid by a commune exceeds 8 tax points (the case for Lausanne) the amount in excess is paid by the communes and the canton through a transport fund at agglomeration scale.

An opportunity to recover costs

The consensus on the transport matter is due to the mutual benefits that public transport provides to public actors: Malley's redevelopment not only provides additional passengers for the train lines operated by the SBB and for the buses and trams run by the agglomerations' public transport company, but it provides additional freight to the SBB via the waste sorting center. The transport company plans to double the number of users using public transport in newly developed neighbourhoods compared to the average percentage of users in existing neighbourhoods⁶⁹. Thus, Malley is the ideal location to recover some of the major investments that

⁶⁵The local development plan sets the share of housing between 25 and 40% of the gross floor area. A minimal amount of extended land service tax is due if the proportion of housing equals 25%. As a consequence the minimal amount of tax due in a "regular" case would be: $(37,300\text{m}^2 * 25\% * 144\text{CHF}) + (37,300\text{m}^2 * 75\% * 33\text{CHF}) = 2.27\text{M CHF}$.

⁶⁶J.-P. Dind, *op. cit.*

⁶⁷The so called *groupe opérationnel des pôles* is composed of representatives from the spatial planning office and the office for economic development, see Canton de Vaud (2011) for additional information.

⁶⁸E. Krebs, *op. cit.*

⁶⁹C. Jemelin, *op. cit.*

the communes make in transport infrastructure, but also in operating costs. The neighbourhood is designed in a way that the future inhabitants are compelled to use the public transport system. In cooperation with real estate corporations, the public transport company will set up a widget on their websites showing the travel times from the inhabitant's potential future home to their work in order to show the value of the site's ideal location⁷⁰.

This section shows the multiplicity of factors that affect land values: zoning, plot ratios, transport infrastructure, district heating or soil pollution. Lausanne and the SBB have created a public oligopoly. Due to their additional policy resources in terms of expertise and infrastructure, this allows them to capture the added values created by other actors: the station financed by the canton and the Confederation, and the zoning operations done by Renens and Prilly. Most of the economic value lost due to contextual factors or legal constraints is compensated by additional building rights.

Emergence of a public oligopoly

The conflicts analysed in the case study are observed not only between public authorities, (one of them being the owner), but also between the different organisations that compose the commune of Lausanne, owner of the plots. Figure 5.2 shows a visual synthesis of the various problems that emerged during the planning process, namely:

- energy supply;
- security provisions against major accidents;
- pollution of soils;
- spatial distribution of building rights;
- division of land service costs and extended land service costs;
- the end of Lausanne's industrial services former land use monopoly.

⁷⁰C. Jemelin, *op. cit.*

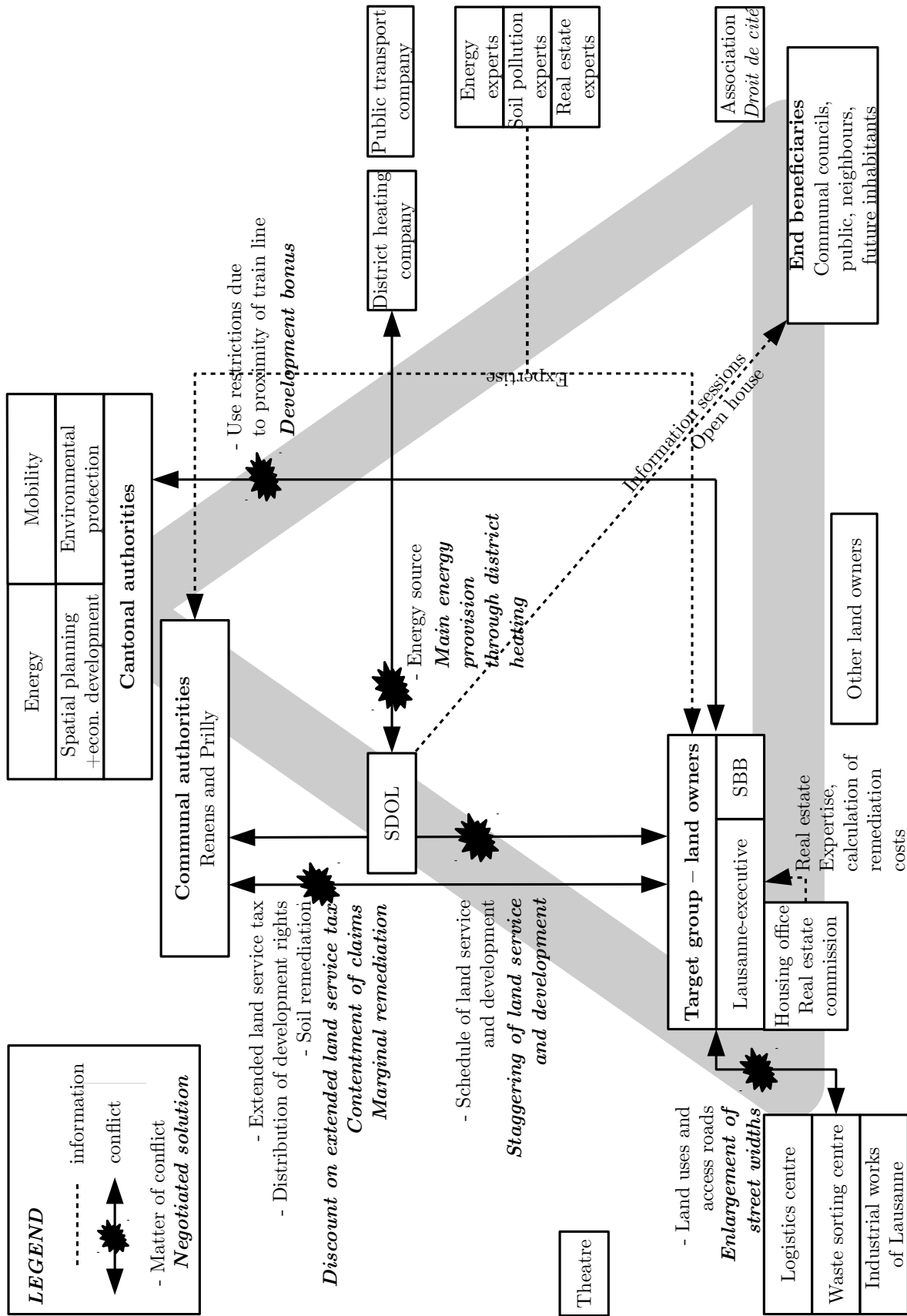


Figure 5.2: Information flows and conflicts between actors in the planning process of Malley.

5.1.6 Impact on value redistribution

The redistributive aspects underlying the entire redevelopment of Malley can be broadly synthesized as follows: the redevelopment of an industrial brownfield located in the centre of an urban area creates economic value, because various plots of the area had lost most of their uses and were converted to economically valuable uses. This is mostly due to the limited and economically cheap remediation process that took place. Some industrial and secondary activities are still present and feel threatened by potential relocation due to the area's reconversion into housing and tertiary activities⁷¹. The ones that get evicted either disappear, or relocate elsewhere. A brief check on these relocated uses shows that they contribute to the urban expansion process: the Bobst factory up north moved to Mex (5 km away) into a new bigger building on former agricultural land; the slaughter activities moved to Cheseaux (5 km away) and Oensingen (in Oberaargau, see also Viallon (2016a)); they are now in bigger factories built on agricultural land. The public transport's network expansion requires a third depot that might be built outside of town⁷²; train maintenance is now taking place in Yverdon⁷³. All these moves take place on open land and contribute to urban growth and therefore reduce the ecological value of soil at regional scale.

In order to appraise more precisely the project's relative outcome, one could compare the sum of soil surfaces built in Malley with the sum of soil surfaces that would have been necessary for the realisation of the same uses in a peri-urban area. But because the industries located outside of town have simultaneously increased their production (Bobst) or merged their activities with other sites (the slaughterhouse) that are now closed, it becomes tricky to evaluate the overall outcome. If I add up the plot ratios of Malley before and after its redevelopment as well as the newly built areas outside town, it would be possible to set up a density index before and after the changes and thus evaluate the overall density change. Nevertheless, this would not take into account the changes in terms of uses (from industrial to housing and tertiary activities). Therefore, I limit the costs and benefits in table 5.3 to a tally of the surfaces, densities, costs and values of the local development plan of *Malley-gare* only (*Malley-gasomètre* is still in negotiation). As one can notice, the sum paid for the extended land service tax corresponds to approximately 19CHF/m², a rate that is far below the minimal rate of 33CHF/m² that would apply in case only commercial activities would be located in the new construction⁷⁴.

If I focus on the actors' intentionality, I can state that Malley's housing and tertiary development was not anticipated by the communes and the landowners. The construction of the waste sorting centre in 2006 supports this statement and shows the frictions that have stemmed from the proposed land use changes, by users within different public bodies contesting the site's new vocation. Industrial, residential and commercial uses will coexist in the same neighbourhood, a fact that corresponds to the master plan's objective of fostering mixed uses. In regard to the landowners, I conclude that their initial intentions were not proceed to an important land use change. This reversal is due to the canton's original intent to construct a train station and to the federal funds that greatly accelerated the process. The waste sorting centre was to be built on the southern side of the train station and it was only in anticipation of the future station's location that it was constructed further west on a property of the SBB (Commune of Lausanne, 2005a). The SBB had planned to establish a transfer station for freight trains, which in the end was not built. Lausanne could have developed its plots in Malley without the SBB, but it needed land for the new cantonal museum of fine arts, which led to the land exchange between Lausanne and the SBB. However, once the redevelopment of the area was considered, financial aspects became central to the entire process and landowners engaged anticipating a monetary return. In table 5.3, the overall initial costs borne by the landowners (planning, connection and land service taxes) are covered after roughly 6 years (construction costs are not taken into account). This corresponds to a quarter of plot's added value (24.4M francs). From this perspective, the value capture mechanism only seizes a small part of the added economic value.

Environmental outcomes of redevelopment counteracted by economic growth

Limited evaluation of ecological value change

Local actors' interests awakened by cantonal and federal incentives

⁷¹C. Jemelin, *op. cit.*

⁷²C. Jemelin, *op. cit.*

⁷³M. Béguelin, *op. cit.*

⁷⁴Art. 8 of the local development plan regulations (Communes of Prilly and Renens, 2015b) foresee a minimum surface of 5,000m² for housing, for which a tax rate of 144CHF/m² would apply.

Surfaces and densities	<i>Malley-gare</i>
Ground surface	10,600m ²
Old GFA	15,200m ²
New GFA	52,500m ²
Added GFA	37,300m ²
New plot ratio	4.95
Values and costs	
Old land value	10M
New land value	34.4M
Added value	24.4M
Planning	-0.30M
Depollution	-2.4M
Connection tax	-0.7M ^a
Land service tax	-5.6M ^b
Extended land service tax	-0.7M
Estimated annual rent ^c	4.5%*34.4M=1.55M

Table 5.3: Financial summary of *Malley-gare*'s planning and pre-development process from the landowner's perspective.

^aEstimation based on Renens' connection tax of 5.8CHF/m³ (Commune of Renens, 1995).

^bThe initial sum of 25.2M (Communes of Prilly and Renens, 2016) has to be divided proportionately to the added gross floor area of the two development plans (*Malley-gare* and *Malley-gasomètre*), because the infrastructure they finance (railway crossing and roads) apply to both. The calculus is as follows: 25.2M/2=12.6M. 45% of the added gross floor area being located on the development plan of *Malley-gare*, 45%*12.6M=5.6M.

^cThis estimation is based on the average rent adopted by the SBB for leaseholds (Cour des comptes du Canton de Vaud, 2011b, 51).

Adding-up of regulations

Another element is that legal constraints reducing added economic value added up over time: the MAO restrictions were negotiated until 2009, then the energy planning obligations were introduced in 2014, and the extended land service tax was put on the negotiation table in 2016. The modest financial impact of these successive regulations show that landowners resisted successfully to a reduction of rent.

Malley, a truly mixed neighbourhood

Malley's redevelopment is not characterised by the eviction of industrial uses. It stands rather for the initiation of a cohabitation between industrial, housing, and tertiary uses. The "playground" of the industrial works is now shared with more contemporary urban uses. It remains to be seen if and when the entire perimeter designated in Malley's master plan will be subject to further usage changes. Only about 20 out of 80 hectares have now been allocated to new uses, which leaves an important discrepancy between the original perimeter of the master plan and the much smaller area subject to current redevelopment. The rest of the plots are rather fragmented and a vast majority of them are in private hands. These plots are still predominantly used for industrial purposes and until recently, have not directly been concerned with the neighbourhood's changes. Therefore, it is probable that the planned urban renewal and accommodation of 16,000 additional jobs and inhabitants (Bauart and Raderschall, 2012, 36) will be accomplished over a long time period.

5.2 Land improvement syndicate in Cheseaux

5.2.1 Introduction

Over the past fifteen years, an urban development above cantonal and national average took place in Cheseaux. Its close location to the agglomeration of Lausanne and good public transport connection led the canton to define it as one of the local centres of the agglomeration. The successive use of policy instruments like land readjustment, land improvement syndicate, zoning, and plot ratio allowed the commune to achieve the following results:

- the property shape and property structure of the intermediary and agricultural zone have been entirely reorganised;
- the intermediary zone has been reduced and development has been defined in dense building zones (plot ratio of 0.6) compared to communal standards;
- the property shape and property structure of the new building zones are defined based on the building zones' requirements;
- despite the initial lack of communal property in the centre of the village, the commune has managed to place its public infrastructure (school) there;
- a wide part of planning and land service costs have been passed on private landowners;
- the absence of control on land value over time has led to a threefold increase of prices in ten years.

This case study analyses the implementation of the land use policy instrument *land improvement syndicate* (LIS) in the commune of Cheseaux, Canton Vaud. The instrument consists of both joint and coordinated use of land readjustment and zoning. The conditions for the instrument's implementation are of central importance to this thesis, because the LIS is one of the few intrinsically redistributive instruments in Swiss land use planning legislation. This case is structured as follows:

- section 5.2.2 provides a description of the instrument and its functions;
- section 5.2.3 presents the land use planning and land use changes in the commune over the past 25 years, in particular, changes within the LIS' perimeter;
- section 5.2.5 presents contextual factors which help explain the previously analysed changes;
- section 5.2.6 explains which legal constraints have played a role in the evolution of land use planning and land uses; it focusses particularly on the procedural factors that condition the LIS' functioning;
- section 5.2.7 analyses how the involved actors have utilized available rules in order to influence the local regulatory arrangements observed during the instrument's implementation process.
- section 5.2.8 summarizes the instrument's value creation and distribution capacity, its compatibility with other value capture instruments, and its possibilities and limits for solving redistributive issues on a regional scale.

5.2.2 Presentation of the LIS

Coordination through the creation of added economic value

Based on the terminology used by Weber et al. (2011), I define the *land improvement syndicate* (LIS) as a process of coordination between zoning, land readjustment and land service, financed through the creation of added economic value within a defined perimeter. The LIS pursues two main goals:

1. reorganise land property according to a planned zoning operation that creates added value on land;
2. realise land service (roads, water adduction, sewer, public spaces, landscape, etc.).

An instrument meant to overcome redistributive issues

Initially, the LIS was created to overcome contentious situations (such as: disagreements between landowners, an irregular property shape, financial risks in the redevelopment of brownfields), and ensure the equitable redistribution of added and reduced values between landowners (for example, a building zone or intermediary zone which has been oversized, or badly located and should be reduced and/or relocated) (Prélaz-Droux, 2008). The LIS, as *Derrière-le-château* analysed here, combined a property shape inadequate for development with a wide intermediary zone that had been undeveloped for over 20 years (see section 5.2.2.1).

5.2.2.1 Uses of the LIS in the Canton of Vaud

Since the 1950's, land readjustment has been used widely in Vaud (as well as greater Switzerland) for agricultural purposes. The aim was to make agricultural land fit for machinery and increase food production through increases in the size of plots, by burying rivers, and by covering paths with concrete (Courdesse, 2014).

An instrument to solve the problem of "intermediary zones"

More recent uses in the canton of Vaud focus on urban development and on the coordination between zoning plans and the property structure. More specifically, the LIS has been used to reduce the intermediary zone. In fact, a high number of Canton Vaud's zoning plans elaborated in the 1970's featured wide surfaces zones as an intermediary. The zones' existence dates back to the 1960's, a period in which communes defined huge building zones (the constructibility of these zones was suspended by the Federal urgent decree in 1972). Subsequently, in order to satisfy federal prescriptions without removing the landowners' potential rights, the commune zoned vast parts of the zones affected by the federal decree as intermediary zones (Nahrath, 2003, 347,351). These zones were defined as unbuildable and intended as the future building zones of the commune. Over the years, wide parts of these intermediate zones remained unchanged, together with the landowners' expectations that these zones would be developed at some point. In the case of Cheseaux, the contributions of the LIS *Derrière-le-château* have reduced a portion of the commune's intermediary zone.

5.2.2.2 Main procedural steps of the LIS

Joint redefinition of property rights...

The core element of the LIS is the coordination and joint redefinition of property rights and public policies applying to a given perimeter. The property rights dimension is addressed through a public law assembly composed of all landowners in the adopted perimeter⁷⁵. This assembly seeks to approve (by majority vote) a set of elements that are presented in more detail in section 5.2.6.1:

1. the approval of the feasibility study;
2. the definition of the perimeter;
3. the modification of property lines;
4. the redistribution of property surfaces;
5. the redistribution of the use rights linked to the plots;
6. the modification, creation, and elimination of easements;

⁷⁵If certain plots within the perimeter are already developed, these landowners are frequently "neutralized" (withdrawn from the perimeter) and do not pay for the LIS' costs, nor benefit from additional development rights.

7. the service of land and underlying costs;
8. operational costs of the LIS.

The zoning plan or local development plan defines and locates the landowners' use rights in the considered perimeter in accordance with public policies such as: location of constructions, building type, usage type, plot ratio, aesthetics, financial contributions, etc. Both the property rights transfer and the local development plan must be approved simultaneously by the cantonal authority.

...and public policies

In order to guarantee the financial viability of the process and ensure the landowners' approval, a feasibility study is conducted by a geometer, urban planner and notary (*i.e.* the experts' commission) mandated by the landowners⁷⁶. This feasibility study consists of a gross evaluation of the landowners' existing properties (physical constraints on land, easements, etc.) and their economic value. Taken into consideration as well, is the possible future state of property, as based on:

Elaboration of a feasibility study

1. communal plans in terms of future land use;
2. the wishes of the landowners (land for development, agricultural land, financial compensation);
3. the future land value, which is based on the potential of development and on additional constraints given by communal building regulations.

Once the feasibility study is approved by the landowners, a local development plan is established that defines plot ratios, estimates land service costs, and provides a more detailed analysis of the available options in terms of development. Based on landowner wishes, and their existing properties, the experts commission suggests a new property structure and negotiates with the landowners on the location and the constraints linked to their future properties, as well as the landowner's contribution to land service costs. The cost of land service should be proportionate to the surface and value of the initial property structure.

Detailed examination of future land use, costs and benefits sharing

When an agreement is reached, the local development plan and the proposed property structure are submitted to the communal legislative body for adoption. When both documents are approved by the cantonal authority, the property transfer is effected, and the land is serviced. Once the infrastructure is built, a final cost breakdown is made, distributing payments equally between landowners. The syndicate is dissolved after the distribution of payments.

Property transfer, approval of zoning regulations and land service

Having provided a brief outline of the instrument, the next section analyses the historical context of the implementation of the LIS in Cheseaux *Derrière-le-château*. It becomes evident that the situation had been blocked for decades due to the potential establishment of an airfield in the neighbour commune of Etagnières. With the removal of the project (that a group of local inhabitants perceived as a threat to the region's quietness and rural character), major successive land reforms have been initiated.

5.2.3 Land use planning and land use changes

Present development cannot be understood without looking at the past events that have shaped communal planning decisions over the last decades. Between 1978 and 2016, the story of Cheseaux's land use planning and land use changes can be separated into two broad overlapping phases:

Two stages of communal planning

1. the first phase comprises the planning, adoption and realisation of the commune's bypass road (Zuppinger, 1986);
2. the second phase consists of the communal agricultural land readjustment necessary for the realisation of the bypass road, and of the two land improvement syndicates *Derrière-le-château* and *Nonceret* that followed the road's construction. The temporal succession of the three land readjustment procedures is

⁷⁶Art. 85 of the *Loi du 29 novembre 1961 sur les améliorations foncières*, SR-VD 913.11.

central to the understanding of the dynamics of communal land use policy. The LIS *Derrière-le-château* is studied in detail in this case study, whereas the LIS *Nonceret* is still in an early stage and currently blocked by the federal moratorium subsequent to the revision of the federal land use planning act in 2014.

5.2.4 Land use planning and land use changes

The first communal building regulations and zoning plan were adopted in 1978. At that time, the commune defined three main building zones as the sites of future development (whose development plans were to be elaborated in separate plans) (Commune of Cheseaux, 1978). Wide surfaces of agricultural land in the east, west and north of the village were zoned "intermediary", *i.e.* meant to be developed over a longer time frame than standard building zones. At that time, the intermediary zone's precise shape and uses were uncertain, because development depended upon two elements:

1. the potential construction of an airfield: this regional infrastructure construction would have had a significant impact on the neighbouring communes, and would have required a road service coordinated with existing infrastructure;
2. the construction of a bypass road for Cheseaux and possibly the neighbouring communes, which was politically linked to the construction of the airfield. In the zoning plan of 1978, the shape of the intermediary zone was defined according to one of the possible routes that had been elaborated for the commune's bypass⁷⁷.

An airfield looking for a location

At the end of the second world war, the canton of Vaud was looking for a site that could host a new airfield. The sites considered by the authorities were located in the communes of Ecublens (west of Lausanne) and Etagnières (a neighbour of Cheseaux, north of Lausanne), but two cantonal popular votes (in 1946 and 1966) rejected proposals to finance the project.

Solution to traffic issues blocked...

In parallel, from the 1960s onwards, the canton tried to reduce the traffic overload on the cantonal road between Lausanne, Echallens and Yverdon. The portion of road intersecting both Etagnières and Cheseaux, experienced a large part of the traffic overload and its subsequent negative effects. In 1967, the cantonal legislative body adopted funding for the construction of a bypass road that would have circumvented Cheseaux and several other villages by the east. However, in-depth studies of the traffic at the regional scale (other roads connect in the immediate southern and western border of Cheseaux) as well as the anticipated extension of Cheseaux's building zone in the east, called this choice into question, and in 1970, led the canton to propose a new bypass road that circumvented the villages through the west.

..due to the threat of an airfield

This proposal was fought by the opponents to the airfield, who considered the road to be a "disguised cantonal support" that would have serviced the future airfield (Zuppinger, 1986, 13). After a popular vote on the road's credit in 1974, the project was abandoned and the canton opted for a smaller bypass alternative limited to the sole commune of Cheseaux. In 1978, the new plans were submitted to public hearing, opponents attacked them, and the plans were temporarily blocked from approval.

Adoption of the communal zoning plan

The same year (1978), the first communal zoning plan was adopted. The plan contained western limits to future development, as defined by the border between the intermediary and agricultural zone (see figure 5.3. These limits were set at that time according to the projected plans for the small bypass road for Cheseaux.

Five new bypass solutions considered

With the motorway between Lausanne and Yverdon put into service during that time, the canton revised its plans for the bypass road and conducted further studies. When it presented the bypass project to the communal authorities in 1983, the opponents to the airfield had withdrawn, because the federal concession for the airfield had expired. However, other opponents appeared, concerned about the western bypass' ability to reduce the traffic in the center of Cheseaux. These opponents promoted a plan for a tunnel straight through the village. This solution was meant to minimise the length of the bypass, and thus incentivise use by commuters. Communal funds were supposed to finance a comparative study of the two possibilities, but the necessary funding was refused by the communal legislative body in 1984, leaving the

⁷⁷R. Courdesse and U. Zuppinger, geometer and urban planner, interviewed in Echallens 14 January 2016.

canton to pay for the study. Ultimately, five solutions were considered: one bypass by the east, two bypasses by the west, one bypass under the village center and one solution involving only improvements to the existing roads.

According to U. Zuppinger (1986), the initial discrepancy between the planning objectives the bypass road was meant to achieve (among which the service of the airfield), and the political stakes these objectives represented, limited the acceptability of the bypass road for a long time. The first comparative study was mandated relatively recently, in 1983. Prior studies considered only one solution at a time, and neglected unsettled political matters such as the airfield, the traffic provided by the other roads crossing near Cheseaux, and the planned urban expansion in the east.

In 1990, two solutions were discussed: construction of a tunnel under the city centre or construction of a western bypass road relatively close to the village (that approximately met the limits of the intermediary zone defined in 1978), the bypass being supported by the canton. The final solution decided by the canton in 1991 consisted of a blend of both options: the bypass road circumvented the village, but was buried at the demands of the inhabitants.

Compromise between cantonal and local proposal

Between 1978 and 2001, existing building zones in the north, as well as parts of building zones in the south and in the east were developed. The eastern and western intermediary zones of the village remained undeveloped until the definitive plans of the bypass road were adopted in 1991. The same year, the canton launched a mandatory land readjustment⁷⁸ on a perimeter of approximately 85 hectares. At the request of the involved landowners, the land readjustment's perimeter was extended in 1993 to cover almost the entirety of the commune's agricultural zone. It was extended further in 1994 to adjacent plots in Morrens, the neighbour commune (Besson and Courdesse, 1999).

Mandatory land readjustment

The problem of the bypass road addressed, the commune could consider the definition of building zones in the east and west of the village. In order to do so, the communal executive body launched the revision of building regulations in 1994 (Baud, 2016, 62), at the same time the agricultural land readjustment took place. The simultaneous redefinition of zoning and of the property structure granted the commune the opportunity to elaborate a strategy combining both dimensions.

Simultaneous redefinition of public policies and property rights

The communal plans to extend the housing zone made the issue of the deprecated and soon to be undersized primary school salient (Baud, 2016, 69). The perimeter of *Derrière-le-château* appears as the best suited location for the development of the new school, because it is the most central, undeveloped zone of the village, and the location of the current primary school.

***Derrière-le-château* as ideal location for future school**

Based on the population growth previsions and on the imminent development in the east of the village (a.o. the area of Cologny), the matter of the future school should be solved quickly. Advised by the communal planner and the geometer in charge of the bypass road's land readjustment, the commune conditioned the development of *Derrière-le-château* to the creation of a land improvement syndicate, an instrument that would redefine property rights and zoning in the intermediate zone close to the village centre. To expedite the implementation of the instrument, the communal executive body mandated a feasibility study⁷⁹ for the future LIS *Derrière-le-château* in 2000, before the new building regulations were approved and the land readjustment procedure from the bypass road entirely finished (Leroy, 2008).

Combined use of three land use policy instruments

5.2.4.1 Land use planning changes in 2001

The new communal building regulations were adopted by the communal legislative body in 1999, and approved by the canton in 2001. Studied changes relevant to the value redistribution process:

Revision of communal structure plan

- zoning in the eastern part of the village was suspended: several hectares of intermediate zone converted to agricultural zone;

⁷⁸In order to build a cantonal road, cantonal law foresees a mandatory land readjustment within 30 meters of the road's future trace (art. 14 and 36 of the *Loi sur les routes LRou*, RS-VD 725.01).

⁷⁹Art. 19a of the *Loi vaudoise sur les améliorations foncières LAF*, RS-VD 913.11.

- the intermediate zone in the west of the village was enlarged slightly in order to match the existing property shape (the boundaries of some plots traversed the intermediary and the agricultural zones).
- the western intermediary zone was divided into two smaller perimeters: *Derrière-le-château* and *Nonceret*;
- within the two perimeters, zoning and development of the plots within were conditioned upon the creation of a land improvement syndicate.

Planning of the future LIS ongoing

In 2000, a local structure plan specifying the commune’s intentions regarding the perimeter near Cheseaux’s castle entered into force, and the feasibility study was approved. At this time, there was no further planning regarding the second perimeter of *Nonceret*.

Once the feasibility study had been approved by the landowners, the shape of the property within the LIS perimeter was redesigned, and new use rights were defined by a 2003 local development plan. The intermediary zone within the LIS perimeter was substituted by approximately 3/5 agricultural zone and 2/5 building zone. Land service and development of the new building zone were initiated in 2005.

Since 2001, other areas have been developed: several hectares of building zone reserves in the southeast (Cognoy area, near the sawmill) and southwest (Sorécot, Sorécot ouest). As of 2016, building zone reserves are within the legal limits (see section 5.2.6.3).

After close to 30 years of political uncertainty, the adoption of definitive plans for the bypass road allowed the commune to redefine planning documents in the west of Cheseaux and lay the foundations for the creation of two successive land improvement syndicates. The temporal overlap between the use of the instruments allowed the commune to quickly act to reduce the intermediate zone and define an optimal location for its future school. As the next section shows, the simultaneous land readjustment due to both the bypass road and the LIS *Derrière-le-château* also granted the commune the possibility to acquire, exchange and relocate its land properties, key factors that allowed public authorities to achieve their development goals.

5.2.5 Contextual factors

5.2.5.1 Property structure

Land use no longer corresponded with property structure

Prior to the land readjustment initiated by the construction of the bypass road, an important discrepancy existed between the effective rights granted to users and the property structure (shape and owners of plots). A third of the property title holders were no longer farmers (Besson and Courdesse, 1999): they had inherited the land and were renting it. In addition, farmers had proceeded with various land exchanges that had not been entered into the land registry, so the shape of plots did not fit actual land uses. The initial perimeter (85 hectares based on the bypass road’s trace) was transformed into a 317 hectare voluntary land readjustment area, including the almost the entire agricultural territory of Cheseaux, and parts of Etagnières and Morrens (Dubauloz and Courdesse, 2004).

Simplification of the property structure and shape

The process of redefining the property structure, combined with the commune’s intentions to develop land close to the village (from 1999 onwards), contributed to a rise in the local land market. Figure 5.3 shows that between 1993 and 2001, the formal property structure was greatly simplified to meet the actual uses: the number of plots was reduced from 31 to 21 and the number of owners within the future perimeter of the LIS *Derrière-le-château* shrunk from 15 to 7. Throughout the perimeter of the land readjustment, there were initially 417 plots owned by 102 persons, and after the readjustment, there were 93 owners, and 162 available remaining plots (Besson and Courdesse, 1999).

Anchor of urbanisation limits

Another element shown in figure 5.3 is the anchor of the urbanisation limits. Before the land readjustment in 1993, these corresponded to the limit between intermediary and agricultural zones (based on the initial bypass road plans designed from 1978).

Year	Land use planning changes	Land use changes
1974	Popular vote rejecting cantonal financial support for the construction of a bypass road for Cheseaux	
1978	Adoption of the communal zoning plan separating agricultural, intermediary and building zone	
1980s	Study of different options for the bypass road of Cheseaux	
1991	Cantonal authorities chose the western bypass option. Launch of a mandatory land readjustment procedure in the future road's perimeter	
1993	At the request of the landowners, extension of the land readjustment perimeter for the entire agricultural zone of Cheseaux and neighbour commune Morrens	
1994	Public hearing on land values	
1996	Examination of future property shape and values by cantonal authorities public hearing on future land service works	
1999	Consultation procedure of the new communal zoning plan Public hearing on the new shape of plots and their ownership, new land values and modified future land service works for the land readjustment <i>contournement</i> Entry into force of the communal structure plan and the local structure plan <i>Derrière-le-château</i>	
2000	Court decision on the future land service works of the land readjustment Entry into force of a local structure plan corresponding to the perimeter of the future LIS <i>Derrière-le-château</i> Elaboration of a feasibility study on the perimeter of the LIS <i>Derrière-le-château</i>	
2001	Entry into force of the new communal zoning plan	
2002	Property transfer of the land readjustment <i>contournement</i> Public hearing on public and private land service works for the land readjustment <i>contournement</i> Creation of the LIS <i>Derrière-le-château</i>	
2003	Negotiations and public hearings on the perimeter, land value and the future shape of plots within the LIS <i>Derrière-le-château</i>	Land service works for the land readjustment <i>bypass</i>
2004	Adoption of the local development plan <i>Derrière-le-château</i> by the cantonal authority Approval of easements on future property shape by landowners Property transfer and entry into force of the local development plan <i>Derrière-le-château</i> Public hearing into land service for the LIS <i>Derrière-le-château</i> Final cost breakdown and dissolution of the land readjustment <i>contournement</i>	
2005	Cantonal authorisation on foreseen land service works	Initiation of the land service works for the LIS <i>Derrière-le-château</i> , first property developments
2007		Arrival of first residents in <i>Derrière-le-château</i>
2009		End of land service works of the LIS <i>Derrière-le-château</i>
2012	Public hearing on modified easements; cost breakdown between landowners and realised land service works	
2014	Final cost breakdown and dissolution of the LIS	

Table 5.4: Main land use planning and land use changes in Cheseaux since 1993.

After the readjustment in 2003, the path has been physically anchored by the bypass tunnel: in fact, construction on top of the tunnel are prohibited.

**Quick development after
the LIS**

The 2003 map (figure 5.3) shows the property structure after the LIS: the separation between agricultural and building zones has been clearly set and the plots formatted for development.

The commune did not own a small portion of a plot that belonged to landowner 3. The commune bought it once the zoning and land readjustment had been done. As of 2016, most of the plots have been developed, only the commune and landowner 3 still have some undeveloped building zone reserves.

Explosion of land prices

It is notable that this quick development was accompanied by skyrocketing land prices. Whereas a square meter of serviced land was estimated around 250CHF/m² in 2003 (Marti and Courdesse, 2003), it is now estimated around 800CHF/m² ⁸⁰.

⁸⁰F. Blanc, former member of the communal executive body in charge of land use planning and construction, interviewed in Cheseaux 24 February 2016.

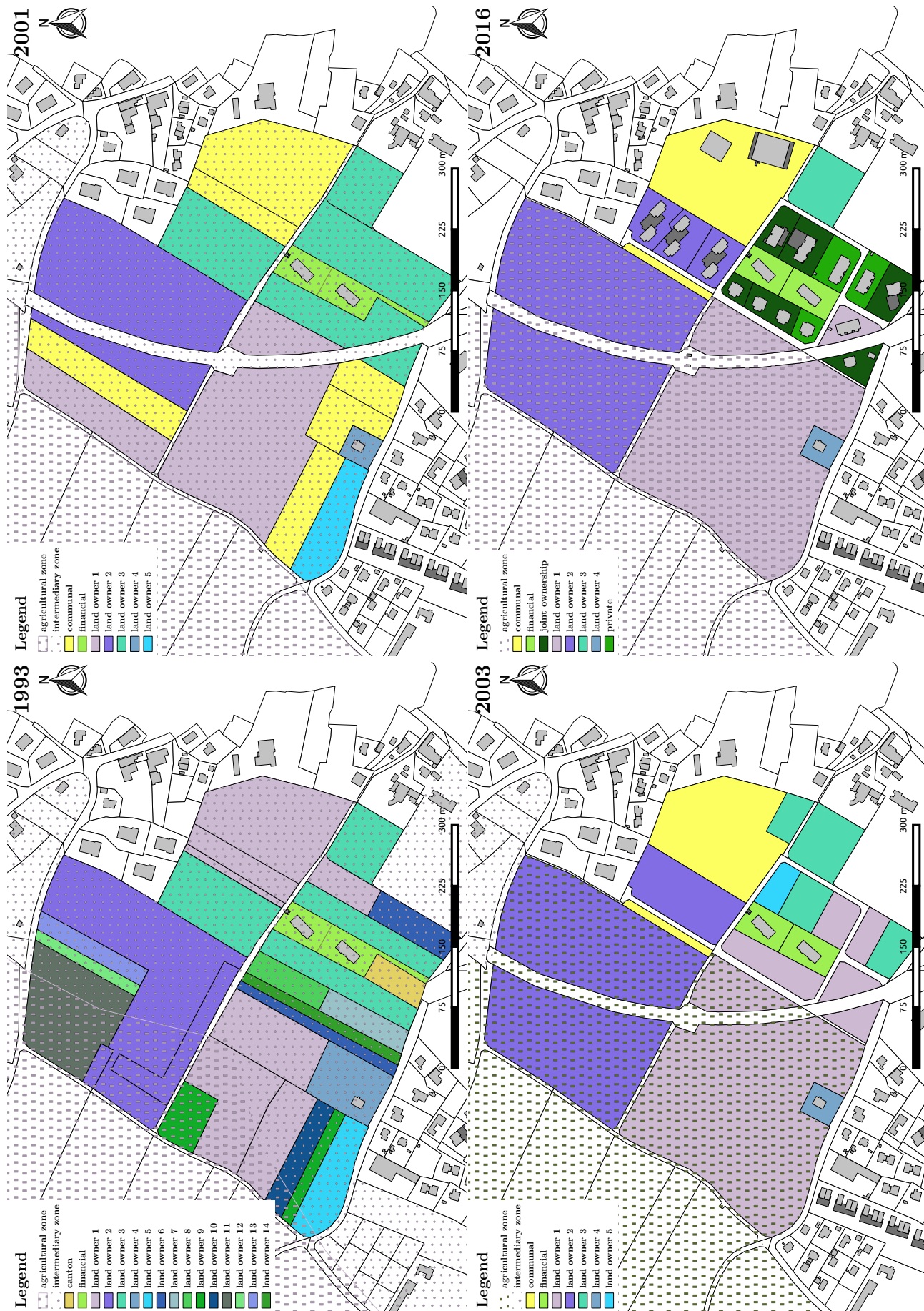


Figure 5.3: Evolution of zoning and property structure in the perimeter of the land improvement syndicate *Derrière-le-château* in Cheseaux.

A land development machine The ability of the LIS to simplify the property structure and reduce the number of owners are among its most outstanding features. This allows it to fit property to land use planning needs, and to elaborate plans without being constrained by existing private law constraints. Further, the LIS plays a decisive role in the negotiations that authorities and landowners conduct on land development, such as valuation, the modalities of land service and development, and other financial aspects. The underlying explanatory causes for this simplification are further researched in section 5.2.6.4.

5.2.5.2 Demographic evolution

Demographic explosion since 2002 Demographic changes contribute to the evolution of land uses. These changes are particularly significant in Cheseaux. From 1980 to 1990, population grew from 2,393 to 2,806 (FSO, 2015c). Between 1990 and 2002, the commune's population was rather constant, it grew by approximately 100 inhabitants per year, reach 4,080 inhabitants in 2014 (+1,300 inhabitants or +45% growth between 1990 and 2014). In comparison, the rural district of the *Gros-de-Vaud* in the north of Cheseaux has grown from 27,000 to 42,100 inhabitants (+15,200 or +56%). The urban district of Lausanne (to which Cheseaux belongs) has grown from 146,000 to 158,700 inhabitants (+12,700 or +8.7%) over the same time period. The regional comparison shows that the majority of the region's population growth took place outside of the agglomeration. Further, the region's demographic growth is far above cantonal (31%) and national (22%) population growth rates.

The need of a new school The demographic growth, combined with the old and progressively undersized primary school building, helped the commune to develop its infrastructure. Looking for a location to establish the new school, officials concluded that the best location would be next to the existing primary school⁸¹.

Growth leads to more growth From 2006 onwards, this growth was partially absorbed by the construction in the LIS' perimeter, whose capacity, in theory, is estimated at 800 inhabitants (Commune of Cheseaux, 2003). However, as two plots remain unbuilt⁸², the effective capacity in 2016 is estimated at 500 inhabitants. The agglomeration's master plan foresees the arrival of additional inhabitants and jobs (1,600 cumulatively) within the commune by 2020 (Canton de Vaud and ALM, 2012a, 87).

5.2.5.3 Accessibility

Intersection of five cantonal roads Transport connections are particularly salient in accounting for the growth of Cheseaux. Its location outside of the urban agglomeration, yet only 9 kilometres from the core of Lausanne creates a complex situation for Cheseaux. In terms of motorised transport, Cheseaux is at the intersection of five cantonal roads that connect the *Gros-de-Vaud* with the urban south. Cheseaux's location at the point of connection with the urban south contributes to heavy traffic. The bypass road alone was not able to alleviate the traffic situation, and has led policymakers to reorient transit towards the motorway (SDNL, 2015). There are two motorway exits about five kilometres away from the village centre – one in the direction of Yverdon-les-bains or Geneva, and the other at the northern limit of Lausanne's agglomeration, in the direction of Montreux or Berne.

Direct train to the agglomeration's core In terms of public transport, Cheseaux is served by a train (every 15 minutes) which takes 19 minutes to reach Lausanne's centre. The frequency of service doubled in 2015, to increase the line's transport capacities. The train line is considered a structural element in the agglomeration's public transport network, and Cheseaux is considered a local node (Canton de Vaud and ALM, 2012b, 87). The large part of part of the commune's settlement is located within 500 metres or less from the train station. Various unbuilt areas still remain within this perimeter. The proximity to the agglomeration's center, the existing transport infrastructure and the existence of unbuilt plots point towards an important development of the commune (SDNL, 2007;

⁸¹François Blanc, *op. cit.*

⁸²As figure 5.3 shows, the commune and landowner 3 still have a building zone reserve on their plot.

Agglomération Lausanne-Morges, 2008). As noticed by the agglomeration's master plan (Canton de Vaud and ALM, 2012b, 55), a weakness of the current infrastructure is the lack of tangential connections that would make it possible to commute to other parts of the agglomeration without passing through the centre.

The contextual factors presented provide an overall explanation of land use changes in Cheseaux: the quick and effective preparation of land for development, the important demographic growth of the region, the good connection to transport infrastructure and booming land prices position Cheseaux as a small growth machine. A closer look at one of the causes of this change, the transformation of the property structure, unveils a set of legal constraints intrinsic to the LIS that have allowed such quick and effective changes. The role of soft law can be observed, along with the minimal density obligations tacitly introduced into the land use plans' approval process.

5.2.6 Constraints of superior law

5.2.6.1 Procedural constraints of the land improvement syndicate

Among the legal aspects that shape the LIS' functioning, five key elements contribute to its successful implementation:

1. the definition of a perimeter⁸³: the LIS' initial perimeter is usually predefined by a communal and/or local structure plan. This plan is non-binding for landowners, *i.e.* does not grant them any additional rights apart from what the zoning plan foresees. This point is crucial, because the future building rights are granted only when the land is readjusted, providing an incentive to go through the LIS process. Further, the perimeter of the LIS itself creates an impermeable border that binds involved actors and excludes third party interference. A club is constituted that benefits from a new property structure and new development rights;
2. the mandatory conduct of a feasibility study⁸⁴: the study determines how many plots are included into the perimeter, and thus, how many landowners are involved. The study also estimates the rough added economic value created through the additional development rights granted by the LIS. Further, the landowners' reactions to the study and its subsequent approval or rejection is a first test which can reveal the owners' preferences. This can indicate not only their will to cooperate (or not), but also the type of value they expect to derive from the LIS (essentially land for development or agricultural land);
3. the coordination process as the temporary joint production of a new property structure and of a local development plan: the land readjustment plan and the local development plan are examined simultaneously by cantonal authorities and together submitted for public hearings. The approval by cantonal authorities of both plans is conditioned on their adoption by the respective parties (communal authorities or landowners) and the resolution of potential opposition⁸⁵. Without coordination, the property structure and the zoning plan would be out of sync, a recurrent problem in the classical implementation of land use planning policy through zoning plans (Gilg and Kelly, 1997);
4. the equal treatment of landowners⁸⁶: the added economic value that is created must be shared among all involved landowners according to the surface of land they possess and the initial value of their land (mainly dependent on zoning). The added economic value transferred to landowners can consist of additional land (mostly likely agricultural land without development rights), additional building rights or monetary compensation, depending on their wishes (see section 5.2.7.4). Further, the value redistribution process has to include all nearby

⁸³Art. 30, SR-VD 913.11.

⁸⁴Art. 85, SR-VD 913.11.

⁸⁵Art. 4, SR-VD 913.11; art. 58, SR-VD 700.11.

⁸⁶Art. 8, SR 101.

landowners whose land might be developed in the future. The law speaks of a "geographical unit"⁸⁷. Communal planning documents and the existing urban morphology serve as references to the definition of the unit. This legal condition reduces the risk of successful legal action by landowners against decisions taken by the LIS' assembly or the LIS itself. In the case of the LIS *Derrière-le-château*, the equal treatment constraint was determined by the intermediary zone. It requires the inclusion of all contiguous owners of land in this zone.

5. the simple majority rule (one landowner, one vote) that applies to decisions of the landowner's assembly fosters land use changes for two main reasons:
 - (a) prior to the creation of a syndicate, landowners are not actively pushed to develop their land: despite the attribution of new rights (e.g. development rights), they continue to use it as they did before (e.g. for agriculture). Once the commune has expressed its intentions to develop a new neighbourhood, and convinced a majority of landowners to agree, the other owners are bound to follow the majority's decision, which, together with the subsequent costs (see section 5.2.7.1), provides momentum for land use change.
 - (b) when the new property lines, use rights, easements, compensations and future land service are discussed, the pressure of majority voting applies to all landowners. This pressure is not absolute, because landowners can legally oppose the assembly's votes. Rather, it is a constraint that drives landowners, advised by the experts' commission, to seek compromise, and reduces the probability of opposition by landowners.

Minimisation of existing legal constraints

Through the simultaneous redefinition of public (zoning) and private law (property) regulations, the LIS minimizes existing legal constraints within a chosen perimeter and thus allows to entirely rethink future land use. Accompanied by chosen experts, the majority rule grants every owner the possibility to influence the decision process without allowing them to dominate or block it.

5.2.6.2 Cropland protection plan

Obligation to compensate

Since the introduction of the federal cropland protection plan in the 1990s, the cantons have been obligated to preserve a certain quota of their most valuable agricultural soil.

In the canton of Vaud, the entire intermediary zone was part of the cropland protection plan. As mentioned in section 5.2.2.1, former building zones were zoned into intermediary zones in order to implement the federal urgent decree of 1972. If the canton had defined only the agricultural zone as part of the cropland protection plan, they would not have been able to reach the quota imposed by the Confederation. In order to maintain the quota, any development of intermediary zone required compensation, that is to say the definition of new surfaces as part of the cropland protection plan. Otherwise, the proof that a new development meets an important cantonal objective that could not have been appropriately reached without using cropland has to be made by communal (or cantonal) authorities. In such a case, the canton subtracts cropland reserves from its reserve quota⁸⁸.

A posteriori compensation

The urbanisation projects of the two LIS *Derrière-le-château* and *Nonceret* took place on cropland, and therefore required compensation. In the case of the LIS *Derrière-le-château*, the commune justified their compensation measures, stating that during the zoning plan revision of 2001, several areas zoned as intermediary had been zoned as agricultural. Thus, the loss of agricultural land used by the LIS *Derrière-le-château* had already been compensated for during the revision of building regulations. This delayed compensation was accepted by the canton.

LIS *Nonceret* suspend by federal moratorium

Due to the 2014 federal moratorium prohibiting any extension of the building zone, the delayed compensation cannot be applied to the LIS *Nonceret* for now⁸⁹. Until the cantonal structure plan is approved by the Confederation, zoning operation must be compensated by an equivalent building zone converted to agricultural zone. The

⁸⁷Art. 52, SR-VD 913.11.

⁸⁸See also art. 30 of the *Spatial planning ordinance of the 28 June 2000*, SR 700.1.

⁸⁹U. Zuppinger and R. Courdesse, *op. cit.*

federal spatial planning office's logic is that oversized building zones from peripheral communes without transport connections would have to be transferred to more central locations prior to any new development. For growing communes like Cheseaux, this can represent an incentive to cooperate with rural communes struggling to reduce their building zones.

5.2.6.3 Master plans

According to Lausanne's agglomeration master plan (Canton de Vaud and ALM, 2012b, 93), Cheseaux and Romanel, (two communes close and well connected to the city centre), are part of a strategic sector intended for urbanisation. In Cheseaux, this future urbanisation is meant to take place in the west and east areas of the village, for continuity with existing construction (Agglomération Lausanne-Morges, 2008, 71). The intercommunal master plan for the northern part of the agglomeration (*schéma directeur du Nord lausannois – SDNL*) sets urbanisation limits in the west along the tunnel of the bypass road (SDNL, 2007, 117), on the new agricultural zone set by the LIS *Derrière-le-château*.

Cheseaux as strategic sector

In terms of population density, the agglomeration's 2008 master plan sets the objective of 200 jobs and inhabitants per hectare within strategic sites, primarily along Cheseaux's train line (Agglomération Lausanne-Morges, 2008, 71). The intercommunal master plan SDNL has planned, on average densities of 165 inhabitants and jobs per hectare (SDNL, 2007, 85). The revised agglomeration's master plan expects the development of several parts of Cheseaux by 2020 with an average density of 160 inhabitants and jobs per hectare (Canton de Vaud and ALM, 2012a, 87)⁹⁰. In order to ensure the realisation of such densities, the cantonal authority examines all zoning plans for compliance with the benchmarks in the agglomeration's master plans (SDT, 2012). Unlike any other zoning plan defining such densities, these master plans set criteria despite never having been adopted by a legislative body.

Minimal density requirements

5.2.6.4 Financial incentives

One central aspect that contributes to the ability of the LIS to redistribute value are the financial incentives provided by the instrument's use: the granting of additional rights aids the LIS implementation of land use planning policy goals. The value creation process can be divided into five steps, (the first two being in reality one single procedure):

How land becomes valuable

1. the first step consists in, if necessary, the reduction of (potentially) constructible surface through the local development plan part of the LIS process;
2. next, the experts commission suggests an allocation of new development rights or higher plot ratios on the (reduced) surface of the perimeter to be developed. A sufficient amount of added economic value must be created to make the operation profitable for all landowners;
3. the new rights are granted to the new plots: the local development plan enters into force and the new property structure is entered into the land registry;
4. these new rights allow the landowners to collectively (via the LIS), or individually mortgage their land to cover future land service costs;
5. once the land is serviced, landowners can either sell their plot to, or contract a developer.

Figure 5.4 shows that the economic value created by the LIS can be significant, in relative (difference between initial and final land value), and in absolute terms (net gains). The difference between the initial and final land values principally depends on:

The value multiplying coefficient

- the type of zone that pre-exists within the perimeter;
- the quantitative amount (surface) of new building zone;

⁹⁰These areas are to be developed through the local development plans of *la Rochette*, *Est-Cheseaux*, *Nonceret-la Croix*, *route d'Yverdon* and *Grand-pré Lacuessière*.

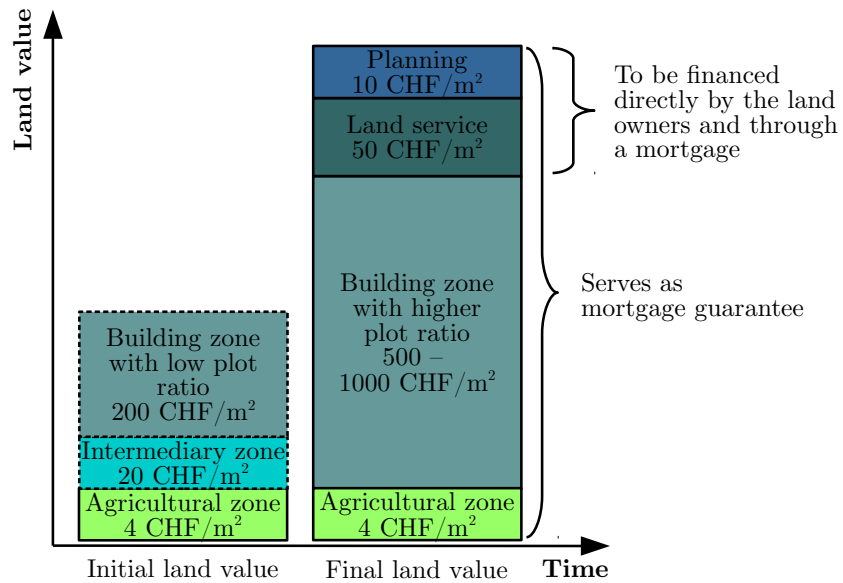


Figure 5.4: Land value change in a land improvement syndicate over time. Source: SDT (2005).

- the plot ratio of the (old and) new building zone.

The difference between initial and final land values are referred to as the *value multiplying coefficient*, *i.e.* a ratio that quantifies the value change and allows each landowner to calculate the proportionate share of added value due to them. Table 5.5 in section 5.2.8 presents this ratio more in detail.

Initial costs to be carried directly by the owners

The financial aspects of the LIS provide incentives for the landowners to fulfill the instrument’s goals, but they also constitute a hurdle : the financial investment required from the landowners (many having inherited the land), constitutes a barrier that, in practice, reduces the number of actors involved. The LIS needs to cover running and planning costs, which means that prior to the entry into force of a new property structure and zoning plan, the actors will have already made financial contributions. Combined with the subsequent land service costs, these elements constitute a financial hurdle that landowners need to overcome. The initial costs must be paid directly by the landowners, whereas once the property transfer and zoning changes have occurred, they have the option to use a mortgage to pay for the land service, planning and (a portion of) development costs.

How value crowds owners out

As a consequence, some landowners, rather than participating in the full LIS process, prefer to sell or exchange their land prior to the syndicate’s creation. In this case of early sale, the price is at an intermediate level, between the initial and final value (estimated value at the end of the process). As figure 5.3 shows, between 1993 and 2001, the number of owners has been significantly reduced. Section 5.2.7.1 provides a more detailed explanation of these changes.

The legal characteristics of the LIS instrument permits the creation of a closed group of equally-treated, development-friendly landowners benefiting from facilitated decisional rules and minimised legal constraints which allow them to achieve their land use planning policy goals. As I have shown, the added value created through the attribution of new rights provides a strong incentive to cooperate. The next section presents how the land readjustment and zoning operations work in practice, and the value distribution arrangements made by involved actors in the case of the LIS *Derrière-le-château*.

5.2.7 Local regulatory arrangement

5.2.7.1 Active communal land use policy

Looking into the involved actors' strategies, I examine how the commune, who did not own any land within the LIS perimeter (see figure 5.3), managed to acquire 17,353m² of land on the most central plots. As presented by the interviewees⁹¹, communal motives for this precise land acquisition were clear: the construction of a new primary school. The old building required an extensive renovation, and had become too small for the expected needs. After looking for the various potential locations⁹² and discussing possible options with the contracted planner⁹³, the commune decided to establish the new primary school close to the old school and to reuse the old school for the communal administration. Further, the optimal location of the entire area, located in the heart of Cheseaux, just behind the castle and only 200 metres from the train station, lent itself well to wider development.

The best location

The projected surface of development and the fragmented property structure would not have allowed each small owner one individual plot in the final property state. They would have been obliged to become co-owners. Further, (Commune of Cheseaux, 2001), several owners did not intend to develop, nor take part in the LIS which involved costs prior to any monetary gain. These costs led to a "crowding out" of the owners not willing to pay for them, either because they did not intend to develop their future property, or because they simply did not want to engage in a complex, cooperative financial operation whose benefits are collected later on. The fact that most of these persons inherited the land they own makes many of them unaware of the price of land and hampers their will to pay for something they have always owned⁹⁴. This financial hurdle not only led to a reduction of participants and simplified future negotiations, as the remaining owners were willing to invest in and proceed with the LIS. It also strengthened the power of the remaining, more entrepreneurial landowners within the LIS. This "crowding out" effect presented an opportunity for the commune. The land from these small owners was sold to the commune at the attractive price of 35CHF/m². In addition to these acquisitions, the commune also exchanged plots with owners unwilling to sell, for larger agricultural plots (these plots, though within communal property, were outside of the perimeter)⁹⁵. These exchanges preceded the zoning and property changes made by the LIS *Derrière-le-château*. They took place when both the agricultural land readjustment and building regulations revision were still in progress. These simultaneous revision processes allowed the commune and the landowners in the intermediate zone to anticipate future changes and elaborate a strategy based on their interests:

Crowding out of landowners

- the landowners had the possibility to remain in the intermediate zone, increase their agricultural land property by exchanging their ideally located plots with the commune for larger ones further away from the settlement, or sell their plot in the intermediary zone⁹⁶;
- the commune could, at the same time, acquire land property in the intermediary zone, reduce the fragmentation of the existing property structure and, through the LIS, redesign the property shape and use.

5.2.7.2 Communal development under stress

As argued by the member of the communal executive body⁹⁷, Cheseaux was under pressure to build its new school, and was thus interested in the quick realisation of the LIS. The communal executive body pre-financed the feasibility study, fostering

Feasibility study as a lift for change

⁹¹F. Blanc, *op. cit.* R. Courdesse and U. Zuppinger, *op. cit.*; G. Conus and D. Villiger, urban technician and urban planner of the commune of Cheseaux, interviewed in Cheseaux 12 January 2016.

⁹²Free available plots next to the secondary school as well as other communal plots close to a major road were also considered, but in the end the former was kept for a potential extension of the secondary school and the latter were considered too dangerous.

⁹³Until 2005, the commune did not have any internal planning staff, but worked for several decades with the same planner.

⁹⁴R. Courdesse and U. Zuppinger, *op. cit.*.

⁹⁵F. Blanc, *op. cit.*

⁹⁶R. Courdesse and U. Zuppinger, *op. cit.*

⁹⁷F. Blanc, *op. cit.*

discussions among landowners regarding upcoming decisions. After the feasibility study confirmed the probable success of the operation, the communal executive body requested a credit to its legislative body (Commune of Cheseaux, 2002). According to the interviewees⁹⁸, this commitment lent momentum to the LIS process.

**Time as main constraint
for the commune**

The commune could not afford to wait too long to find a compromise with the other landowners on elements such as the location of the owners' future property, the plot ratio and the constraints of the local development plan (location and type of roads, division of land service costs, creation of a green corridor, subterranean car parks, playgrounds). The location of the commune's future plots was an (almost) non-negotiable element: the commune wanted to build the school in the most central location, adjacent to the existing institutional zone where the old school was located. As a consequence, in order to keep on schedule, but also to minimise implementation gaps that it potentially faced when negotiating with the other landowners, it agreed to the following elements:

- the plot ratios had to be set at a level providing a sufficient financial levy for the involved parties. The maximum plot ratio ever applied on communal territory⁹⁹, 0.6, was used for a third of the construction in the LIS perimeter;
- the creation of an east-west green corridor crossing the northern part of the perimeter was heavily contested by the concerned landowner, because it obligated him to bury the car parks and invest additional funds in the corridor's realisation. Therefore, the commune agreed not only to carry the associated production and maintenance costs, but also extract from the LIS' redistributive process a thin (non-valuable) strip of land along the road in the west, and to pay for the trees (and their maintenance). Additionally, the former communal representative pointed out the absence of a playground in the green corridor, despite this being an obligation for the landowner (according to the local development plan).
- the commune also agreed to designate their land reserves as building land (190CHF/m²) and not as public land (95CHF/m²) like the school ground, although its intentions for it are not settled for now. In case of development, these land reserves would require additional service costs (such as a road) beyond what the costs that have been covered by the LIS.
- another concession linked to the previous ones is the small plot of land in the center east (see the 2003 map on figure 5.3). The commune had to buy this plot from one of the owners after the LIS procedure had ended in order to possess a plot shape fit for development. Because the commune had already covered its value claims in the LIS, it had to acquire the plot separately.

The commune had to make concessions in regard to the valuation of its land, to cover the costs of the development obligations set by the local development plan, and the uncovered land service costs of its undeveloped land reserve.

5.2.7.3 Car parks

In regard to the car parks, several different positions have been advocated by the urban planner, the communal executive body, the communal technical services and the landowners. The urban planner argued that since the future construction would be within walking distance of the train station, the number of parks could be reduced below the official norms foreseen by the VSS. For this reduced number of parks, the excavation of soil and the parks' burial was not needed, and would unnecessarily degrade the soil. The communal executive body was convinced by the necessity to bury the parks, but unsure about their quantity. The communal administration insisted on the fulfilment of the official norms, regardless of the proximity of the train station. The landowners were divided on the question of the car park burial. This mixture of opinions left the matter unsolved in the local development plan, which in turn led to the construction of numerous car parks, mostly above ground.

⁹⁸R. Courdesse and U. Zuppinger, F. Blanc, *op. cit.*

⁹⁹F. Blanc, *op. cit.*

5.2.7.4 The role of the experts commission

The experts' commission is hired by the landowners. They have the urban, legal and economic expertise needed to meet the landowners' objectives. Their position between the syndicate and the commune, as well as their professional knowledge grants them the capacity to anticipate future constraints (e.g. during the site's development or effective use), moderate (if necessary) the owners' wishes, balance the commune's and the owners interests, ensure their equal treatment, etc. But at the same time they fulfill two purposes that can be contradictory: any additional obligation of constraint defined in the zoning plan lowers the profit margin of the landowner and is subject to contention, because the experts commission is hired and paid by the landowners. At the time of the LIS *Derrière-le-château*, the commune did not have internal planning expertise and therefore relied solely on the LIS' experts who, as it was shown for the car parks, were in conflict against both the landowners and the communal administration. Thus, in the present case, the experts commission defended both the public administrative authorities and the public policy's target group, (this includes the commune).

Chief negotiators

These arrangements show that the lack of internal expertise, time, and property on site led the commune to grant an extended share of the economic value created through the LIS to the landowners. This term, "extended share," indicates how the "equal treatment" constraint was applied in a way that favoured the landowners.

5.2.8 Impact on value creation and redistribution

Table 5.5 shows the different surfaces and values before and after the implementation of the LIS, as well as the land value in 2016. It also shows the value multiplying coefficient of the LIS *Derrière-le-château*: 2.84. It is the ratio between the final land value (without land service costs) and the initial land value. This almost threefold increase in value was a strong argument for landowners with financial interests to participate in the LIS.

Threefold value increase

Considering land prices in 2016¹⁰⁰, I can see that the land value has almost tripled again. However, the actors could have only marginally anticipated such a price increase. This value change is attributed to regional market conditions during that specific period, as the LIS does not regulate value in time, but only redistributes its amount and location at one precise moment.

Time factor central to the control of land value

The initial price of the intermediary zone (20CHF/m²) is set tacitly by the experts commission of the LIS¹⁰¹. It can be considered artificial for two reasons:

Actual land value even higher

1. the zone is defined by law as unbuildable, and therefore not worth more than regular agricultural zone. As the revision of Cheseaux's zoning plan in 2001 showed, the risk that authorities will have to compensate the "value loss" in case of zone change from intermediary to agricultural zone is almost non-existent because agricultural land is not serviced, and under the purview of the cropland protection plan (see section 5.2.6.2);
2. the perimeter initially considered includes the entire perimeter of the LIS. But if the intermediary zone is valued the same as agricultural zone, then one should only include the surface effectively dedicated to development in the calculation.

Therefore, I propose an alternative way of calculating the land's actual economic value based on agricultural land prices and the perimeter that has effectively been zoned. In comparison to the first (official) method that shows a value increase of 6.1 million francs, the second method shows an added value of 8.7 million francs (see table 5.6). This second calculation method can be criticised, because it assimilates the intermediary zone to a regular agricultural zone (it is in fact part of the cropland

An added economic value of 8.7 millions francs

¹⁰⁰800CHF/m² according to M. Blanc, *op. cit.*

¹⁰¹R. Courdesse, geometer and U. Zuppinger, urban planner, interviewed in Echallens 14 January 2016.

protection plan). Further, it neglects the equal treatment constraint that is a necessary condition of the LIS use, because it excludes from the part of the plots in the intermediary zone from syndicate's perimeter (see section 5.2.6.1). However, the non considered agricultural land remains in the hands of the landowners and therefore imparts (future) added value. It is reasonable to believe that, in the medium term, some portion of these surfaces will be developed (SDNL, 2015).

Learning effect

An important element is the learning effect on the involved actors after having experienced a land readjustment and two land improvement syndicates. The second land improvement syndicate *Nonceret* is still active, but the involved landowners, some of whom were present in the first LIS *Derrière-le-château*, pushed for the realisation of the second. The commune wanted to stagger both LIS in time, because they did not have the organisational means, nor, possibly, the political support, to initiate two development projects at the same time. But once the LIS *Derrière-le-château* was finished, the commune hired a professional planner and they launched into agreement with the concerned landowners, the LIS *Nonceret*. A safe assumption is that all parties had learned the benefits they could gain from the first LIS.

Small growth machine

The actors' interests in using the LIS instrument can be linked to the coalition of actors created by the LIS' coordination mechanism between the landowners' assembly and the local development plan: factors such common objectives between the commune and (at least part of) the landowners to develop the land, the definition of an impermeable perimeter where all actors share proportionately the gains they create, the resources that actors share (infrastructure, money, information), and the wide margin of manoeuvrability they are granted in the definition of plot ratios, land service and type of construction, creates a community of interests whose production results in a huge amount of added value, (see table 5.5) primarily to the benefit of the landowners.

State	Surface	CHF/m ²	Absolute value	Zone
2001	158,031m ²	20CHF/m ²	3,160,620CHF	Intermediary
2003	43,092m ²	189CHF/m ²	8,164,000CHF	Building zone
	105,565m ²	3.83CHF/m ²	404,300CHF	Agricultural zone
	8,136m ²	95CHF/m ²	772,900CHF	Institutional zone
	1,238m ²	7CHF/m ²	8,700CHF	Green zone
			9,349,700CHF	Total

Table 5.5: Land values in the LIS *Derrière-le-château* in 2001 and 2003s. Data: Marti and Courdesse (2003, 2012). The surfaces considered do not include public domain nor the "neutralised" plots.

Absolute value	Description
9,349,700CHF	Final land value
-3,160,600CHF	Initial land value
6,189,300CHF	Added value
8,945,400CHF	Final land value without agricultural zone
-200,900CHF ^a	Theoretical initial land value
8,744,500CHF	Theoretical added value

Table 5.6: Added land value in the LIS *Derrière-le-château*. Data: Marti and Courdesse (2003, 2012). The surfaces considered do not include public domain nor the "neutralised" plots.

^a(Surface of perimeter - agricultural zone)*agricultural land price: (158,031m²-105,565m²)*3.83CHF/m²=200,900CHF

Estimated surfaces and values

Gross floor area ^a :	24,600m ²
Construction volume ^b	98,400m ³
Construction costs ^c :	68.5M
Land service costs:	2.6M

Table 5.7: Estimated surfaces and values of the land dedicated to development in the area *Derrière-le-château*.

^aThe estimated gross floor area has been calculated based on a plot ratio of 0.35 for 5,000m² of building zone and 0.6 for 38,100m² building zone (Marti and Courdesse, 2003).

^b24,600m²/3 = 8,200m² of used ground surface. For three floor dwellings with 4 meters height per floor: 12*8,200m² = 98,400m³.

^cBased on a price of 580CHF/m³ + 20% for additional costs and landscape modelling (Unknown, nd): 696CHF/m³*98,400m³=68.5M

Estimated benefits and costs

Gross rental income per year ^a :	+4.7M
Operational expenses ^b :	-0.95M
Gross annual financial return on total investments ^c :	5.9%
Mortgage interests ^d :	-3.2M
Net annual financial return on capital ^e :	6.8%
Net yield per year:	0.48M

Table 5.8: Estimated benefits and costs of the development of the perimeter *Derrière-le-château*.

^aBased on an occupancy rate of 0.85 and a rental value of 19CHF/m²/month. The price hypothesis is one of the values used for the real estate calculation including car parks made for the LIS' assembly (Unknown, nd).

^bThis sum corresponds to 20 % of the gross rental income. Based on <https://d-1.ch/fr/articles/les-rendements-brut-et-net>.

^c4.7M (gross income) / (70.1M (value of construction and land service) + 8.1M (value of land)) = 5.9%

^d4.5% is the rate of reference for the canton of Geneva in 2001. See <http://www.asloca.ch/evolution-des-taux-hypothécaires-de-référence-canton-de-genève>. I assume that the entirety of construction and land service costs are financed via mortgage. Therefore: 70.1M*4.5%=3.2M

^e(4.7M (gross rental income) - 0.95M (operation expenses) - 3.2M (mortgage interests) / 8.1M (invested land value)) = 6.7%

5.2.8.1 Limits of the LIS to a more extensive redistribution

The capacity of one tenacious landowner to substantially lengthen the process shows one of the weaknesses of the instrument: despite the removal of the double majority rule¹⁰² in 1997, the inclusion of landowners who systematically opposed the LIS process, such as in the case of the LIS of Bussigny or Le Mont, can noticeably slow down the instrument's implementation¹⁰³. Experts recommend not to exceed 10 to 15 different owners within one LIS¹⁰⁴.

An additional element that the LIS does not anticipate is the common development of land. The LIS process stops once the land is serviced. The various interests of landowners and their respective financial capacities, leads to separate development processes. Common aesthetic criteria depend solely upon communal or local building regulations. In the case of Cheseaux, the owners preferred to fully control the development of their own land, according to their own financial capacities and the planned type of occupation (rental, freehold).

With the revision of the federal spatial planning act in 2014 and the re-introduction of the tax on added land value created through zoning, the mandatory tax of 20% of the added value will impact the value multiplying coefficient (the gains) for landowners. Reading from table 5.5, the sole gain created through zoning is the difference between the value of the building zone¹⁰⁵ and the value of the intermediary zone:

Limit of the number of landowners

No common real estate development

1 million francs potential revenues from the tax on the added land value

¹⁰²Majority of the landowners and of the landowners that represent the majority in terms of surface

¹⁰³D. Leroy, Land readjustment engineer, cantonal spatial planning office, interviewed in Lausanne 25 September 2015.

¹⁰⁴U. Zuppinger and R. Courdesse, *op. cit.*

¹⁰⁵The tax does not apply to land dedicated to public infrastructure.

amounting to 4.87 million francs. A 20% tax could have captured roughly one million francs and lowered the value multiplying coefficient from 2.87 to 2.54. Based on these estimations, the introduction of the new tax will, in my opinion, not impact the functioning of the instrument in future implementation processes that have a similar value multiplying coefficient.

Potential 2.58 million francs of extended land service tax

However, since 2013, the communes in Vaud have also had the possibility to apply the extended land service tax, which Cheseaux did in 2013 (Commune of Cheseaux, 2013). The tax amounts approximately to 82CHF/m² for housing surfaces. In the case of the LIS *Derrière-le-château*, the tax could have amounted to 1.51M francs¹⁰⁶. If both taxes had been combined, a net gain of approximately 2.39 million would have remained for the landowners, which corresponds to a taxation of 72% of the added land value created through zoning. According to the Federal Tribunal¹⁰⁷ and to a report of a commission from the cantonal parliament (Canton of Vaud, 2014), such a taxation would not be considered confiscatory.

Annual revenue of 480,000 francs

Referring to the land value estimation calculation elaborated by mandate of the landowners' assembly (Unknown, nd), the yearly gross rental income of the building zone in the perimeter of the LIS *Derrière-le-château* can be estimated at around 3.6M francs. If I estimate operation expenses of 720,000CHF (see table 5.8), and a mortgage interest rate of 4.5%, the annual gain can be estimated at around 480,000CHF for the entire building zone of the LIS, which corresponds to a net financial return on capital (land value) of 6.8%.

Taxed added economic value recovered within seven years

The comparison between the financial gain generated by the properties to the sum of the taxes, (on added land value and of the extended service tax), shows the importance of time as a factor when dealing with land value and its redistribution. Taking into consideration what landowners invested, they should recover the taxed added economic value within seven years. I deduce that these two value capture instruments are only able to grasp a limited amount of the economic value when a zone change occurs, a very specific and unique moment in time. The effectively created economic value, (the rent), is paid every month and year. The two taxes are only marginally able to seize the value added over time. In fact, the land price referenced for the calculation of the tax on added land value created through zoning, reflects the land rent over time, but only up to a certain point (application of lowered market prices) and not as a perpetual factor, as opposed to the financial return from landownership.

5.2.8.2 LIS on multiple sites?

One of the main problems that land use policy currently faces is the relocation of oversized and undeveloped building zones from small peri-urban communes where no development takes place and where access by public transport is inadequate to more central urban communes that drive development. Until now, most LIS have been used on limited portions of the territory (with exception of the LIS *Le Mont*), within one commune or across two communes. In order to address the problem of the location of undeveloped building zones, it would be necessary to broaden the scale of implementation of the instrument and stretch the instrument's perimeter across two or more geographically distinct locations. Based on the findings from this case study, and the advice of the experts interviewed¹⁰⁸, one should pay attention to the following elements:

- the number of landowners involved has to remain small, otherwise the chances of finding a suitable compromise is diminished. More specifically, the values attributed to the different plots becomes an issue for the owners: they contest the equal/unequal valuation of their land, (the principle of equal treatment is a central constraint that has to be fulfilled for the implementation of the LIS). Optimally, the perimeter of a multi-site LIS should consider only parts of communal territories that belong to a restricted number of owners;
- the definition of a "sending area" in one commune and of a "receiving area" in another commune requires both communes to cooperate, for example by

¹⁰⁶18,450m²*82CHF/m².

¹⁰⁷ATF 105 Ia 134.

¹⁰⁸R. Courdesse and U. Zuppinger, *op. cit.*

"synchronising" the transfer: both zoning plan revisions would have to take place (be approved by the canton) at the same time in order to be recognised as an effective transfer. But more importantly, the communes should both be interested in doing the deal. In 2015, various communes with undeveloped oversized building zones appeared reluctant to transfer these rights (24 heures, 2015a,b). Further, in the rights transfer process, the desired profits of the sending owners might not align with expectations of profit for those receiving. On the side of the "receiving area", the commune that augments its building zone or plot ratio (in case of densification) needs to show an interest in development, which depends, for now, upon the communal legislative body's opinion on the matter¹⁰⁹;

- The heterogeneity of the landowners' interests facilitates the realisation of a LIS: if all landowners want agricultural land or all want building zone, then the landowners' wishes cannot be satisfied, either because there is not enough (agricultural) land surface available, or because the property structure would become too fragmented to be developed. The same thought would apply to a multi-site syndicate: exchange of development rights is only possible between communes with different demographic and economic dynamics and between landowners with different interests (agriculture v. development).

¹⁰⁹However, those communes part of Lausanne's agglomeration master plan have minimal density criteria that they need to fulfil. See also section 5.2.6.3.

Chapter 6

Test of hypotheses and comparison

Now that I have presented the results from the case studies' analyses (chapters 4 and 5), the next step is to provide short syntheses of the empirical findings in light of the fifteen redistributive processes identified in the case studies (section 6.1). The description of these redistributive processes in a subsequent step (section 6.2) allows for cross-case testing of the research hypotheses.

As mentioned in the methodological section 3.3, I define redistributive processes as land use policy processes where authorities tackle a specific problem, intervene against the target group through one main, and several secondary policy instruments, in order to achieve a specific goal. The instruments and problems in the centre of each redistributive process are the following:

1. building zone transfer (Wiedlisbach): use of zoning in order to operate a spatial relocation of development rights from the centre of the commune to agricultural land outside of the village;
2. building obligation (Wiedlisbach): use of zoning, contracts and mortgages in order to fight land hoarding in three different land use policy and property rights scenarios;
5. building zone reduction (Huttwil): use of zoning and plot ratio for reducing the available building zone reserve;
6. building right (Huttwil): use of zoning and building rights in order to supply cheap land for development;
7. polluted soil (Niederbipp): use of zoning, building permit specifications (implementation of the contaminated sites ordinance) and a financial guarantee in order to develop a former landfill without contaminating underground waters;
8. tax on added land value (Niederbipp): first implementation of the tax on added land value created through zoning (TALV) a new industrial zone;
9. land exchange (Malley): exchange of plots between the target groups involved in the urban reconversion in Malley;
10. MAO restrictions (Malley): implementation of use restrictions imposed by the major accidents ordinance and use of zoning in the urban reconversion of Malley;
11. polluted soil (Malley): implementation of the contaminated sites ordinance, use of zoning and reshape of plots in order to transfer development rights;
12. extended land service tax (Malley): implementation of the extended land service tax (ELST) in order to finance communal infrastructure;
13. energy planning (Malley): implementation of energy planning in order to determine future energy supply;

14. land exchange (Cheseaux): acquisition and exchange of plots in order to become member of the future land improvement syndicate;
15. land improvement syndicate (Cheseaux): use of the land improvement syndicate (LIS) in order to define new building zone, remove intermediary zone, reshape plots and redefine their owners;

Once the redistributive processes have been presented, I provide, in section 6.1.6 two tables (tables 6.16 and 6.18) which sum up the different variables relating to the redistributive processes, and assess the redistributive effects of these processes. These two tables constitute the main research results of the thesis.

In a subsequent step, I test the hypotheses on the research results (section 6.2), which then allows for the identification of a set of factors determining land use policy outputs and value redistribution (section 6.4).

In the last section (6.5) of the chapter, I confront the theoretical material mobilised for the thesis, and the results obtained from the research.

6.1 Cases' synthesis

The aim of the syntheses of the cases is to reread the fifteen redistributive processes identified in the empirical work through the lens of the variables selected in the conceptual framework. Each synthesis presents the following elements (each examined in a specific section):

1. the local public problem, sets the local context, exposes the location-dependent (contextual) factors in which the redistributive process occurs, and summarises the problems faced by authorities;
2. the configuration of actors, which is the first intermediary variable defined in the conceptual framework in chapter 3;
3. the strategies chosen by actors (second intermediary variable);
4. the instrument types and the policy resources mobilised by the actors, (the third and fourth intermediary variables, respectively). These are classified according to the typology presented in table 2.14 in chapter 2;
5. the local regulatory arrangement, the first dependent variable; it compares the output of the process with the institutional regime and land use policy objectives;
6. the redistributive effects produced by the arrangements as the second dependent variable.

At the end of the section, tables 6.16 and 6.18 provide a synthesis of the redistributive processes. They gather the main results of the empirical research, and constitute the basis for the test of the hypotheses.

6.1.1 Wiedlisbach

6.1.1.1 Local public problem

Since the adoption of their first zoning plan in 1978, Wiedlisbach has had wide, undeveloped building zones. With the entry into force of the federal land use planning act in 1980, the building zones intended for development were obligated to align with the commune's development needs over the subsequent fifteen years. Local efforts to reduce building zones were countered with threats of compensation claims by concerned landowners. Further, scattered construction blurred the boundaries of urbanisation, and undermined the consistent reduction of building zones. Over time, the situation became problematic due to the underused infrastructure financed by authorities, and due to increased fiscal competition with neighbour communes. The situation was such that the commune was unable to gain sufficient revenues. In order to overcome this, local authorities sought to attract new inhabitants, and thus augment their fiscal revenues. However, the existing undeveloped building zone was

not available for development, because numerous landowners hoarded the land and refused to develop it. Further, the commune could not open new land for urbanisation, because their zoning plan did not meet the federal requirements in terms of the size of the undeveloped building zone, and because any building zone extension was blocked by the canton.

Further, numerous landowners in the building zone hoarded their property: they did not develop it, did not sell it, or they asked for a price that no buyer was willing to take. In recent years, hoarding behaviours became more problematic, because the commune had exhausted its quota of building zone reserves and its development was blocked. In addition to the scattered undeveloped plots, the commune zoned 2 hectares of industrial land in 1989. This land was intended to attract companies and jobs on communal territory. As of 2013, the landowner did not launch the planning and land service procedures, and the plots remained undeveloped.

6.1.1.2 Configuration of actors

The actors intervening in the building zone transfer are: the communal executive body (which wants to increase communal revenues), landowners in the building zone (willing to build, not willing to build and resisting, willing to be put in the green zone), who are the target of the green zone, landowners outside of the building zone (willing to build) who are the target of the building zone extension, neighbours and inhabitants who want to keep their view and limit the additional traffic that a building zone extension would create. In addition, the communal planner advises the communal executive body on the proceedings and supports the local authorities in the negotiations with landowners.

The actors involved in the building obligation processes are:

- The communal executive body wants to make building land for housing and industry available;
- Landowners who are inactive, or hoard their land;
- Communal planner advising the communal executive body.

6.1.1.3 Actors' strategies

In order to overcome this blocked situation, the first strategy pursued by the communal executive body from Wiedlisbach was to transfer existing undeveloped building zone (unused development rights) to a new perimeter to be zoned outside of the village. This required a zone change for the undeveloped plots in the centre of the village. This process induced a reduction of the undeveloped building zone, and a relocation of these rights on agricultural land to be zoned as building zone.

On the landowners' side, the group targeted by the green zone tried to either maintain the status quo (no zone change), or to obtain compensation (through additional development rights).

On the inhabitants' side, a coalition against development emerged that contested the first zoning plan proposed by the communal executive body by opposing the revision, voting against it, and mobilising the press.

In regard to the building obligations, three distinct situations were found:

1. the situation of serviced land in the building zone hoarded by landowners;
2. the one where industrial land is already zoned but not yet serviced;
3. and the situation where land is not yet serviced or zoned.

In the case of already zoned and serviced land, the green zone was used as a means of pressure to gain the landowners' consent to develop. These landowners reacted in different manners:

- some refused to sign the building obligation and be put in the green zone, and asked the commune to deliver a building permit, thus hindering the zone change on their plot;
- others agreed to a zone change and negotiated additional development rights when they are rezoned as building zone (a process described previously in the building zone transfer);
- some unsuccessfully opposed the communal decision and voted against the building regulations revision;
- others signed a "voluntary building obligation" on their plot as response to the communal threat of green zone.

In the case of zoned but non-serviced land (industrial land), the commune decided to pay for all planning and land service costs, and created a mortgage in favour of the commune on the plots concerned. This provided local authorities the financial levy to pay for the planning and land service works. Additionally, a repayment obligation with a ten year delay was signed with the landowner, ensuring the plots' availability on the market and the recovery of the investments made.

In the case of the building zone extension, the commune used the added economic value created through zoning as a levy, in order to negotiate an emption right with the landowners. The emption right granted authorities a right to buy the land at a pre-determined price for 10 years if the landowners did not develop it.

6.1.1.4 Instruments and policy resources mobilised

During the first time span, local authorities used zoning, rezoning priority (time), plots ratio and exemption from tax on added land value created through zoning in order to obtain the landowners' consensus on a temporary removal of their development rights. Landowners who opposed communal intervention used legal means to contest the decision. Other landowners agreed on a "voluntary building obligation" to avoid their plots zoned into the green zone. Neighbours and inhabitants utilised the law (opposition to zoning plan) in order to oppose the building zone extension.

During the second time span, after the failure of the first vote on the communal zoning plan, the commune reduced the surface of a new building zone that was to be created. Inhabitants and neighbours agreed to the changes, and adopted the communal zoning plan (political support). Prior to the extension of the building zone, the commune was promised by the concerned landowners that they will develop the zoned perimeter within a specific time horizon (emption right), bear all land service costs (land service tax), and pay the tax on added land value created through zoning.

In regard to the building obligations, the three processes involved the following instruments and resources: in the case of the existing serviced building zone, local authorities used the green zone as a threat in order to force landowners to develop their land. Certain landowners agreed to sign a "voluntary building obligation"; others fought against it and asked the commune to deliver a building permit they did not intend to use; others agreed to the green zone, some of them negotiated additional development rights or derogations to building regulations. Those who signed the voluntary obligation and those who agreed to the green zone provided consensus to one of the commune's strategies, whereas the others mobilised the law to fight off implementation.

In the case of the industrial land, landowners' consensus was also mobilised and traded against a legal mortgage associated with a delay of payment, resulting in a facilitated planning and land service procedure, as well as a quick realisation of gains for the landowners.

In the case of the building zone extension, the levy created through zoning, and the local authorities' will to push development forward was traded against an emption

right at a pre-determined price on the land and the payment of the tax on added land value created through zoning;

In all cases, but particularly in the case of the building zone extension, political support was mobilised for the votes on the revised building regulations. The communal executive body relied on personnel and information provided by the hired planner for assistance in the negotiations with landowners and the definition of the instruments to be used (as well as of their modalities).

6.1.1.5 Local regulatory arrangement

Initially, the commune exceeded its quota of undeveloped building zones. Local authorities gained a margin of manoeuvrability in the cantonal building zone calculation scheme through a diversion of zoning: the commune created a new non-constructible zone (the green zone) that removed unused development rights, which allowed a reduction in the amount of undeveloped development rights considered in the cantonal calculation scheme. The commune negotiated individual compensations (zoning priority, additional development rights (plot ratio) with the concerned landowners, exemption from the tax on added land value created through zoning), and transferred the "gained" development rights outside of the village into a new building zone.

The arrangement represents a diversion of land use policy objectives, because it uses the zoning instrument, conceived as a means of separating constructible from non-constructible areas, in order to blur the separation between zones. The use of zoning (green zone and building zone extension) created a scattered urbanisation pattern and expands the limits of urbanisation beyond those previously considered as already exceeding communal needs.

The processes involving the building obligations produced the following arrangements.: for the serviced building zone, the commune innovated by elaborating and implementing "voluntary building obligations" for the landowners that did not want to have their plot in the green zone. However, the effects of these voluntary obligations remain unproven. Local authorities tried to overcome a lack of coherence in the soil's institutional regime by developing a new rule to overcome the land hoarding problem .

For the industrial land, the communal executive body innovated by signing an agreement with the landowners transferring the planning and land service activities to the commune, and writing a mortgage on the landowner's plot to ensure the payment of the land service. They set a repayment obligation of 10 years to expediate land development, once serviced.

For the building zone extension, the commune implemented land use policy objectives by mobilising all legal measures available to capture some of the added land value they had created through zoning, and to ensure the land's development.

6.1.1.6 Redistributive effects

Features	Explanation
Across actors:	Transfer of development rights from a group of landowners to another group of landowners (target group 1 to target group 2)
Across policies:	Added value created by land use policy is transferred to the landowners' property rights (both in case of green zoning (additional development rights) and building zone extension), and part of it is captured for land use policy (tax on added land value created through zoning)
Across space:	Value/rights transfer operates within one commune from scattered plots in the commune's centre to contiguous plots at the urbanisation limits
Across scales:	Commune withdraws development rights, which allows them to reduce their oversized building zone (under supervision of the canton), and redistribute these rights to other plots
Across time:	Green zone linked with rezoning priority when building regulations are revised (at least 10 years); emption right on newly zoned plots limited to 10 years. Beyond these dates, no redistribution of value
Across value dimensions:	Once the newly zoned plots are developed, the reduced ecological value (development of at least 4,000m ² of gross floor area with a plot ratio of 0.4) will be substituted for added economic value (estimated value of new building zone: 1.5M francs + recovery of past development rights + additional negotiated development rights for landowners in the green zone). Part of the added economic value of the new building zone (approx. 290,000 francs) is captured for land use policy purposes (land service and tax on added land value created through zoning)
Across policy resources:	In case the building zone extension is not developed in a 10 years time frame, then the commune may use the emption right and substitute the target group's infrastructure for the resource money

Table 6.1: Redistributive effects of the building zone transfer in Wiedlisbach.

Features	Explanation
Across actors:	None
Across policies:	None
Across space:	Within plots: developed will be more valuable than undeveloped plot
Across scales:	Between commune and landowners: the former obliges the latter to make available the value distributed through zoning
Across time:	"Voluntary building obligations" have a duration of 15 years
Across value dimensions:	Future construction due to the "voluntary building obligations" induce a reduced ecological value and an added economic value

Table 6.2: Redistributive effects of the building obligations on serviced land in Wiedlisbach.

Features	Explanation
Across actors:	Value transfer from landowner to commune solely due to land service
Across policies:	None
Across space:	Within plots
Across scales:	Between commune and landowners only
Across time:	Land mortgage on plot has a delay of 10 years
Across value dimensions:	Reduced ecological value (future development of 2ha of industrial land) is substituted by an added economic value (development and service of land)

Table 6.3: Redistributive effects of the building obligation on non serviced land in Wiedlisbach.

Features	Explanation
Across actors:	Commune captures part of the added economic value created through zoning through the instrument tax on added land value created through zoning on landowners' plots. In addition, it charges land service costs through the land service tax and provides land service in return
Across policies:	None
Across space:	None
Across scales:	Between commune and landowners only
Across time:	Emption right on new building zone is limited to 10 years
Across value dimensions:	Reduced ecological value (future development of 1ha of new building zone) is substituted by an added economic value (development and service of land)

Table 6.4: Redistributive effects of the building obligations on future building zone in Wiedlisbach.

6.1.2 Huttwil

6.1.2.1 Local public problem

Since the adoption of their first zoning plan in 1977, Huttwil had wide undeveloped building zones. In order to match federal requirements, the building zones intended for development needed to match the commune's development needs over the subsequent fifteen years. An initial reduction of undeveloped building zones took place through the revision of the building regulations in 1994. But four additional perimeters of 1 to 4 hectares each remained undeveloped in the building zone, maintaining the commune's building zone reserves at the upper end of the legal limit. Further, contractual agreements signed with the landowners in these perimeters anticipated that the commune would bear all land service costs. Since the 1990's, Huttwil has witnessed a progressive demographic decline. The commune struggled to encourage the development of housing and thus, to attract new inhabitants, it faced shrinking revenues, and the existing construction did not meet contemporary living standards. Despite successive agreements between the commune and the landowners on the development of the hoarded perimeters, the status quo prevailed, hindering the fulfilment of communal growth objectives.

6.1.2.2 Configuration of actors

The actors involved in the process are the communal executive body, which is supported by the canton in the building zone reduction process. The local planning committee, together with the landowners, oppose the executive body in their strategy. The construction experts and the report they produce are third parties paid by the commune to determine the perimeter's constructibility. Neighbours who own water rights are third party losers whose rights will potentially be destroyed with the development of the plots (they oppose the development process).

In the process "building right", the commune and the *Herdgemeinde* shared a set of common interests, and could gain benefits from cooperation: the wide properties of the *Herdgemeinde* (target group) and the zoning powers of the commune could be joined to attract new inhabitants to Huttwil. This redistributive process also involved future homeowners (end beneficiaries): those who look for a cheaper way to buy property and for a quiet place outside of the bigger urban centres, homeowners who are not interested in full ownership on their home or do not have sufficient funds to buy both land and house.

6.1.2.3 Actors' strategy

The communal executive body aimed to reduce unused building zones and pass on land service costs to landowners to gain a margin of manoeuvrability with the canton and reduce communal expenses created through zoning. Further, in order to limit the rural exodus and attract new contributors, communal authorities decided upon new, cheap building land for construction, by zoning and selling building rights on the *Herdgemeinde's* properties.

Landowners and third party losers aimed to maintain the status quo: keep their rights without additional obligations or costs (land service costs, destruction of water catchment).

6.1.2.4 Instruments and policy resources mobilised

Once the 2008 elaboration of the hazard map placed the perimeter of Thomasbode in the medium risk zone, the communal executive body considered the information an opportunity to zone the perimeter of Thomasbode back to agricultural land. However, the local planning committee used its political support and, together with opposing landowners (lack of consensus), pressured the communal executive body: they refused the communal executive body's consideration to withdraw development rights without compensation.

In order to circumvent the information provided by the instrument hazard map, the planning committee asked the communal executive body to mobilise the instrument constructibility assessment (resource information), which would confirm or infirm the perimeter's constructibility, and thus the necessity to pay or not a compensation to the landowners. Once the study was published, the communal executive body submitted to the demands of the landowners and the local planning committee, who interpreted the report's results as a confirmation of the landowners' development rights.

In the process "building right", the commune used zoning to extend the building zone on the land owned (infrastructure) by the *Herdgemeinde*. The *Herdgemeinde* leased the plots through building right to home owners who built on it. The commune used the land service tax on the plots leased to the home owners in order to recover land service costs.

6.1.2.5 Local regulatory arrangement

Once the report confirmed the plot's constructibility, the communal executive body elaborated, in accordance with the landowners, a new local development plan. This plan allowed for the partial implementation of land use policy objectives: authorities reduced the size of the building zone (use of zoning), reduced the impact on existing water rights through the concentration of constructions, defined a higher plot ratio, and passed on part of the land service costs to landowners.

In the process "building right", the commune implemented land use policy by making building land available at reduced costs. Through the "building right", they enlarged the group of end beneficiaries and reduced the financial costs of buying a home. The lease rate that was chosen, allowed the *Herdgemeinde* to recover the full economic value of land (at the current price of 200CHF/m²) by the end of the contract (60 years), and at the same time, keep possession of the land.

6.1.2.6 Redistributive effects

Features	Explanation
Across actors:	Commune uses the levy provided by the higher plot ratio granted to landowners in order to pass on part of the land service costs and the ownership on the future infrastructure
Across policies:	Building zone reduction achieved through value creation by land use policy; capture of the added value by land use policy and property rights
Across space:	Redistribution between parts of contiguous plots
Across scales:	Pass on of part of land services costs from commune to landowners
Across time:	Value distribution only
Across value dimensions:	The added economic value created through the high plot ratio allows for reduction of the surface of the building zone to be developed as well as a reduction of the future development's impact on water catchments (reduction of the reduced ecological value created by land development)

Table 6.5: Redistributive effects of the building zone reduction in Huttwil.

Features	Explanation
Across actors:	Target group offers a reduced rent to end beneficiaries and contributes to communal objectives
Across policies:	Reduced rent collected by landowner (through its property right) allows for access to cheaper home ownership (housing policy)
Across space:	—
Across scales:	Commune distributes economic value to the <i>Herdgemeinde</i> and to lease holders (plot users)
Across time:	Duration of the lease: 60 years, renewable
Across value dimensions:	Development induces a reduction of the ecological value of land, which is substituted by a moderate added economic, and thus social, value generated by the leasehold (1,630CHF/year)

Table 6.6: Redistributive effects of development through building right.

6.1.3 Niederbipp

6.1.3.1 Local public problem

From the 1960's until 1992, a landfill operated in Niederbipp. Eventually, it accumulated over 1.5 million m³ of partially toxic waste. After its closure, it was covered with fertile soil and used as agricultural land. In 1996, a regional industrial zone which included the former landfill was planned and progressively developed. However, the former landfill was not reused, due to soil instabilities which reduced possible land use, posed additional development constraints, and increased financial risks for the developer. In 2004, the second extension of the building zone was planned, and the question of the costs linked with the zone's extension had to be settled.

6.1.3.2 Configuration of actors

The main actors were the cantonal office of economic development, who politically and financially supported the industrial zone's development, the cantonal office of water and waste, in charge of implementing the federal water act and the ordinance on polluted soils, the prefecture of Wangen, which delivered the building permit for the logistics centre, the commune of Niederbipp, which zoned the land, the landowners, the developer, and soil experts.

For the process "tax on added land value", involved actors were the commune, who wanted to extend their industrial zone, and landowners ready to sell their plots. One single land buyer had already been found. The promise was to provide fiscal revenues and jobs to the commune's inhabitants (end beneficiaries).

6.1.3.3 Actors' strategy

The public objective was to foster the development of the industrial zone and find a developer willing to build construction on the former landfill's perimeter to reduce the risks of water infiltration and prevent the exfiltration of toxic waste. The absence of obligation to remediate the site and the initial difficulty to find a developer willing to bear additional costs and take the risk of disturbing the site (and thus take part of the responsibility in remediating it) reduced the conflict potential between the involved actors.

Further, the commune aimed to recover part of the added land value it created through zoning by implementing the tax on added land value created through zoning.

6.1.3.4 Instruments and policy resources mobilised

The cantonal office of economic development lends 1.5 million francs (money) for land service, the cantonal office of waste and water sets various requirements to the construction plans and technique (construction requirements) and requires a financial guarantee, the prefecture signs the building permit, the commune provides land service and contributes to it (infrastructure and money), the landowners pay for land service and monitoring costs (money) and agree to a reduced sale price (money), the developer deposits a financial guarantee for 10 years (money) and fulfils the specific construction requirements (infrastructure), the soil experts provide knowledge on soil composition and structure and make recommendations on type of construction and monitor toxic exfiltrations (information).

In the process "tax on added land value", the commune mobilised zoning and tax on added land value created through zoning in order to recover part of the value created. It increased the consensus of landowners by using outdated land values for the calculation of the tax rate and passing on detail land service costs to the land developer.

6.1.3.5 Local regulatory arrangement

The canton implemented the economic development policy and soil protection policy by authorising the construction of a lid in order to limit the infiltration of water and the exfiltration of pollutants from a landfill whose remediation costs would have required massive public investments. The developer agreed to bear the financial risks linked with the landfill's redevelopment and in return benefited from a reduced land sale price, because they managed to pass on the additional costs – except those of the financial guarantee – to the initial landowners.

The process "tax on added land value" resulted in an implementation of the voluntary tax on added land value created through zoning. No percentage was fixed in the building regulations. The commune defined the percentage of taxation in its decision: 30%. However, the land prices were favourable to the landowners and led to an effective taxation of 21%. The delay of payment for the tax was set at 90 days. Further, in order to pass on the land service costs to the land developer and ensure the recovery of the investments made, the commune conditioned the payment of the land service costs on the delivery of the building permit.

6.1.3.6 Redistributive effects

Features	Explanation
Across actors:	Commune zones land and distributes value to landowners, canton imposes restrictions, monitoring obligations (part of which benefits the soil experts) and the payment of a temporary financial guarantee, which then returns to the developer
Across policies:	Value created by land use policy is used to finance the implementation of soil and water protection policies
Across space:	—
Across scales:	Developer deposits a financial guarantee, which is under control of the canton in case pollution spreads
Across time:	Duration of the financial guarantee: 10 years
Across value dimensions:	Part of the added economic value created through zoning (2.37M francs) is used to create an added ecological value: limitation of water infiltration through the construction of a specific lid on the landfill, as well as monitoring of the site

Table 6.7: Redistributive effects of the process polluted soil in Niederbipp.

Features	Explanation
Across actors:	Commune distributes value to landowners through zoning and captures part of it through the tax on added land value created through zoning
Across policies:	—
Across space:	within communal (and cantonal) territory
Across scales:	Between commune and landowners and canton, who recovers part of the taxed amount (2.4M francs in total)
Across time:	One time value capture
Across value dimensions:	Reduced ecological value induced by land development is substituted by added economic value created through zoning (approx. 16M francs for 10ha industrial land). Part of the added economic value created through zoning is captured and used by authorities for other land use policy processes

Table 6.8: Redistributive effects of the tax on added land value created through zoning Niederbipp.

6.1.4 Malley

6.1.4.1 Local public problem

Over the past decades, the expansion of urban areas has been a growing public concern. However, unused or underused brownfields and former industrial fields had the potential to limit such expansion. Initially, these areas were located on the limits of urbanisation, but over time, they have been absorbed by urban growth. Some of these fields, such as the one of Malley, were located close to major transport infrastructure and already surrounded by urbanisation. In the end of the 1990's, the industrial activities present in the area of Malley had decreased. They left wide surfaces of land in the core of Lausanne's agglomeration partly unused. Their redevelopment constituted an ideal opportunity for urban renewal and expansion without "consuming" open land, as well as for improving the coordination between urbanisation and transport infrastructure.

6.1.4.2 Configuration of actors

The Confederation launched the agglomeration policy and co-funded the train station of Malley. The canton obtained funding, co-funded the train station, and financed a portion of the planning works. They also supervised the implementation of the measures planned in the agglomeration program. They were also responsible for the

implementation of the major accidents ordinance (MAO), and of the contaminated sites ordinance. Further, they supervised the land and energy planning procedures.

The intercommunal planning office SDOL (third party) suggested the future urban shape of the neighbourhood and set future urban densities. Architects and planners (third parties) designed public spaces and suggested the location of different uses within the perimeter. Together with the landowners, the communes (Prilly and Renens) elaborated the local development plans. Separately, they approved the local development plans, implemented the extended land service tax and set communal energy goals. The landowners (Lausanne and SBB) leased their land for development. They also managed train infrastructure (SBB infrastructure), train operations and the company's properties (SBB real estate), distributed gas to numerous communes, and managed the agglomeration's waste (Lausanne).

The intercommunal heating company, owned by local authorities and landowners, constructed the district heating network in the western part of the agglomeration and distributed heat produced by the industrial services from Lausanne (third party). The industrial services were the main adjacent land users; they built a new heating plant adjacent to the new local development plan. The agglomeration's public transport company owned a nearby bus depot and ensured the future neighbourhood would be provided with public transport other than the train.

6.1.4.3 Actors' strategies

By co-funding transport infrastructure projects that were ready to be realised, the Confederation intended to foster the redevelopment of plots close to public transport axes and thus steer development towards already (partly) urbanised areas. The canton co-funded the train station of Malley in order to increase the accessibility of the area and induce the redevelopment of unused or underused properties surrounding the station. These new uses needed to be compatible with risk considerations (due to the proximity of the train line), and had to consider energy provision (due to the new law). The communes intended to provide additional housing, attract new inhabitants – some of them with above average revenues –, and minimise costs linked with redevelopment.

The landowners' strategy was to maximise high development rights on their land in order to generate revenues from their property. In addition, they exchanged a plot: Lausanne's goal was to host the new cantonal museum of modern arts, SBB's goal was to develop their property for profit.

6.1.4.4 Instruments and policy resources mobilised

The canton and Confederation mobilised infrastructure by developing the train station and set an incentive for local authorities to use planning instruments in order to ensure the area's redevelopment. They also provided money (co-funding of railway crossing) towards infrastructure (construction of the crossing) provided by the target groups.

In regard to the five redistributive processes observed, the following instruments and resources have been identified:

1. land exchange: both landowners exchanged land (infrastructure) in order to (1) reuse the former locomotive hall near Lausanne's central station in a way that better fit its location and development constraints; (2) ensure the profitability of the other plots surrounding Malley station. The lack of money on both sides for buying land, the political support behind the museum, the consensus between the two parties, and the opportune time schedule made the deal possible;
2. MAO restrictions: the implementation of the MAO by the Canton led to a restriction on the type of future construction use. Landowners mobilised information (studies provided by the SBB minimising existing risks and use restrictions) and consensus (their approval of the development and financial plans), and time (they left the negotiation tables for two years) in order to obtain compensation;
3. polluted soil: local authorities and landowners transferred development rights within the perimeter of the local development plans and reshaped the plots in order to reduce soil excavation, and thus, remediation costs, while maintaining the same overall plot ratio, a satisfactory financial return for the landowners, and tax revenues for local authorities;

4. extended land service tax: both landowner and communes exchanged the resource law, *i.e.* legal advice regarding the necessity for public authorities to pay the tax. This exchange blocked temporarily the negotiation. However, the personnel available to the landowners allowed them to precisely calculate the overall costs of the project (remediation costs in particular), which gave them a strategic advantage over local authorities. In addition, landowners argued that existing development rights would be used as such, if no agreement was found. Further, local authorities had limited available time for negotiation, as part of the infrastructure constructed in the neighbourhood was linked to the agglomeration program development schedule;
5. energy planning: landowners created a coalition with local authorities by creating a co-owned company (organisation) in charge of constructing the district heating system (infrastructure) and distributing the energy. This allowed for the exchange of infrastructure (district heating) for the resource money, reducing development costs, and passing on maintenance and other related costs linked to energy goals on the end beneficiaries (future home owners and renters).

Inhabitants provided political support in favour of an increased proportion of housing during the adoption stage of the first local development *Malley-gare* by the communal legislative bodies.

6.1.4.5 Local regulatory arrangement

The local regulatory arrangements of the five redistributive processes observed are as follows:

1. land exchange permitted the implementation of two distinct policy objectives: Lausanne succeeded in hosting the future museum on their territory in a central location, fulfilling culture policy objectives; the SBB ensured the financial profitability of their properties;
2. MAO restrictions: the value loss induced by the restrictions (due to risks of major accidents) were fully compensated through additional development rights negotiated by landowners (circumvention).
3. polluted soil: the remediation costs (obligation to remediate excavated, polluted soil) induced by the soil pollution led to a transfer of development rights to adjacent plots (implementation).
4. the legal uncertainty surrounding the necessity for public landowners to pay the extended service tax, as well as the lack of time, led communes and landowners to a lump sum agreement on the amount of tax to be paid, constituting a circumvention of land use policy objectives.
5. the landowners and communes co-owned the company distributing the heat to the buildings, which allowed for the creation of a coalition agreeing on the source of energy to be used for the constructions in Malley, increase the number of clients and ensure the profitability of the network's extension (circumvention of energy objectives).

6.1.4.6 Redistributive effects

Features	Explanation
Across actors:	Target groups exchange between each other two plots
Across policies:	The added value created through land use policy in Malley allows Lausanne to exchange one plot against a larger plot close to the train station and develop a cultural complex
Across space:	Change of ownership between two very central plots, across two communes
Across scales:	Between commune (Lausanne) and landowner (SBB), both acting as private landowners
Across time:	—
Across value dimensions:	Economic value created in Malley benefits the social value of the museum in Lausanne
Across re-sources:	Exchange of infrastructure for infrastructure

Table 6.9: Redistributive effects of implementation of land exchange in Malley.

Features	Explanation
Across actors:	The canton, which is responsible for the implementation of the ordinance on major risks, approves additional development rights in order to compensate for the reduced economic value due to use restrictions imposed by the ordinance
Across policies:	land use policy is used as a levy to compensate for reduced economic value due to the ordinance on major risks
Across space:	—
Across scales:	Canton allows higher plot ratio on plots
Across time:	—
Across value dimensions:	Compensation of economic reduced value through added economic value

Table 6.10: Redistributive effects of implementation of MAO restrictions.

Features	Explanation
Across actors:	Communes and landowners negotiate a relocation of development rights
Across policies:	The location of development rights granted by land use policy minimises the costs induced by soil protection policy
Across space:	The redistribution occurs across reshaped plots within the local development plan
Across scales:	Canton to landowners
Across time:	None
Across value dimensions:	The added economic value created through zoning is used to remediate the excavated soils and create added ecological value. The minimisation of the amount to be excavated limits the added ecological value created
Across re-sources:	Initial plot shapes are exchanged against a new plot shapes with added economic values (money)

Table 6.11: Redistributive effects of soil protection in Malley.

Features	Explanation
Across actors:	Communes distribute economic value to landowners through zoning (37,300m ² GFA) and accept a reduced amount of tax in return (700,000 francs)
Across policies:	—
Across space:	The tax revenue is redistributed within the communes' territory
Across scales:	The tax applies to the local development plan and is spent on the communal level
Across time:	One time value capture
Across value dimensions:	The tax' revenue is used for communal infrastructure. The remainder of the rent is distributed to the landowners who normally negotiate a 4.5% return rate on building rights they lease (approx. 1.55M francs annual return for <i>Malley-gare</i>). The added social value is created through the potential rent reduction granted to the building right holders (cooperatives) in <i>Malley-gasomètre</i>

Table 6.12: Redistributive effects of the extended land service tax in Malley.

Features	Explanation
Across actors:	The choice of a renewable source of energy by end beneficiaries is meant to cover the energy goals set by the communes and the landowners
Across policies:	The obligation set by energy policy to plan energy provision for a neighbourhood, together with land use policy, does not impact the type of energy chosen
Across space:	The rent generated by district heating is split among communes and landowners, the latter benefiting from a higher amount of rent due to the fact that they provide the energy sources used for district heating
Across scales:	—
Across time:	—
Across value dimensions:	Less ecological and more economic energy sources are privileged over less ecological and economic ones

Table 6.13: Redistributive effects of energy planning in Malley.

6.1.5 Cheseaux

6.1.5.1 Local public problem

Since the 1960's, traffic management and communal development in the east and west of Cheseaux has been blocked by uncertainty regarding the outline of the planned bypass road. Past, and planned demographic growth, as well as an outdated school building, required the construction of a new school, which the commune planned to locate in the village's centre. Once inhabitants and political authorities found a solution to the outline of the bypass road, it became possible to revise planning documents and adapt them to the commune's development objectives.

6.1.5.2 Configuration of actors

The process included various actors at various stages: the commune as planning authority, the planner contracted by the commune, as well as a dozen of landowners were all present along the entire process. Various landowners, primarily farmers, were only present during the land betterment procedure and the land acquisition and exchange process conducted by the commune. During the land improvement syndicate, only the landowners included in the perimeter were present, (including the commune). Together they formed the landowners' assembly, approving the relocation of rights, and the new plot shapes proposed by the expert commission of the LIS, a third party of the process (composed of a planner, a geometer and a notary). The planner had a dual role, he counselled landowners involved in the LIS, and

elaborated the structure plan and local development plan of *Derrière-le-Château* for the commune. The canton supervised the process and validated the plans and the LIS' results.

6.1.5.3 Actors' strategy

Once the bypass road plans were adopted, the canton initiated a mandatory land betterment along the future route, of a 100ha surface for the building of the road. Both the landowners and the commune used the opportunity to extend the instrument's perimeter to the entire agricultural and intermediate zones of the commune (300ha) in order to align the property structure with use rights that had changed over time and had not been registered.

The commune used the extension of the land betterment's perimeter to acquire plots on the border of the settlement area, anticipating a future change of zone. In a parallel procedure, they launched the revision of the communal building regulations. Once the commune had exchanged and acquired several plots close to the settlement area and within the future LIS' perimeter (as defined in planning documents), the LIS was constituted in a perimeter including the entirety of the intermediate zone close to the village centre. The shape of plots and use rights on these plots were redefined in accordance with the communal structure plan. Once the procedure was completed, the commune was able to build its new school in the centre of the village, and the landowners were able to develop and/or sell their land.

6.1.5.4 Instruments and policy resources mobilised

The commune managed to extend and relocate its properties on a consensual basis through the acquisition and exchange of plots with landowners. The participation costs linked with the LIS (combined instrument of type 2 and 4), the procedure's complexity, the small amount of land owned by the selling owners, and the public interest underlying communal land acquisition (political support), led to a reduction in the number of landowners and concentrated landownership due to sale of land by the landowners.

6.1.5.5 Local regulatory arrangement

The commune anticipated future development, and successfully relocated its properties within the perimeter of the LIS to meet development goals (implementation). The commune implemented federal and cantonal land use planning policy objectives, as well as the agglomeration policy objectives, by extending the settlement area close to existing development, by coordinating development with the public transport infrastructure and by defining high plot ratios (compared to communal standards).

In order to achieve quick implementation of the instrument and build the school (lack of time), authorities took over a larger part of the infrastructure and maintenance costs than required by their share of land. The land assembly's expert commission provided qualified personnel to the commune and other landowners for implementing the instrument and achieving development goals.

The commune had the obligation to compensate the surfaces that the LIS transferred to the building zone as part of the cropland protection plan. This was achieved by invoking other land surfaces put under protection of the cropland protection plan during the revision of the communal zoning plan in 2001.

6.1.5.6 Redistributive effects

Features	Explanation
Across actors:	Commune exchange plots they own with landowners and buy plots from landowners.
Across policies:	—
Across space:	The titles exchanged and bought are all located in the commune's territory. The plots acquired or exchanged are within the future LIS' perimeter, while those sold are located further away
Across scales:	The exchange takes place between commune and landowners
Across time:	Permanent relocation of property titles and exchange of their future value
Across value dimensions:	Transfer of economic value
Across resources:	Exchange of infrastructure for infrastructure, and of infrastructure for the resource money

Table 6.14: Redistributive effects of the land exchange in Cheseaux.

Features	Explanation
Across actors:	Commune and landowners relocate and reshape their properties
Across policies:	—
Across space:	The relocation and redefinition of land value takes place within the LIS' perimeter, which consists of contiguous plots
Across scales:	Among plots/landowners and commune
Across time:	Punctual redistribution only
Across value dimensions:	Permanent substitution of reduced ecological value by added economic value (development rights worth 8.2M francs) and the plots' development; substitution of ecological reduced value by social added value due to the construction of a school
Across resources:	Initial properties (infrastructure) are exchanged for new properties with other plot shapes (infrastructure) and higher economic value (money)

Table 6.15: Redistributive effects of the land improvement syndicate in Cheseaux.

6.1.6 Cross-case synthesis of the variables

Tables 6.16 and 6.18 provide a synthesis of the 15 redistributive processes identified in the five case studies. The process "building obligations" sums up three processes, therefore 13 processes figure in the tables.

The "building zone transfer" process can be accounted for in two different manners: as a whole, the process analyses the communal strategy of building zone transfer. One can also consider solely "green zoning" as a process that allows for the reduction of the building zone reserve – the second part of the process, "building zone extension," is accounted for in the "building obligations" process section. I opted to emphasise the building zone transfer process, because it best reflects the politics of growth pursued by the commune.

The variables summed up in the tables 6.16 and 6.18 correspond with those identified in the conceptual framework (figure 3.1) in chapter 3 and, during the previous two chapters, are used throughout the analysis:

- contextual variables: these are synthesised through four indicators: demography, land prices, location, soil structure. These indicators reflect trends during previous decades. These tendencies can take five values: from very negative (– –), over neutral/no impact (0), to very positive (++). The value of the variables from one case are relative to the values of the same variables from the other cases;
- instruments: I classified the instrument used in each redistributive process based on the source of law (public or private), and impact on property rights. These are the instruments used by local or cantonal authorities. Cases where target groups mobilised an instrument are mentioned in brackets (TG). If no instrument of that type is used, a zero is input;
- policy resources: from the ten policy resources identified in the literature, I summarised with a + cases where authorities mobilised resources they had or they obtained from the target group. A – means that authorities lacked the resource. Cases where target groups (or both authorities and target groups) mobilised the resource are mentioned in brackets (PAA&TG);
- actors: coalitions and oppositions between actors identified in the process are mentioned here. Members of a coalition are linked with a +, whereas opponent parties are separated by a –;
- LRA: the policy output is qualified according to their type of (non) deviance from land use policy objectives. The categories used rely on the typology Schweizer (2015) and can take five values: innovation, implementation, passivity, circumvention, and diversion;
- redistributive effects: the redistributive effects produced by the processes are summed up in seven empirically identified features:
 - actors who create economic value, or from whom economic value is captured, to actors who benefit from the economic value. These actors are those constituting the triangle: political administrative authorities, target groups, end beneficiaries, and third parties;
 - policies that create value which is transferred to other policies or to the property right title owner (PR);
 - space is meant to characterise the initial and target location of the value that is captured. In cases where the target location of value redistribution is not defined, I mention the entity that captures the value (for example the commune);
 - scales allow for the identification of the level of government involved in the value creation, reduction, exchange, and capture process. The unit of capture and/or distribution are plots;

- time seizes the duration of value creation, reduction, retention, capture processes. Only process-specific time aspects of instruments' use are mentioned, as, most instruments studied did not produce redistributive effects in time (with exception of the building right);
- the value dimensions refer to the transfers from one value dimension to another. The types of value considered are the three value dimensions defined in the concept of sustainable development policies (Brundtland et al., 1987);
- the feature resources captures the possible changes in terms of property titles induced by type 4 instruments. The significant aspect is a change in the nature of the resource (substitution from “infrastructure” to “money” or vice versa).

	BZ transfer	Building obligation on serviced land	Building obligation on un-serviced land	Building obligation on future building zone
INDEPENDENT VARIABLES				
Contextual				
Demography	0	0	0	0
Land prices	0	0	0	0
Location	0	0	0	0
Soil structure	0	0	0	0
Instruments				
Type 1	Rezoning priority, TALV exemption	0	0	LST, TALV
Type 2	Green zone, building zone, plot ratio	Threat of green zone, building permit (TG)	Land service	Building zone, land service
Type 3	0	"voluntary building obligation" (TG)	10 year mortgage on land	0
Type 4	Emption right	0	0	Emption right
INTERMEDIARY				
Policy resources				
Infrastructure	0	0	0	0
Time	0	+	+	+
Organisation	0	0	0	0
Personnel	+	+	+	+
Information	+	+	+	+
Consensus	-/+	-/+	+	+
Political support	-/+	0	0	-/+
Law	0	-	0	0
Money	0	0	+	0
Actors				
Coalitions	0	0	0	0
Oppositions	Non opposition of canton, TG v. PAA	part of TG v. PAA	0	0

Table 6.16: Synthesis of the cases' variables. LST = land service tax; ELST = extended land service tax; TALV = tax on added land value created through zoning. LIS = land improvement syndicate.

DEPENDENT VARIABLES					
LRA	BZ transfer	Building obligation on serviced land	Building obligation on un-serviced land	Building obligation on future building zone	
	Diversion	Innovation	Innovation	Innovation	
Redistributive effects	Across actors	TG1 to TG2	0	TG to PAA	0
	Across policies	land use policy to PR between plots	0	0	land use policy to PR
	Across space	Commune to plots	within plots	0	0
	Across scales	10-15 years (green zone), 10 years (emption right)	Commune to plots	0	Commune to plots
	Across time	Ecological and economic to economic	10 years (obligation)	10 years (mortgage), after 0	10 years (emption right)
	Across value dimensions	Ecological and economic to economic	Ecological to economic	Ecological and economic to economic	ecological to economic
	Across resources:	“infrastructure” to “money” (in case emption right is used)	0	0	0

Table 6.17: Synthesis of the cases' variables in Wiedlisbach (dependent variables).

	BZ reduction	Building right	Polluted soil	Tax on added land value
INDEPENDENT VARIABLES				
Contextual				
Demography	-	-	++	++
Land prices	0	0	+	+
Location	-	-	+	+
Soil structure	+	+	--	++
Instruments				
Type 1	Lump-sum LST	LST	EIA	Building permit, LST, TALV
Type 2	Dezoning, plot ratio	Zoning	Zoning, building permit specifications, surveillance obligation	Zoning
Type 3	Legal mortgage	Building right	Financial guarantee	0
Type 4	0	0	0	0
INTERMEDIARY VARIABLES				
Policy resources				
Infrastructure	0	+	0	+
Time	0	0	0	0
Organisation	0	0	0	0
Personnel	0	+	0	+
Information	+(PAA&TG)	0	+(PAA&TG)	0
Consensus	-	+	0	0
Political support	-	+	0	+
Law	0	0	+	0
Money	-	+	+	+
Actors				
Coalitions	Canton+commune	Commune+TG	Canton+commune	Commune+canton+EB
Oppositions	Planning commission/TG v. PAA	0	0	0

Table 6.18: Synthesis of the cases' variables in Huttwil and Niederbipp (independent and intermediary variables). LST = land service tax; ELST = extended land service tax; TALV = tax on added land value created through zoning. LIS = land improvement syndicate.

		BZ reduction	Building right	Polluted soil	Tax on added land value
DEPENDENT VARIABLES					
LRA	Passivity	Implementation	Implementation	Implementation	
Redistributive effects	Commune to TG	TG to EB	Commune to TG	Commune to TG to commune	
	Across policies	land use policy to PR	land use policy+PR to housing policy within plots	land to soil and water policies within plots	0
	Across space	within reduced number of plots			plots to commune
	Across scales	Commune to plots	Commune to plots	Canton to plots	Commune to plots to commune and canton
	Across time	as long as unbuilt, until next zoning plan revision	60 years contract, after unknown	10 years value retention, after 0	Punctual value capture, payment within 90 days, after 0
	Across value dimensions	Economic to ecological and economic	Economic and ecological to economic/social	Economic to ecological	Ecological and economic to economic
	Across resources:	0	0	0	0

Table 6.19: Synthesis of the cases' variables in Huttwil and Niederbipp (dependent variables).

	Land ex- change	MAO restric- tions	Polluted soil	Extended land service tax	Energy plan- ning	Land ex- change	LIS
INDEPENDENT VARIABLES							
Contextual							
Demography	++	++	++	++	++	++	++
Land prices	++	++	++	++	++	++	++
Location	++	++	++	++	++	++	++
Soil structure	--	--	--	--	--	++	++
Instruments							
type 1	0	Construction spe- cifications	0	Lump-sum ELST	0	0	LST, local build- ing regulations, cropland protec- tion
type 2	0	MAO restrictions, Zoning & plot ratio	Obligation to re- mediate excav- ated soil, zon- ing (transfer of rights)	Zoning (PAA+TG (ex- isting rights)	Energy obliga- tions in develop- ment plan, build- ing permit	0	LIS, building zone, agricultural zone, plot ratio
type 3	0	0	0	Legal mortgage	0	0	0
type 4	Land ex- change	0	Reshaping of plots	0	0	Land ex- change and acquisition	Reshaping and relocation of plots
INTERMEDIARY VARIABLES							
Policy resources							
Infrastructure	+	0	+(TG)	0	+(PAA&TG)	+	+
Time	0	+(TG)	0	-	0	0	-
Organisation	0	0	0	0	+(PAA&TG)	0	0
Personnel	0	0	+(TG)	-	+(TG)	+	+
Information	+(TG&TG)	-	+(PAA&TG)	0	-	0	0
Consensus	+	-	0	-	+(PAA&TG)	+	0
Political support	+	0	0	0	0	+	+
Law	0	0	0	-(PAA&TG)	0	0	0
Money	-	0	0	0	0	0	0
Actors							
Coalitions	TG-TG	0	0	0	PAA+TG	PAA+EB	Commune+third parties (planner, geometer)
Oppositions	0	TG v. TG/PAA	0	TG v. PAA	0	0	0

Table 6.20: Synthesis of the cases' variables in Malley and Cheseaux (independent and intermediary variables). LST = land service tax; ELST = extended land service tax; TALV = tax on added land value created through zoning. LIS = land improvement syndicate.

DEPENDENT VARIABLES									
LRA	Land ex- change	MAO restric- tions	Polluted soil	Extended land service tax	Energy plan- ning	Land ex- change	LIS		
	Implementation	Circumvention	Implementation	Circumvention	Circumvention	Implementation	Implementation		
Redistributive effects	Across actors	TG to TG	PAA to TG	PAA to TG	EB to TG&PAA	PAA to TG and TG to PAA			
	Across policies	Land to cul- ture policy	land use policy to major accidents	land use policy to soil protection	Energy to PR	PR to PR	land use policy to PR		
	Across space	across com- munes	0	within local de- velopment plan	across communes	between plots	between plots		
	Across scales	Commune to plots to commune	Canton to plots	Commune to plots	Commune to plots	Commune to plots to commune	Commune to plots		
	Across time	punctual ex- change	0	Punctual value capture	0	punctual exchange	0		
	Across value dimensions	Economic to social	Economic to eco- nomic	Economic to eco- nomic	Economic to eco- nomic	Economic and eco- logical to economic	Economic and ecological to eco- nomic		
	Across re- sources:	“infrastructure” to “infra- structure”	0	0	“infrastructure” to “infrastruc- ture” and “money”	0	0		

Table 6.21: Synthesis of the cases' variables in Malley and Cheseaux (dependent variables).

6.2 Test of hypotheses

Now that the variables' values have been summed up for each of the 15 redistributive processes identified, I proceed to the verification of the hypotheses. I have defined three different possible results for each hypothesis: confirmed, partly confirmed, and disproved. For each hypothesis, I first individually discuss the results of each case and process, and then summarise the results of each hypothesis in a section entitled "general discussion". These sections are accompanied by a table synthesising the results. The tables provide the reader a systematic overview of the results, but are not intended as a quantitative analysis of their confirmation or disproof.

6.2.1 H1: Effects of the institutional resource regime of soil on the LRA

In chapter 3, I formulated the following hypothesis:

H1: If the institutional regime of soil is simple or complex, then the LRA consists in a passive implementation, circumvention, or diversion of land use policy objectives. This can be explained by the high margin of manoeuvrability that a simple or complex regime grants to actors in the implementation of existing rules. Actors use this margin of manoeuvrability in order to achieve their own specific goals that do not match federal objectives.

As defined by Gerber et al. (2009) and Nahrath (2003), and discussed in chapter 2 introducing the IRR framework, the institutional regime of soil is defined as a complex regime. Until 2014, no mandatory compensation mechanism existed, and authorities lacked the necessary funds to reduce oversized building zones. Further, the conflict between the principles of economic freedom, economic promotion, and sustainability, creates incoherences in the soil regime. As a consequence, according to H1, the observed LRAs should consist of passive implementation, circumvention, or diversion of land use policy objectives.

6.2.1.1 Wiedlisbach

Through the subdivision of the existing building zone into building and non-building zone, Wiedlisbach adopts a micro-zoning approach that opposes the fundamental legal distinction operated by zoning: the commune diverts the instrument zoning from land use policy objectives such as the "economic and appropriate use of soil" (art. 75 Cst). By applying a green zone (a temporary suspension of development rights) to non-developed plots, the commune creates temporary non-constructible "holes" in the urban framework, and uses the "building zone credits" it obtained to extend the building zone outside of the village. The combination of these two steps induce a relocation of development rights from the village's centre to the agricultural periphery and an increase of the overall building zone surfaces over time. I observe that local authorities *create incoherence during the implementation process* through the use of the instrument "green zone" for the temporary reduction of existing building zone reserves.

Further, one can argue that *the institutional regime of soil lacks strictness*, because the regime aims to *separate building zones from non building zones* – an aim blurred by the present transfer process – and implicitly prohibits development rights transfers outside of the settlement area, because such transfers create a sprawl pattern and thus a non-economic use of the resource soil. The canton's strictly legal interpretation of local zoning intentions – the commune respects its maximum quota of building zone reserves –, results in an acceptance of the transfer. Hence, *H1 is confirmed for the process "building zone transfer"*.

Compared to the other redistributive processes analysed, a specificity of this diversion strategy is that it was initiated by local authorities, and did not result from the target group's strategy.

Building zone transfer confirms H1

Building obligation strategies disproves H1

In the three processes dealing with building obligation, the commune tries to reduce the "zoning gap" induced by land hoarding or land unavailability, *i.e.* they try to overcome a lack of strictness of the institutional regime. To this end, authorities established three strategies – including the creation of new instruments –, with various rates of success:

1. In the case of previously zoned and serviced land: the commune combined the use of two instruments – threats of placement in the green zone, and voluntary contracts signed by landowners – in order to tackle the land-hoarding problem. This represented an innovative solution for pushing landowners to build within 15 years. Some landowners signed the obligation, which allowed authorities to overcome the gap between zoning prescriptions and actual land uses, and thus increase the strictness of the regime. As opposed to the building zone transfer process, local authorities in this case, used the green zone as a means of increasing regime coherence and strictness, and limiting actors' margin of manoeuvrability in terms of effective land uses. This result disproves H1, because despite the complexity of the soil's institutional regime, authorities managed to elaborate ad hoc solutions that partly overcame the land-hoarding problem. However, the commune also faced resistance from the landowners: some asked for building permits (although they did not intend build), thus exploiting the regime's lack of strictness (conformity of effective land use to zoning). Other landowners agreed on the green zone, which, as discussed in the building zone transfer process, consists of a diversion of land use policy objectives (incoherence between communal planning autonomy and land use policy), and confirms H1. Therefore, the use of the green zone produces ambivalent results that allow for the qualification of what the LRA observed simultaneously as a diversion and an innovation of the institutional regime. Hence, *in the building obligation on serviced land process, H1 is partly confirmed.*
2. The second building obligation process concerns the un-serviced industrial zone in *Weiermatt*: the commune paid directly for the land service, and used a mortgage on the plots, combined with a 10 year delay of payment, in order to ensure the land's availability and recover their investment over a maximum period of ten years. In this case, landowners possessed reduced means to fight the decision because the land was not serviced: this made, for example, the request of a building permit impossible, or, theoretically, permitted building zone reduction without financial compensation (a solution contrary to the communal growth strategy). The consensus reached with the landowners allowed the commune to implement an innovative solution for financing land service and guaranteeing land availability. Thus, despite a complex regime that did not obligate landowners to develop their land, local authorities and landowners reached an agreement that achieved both land service and development. As a consequence, *in the process "building obligation on non-serviced land", H1 is disproved.*
3. The third situation regards the new building zone in the *Gerzmatt*: the added economic value created through zoning, which benefited the landowners, granted authorities a sufficient negotiation power to contractually apply the tax on added land value created through zoning, implement the land service tax, as well as an emption right allowing the commune to buy the land within in ten years if not developed. The results of this process go beyond the existing rules of the institutional regime of soil: they include a redistribution of economic value created, and guarantee land availability. Consequently, *in the process "building obligation on new building zone", H1 is disproved.*

All three instrument mixes meant to achieve the development of building zones in Wiedlisbach relied on:

- local authorities' creativity, which, combined with the support of the hired planner, led to a set of singular arrangements that have not been observed in other processes;

- local authorities' capacity to implement instrument mixes: the communal executive body created and used instruments like "green zone" or "zoning out" as means of pressure, but also created compensatory mechanisms to ease their implementation (additional or new development rights, tax exemptions, priority zoning right);
- some landowners' cooperativeness, and the political institutions' relative support. The large number of landowners, representing high fragmentation of property (*i.e.* of the target groups – see H3a), allowed authorities to achieve a mixed success rate: some landowners fought against the communal strategies, some did not, and others negotiated with the commune. If local authorities would have faced a single (or a few) landowner(s), then the process' results would have been more polarised: the complex institutional regime of soil would have resulted either in an innovative LRA, or in a circumvention of existing objectives.

6.2.1.2 Huttwil

In the case of the reduction of building zone in Huttwil, the soil's complex regime (allowing for a discrepancy between plan and effective land uses, and lacking a compensatory mechanism) hindered the commune's zoning of hoarded land located at the border of the settlement area in the agricultural zone. Hence, *in the process "building zone reduction", H1 is confirmed.*

Failed building zone removal confirms H1

The increased plot ratio economically compensated for the reduced surface available for construction. It also limited the ecological impact on land and on the water catchments, and allowed the commune to pass on part of the land service costs to the landowners (initially, these were born entirely by the commune). Further, the new LRA has not yet produced any impact: the development of the land is not completed, and, as opposed to the building zone extension in Wiedlisbach, the LRA did not include an emption right or another means of imposing development within a given time period. This process showed that in a process where landowners have political support, withdrawal of development rights can be difficult to achieve.

Future land use remains uncertain

In the process of land development through the instrument building right, the commune creates a coalition with the *Herdgemeinde* that owns the land (target group), and agrees to lease it to future home owners (end beneficiaries) for a reduced rent – compared to local land market prices. This coalition mobilises public land (resource infrastructure), in order to achieve communal growth objectives and implement land use policy. This strategy overcomes the land hoarding problem, a central regime incoherence faced by the commune. Consequently, *the process building right disproves H1.*

Building right process disproves H1

6.2.1.3 Niederbipp

The development of polluted soil in Niederbipp mobilises rules and procedures specific to soil protection policies, which are partly incoherent, due to the limited funds available for remediation and the limited capacity to collect these funds (Dupuis and Knoepfel, 2015). However, as no remediation of soil is required, authorities opt for the development of the polluted plots in order to restrain water infiltrations and thus prevent future environmental damages. The LRA consists in an implementation of various obligations defined by the institutional regime and in the achievement of water pollution standards. Hence, *H1 is disproved in the process "polluted soil in Niederbipp".*

Development of polluted soil disproves H1

One central factor that conditioned the process' success was the absence of a remediation obligation, which made profitable development of land possible. Further, finding a risk-taking investor ready to deposit a financial guarantee had been a problematic element since the first development projects were discussed.

Innovation through compensation mechanism disproves H1

In the process "tax on added land value", *H1 is disproved*: the commune used their margin of manoeuvrability, granted by the complex institutional regime of soil in order to enhance the local regime's coherence, and successfully implement the tax. This implementation of the institutional regime can be explained by several elements:

- the zoning operation created an important added economic value for landowners;
- landowners did not pay for land service, because the basic land service had been paid six years earlier during the creation of the industrial zone. This was perceived and used as an opportunity for the commune to capture a portion of the added economic value they created.
- detail land service costs were paid by the land buyer. In order to ensure the payment of the land service costs, the delivery of the building permit was conditioned on the payment of these fees by the new landowner;
- in order to ease the landowners' consensus on the tax on added land value, the commune granted them a "discount" on the tax rate: land prices used for the implementation of the tax were under-assessed. This discount was not considered a circumvention of the IRR, because no formal tax rate is mentioned in communal building regulations;
- in addition, the commune gained political support for the zoning operation through the mobilisation of end beneficiaries (inhabitants), who would benefit from one major employer offering jobs and fiscal revenues.

6.2.1.4 Malley**Land exchange disproves H1**

The land deal process mobilised the property rights side of the regime, land use policy and culture policy (through the spatial impacts produced by the museum). The double role of Lausanne (landowner and local authority defining land use planning regulations) allowed them to adjust the value of one of the exchanged plots and thus reduce the amount of cash involved in the property transfer. Thus, *in the process "land exchange in Malley", H1 is disproved*.

Implementation of MAO restrictions disproves H1

In the process of the major accidents ordinance, the incoherence between densification objectives in land use policy and use restrictions imposed by the MAO, is overcome through an increase of the plot ratio (which induces higher densities) and a prohibition of specific land uses. Actors used their margin of manoeuvrability in order to implement the objectives of the institutional regime. Hence, *in the process "MAO restrictions", H1 is disproved*.

Implementation of soil protection ordinance disproves H1

Similar to the process "polluted soil" in Niederbipp, polluted soil in Malley was faced with incoherence in terms of financial means allocated to remediation. As only the excavated soil was to be remediated, authorities and the target group agreed on a relocation of development rights to the least polluted areas, thus minimising the amount of excavated soil to be remediated. The obligations set by the institutional regime were fulfilled and *H1 is disproved for the process "polluted soil in Malley"*.

Circumvention of extended land service tax confirms H1

The legally unresolved issue of payment of the extended land service tax by a public landowner called into question the extent of the tax' target group, and thus the extent of the institutional regime of soil. The conflict between local authorities and landowners resulting from this uncertainty led actors to mobilise several resources. The reduced amount of taxation shows the results obtained through the resistance of the target group to the instrument's use, and characterises the circumvention of the LRA. Thus, *in the process "extended land service tax", H1 is confirmed*.

In terms of energy provision, the incoherence of the institutional regime of soil lies in the discrepancy between cantonal and local (communal and master plan's) objectives for providing energy from renewable sources: the former sets a goal of 20 %, while the latter targets the 2000W-society, requiring 75 % of energy stemming from renewable sources (Commune of Lausanne, 2014b). This discrepancy led to a circumvention of local energy goals both by local authorities, and landowners who privileged their energy production and distribution infrastructure, over alternative energy sources. As a consequence, target percentage of renewable energy source were not met, and, *in the process "energy planning", H1 is confirmed.*

Circumvention of energy objectives confirms H1

6.2.1.5 Cheseaux

In the land exchange process in Cheseaux, local authorities overcame the limited compensation mechanisms of the institutional regime of soil through the mobilisation of their own resources in order to exchange and acquire land. The regime's coherence is partial, because local authorities do not have the funds that the tax on added land value would have allowed to constitute in order to compensate for land use planning measures (such as removal of intermediary zone, or land acquisition). Hence, *in the process "land exchange in Cheseaux", H1 is disproved.*

In the case of a highly coherent regime, authorities would have relied on a dedicated fund from the tax on added value, in order to finance the land acquisitions prior to the syndicate.

Another possibility could have been the use of expropriation as an alternative means of value compensation. For consensual, time, and monetary reasons, local authorities favoured the voluntary exchange and sale procedures over expropriation. As publicly announced and implemented procedure, expropriation would have been highly visible, strongly ideologically connoted, and time consuming. Further, it is uncertain to what extent expropriation would have made it possible for authorities to pay a higher land price than the negotiated land prices of the intermediary zone (35CHF/m² instead of 20CHF/m²).

The implementation of the land improvement syndicate (redefinition of property shapes and titles, modification of the zoning plan) allowed for the simultaneous creation of a significant amount of added economic value, reduction of the intermediary zone, and financing of land service within the perimeter to be developed. Through the value induced by the new building zone, the instrument allowed for compensation of the reduced value on the plots due to transitioning from intermediary to agricultural zone. The instrument also partly substituted to a building obligation, because landowners facing a strong incentive to develop the land in order to be able to pay for the LIS' functioning and for the land service. Thus, the soil's institutional regime was implemented. Although the implementation process involved specific concessions on the communal side (regarding to the zone of their land, to the land service costs division, and to the maintenance of green spaces), the regime's objectives were implemented. Hence, *in the process "land improvement syndicate", H1 is disproved.*

Land improvement syndicate disproves H1

6.2.1.6 General discussion

The complex regime of soil grants actors (both public authorities and target groups) a significant margin of manoeuvrability in the implementation process. The verification of H1 can be synthesised as follows: despite a complex institutional regime, characterised by multiple incoherences and a lack of strictness, authorities tended to use the available margin of manoeuvrability in order to implement local policy goals compatible with the regime's objectives. Therefore, H1 is mostly disproved.

Despite the hypothesis' rejection, its test allows for the identification of a set of factors that contribute to the regime's implementation or circumvention. First, local authorities can use the *function of incentive or threat* of policy instruments in order to implement land use policy. The process of imposing a building obligation on landowners by threatening placement in the green zone in Wiedlisbach, or the process of implementing MAO restrictions in Malley by granting a high plot ratio to landowners, these examples display this threat and incentive function. The levy

provided by land use policy instruments is intrinsic to the concept of instrument (see table 2.7 on chosen typologies in chapter 2). A notable element is that rules and obligations (use rights) defined by zoning can simultaneously have a control and an incentive function. This blurs the distinctions drawn by typologies such as those elaborated by Lascoumes and Le Galès (2007) or Bemelman-Videc et al. (1998).

Second, the *existing margin of manoeuvrability in the implementation process*, possible interpretations in the definition of policy instrument modalities when applied to individual concrete situations, can play a decisive role. Implementation processes considered a success can quickly become failure, and vice versa:

- in Wiedlisbach, the zoning of constructible plots into a green zone allowed for the extension of the building zone beyond legal limits. If no new building zone had been created, the green zone would have facilitated a partial mobilisation of building zone reserves, consistent with land use planning objectives;
- in Niederbipp, despite a temporary excess of limit values in groundwater, the redevelopment of the polluted soil took place without remediation. If the limit values had been exceeded over a longer period of time, remediation would have been necessary, and the process' success far from certain;
- in the case of the MAO restrictions in Malley, the flexibility approach taken by authorities in redefining the plot ratio led to a reopening of negotiations;
- also in Malley *the uncertainty of extend* of the extended land service tax (unclear targeting) eased landowners possibility to fight the instrument and reduced the amount of value captured by the instrument.

Third, the hypothesis highlighted the importance of *initial coherence between property rights and public policies* (in particular land use planning policy) for the implementation processes to succeed. The building zone reduction in Huttwil was only possible because the size of the reduced building zone on each plot (each belonging to a different owner) was proportionate to each landowner's property (see also H3a). The relocation of development rights in Malley could be done without changing the property structure, because the local development plan involved only one landowner. In case no initial coherence existed (Cheseaux), specific instruments had to be used to reshape the plots, relocate development rights, and make subsequent construction possible.

The fourth factor, the *presence of public infrastructure*, can either foster the regime's implementation, or hinder it. In the building right process in Huttwil, public property allowed to adapt the land rent to housing demand. Regarding the process of tax on added land value in Niederbipp, existing land service provided authorities the opportunity to apply a new tax. In Malley, the train station fostered the redevelopment of the entire neighbourhood. In Cheseaux, public land allowed the commune to exchange for more central plots, and thus build its school. However, public infrastructure can also hinder the implementation of policy objectives, as the district heating system in Malley has shown. Hypothesis H3c discusses the importance of public infrastructure in the elaboration of public strategies further.

Fifth, *communal autonomy in land use planning and fiscal matters*, which are linked to the federalist nature of Swiss institutions, create incoherences between public policies, and thus produce effects opposed to the institutional regime's objectives. This has been shown in Wiedlisbach's building zone transfer, and more generally, in the wide expansion of urbanisation in Huttwil and Niederbipp – despite demographic decline. The fight over territorial attractiveness pushes tax rates down, and provides incentives to communes to make cheap building land with loose building regulations available.

Sixth, *the absence of compensation mechanism* (such as a tax on added land value created through zoning) reduces the margin of manoeuvrability local authorities have in the implementation of the soil's institutional regime. This issue is specific to the Swiss regime of soil, where economic losses due to zoning changes are, under certain conditions, to be compensated (Nahrath, 2003; Jomini, 2008). It has become salient in the case of Huttwil, where the threat of landowners claiming compensation for material expropriation and the absence of funds in case of effective compensation

made the removal of the hoarded building zone impossible. This regime incoherence contributes to the previous point: the implementation of value capturing instruments at the communal level faces high resistance, because it directly confronts local interests of both the landowners and the communal authorities, the latter placed under pressure by fiscal competition and territorial attractiveness.

Cases	Verification	Explanation
WIEDLISBACH		
Building zone transfer:	Confirmed	Communal planning autonomy leads to the creation of "holes" in the building zone
Building obligation on serviced land:	Partly confirmed	Absence of building obligation induces resistance through building permits, and the negotiation of additional development rights. Others sign the building obligation (implementation)
Building obligation on un-serviced land:	Disproved	Absence of building obligation is overcome through consensus between parties
Building obligation on new building zone:	Disproved	Absence of building obligation is overcome through mobilisation of zoning and emption right
HUTTWIL		
Building zone reduction:	Confirmed	Absence of compensation mechanism prevents the removal of the oversized building zone
Building right:	Disproved	Infrastructure and reduction of land rent are used in order to foster land development
NIEDERBIPP		
Polluted soil:	Disproved	Potentially high remediation costs and limited funds are overcome through land development
Tax on added land value:	Disproved	Margin of manoeuvrability is used to enhance the institutional regime's incoherence and implement the compensatory instrument "tax on added land value"
MALLEY		
Land exchange:	Disproved	Mobilisation of own resources and zoning allow for the implementation of the regime's objectives
MAO use restrictions:	Disproved	Incoherence between MAO restrictions and cantonal planning is overcome through zoning
Polluted soil:	Disproved	Potentially high remediation costs and limited funds are overcome through relocation of development rights
Extended land service tax:	Confirmed	Unclear extent of the tax' target group leads to the circumvention of the amount to be paid
Energy planning:	Confirmed	Incoherence between cantonal and (inter-) communal energy goals lead local actors to circumvent local objectives and privilege the owned infrastructure
CHESEAUX		
Land exchange:	Disproved	Absence of value compensation mechanism compensated by mobilisation of own resources
Land improvement syndicate:	Disproved	Absence of value compensation mechanism and building obligation overcome through land improvement syndicate

Table 6.22: Synthesis of the verification of H1.

6.2.2 H2: Effects of contextual factors on the LRA

The second hypothesis aims to assess the general impact of contextual factors (demography, land prices, soil pollution, transport infrastructure, and distance to centres) on land use policy processes. These factors are assessed as a bundle, because I do not aim to quantify their individual explanatory power, but to extract relevant contextual characteristics in the studied processes which potentially play a role in all processes.

H2: If there is stagnation of demography and land prices in the local context, a low degree of access to transport infrastructure, and a significant distance to urban centres, then the LRA consists of passive implementation, circumvention, or diversion, of the institutional regime of soil. This can be explained by the limited economic value that authorities can create through zoning and use in land use policy processes.

Conversely, a local context where demography and land prices increase, where soil structure is adequate (not steep, stable, and not polluted), where accessibility is high and distance to centres low, the LRA consists of an implementation or innovation of land use policy objectives.

6.2.2.1 Wiedlisbach

In the case of Wiedlisbach, contextual factors play an ambivalent role:

- stagnant demography and growth induce a building zone transfer and various building obligation strategies. The former result in a diversion LRA, the latter in an innovation LRA;
- the role of land prices cannot be assessed with sufficient precision, because I lack proper data. However, prices are sufficiently high to allow for the implementation of the tax on added land value in the process of building zone extension;
- compared to the other cases, access to transport infrastructure and distance to urban centres is rather low, but sufficient to achieve development and allow local authorities to capture part of the added economic value induced by zoning.

Consequently, contextual factors play a rather mixed role leading to a *partial confirmation of H2 in the process "building zone transfer", disproved in the three processes "building obligations"*.

6.2.2.2 Huttwil

In the case of Huttwil, population is shrinking, land prices are lower than in the centre and north of the region, and the accessibility of urban centres is rather low (long travel distances and time required). Low land prices explain part of the hoarding behaviour of landowners in the process "building zone reduction", as well as the lowered rent required for the building rights. The passive implementation LRA in the case of Thomasbode is only partly explained by the unfavourable context faced by actors. In the process "building right", authorities manage to overcome the contextual factors and implement the institutional regime of soil. *In the case of Huttwil, H2 is disproved.*

6.2.2.3 Niederbipp

In the case of Niederbipp, connection to transport infrastructure influenced the creation of the industrial zone, because it was considered a necessary factor for the development of industrial land uses by cantonal authorities. In the process "polluted soil", soil structure and pollution have a negative impact on the economic value of soil (additional construction requirements), which is entirely compensated for by the added land value induced by zoning. In the process "tax on added land value", the implementation of the instrument is conditioned by the existing basic land service (contextual infrastructure), leading to the absence of land service costs for landowners, and in turn, allowed for the implementation of the tax on added land value. Consequently, *in the case of Niederbipp, H2 is confirmed in the process "polluted soil", and partly confirmed in the process "tax on added land value"*.

6.2.2.4 Malley

In the case of Malley, demographics, connection to transport infrastructure and immediate proximity to centres influence land prices in two ways: despite high land values, local authorities were unable to implement value redistributive instruments (circumvention of LRA in the process "extended land service tax"). However, the plots' location led to a land exchange between landowners.

The adjacent train lines also reduce possible land use due to the MAO restrictions and impacts land value negatively. However, this is not reflected in the circumvention LRA, because the "lost economic value" is compensated for with additional development rights.

Soil pollution (and the obligation to remediate excavated polluted soil) induces a concentration of development rights on less polluted grounds (implementation LRA). Further, available and planned heating infrastructure (district heating system) limits the implementation of inter-communal energy objectives (circumvention LRA).

Consequently, *in the case of Malley, H2 is confirmed for the processes "land exchange", and disproved for the processes "MAO restrictions", "polluted soil", "extended land service tax" and "energy planning"*.

6.2.2.5 Cheseaux

In the case of Cheseaux, demographic growth, and the subsequent need to create a new school, facilitated the acquisition (and to a certain extent, the exchange) of land between commune and landowners. Transport infrastructure and proximity to the agglomeration of Lausanne contributed to the definition of land use policy objectives oriented towards land development. The commune's demographic growth – the most significant among the cases studied – contributed directly to the need of a new school, which was the central motivation of the commune to launch the development project and thus achieve its local, in addition to the agglomeration's and cantonal's land use policy objectives. Consequently, *in the case of Cheseaux, H2 is confirmed in both processes*.

6.2.2.6 General discussion

**Proactive land use policy
reduces the influence of
contextual factors**

The results of H2 show that demographics, land prices, connection to transport infrastructure, and distance to urban centres, influence the implementation of land use policy goals, particularly when these concern land development.

In the cases of Wiedlisbach and Hutwill, where there is a stagnation or decline of demography and/or land prices, as well as moderate to low connection to transport infrastructure and moderate/low proximity to urban centres, I observed that the implementation of the institutional regime of soil required a proactive communal land use policy: the extensive use of policy instruments, and the mobilisation of policy resources (like infrastructure) were necessary to achieve land development. This becomes salient in the process "building right" in Hutwil: the case has shown that despite a context of stagnant prices and declining demographics, development is still possible, as long as landowners are willing to reduce the rent on their property. In the unfavourable socio-economic contexts observed, landowners had the possibility to absorb the reduced rent, but authorities were not in the position to systematically force them to do so. In the cases analysed, this has three explanations:

- a lack of regime strictness and coherence: local authorities did not have the necessary instruments to implement the regime, such as a building obligation prior to the last revision of the spatial planning act, or a compensation mechanism that would allow for the removal of oversized building zones;
- local authorities face asymmetric power relations that circumvent instrument use (*e.g.* zoning operations based on local interests, payment of land service by local authorities);
- the low to moderate rent expected from land development provides an incentive to landowners and investors to wait for prices to rise.

Further, transport infrastructure played a less important role in the peri-urban than in the urban context: its presence provides a limited levy for the development of housing, as the generalised hoarding behaviours in the three peri-urban cases show. This statement applies less to industrial uses, as demonstrated by the logistics hub established in Niederbipp. In fact, industrial uses depend more on the immediate proximity to the infrastructure itself, rather than on the proximity to urban centres, which is of greater importance for housing.

The situation is different in the urban context, where demography and land prices have risen over the past fifteen years, and connection to transport infrastructure is determinant: landowners and investors are willing to develop in proximity to mass public transport stations. However, without a financial return deemed sufficient, land use change processes can also be easily blocked – at least until the 2014 revision of the spatial planning act. This becomes particularly salient when landowners, (also public or semi-public), rely on action plans or master plans with predefined densities to defend the added economic value they expect from the project (such as in Malley when the MAO restrictions were imposed), and impose their veto in case their expectations are not met. In the urban context, authorities have a wider margin of manoeuvrability for adjusting the plot ratio and using it as a levy to maintain the financial attractiveness of land development. However, the threat of third party users (neighbours, renters association, neighbourhood association, etc.) deploying referendums against local development plans is a factor to consider.

As a consequence, in the cases studied, actual land use does not solely depend on land price, but on the landowner's willingness to absorb the difference between the land's market value and the financial return of the asset. Referring to the economic theory explaining land value exposed in chapter 2, the processes studied show that rent does not claim the remainder of the value, once labour and capital have been remunerated, but becomes a central issue to land use policy negotiation processes: target groups expect a minimum financial return, sometimes a return above market prices (absolute rent in case of district heating in Malley). The rent issue plays a reduced role in peri-urban contexts, where authorities are willing to reduce it in order to achieve local goals (Huttwil). Such expectations become evident in the cases of major landowners applying the same rate of return for all building rights (commercial leases and cooperative housing leases) they grant on their land (Cour des comptes du Canton de Vaud, 2011b). The minimum rate of return is the expression of a power relation in which the landowner tends to have the upper hand. This power relation is observable in various contexts: the circumvention of the extended land service tax in Malley, the disproportionate land service costs carried by the commune in the case of the LIS in Cheseaux, and the compensation claims against the building zone reduction in Huttwil, all of which show the ambivalence of land prices on the implementation of the soil's institutional regime.

Redistribution of rent as central issue

Cases	Verification	Explanation
WIEDLISBACH		
Building zone transfer	Partly confirmed	Stagnant demographics induce an extensive urban growth strategy, diverting land use policy objectives, but capturing a portion of the added economic value created through zoning
Building obligations	Disproved	Stagnant demographics induce mobilisation of hoarded land, exceeding land use policy objectives (innovation LRA)
HUTTWIL		
Building zone reduction	Disproved	Limited influence of contextual factors on LRA
Building right	Disproved	Reduced land prices induce an implementation of LRA through a reduced land rent
NIEDERBIPP		
Polluted soil	Confirmed	Accessibility and land prices cover additional costs linked to soil pollution. LRA implements the institutional regime
Tax on added land value	Partly confirmed	Implementation of the institutional regime of soil conditioned by market demand for industrial land and existing land service
MALLEY		
Land exchange	Confirmed	Similar land values allow actors to exchange plots
MAO restrictions	Disproved	Reduced value induced by proximity to rail tracks is compensated by additional development rights (circumvention LRA)
Polluted soil	Disproved	High land values are partly used to cover soil remediation costs (implementation LRA)
Extended land service tax	Disproved	High added land value induces an LRA circumventing policy objectives
Energy planning	Disproved	Additional costs due to high energy requirements are circumvented through the use of the district heating system (circumvention LRA)
CHESEAUX		
Land exchange	Confirmed	Experienced demographic growth and need of a new school facilitated the acquisition of land (implementation LRA)
Land improvement syndicate	Confirmed	Experienced demographic growth and proximity to transport infrastructure and urban centre induce an implementation of land use policy objectives

Table 6.23: Synthesis of the verification of H2.

6.2.3 H3a: Effects of property structure on instrument use

H3a: If the property structure is highly fragmented or unordered, then authorities combine public law and property rights instruments to redistribute value. This can be understood through the constitutional requirement to treat all target groups equally.

To test this hypothesis, I compare land use policy processes that involve different levels of property fragmentation and order (for example, different numbers of plots and landowners involved, sizes and shapes of the plots): the building zone transfer in Wiedlisbach (high level of fragmentation), the land improvement syndicate in Cheseaux (moderate level of fragmentation), the building zone reduction in Huttwil (low level of fragmentation), the relocation of development rights based on soil pollution in Malley (no fragmentation).

6.2.3.1 Wiedlisbach

In the process “building zone transfer” in Wiedlisbach, the property structure was highly fragmented, involving dozens of landowners. Local authorities did not aim to redistribute development rights, but only to reduce existing unavailable building zone reserves, so that they could extend their building zone elsewhere. In this case, the location of the building zone reserves intended for reduction was not important for authorities; only the quantitative reduction of the reserves was relevant. In this way, authorities targeted (through the use of the zoning plan (type 2)), all plots that were considered building zone reserves, and placed them into the green zone. Due to the various circumvention strategies adopted by landowners, only certain targeted plots were effectively moved to the green zone (see figure 6.1). For the building zone transfer to succeed, a zone change for a portion of the targeted plots was sufficient (2ha out of 7ha building zone reserves – 2ha corresponding to the new building zones to be created). The strategy allowed authorities to discriminate “accommodating” from “virulent” landowners, and to quantitatively and temporarily reduce building zone reserves.

Alternatively, local authorities could have employed property rights instruments as well as negotiate temporary non-constructibility easements with landowners. A property rights approach would have required a systematic agreement with the landowners, whereas local authorities could, in the strategy adopted, impose their decision through majority vote of the communal legislative body. Consequently, *H3a is disproved in the process building zone transfer*.

According to the Constitution, landowners are entitled to receive the same advantages and disadvantages resulting from land use planning measures, as long as their situation (in terms of surface owned, of soil quality, and of location) is comparable, and as long as “the zoning decision relies on objective grounds”¹. Regarding whether or not the building zone transfer in Wiedlisbach fulfils the equal treatment condition is unclear: some landowners have obtained advantages from the zone change, whereas others remained in the building zone. These (non-) changes occurred based on the willingness of landowners to fight the implementation of the green zone. However, such potential unequal treatment is temporary.

¹ATF 101 Ia 502.

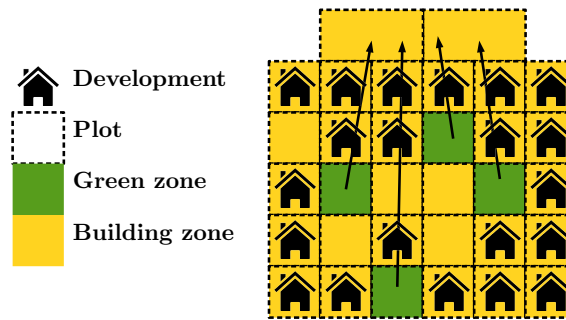


Figure 6.1: Redistribution of development rights in Wiedlisbach.

6.2.3.2 Cheseaux

In the process land improvement syndicate in Cheseaux, there was a moderately fragmented property structure involving dozens of landowners. Local authorities' aim was to relocate the plots they owned to the east of the perimeter, as it is the most central and appropriate place to build the new school. In this case, location mattered, and so did the landowners within the LIS' perimeter: it was necessary to redistribute property titles in order for the commune to obtain the well-located ones. The commune could have used the property rights path and buy the plots from each individual landowner. The property rights path was indeed chosen for the land exchange in order to acquire plots in the LIS' future perimeter. However, it did not allow to reshape the plots for development and change their zone. The commune could also have negotiated one to one with landowners in order to define new plot limits. But such a procedure would have been extremely time consuming and any disagreement from even one landowner would have called the entire arrangement into question. Further, solely using public law instruments, (for example zoning the plots as "public zone"), would not have changed the plot shapes which were inadequate for development, and it would have possibly required them to expropriate the landowners of the targeted plots. Local authorities required a meso-level tool that made the simultaneous use of PR instruments (such as conventions redefining plot limits) possible (see figure 6.2). Through the land assembly, (which makes majority based decisions), and the proportionate distribution of development rights among all involved landowners, the LIS was used to relocate rights and redefine the property shapes. Hence, H_4 is confirmed.

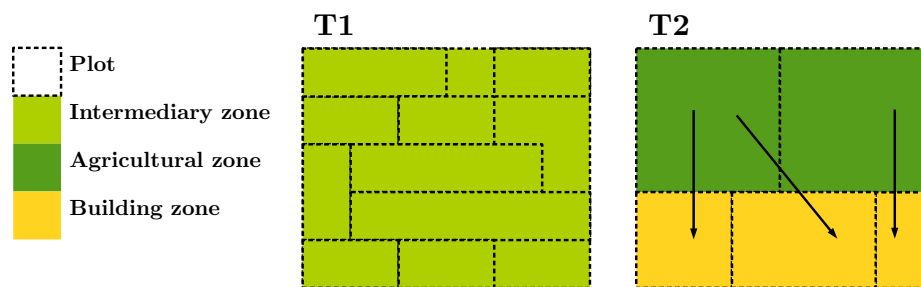


Figure 6.2: Redistribution of development rights in Cheseaux.

6.2.3.3 Huttwil

In the process of building zone reduction in Huttwil, there is a low fragmentation of property structure involving three landowners. The communal aim was to reduce building zone reserves, so that the legal obligation of correct building zone dimensioning was fulfilled. In this case, location was a given, with the reserves located at well-identified places. The concentration of development rights within a smaller perimeter occurred through the elaboration of a new local development plan (type 2). This, however, was only possible through the proportionate reduction of constructible

surfaces and the allocation of new development rights on all plots. A necessary condition allowing for the proportionate relocation of development rights without modifying the property titles, was the striped property structure, which allowed a proportionate distribution of development rights among landowners (see figure 6.3). In other words, the existing property structure reflects the implementation of a local development plan that fulfils the principle of equal treatment. If the property structures had been more jumbled (as in the process LIS in Cheseaux), then a land betterment procedure, or conventional negotiations on plot limits, would have been necessary. Hence, H_4 is confirmed.

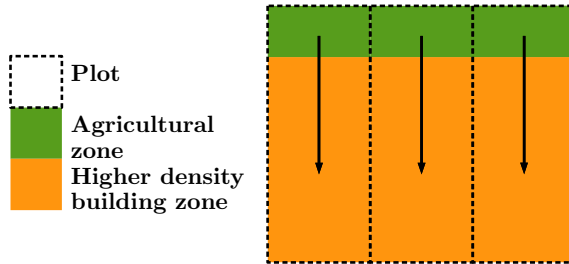


Figure 6.3: Redistribution of development rights in Huttwil.

6.2.3.4 Malley

In the process "polluted soil" in Malley, there is a unified property structure involving two landowners, one of whom owns the entirety of the land targeted by the local development plan *Malley-gasomètre*. The aim is to relocate development rights, so that soil remediation costs are minimised. The location does matter, because pollution is more acute in certain areas than in others. But the property rights structure is not a condition of implementation, because for the landowner, as long as the amount of rights remains the same, the location of the development rights do not matter. Consequently, authorities can relocate development rights relying entirely on the soil pollution criteria, which allows for the landowner to obtain a tailor-made local development plan which minimises soil excavations and underlying remediation costs (see figure 6.4).

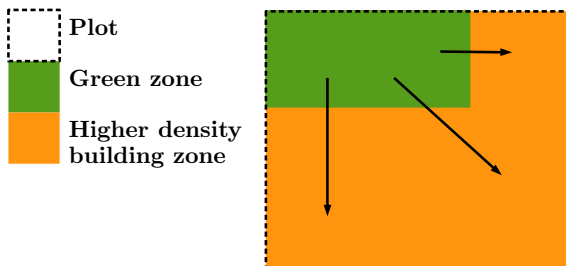


Figure 6.4: Redistribution of development rights in Malley.

6.2.3.5 General discussion

The results show that overall, the hypothesis is confirmed. In the processes of Huttwil and Malley, property rights did not impede the spatial redistribution of value, either because the plots were shaped in a way that allowed them to transfer the same amount of value to all landowners, or because there was one single landowner. In the process of Cheseaux, value redistribution through zoning occurred jointly with the reshaping and relocation of property titles, which allowed for equal treatment for all parties.

For the building zone transfer in Wiedlisbach, value redistribution occurred based on landowners' willingness to contest the green zone. In this case, the disproving of the hypothesis, and the non-utilised property rights instrument, is explained through the communal objective to reduce *temporary quantitative* building zone reserves. The

process result is tightly linked to the Swiss legal obligation to dimension the building zones according to the needs of the next fifteen years. Without such obligation, local authorities could simply have created a new building zone such as in Huttwil, Malley, and Cheseaux.

Cases	Verification	Explanation
WIEDLISBACH		
Building zone transfer	Disproved	Fragmented property structure does not impeach value redistribution without the use of property rights instruments
HUTTWIL		
Building zone reduction	Confirmed	Ordered property structure allows value redistribution without the use of property rights instruments
MALLEY		
Polluted soil	Confirmed	Single landownership allows value redistribution based on criteria independent from land property
CHESEAUX		
Land improvement syndicate	Confirmed	Fragmented property structure induces the use of the LIS (type 2 and type 4 instrument)

Table 6.24: Synthesis of the verification of H3a.

6.2.4 H3b: Effects of "information" on instrument use

H3b: If the resource information is shared between authorities and the target group, then these actors define a joint strategy and establish together the modalities of the instruments' use. This can be explained by the reduced power asymmetry between actors and by the enhanced (public) accessibility of the shared resource, which compels actors to find a compromise.

Out of the 15 redistributive processes analysed, I identified four processes (building zone reduction in Huttwil, polluted soil in Niederbipp and Malley, and land exchange in Malley) where information was shared between actors. In two other processes, an information asymmetry between authorities and the target group prevailed: the MAO restrictions and energy planning in Malley. In order to test H3b, I analysed if and how shared information contributed to the definition of a joint strategy, and helped define the modalities of the implementation of policy instruments.

6.2.4.1 Huttwil

Starting with the process of the building zone reduction in Huttwil, the initial data received was a report on risk zones, which classified the area of Thomasbode as a medium danger zone. The report was used by the commune as an argument for the removal of the undeveloped building zone. However, the elaboration of a second report on the land's constructibility was mobilised by landowners as a justification of the need to pay compensation if the land were zoned as agricultural. In this way the second report contributed to the failure of the initial communal goal to utilise zoning to entirely remove the building zone. However, once the site's constructibility was confirmed, it allowed authorities, in accordance with the landowners, to redesign a local development plan that would correspond with the types of construction (*Terrassenhäuser*) suggested by the report, which in turn allowed the authorities to reduce the size of the building zone.

Ultimately, the information and reports shared between authorities and target groups serve as common ground for modifying local authorities' use of the instrument zoning. Hence, *H3b is confirmed*.

6.2.4.2 Niederbipp and Malley

In the process of the polluted soils in Niederbipp and Malley, the pollution reports provided data on the type and spread of pollution, and on the risks of exfiltrations. It is only because both authorities and target groups knew the pollution's location

and the risks of exfiltrations that they were able to design a building permit conciliating remediation obligations, prohibition of exfiltrations, and development goals. Consequently, *H3b is confirmed*.

6.2.4.3 Malley

In the process of the land exchange in Malley, both parties ordered a financial report of their plots' value in order to assess the relevance of an exchange. The uncertainty linked with the plots' values (due to zoning regulations that had not yet been approved) was reduced through contractually defined cash payments between landowners, intended to compensate for the potential difference of value between the plots. Without shared financial information, the parties would not have agreed to such an exchange. Thus, *H3b is confirmed*.

In the process of MAO restrictions where an information asymmetry existed, the canton did not initially know how to assess the risks targeted by the MAO, and delegated their assessment to the target group (SBB). The absence of information exchange between the parties (on the methodology used for the risk assessment) led the canton to later produce on another financial report, which excluded a set of land uses on the concerned plots, and opposed the first report produced by the target group. The contradictory reports blocked the negotiations, and prevented the definition of zoning regulations in the concerned perimeter. Hence, *H3b is confirmed*.

In the process energy planning, local authorities lacked information on the compatibility of district heating with defined energy goals. However, the target group promoted district heating as a renewable source of energy, and sold shares in the district heating network to local authorities, including local authorities in a coalition favourable to district heating. When district heating was shown incompatible with the defined energy goals, local authorities faced reduced choices in terms of energy provision, as the choice of an energy source other than district heating would have directly impacted the investments they had made. Hence, *H3b is confirmed*.

6.2.4.4 General discussion

Summarising the hypothesis' results, I confirm the relevance of (un-) shared information in the processes analysed, and thus the hypothesis H3b: I observe that shared information – experts' reports on the soil structure or on financial elements – created a common basis for the definition of a joint-strategy, and the joint definition of the instruments' modalities such as density, type of use, etc. On the contrary, information asymmetry led to a temporary block in the implementation process, or restrained the obligations defined by the instruments (such as the source of energy to be used) and resulted in privileging of the informed actor's interests over those of the other actors.

Based on the cases analysed, complementary resources have been identified in determining the power position of actors:

- resource personnel can be necessary to exploit available information and gain an advantage over other actors (as in the case of polluted soil in Malley);
- resource time can be mobilised by landowners to threaten to interrupt negotiations (like in the process MAO restrictions);
- infrastructure can reflect a past investment whose costs have to be born in the present, and thus limit actors' consideration of potential options (as in the energy planning case in Malley – see H3c).

Cases	Verification	Explanation
HUTTWIL		
Building zone reduction	Confirmed	Soil constructibility report induced the abandonment of building zone removal and its substitution through a reduction of the building zone
NIEDERBIPP		
Polluted soil	Confirmed	Soil structure and pollution report permitted to set a detailed prescription for the building permit and define obligations in regard to rain water drainage
MALLEY		
Land exchange	Confirmed	Shared information on the plots' financial value allowed to exchange plots
MAO restrictions	Confirmed	Information asymmetry prevented a common understanding of risk norms to be applied, blocking the process
Polluted soil	Confirmed	Soil pollution report helped define the privileged areas for construction according to effective soil pollution
Energy planning	Confirmed	Information asymmetry led to the creation of a dominant coalition containing predetermined energy prescriptions in the local development plan

Table 6.25: Synthesis of the verification of H3b.

6.2.5 H3c: Effects of public "infrastructure" on instrument use

H3c: If the resource "infrastructure" owned by authorities is involved in a land use policy process, then authorities tend to define their strategy and the modalities of the instruments' uses in accordance with the resource's uses they seek. This can be explained by their double role as both regulator and owner of the resource soil.

Out of the 15 redistributive processes analysed, local authorities mobilised infrastructure through six processes: the process "building right" in Huttwil, existing land service in the process "tax on added land value" in Niederbipp, "land exchange" and "district heating infrastructure" in Malley, land plots exchanged and then subject to the "land improvement syndicate" in Cheseaux. In order to test H3c, I analyse how local authorities mobilise their infrastructure to support communal strategy or define the modalities of land use policy instruments.

6.2.5.1 Huttwil

The process "building right" in Huttwil shows that through the mobilisation of the land of the *Herdgemeinde*, local authorities could make building land effectively available, and thus contribute to the achievement of demographic growth on communal territory. Hence, *H3c is confirmed*.

6.2.5.2 Niederbipp

In the process of the tax on added land value in Niederbipp, local authorities provided basic land service during the initial creation of the industrial zone. When the industrial zone was expanded, they did not have to service the land again. However, they could still charge landowners for the added value of the land service, and thus recover the investments made in land service during the initial creation of the industrial zone. Such value recovery occurred through the implementation of the tax on added land value created through zoning. Hence, existing infrastructure allowed authorities to use the tax instrument on added value. Hence, *H3c is confirmed*.

6.2.5.3 Malley

Through the exchange of their plot with the SBB, the commune of Lausanne mobilised their infrastructure to obtain a plot well suited for the future cantonal museum, achieving their strategy of hosting the museum on communal territory: *H3c is confirmed*.

In the process of the energy planning, local authorities were co-owners of the district heating company, financially constraining their choices in implementing energy provision goals. Hence, *H3c is disproved*.

Further, the decision to minimise the excavation of polluted soil, and locate construction where soil was less polluted, is explained by the costs involved with the remediation of the infrastructure they own. This cost minimisation strategy occurs without impacting the planned amount of gross floor area. Consequently, *H3c is confirmed*.

6.2.5.4 Cheseaux

In the processes of land exchange and the land improvement syndicate in Cheseaux, local authorities mobilised infrastructure for the relocation of their properties closer to the centre, and then used the land improvement syndicate, allowing them to make land available for the construction of the new school. Hence, *H3c is confirmed*.

6.2.5.5 General discussion

Summarising the results of the hypothesis, the relevance of the resource infrastructure in explaining communal strategies and instrument use has been shown, which allows for *confirm the hypothesis H3c*. Infrastructure was mobilised to support communal objectives (demographic growth, finance of land service, creation of rent, construction of public facilities), and the modalities of land use policy instruments were defined according to the policy resource infrastructure (existing land service legitimises tax on added land value, energy planning shows compatibility of district heating system with 2000W society).

The case of Malley shows how the financial costs linked with the mobilisation of infrastructure can play a prominent role: if infrastructure involves additional costs that stand against past policy decisions (such as the substitution of the district heating system with geothermal energy), or simply involves non-mandatory, additional costs linked to specific land uses (such as the excavation and remediation of soil for underground construction), then infrastructure is mobilised in a way that minimises financial costs, or, said otherwise, maximises financial gains.

Cases	Verification	Explanation
HUTTWIL		
Building right	Confirmed	Plots owned by the <i>Herdgemeinde</i> allowed for the planning of a new neighbourhood in accordance with the communal growth strategy
NIEDERBIPP		
Tax on added land value	Confirmed	Land service built and owned by the commune allowed them to charge landowners for the benefit of added economic value
MALLEY		
Land exchange	Confirmed	Plot owned by Lausanne allowed them to exchange it, and thus host the future cantonal museum
Polluted soil	Confirmed	Large land surfaces owned by Lausanne allowed them to relocate development rights to where soil is less polluted, and thus minimise development costs
Energy planning	Disproved	Heating infrastructure owned by the commune reduced the possibilities of defining future energy sources
CHESEAUX		
Land exchange	Confirmed	Plots owned by the commune allowed for the exchange of plots for plots located within the future perimeter of the LIS
Land improvement syndicate	Confirmed	Plots owned by the commune enabled their development of public infrastructure

Table 6.26: Synthesis of the verification of H3c.

6.2.6 H4a: Effects of sole public policy instruments on the LRA

The general hypothesis underlying the instrument types' effects on the LRA is that only a combination of different instrument types allows for the implementation of the institutional regime of soil. In order to test the hypothesis, the analysed redistributive processes are divided among those that involve only type 1 and type 2 instruments (H4a), and those that involve a mix of different instrument types (H4b). As a reminder:

- type 1 instruments are public policy instruments that do not impact use or disposal rights;
- type 2 instruments are public policy instruments that have an impact on use and/or disposal rights;
- type 3 instruments are property right instruments that impact use and disposal rights;
- type 4 instruments are property right instruments that impact the distribution of property titles.

Hypothesis H4a is formulated as follows:

H4a: If authorities only use type 1 and type 2 instruments, then they will not implement the institutional regime of soil. This can be explained by the limited strictness and the incoherences of the institutional regime of soil, which grants to actors a significant margin of manoeuvrability for the implementation of public policy instruments.

Based on the type of instruments used in each redistributive process (as identified in tables 6.16, 6.18, and 6.20), I test H4a for the processes building obligation on serviced land, tax on added land value, and MAO restrictions. H4b is tested for all other processes.

6.2.6.1 Wiedlisbach

Responding to the communal threat of the green zone (type 2 instrument), several landowners with plots in building zone, requested building permits (type 1 instrument) in order to maintain the status quo, and preserve existing rights. This *circumvention of the institutional regime confirms H_4a* , because the sole use of zoning prevented authorities from achieving land use policy objectives.

A second LRA that resulted from the implementation of the building obligation on serviced land, consisted of the effective use of the green zone (type 2 instrument) combined with a higher plot ratio (type 2 instrument) and various derogations of building regulations (type 1 instrument). The policy output is a *diversion of the institutional regime of soil*, the settlement area more fragmented with development holes. As a consequence, *H_4a is confirmed*.

6.2.6.2 Niederbipp

The implementation of the tax on added land value created through zoning for the extension of the industrial zone in Niederbipp *disproves H_4a* , because the LRA consists of an implementation of the institutional regime, and no type 3 or type 4 instrument is used. Four factors contribute to explaining this arrangement:

1. basic land service was already available, because it had been paid for by other landowners and realised when the industrial zone was initially created. This reduced overall land service costs, and removed all costs due to basic land service for the landowners (to whom the tax on added land value had applied);
2. detail land service was paid by the developer (land buyer) – its payment was tied to the delivery of the building permit (type 1 instrument)–, which further reduced costs for the initial landowners (a pass-on of land service costs);
3. the effective tax rate applied did not correspond with effective land prices, resulting in a tax rate reduction 30% to 21% of the added value created through zoning;
4. communal and cantonal interest in the extension of the building zone was strong, the host of a major health care distributor, the creation of jobs and the increase of tax revenues (involvement of end beneficiaries) were used as arguments in favour of the project.

6.2.6.3 Malley

The negotiations on the use restrictions imposed by the ordinance on major risks led to divisions among authorities and target groups, as well as divisions within the target groups (infrastructure and real estate department of the SBB). The process' results are a set of construction specifications (type 1 instrument) and a prohibition of specific uses (type 2 instrument), which, in terms of reduced economic value, were fully compensated through an increase of the plot ratio (type 2 instrument). Hence, *the resulting LRA is characterised by a circumvention of the institutional regime*.

However, it is unclear if the use of type 3 or type 4 instruments would have allowed for implementation of the institutional regime. In fact, the use of type 3 or type 4 instruments – such as a financial guarantee or an emption right – ifor the implementation of the MAO restrictions, may even have induced perverse effects: for example, in cases where the target group would have circumvented the restrictions by implementing forbidden, but economically more profitable uses, authorities could have benefited from this circumvention via the financial guarantee. Therefore, the type of instrument does only provide part of the explanation of the policy output obtained and *H_4a is only partially confirmed*.

6.2.6.4 General discussion

Summarising the results of H4a, and using counter-factual reasoning, it is unclear how the use of property rights instruments could have allowed for the implementation of the institutional regime of soil to better conform to policy objectives. In the case of Wiedlisbach, the choice of instruments was dependent on the authorities' strategy to suspend the building zone. In Niederbipp, local authorities substituted the costs landowners would have born through the implementation of a redistributive instrument. In Malley, there were limited reasons to believe that the outcome (for example the non-negotiation of additional development rights by the landowners) would have differed with the use of a property rights instrument.

Nevertheless, two general observations specific to H4a can be made (additional results applying to H4a and H4b are presented in the general discussion of H4b). First, the initial implementation of instruments induced a margin of manoeuvrability which benefited both public authorities and target groups:

- the process of "building obligation on serviced land" in Wiedlisbach demonstrated a variety of reactions by the landowners, ultimately resulting in different LRAs. Local authorities dealt with the resulting outputs, because they could achieve quantitative reduction of building zone reserves as well as the subsequent building zone transfer. The most "virulent" landowners could opt for a rejection strategy, asking the commune to deliver a building permit, or negotiate additional development rights, without threatening the achievement of communal goals;
- in Niederbipp, the tax on added land value created through zoning was implemented, because local authorities and other landowners had paid for basic land service in the past, which in turn created a "margin of taxation" on newly zoned land. In turn, the discounted tax rate granted by the commune benefited landowners.

Second, the instrument building permit (type 1 instrument) can be used both by public authorities to ensure the target group's implementation of public decisions, and by the target group to maintain the status quo. Consequently, the effects of the instrument depends on who mobilises it:

- the process of the polluted soil in Niederbipp showed that it can be used by authorities to impose additional obligations;
- the process of the tax on added land value in Nieberbipp showed that local authorities used the instrument in order to ensure the payment of land service;
- in the process of the building obligation on previously zoned land in Wiedlisbach, landowners mobilised it to prevent a withdrawal of rights and gain more time.

Cases	Verification	Explanation
WIEDLISBACH		
Building obligation on serviced land:	Confirmed	Threat of zoning (type 2) is countered by building permit (type 2), which results in circumvention LRA Implementation of green zone (type 2) compensated by additional development rights (type 2) also results in a circumvention LRA
NIEDERBIPP		
Tax on added land value	Disproved	Tax on added land value (type 1) is implemented (implementation LRA), considered that it "substitutes" the land service tax
MALLEY		
MAO use restrictions	Partly confirmed	Circumvention LRA modifying plot ratio fixed in local development plan (type 2)

Table 6.27: Synthesis of the verification of H4a.

6.2.7 H4b: Effects of instrument mix on the LRA

Based on the distinction between type 1 and type 2, and type 3 and type 4 instruments, I now test the effects of the analysed processes that involve a mix of different instrument types on the LRA:

H4b: If authorities combine different types of instruments, then they will be able to implement the institutional regime of soil. This can be explained through the additional restrictions and/or obligations that these instruments impose on landowners, which allow for the enhancement of the institutional regime's strictness and for the reduction of its incoherences.

6.2.7.1 Wiedlisbach

In the case of Wiedlisbach and the building zone transfer, authorities used a mix of type 1 instrument (rezoning priority, exemption from tax on added land value created through zoning), type 2 instrument (plot ratio, green zoning, building zone extension), and type 4 instrument (emption right). The LRA that resulted from the implementation of this instrument mix amounted to a *diversion of the institutional regime of soil*, because it created "holes" in the building zone and fostered small scale urban sprawl. Therefore, *in the process of the building zone transfer, H4b is disproved*. As already mentioned in the discussion of H1, the specificity of the process "building zone transfer" is such that local authorities function as the actors who orchestrate the diversion of land use policy objectives, not the policy's target group.

Building zone transfer disproves H4b

Following local authorities' implementation of building obligations, *three LRAs* involved a mix of public policy and property rights instruments and *representing an innovation in the current institutional regime, confirming H4b*:

Building obligations confirm H4b

- in the case of serviced land, the LRA consisted of a contract between authorities and landowners, the latter contractually committed to developing their plot within 15 years. This contract is categorised as type 3, because it is not part of the institutional regime, relies on civil law, and has an impact on use rights. As a consequence, the LRA reduces the landowner's margin of manoeuvrability by imposing a land use change (development) within a given time period. *The LRA consists of an innovation of land use policy objectives, which confirms H4b*;
- in the case of un-serviced, industrial land, a legal mortgage with a delay of payment (type 3 instrument) is used. The financial resources required for the land service can be covered through the mortgage that local authorities hold on the land. It also guarantees the development of the land (*innovation LRA*): when the mortgage expires, landowners will have to reimburse approximately 1 million francs to local authorities, a sum that they might not be able to pay without selling the land. Hence, *H4b is confirmed*;
- in the case of the building zone extension in the Gerzmatt, the applied instrument mix consisted of zoning (type 2), which is exchanged for emption right (type 4), land service tax (type 1) and tax on added land value (type 1). The emption right is used to prevent a circumvention strategy by landowners (such as land hoarding and non-payment of the tax), whereas the tax on added land value value redistributes part of the added economic value generated by the operation (see H4). The building zone extension creates important added economic value, which is used as a levy by authorities to implement the various instruments mentioned. The implementation of these instruments is guaranteed through the emption right. In this case, *the LRA consists of an implementation of land use policy objectives, which confirms H4b*.

6.2.7.2 Huttwil

The process in *Thomasbode* consisted in a failed un-zoning process, and in a reduction of the constructible surface (type 2 instrument), achieved through a higher plot ratio (type 2). The commune traded the landowners' financial contribution to land service

Building zone reduction disproves H4b

(type 1) for a higher plot ratio, and status quo, in terms of obligations (no building obligation). The negotiated LRA benefited local authorities, because their building zone reserves were reduced, and a portion of the land service costs they faced were passed on to landowners (secured by type 3 instrument, legal mortgage). However, local authorities failed in the un-zoning process. The lack of political support and consensus resulted in a *LRA that meant a passive implementation of the institutional regime of soil, which disproves H4b*.

Building right confirms H4b

The case where the two communes use building rights in order to make land available to development, thus creating an *LRA that implements the institutional regime of soil and confirms H4b*: the combined use of zoning (type 2 instrument) and building right (type 3 instrument) allowed local authorities to dedicate new land to development and make it directly available to potential inhabitants. They also passed on land service costs (type 1) to future home owners, their payment being conditioned on the delivery of the building right. The mix of instruments used, together with the policy resources mobilised ("infrastructure" through land, and "money" through the low rental income they agreed on), allowed local authorities to achieve a portion of their land use policy objectives.

6.2.7.3 Niederbipp

Once the plots were zoned as industrial land (through type 2 instrument), the development of the former landfill was bound to a set of construction specifications and surveillance obligations (type 1 instruments), whose fulfilment was defined in the building permit (type 1 instrument). The risk against water contamination, and some of the costs that would be incurred in case pollutants exfiltrate from the landfill, were covered through a 10 year financial guarantee (type 3 instrument). *The LRA that results from the instruments' mix implements the institutional regime of soil, and thus confirms H4b* for the 10 year period that the guarantee lasts and up to the financial amount deposited. Beyond the 10 year period, or in case of remediation costs exceeding the financial deposit, the implementation of the institutional regime is no longer guaranteed.

The LRA also shows that 20% of the added economic value created through zoning was used to cover additional costs linked with the polluted soil (through a reduced sale price), leaving the landowner with a gain of 80% of the pre-agreed land price.

6.2.7.4 Malley

Land exchange confirms H4b

The exchange of plots (type 4 instrument) between landowners allows Lausanne to implement land use policy and cultural policy objectives. The infrastructure owned by Lausanne was mobilised as a means of establishing the new cantonal museum on communal territory, and as a means of creating housing and working areas in Malley. *The LRA that results from the land exchange implements the institutional regime of soil, and H4b is confirmed*.

Relocation of development rights confirms H4b

The high costs linked with the obligation to remediate the excavated polluted soil (type 2 instrument) led the actors to minimise the amount of soil excavated and the amount of underground surfaces created. The park was located where the soil is the most polluted, and the development rights were transferred from the un-developed areas (park, underground) to the places where future construction will be located (through zoning, type 2 instrument). The relocation of development rights within the perimeter of the local development plan is part of the process of elaboration of a local development plan, but the process was made possible without a dedicated instrument such as a land improvement syndicate (see Cheseaux), only because the property structure involved one single landowner; this situation removed the obligation to compensate for the difference, in terms of uses (and thus the differences in terms of economic value) between plots or owners. As a consequence, the use of type 4 instruments was substituted by the single landownership. *The LRA consisted in an implementation of the institutional regime of soil, indirectly confirming H4b*.

The process of the extended land service tax (type 1 instrument) results in a LRA where the amount of tax is a pure product from negotiations between communes and landowners. Despite a fixed rate written in communal regulations, the LRA results in *the payment of a negotiated lump-sum. Therefore, the institutional regime of soil is circumvented, which disproves H4b.*

Circumvention of the extended land service tax disproves H4b

The legal requirements for the establishment of an energy plan produces limited effects on the local development plan: the instrument does not define any binding measure, nor any additional instrument in order to guarantee the implementation of energy objectives. Target groups pass the responsibility of achieving the targeted energy objectives to the end beneficiaries. The *circumvention of the institutional regime of soil* is explained by local authorities' acquisition (type 4) of a portion of the district heating infrastructure. Thus, the achievement of energy objectives becomes secondary. As a consequence, *H4a is disproved.*

6.2.7.5 Cheseaux

In order to satisfy a large part of its land needs, build a school, and achieve its land use policy objectives, the commune exchanged (type 4 instrument) private plots located in the future perimeter of the LIS for bigger agricultural plots they owned in the agricultural zone. The commune also acquired plots (type 4 instrument) within the LIS perimeter. The use of these instruments anticipated the LIS process, and resulted in an *LRA which implements the institutional regime of soil. As a consequence, H4b is confirmed.*

Land exchange confirms H4b

The relocation and reshaping of rights achieved through the land improvement syndicate (mix of type 2 and 4 instruments) which allows for the removal of the intermediary zone, creates a separation between agricultural and building zones, opens new land for development, and ideally locates communal property for future communal infrastructure. The instrument mix used produces an *LRA that results in an implementation of land use policy objectives, which confirms H4b.*

Land improvement syndicate confirms H4b

6.2.7.6 General discussion

Synthesising the results of H4b, I can state that the combination of different instrument types facilitates the implementation of the institutional regime of soil. For example, property rights instruments can be used by authorities as a guarantee in order to increase the regime's strictness and ensure:

1. the effective implementation of the desired outcome (availability/sale of land, development or land), that is to say as insurance on future land use;
2. the availability of the money (potentially) due to local authorities (service of industrial land in Wiedlisbach, polluted soil in Niederbipp) – such guarantee is often automatically granted by law;
3. a third use is the relocation of property titles, as shown in hypothesis H3a.

However, the instrument mix does not overcome existing power relations. Wiedlisbach managed to impose their strategy of building zone transfer through the mobilisation of a political majority, and used to approve new building regulations. Huttwil failed in removing the hoarded building zone, because of the prevalence of the target groups, and the stance of the elected representatives. In Malley, landowners mobilised various policy resources they mobilised in order to limit the effects of the extended land service tax. In the process of energy planning, it was precisely the mobilisation of property rights instruments (acquisition of district heating infrastructure) that facilitated the circumvention of policy objectives.

A counter-example to the above cited cases is the land improvement syndicate in Cheseaux. The LIS consists of an instrument mix that overcomes part of the

power struggle among actors: as opposed to other instruments analysed which target individual plots, the LIS defines a new decisional (majority-based) rule that applies to all plots at once within the perimeter of intervention. The instrument goes one step further than regular instrument mixes by creating a community of landowners where all members – notwithstanding the surface they possess – have one equal vote. This decisional setting implies a redefinition of the individual property right, as it enables collective decisions on a group of plots.

Finally, the instrument mix (including the LIS) does not solve the question of economic value, which appears to play a central role in the processes where the instruments' implementation was circumvented (building zone reduction, extended land service tax, energy planning). On the contrary, the processes where type 3 and 4 instruments were used, permitted to implement or innovate the institutional regime of soil, I observed that most processes were linked with a substantial value creation, benefiting the target group:

- the building obligations on un-serviced land and on the new building zone were linked with the effective creation of added economic value. The property rights instruments forced the realisation of economic gains, but at the same time conditioned their creation;
- the process of building rights in Huttwil created minor permanent economic value, but more importantly, the process pursued broader communal goals of demographic growth;
- the added economic value created in the process of polluted soil in Niederbipp was, despite additional development and monitoring costs, substantial. It also settled the soil pollution issue for the landowners, their obligations limited to the expiration of the 10 year financial guarantee they deposited;
- the land exchange between the SBB and Lausanne granted both parties substantial benefits in terms of rent (Malley) and recognition (museum);
- in the polluted soil process in Malley, a relocation of rights prevented loss of economic value, but also minimised the reduction economic value linked with soil remediation;
- the added economic value in the two processes of Cheseaux were also evident, both for the landowners who sold or exchanged land with the commune, and for those involved in the land improvement syndicate.

Cases	Verification	Explanation
WIEDLISBACH		
Building zone transfer:	Disproved	Diversion LRA despite the use of type 1, 2 and 4 instruments
Building obligation on serviced land:	Confirmed	Type 3 instrument (voluntary obligation) allows innovation
Building obligation on zoned industrial land:	Confirmed	Innovation through type 3 instrument (mortgage)
Building obligation on new building zone:	Confirmed	Innovation through type 2 and 4 instrument (zoning and emption right)
HUTTWIL		
Building zone reduction:	Disproved	Passive implementation, type 3 instrument (mortgage guaranteeing the payment of land service) is implemented by default; no guarantee that the land will be developed
Building right:	Confirmed	Implementation through type 2 and 4 instrument (building regulations, zoning, building right) + resource infrastructure
NIEDERBIPP		
Polluted soil	Confirmed	Implementation for a 10 year period through type 1 (building permit) and type 3 instrument (financial guarantee)
MALLEY		
Land exchange	Confirmed	Implementation through type 4 instrument (land exchange)
Polluted soil	Confirmed	Property structure owned by sole landowner allowed to relocate (type 4) development rights within the local development plan's perimeter
Extended land service tax	Disproved	Circumvention due to unclear legal basis, and the time limitations and lack of organisation of local authorities. Legal mortgage (type 3) guarantees only the payment of the amount due
Energy planning	Disproved	Circumvention of energy objectives due to infrastructure bought by local authorities
CHESEAUX		
Land exchange:	Confirmed	Implementation through acquisition and exchange of land by local authorities (type 4)
Land improvement syndicate:	Confirmed	Implementation through combination of type 2 and 4 instruments. Marginal circumvention of type 1 instrument (land service tax) by landowners through the use of the resource "time"

Table 6.28: Synthesis of the verification of H4b.

6.2.8 H5a: Redistributive effects of public policy instruments

The general hypothesis underlying the redistributive effects of policy instruments is that only a mix of instruments allows for the redistribution of value. In order to test the hypothesis, the redistributive processes analysed are divided among those that only involve type 1 and type 2 instruments (H5a), and those that involve a mix of different instrument types (H5b). As a reminder:

- type 1 instruments are public policy instruments that do not impact use or disposal rights;
- type 2 instruments are public policy instruments that have an impact on use and/or disposal rights;
- type 3 instruments are property rights instruments that impact use and disposal rights;
- type 4 instruments are property rights instruments that impact the distribution of property titles.

H5a is formulated as follows:

If authorities use solely type 1 and type 2 instruments, then they do not redistribute value. This can be explained by the complex institutional regime that does not provide authorities with the necessary tools to impose value redistribution.

6.2.8.1 Wiedlisbach

In the process where local authorities threaten to utilise the green zone on hoarded, serviced land, some of the landowners requested a building permit (in order to maintain the status quo), but they did not intend to build. No value redistribution took place.

Other landowners agreed to the green zone transfer, which was exchanged for a higher plot ratio, and derogations to future building regulations. Thus, a temporary preservation (until the plots are zoned back to the building zone) of ecological value, and a temporary suspension of economic value, are achieved for a period of at least ten years (until the next revision of building regulations). When the plots will be put back into the building zone, then a small increase of economic value should occur (due to the higher plot ratios). Hence, *in both processes, no value redistribution takes place, and H5a is confirmed.*

6.2.8.2 Niederbipp

Authorities use the tax on added value created through zoning (type 1 instrument) to punctually capture some (21%) of the added economic value created through zoning. They redistribute the value within the communal territory for other (undetermined) land use planning measures. As a consequence, *H5a is disproved.*

6.2.8.3 Malley

The reduced economic value induced by the implementation of the major accidents ordinance on the plots intended for development is compensated for through the use of plot ratio (type 2), but no value redistribution (across actors or places) takes place. Hence, *H5a is confirmed.*

6.2.8.4 General discussion

In a complex regime that does not have a redistributive mechanism to compensate for advantages and disadvantages resulting from land use planning, the results of H5a show that value redistribution without using property rights instruments is limited to very specific circumstances: the case of Niederbipp has shown that in the absence of land service costs, local authorities were able to substitute the landowners savings with the tax on added land value created through zoning. In the two other cases, the

**Value transfer from MAO
to the property right**

policy instruments used by authorities only distributed value (or compensated a loss of value).

Furthermore, the cross-case analysis of the evolution of communal tax rates has shown the marginal use of classic fiscal instruments in order to capture added economic land value (Viallon, 2016a): in the studied regions, communal land tax rates, like the income tax rates, have decreased over the past twenty years; further, there is no specific land property income tax – all types of revenues are taxed together through the income tax. Such observations reveal that the matter at stake is less a question of the type of instrument available, but of the political setting that may or may not allow for their use. In fact, factors such as fiscal federalism and the underlying communal competition limits the use of these instruments. The reduction of inhabitants experienced by some peri-urban communes amounts to fiscal competition. As discussed in H5b, it appears easier for authorities to negotiate *punctually* value capture together with the distribution of added value through zoning, both occurring punctually in time, and separately (for each development project), than to demand a small tax from all landowners in a *durative* manner. This practice reveals an offset between the permanent value creation that occurs through land use planning decisions – and which materialises through the rent paid every month by the tenant to the property title holder –, and the predominantly punctual value capture mechanisms mobilised by authorities.

Cases	Verification	Explanation
WIEDLISBACH		
Building obligation on serviced land:	Confirmed	Threat of zoning (type 2) and building permit (type 2) do not induce redistributive effects. Implementation of green zone (type 2) compensated by additional development rights (type 2) induce distributive effects in time.
NIEDERBIPP		
Tax on added land value	Disproved	Redistribution of value captured through the tax on added land value (type 1) to communal land use policy
MALLEY		
MAO use restrictions	Confirmed	Increase of plot ratio allows for the compensation of the value loss induced by use restrictions

Table 6.29: Synthesis of the verification of H5a.

6.2.9 H5b: Redistributive effects of instrument mix

Based on the distinction between type 1/2 and type 3/4 instruments, I now test the redistributive effects of the analysed processes that involve a mix of different instrument types:

If authorities use a mix of instrument types, then they *can* redistribute value. Value redistribution is only a possibility, because the complex institutional regime does not provide authorities the tools to impose value redistribution. However, authorities tend to redistribute value in order to implement their own strategies.

6.2.9.1 Wiedlisbach

Building zone transfers only temporarily redistribute value

The building zone transfer process relies on type 1, 2, and 4 instruments, and allows a spatial redistribution of economic and ecological value across a spatially and fragmented land property structure belonging to various owners. However, this transfer occurs during a limited time period, as landowners have priority zoning rights, and will benefit from an exemption on the tax on added land value in 10 to 15 years when the communal building regulations are revised. The process' medium-term redistributive effects equates to a simple building zone extension (distribution of economic value). Hence, *H5b is disproved*.

Emption right as enforcement mechanism

In the process "building obligation on serviced land", some landowners signed a "voluntary building obligation" (type 3 instrument). Through this instrument, an effective realisation of the added economic value (created through zoning) occurs, but no value is captured and subsequently redistributed. Hence, *H5b is disproved*.

In the process "building obligation on industrial land", the mortgage (type 3) only allows for a temporary value capture in order to compensate local authorities for the cost of land service. As a consequence, *H5b is disproved*.

The hypothesis *H5b is confirmed in the process of the new building zone creation in the Gerzmatt*: the process involves a type 1, 2 and 4 instrument mix and punctually captures a portion of the added economic value through the tax on added land value created through zoning.

6.2.9.2 Huttwil

Building zone reduction confirms H5b

The process of building zone reduction in Thomasbode relied on type 1 (building regulations), type 2 (zoning), and type 3 (legal mortgage) instruments. It produced two types of redistributive effects: first, a reduction of the surface to be developed, which was compensated for with a higher plot ratio (spatial redistribution/concentration of development rights). Second, the reduced constructible perimeter limited the number of water catchments to be destroyed (reduction of ecological value to be destroyed through development). Third, a portion of the land service costs were passed on to landowners. Consequently, *H5b is confirmed*.

Building right process confirms H5b

In the process building right, land development through building right induced a redistribution of economic value from the land use policy's target group to the end beneficiaries: through the reduction of the rent charged by landowners, future inhabitants benefited from cheaper land. Therefore, *H5b is confirmed*. Such redistribution in the present case was made possible by the possession of the resource infrastructure, and the control of land use regulations.

6.2.9.3 Niederbipp

The zoning of the plots (type 2 instrument) creates significant economic value. Specific construction and monitoring prescriptions (type 1 instruments), as well as the financial guarantee (type 3 instrument), made the delivery of a building permit possible, which in turn made the development of the plots possible. The construction of a lid prevented the infiltration of water, and thus limited the potential spread of

pollution (reduction of ecological value). However, the arrangement is for a limited time, and redistributive issues could arise after the financial guarantee has expired, which would not be covered by the arrangement. Therefore, *H5b is partly confirmed*.

6.2.9.4 Malley

The land exchange (type 4) aimed to exchange two plots of the same value, compensating any difference through cash payments. The redistributive process occurred spatially. Consequently, *H5b is confirmed*.

Spatial value redistribution through land exchange

In the polluted soil process, the soil's remediation costs induced the transfer of development rights across plots, possible because of the single landownership and of the reshaped plots (type 4 instrument). Hence, *H5b is confirmed*.

Spatial value redistribution through soil pollution

Actors negotiate the amount of value captured punctually by the extended land service tax (type 1 instrument), based on financial considerations linked to the project's development plans (type 2 instrument). The lack of precedent for implementation of the tax involving a public landowner allowed actors to mobilise several policy resources, which led to a redistribution of value. As a consequence, *H5b is confirmed*.

Value redistribution through land service tax

In the process of energy planning, the elaboration of the local development plan (type 2 instrument), and the circumvention of energy objectives led to the use of the district heating system as the main source of energy. This choice meant a redistribution of value from end beneficiaries to the target groups: the heating system paid by end beneficiaries, and target groups are able to capture the amount of money saved on the building heating system in the form of additional rent. Such redistribution is only possible because target groups own the district heating infrastructure and production. As a consequence, *H5a is confirmed*.

Value transfer from end beneficiaries to target group

6.2.9.5 Cheseaux

The process involves the acquisition and exchange of plots (type 4) for money and for wider plots. The commune distributed additional value (overrated exchange price, or additional land surface) to the landowners, in exchange for more centrally located plots. Hence, a spatial redistribution of value takes place, and *H5b is confirmed*.

Spatial value redistribution through land exchange

Authorities and landowners conducted a value redistribution process composed of three elements: an economic value creation through the new building zone of the LIS (type 2, 3 and 4 instrument), which allowed them to reduce the intermediary zone, as well as relocate and reshape the plots through the LIS. Hence, *H5b is confirmed*.

Spatial value redistribution through LIS

6.2.9.6 General discussion

The verification of H5b presented a set of findings summed up as follows: in a complex regime, property rights instruments play a central role in value redistribution, because contracts partly substitute for the absence of punctual value capture mechanisms such as the tax on added land value (prior to 2014), or the extended land service tax (in canton Vaud prior to 2013). Contracts allow for the passing-on of various additional, project-based obligations that are not (and could only partly be) explicitly planned by law.

In regard to the voluntary instruments "tax on added land value" and "extended land service tax", the implementation of the former in canton Bern has been more difficult than the latter in canton Vaud. This can be understood through the direct and indirect benefits landowners receive from the extended land service tax, as opposed to the tax on added land value. In fact, the main difference between the two instruments is that the extended land service tax redistributes value to predetermined uses generally located within the neighbourhood or the communal territory, whereas the tax

on added land value primarily aims to compensate landowners. The point is that the (lack of) success of their implementation is not primarily linked with the mobilisation of property rights instruments, but with the perceived and spatially defined benefits they brought (or not) to landowners as well as to the broader community (in the case of the extended land service tax).

In the absence of an institutional compensation mechanism, local authorities created case specific alternative compensatory mechanisms (through public policy or property rights instruments): a "rezoning priority" in the process of the building zone transfer, an increase of the plot ratio in the process of building zone reduction, and land acquisition above market prices in the process of land exchange in Cheseaux. Consequently, as mentioned before, it is not fundamentally the type of instrument that determines authorities' capacity to redistribute value, but the ability of authorities to use them in order to create or mobilise added economic value and achieve redistribution.

This last point merges with one conclusion from H4b: property rights instruments work primarily as insurance on future land use, or as insurance on the payment of money captured by or due to authorities. Their uses are either planned as such in legislation, or mobilised ad hoc by public actors.

Furthermore, in cases where authorities own land, property rights instruments allow them to mobilise the policy resource "infrastructure" in order to:

- capture rent induced by land use policy (building right in Huttwil);
- capture rent induced by other public policies (energy planning in Malley).
- for the exchange of infrastructure (Malley, Cheseaux);

Cases	Verification	Explanation
WIEDLISBACH		
Building zone transfer:	Disproved	Temporary redistribution of economic and ecological value
Building obligation on serviced land:	Not applicable	Concretisation of existing added economic value
Building obligation on zoned industrial land:	Not applicable	Concretisation of existing added economic value
Building obligation on new building zone:	Confirmed	Redistribution of part of the added economic value created through zoning to other land use policy goals
HUTTWIL		
Building zone reduction:	Confirmed	Spatial redistribution of development rights and of ecological impacts of development
Building right:	Confirmed	Redistribution of added economic value (created through zoning) for end beneficiaries through cheaper rent
NIEDERBIPP		
Polluted soil	Partly confirmed	Minimisation of ecological reduced value through the added value created through zoning and subsequent land development
MALLEY		
Land exchange	Confirmed	Spatial redistribution of property titles
Polluted soil	Confirmed	Spatial redistribution of development rights
Extended land service tax	Confirmed	Redistribution of a portion of the added value created through zoning, to public infrastructure within the communal territory
Energy planning	Confirmed	Value redistribution from end beneficiaries to target group: authorities do not depend on instrument (energy plan)
CHESEAUX		
Land exchange:	Confirmed	Spatial redistribution of property titles
Land improvement syndicate:	Confirmed	Land improvement syndicate allowed for the reduction of the intermediary zone, extension of the agricultural zone, and a reshaping of plots

Table 6.30: Synthesis of the verification of H5b.

6.2.10 H6: Effects of expected added economic value on the LRA

If a land use policy process is expected to produce redistributive effects, then target groups successfully use available policy instruments and resources to obtain full compensation for their anticipated loss of economic value. This can be explained through the capacity of land use policy to create added economic value that authorities can use for compensation and redistribution.

6.2.10.1 Wiedlisbach

**Partial successful
resistance to economic
value reduction**

The transfer of the building zone *partly confirms H6*: some landowners negotiated an increase of the plot ratio, which proved a valuable enough incentive for them to agree to the temporary value redistribution process initiated by authorities. Other landowners did not agree with the communal strategy, and asked for building permits: they preferred to maintain the status quo over the temporary lowered economic value induced by the green zone. These arrangements confirm H6.

However, other landowners legally opposed the revision of building regulations, and/or voted against it, both without success; these arrangements hindered them from obtaining compensation and preventing redistribution, which disprove H6.

The various landowner reactions in the case of the green zone show that the sole dimension of expected redistributive effects (notably in terms of economic value) is not sufficient to explain the negotiated arrangements. It does impact the LRA, but landowner strategies vary according to other criteria, such as the strategy they pursue in regard to the future use of their property, their temperament or willingness to fight communal decisions, their perception of and relations with communal authorities, etc.

**Partial successful
resistance to reduced
economic value**

The building obligation implemented through the threat of the green zone confirms and disproves the H6, because those landowners who request a building permit manage to maintain the status quo (*confirmation of H6*), whereas others sign the "voluntary building obligation" (*disproof of H6*).

The case of the mortgage on industrial land disproves H6: no net added economic value is created for the landowners, since in the end they pay for the entire land service. In addition, landowners need to sell the land within a given time span, *i.e.* authorities force landowners to take their gains. However, the land sale is greatly facilitated, because the plots are serviced, which bestows them with an additional characteristic: they are ready for development (effective use). Specific landowners concerned by the process need to interpret the result of the hypothesis with caution.

The building zone extension (distribution of added economic value) provides a significant economic levy which allows to pass land service costs on, and capture some of the added value through the tax on added land value created through zoning. *H6 is confirmed.*

6.2.10.2 Huttwil

**Successful resistance to
value reduction**

The landowners and the planning commission opposed the initial communal strategy to remove the building zone of Thomasbode, mainly because authorities did not have and had not considered a means of compensation. When the parties agreed on a reduced constructible perimeter, and on the passing-on of land service costs, landowners were compensated with significant increases of their plot ratios. This increase allowed for an increase in the overall added economic value of the building zone. Thus, *H6 is confirmed.*

**Expected added economic
value and demographic
growth**

Authorities occupied both functions of authority as well as target group, allowing them to set low rent prices (financial return of the building right) and fulfil other communal objectives: attract new inhabitants, and better the financial situation. Therefore, *the hypothesis H6 is disproved.*

6.2.10.3 Niederbipp

The value redistribution that takes place is limited to the prevention of reduced ecological value. For the landowner, the expected economic value from the land's acquisition and development are balanced with the additional costs of analysis, development and monitoring costs, and the probability of the exfiltration of pollutants over the next ten years (financial costs which are contained in the financial guarantee that landowners must deposit). The process results in a reduced (20% reduction, due to additional costs induced by the soil structure), but still significant added economic value for the selling landowner. As a consequence, *H6 is confirmed*.

Limited redistributive effects

The expected economic value from the zoning operation is both high, and immediate (buyer of all plots is predetermined). Landowner gains are increased through the reduced land service costs (partly carried by other landowners from previous zoning operations, and by the land buyer). These increased profits are only partly captured through the tax on added land value. Therefore, *H6 is confirmed*.

Redistributive effects lower than regular land service costs

6.2.10.4 Malley

Landowners expected a high amount of added value from the plot in Malley and from the one adjacent to Lausanne's station is high. As the financial estimations of both surfaces are comparable, and the contract plans compensatory payments in case of land value changes (due to zoning for example), the land exchange faced no opposition. Consequently, *H6 is confirmed*.

High anticipated added economic value for both parties

The landowners initially refused the implementation of use restrictions and construction specifications due to the MAO. They successfully blocked negotiations until the reduced economic value induced by the MAO was fully compensated by additional development rights, which *confirms H6*.

Successful blocking of expected reduced economic value

The landowners calculated the precise additional costs linked with the development of the polluted soil, and, in accordance with local authorities, located future buildings (and the park) based on the soil pollution criteria. Further, they chose a type of construction which minimised underground construction, which in turn minimised excavation and underlying remediation costs. As a consequence, *H6 is confirmed*.

Minimisation of expected reduced economic value

The extended land service tax reduced the added economic value landowners gained from the development of their properties. The legal uncertainty about the implementation of the tax led to a long and resource-intensive negotiation between landowners and authorities, with the authorities agreeing to a reduced rate in order to finalise negotiations, which *confirms H6*.

Reduction of taxed amount of value

In the landowners' perspective, following economic factors led to the passing-on of the provision on renewable energy to end beneficiaries and thus *confirm H6*:

Absence of obligations reducing expected economic value

- expected additional costs of installation and production of geothermal or solar energy compared to those of district heating;
- expected reduced economic value from landowners' and local authorities' investments in the district heating system;
- expected reduced economic value from the reduced amount of gas sold by the landowners.

6.2.10.5 Cheseaux

Immediate added value for landowners

For the landowners, land exchange and acquisition with the commune resulted in an immediate added economic value, either in cash (land acquisition), or in kind (exchange for a larger surface of agricultural land). Therefore, *H6 is confirmed*. This relatively low compensation (compared to the final land value) can be partially attributed to the commune's intentions to build a school. Would the landowners have agreed to the same compromises if the commune had only intended to develop housing, or simply sell it to developers?

High added economic value expected

The use of the land improvement syndicate entailed the creation of a significant amount of added economic value, because new land was opened for development. Landowners included in the LIS perimeter expected a redistribution of the shape and location of their properties. The significant added economic value resulting from the partial zoning of the land as constructible, created a significant incentive for landowners to cooperate to achieve development goals among fellow landowners, and with local authorities. Consequently, *H6 is confirmed*.

6.2.10.6 General discussion

As opposed to the other hypotheses, the sixth hypothesis is formulated from the perspective of the target groups. The broad support in its confirmation shows that target groups have powerful means to control value redistribution in land use planning processes. They can:

- obtain compensation for reduced economic value;
- maximise the added economic value authorities create;
- limit the redistributive impacts of policy instruments, and capture major parts of the added economic value created;
- negotiate additional added economic value against policy resources that authorities lack of.

Landowners' means are policy resources ("consensus" in the case of Wiedlisbach, "political support" in the case of Huttwil, "time" in the case of Malley and Cheseaux, "infrastructure" in the case of the energy plan in Malley, etc.), instruments (building permit in Wiedlisbach, land exchange in the case of Malley and Cheseaux), as well as more generic arguments, such as the right to appropriate land rent, as an inherent part of the property title, the necessity of making a profitable operation, or saving land for their children.

Although authorities and target groups almost systematically negotiate development rights, including the definition of various obligations and financial contributions, authorities do not systematically link the added economic value they produce through zoning with the costs involved in development and land use policy in general.

Further, the threat to reduce the economic value of land (used in Wiedlisbach and Huttwil) provides a limited levy of action for several reasons. First, it resists the guarantee of property, which a priori requires full compensation for restrictions on property equivalent to an expropriation. Second, it reduces the coherence of planning activities, and more broadly the achievement of policy objectives (as shown by the green zoning in Wiedlisbach).

Another outstanding element is that in the process MAO restrictions, landowners managed to obtain compensation for the reduced value imposed by the MAO, though this reduced value was purely theoretical and did not figure in any legally binding planning document (local development plan or zoning plan) defining the actual plot ratio. The expected value remained largely fictitious, but served landowners as a basis for calculating the minimal acceptable financial return linked with the plots' redevelopment. One of the explanations for this situation is the mobilisation of the resource time by target groups. Their blocking of the project for several months put authorities in a paradoxical situation of emergency with regard to the landowners and inhabitants, as they needed to show results to their electorate. Although authorities

can be perceived as perennial actors in possession of time, the cases analysed show the contrary (Malley, Cheseaux). In these cases, local authorities used the economic levy of zoning to obtain landowners quick approval (resource time).

Other uses of the economic levy by authorities were to reduce the financial needs in the case of building zone reduction in Huttwil (a pass-on of land service costs, prevent the payment of compensation for material expropriation), or to adapt land values in order to facilitate land exchanges (Malley, Cheseaux).

Cases	Verification	Explanation
WIEDLISBACH		
Building zone transfer:	Partly confirmed	Expected reduced value of green zone led to various reactions of target groups: some obtained added economic value, some maintained the status quo, some experienced a reduction of economic value through the green zone
Building obligation through threat of green zone:	Partly confirmed	Expected limitation of added economic value allowed certain landowners to maintain the status quo, others signed a building obligation
Building obligation on zoned industrial land:	Confirmed	Redistributive effects limited to recovery of land service costs, counterbalanced by the possibility to sell the land at a later date
Building obligation on new building zone:	Confirmed	Expected redistributive effects limited to recovery of land service costs and value capture through the tax on added land value, counterbalanced with the added economic value created through zoning
HUTTWIL		
Building zone reduction:	Confirmed	Expected reduced economic value from zone removal was blocked; expected increase of economic value through higher plot ratio was accepted as counterpart to building zone reduction and to the pass-on of a portion of land service costs
Building right:	Confirmed	Expected economic value also fulfils wider communal demographic objectives
NIEDERBIPP		
Polluted soil	Confirmed	Expected added economic value perceived as sufficient to accept prevention measure limiting the potential creation of reduced ecological value
Tax on added land value	Confirmed	Expected high added economic value created through zoning and absence of land service costs perceived as sufficient in order to accept the capture of part of the added value
MALLEY		
Land exchange	Confirmed	Expected added economic value allowed to exchange the plots
MAO use restrictions	Confirmed	Expected reduced economic value fully compensated through zoning
Polluted soil	Confirmed	Expected reduced economic value determined the location and type of constructions
Extended land service tax	Confirmed	Expected reduced economic value opposed successfully
Energy planning	Confirmed	Expected reduced economic value opposed successfully by target group and local authorities
CHESEAUX		
Land exchange:	Confirmed	Expected added economic value (intermediate land price proposed by the commune + wider plots) and withdrawal from future complex and costly LIS procedure perceived as sufficient by landowners
Land improvement syndicate:	Confirmed	Expected added economic value maximised by landowners due to a deficiency in communal policy resources.

Table 6.31: Synthesis of the verification of H6.

6.3 Factors conditioning the use of instruments

6.3.0.1 Property structure

The four processes that tested the influence of land property on the authorities' strategy and instrument use, showed the relevance of the existing property structure when elaborating a strategy or choosing the instrument to be used: depending on the number of landowners involved, and the shape of existing plots, the instruments used change:

- if only a few landowners are involved, instrument choice may be limited to classic public land use policy instruments. Public law instruments are either adapted to fit the existing property rights structure, or combined with classic landowner-to-landowner property rights instruments such as conventions and easements (for example to modify plot limits, or allow overlapping uses);
- if about a dozen landowners are involved, and/or the property structure does not fit future land uses (high level of fragmentation, unordered property limits), instrument choice needs to consider regular public law instruments *combined with* property rights instruments that allow for the reshaping of the property structure, such as the land improvement syndicate;
- if numerous landowners are involved, or if the project scale is too broad (if, for example, it involves, geographically separated areas), authorities lack instruments permitting the redefinition of property rights. In the cases analysed, authorities limited implementation to the use of public law instruments (such as in the building zone transfer process in Wiedlisbach), or adopted dedicated, mixed instruments such as the LIS. In this regard, the LIS in Le-Mont-sur-Lausanne, which applies to a perimeter of hundreds of hectares, and involves several dozens of landowners, is an example revealing this lack of relevant instrumentation: the LIS has existed for more than thirty years and has still not fulfilled its task.

One explanation underlying the difficulty of restructuring multiple property rights is the uniqueness of each plot: no single plot is equivalent to another, so it is extremely difficult to implement land use policy regulations while simultaneously guaranteeing equal treatment for the concerned landowners. One factor reducing this difficulty, is the involvement of a limited number of landowners (Malley, Cheseaux), and basic property shapes (Huttwil).

The building zone transfer process in Wiedlisbach revealed an additional factor which conditions the use of instruments: the acceptable amount of reduced economic value that a landowner can endure without authorities having the obligation to compensate the concerned landowner(s). The main criteria used by the Federal Tribunal to decide if compensation is due, is the degree of loss the landowner endures compared to other landowners (*Sonderopfer*). As Bovay et al. (2010, 34) noted, the compensation that authorities would be obligated to pay is linked more to the principle of equal treatment than to infringement of the property guarantee. Nevertheless, these questions hold significant implications for the authorities managing the resource soil: to what extent can they adopt economic value reduction or value control strategies? Or, does land use policy only work in a context of growth?

6.3.0.2 Information

Through five processes, the resource information has had a decisive influence on the strategy adopted and on the instruments mobilised by authorities:

- in Huttwil, information was first mobilised by authorities for the removal of the building zone. New information was then used by landowners to contest the building zone removal, and jointly by authorities and landowners to redefine zoning in the concerned area;
- in the process polluted soil in Niederbipp, information was used to define the technical modalities of the building permit, minimising uncertainty and pollution risks in the development process;

- in Malley, information contributed to the financial feasibility of the land exchange. This land exchange was budgeted with minimal financial consideration for Lausanne (cash payment of less than 1 million francs). But in order to minimise the financial repercussions, the densities and land use restrictions defined in the local development plan of *Malley-gare* needed to reflect the plot's estimated initial value, an argument successfully mobilised by landowners;
- in regard to soil pollution, information contributed in Malley to spatially define the future areas of construction, thus excluding certain areas from development in order to ensure the profitability of the operation;
- in the implementation of the MAO, the information that the target group withheld blocked the elaboration of the local development plan until authorities agreed to increase density in the given area;
- in the elaboration of an energy plan, the information that the target group did not provide led local authorities to invest in infrastructure, which in turn limited future energy choices for the neighbourhood.

6.3.0.3 Public infrastructure

In the five processes where infrastructure owned by local authorities was involved in the land use policy process, it was mobilised in order to contribute to communal goals, use new instruments, or define their modalities:

- in the case of Huttwil, land owned by the *Herdgemeinde* was used jointly with communal planning tools to combat demographic decline and support the communal growth strategy;
- in Niederbipp, available land service was mobilised to justify the implementation of the new tax on added land value created through zoning;
- in Malley, the co-ownership of the district heating system led to the absence of binding energy obligations for the landowners, and to the elaboration of an energy plan that favoured the district heating system. Further, the costs induced by the remediation of the location and the type of development (*e.g.* no underground constructions) constrained the modalities of the local development plan;
- in Cheseaux, infrastructure allowed the commune to participate as a landowner in the land improvement syndicate and to locate their properties in a desired location.

6.4 Factors determining land use policy output and value redistribution

6.4.1 The role of policy resources

In the five cases analysed, I observed that policy resources played a significant role in explaining instrument use, land use policy outputs and, subsequently, redistributive effects. Actors who had, and mobilised the necessary resources, were able to bargain with significant advantages in the implementation process (such as definition of the modalities of implementation of (new) instruments, modification of the implementation schedule, or securing a larger amount of the added value created), whereas those who lacked resources made concessions to the other party on the negotiated output. Reviewing the mobilisation of policy resources across the various cases and processes analysed, the following elements can be mentioned:

1. resource personnel played a key role, because they provided local authorities the counselling required to chose the instruments, and/or define the modalities of their implementation, and, in the end, enabling authorities in the achievement of their goals. This was particularly visible in:

- Wiedlisbach, where new strategies and instruments were adopted and used, in close cooperation with the planner working with the communal authorities;
 - Niederbipp, with qualified, internal planning staff, negotiated the creation of an industrial zone, and the application of a tax on added land value;
 - Malley, where the landowners relied on their staff (planners, housing and real estate experts, etc.) in order to fulfil the various objectives such as: provision of land for the cantonal museum, financial profitability of development (*e.g.* minimisation of the amount of extended land service tax owed), increase of energy rent, cooperative housing;
2. hypothesis H3b showed the importance of information in land use policy implementation. When information was shared between actors (building zone reduction in Huttwil, land exchange in Malley, polluted soils in Niederbipp and Malley), a compromise was found for all parties. In the processes where an asymmetry of information existed (building zone transfer and building obligation in building zone in Wiedlisbach, MAO restrictions and energy planning in Malley), these processes resulted in a conflict between actors, or in circumvention of the institutional regime of soil. Further, successful (non-) mobilisation of information can also be linked to the use of other resources: resource “personnel” in order to exploit available information, time or infrastructure in order to limit the effects of the resource.
3. the resource infrastructure also played a central role:
- authorities mobilised infrastructure for negotiating the implementation of type 3 or type 4 instruments (land exchanges, building right)
 - authorities mobilised infrastructure in order to enhance the implementation of the institutional regime (existing land service allowing for the introduction of the tax on added land value in Niederbipp, and relocation of public property in Cheseaux)
 - in Malley, landowners mobilised public land and the district heating system in order to create lucrative development possibilities at reduced costs and thus secure land rent.
4. in the processes where a lack of consensus between authorities and target group was present, the communal strategy was only partially implemented, and the LRA resulted in a circumvention, passive implementation, or diversion of the institutional regime of soil. Target groups often mobilised consensus in combination with other resources. This was the case for:
- the green zone and building obligation on serviced land in Wiedlisbach, where landowners fought against green zoning and building obligations through the resource law (request of a building permit);
 - for the building zone reduction in Huttwil, where landowners mobilised political support in order to prevent a building zone removal;
 - for the MAO restrictions in Malley, where landowners used the resource time in order to obtain a higher plot ratio;
 - for the extended land service tax in Malley, where landowner used the resource personnel in order to limit the instrument’s effects;
 - in energy planning, where infrastructure and organisation was shared with local authorities;
5. the resource time played a decisive role in determining the process output and its redistributive effects:
- Wiedlisbach’s executive body mobilised time in the building zone transfer to avoid permanently withdrawing landowners’ rights in the green zone. They used time in the building obligation processes as a guarantee for the instrument’s effectiveness;

- landowners mobilised time in Malley, leaving the table of negotiations for more than a year, until they received additional development rights as a compensation for the MAO restriction they had to comply to;
- local authorities lacked time in Malley while implementing the extended land service tax (the negotiation process held to the tight agglomeration program's schedule), reducing the amount of tax they could request;
- local authorities in Cheseaux bought time from the landowners in the implementation of the LIS: the commune wanted to build the school in time, and did not want to further delay the process. This urgency influenced the reference value applied to the new communal property (as well as public sharing in land service costs);

When authorities lack one or several of the resources identified above (like in the processes of building zone reduction, MAO restrictions and extended land service tax in Malley, or LIS in Cheseaux), they either fail to achieve their goals, or need to rely on the economic levy created through zoning in order to obtain the target group's acceptance (building zone reduction in Huttwil, over-proportionate share of land service costs in the LIS in Cheseaux).

Personnel and information are mobilised externally in small communes, because they lack the internal resources or competencies to implement land use policy. Bigger communes rely both on internal and external experts, particularly when they are involved in costly urban redevelopment projects. This frequent mix of public and private personnel is not solely a matter of costs; in addition to the competencies and knowledge brought by the experts, these are also perceived as (or legally obligated to be) neutral actors and negotiators: this function is prescribed legally in the case of the land improvement syndicate, and also applies to land use policy procedures in general, through the involvement of the contracted planner in negotiations with landowners (Wiedlisbach, Huttwil).

Political support was a condition of the achievement of the broad communal goals in four of the analysed processes: in the building zone transfer process in Wiedlisbach, inhabitants protested against the additional traffic that a building zone extension would create, and were in favour of retaining unobstructed views; in the building zone reduction in Huttwil, local representatives opposed a withdrawal of rights without financial compensation; in the land exchange in Lausanne, local representatives supported the creation of the new museum; in Cheseaux, inhabitants supported the construction of a new school.

The resource money was present through the added value generated by the granting of development rights, but materialised in negotiations through the financial payments which authorities and landowners agreed to. It appeared as a threat in the case of Huttwil, where authorities could have faced compensation claims, and in the case of polluted soil in Niederbipp, where the exfiltration of pollutants could have led to very costly protection measures. It also played an indirect role when local authorities hire personnel or buy information. In the two processes "land exchange" analysed, local authorities preferred to exchange their infrastructure (exchange land) rather than money (buying the land).

6.4.2 The role of instruments

The majority of land use policy processes analysed showed that local authorities used a mix of public policy and property rights instruments to implement land use policy. H4 and H5 showed how only the combined use of different instrument types made it possible for authorities to implement and complement the institutional regime, as well as pursue their own goals. Such instrument mix granted authorities the following possibilities:

- guarantee effective land use;
- guarantee payments due to authorities;
- capture part of the added value created;
- pass on various project-based obligations not explicitly planned by law;

- determine and capture the rent they seek to obtain from their property title (in cases where they own the land);
- capture the rent induced by other public policies (such as energy planning);
- exchange and relocate their land (infrastructure).

But the instrument mix did not appear sufficient for the implementation of the institutional regime of soil, or achieving local objectives. One key additional condition was the creation of economic value, as the results of H6 have shown.

6.4.2.1 Economic value creation as key factor

In all processes, added or reduced *economic value* played a central role: target groups sought to preserve existing value, creating added value if possible, and/or to minimise the costs induced by various legal obligations.

Five processes resulted in a failure (diversion, circumvention, passivity) to implement land use policy objectives: the building zone transfer in Wiedlisbach, building zone reduction in Huttwil, the MAO restrictions, the extended land service tax, and energy planning in Malley. With the exception of the building zone transfer (whose failure can be explained by the diversion strategy pursued by the commune), the failure of the four other processes can be explained by the reduced economic value that implementation of the instruments would have created for the landowners. In fact, *all value capture or value reduction processes that succeeded, induced as a counterpart, at least a full compensation of the reduced value or, in the majority of cases, the creation of additional added economic value.* Let us discuss these cases of failure in more detail:

No value capture or reduction without compensation

- in the case of the building zone reduction in Huttwil (passivity – process failure), the reduced economic value for the landowners is obvious, and the coalition of actors in the political decision process opposed to a pure withdrawal of value (development rights) are dominant. In order to fulfil its land service obligations and elaborate a new contract where the commune does not pay for land service, the communal executive body creates added economic value through zoning, and thus passes on a portion of the land service costs;
- in the case of the extended land service tax (circumvention – process failure), a high degree of legal uncertainty prevails, and none of the actors want to settle the issue publicly in front of a court. One could argue that the amount of tax paid is largely covered by the development rights granted, which is true; but the problem is the late "arrival" of the tax: actors had been negotiating value redistribution for almost a decade when, at the last minute, authorities announce a new tax that calls into question the financial calculus made by the landowners. The remaining options were: for the landowners, to play the time card like it did for the MAO restrictions; for the communes, risk arousing political opposition where the communal legislative bodies would see the tax exemption that the landowners benefited from; or negotiate the amount of tax to be paid in order to seal the deal quickly, which is also in the all actors' interest, and in particular of the local authorities – they benefit from public funding for local infrastructure, whose use is limited in time;
- the case of energy planning (circumvention – process failure) is also obvious and has been discussed in section 5.1 presenting the Malley case study. As for the extended land service tax, one could argue that the additional costs linked with more environment-friendly energy provisions are covered by the overall creation of added economic value. The attitude seemed to be: but now that joint investments in heat pipes have been made, why not take full advantage of them?
- the case of the MAO restrictions (implementation through full compensation) reflect the shift of information in time between the SBB, which set the restrictions, and the canton, who initially accepted them as such. When the canton gained access to the necessary information, they imposed a set of restrictions

impacting the initial added economic value calculations by the SBB, who in turn accepted, after several months, the restrictions, under the condition of full economic compensation.

From simple value distribution...

Thirty years ago, in his analysis of land markets in canton Vaud, V. Ruffy (1989) observed that the economic levy provided by land use policy is a key factor in explaining the implementation of land use policy instruments.

Starting from the introduction and emergence of the institutional regime of soil introduction in the 1960's, through land use policy instruments, authorities have mainly distributed economic value: zoning occurred based on local interests, as in the case of Huttwil, and the more recent case of Malley (local development plan sized according to property structure), have shown. One of the few obligations imposed on landowners and developers was the connection of construction to the sewer (Nahrath, 2003). Land service benefiting private owners was financed by the public (Huttwil, Wiedlisbach, and to a lesser extent, Cheseaux). Further, due to the absence of a compensation mechanism for land use planning measures, a large part of the land rent was captured by the landowner, and the implementation of the institutional regime of soil faced significant difficulties, such as the correct dimensioning of building zone, and the relocation of building zones (H1). As H3a has shown, these issues were particularly problematic in cases of fragmented or unordered property structures, because public policies did not grant authorities the necessary tools, leaving them to rely on property rights instruments (H4), whose implementation was conditioned on the approval of the landowners. Thus, policy implementation was often tied to the creation of substantial added economic value for the landowner.

...To redistribution within land use policy...

The element that has changed over time is that authorities used available instruments not only to distribute, but also redistribute this value. The added value induced by zoning is redistributed in order to meet land use policy objectives such as land service, and infrastructure costs. More recently, this redistribution has funded the compensation mechanism through the tax on added land value created through zoning, or communal infrastructure through the extended land service tax. H1 has also shown that authorities have mobilised public policy instruments as threats, in order to implement the institutional regime.

... To redistribution spread across policies

Beyond value redistribution within land use policy, the added economic value created has also been increasingly redistributed to other public policies. Among these public policy recipients are: fiscal policy, where urban growth strategies are meant to compensate for lowered tax rates (H2), economic promotion, in order to make land available for new businesses, major accidents ordinance (MAO) through the additional development rights that compensate use restrictions, transport policy through the provision of additional users, and energy policy through the provision of captive clients. Such value redistribution benefited various parties, for example: landowners who profit from additional land rent, developers who receive new contracts, inhabitants and companies who benefit from low taxes, transport companies that benefit from additional users, energy companies that guarantee the profitability of their investments, and inhabitants with new homes. One element to emphasise is that end beneficiaries are rather poorly represented in the negotiation of policy outputs, as they mainly intervene at the end of the process through the communal legislative body, which is often restricted by the pre-negotiated decisions between communal executive and landowners. This fact has already been acknowledged in early works on land use policy (Knoepfel, 1977).

The observed redistributive processes also contain spatial implications. Those considered by actors primarily are within communal boundaries. Hypothesis H5 showed the link between the acceptance of value redistribution and the spatial proximity of the infrastructure financed through value redistribution: landowners opposed redistribution of the captured value beyond the neighbourhood, and communes that dimensioned their building zones correctly do not want to pay for those who did not.

6.4.2.2 Parsimonious value redistribution

What has not changed over time is that redistribution remains parsimonious. One element illustrating this, is that despite sharp increases in Swiss urban land prices, authorities have taken only limited steps towards controlling or redistributing the

value induced by the institutional regime of soil. With the exception of specific zones in canton Geneva (*zones de développement*), there has been an absence of control on land values.

Considering the initial reasons of the launch of the federal land use planning policy in the 1960's (Nahrath, 2003, 194), today's absence of control on land values is paradoxical, because one of the motives justifying federal intervention were the perceived indirect negative effects of land price increase, such as speculation and inflation. The analysed cases show that the political objective of value control has completely failed.

One partial explanation for the absence of value control is provided by H6: land value plays a central role in the negotiation between authorities and target groups, as both parties intend to benefit from it. Therefore, no party intends to "kill the golden goose". Another explanation is linked to the current conception of land property, which reflects in existing value taxation instruments:

- first, taxation focusses on anticipated (fictitious) gains which refer to the exchange value of land, and neglects the effective amount of rent generated for the property title holder. The effective rent is taxed together with revenues or benefits generated by a regular occupation or work. There is no distinction between income and benefits generated by production or service provisions on one hand, and income and benefits generated by the mere possession of a property title on the other hand;
- second, current fiscal instruments subsidise the mobilisation of landed capital through the mortgage of the property title: the subsidy is granted to the property title holder and indirectly to banks through the possibility of deducting mortgage interest from their tax declaration.

Both authorities and landowners benefit from high land values

These two elements show the current dominant conception of land as a banal good and, contribute to explaining the limited role of value redistribution in the institutional regime of soil.

Land as banal good

An additional element representing the parsimony of value redistribution is the marginal link between ecological and economic values: there is no incentive for developers or landowners to remediate soil, preserve fertile land, or avoid an urban growth strategy. This has been shown through the two polluted soil processes, and by the peri-urban cases, where authorities face an institutional setting and structural changes beyond their influence. Further, the considerable price difference between building land and agricultural land severely restricts the initiation of redistributive mechanisms for the protection of such economically lower value uses. This becomes particularly salient when these uses do not have local users to protect them (such as neighbours who want to keep their view, or inhabitants that want to keep the nearby natural area for walks).

Limited link between ecological and economic land values

6.4.2.3 Increase of redistributive processes

Recent legal changes and the practices of authorities have evolved towards a more constrained distribution of value: landowners cannot expect to receive added economic value without being obliged to adhere to a set of obligations, either in the form of value retro-cession, or through different land use obligations. Thus, one can state that *there is a progressive increase of redistributive processes in land use policy*.

This increase is due to the adoption of new land use policy instruments, such as the tax on added land value and the extended land service tax, as well as the extension of redistribution to other soil related policies, as shown by the empirical analysis. However, it is not possible to assess how the overall percentage of redistributed economic value has evolved over time, because value capture through fiscal instruments has declined over the same period. The consideration of time for the quantification of the percentage of captured value is central, because market prices reflect the land's value only at a specific moment, and not over the entire period during which the land is used. Depending on future land use, land market prices include the expected added value of land over the next five, ten, or thirty years, but land continues to generate added economic value beyond the time span referred to in its calculation.

These two findings – the increased number of instruments dedicated to value cap-

A historical fight on soil value

ture, and the ongoing parsimonious redistribution of value – reflect the ongoing historical fight between advocates of State intervention, and protectors of the landowners' interests. This fight already existed in the 1960's, when planning milieus, unions and left parties argued in favour of a stronger regulation of the resource soil in order to control soil uses and value, and bourgeois and economic interests stood against central planning competencies and State intervention on the land market (Nahrath, 2003, 197ff).

6.4.3 Redistributive capacity of analysed instruments

6.4.3.1 Several instruments taxing the same added value?

Distinct punctual value capture tools

The increase in redistributive processes referred to in section 6.4.2 translated into a set of value capture instruments. The analysed redistributive processes have shown that several instruments can pile up and jointly tax the added economic value created at a specific moment in time:

- when a plot is zoned as building land and sold by its owner (in which case the tax on added land value created through zoning and real estate gains taxes applies);
- when additional development rights are granted and the landowner sells the plot (in which case the extended land service tax and real estate gains tax apply);
- potentially when additional development rights are granted (in which case the tax on added land value created through zoning and the extended land service tax would apply²).

The chase after value

Eventually these instruments all capture a share of land's added value. In order to limit their cumulative effects, federal and cantonal legislators have added specific clauses in legislation. The questions that arise for authorities are twofold:

1. what share of the value created does each level of government receive?
2. how much added value is to be captured?

Different taxes for different levels of government

The first question depends upon each zoning case or land transaction: depending on the location of the instruments' use (commune, canton), different instruments and different taxation rates apply. The real estate gains tax depends on the duration of ownership and cantonal legislation. The extended service tax depends on communal regulations, and the tax on added land value created through zoning depends on cantonal legislation (based on the minimum federal rate of 20% and a defined use of the tax produce). Based on a set of legal dispositions, the gains generated are dispersed among authorities.

Public interest in value capture

The second question remains presently unanswered. In a case in canton Basel³, where the tax on added land value has been applied since the 1970's, the Federal Tribunal has left the question deliberately open. The court argued that development rights granted to a plot create a *special advantage* from which the landowner benefits. The capture of these benefits are due in order to respect the principle of equality in the eyes of the law. Further, the court argued that given the degree of industrialisation and agglomeration of society, there is a public interest in capturing the added value created, to finance planning and urbanisation costs that aim to concentrate certain land uses in given perimeters and to protect other perimeters from these uses. The only response provided by the Court is that the guarantee of the institution of property requires that the legislator preserves the substance of existing property and the possibility to create new wealth. However, they do not set a maximum amount of taxation.

If we now individually consider the main redistributive instruments of land use policy, a set of conclusions can be drawn for the cases analysed.

²Federal legislation leaves the choice of implementing the tax on added land value created through zoning in up-zoning processes for the cantons. Current legislative proposals in canton Vaud plan to tax the value created through new building zones, and on existing building zones that were granted additional development rights.

³ATF 105 Ia 134.

6.4.3.2 Tax on added land value created through zoning

In the absence of a federal tax on added land value created through zoning, the cases analysed focussed on cantonal value capture instruments and their implementation. As the empirical findings have shown, the voluntary instrument adopted in canton Berne, the tax on added land value created through zoning, is not a success story: twenty years after canton Bern introduced the tax on added land value in its cantonal legislation, only 18 communes out of 47 in Oberaargau implemented the tax in their building regulations.

The analysis on local level showed that in the case of Huttwil, the tax was adopted in communal building regulations, but only used as means of pressure to compel landowners to financially participate in land service costs, and thus never effectively implemented. In the case of Niederbipp, where the tax was applied, the amount taxed did not match land market values.

Further, the tax revenue was not used for out-zoning operations, primarily because the local implementation of the tax on added land value does not fit the scale of the problem of reduction and relocation of building zones.

Further, figure 6.5 shows that the communes that introduced the tax are mainly those that have already over-sized building zones. Significantly, these communes introduced the tax only decades after the definition of their building zone, (from the 2000's onwards) (Viallon, 2016a). Consequently, the initial aim of the instrument – the collection of funds to financially compensate building zone reductions – could not be fulfilled, as subsequent zoning operations were quite limited due to existing over-sized building zones.

Overall, the adoption of the tax on added value created through zoning on the communal level faced strong resistance, because it directly challenged local interests of landowners, who perceived the capture of a portion of their gains as "robber barony", and of communal authorities, who faced strong incentives not to implement the instrument. Reasons for not implementing the tax are the pressure of fiscal competition among communes, and the fear of jeopardizing future development and losing territorial attractiveness (Viallon, 2016a).

Marginal communal implementation of the tax

Tax as mean of pressure on landowners

Tax revenue not used for out-zoning

Tax primarily implemented in commune with over-sized building zones

Local adoption of the tax faces strong resistance

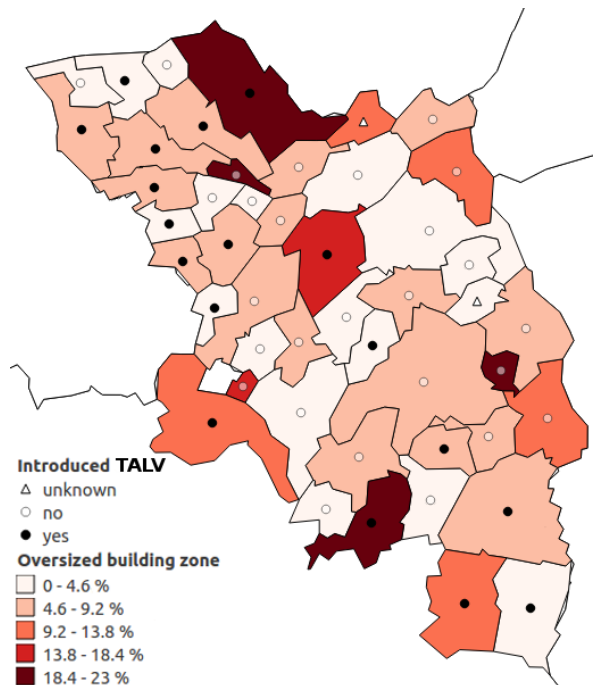


Figure 6.5: Communes with oversized building zones (as percentage of overall housing and mixed zone) and implementation status of the tax on added land value created through zoning in Oberaargau. Data: Communal building regulations. Map: FSO (2014b).

In order to fulfil the redistributive processes intended by the instrument, such as the reduction of oversized building zones, it would have been necessary to implement

Time and level of implementation limits the tax' effects

the instrument (at least on a regional level), where potential for value redistribution exists (for example between a more attractive growing commune with smaller building zone reserves or a less attractive, declining commune with larger building zone reserves). The un-official, country-wide analysis of the location of oversized building zones completed by the ARE, shows that such an instrument would be the most relevant at the inter-cantonal or federal level.

As a result, the instrument which dictated the instrument's scale of action on the federal level, as conceived in the initial legislative proposal in 1974, would have confronted the issue of over-sized building zones on more congruent time and spatial scales than the instrument defined by the spatial planning act that entered into force in 2014. In fact, the new tax on added land value currently operates in a best case scenario on cantonal level (canton Bern, for example, maintained the communal scale of action regarding the instrument). The implementation of the tax is forty years after the problem was first politically discussed, reducing the amount of surface on which the instrument could possibly be implemented, and severely limiting its redistributive potential.

6.4.3.3 Vaud's extended land service tax

The study of Vaud's extended service tax shows that the instrument has been adopted by most of the urban communes of Lausanne's agglomeration. This finances general communal infrastructure such as schools, administrative and cultural buildings and sports facilities, the aim it was conceived for. Due to a lack of legal clarity, the question of its application with regards to public landowners remains open, and has led to the litigious implementation in Malley.

The potential financial overlap of the extended land service tax with the future tax on added land value created through zoning is, in the current legal proposal, prevented through the possibility to deduct the amount of money paid for the extended land service tax from the amount paid for the tax on added land value created through zoning⁴.

6.4.3.4 Land tax and income tax

General reduction of land taxation

The evolution of land tax rates between 2003 and 2013 in Oberaargau has shown a general tendency towards a reduction of land tax rates (Viallon, 2016a). This trend also applies to the income tax. The analysis done between 2008 and 2016 in the agglomeration of Lausanne shows only evidence of a reduction of the income tax rate, but not of the land tax rate. The reduction of land taxation is not an isolated phenomenon but has endured in OECD countries since the 1970's (Guigou, 1983). The situation is particularly acute in peri-urban communes: local authorities minimise value capture on present landowners and residents, and open up new building land in order to increase the number of residents, which in turn is supposed to increase local fiscal revenues.

Shift to residential economy

This phenomenon has been highlighted by regional economists such as O. Crevoisier and A. Segessemann (2016), who emphasised the shift from a productive economy to a residential economy, *i.e.* the capture of revenues brought into the territory via the residential population. The added value created by foreign territories (other regions and countries) has become a prime source of income for Swiss regions, representing – independently of the commune's location – half of their source of income – the other sources of income being annuitants, industrial production, public spending, and income from tourism (Segessemann, 2016, 136).

Urban growth as necessity?

The critical factor for such strategy to succeed, is the effective attraction of new residents; an objective that heavily depends on urban growth. As the mayor of Huttwil stated⁵: "without growth, communes face financial collapse". But such strategy leads to an extension of urbanisation away from urban centres, a result which fully contradicts the objectives of the institutional regime of soil.

⁴Art. 65 of the *Projet de loi modifiant la partie aménagement de la loi sur l'aménagement du territoire et les constructions (LATC) du 4 décembre 1985*.

⁵M. Jampen, *op. cit.*

6.4.3.5 Land property income tax

This instrument does not exist in Swiss legislation (nor in French or German legislation), but can play a central role in the control of land value and the redistribution of the economic value generated through land.

Current value capture tools are mostly *punctual* value capture tools: the real estate gains tax, and the tax on added land value created through zoning (or the extended land service tax) are bound to zone changes or the sale of land. In current legislation, *durative* value capture tools tax income or benefits generated through land over time – the rent paid by tenants to the landlord for the use of the land and the constructions on it – together with other types of revenues. Current income and benefits tax are generic, because they consider jointly all types of income and benefits, regardless of their source. This means that current durative taxation of land-based income or benefits confounds the added value created by any kind of individual or collective effort (production, delivery of a service, trade of non real goods) with the sole net retribution of possessing property. The retribution is net, because landowners already have the possibility to deduct property maintenance costs and mortgage interests from their taxes. As argued in section 6.4.2.2, the absence of a specific instrument for land-based revenues neglects not only the source of revenue that is taxed, but the time dimension of value.

According to J. Tinbergen Tinbergen (1952), each policy objective requires its own instrument. If the institutional regime of soil aims to capture economic gains which landowners benefit from, which concedes them specific and individual advantages resulting from land use policy, it would be appropriate to consider income and benefits generated by land property separately from other types of revenues. A durative value capture instrument such as the land property income tax would neatly complement punctual value capture instruments (such as the real estate gains tax).

The value capture mechanism would require to separate the declaration of income and benefits stemming from the lease of immovable properties, from those stemming from the lease or sale of movable properties and services. The definition of a specific taxation rate for income and benefits from the lease of immovable properties would allow to capture a wider amount of land rent than through the current generic scheme. Tax revenues could then be reinvested in desirable land uses (such as housing, infrastructure, or agriculture).

Neglection of durative value capture tools

One instrument for each objective

Separate declaration of land revenues

6.4.3.6 Other fiscal instruments

Although not explicitly considered in the case studies, two other fiscal instruments play an important role in the institutional regime of soil, and set forth counter-productive incentives regarding land use:

- in most cantons, the real estate gains tax, which aims to capture a portion of the gains generated from acquisition, and subsequent sale of immovable property, is digressive over time, which means that the longer landowners hold the land, the less they taxes they pay. This situation has stimulated land hoarding behaviours, which in turn block development projects. In cases where farmers own land (which had been zoned as constructible), these landowners often benefit additionally from a land taxation based on the land's provided income value (similar to the instrument suggested above for land income taxation), rather than the market value (Egloff, 2008), a valuation which fostered the hoarding behaviour;
- the possibility to deduct mortgage interest from taxes: landowners who have mortgaged their property can reduce their taxable income or benefits by declaring the interest paid on the mortgage. Such possibility creates an advantage for landowners as opposed to home renters, but also fosters individually owned housing, which is overall more land-consuming than rented housing (Waltert et al., 2010). Further, it creates an incentive for landowners to finance their property through mortgage, which in turn subsidises mortgage-lending banks.

6.4.3.7 Soil remediation obligation

The polluted soil processes studied (Niederbipp and Malley) show that the solutions

Choice of the cheapest solution

chosen adapt construction types and techniques to the polluted grounds in question, rather than engaging a costly remediation process. Actors cover the contaminated soil with new buildings, which create a lid, and thus reduce the risk of future damages to the environment. At the same time, the lid allows for a minimisation of remediation costs. Such solutions impeaches soil remediation for an undetermined period of time, which has no relation to our anthropic conception of time. These implementation strategies can be explained by the financial costs of remediation. More importantly, these strategies emphasise the absence of a link between land use policy and the qualitative protection of soils: in fact, there is no instrument linking the capture of added economic value with the financing of ecological remediation measures. Currently, public contributions to remediation projects are financed by the waste tax.

In Niederbipp, the process has shown that polluted soils can be a good deal for developers: they can buy industrial land at a reduced price; and the landowner can sell their land four times! In Malley, soil pollution has been a minor issue, as no exfiltration risks existed, and the development rights have been relocated on less polluted grounds.

To summarise, contaminated sites policy induces redistributive processes, but in the absence of site contamination, remediation costs are minimised, which hinders the redistribution from economic to ecological value.

6.4.3.8 Vaud's energy planning

Vaud's energy planning states that authorities and landowners/developers need to consider the energetic dimension of the neighbourhood when elaborating a new local development plan. The case of Malley has shown that the plan's content as well as its implementation was dependant on the resources owned and mobilised by the landowners, which reduced the plan's effects to just a pass-on of costs. However, it was not possible to take all the energy policy's effects into account: for example, the 5% development rights bonus that developers can obtain if they exceed legal energy standards⁶ was not considered, because the effective policy output depends on the building permit, which remains to be elaborated.

6.4.3.9 Land improvement syndicate

The study of the land improvement syndicates (LIS) in the case of Cheseaux shows that:

- the instrument coordinates land improvement and zoning within a determined perimeter and thus allows a complete redefinition of the shapes and sizes of the property structure, and the use rights linked to them (through a local development plan). In Cheseaux, the use of the instrument has unblocked a land use process deadlocked for more than 40 years;
- procedural aspects such as the use of a majority rule within the landowners' assembly, the mandatory conduct of a feasibility study, the communal pre-definition of the perimeter, the equal treatment of landowners, and the above mentioned mandatory coordination between the property structure and zoning, reduce existing constraints of both public and private law, and allow for a nearly complete reconsideration of land use;
- from a planning perspective, the economic value created through zoning allows, for example, for a reduction in the amount of soil surfaces dedicated to development through the allocation of a higher density coefficient to the landowners; the added value could also be used to reduce oversized - and relocate badly located - building zones. Joint simulations made with Vaud's spatial planning office, have shown the economic feasibility of a regional transfer of rights (e.g. from a peri-urban to an urban commune).
- from the landowners' perspective, the economic value created through zoning allows them to use their land (and the additional development rights allocated) as a financial guarantee to pay for land service;

⁶Art. 97 *LATC*, SR-VD 700.11.

- however, there is no coordinated development process which limits the common aesthetics of construction and their integration into the existing urban framework to the legal prescriptions of the local development plan;
- the number of landowners involved in the instrument's process is limited to a dozen cooperative landowners: despite the use of majority rule for decisions within the landowners' assembly, negotiations are a central element (e.g. for the definition of the future property structure and building regulations which will apply to it) and legal action (through civil and administrative procedures) can be taken by each landowner in case of disagreement. Thus, a relative consensus between the involved parties is necessary.

6.4.3.10 Building right/leasehold land

The study of the building right instrument (in Huttwil, and Malley) has shown that the separation of the property of land from the property of construction allows the landowner to keep property, and allows the lease holder to dispose of it within a determined period of time. The terms of the lease generally mention an obligation of development and a pre-emption right in favour of the landowner. They also specify the type of construction that can be built, and its intended use, as well as obligations or restrictions related to its economic use.

In Huttwil, the instrument shows its resilience to shrinking land prices: the public owner adopts a low price policy, and thus manages, less dependent of market conditions, to attract more new inhabitants than private landowners. In the long-term, public owners are able to keep the land in their ownership .

In the case of Malley, the instrument allows the public landowner to ensure the construction of a determined amount of social housing by private developers, to fix the schedule of development, fix a financial return, as well as the rent the owner of the building can ask.

Tailor-made arrangement for development

Resilience to shrinking land prices

Compromise between financial return and social housing

6.4.4 The role of urban and peri-urban contexts

The cases analysed have shown the importance of socio-economic conditions for implementing development objectives. Comparing the peri-urban and urban contexts, a segmentation of the land markets is observable (Theurillat et al., 2015): peri-urban communes struggle between self-provision of development (e.g. building right in Huttwil), a stage where households provide for their own housing needs and are primarily focussed on the usage value of constructions, and market-provided development, a stage where property developers invest in land development in order to generate financial return (e.g. Wiedlisbach). Empirically, the difference between these two stages reflects in local authorities' ability to impose a set of obligations to the landowner (e.g. building obligation, land service costs, tax on added land value created through zoning). But socio-economic conditions are not the sole factor explaining the implementation of land use policy goals in peri-urban areas: intertwined interests between authorities and landowners, and authorities' ability to mobilise resources and instruments, also play a significant role.

In the urban context, local authorities' land use planning policy attracts institutional investors, who operate in national and international, real estate and financial markets. This capitalist stage is characterised by investors' comparative risk/return calculations to determine the most attractive locations to invest in (Theurillat et al., 2015). Based on these criteria, authorities seek sufficient financial attractiveness for their project, and thus aim to channel urban growth, and, depending on authorities' power position (i.e. available policy resources and instruments), shift major infrastructure costs to developers.

Although acting in different contexts and with different actors, peri-urban and urban communes both face financial competition from their peers: peri-urban communes struggle to maintain their population and try to increase their attractiveness towards neighbour communes by lowering tax rates and opening land for development at low costs. Considering the demographic evolution of the peri-urban communes analysed, such strategy has encountered limited success, and results in an extensive consumption of land by low density housing.

Segmentation of land markets

Necessity of a sufficient rate of return

Financial competition among local authorities

Two options for urban development

Urban communes try to attract financial investors through the definition of high plot ratios close to transportation networks. They also compete with geographically separated urban communes for the attraction of capital, and depend on the rate of return of real estate compared to other investments on the financial markets. However, in case urban communes own land, they can also lease it to cooperatives and small local investors, cases in which they opt for a reduced profit rate in exchange of controlled rental prices or additional development obligations (*e.g. Malley-gasomètre*).

6.5 Feedback to theory

6.5.1 Economic theory

Key role of locational attributes

Despite the lack of statistically significant analysis (see however Viallon (2016a)), I can generally confirm the effects of locational attributes of land suggested by hedonic pricing models on land value (Sirmans et al., 2005): the further away from and the less well connected to urban centres, the lower the land prices and the less attractive urban development are. In Huttwil, the least attractive commune analysed, actors lowered rental revenues in order to attract new inhabitants. In Malley, the future urban neighbourhood in Lausanne’s agglomeration, actors achieved urban development on a brownfield with a 4.5-5% annual return on the plot’s value. The lower intermediate cases of Niederbipp and Wiedlisbach achieved growth through a specialisation of activities: the former used the existing transport infrastructure and flat land to foster the development of a logistics hub, the latter put forward the view attributes of certain plots and a train connection (to secondary centres like Solothurn) to attract middle class residents. The upper intermediate case of Cheseaux shows that a rapid transport connection to Lausanne’s agglomeration, and the proximity of developed plots to the village’s centre and public infrastructure led to a quick development (and sky-rocketing land prices, which were also bound to the general economic conjuncture).

Creation of rent monopolies

Confronting the analysed processes with classical land rent theories, I observed that in at least two cases analysed, actors – both private and public landowners, and, to a certain extent, public authorities – tried to create a rent monopoly from which they sought to benefit (Harvey, 1982). This occurred through various means:

- the elaboration of a growth strategy through the reduction of taxes (Obereargau, in general), which can be combined with a reduction of the revenues from land (building right in Huttwil). As shown by Segessemann and Crevoisier (2016), commuters are the main source of revenues for communes. In order to capture these revenues, communes sell residential space below market prices and lower taxes, in order to attract new inhabitants, which, in turn, should increase their revenues;
- the resistance to instruments implementation, as shown in the case of Malley:
 - by obtaining full compensation for the MAO restrictions, landowners maximised the surface of production (gross floor area) in an outstanding location (centrality of the plots, close proximity to the train station);
 - through the circumvention of the extended land service tax, which aimed to maximise the amount of rent;
 - through the relocation of development rights minimising soil remediation operations, they reduced construction costs, and thus reduced their impact on future land rent;
 - in regard to energy provision, landowners minimised their costs linked to the future building’s heating system, by defining the district heating network as a main source of energy, allowing them to pass on the energy provision costs to future tenants and home buyers. Such transfer of costs forces higher rental prices than if landowners had invested in their own heating system. As a consequence, in the present case, landowners achieved absolute rent;

Referring to the previous comments made in section 6.4.1 on the role of policy resources, economic analysis explaining land rent could be enriched by a systematic analysis of actors' mobilisation of policy resources and instruments. This would allow researchers to explain in greater detail, why actors were able (or not) to maximise revenues from land property. Contrariwise, policy analysis would benefit from economic theory through its qualitative characterisation of the outputs or redistributive effects resulting from policy processes (differential, monopoly, absolute rent) and the complementary explanations it provides to actors' decisions (rent-maximising behaviour).

Cross-fertilisation of economic and political analyses

6.5.2 Policy and regime theory

The relevance of policy resources in achieving land use policy objectives has been shown and discussed in the present chapter. The importance of possessing and mobilising personnel and information appear to be key factors in successfully implementing land use policy objectives (building obligations, polluted soils, tax on added land value created through zoning, LIS), but also in diverting them (building zone transfer).

Prominent role of the resources personnel and information

Consensus and political support have also played important roles in defining policy outputs, because the target group's consensus is conditioned on a guarantee (through compensation, or value increase) of the economic value of the property titles.

Land use policy, which through zoning makes the creation of added value *possible*, only marginally accounts for the value it induces – mainly through punctual value capture instruments. Until 2014, land use policy delegated the use, capture, or control of the land value to other circumstantial process-bound policies (environmental protection, energy, housing, transport, etc.), or simply to the property title holder. Although the tax on added land value created through zoning is now mandatory, a major part of the added economic value remains in the hands of the landowners.

Limited account for the value induced by land use policy

This insight sheds new light on what the IRR framework conceptualises as a lack of extent, coherence, or strictness in managing natural resources: there is a lack of coordination and of control mechanisms between public policies and property rights on the potential value created through land use policy. Such regulatory gaps are symptomatic for what P. Knoepfel et al. (2007, 464) have identified as the absence of "distinction between sustainability of the resource (system) and the ecological, economic and social sustainability of its different uses": current soil resource management aims to limit building zone extensions, foster densification, and reduce emissions of pollutants, but does not account for the stock or the reproductive capacities of the soil resource system. In the case of soil, this is reflected in the absence of link between the stock of soil and the stock of the services soil provides.

Sustainability of the resource or of its uses?

Hence, future research questions are: *how is the constructible stock of land to be defined in accordance with other non-construction uses, and how is the constructible stock of land to be shared among the various land uses involving construction?*

6.5.2.1 Towards an integration of infrastructural and natural resource management

C. Bréthaut (2012) applied the IRR framework to drinking water networks in tourist communes, and established a link between these networks and the institutional regime of water, whose management perimeter is functionally defined by the water basins. The author cited the progressive change of scale initiated by actors from the commune's infrastructure to the intercommunal water basin management, and emphasised the increased management possibilities on the natural resource's stock that result from such change of scale.

More integrated resource management

L. Nicol and P. Knoepfel (2014) applied the IRR framework to housing stocks, a central use of developed land. Through the use of this framework, the authors identified the stock owners, users and third parties, and classified mains goods and services derived from the resource housing. This allowed them to show which actors and elements a housing stock needs to account for to remain functional.

In the two examples cited, there are missing links between the soil stock and the stock of the various infrastructural resources which rely on soil (such as water networks, housing, food). These missing links are twofold: at what scale are the "sub-resources" to be managed? And how (and at what scale) is it to be quantitatively

Functional localisation of housing and employment

regulated in comparison with other soil uses?

The agglomeration programs developed over the past fifteen years have initiated a significant change which provides a first response to the question of the scale for defining and managing the housing stock: these programs have initiated a change of scale in defining and locating future housing and employment. In canton Bern, these changes have even been formalised in regional functional political-administrative structures that cover the entire territory. However, the new government level in Bern (or the less formalised agglomeration committees in Vaud) have marginal or no direct zoning competency, an element crucial for the definition and location of housing stock, and related employment areas.

Quantitative resource stock managed by cantons

Since the 2014 spatial planning act revision, the question of the quantitative management of the soil stock and its allocation to various types of uses (see table 8.32 in the annexes) is now dependent on the cantons: they have the competency to define the stock of land dedicated to urbanisation for each commune, and thus manage its canton-wide (re-) distribution.

6.5.3 Instrumental theory

The theoretical chapter referred to three main strains of research in instrumental theory: institutions as instruments, politics of instrumentality, and typologies. Confronting the thesis' results with the instrumental literature mobilised in the theoretical chapter, the following comments can be made:

- the classification of instruments in a typology, close to the one developed by P. Lascoumes and P. le Galès (2007), has allowed for the sorting of instruments stemming from various public policies in order to gain an overview of their nature, their role in redistributive processes, the governmental level in charge of implementation, the objectives they aim to achieve, as well as the groups they target;
- based on the comparative attributes from B. Linder and G. Peters (1998), I formulated preliminary expectations about the resource intensiveness, the target quality, and the political risks involved with the instruments' implementation. In accordance with the central research question of the thesis, I put an emphasis on the instruments' redistributive capacity or effects, which is another dimension of analysis put forward by A. Schneider and H. Ingram (1990).

Shift from permanent to punctual value capture tools

Considering instruments as markers of change (Lascoumes and Le Galès, 2007), I observed a reduction in the importance of permanent value capture instruments (land tax) – a decades-long phenomenon (Guigou, 1983) –, and a growing use of punctual value capture instruments (tax on added land value created through zoning, extended land service tax). In the short term, one can argue that public authorities benefit from this change, because they quickly capture significant sums of money which they can use for various political goals. In the long term, the effects on public finances depend upon authorities' ability to capture economic added value as a whole. On this aspect, the previously discussed research results from O. Crevoisier and A. Segessemann 2016 provide useful insights.

More indirect, invisible and automatic tools

Referring to L. Salamon's (2002) hypothesis on the growth of new governance, notably the premium put on indirect, invisible, and automatic tools, the observed rise of punctual value capture confirms two of L. Salamon's features:

- in terms of directness, the newly introduced punctual value capture tools are defined on the federal (respective cantonal) level, and implemented by cantonal (respective local) authorities. Compared to other taxation tools, no effective change in terms of directness is observed;
- in terms of visibility, the impact on the budget process of punctual value capture instrument tends to be reduced: although their amount can be substantial, funds collected through the extended land service tax only concern specific landowners. They are bound to specific communal infrastructure, and cannot be used for other purposes. On the contrary, permanent value capture instruments (such as the land tax) concern all landowners and can be used for any politically decided

purpose, and therefore open up to long and intense discussions on the budget, regarding, for example, the distribution of revenues, or on the adjustment of the tax rate;

- in terms of automaticity, punctual value capture instruments have been formalised and their implementation has become, in the case of the federal tax on added land value created through zoning, mandatory. Their adoption as taxation instruments makes their use systematic and non-negotiable, in contrast with previous contractual negotiations. Compared to previous less or non-formalised uses, the tools' automaticity is enhanced. However, compared to other taxation tools, their automaticity is not enhanced.

If I relax the functionalist definition of "policy instruments" adopted for analytical purposes, and include more blurred forms of public intervention – such as action plans or other indirect instruments that frame the use of instruments directly impacting the target groups, I observe an increase of the role of indirect instruments in time. Several recent changes show the increased role of agreements set up by private, or half-public actors that indirectly condition the delivery of policy output.

The 2014 technical directive on building zone dimensioning (Flückiger, 2014; Viallon, 2016a) is characteristic of the new governance era: the federal administration, with the approval of the cantonal ministers in charge of public works and spatial planning, defined a highly precise measurement technique in order to calculate the legally admissible amount of surfaces dedicated to future urbanisation. The tool is implemented through the cantonal structure plan – a second indirect instrument that sets development goals. However, the structure plan does not take direct action through resizing building zones. It leaves the task to the communes, which are, in most cantons, responsible for dimensioning the building zones. The technical directives solely provide a highly technical-administrative comparative model that allows for the classification of "good communes" and "bad communes" for the purposes of comparison. The tool is also invisible, because it does not have any financial impact on the Confederation, only the communes potentially facing compensation claims (for material expropriation, in case they have to reduce their building zone) are subject to financial impact. And it is also automatic, in the sense that existing cantonal administrations only adapt their current building zone calculation methods to federal directives.

Agglomeration programs are contract-based action plans negotiated by the federal administration with cantonal political administrative authorities. The latter, in turn, set up (ad hoc) governance structures gathering delegates from the cantonal administration, dedicated personnel hired specifically for the program's implementation, and the mayors of the involved communes. In canton Vaud, this twofold political-administrative process (Confederation-canton and canton-communes) is entirely contractual and voluntary. The agglomeration program's content is elaborated by an ad hoc administration, under the supervision of cantonal administrative authorities, and by representatives of the communal executive body. The program's content is implemented in successive master plans, and other indirect tools. Communal legislative bodies, when they adopt the usual land use policy instruments (building regulations, zoning and local development plans), must comply with the program, without the possibility to determine their content. Consequently, in Vaud, indirect tools de facto bind communal legislative bodies, because the zoning plans they adopt need to conform to the master plans. The situation is different in Bern, where formalised institutional structures have emerged. However, these structures lack the formal competency to implement land use policy instruments, such as binding zoning plans for landowners, a competency which remains in communal hands.

Looking closer at the legal transformations induced by the increased number of indirect instruments, the case of Malley reveals that landowners were involved in the elaboration of master plans, the master plans immediately preceding local development plans. The involvement of master plans can be understood through the direct consequence they have on landowners' rights and the land's subsequent value. These master plans allow a pre-determination of land prices, and they coordinate and stabilise actors' expectations prior to the definition of binding instruments. However, such coordination has, in the case of Malley, resulted in a "cherry picking" strategy by landowners: they picked elements of the master plans that matched their interests

Competence shift to new State level?

Cherry picking strategy of landowners

(gross floor areas to be built), excluded or minimised those that did not (MAO restrictions, energy provision standards), and put forward others they did not intend to realise at all (a planned pond in the centre of the new neighbourhood). The regional landscape protection plan in Oberaargau was subject to similar selective implementation: although cantonal administrative and communal political actors agreed on a regional plan defining wildlife corridors and urbanisation boundaries, their implementation did not occur in Wiedlisbach's zoning plan.

Formal defect of indirect tools

The point is that these indirect tools introduced a formal defect, where pre-negotiated arrangements are used by the most powerful actors to secure their interests, and are presented as non-negotiable in subsequent democratic steps.

Authorities increasingly rely on instrument mix

The four instrument types defined by the IRR framework are classified as instruments according to their public or private law background and their impact on property rights. This categorisation allowed them to distinguish between regular public tools of intervention (taxes, zoning, building regulations), public tools used more parsimoniously (redefinition of the property structure, expropriation), and private tools (exchange, sale, mortgages). The suggested increased blurring in authority use of instruments (Peters, 2005, 362) is confirmed by the thesis' empirical results. Authorities increasingly rely on property rights instruments to implement land use policy goals: They extend the regime's scope to match the problems they face, (such as building obligations or the relocation of development rights), or add contractually-defined, project-bound obligations (cost division for local infrastructure in Malley, playground in the process LIS in Cheseaux). Further, property rights instruments are frequently (and often by law) used as payment guarantees: land is mortgaged by public authorities to ensure landowner payment.

Formalisation of contractual practices over time

Further, considering authorities' practice and the evolution of legislation, I observe that specific contractual practices (building obligation, passing-on of infrastructure costs linked to development to landowners) tend to be formalised in public policies over time: this applies, for example, to Vaud's extended land service tax, which formalised informal value redistribution practices; further, the contractual building obligations developed in Wiedlisbach have recently been formalised in federal and cantonal laws.

Conclusion

In order to respond to the research question asked at the beginning of this thesis, in section 7.1 I summarise the knowledge gathered from the literature review in chapter 2, from the conceptual framework applied to the analysis, and from the results obtained from the studied cases and redistributive processes. In section 7.2, I present the recent legal changes in Swiss legislation on soil, and discuss how these changes respond to the challenges and implementation issues observed in the empirical field.

Based on the knowledge acquired in this thesis, I list in section 7.3 a set of challenges that I consider relevant for soil management in the future. Section 7.4 ends the present work with concluding thoughts.

7.1 Response to research question

In the introduction, I formulated the following research questions:

What is the redistributive capacity of the current Swiss institutional regime of soil? What obstacles and limits does the current institutional regime of soil face in terms of redistribution? What are the consequences in terms of land use? And what are the most promising strategies for increasing the regime's redistributive capacity?

Increase of land related issues

The underlying postulate was that the redistribution of added and reduced economic and ecological values in land use policy processes can lead to a more sustainable use of soil. The literature review in chapter 2 has shown that existing research on the soil's institutional regime focussed essentially on the emergence and adoption of land use planning regulations and the effects they produced on land uses from the 1960's through the 1990's (Nahrath, 2003). Since then, land use planning has grown in importance, and the restrictions and obligations linked with land property have increased. The revision of the federal spatial planning act in 2014 and the re-introduction of a value compensation mechanism, were relevant opportunities to review the effects of the institutional regime of soil over the last 25 years, and to discuss if and how these legal changes were conditioned by land use issues encountered in practice. Further, since the 1990's, other issues linked to soil management grew in importance (such as contaminated sites), because of the high environmental and financial costs induced by their management and potential remediation. In the 2000's, supra-communal forms of political action emerged, introducing an intermediate level of coordination in land use planning, and a set of indirect tools overlaying existing land use policy instruments (Pflieger, 2013b).

Value and its redistribution as main stake

Based on these literature findings and on existing theoretical approaches to natural resource management (Ostrom, 1990; Gerber et al., 2009), I elaborated a framework of analysis that included contextual and institutional factors, as well as instruments and policy resources available to actors, in order to analyse actors' games in the implementation of Swiss land use policy, in particular regarding the redistribution of added and reduced economic and ecological values. The theoretical analysis conducted in chapter 2 allowed the institutional regime of soil to be characterised as follows:

1. there is a gross incoherence between the duration of anthropic soil uses and the renewal capacity of the resource stock. From a financial perspective, the maximum time period to write-off land or real estate investments is 30 years. However, from an ecological perspective, the time to "write-off" land development can be thousands of years, for example, if land that has been developed is supposed to be reused for agriculture (Bartz et al., 2015, 7);

2. current legal conceptions view soil as a mortgageable commodity to be exchanged on a market, whose economic rent can be appropriated by the property title holder. Notwithstanding the differential and residual characteristics of land rent, one can define current Western conception of land property as simple fictitious capital, in the sense that similar to any financial asset, "rent figures in the landowner's accounts as the interest on the money laid out on land purchase" (Harvey, 1982, 347);
3. given the importance of value redistribution in the successively formulated public problems linked with soil (see section 2.3.1), the redistribution of land rent is considered the eminent issue of land politics;
4. policy instruments, through the form of social control they exercise, and the values they carry (Lascoumes and Le Galès, 2007), are where negotiation crystallises between authorities and target groups on the appropriation of rent, which makes the study of these actors a key element for understanding redistributive issues on soil.

The empirical analysis conducted in chapters 4, 5 and 6 allowed for the characterisation of the redistributive capacity of the Swiss institutional regime of soil prior to the 2014 spatial planning act revision as follows:

Lack of tool use for permanent value capture

1. the absence of a mandatory compensation mechanism for advantages resulting from land use planning (art. 5 SPA) induced a significant incoherence between the property right system and land use policy (Nahrath, 2003). This incoherence constrained authorities in their use of land use policy instruments in several ways:
 - the region of Oberraargau has shown that the late and partial introduction of voluntary mechanisms, such as the communal tax on added land value, have produced limited effects, in particular on the reduction of oversized building zones. These limited effects are not only due to the resistance faced by authorities in capturing land rent, but also to inherited zoning practices: the communes inherited their zoning plans with oversized building zones prior to the introduction of the spatial planning act, which severely reduced their possibility of capturing added value created through zoning;
 - consequently, authorities were unable to constitute a monetary fund that could compensate landowners who would lose such rights, which reduced their margin of manoeuvrability when reducing (and since 2014 relocating) oversized building zones and dimensioning them in accordance with legal prescriptions;
2. fiscal land use policy tools as durative instruments are widely underused. These tools grant a much more precise picture of the economic value generated on each plot, and allow its capture and control:
 - official fiscal plot and real estate values are generally underrated;
 - official land values are not publicly accessible. This creates an information asymmetry between end beneficiaries and the policy's target groups, and limits the assessment of the costs and benefits, and of the winners and losers, of the current institutional regime of soil. Only those who own land, and fiscal experts in the administration, that can access the databases;
 - tax rates of permanent value capture tools on land have shrunk over the past decades, and are at a historical low (see section 6.4.3 in chapter 6 and Guigou (1983));
 - fiscal tools are not coordinated with land use policy tools: there is no coherence of redistributive mechanisms (for example between the land tax or the land property tax) with land use policy issues. The objectives of land use policy oppose those of fiscal competitiveness: whereas the former aims to set spatial boundaries on urban development, the latter aims to increase communal revenues through urban expansion and the attraction of new fiscal contributors;

- further, hidden fiscal instruments, such as the deduction of mortgage interest in the fiscal declaration, favour already privileged natural persons who, in the words of Credit Suisse, are not even longer able to afford a mortgage because of the increase of real estate prices (Fries et al., 2015);
3. the absence of considerations on soil quality when defining new zones of development: the restrictions set by the federal cropland protection plan are limited to a cantonal quota of fertile surfaces to be preserved. But as long as the quota is not reached, this land can be developed. In canton Bern, a higher minimum plot ratio (0.4) applied to the development of such land.
 4. the exclusion of end beneficiaries from land use policy implementation: most inhabitants and land users are included at the end of (re-) development projects, because previous steps mainly serve negotiations between authorities and target groups. This issue has existed since the beginning of land use policy (Knoepfel, 1977). Further, future users are not all yet present (for example new renters), or are excluded, because their grievances (linked for example with rental lease law) are not addressed by land use policy.

Value through economic development

In summary, the redistributive capacity of the institutional regime of soil has been limited: a set of tools exist, but these are underused and lack coordination among each other. This induces the following consequences on land use:

1. oversized building zones have been marginally reduced over the past thirty years and are still a major issue in Swiss land use policy:
 - the case of Wiedlisbach has shown that these large oversized building zones have created urban sprawl within the building zone, leaving development holes and unordered property structures unused;
 - the cases of Wiedlisbach, Niederbipp, and Huttwil have also shown that despite this important zoning gap and the unused, oversized building zones, urbanisation continues to expand, the political pressure on the extension of these zones being significant (essentially motivated by landowners' gains and public growth strategies);
2. the systematic privilege of development (and of the linked added economic value) over other land uses, such as agriculture, protected areas, landscape, or other kind of ecological value. This can be explained by the time offset between financial and ecological perspectives, in addition to the difficulty to take into account the externalities or spillovers of urban development, (such as the additional transport distances in a dispersed urban area, additional resource extraction necessary to development which takes place elsewhere, human travel, and migration induced by the economic attractiveness of growing urban areas).

Additionally, there is a general lack of consideration of the spatial dimension of environmental legislation, or, in other words, of the environmental impacts of land use planning legislation Knoepfel and Nahrath (2014, 771): spatial restrictions on noise, air, water, soil pollution are not defined in local development plans. The authors explain this lack of coordination by citing the prevalence of use rights on land given precedence over other natural resources (those present being subject to financial compensation in case of withdrawal);
3. the avoidance of costly soil remediation projects: the reuse of former brownfields (in Malley) or landfills (in Niederbipp) is conditioned on the possibility of developing the site without disturbing the existing soil structure. Otherwise, threshold values could be exceeded and remediation would become mandatory. Developers have no incentive to increase the ecological value of soil beyond legal obligations. Consequently, they seek to minimise interventions in order to reduce costs (*e.g.* treatment of soil excavations, prevention of (rain) water infiltration and exfiltration of pollutants);
4. the importance of owning land in order to achieve land use changes in less attractive locations (such as in Huttwil). Without a double control on the

resource (as public regulator and property title holder), land development is constrained to locations where the land rent satisfies the investor's desired profit margin. The broader issue at stake is the functioning of current land use policy and the property rights system in a context of economic stagnation or recession;

5. the directions taken by spatial planning and fiscal policy combined with economic promotion are diverging. Considerations of sustainability are contrary to considerations on attractiveness for developers, and for general economic activity. These tensions are reflected in the multiple cropland protection initiatives launched in Zurich, Berne, Thurgau, and currently, at the federal level;
6. the limited availability of instruments jointly considering land property and public law, such as the land improvement syndicate, is an issue that has led to a suboptimal use of building zones (non-development of plots whose shape is unfit for construction in Wiedlisbach);
7. the lack of a specific rent capture instrument limits the redistributive capacity of the regime. Authorities capture the anticipated capitalised gains on land, instead of effectively taxing generated income. This issue is particularly salient in respect to the underused existing fiscal tools: currently the control of rent is only marginally considered part of land use policy.

Land use changes observed over the past decades are the same which led to the emergence of land use planning policy in the 1970's: the consumption of arable land through urbanisation. As the Federal Council states in the message accompanying the proposed spatial planning act (Federal Council, 2010): the spatial planning act has led to a reduction in urban sprawl and the loss of fertile soils, but it has not managed to control their evolution.

Main issue of the loss of fertile soil unchanged

7.2 Recent changes in the institutional regime of soil

7.2.1 Changes induced by the 2014 spatial planning act revision

The 2014 spatial planning act revision changed important elements in the institutional regime of soil that can be subsumed as follows:

Indirect tools become more stringent

1. the compensation mechanism for advantages resulting from planning (tax on added land value created through zoning) is now mandatory (art. 5 SPA). This resolves theoretically one of the main incoherences of the IRR, because it provides the funds for the payment of compensation in cases of material expropriation and grants authorities a margin of manoeuvrability in their use of zoning;
 - however, the scale of implementation of the instrument is not adequate for the problem of the oversized building zones, the problem it is tasked with solving: cantons such as Basel or Geneva tend to have a building zone shortage, high land prices, and could provide the funds captured through the instrument to compensate building zone reductions in Valais and Fribourg, where the largest oversized building zones are. As it is conceived today, no redistribution of value across cantons is possible, severely limiting the instrument's expected effects. Thus, the current solution seems to be less effective than the 1976 legal proposal, which included a compensation mechanism on a federal scale;
 - further, federal law obliges cantons and communes to tax advantages granted by zoning only on new building zones. The cantons are free to implement the instrument in case the plot ratio is increased;
 - in addition, the payment of the tax on added land value created through zoning is due when the building permit is delivered, which means that landowners or developers do not have an immediate obligation to develop the land once it is zoned. This can induce hoarding behaviours;

- notwithstanding this fact, a new article (art. 15a SPA) delegates the responsibility to define instruments able to guarantee the availability of zoned land to the cantons, in cases where availability is justified by public interest;
 - the tax on added land value captures a portion of the expected fictitious land rent. The estimations of the amount of value captured is essentially speculation, because anticipation of potential land rent over a given time period, does not necessarily correspond to the added value effectively gained by the property title holder, and misses the essential timeless characteristic of the property title.
2. In terms of the dimensioning of building zones, the 2014 federal law introduced a set of changes (Flückiger, 2014): a unified calculation method for dimensioning which anticipates the needs of the next fifteen years. Widely inspired from the Bernese calculation method, the federal formula introduces a cantonal building zone use-coefficient (*taux cantonal d'utilisation – kantonale Auslastung*). This coefficient defines, for each type of commune (urban, peri-urban, touristic, etc.), and for the three zone types (housing, mixed, central zone) an admissible amount of square meters of sealed surface per inhabitant. This in turn allows comparison of (portions of) communes with each other (and distinctions between the "good" and the "bad" communes), and helps to define minimal densities for new building zones. However, with this method, several issues exist (Flückiger, 2014):
- this use coefficient introduces a minimal quota of inhabitants and jobs that each canton is allowed to accommodate, depending on the demographic growth scenario they chose, and on the relative host capacity of its building zones. As the author notes (Flückiger, 2014, 151), this minimal quota of persons (in order to limit soil consumption) is surprising, as one would expect a definition of the maximum quota of building zones to limit soil consumption;
 - nevertheless, according to art. 32 SPO, the *sum* of cantonal serviced building zones cannot exceed those required for the next fifteen years (based on the medium demographic growth scenario of the Federal statistical office). However, *single* the dimensioning of new building zones can refer to each of the three (low, medium, high) population growth scenarios elaborated by the Federal statistical Office. This provides a significant margin of manoeuvrability for the definition of the necessary amount of building zones.
 - the three types of defined zones (housing, mixed, central) do not take into account tourist and leisure zones which consume large amounts of soil through secondary homes;
 - further, strategic cantonal zones dedicated to economic development are excluded from the calculation.
 - finally, the inter-communal comparison refers to existing urbanisation/density patterns in qualifying the admissibility of future densities, which might lead to a simple reproduction of these patterns on future land use;
3. coordination of urbanisation and transport: the cantons must now define future zones of urbanisation in the cantonal structure plan (art. 8a SPA), a requirement that has anchored the agglomeration policy to spatial planning legislation. This means that the future areas to be developed need to be spatially defined in the cantonal structure plan, and their relevance in regard to transport infrastructure demonstrated. This new function tends to transform the cantonal structure plan from a simple coordination tool into a pre-zoning plan, as intended by the initial SPA from 1974 (Marti, 2014). The general idea is to (re-) locate (existing) building zones to the most relevant areas, from a land use planning perspective, and to ensure their development. In this way, the new federal law recommends the use of the land improvement syndicate (art. 20 SPA). However, the instrument does not allow for a spatial relocation of peripheral development rights to more central locations, although the observed building zone patterns of the peri-urban and urban cases analysed show the relevance of such transfers;

4. further, the revision misses the coordination with agricultural land uses and the protection of the most fertile soils, which was supposed to be considered in the second part of the SPA revision. This issue has been postponed to 2020. Currently, the quantitative issue of desirable soil consumption remains open until the cantonal quotas of the cropland protection plan are exhausted⁷. From a qualitative perspective, researchers and political-administrative authorities aim to eventually create a soil quality index classifying cropland with more precision than current methods. Such an index would limit the ecological impact of development through a more precise definition of new zones, or spatially redistribute ecological value, (*e.g.* through the ecological melioration of less fertile soils).

A significant legal change is the decision of the Federal Tribunal from 24 August 2016⁸. The Swiss Foundation for Landscape Conservation appealed against the adoption of a zoning plan by Adligenswil, (a commune in canton Lucerne), featuring a building zone capacity of five times the village's actual population. The cantonal tribunal rejected the appeal, on the grounds that the organisation had no right to appeal. But the federal judges decided otherwise: based on the grounds that the federal legislator adhered to extensive regulations on building zone dimensioning, the judges argued that since 2014, the creation of new building zones is a federal competency. The consequences of this decision did not include a modification of the recently modified zoning implementation process, but rather the attribution of a new right of appeal for nature and landscape protection organisations against communal decisions on building zone dimensioning. The Tribunal extended the end beneficiaries' power by introducing a new watchdog into the zoning plan adoption venue. Thus, the Tribunal expects to limit future excessive building zone extensions. It remains to be seen if and when environmental and landscape protection organisations mobilise their rights of appeal in the future.

**New venue for
environmental and
landscape organisations**

7.2.2 Changes induced on cantonal level

In Canton Bern, the construction act (revised in 2016) was subject to four major changes in order to comply with federal law:

1. capture of added land value created through zoning (art. 142 to 142f BauG): the communes are obligated to capture at least 20% of the added land value created through zoning, both on newly zoned land, and on land benefiting from additional development rights. The taxation level is capped at 50% for newly zoned land and at 40% on up-zoning procedures. The tax payment is secured by a legal mortgage. Ninety percent of the tax revenue is distributed to the commune, and 10% to the canton⁹. The communal implementation of the instrument will severely limit fund use for building zone reductions, as the funds can only be used within the communal territory;
2. introduction of a building obligation (art. 126a to 126d BauG): in order to reduce land hoarding behaviours, communes now have the possibility to set a delay of between 5 and 15 years during which the landowner must use the land in conformity with zoning prescriptions. Authorities note the building obligation in the land register. Once the delay has expired, and if the landowner can be considered responsible for use that does not conform to zoning prescriptions, then a land use steering tax is to be paid to the commune. The commune can also implement, with the landowner's approval, a contractual emption right (art. 126b). These changes fill a regulatory need for situations experienced

⁷In 2012, for example, Zurich's citizens approved higher protection of cropland through the cantonal structure plan, but in 2016 refused an initiative which required compensation of any extension of the building zone on cropland through the zoning of an equal amount of cropland (*Kulturlandinitiative*).

⁸1C_315/2015, 1C_321/2015.

⁹The division of the tax revenue aims to compensate cantonal losses due to a reduction of the revenue stemming from the real estate gains tax. In fact, the capture of added value through the tax on added land value created through zoning, induces a loss of revenues from the real estate gains tax. This is due to the tax calculation method, based on the net gains the landowners receives, and not on the difference between land value prior and after the zoning operation.

by communes such as Wiedlisbach. These regulatory changes confer greater legitimacy and enforcement possibility to building obligation contracts signed in the past.

3. the land use steering tax rate ranges from 1% of the land's market value during the first year, and up to 5% of the land's market value, five years after the expiry of the delay. The funds collected by the land use steering tax are bound to the same uses as those captured by the tax on added land value created through zoning (art. 142f BauG). For previously zoned land, the instrument does not require implementation through local building regulations, and can directly be adopted by the communal executive body. The land use steering tax might prove an effective tool to limit hoarding behaviours, because it does not rely on official land values, which tend to be underrated. The time delay for implementation can be very long, and the absence of automaticity in the use of the instrument, can, in cases of conflicts of interest between landowners and local authorities, limit the intended effects;
4. protection of cropland (art. 8a, 8b, 8c, 19, 54 and 64 BauG): the use of agricultural surfaces protected by the cropland protection plan for development is conditioned on the implementation of a particularly high plot ratio, a qualitative compensation of the used surfaces (for example through the melioration of less fertile soils used for agriculture), the integration of parking spaces within buildings, and the definition and use of portions of the existing building zone for redevelopment. Relevant analysis will concern how the canton decides upon future local development plans on cropland: what plot ratio will authorities require, and will the plot ratio be applied systematically? How will a mandatory higher plot ratio fit with existing urban development, which can be of a lower density?

Taxation of all up-zoning changes

In Canton Vaud, the spatial planning act is still being revised. The legislative proposal plans for a 20% tax rate of the added value created on newly zoned land, and on up-zoned land (Conseil d'Etat du Canton de Vaud, 2016). The taxation of both zoning and up-zoning procedures is justified with the requirement to treat all landowners equally. The tax cumulates with the extended land service tax. Changes affecting the federally imposed building incentive or obligation have not yet been defined.

Privilege of office space over housing?

Nevertheless, in 2014, Vaud introduced the extended land service tax. As opposed to the tax on added land value created through zoning, the instrument aims to finance communal public infrastructure like schools, bus stops, and sports facilities. It formalises an informal planning practice, used for decades in the canton, through a fixed tax on each additional square-meter to be built. The amount of the tax varies greatly, depending on the land use (33 francs per square meter of office, and 140 francs per square meter of housing). Such variation can stand against a proportionate development of housing and office space, the latter being less costly both for commune and developers.

Ambiguous effects of the extended land service tax?

The case study of Malley provided an outstanding example of the tax's implementation. This was due to the asymmetry of policy resources which actors were able to mobilise, other infrastructure landowners agreed to participate in (railway underpass), and to the late mobilisation of the instrument by public authorities. The broader consequence of the tax's introduction is that urbanisation becomes cheaper for authorities, because they are able to pass-on significant costs (inherent in urban growth or redevelopment) to landowners, reducing their dependence on fiscal revenues. Such increase of revenues can be considered positive for redevelopment projects in urban communes, because they do not increase the surface of urbanised soil, but merely intensify its uses. But the result might look different for peri-urban communes: an increased profitability of urbanisation could induce the opposite effect, and lead to a situation where the communes could further extend their building zone. However, the stricter zoning procedure introduced with the 2014 spatial planning act revision is meant to limit this possibility. Consequently, it is the redistribution of the additional value captured by authorities that is determinant for future resource use: where is it redistributed? And to what aim?

Further, the agglomeration policy launched by the Confederation in the 2000's led to the emergence of informal structures that defined indirect instruments of land use policy (action plans) in canton Vaud. These plans precede traditional land use policy instruments like zoning plans or local development plans in the implementation process. As counterpart for the action plans' stabilisation of prices and expectancies, the action plans introduced a formal defect into land use policy procedures which restricts the subsequent democratic choices in the adoption of zoning plans: legislative bodies are tied to adopt the plan as it is and lose the possibility to modify the pre-negotiated deal.

Formal defect of agglomeration policy's action plans

7.2.3 Other recent redistributive developments

On the federal level, the 2013 revision of the environmental protection act essentially aimed at ensuring the payment of remediation costs by polluters. In certain cases, authorities faced difficulties in compelling polluters to pay for their actions – actions which may have occurred decades ago. The limited legal possibility of prosecuting polluters created a cat-and-mouse game impeding quick rehabilitation of the polluted perimeter: practitioners cite examples of companies that have polluted in the past and have subsequently transferred their assets to another company. Having moved their significant assets, they declared bankruptcy, and appeared unable to pay for the damage caused. The recent introduction of article 32d^{bis} of the environmental protection act aimed to circumvent the problem by introducing a cost cover guarantee to impeach the transfer of assets.

Guarantee that the polluter pays?

Integration of energy policy in to land use policy

On the cantonal level, Vaud revised the cantonal energy law in 2014, and introduced mandatory coordination of local development plans with the energy provision of future constructions. The general objective is that 20% of electricity needs and 30% of hot water needs in new buildings are derived from renewable sources (art. 28a and 28b LVLne¹⁰).

The case study of Malley has provided an example of the new mandatory energy plan's implementation. The plan has produced marginal effects, because the minimal renewable energy standards defined in cantonal legislation were already largely exceeded. But the case revealed cost minimisation strategies pursued by actors, who circumvented their own energy targets, which were far more ambitious than the legal minima. Furthermore, the new planning procedure reveals the general tendency to shift from centralised energy production and distribution, to a local reflection on effective energy needs and their more decentralised production. To a certain extent, these changes are in opposition with the interests of established actors. The reduction of higher costs associated with the production of renewable energies, and the more efficient use of these energies, represent a possible target of value redistribution.

End of the Bernese Fahrleistungsmodell

Another cantonal tool with redistributive effects was the Bernese *Fahrleistungsmodell* introduced in 2002. The instrument was based on the emission prognostics for motorised individual vehicles. These prognostics anticipated a reduction of the overall emission of pollutants from motorised individual vehicles. This anticipated "reduction" was divided into quotas, allocated to well-connected agglomerations, effectively granting them "credits" for their future traffic increases. The remaining quotas were granted to buildings generating high traffic (such as commercial centres) and thus aimed to control the emissions generated by each of these buildings through traffic. As the set targets were met, the quotas were abandoned in 2016 (Kanton Bern, 2015). The model is nevertheless interesting, because it linked air pollution issues to land use planning measures: it coordinated motorised individual transport and land use policy through a quota system that granted use rights on emissions to users whose (intended) location was most suitable from a planning perspective.

¹⁰ *Loi vaudoise sur l'énergie du 16 mai 2006*, SR-VD 730.01.

Integration of land use policy in fiscal equalisation Two other recent developments particularly relevant for the integration of land use policy with broader policy issues like fiscal equalisation or transport:

The integration of land use policy objectives into the inter-communal fiscal equalisation in Canton Thurgau: the idea behind the parliamentary motion was to financially compensate communes that durably renounce extensions of their building zones (Regierungsrat des Kantons Thurgau, 2012). The instrument would have been paid by the canton as compensation for the costs supported by the commune, such as keeping the land undeveloped, and costs linked to the provision of recreational areas. The solution adopted by the cantonal legislative body introduced a separate mechanism where communes that do renounce a building zone extension can apply for compensation at the responsible cantonal department. This means that the funds do not stem directly from the cantonal equalisation, which compensates outstanding costs (such as those linked to social assistance), but from a dedicated cantonal fund (Institut für Wirtschaftsstudien Basel, 2016).

Another compensation mechanism of the federal fiscal equalisation was introduced in 2008 (Frey, 2016): it aimed at horizontally (between communes) compensating territorial externalities, such as renouncement of a building zone extension. However, the compensation was to be negotiated directly between communes, which has, to date, prevented the implementation of the mechanism. A suggested alternative approaches the solution adopted in Thurgau (Estermann, 2016): authorities could attribute some of the funds collected through the tax on added land value created through zoning, to such compensatory payments. However, making this choice induces two elements which need to be considered:

1. if the compensatory payments are meant to occur on a regular basis, then one has to ensure that the funds (provided by the tax on added land value created through zoning) are also durative, which is in opposition to the punctual value capture mechanism of the tax on added land value created through zoning;
2. one has to ensure that the compensatory payments indeed have a positive effect on issues such as landscape, the protection of high quality soils, and on ecosystem service provision.

Emption right in Rothenbrunnen

The case of Rothenbrunnen in Graubünden shows us a different setting, where local authorities relied on cantonal legislation in order to use the threat of an emption right on specific plots without the landowners' consent (Hengstermann, 2017). Since 2004, the cantonal legislation mentioned the possibility that communes will have to "take the necessary measures to ensure the availability of land for the designated zone purpose"¹¹. The commune of Rothenbrunnen revised its building regulations, and threatened, with the political support of the legislative body, to implement the type 4 instrument emption right on previously zoned land. This would have occurred through an administrative decision that did not require the landowners' approval. This situation proved to be sufficient to convince most land hoarding owners to develop their plots. However, the possibility to use an emption right depends on the possibility provided by cantonal legislation, as the discussion of the recent legal changes in section 7.2.2 shows.

7.2.4 Institutional limits to the regulatory capacity of authorities

In a brief assessment of the institutional limits of authorities' current regulatory capacity, a set of elements can be pointed out. First, fiscal competition opposes a coherent implementation of land use policy. Local authorities use available fiscal instruments in the broader political context of cross-communal and cross-cantonal fiscal equalisation and competition. Therefore, the use of fiscal instruments as they exist today are only as abated levies, whose use only marginally depends on land use policy. Such

¹¹Art. 19 par. 2 of the *Raumplanungsgesetz des Kantons Graubünden vom 06.12.2004, SR-GR 801.100*.

abatement is reflected in fiscal legislation: it does not distinguish between revenues and benefits resulting from the production or the provision of services, nor does it distinguish between revenues and benefits from sole possession of land. Further, the autonomy possessed by communes regarding in fiscal and planning matters, pushes authorities to favour demographic and economic growth, and opposes the land use policy rationale of using soil economically and appropriately.

The other aspect linked with the adoption and use of fiscal instruments is the right of the landowner to collect the rent induced by the possession of a property title. This fact remains a hidden, and legally open issue that is difficult to highlight, because it flirts with a core principle of capitalist economies, namely the remuneration of land as a form of capital, which is anchored in Western civil law societies and institutions. The discussion of these issues have been circumscribed to the political left, but reduced economic growth rates, increasing inequalities, high unemployment rates on the EU level, and the debates on the introduction of an unconditional revenue, might provide a favourable political context for posing these questions.

Direct democracy has played both a favourable and a blocking role on land use policy processes. Popular votes favourable for land use policy have been: the approval of the initiative in Rothenthurm in 1987, the initiative on the limitation of secondary homes to 20% of a commune's overall homes in 2012, the referendum on the revised spatial planning act in 2013, the first cropland protection initiative in canton Zurich in 2012, and the cropland initiative in Thurgau. Popular votes impeaching land use policy include: the popular vote which rejected the first spatial planning act in 1974, and the second cropland protection initiative in canton Zurich in 2016. Upcoming votes on cropland protection in Bern, Thurgau, and others at the federal level, show the recent political importance of landscape and agricultural land protection, but does not indicate the people's support: the success rate of popular initiatives is limited, and their impact on the outcomes of the political process has changed marginally since the 1970's; what has changed, is the consociational nature of the political system, as political parties more systematically oppose government decisions, and the government is unable to continue relying on the coalition parties' unanimous support (Sciarini, 2014).

Remuneration of land ownership as core issue

Reduction of the consociational nature of the political system

7.3 Suggestions for a more sustainable resource use

Based on recent redistributive developments (previously introduced), and on the results of the thesis, I propose a set of elements that, if taken into account in land use policy legislation and processes, can lead to a more sustainable use of the soil resources:

1. tighten the coordination between spatial planning and soil protection regulations: explicitly consider soil quality in planning procedures, and consider, in addition to available transport infrastructure, the creation of a soil quality index (Wolff, 2006), and its use as criteria for determining which areas to zone. Further, consider the redistribution of the funds provided by the tax on added land value created through zoning, to environmental protection, such as coordination measures bound to local development plans, remediation projects, or energy projects;
2. jointly coordinate fiscal policy tools with land use policy in order to increase rent capture: *punctual* (tax on added land value created through zoning, the real estate gains tax) and *durative* (land property income tax, land tax) rent capture tools offer two approaches of value capture that should be jointly considered in order to respond to political issues on soil protection. In particular, the introduction of a new instrument that specifically taxes revenues and benefits generated by land property would provide a fine-tuned, and temporally adaptive levy in order to control and redistribute land value. This would be an improvement on the tax on added land value created through zoning, whose calculation is based on fictitious capital. The captured value could then be dedicated to a revaluation of non-constructible land (*e.g.* the financial compensation for the absence of development), or through an enhanced protection

of other resource uses, such as agriculture, recreational areas, affordable housing, and energy provision. From a legal perspective, no major obstacles impede the introduction of such instrument; the Federal Tribunal left quite open the question of the amount of rent that the landowner is entitled to¹²;

3. favour the relocation of oversized, and badly located building zones to more central and well connected areas. Such spatial transfer could occur through Vaud's land improvement syndicate, as long as the instrument's modalities are redefined: the geographic unit of the instrument's perimeter should allow for the definition of non-contiguous areas, in order to transfer development rights.
4. coordinate urbanisation with surrounding agricultural production. Whereas the 2000's were shaped by the coordination between urbanisation and transport, the 2020's should be oriented towards the integration of agricultural production into regional food provision. The increasing political will to protect farmland requires a common interpretation with regard to urbanisation aspects, so that the production of food in a given region is primarily oriented towards the needs of the inhabitants of the same region. This would also contribute to the local and regional legitimacy of soil protection measures by reinforcing the link between urban and peri-urban regions;
5. foster coordination between energy provision and land use policy, by taking into account energy and material requirements, as well as energy and material sources for each development project. An example would be, a cutting-edge housing development, like in Malley, which takes factors into consideration such as, grey energy (energy used in order to extract raw materials, transport them to the building site, building), the time span during which the building is built, the underlying needs constructions create in terms of infrastructure and provision of goods, as well as the disposal of the various materials when the building's lifetime is over;
6. assess and propose solutions to the "external" spillovers of land use policy: in a world of global markets, one cannot limit the question of soil protection to a country's borders, but must include goods and services provided by soil that are produced elsewhere and consumed internally. These foreign land uses are not considered by current land use reports, either because these uses are located beyond regional or national borders, or because such an assessment would be highly complex. In fact, it would be necessary to trace back over the entirety of the production processes and include evaluation of their impact on land use abroad in order to get a more complete picture of the sustainability of land use. However, this external soil consumption increases (FOEN, 2015, 35), and we need to account for it. First initiatives exist, for example, in the agricultural (local circuits of consumption) and energy (local production) sectors.
7. regulate the "internal" spillovers induced by tourism: with the expansion of the European air and high speed train transportation networks, new rivalries have emerged between weekend tourist visitors and local inhabitants. The former increased the demand for housing, particularly in cities, inducing rent inflation. These foreign revenues have been captured by landowners, real estate companies, and internet platforms (Council, 2017, 105), for the benefit of tourists, but at the expense of local inhabitants. The latter experience increasing rent, gentrification, and face relocation and eviction. The transition to a digitised economy where regulations are increasingly challenged underlines the importance of permanent and use-based value capture mechanisms for controlling rent. The data collected by internet platforms is an indispensable source of information for defining the proper amount of tax and ensuring the declaration of revenues and benefits by landowners.

¹²See ATF 105 Ia 134.

7.4 Concluding thoughts

The French revolution substituted the *plura dominia* model with an individual land property title model in order to overthrow the domination of lords over peasants, and grant single male citizens enough land to cultivate, and thus support their family. The reference unit that served the division of land was the surface a horse required to be fed in one year.

With industrialisation, urbanisation and the division of labour, the requirements on individual property have changed considerably. Broadly defined, individual demands on soil depend on housing, work, leisure, and transport. Forty percent of the Swiss population controls the category "housing" through an individual property title. The rest of the population has only a temporary use right on their home. Work areas are owned by limited companies, with a portion of these also owned by the State. Transport areas are almost entirely public property. Constructed part dedicated to leisure are privately owned (*e.g.* commercial centres) and public owners (*e.g.* sports facilities); natural leisure areas are owned by the authorities (*e.g.* parks, forests, mountains). The point is, that there is a vast decoupling of use and ownership rights which contrasts with the revolutionary era of the eighteenth century. I argue that the purpose for which these property titles were created no longer correspond to current land uses. The numerous public policies regulating land use that were set up over the last decades are emblematic of these changes (Ruegg, 2000, 17): they were meant to adapt, and redefine the rights included in the property title according to societal needs, which have constantly changed and increased.

S. Nahrath (2003, 448) argued that the phenomena of the over-exploitation and absolute rarefaction of resources are not enough to induce a regime change, but that these phenomena need to be translated into the effective rarefaction of specific goods and services (housing, fertile land) in order to induce regime change. In particular, change can occur if these goods and services have consequences for other socio-economic activities (importance of collateral effects). The problem is that the consequences of the rarefaction of arable land in Switzerland have been overcome through food imports, and that actual spillovers are blurred by the physical distance between producers and consumers, and the lack of production tracking.

In order to modify the submission of land use for monetary return underlying our capitalist economy (see section 2.2.2 in chapter 2), P. Griethuysen and R. Steppacher (2015, 44f) suggest two main institutional innovations: the institutionalisation of common property titles and the sharing of return (added economic value) between creditor and debtor, as in Islamic societies. The introduction of community land trusts (*organismes fonciers solidaires*) in the French housing and urbanism law in 2016 constitutes a first step in the transformation of Napoleonic civil law. Its evolution in terms of actual implementation should be followed closely.

In my opinion, the integration of agricultural production and soil protection into land use policy would be a good starting point for managing the resource soil in a more integrated manner. As encouraged by the 2014 spatial planning act, as well as planning and soil experts (Imhof, 2016; Estermann, 2016), a regional redistribution of land rent towards sustainable food production and consumption would not only facilitate the provision of ecosystem services by agriculture, but also foster soil protection and enhance biodiversity. Further, it can foster territorial identity, and thus provide a local response to public distrust in globalisation.

A property model dating back to the French revolution

Decoupling of use and ownership rights

Relative rarefaction of goods and services provided by soil

Land use submitted to monetary return

Towards an increased regional redistribution of land rent?

Annexes

Goods and services provided by the resource soil

Type of use	Category of goods and services
A Constructible surfaces	A1 Urbanised land, public amenities, infrastructure
	A2 Housing, collective housing, single family homes, secondary homes
	A3 Commercial and industrial zones
	A4 Transport infrastructure
	A5 Tourism and leisure infrastructure
	A6 Military infrastructure
	A7 Building zone reserves
	A8 Investment, hoarding, speculation
	A9 Heritage and landscape protection
	A10 Leisure and recreational areas (parks and green spaces)
	A11 Archeological sites
B Natural and biodiverse areas	B1 Landscape and nature protection areas of regional or national importance
	B2 Wetlands
	B3 Natural areas without specific attribution (hedges, groves)
	B4 Hunting reserves
	B5 Forests and forest borders
	B6 Ecological compensation areas
C Waste storage	C1 Open landfill
	C2 Landfill for incinerated waste
D Extraction of vegetal and mineral resources	D1 Mines
	D2 Gravel pits, sandpits, quarries
	D3 Peatlands
	D4 Humus
E Water filtration and water cycle regulation	E1 Water filtration
	E2 Air filtration
	E3 Regulation of the water cycle
F Fertile surfaces	F1 Intensively used agricultural land
	F2 Pastures, grasslands, alpine pastures, extensively used agricultural land
	F3 Forests
	F4 Hydroponics
	F5 Surfaces dedicated to gardening, tree nurseries

Table 8.32: Types of uses of the resource soil and goods and services derived from them (Nahrath, 2003, 127f).

Working definitions

In order to orient the reader and clarify the concepts referred to in this thesis, I provide a set of definitions. These are drawn from the literature, and from the collection, sorting, analysis and interpretation of the collected data.

Soil and land are used as synonyms. When referring to soil pollution, soil consumption, or land development, the reader should keep in mind the horizontal and vertical dimensions of soil.

Compared to other resources systems (fishing grounds, bridges, grazing areas, etc.) one of the specificities of land is the heterogeneity of uses, and the immense variety of goods and services it provides. Table 8.32 in the annex proposes a typology of uses of the resource land, and the categories of goods and services stemming from the different types of use, (based on S. Nahrath (2003)).

Resource : natural or man made resource system composed of a resource stock and a resource flow (Ostrom, 1990). The resource flow or resource units are produced by the resource system, and withdrawn by humans in order to obtain goods and services from these units. The resource stock are resource units necessary for the reproduction of the resource system.

Land use policy is meant as all interventions by authorities through public policies and the private law that regulate ownership and use rights on the resource soil. It is understood as a synonym of the institutional resource regime of soil. It encompasses land use planning policy, soil protection policy, remediation of contaminated sites policy, interventions on the land market through property rights, etc.

Economic value refers to the economic or financial value of land that can be measured in monetary terms. Its creation corresponds to land prices (expected land value, capitalised value, fictitious value), or the rent provided through land lease. When the value is captured by authorities, it may adopt the form of a financial payment, of a tax, or of a contribution.

Ecological value can be defined and measured in various ways, depending on the goods and services, and, notably, the ecosystem services one refers to. For example, the ecological value of a plot might be very high for agriculture, but low in terms of flood protection. As explained later on in a section dedicated to the explanation of the soil's value (section 2.1 in chapter 2), I focus on two attributes of soil: its (non) development and its pollution or contamination.

Value distribution is understood as the existence or provision of economic (or ecological or social) value to a specific area. This value is granted by the goods and services a given location provides to humans. Depending on the theoretical perspective adopted (see chapter 2), a given location can have different values. The important element is that this value exists either because of the soil's intrinsic properties, or because it is granted by law in terms of possible uses which in turn, can be monetised. Therefore, value distribution can be assimilated with value creation or concession.

Value redistribution is the transfer of value through its capture and subsequent distribution. A redistributive process can occur from one location to another, from one actor to another, between public policies, and across time.

Value compensation is a specific form of value redistribution. Compensation refers to a payment as counterpart of imposed obligations or prohibitions that reduce or enhance the economic, ecological, or social value of its property. The obligation or prohibition can be set by public policies (*e.g.* obligation to service the land) or the property rights regime (*e.g.* cases of expropriation).

Urban and peri-urban areas rely on the definition and classification of the spatial planning office, which is derived from the categorisation elaborated by Schuler and Joye (2000).

Sustainability can be defined in several ways. Referring to P. Knoepfel et al. (2007), three levels of conception of the sustainable resource management can be identified, the third one is referred to in this work (see sustainable resource use below):

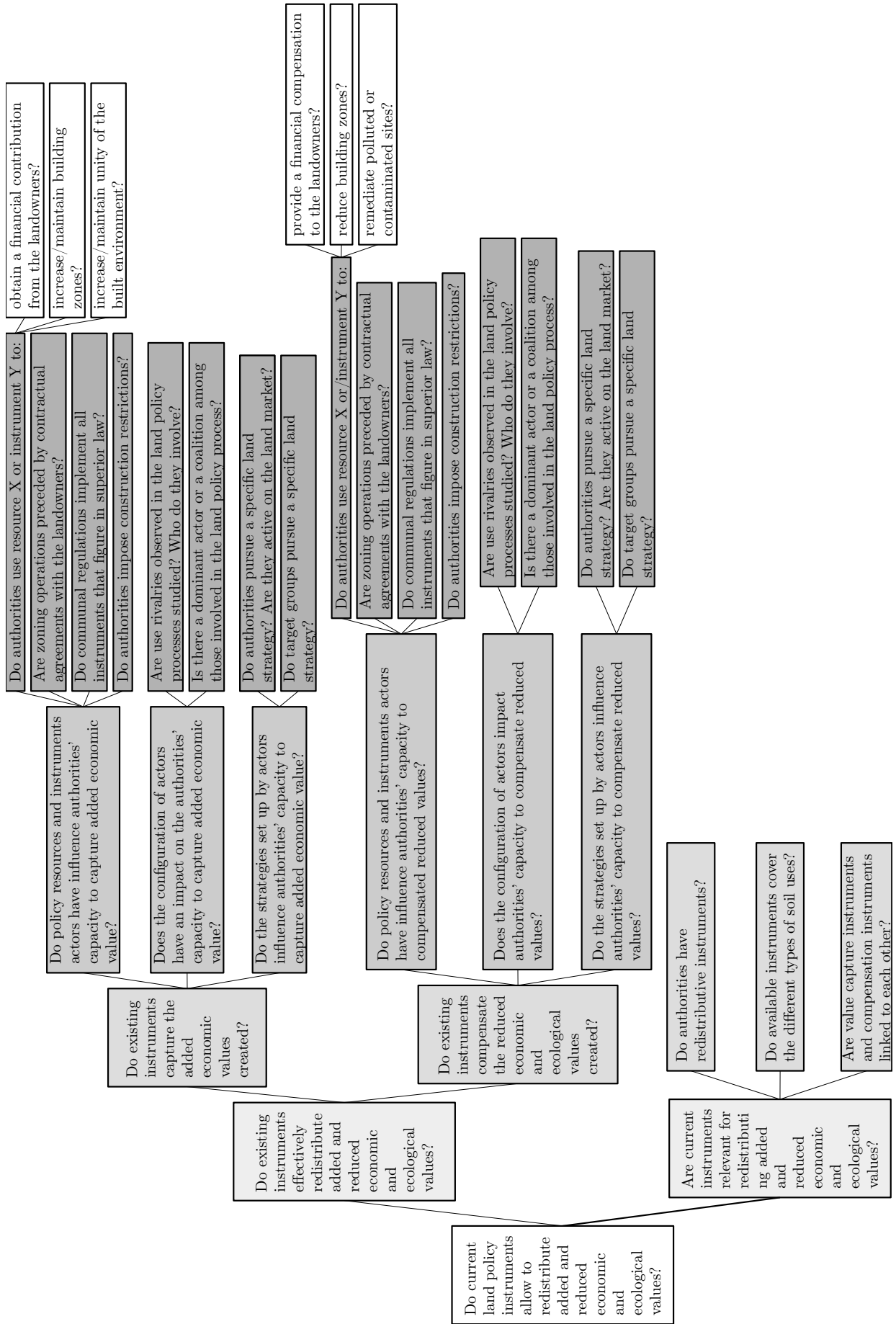
1. the environmental policy level, which defines obligations, restrictions, incentives, and information on resource units withdrawal, and uses, not necessarily in accordance with the resource's stock reproductive capacity. In fact, the effectiveness of the policy is determined by the way the underlying problem the policy intends to solve is politically defined;
2. the sustainable development level, which coordinates environmental, social, and economic requirements linked to the "*modes of uses* of goods and services provided by natural resources" (Knoepfel et al., 2007, 462);
3. the level of the resource system, which requires that "all of the users jointly ensure that the quantities they extract or withdraw from a resource do not reach the limit of the reproductive capacity of the resource system" (Knoepfel et al., 2007, 464).

Sustainable resource use is defined by the literature on common pool resources (Ostrom, 1990) as a withdrawal of resource units from the resource's stock that does not exceed the resource stock's reproductive capacity. One particularity of the resource soil units is that they cannot entirely be withdrawn: one can withdraw the fertile layer or the minerals in the ground, but a surface (essentially a deep hole) will always remain. The fertile layer of soil has an extremely slow renewal rate: it takes approximately 2,000 years for 1 cm of fertile ground to form (Bartz et al., 2015, 34), whereas its compaction and sealing (its destruction), occurs in a matter of minutes. The time required for minerals to form, strongly varies depending upon the mineral. The key point is that the renewal of fertile ground is not possible on a human time scale. As a consequence, there are two options for characterising soil uses as sustainable: focus on the renewal or recycling of the soil's (human) uses, or on the predictability of future withdrawals.

Land use policy process are defined as implementation cases of land use policy, where authorities, in a specific context, intervene on a target group and mobilise a set of policy instruments and resources, in order to achieve a specific goal or solve a specific policy problem. The term *process* refers to the different steps of the policy cycle, beginning from the political administrative program, and ending at the (expected) outcomes or redistributive effects on the target group and on end beneficiaries.

Land use policy objectives understood as synonymous with the objectives of the institutional regime of soil, with the objectives of the various public policies impacting land use.

Pyramid of questions



List of interviewees

Name	Function	Place	Date
OBERAARGAU			
Robert Grogg	Journalist, Berner Zeitung	Langenthal	25.03.2014
Rennie Wyss	Englisch-Professor und Landschafts- chutzaktivist	Attiswil	26.03.2013
Daniel Ott	Architekt und Planer, Mitglied der Geschäftsleitung baderpartner	Solothurn	01.04.2014
Ernst Grütter	Pensionierter Ingenieur, Pro Natura Mitglied	Langenthal	01.04.2014
Markus Ischi	Ingenieur, ehemaliger Präsident der Region Oberaargau	Langenthal	01.04.2014
Dominik Lues- cher	Leiter Abteilung Grundstücks- gewinnsteuer, FIN	Bern	08.04.2014
Roger Schibler	Kreisoberingenieur Oberaargau- Emmental Tiefbauamt, BVE	Burgdorf	14.04.2014
Christoph Matti	Projektleiter Wasserbau Tiefbauamt, BVE	Burgdorf	14.04.2014
Petra Graf	Projektleiterin Artenschutz und Naturschutzgebiete Abteilung Naturförderung, Amt für Land- wirtschaft und Natur	Münsingen	14.04.2014
Anita Schnyder	Verantwortliche Orts- und Region- alplanung Oberaargau, Amt für Ge- meinden und Raumordnung, JGK	Bern	24.04.2014
Selina Bleuel	Kantonsplanung, Geschäftsführerin ESP, Amt für Gemeinden und Raum- ordnung, JGK	Bern	24.04.2014
Regula Sie- genthaler	Planerin, Sektion Orts- und Region- alplanung, Amt für Gemeinden und Raumordnung, JGK	Bern	24.04.2014, 25.08.2014
Stefan Costa	Geschäftsführer Region Oberaargau	Langenthal	25.04.2014
Jean-Pierre Clément	Fachbereichsleiter Grundwasser und Altlasten, Amt für Wasser und Abfall, BVE	Bern	14.05.2014
Martin Alle- mann	Gemeindepräsident von Wiedlisbach, Informatiker	Wiedlisbach	24.06.2014
Carina Schneeberger	Leiterin Administration Wiedlisbach	Wiedlisbach	24.06.2014
René Suter	Bauverwalter der Gemeinde Nieder- bipp	Niederbipp	08.07.2014
Martin Jampen	Gemeindeverwalter von Huttwil	Huttwil	13.08.2014
Hansjörg Mur- alt	Gemeindepräsident von Huttwil	Huttwil	13.08.2014
Stefan Ghioldi	Jurist in der Abteilung Orts- und Re- gionalplanung, Amt für Gemeinden und Raumordnung, JGK	Bern	27.08.2014
Christoph Schneider	Architekt und Planer, Büro Schneider Partner, zuständig für die Gemeinde Huttwil	Burgdorf	16.09.2014

Table 8.33: List of interviewees in region Oberaargau.

Name	Function	Place	Date
LAUSANNE			
Philippe de Almeida	Architecte communal, urbaniste adjoint de la commune de Renens	Renens	12.05.2015
Patrick Hassler	Chef du service de l'urbanisme et des constructions de la commune de Prilly	Prilly	19.50.2015
Nicolas Wisnia	Chef de projet de Malley pour le SDOL	Renens	20.05.2015
Jean-Louis Griver	Municipal d'Etagnières, ancien travailleur indépendant des abattoirs de Lausanne	Etagnières	21.05.2015
André Baillot	Chef du service de l'urbanisme de la commune de Lausanne	Lausanne	28.05.2015
Julien Guérin	Service de l'urbanisme de la commune de Lausanne	Lausanne	28.05.2015
Guillaume Dekkil	Chef de projet en charge de Malley, CFF Immobilier	Lausanne	08.06.2015
Yvers Deillon	Chef de service, Service de la coordination et du cadastre, Ville de Lausanne	Lausanne	15.06.2015
Mohamed Meghari	Ingénieur section efficacité énergétique, Service de l'énergie, Direction de l'environnement	Lausanne	25.06.2015
Mme Annamaria Mosetto	Ingénieur section efficacité énergétique, Service de l'énergie, Direction de l'environnement	Lausanne	25.06.2015
Mme Céline Dubois	Ingénieur section efficacité énergétique, Service de l'énergie, Direction de l'environnement	Lausanne	25.06.2015
Elinora Krebs	Chef du service du logement et des gérances	Lausanne	09.07.2015, 13.05.2016
Jean-Philippe Dind	Chef de projet au Groupe opérationnel des pôles	Lausanne	13.07.2015
Tinetta Maystre	Municipale de Renens, Direction de l'urbanisme et des travaux	Renens	28.07.2015
Christophe Jemelin	Responsable du développement de l'offre, membre de la direction des transports lausannois	Renens	29.07.2015
Adriano Bartolomei	Directeur de CADOuest SA	Prilly	21.08.2015
André Jomini	Juge au tribunal cantonal du Canton de Vaud	Lausanne	15.12.2015
Régis Courdesse	Ingénieur géomètre, directeur de Courdesse et associés SA	Echallens	14.01.2016
Urs Zuppinger	Urbaniste, Urbaplan SA	Echallens	14.01.2016
Gabriel Conus	Service technique et urbanisme de la commune de Cheseaux	Cheseaux	08.01.2016
Damien Villiger	Urbaniste, Service technique et urbanisme de la commune de Cheseaux	Cheseaux	08.01.2016

Table 8.34: List of interviewees in region Lausanne.

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