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Implementation of redistributive land policy instruments in urban spaces: the case of Cheseaux

Working paper de l'IDHEAP 10/2016
Unité Politiques publiques et durabilité

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Foreword

Part of the National Research Program 68 financed by the Swiss national science foundation through the grant number 406840_143057, the SUstainable Management of SOil as a Resource (SUMSOR) project asked five main research questions (Nahrath et al., 2012):

1. What are the main economic, demographic, as well as institutional, political and fiscal drivers of spatial development in different types of spaces in Switzerland (urban, peri-urban, mountainous)?

2. What are the impacts of spatial development on economic and ecological soil added and reduced values in the different types of spaces?

3. What are the existing policy instruments currently dealing, in Switzerland and abroad, with the question of added(reduced value redistribution?

4. What are the most relevant (sets of) policy instruments that allow to integrate objectives in terms of soil quality into densification strategies? To what extent are the (sets of) policy instruments able to create "win-win" situations?

5. What are the main institutional conditions (or changes required) for the implementation of these policy instruments in the Swiss institutional regime of soil?

In order to answer these questions, one of the means chosen by the research team was to elaborate working papers that analyse the different types of spaces in Switzerland: one working paper focusses on the peri-urban region of Oberaargau (Viallon, 2016a); two working papers analyse urban dynamics in the region of Lausanne (Viallon, 2016c,b).

The present working paper analyses the politics of land policy instruments implementation in Cheseaux, a commune located at the border of the agglomeration of Lausanne. The paper studies the impact of communal land policy, in particular the communal use of land policy instruments, on local arrangements negotiated between political-administrative authorities and landowners.

The document's content has been discussed with the Ph.D. supervisors of the author, Prof. Stéphane Nahrath (University of Lausanne) and Prof. Géraldine Pflieger (University of Geneva). The proof reading has been done by Daniel Baumgartel, teaching assistant at the English Department of the University of Lausanne.

I would like to thank my supervisors and proof reader for their comments on previous versions of this document. I would also like to thank Emilie Baud with whom I did the field work, Denis Leroy, who granted us access to the archives of the spatial planning Office of the Canton of Vaud for our research, and the persons who granted us time for an interview.

Land improvement syndicate in Cheseaux

This case study analyses the implementation of the land 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 1 provides a description of the instrument and its functions;
- section 2 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 3 presents contextual factors which help explain the previously analysed changes;
- section 4 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 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 6 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.

1 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 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.

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 perimeter[1]. This assembly seeks to approve (by majority vote) a set of elements that are presented in more detail in section 4.1:

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;
7. the service of land and underlying costs;
8. operational costs of the LIS.

...and public policies

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.

Elaboration of a feasibility study

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 landowners[2]. 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:

1. communal plans in terms of future land use;
2. the wishes of the landowners (land for development, agricultural land, financial compensation);

[1] If 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.

[2] Art. 85 of the *Loi du 29 novembre 1961 sur les améliorations foncières*, SR-VD 913.11.

3. the future land value, which is based on the potential of development and on additional constraints given by communal building regulations.

Detailed examination of future land use, costs and benefits sharing

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.

Property transfer, approval of zoning regulations and land service

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.

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.

2 Land use planning and land use changes

Two stages of communal planning

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:

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 central to the understanding of the dynamics of communal land 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.

2.1 Land use planning changes in 1978, and land use changes from 1978 to 2000

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 then 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 neighbour 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 bypass[3].

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 proposalsto 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 1. 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 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.

Compromise between cantonal and local proposal

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.

Mandatory land readjustment

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

[3] R. Courdesse and U. Zuppinger, geometer and urban planner, interviewed in Echallens 14 January 2016.

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 readjustment[4] 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).

Simultaneous redefinition of public policies and property rights

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.

***Derrière-le-château* as ideal location for future school**

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.

Combined use of three land policy instruments

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 study[5] 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).

2.2 Land use planning changes in 2001 and land use changes from 2001 to 2016

Revision of communal structure plan

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:

- zoning in the eastern part of the village was suspended: several hectares of intermediate zone converted to agricultural zone;
- 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.

[4] In 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).

[5] Art. 19a of the *Loi vaudoise sur les améliorations foncières LAF*, RS-VD 913.11.

Since 2001, other areas have been developed: several hectares of building zone reserves in the southeast (Cologny area, near the sawmill) and southwest (Sorécot, Sorécot ouest). As of 2016, building zone reserves are within the legal limits (see section 4.3).

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.

3 Contextual factors

3.1 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 1 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 1 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). 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 1) 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/m^2 in 2003 (Marti and Courdesse, 2003), it is now estimated around 800CHF/m^2 [6].

[6] F. Blanc, former communal executive in charge of land use planning and construction, interviewed in Cheseaux 24 February 2016.

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 *contournement* Entry into force of the communal structure plan and the local structure plan *Derrière-le-château*	
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 *Derrière-le-château* Elaboration of a feasibility study on the perimeter of the LIS *Derrière-le-château*	
2001	Entry into force of the new communal zoning plan	
2002	Property transfer of the land readjustment *contournement* Public hearing on public and private land service works for the land readjustment *contournement* Creation of the LIS *Derrière-le-château*	
2003	Negotiations and public hearings on the perimeter, land value and the future shape of plots within the LIS *Derrière-le-château*	Land service works for the land readjustment *bypass*
2004	Adoption of the local development plan *Derrière-le-château* by the cantonal authority Approval of easements on future property shape by landowners Property transfer and entry into force of the local development plan *Derrière-le-château* Public hearing into land service for the LIS *Derrière-le-château* Final cost breakdown and dissolution of the land readjustment *contournement*	
2005	Cantonal authorisation on foreseen land service works	Initiation of the land service works for the LIS *Derrière-le-château*, first property developments
2007		Arrival of first residents in *Derrière-le-château*
2009		End of land service works of the LIS *Derrière-le-château*
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 1: Main land use planning and land use changes in Cheseaux since 1993.

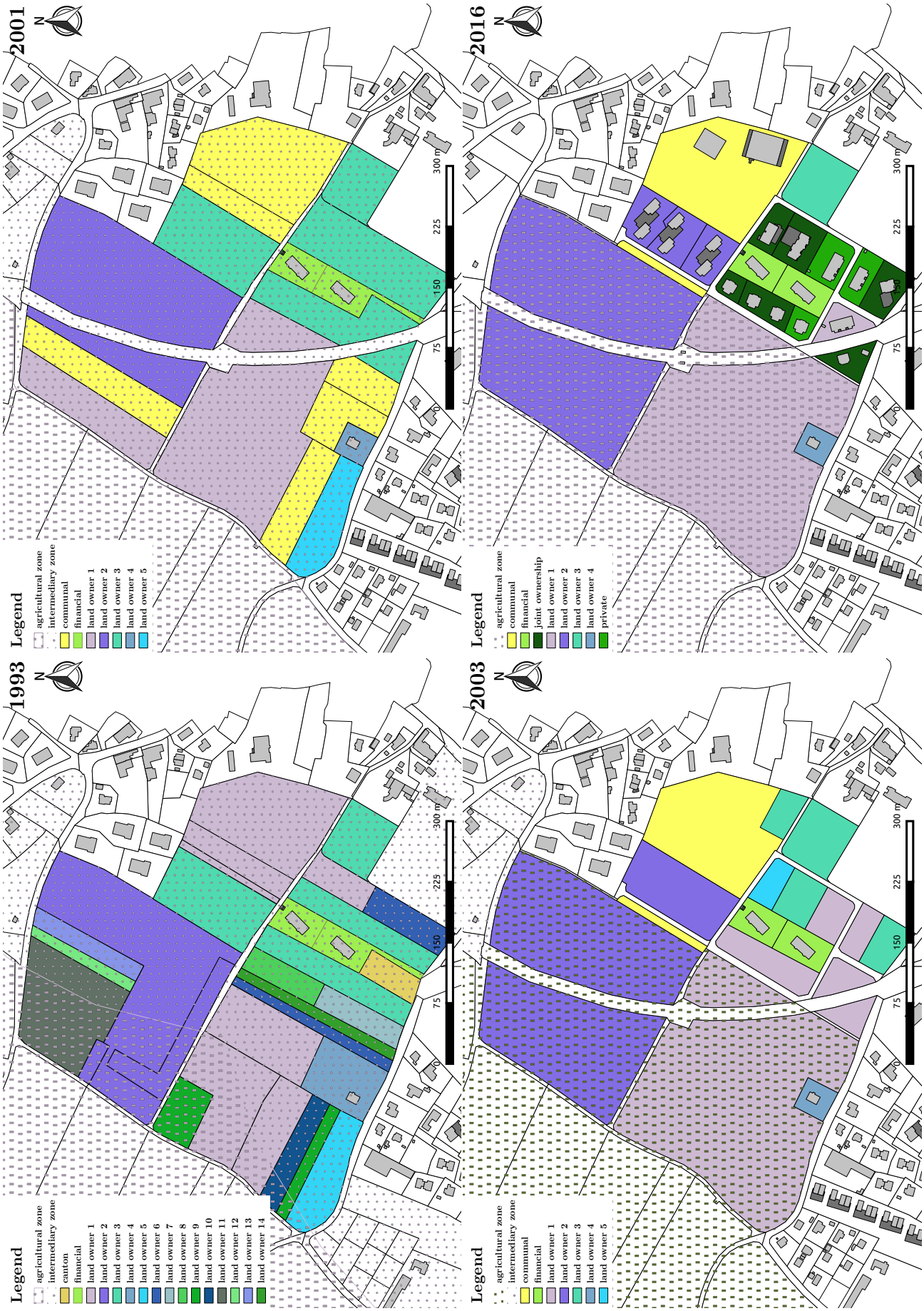

Figure 1: Evolution of zoning and property structure in the perimeter of the land improvement syndicate *Derrière-le-château* in Cheseaux.

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 4.4.

3.2 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 (BFS, 2015). 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 school[7].

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 unbuilt[8], 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).

3.3 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 agllomeration's center, the existing transport infrastructure and the existence of unbuilt plots point towards an important development of the commune (SDNL, 2007; 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

[7] François Blanc, *op. cit.*

[8] As figure 1 shows, the commune and landowner 3 still have a building zone reserve on their plot.

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.

4 Constraints of superior law

4.1 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 perimeter[9]: 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 study[10]: 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 opposition[11]. 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 landowners[12]: 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 5.4). Further, the value redistribution process has to include all nearby landowners whose land might be developed in the future. The law speaks of a "geographical unit"[13]. Communal planning documents and the existing urban

[9] Art. 30, SR-VD 913.11.
[10] Art. 85, SR-VD 913.11.
[11] Art. 4, SR-VD 913.11; art. 58, SR-VD 700.11.
[12] Art. 8, SR 101.
[13] Art. 52, SR-VD 913.11.

morphology serve as references to the definition of theunit. 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 5.1), 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.

4.2 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 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 quota[14].

***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 now[15]. 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 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

[14] See also art. 30 of the *Spatial planning ordinance of the 28 June 2000*, SR 700.1.
[15] U. Zuppinger and R. Courdesse, *op. cit.*

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.

4.3 Master plans

Cheseaux as strategic sector

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*.

Minimal density requirements

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)[16]. 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.

4.4 Financial incentives

How land becomes valuable

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):

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.

The value multiplying coefficient

Figure 2 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 type of zone that pre-exists within the perimeter;
- the quantitative amount (surface) of new building zone;
- the plot ratio of the (old and) new building zone.

[16] These 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*.

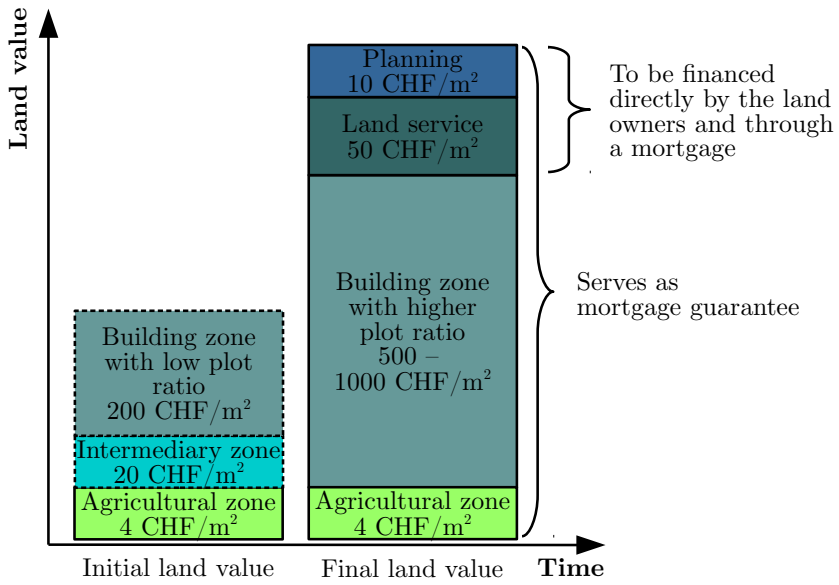

Figure 2: Land value change in a land improvement syndicate over time.

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 2 in section 6 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 1 shows, between 1993 and 2001, the number of owners has been significantly reduced. Section 5.1 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 Local regulatory arrangement

5.1 Active communal land use policy

The best location

Looking into the involved actors' strategies, I examine how the commune, who did not own any land within the LIS perimeter (see figure 1), managed to acquire 17,353m^2 of

land on the most central plots. As presented by the interviewees[17], 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 locations[18] and discussing possible options with the contracted planner[19], 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.

Crowding out of landowners

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 owned[20]. 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/m^2. 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)[21]. 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:

- 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 zone[22];
- 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 Communal development under stress

Feasibility study as a lift for change

As argued by the communal executive[23], 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 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 interviewees[24], this commitment lent momentum to the LIS process.

[17] F. 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.

[18] Free 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.

[19] Until 2005, the commune did not have any internal planning staff, but worked for several decades with the same planner.

[20] R. Courdesse and U. Zuppinger, *op. cit.*.

[21] F. Blanc, *op. cit.*

[22] R. Courdesse and U. Zuppinger, *op. cit.*

[23] F. Blanc, *op. cit.*

[24] R. Courdesse and U. Zuppinger, F. Blanc, *op. cit.*

Time as main constraint for the commune

TheIt 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 territory[25], 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/m^2) and not as public land (95CHF/m^2) 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 1). 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.

5.3 Car parks

In regard to the car parks, several different positions have bee 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 executivebody 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.

5.4 The role of the experts commission

Chief negotiators

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

[25] F. Blanc, *op. cit.*

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).

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.

6 Impact on value creation and redistribution

Threefold value increase

Table 2 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.

Time factor central to the control of land value

Considering land prices in 2016[26], 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.

Actual land value even higher

The initial price of the intermediary zone (20CHF/m^2) is set tacitly by the experts commission of the LIS[27]. It can be considered artificial for two reasons:

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 agricultaral land is not serviced,and under the purview of the cropland protection plan (see section 4.2);

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.

An added economic value of 8.7 millions francs

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 3). 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 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 4.1). 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

[26] 800CHF/m^2 according to M. Blanc, *op. cit.*

[27] R. Courdesse, geometer and U. Zuppinger, urban planner, interviewed in Echallens 14 January 2016.

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 2: 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 3: 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 - argicultural zone)*agricultural land price: (158,031m^2-105,565m^2)*3.83CHF/m^2=200,900CHF

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 2) primarily to the benefit of the landowners.

Limits of the LIS to a more extensive redistribution

Limit of the number of landowners

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 rule[28] 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 implementation[29]. Experts recommend not to exceed 10 to 15 different owners within one LIS[30].

No common real estate development

An additional element that the LIS does not anticipate is the common develop-

[28]Majority of the landowners and of the landowners that represent the majority in terms of surface

[29]D. Leroy, Land readjustment engineer, cantonal spatial planning office, interviewed in Lausanne 25 September 2015.

[30]U. Zuppinger and R. Courdesse, *op. cit.*

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 4: Estimated surfaces and values of the land dedicated to development in the area *Derrière-le-château*.

[a]The estimated gross floor area has been calculated based on a plot ratio of 0.35 for 5,000m^2 of building zone and 0.6 for 38,100m^2 building zone (Marti and Courdesse, 2003).

[b]24,600m^2/3 = 8,200m^2 of used ground surface. For three floor dwellings with 4 meters height per floor: 12*8,200m^2 = 98,4000m^3.

[c]Based on a price of 580CHF/m^3 + 20% for additional costs and landscape modelling (Unknown, nd): 696CHF/m^3*98,400m^3=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: Estimated benefits and costs of the development of the perimeter *Derrière-le-château*.

[a]Based on an occupancy rate of 0.85 and a rental value of 19CHF/m^2/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).

[b]This sum corresponds to 20 % of the gross rental income. Based on `https://d-l.ch/fr/articles/les-rendements-brut-et-net`.

[c]4.7M (gross income) / (70.1M (value of construction and land service) + 8.1M (value of land)) = 5.9%

[d]4.5% 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%

ment 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).

1 million francs potential revenues from the tax on the added land value

With the revision of the federal spatial planning act in 2014 and the re-introduction of the tax on added land value created by zoning, the mandatory tax of 20% of the added value will impact the value multiplying coefficient (the gains) for landowners. Reading from table 2, the sole gain created by zoning is the difference between the value of the building zone[31] and the value of the intermediary zone: 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/m^2 for housing surfaces. In the case of the LIS *Derrière-le-château*, the tax could have amounted to 1.51M francs[32]. 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 by zoning. According to the Federal Tribunal[33] 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), 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 capial (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 by 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 land ownership.

LIS on multiple sites?

One of the main problems that land 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 distinct locations. Based on the findings from this case study, and the advice of the experts interviewed[34], one should pay attention to the following elements:

[31] The tax does not apply to land dedicated to public infrastructure.
[32] 18,450m^2*82CHF/m^2.
[33] ATF 105 Ia 134.
[34] R. Courdesse and U. Zuppinger, *op. cit.*

- 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 "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 matter[35];

- 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).

[35] However, those communes part of Lausanne's agglomeration master plan have minimal density criteria that they need to fulfil. See also section 4.3.

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