

# STUDYING URBAN SPRAWL AND LANDSCAPE CHANGE IN MATADEPERA (BARCELONA METROPOLITAN REGION)

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## 1. INTRODUCTION

The intervention of the human species in natural ecosystems has been a determining factor in landscape configuration for centuries. In Mediterranean countries, the cultural landscapes created and maintained by traditional primary activities are rapidly becoming degraded due to abandoned land and villages, intensification of agricultural activities, and urban sprawl (Farina, 2000; MacDonald et al., 2000; Stoate et al., 2001; Catalán et al., 2008). On one hand, the abandonment of agricultural activity gives way to increased forest growth and a homogenized landscape (Lasanta et al., 2006), increasing the vulnerability to forest fire (Scarascia-Mugnozza et al., 2001). On the other hand, Mediterranean countries are experiencing the most rapid rates of urban sprawl in continental Europe (EEA, 2006). This pattern, which is on the rise throughout Europe, affects the ecological, social and cultural characteristics of landscapes and represents an increasing conservation challenge. Obviously, the Barcelona Metropolitan Region (BMR) is not exempt from all these processes; the great transformation of land use in the BMR has generated changes in the structure and function of the landscape. There is less cultivated land, more forest area, and a more dispersed urban fabric. Small villages that were primarily rural until the mid-20<sup>th</sup> century have been converted into low-density residential suburbs. This has occurred in Matadepera, a second-ring BMR suburb, which offers an interesting case study to analyse and explain the process of «metropolizing» a rural space.

## 2. METHODOLOGY: THE INTEGRATION OF CARTOGRAPHIC AND ORAL SOURCES

Using a combination of cartographic sources and local interviews, this study takes a socioecological approach to analyse the growing urban sprawl and landscape change in Matadepera from 1956 to 2008. This integrated and interdisciplinary methodology

incorporates distinct forms of knowledge and combines quantitative analysis, using digitalization and superimposing various cartographic elements, with qualitative analysis of interviews with a group of elderly residents from the Matadepera area. The oral source view of Matadepera offered by these individuals of rural origin adds value to the quantitative analysis of the changes that have occurred over more than 50 years.

The quantitative data were obtained from a cartographic analysis of the changes in land use and land cover from 1956 to 2004, supplemented by fieldwork to determine the changes that occurred from 2005 to 2008. The cartographic material came from black and white U.S. aerial photographs taken in 1956-57 (approximate scale: 1:33,000) and colour digital orthophotos taken in 2004 (approximate scale: 1:5,000). Interpretation of the early photographs consisted of an initial visual inspection, followed by GIS digitalization. Interpretation of the 2004 aerial photographs followed a slightly different procedure, taking advantage of the 2003 Map of Land Cover in Catalunya (*Mapa de Cobertes del Sòl de Catalunya: MCSC*), complemented by fieldwork to determine changes that occurred in 2005-2008. Defining the categories into which land cover are placed is an important part of photointerpretation. We based our analysis on the MCSC definition of cover (<http://www.creaf.uab.es/MCSC/>), although we adapted them to fit the specific characteristics of the study area.

The oral interviews were often used to document local knowledge of various environmental management efforts and specifically to describe the changes in the landscape. The importance of using this type of information source comes from the fact that, in addition to contributing data, it provides context for historical facts, which helps to improve our understanding of the changes that occurred (Wagner & Gobster, 2007). We must, however, take into consideration that the interviewee's perception of changes in the landscape is affected by individual and subjective factors, such as the activities the individual was engaged in or the years spent in the community (Wagner & Gobster, 2007). Calvo-Iglesias et al. (2006) highlight the farmer or agricultural worker's knowledge of the environment as an information source for the study of landscape change. Our study focuses on the description of landscape change provided by this group, which –although not representative of the rest of society– contributes valuable information based on traditional knowledge and a special way of perceiving the landscape.

Ten semi-structured interviews were conducted using video and/or audio recording equipment, in collaboration with an ongoing project, where inhabitants of the village from a full range of profiles are being interviewed to compile an oral source of Matadepera for the period encompassing 1931-1983. A *photo-elicitation* session is conducted with one informant, in which both old and recent photographs are used to elicit comments about the informant perception of the landscape and the changes that have occurred (Clarck-Ibáñez, 2004). The orthophotographs are also used to help informants locate the places in question or clarify any doubts about the land cover at a particular site.

#### **4. CHANGES IN LAND COVER (1956-2008)**

The analysis based on cartographic modelling of land cover in 1956 and 2008 allowed us to quantify and describe one of the most significant and characteristic changes in periurban zones: increased urban cover, which in Matadepera represents a relative growth of 856.1%

for this period. Urban expansion has occurred to the detriment of cultivated land, especially during the first period affecting the fields in the flattest areas close to the urban centre, and also to the detriment of forest cover during a second period in the 1980s, when the construction of housing developments moved up the mountain slope, occupying wooded areas. Of the current urban area, 51.2% was densely wooded in 1956 and 27.7% was under cultivation. The decline in cultivated land is also significant; of the 228.3 hectares farmed in 1956, only 18.5% remain under cultivation and nearly half (43.7%) have been transformed into urban cover. The rest has been colonized and converted to woods or scrub. Therefore, 14.0% of the land that was cultivated in 1956 is currently categorized as densely wooded, 15.3% is scrub and 2.5% is sparse forest. The stage of forest colonization depends upon the year the field was abandoned. Of the lightly wooded area in 1956, 56% is now densely wooded as a consequence of abandoning forest exploitation (Estany et al., manuscript in press).

## **5. THE VOICE OF ORAL SOURCES**

The quantitative view of the changes in land cover offers important data on urban growth, with exhaustive detail about the loss of certain cover in favour of urban cover. However, the voice of the local informants adds a personal touch to these numbers, sharing the life experience of people directly connected to the territory who, because of their age, have seen how the landscape of Matadepera has been completely transformed from an organized rural landscape to one in which it is difficult to determine the borderline between the built environment and the woods. This change is analysed using three central themes: the traditional link between society and nature, changes in the landscape during the process of urbanization of the village, and the perception of main environmental problems (i.e., water consumption and forest fires).

## **6. CONCLUSIONS**

The current landscape of Matadepera represents a new relationship between society and nature, in a context of global change. The changing demands of society have evolved from subsistence to recreation and aesthetics. This is reflected in the current landscape of Matadepera, which has changed from its rural character to a basically residential municipality. The agroforest mosaic and the intensely productive relationship between its inhabitants and the environment have been transformed into a polarized landscape with two extremes: on one hand, an extensive urban-forest interface zone, where the population lives, and on the other hand, a «protected» natural zone within the boundaries of a natural park, assuming the functions of recreation and preservation.

Urbanization has occupied spaces that previously were woods or fields, confronting the normal risks of urban dispersal in forest zones. Together with increasing density of the woods as the exploitation of trees and scrub was abandoned, this makes urban settlements highly vulnerable to forest fires (Mira & Badia, 2009). Housing construction no longer follows the traditional logic of adaptation to the biophysical conditions of the terrain, but rather is the outcome of the real state interest by the principal landowners, who subdivided and sold their land to the wealthy industrialist of the region for the construction of second residences (Otero et al., 2009).

The path from rural to urban-residential community has also meant a progressive erosion of the traditional knowledge that the inhabitants of the rural municipality had acquired through experience, observation and successful adaptation to the environment (Folke et al., 2003) and had applied to the «construction» and conservation of the territory. Traditional forms of occupying space and the primary productive activities also tended to adapt to the biophysical characteristics of the territory, such as the lack of water due to irregular precipitation and the unique hydrogeology of the area. The latter was not taken into consideration when it came to selecting a model for the current urban settlement.

We must underline the fact that the contribution of the local informants has been an indispensable element in our analysis of landscape change, because they have helped us to better understand these changes at the local level and include a social perception of change from a more participative perspective. Even though the perceptions of the older rural residents interviewed for this study cannot be generalized to the rest of the local population, their interpretation of the changes is very valuable because it provides a perspective that is different from the norm, given the particular relationship that this group had with their environment, a perspective that has tended to be silenced. The knowledge transmitted by older men and women who have lived on the land reminds us of the need to recover the link between society and nature through active territorial management.