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Abandonment phenomenon in Europe

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Abstract. In the last century, rapid transformations, industrialization, urbanization, tertiarization, the boom in services, modern counter-urbanization trends, social mobility, and bigger transport infrastructures could have been seen. The eastern Mediterranean area, located next to the Mediterranean Sea, was one of the most significantly changed parts of the agrarian lands in Europe. The recession left its mark everywhere in Europe. This paper focuses now on the land-use changes of the east coast of Spain, on the Huerta de Valencia. The objective of this paper is to assess spatial changes and to analyse the land-use changes between 2008 and 2013.

Keywords: land-use change, Mediterranean area, resilience, socio-ecological systems

1. Introduction

When considering agricultural landscapes, we refer to lands normally used for agricultural purposes and managed to provide adequate and durable production capacity [1]. Land abandonment is a phenomenon. It is applied to traditional lands or lands that have been used for agriculture but such activities on them have stopped for a while.

When we talk about abandonment, we have to clarify what it means exactly. It has a relative meaning. Baudry says there can be activity, but there is normally a change towards a less intensive pattern in the land concerned. It can be a land in itself, and there the soil stops being managed and used.

The phenomenon that is actually recognizable in the Mediterranean area refers to the last one. Traditionally, landscapes have changed.

They became intensively used systems, and spontaneous abandonment has started and changed the dynamics of them.

Mediterranean agricultural landscapes are specific cultural landscapes, resulting from a long history of human management adapted to restrictive environmental conditions and biological diversity [2]. They optimize the annual fluctuations in productivity without causing ecological degradations [3]. In the Mediterranean area, the abandonment reached a large proportion in the socio-economic system and in landscapes as well.

What is the process of land abandonment? It can take place by the death of agricultural activity, or the unsuccess of farmers. The process can be progressive. If there was cultivation, even if only for a certain period, it has been suspended; grazing becomes more extensive by less care concerning the pastures or reductions in livestock density; permanent crops are not maintained or improved by regular management measures even if they are still being exploited.

Naveh and Lieberman say the first step can also be the intensification of traditional use that has happened in the south part of the Mediterranean area. The extensive systems have changed to intensive, but the landscape was not able to totally adapt to the process. The Huerta de Valencia is defined as an agricultural plane irrigated by the River Turia. It surrounds Valencia and the east coast of Spain. Its origins are dated to the 8th century with the arrival of the Muslims. The Valencia Metropolitan area is the economic and administrative centre of the Valencian Region. The Huerta de Valencia connects three landscapes: the Turia River Natural Park with its riparian forests, the Albufera Natural Park, and the Mediterranean Sea.

The Huerta of the City of Valencia became a unique and interconnected landscape.

The values of Huerta are the main elements of its character. It has a historical structure with a dense network of channels, rural roads, and traditional buildings, like *barracas*. It has a strong agricultural activity, which changed the landscape.

Finally, it is irrigated by the Tribunal de las Aguas, the oldest active jury in Europe. It is a harmonious landscape which produces a patchwork of land uses and has a high visual value. Besides its visual and productive value, it creates the social memory of the locals. The Huerta de Valencia has been threatened by different factors throughout the centuries.

The main problem is the lack of co-ordination among the 45 involved municipalities, the fragmentation by the development processes, and the rising number of abandoned fields. These factors cumulatively cause the disappearance of the Huerta landscape.

In the last decade, the resilience theory has extended from the pure ecological domain – considering resilience as a property of ecological systems – to cultural landscapes (socio-ecological systems) [4].

The concept of resilience refers to the capacity of a system to experience shocks while retraining the same function, structure, and identity. It is the ability of dealing with disturbances or changes without altering the essential characteristics of the system [5].

The area of the Huerta de Valencia can be considered as a resilient landscape. It is the result of a long-lasting human interaction with the physical environment.

The Huerta is the most resilient landscape of its type. The Dobris report in 1998 emphasized that there are only six huerta landscapes left in Europe [6].

Despite the cultural representation of the Huerta – it is usually associated with horticultural crops –, different crops have been grown, adapting to the population needs in each historical period [7]. During the Middle Ages, lands were dominated by wheat and vineyard with olive and fruit trees on the edges, and vegetables were in small plots, while a mulberry tree forest covered the Huerta by the sixteenth century. In the nineteenth century, horticultural crops became the dominant vegetation; and it was not until the second half of the twentieth century that citric trees started to expand [8].

At the beginning of the twenty-first century, the Huerta de Valencia, like other traditional landscapes [9], experienced unprecedentedly fast and profound changes. Now, due to the economic crisis, there has been a lack of infrastructure growth. The problems related to the low profitability of agriculture persist as well as the threat of abandonment.

This work refers to the analysis done during 2014 and 2015 at the Department of Rural Engineering, Technical University of Valencia, and supervised by Prof. María Vallés Planells.

2. Materials and methods

The study analyses an 11,370-ha area. It composes twenty-four units delineated for Huerta de Valencia Action Plan. The starting point of the work was the land-use map developed in 2008, in which land use corresponds to land cover. It means that it refers rather to natural or human-introduced elements that cover the surface. The identification of land use in 2013 was performed with the aid of ArcGIS software. For this task, the latest available aerial photograph – which corresponded with the 2012 flight – was used. A new class "infrastructure," which was classified as "urban processed areas" in 2008, was included during this stage. These new infrastructures were mainly connected to the CV-300 road in the north and the high-speed railway in the south (AVE). Finally, the field survey was developed during May 2014. It was conducted on a set of sample areas that were based on buffer areas of 500 meters around a set of randomly selected points that were spatially distributed among the 24 landscape units (*Figure 1*). As a whole, the sampled area was of 1,806 ha, which involved 16% of the study area.

The detection of abandonment was not straightforward. The edge between abandonment and agricultural use may not be sharp enough because abandonment may occur at different degrees of intensity. Here, abandonment includes fields that have lost their regular characteristic pattern of cultivation because agricultural use has completely stopped or management intensity has become very low.

The map classifies 17 types of land uses divided into two main groups: vegetated and non-vegetated surfaces. The vegetated surface applies to areas that have a vegetated cover of at least 4% for at least two months of the year; they are cultivated or contain natural vegetation. These covers consist of the life forms.

Artificial surfaces describe areas that have artificial cover because of human activities with less than 4% vegetative cover.

Figure 1. Distribution of sample areas

3. Results and discussions

The analysis of land-use change in the Huerta de Valencia as a whole shows three main dynamics during the period between 2008 and 2013. First, results show that there has been a decrease in the area covered by citrus from 32.2% to 24.8%, which corresponds to a decline of 23% in citrus as compared to 2008. According to

cross-tabulation, 15% of the area covered by citric fields in 2008 has become abandoned and 9% has been converted into irrigated arable land in 2013. Second, the percentage of abandonment or of the fields in bad condition has increased from 11.1% to 15.6%, which involves a rise of 40.8% as compared to 2008. Cross-tabulation shows that the surface increase of abandonment is mainly through citrus (31%) and irrigated arable land (9.6%). Finally, the emergence of recently cultivated fields is also remarkable (4% of the total area in 2013). According to the data derived from the fieldwork, most of these newly cultivated areas would correspond to horticultural fields (97%) and 3% would correspond to other fruit trees, especially khaki fields. This fact would involve that the area of horticultural fields has not decreased, but there has been a slight increase of 6.2% in the area covered by irrigated arable land as compared to 2008 (*Figure 2*).

Concerning the analysis of change with regard to the land-use values in 2008, results also show a marked rise in palms (53.5%) and asphalted fields (22.4%). However, they are not considered significant since they occupy less than 1% of the total area. There is also a drop in urban processed areas (13.8%) which are mainly connected with the new high-speed railway (AVE) and CV-300 road. The artificial surface (containers, industry, installation, urban processed areas, infrastructure, store and asphalted field, and landfill) has not significantly increased. It has risen from 4.7% to 5.4%. This increase is mainly due to the new infrastructures and areas in urban process.

Table 1. Cross-tabulation for land-use change in the period of 2008–2013 in the Huerta

	LAND USE 2008														
LAND USE 2013	Rice	Citrical	Containers	Horticultural	Industry	Installation	Greenhouse	Wetland	Urban process	Palms	Abandoned field	Storage field	Asphalted field	Landfill	Nursery	TOTAL 2013
Rice	1790,5										0,2					1790,8
Citrical		2760,4		34,3			0,2				22,7				0,2	2817,8
Containers			20,8													20,8
Horticultural	0,9	322,7		3457,6			0,3			1,0	146,2			0,4	5,6	3934,7
Industry		0,6		1,7	182,1						4,4			0,1	0,3	189,3
Installation				0,6		119,6			0,3		0,2					120,7
Greenhouse				8,7			67,3									75,9
Wetland				5,6				204,0		0,4	11,6	0,1				221,6
Urban process		5,6		5,6			0,1	1,6	60,5		34,1	0,3		0,4	4,0	112,3
Infrastructure		7,2		10,8	0,0				65,6		5,5			1,1	0,4	90,6
Palms		5,2		4,0						7,7	2,0				0,8	19,7
Abandoned field	0,6	550,0		171,2	0,4		2,5		3,7	3,7	1035,5	0,5		0,4	9,5	1778,1
Storage field		0,1		0,3							0,2	33,0				33,5
Asphalted field		0,4											2,0			2,4
Landfill														46,8		46,8
Nursery		3,8		3,5											103,1	110,4
Other fruit trees		4,0		2,2							0,4					6,7
TOTAL 2008	1792,1	3660,1	20,8	3706,0	182,6	119,6	70,4	205,6	130,3	12,8	1263,0	33,9	2,0	49,2	123,8	11372,2

Figure 2. Examples of newly cultivated areas in the Horta de Faitanar (19), Horta de Picanya (24), and Horta de Campanar (14) between 2008 and 2013

When analysing land-use evolution unit by unit, results show different patterns of land-use changes (*Figure 3*) as follows:

Unit 22 (Horta de la Séquia de L´Or I Arrossars de L´Albufera). It is part of Albufera Natural Park and rice is the dominant form of land use. Abandonment is scarce.

Units 6, 8, 9, 10, 11, and 12 (Horta de Meliana, Hortad´Almàssera I Alboraia, Hortad´Alboraia, Horta de San Miquel del Reis, Horta de Petra, Horta de Poble Nou).

They are dominantly irrigated arable lands (this land use covers more than 70% of the units) and with some scattered abandoned fields that involve less than 6% of the units.

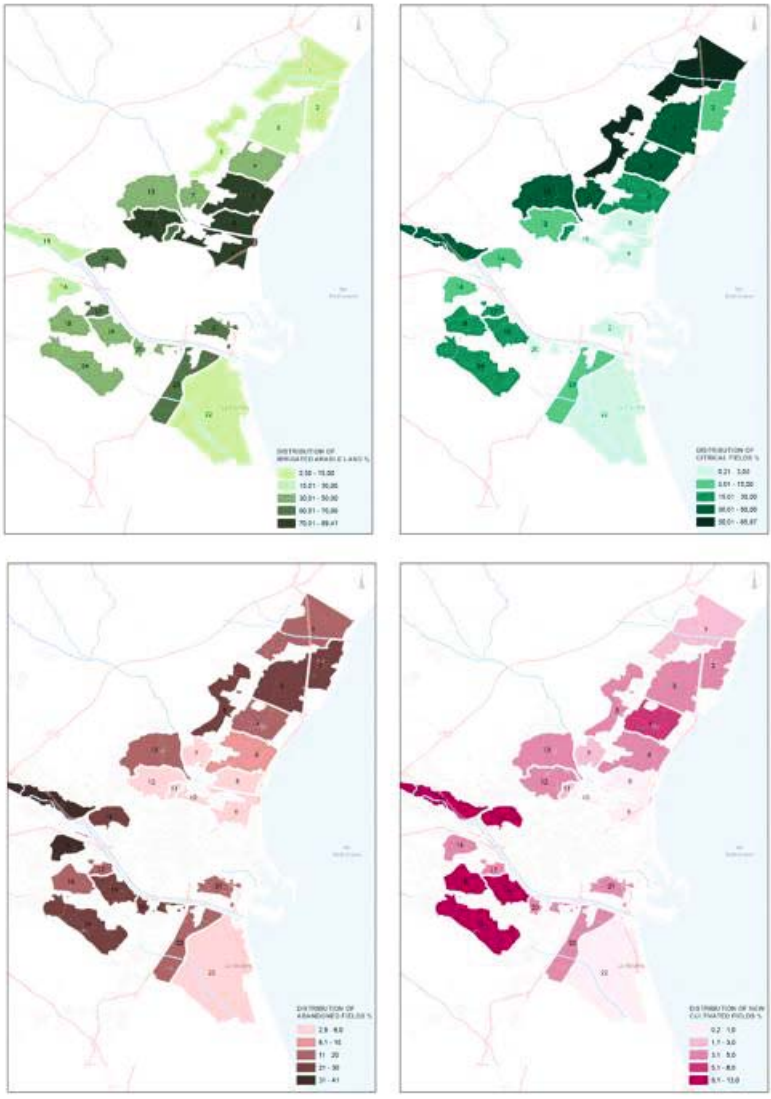

Figure 3. Percentage of irrigated arable land, citrus, abandonment, and new cultivated areas in 2013 within the different units that compose the Huerta de Valencia

Newly cultivated areas are not significant except for units 6 and 12 (Horta de Meliana, Horta de Poble Nou) which correspond to 3% of the units.

Units 7 and 13 (Horta de Vinalesa, Bonrepós I Mirambell, Horta de L´Arc de Moncada). Both units show a mosaic mainly composed by horticultural and mosaic fields with some recent khaki crops. With regard to the level of abandonment, there has been an increase from 6% to 16% in unit 13 as compared to unit 7, which has 5% abandonment in 2013. Newly cultivated areas, including khaki, involve between 2% and 4% of the unit.

4. Conclusions

According to the results, 13% of the analysed territory has changed. The main changes are the decrease in the area covered by citric fields (7.4%), the increase of abandonment or of areas in bad condition (4.5%), and the increase of irrigated arable lands (2%). The latter, being one of the most significant changes, is through the conversion of citric and abandoned fields. As a whole, the loss of cultivated land in the Huerta de Valencia is similar (6.5%) to the average value for the Valencian Region (6.3%). However, results indicate that land-use dynamics are not homogeneous within the Huerta de Valencia. The increase of abandonment goes from 1% in the most stable units to 13% in the most degraded ones. The work shows a simple methodology to show how we can analyse changes in land use between such short periods of time and get some ideas about a resilient landscape.

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