

# Rural areas and urbanization: analysis of a change

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## 1. Introduction

Man's ability to shape ecosystems (SMITH 2007) has contributed to sustaining the global demographic increase recorded in the last fifty years, placing it at the summit of the pyramid of net terrestrial productivity users (VITOUSEK ET AL. 1986; LMHOFF ET AL. 2004) and, at the same time, making it responsible for a greater soil impact, in comparison with all the other living beings combined (WILKINSON ET AL. 2007).

Recent studies indicate that the ecosystems which are strongly influenced by man cover a greater surface than systems which we could define virgin or wild (McCLOSKEY, SPALDING 1989; VITOUSEK ET AL. 1997; SANDERSON ET AL. 2002; MITTERMEIER ET AL. 2003; FOLEY ET AL. 2005). According to Ellis and Ramankutty (2008) 75% of the lands above sea level present alterations due to the presence of man. The notion of anthropogenic biomes, or *Anthromes*, is based on this concept, with the creation of a new system of classification on which ecological and Earth science can be based in order to give prominence to the anthropic intervention as a modification factor (ALESSA, CHAPIN 2008), in order to define a first classification level, given by the distinction between *used lands* (agricultural, pastoral farming and urban) and *unused lands*.

The relationship between the city and the countryside, as a part of the broader and sustained relationship between agriculture and territory, connotes a characteristic feature of the general historical process, the mainstay of the complex co-evolution of man and nature which we can identify with the term 'territorialisation'. The history of Italy represents a privileged example of this dynamic, and, from many sides, hierarchical relationship: the same regional divides, often hastily ascribed to a dualistic north/south viewpoint, reflect, more specifically, the different degree and method of said relationship which has proved to be more pronounced and lasting in central and northern Italy and more feeble (although not absent) in the south of Italy. The city means the presence of a multitude of functions within the territory, political autonomy and the proximity of power, organization of the countryside and farming systems as a function of food (e.g. Share farming in central Italy, but also all the other forms often connected to collective possession and communal uses) and a frequent cultural contact on behalf of the inhabitants of the countryside with urban life. These are deeply rooted and resistant connections that have not impeded a clear distinction regarding roles and the idea of urban planning. In a single system, the city had to act as a city and the countryside as a countryside. In order to be together so that the system was functional, the roles had to be clearly separated and perceived as such. Relationships and the integration of each function was what counted (PAZZAGLI 2012, 109-110).

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With the processes of industrialization and globalization, the progressive destruction of that which was local and rural has led to a bypass: the city can live without its countryside and the countryside can fade away without having any further relationship with its urban centres of reference. At a certain moment in history, the energy cycle broke down, as did the economic and cultural connection, with an increasing marginalization of farming and the abandonment of a virtuous chain from the point of view of the energy balances. It was not - as has been observed since the end of the 1980s - simply an urban planning crisis, but a crisis regarding an economic model, a way of comprehend politics and the capability which the public authorities have to provide explanations for the unease regarding the urban condition and the territory in general (DE LUCIA 2006).

The rapid and disorganized colonization of new spaces on behalf of the urban fabric (*urban sprawl*), together with two phenomena, apparently in contradiction, such as the rural abandonment and the industrialization of agriculture, as well as the arrogance of the land and building lobbies, bring about a negative effect which converges on the nature of the landscape, which shows evident signs of trivialisation and simplification connected to a steady loss of biodiversity and complexity.

The city boundaries, once represented by city walls, have progressively vanished into the urban fringe and suburbs, while the detectable distinction between the city and the countryside has faded and the prudent integration of these two primary territorial components has fallen into crisis: the urban and the rural which have, for centuries, made up the innermost identity of many Italian regions and, additionally, have also learned to interact with each other respectfully. Now they no longer interact or, when they do, it is with almost violent language and the tone is almost always vexed, over the top. The traditional relational model, as the corresponding energy and productive chains were shattered on the horizon of the contemporary megalopolis (MAGNAGHI 2010; MAGNAGHI 2012).

Land take means, firstly, the distortion of the landscape, a fracture in the consolidated equilibrium between the city and the countryside, new environmental expenses in terms of the use of natural resources and waste disposal, the redefinition of social identities. Such an analysis must make up the basis for the priority identification of reducing land consumption and conserving the landscape, of which environmental and historical values of every local community are part. Only at the end of the 1900s, after the redefinition of the role of the city in terms of tourism and the intense exploitation of the coasts, was there a process of rediscovery and valorisation of rural territory (MEINI 2012).

These considerations underline the need to have objective data which is ready to describe phenomenon of land take and support the decision makers. In such a context, some ministerial initiatives, although they were still not translated into consistent urban planning policies, enter into the picture, having laid the foundations for an overall, dynamic analysis of the Italian territory with databanks and indicators which should make up the scientific basis for the decision-making processes on an institutional level.

In recent years, the well-known Corine land cover and LUCAS, developed respectively by the *European environment agency* and EUROSTAT, have been combined in several national initiatives. These aimed at filling the information gap which they may be subject to in order to perform analysis at a more detailed scale or aimed at understanding specific issues related to land use changes, such as soil sealing related to urban sprawl (MARICCHIOLO ET AL. 2005; MUNAFÒ 2008). This is the case, for example, of the study of processes related to the expansion of urban areas in Italy during the last fifty years using a cartographic approach (ROMANO ET AL. 2013) or of the estimate of soil sealing degree based on the interpretation of aerial photographs and high-res-

olution topographic maps, carried out on a random sample points over the whole national territory (MUNAFÒ ET AL. 2013).

Other projects that are part of this area of interest are also the *Atlante nazionale del territorio rurale* (National atlas of rural territory <<http://www.reterurale.it/atlante/index1.html>>, last visited: April 2013), promoted by the Ministry of agricultural food and forest resources, with the objective of reconstructing a national idea of rural territory, in its socioeconomic, environmental and settlement components, through the preparation of a system of indicators across a broad thematic spectrum, and the development on behalf of the Ministry for the environment, land and sea from the *Inventario dell'uso delle terre in italia* (LUTI - Inventory of land use in Italy), carried out on a sampling basis, in support of the National register of agroforestry carbon reservoirs and within the Extraordinary plan for environmental remote sensing. The hierarchical classification system used in LUTI has, as a basis, 6 categories for the use of land defined by GPG-LULUCF (*Good practice guidance for land use, land-use change and forestry*), integrated with second-level and third-level subcategories, for a total of 9 classes (Table 1), for which the detailed description can be found in MARCHETTI ET AL. (2012). The analysis of land use changes occurred from 1990 to 2008 in Italy, in accordance with LUTI, allow for the expression of quantitative assessments in terms of said phenomenon, useful in order to encourage reflection and discussion regarding the possible creation of new forms of land use management, centred on the essential role of the rural world.

<i>GPG-LULUCF Categories</i>	<i>LUTI Categories and subcategories</i>	<i>LUTI Code</i>	
Forest land	Woodland	1	
Cropland	Arable land and other herbaceous crops	2.1	
	Herbaceous crops	Arboriculture (fruit and nurseries)	2.2.1
		Arboriculture (wood)	2.2.2
Grassland	Lowlands, grazing and uncultivated herbaceous land	3.1	
	Other woodlands	3.2	
Wetlands	Humid and water areas	4	
Settlements	Urban areas	5	
Other land	Infertile areas with scarce or absent vegetation	6	

**Table 1.** Land classification according to LUTI.

## 2. Results

The analysis of the results starts from the construction of the transitional matrix (Table 2), based on the flow method (ONCS 2009) which allows for the isolation of the single transitions which occurred throughout time among the different categories of land use.

The matrix highlights some significant changes which occurred from 1990 to 2008, among which the increase in forest area (about 500,000 hectares) and the decrease in agricultural areas, which, although they are category of land use most present within the national territory (33.4%), they also register a loss of more than 800,000 hectares. In the same time period, the data related to land consumption is noteworthy, with the expansion of urbanized areas equal to little less than 500,000 hectares (about 28,000 hectares per year) at the expense, above all, of lands which were previously intended for farming use (about 75%) (MARCHETTI ET AL. 2012).

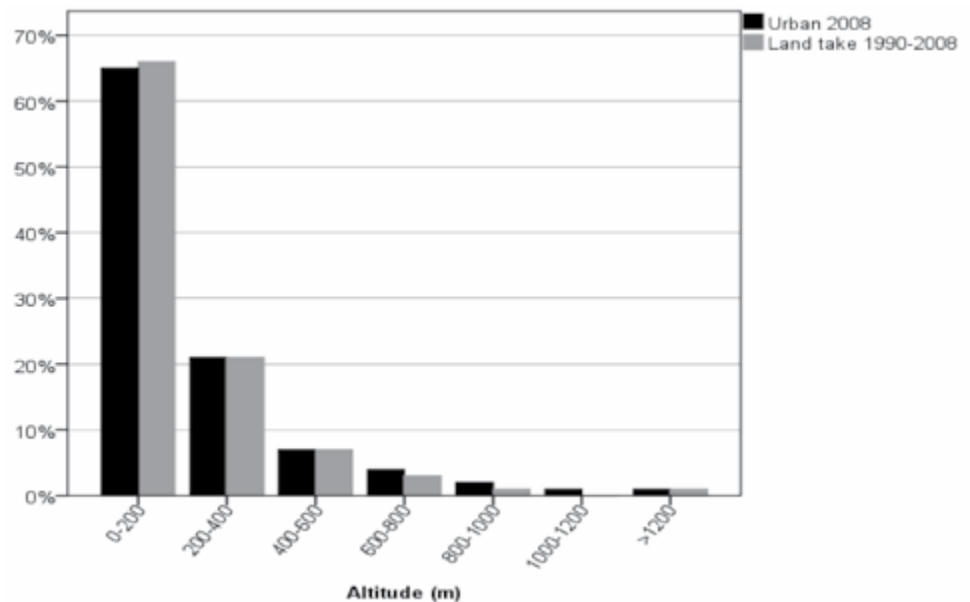
The use of the digital elevation model (DEM) has allowed for the individuation of altitudinal zones and slope class which are more urbanized and concern the phenomenon of land consumption during said time frame. In 2008, the urban fabric, as well as land take, are concentrated mainly in flat areas, 65% in the zone between 0 and 200 m and even 86% between 0 and 400 m (Figure 1); the same trend can be observed in Figure 2, from which one can infer that 70% of the artificialized land are found at slopes inferior to 5%, while those under 10% reach 84%; as for the land take, it can

be observed that, in this case, in the last 20 years the , the lands in the first area have become even more desirable that in the past, in fact the phenomenon records 73% compared to the aforementioned 70%.

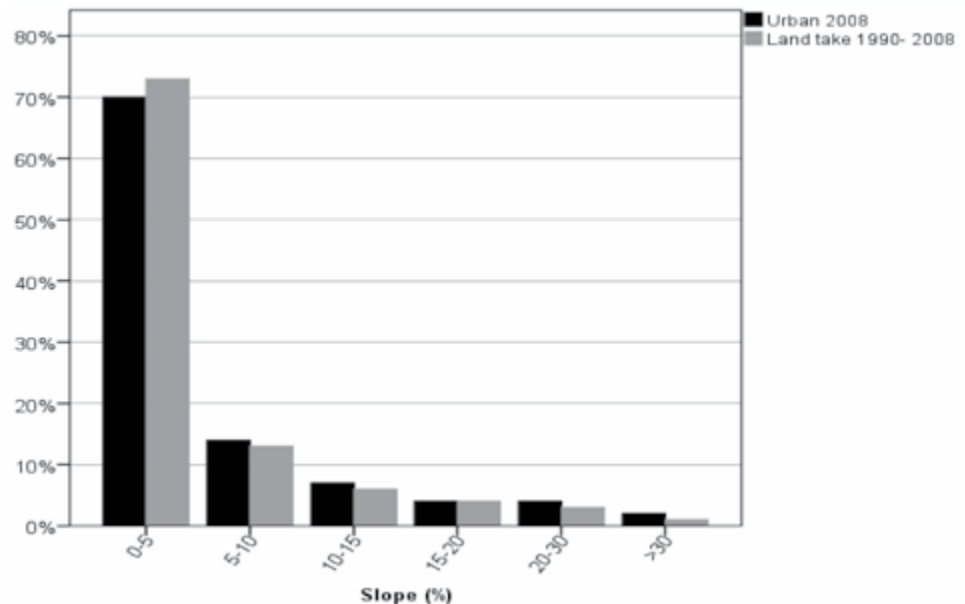
**Table 2.** Transition matrix of the changes which occurred in land use from 1990 to 2008 in Italy (for the meaning of the codes in use, see table 1). The surface data are in hectares (from MARCHETTI ET AL. 2012).

		2008									
		1	2.1	2.2.1	2.2.2	3.1	3.2	4	5	6	Totale
1990	1	9014117	30192	13573	975	13446	37213	9497	21118	1225	9141355
	2.1	184398	9586594	789148	69470	154166	128526	15374	387391	150	11315217
	2.2.1	35547	272931	2269752	775	21650	16571	575	64962	0	2682761
	2.2.2	3847	51692	1249	67659	2773	2349	1249	3273	0	134091
	3.1	138121	60692	22573	4224	1662343	276904	5349	24998	550	2195754
	3.2	256716	48566	17072	750	9449	1513565	7399	13097	525	1867138
	4	14696	1225	425	400	2999	11224	476768	1500	825	510061
	5	5023	4174	950	125	5250	3724	1250	1623439	75	1644010
	6	750	75	25	0	2373	1125	1125	1125	651691	658288
	Totale	9653216	10056141	3114765	144376	1874449	1991200	518586	2140903	655040	30148676

**Figure 1.** Distribution of the urban fabric in 2008 and the land take from 1990 to 2008 based on altitude ranges in Italy.

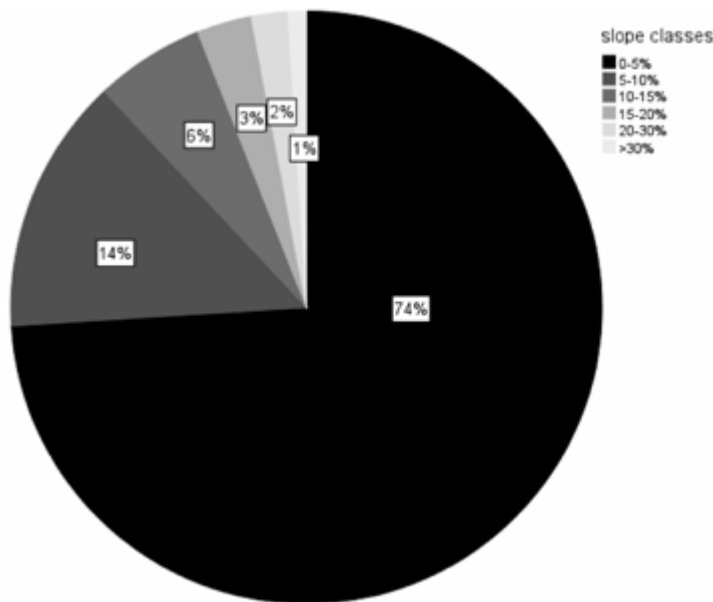


**Figure 2.** Distribution of the urban fabric in 2008 and the land take from 1990 to 2008 based on slope in Italy.

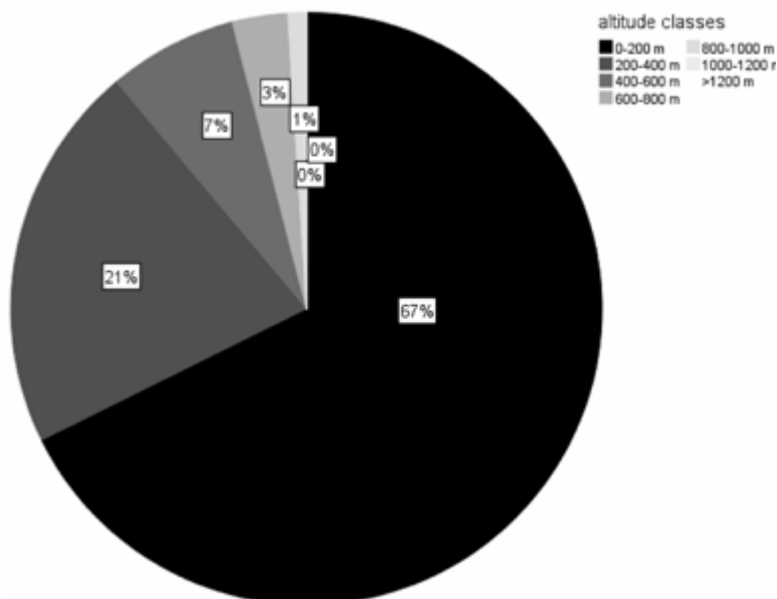


The problem with urban sprawl, as stated earlier, has mainly affected ex-agricultural lands (75%), whose area has been considerably reduced, also due to the abandonment of said activities which are then followed by the recovery of vegetation, with the invasion, firstly, of shrubs (class 3.2 according to the LUTI) and, later, tress, until its transformation in proper forest areas (class 1 according to the LUTI) (see the FAO definition, 2001), for a total net loss of about 120,000 hectares which reaches 500,000 if artificialized land is included and 600,000 if uncultivated land is. In any case, the transition which is most worrisome is that connected to land take, for many different reasons, (ROMANO, ZULLO 2013; ROMANO 2011), including irreversibility. The analysis, therefore, focused on about 380,000 hectares of urbanized farmland that from 1990 to 2008 aimed at understanding, in greater detail, the characteristics of the same. Even for the latter, cross-referencing the LUTI and DEM data showed that most of the losses occurred in the land located at lower altitudes (88% below 400 m a.s.l.) and virtually flat (74% in land with a slope less than 5%, and 87% with a slope less than 10%), as shown in figures 3 and 4.

Cross-referencing the LUTI data with the Corine land cover mapping data (1990), characterized by a more detailed definition types of farming land, has allowed for a more in-depth investigation; cross-referencing was possible due to a 70% correspondence in the land classified as farming land both by LUTI and by CLC in 1990. The graph in figure 5 was obtained from this operation, from which it is shown that 65% of the time, converted farming land were used for arable, non-irrigated crops, economically less profitable and which are not affected by the phenome-

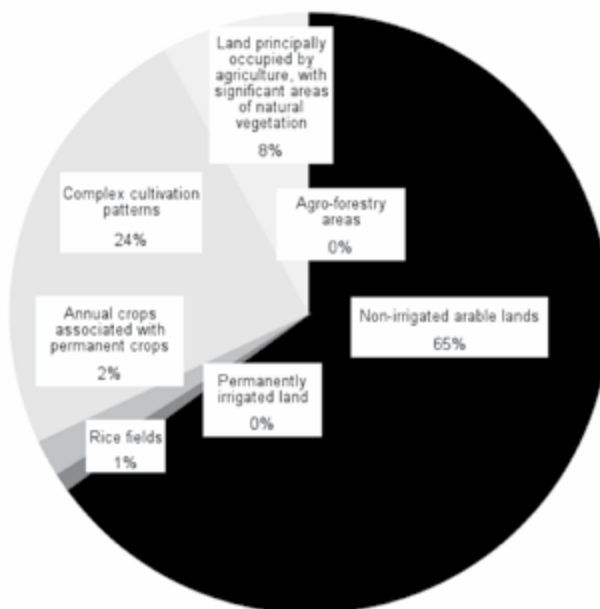


**Figure 3.** Urbanized cropland from 1990 to 2008 based on altitude.



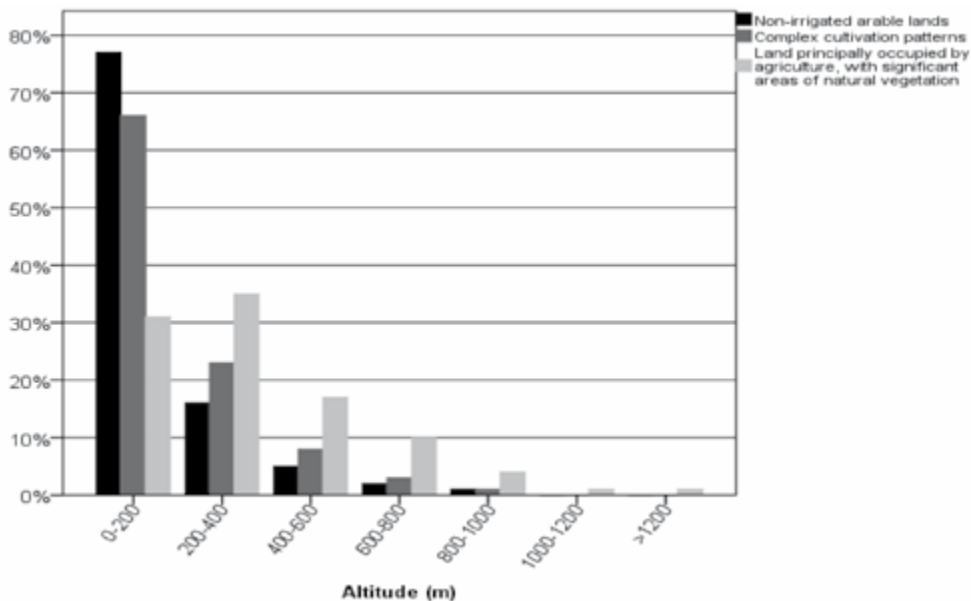
**Figure 4.** Urbanized cropland from 1990 to 2008 based on slope.

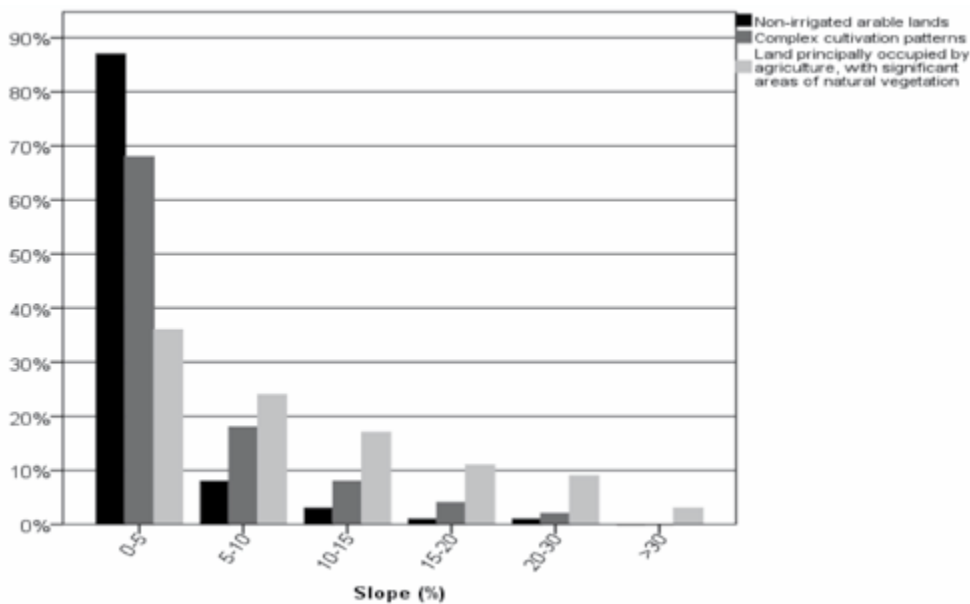
non. One should not underestimate the urbanization of land characterized by complex cultivation patterns (24%) and by land principally occupied by agriculture, with significant areas of natural vegetation (8%), remarkable in terms of biodiversity conservation. In a closer examination of these three types of I and (figures 6 and 7), one can observe that the non-irrigated arable lands lost are located nearly only at altitudes less than 400 m (93%) and in flat areas. In fact, 87% of the time, these are areas with a slope of less than 5%. This trend is quite evident, although less pronounced, when analyzing the results regarding land characterized by cultivation and complex cultivation patterns; it is also affected by the phenomenon of land take, mainly in lowland areas or small hills characterized by gentle slopes; as for those which were once occupied by land principally occupied by agriculture, with significant areas of natural vegetation, however, despite a substantial predominance of losses in areas of low altitude and slope, the phenomenon displays a certain consistency even in hilly areas (27% between 400 and 800 m) and with slopes greater than 10% (37% between 10 and 30%).



**Figure 5.** Distribution of urbanized cropland according to the Corine land cover classes.

**Figure 6.** Land take from 1990 to 2008 in Italy based on altitude, in terms of the types of cropland most affected by the phenomenon.





**Figure 7.** Land take from 1990 to 2008 in Italy based on slope, in terms of the types of cropland most affected by the phenomenon.

### 3. Conclusions

The data which emerges underlines how, the past 20 years, urban sprawl mainly affected the land in lowland areas and with gentle slopes, in an even more obvious way than what emerged from the data for the entire urbanized area in 2008 (fig. 1 and 2). But their unavoidable future scarcity, could drive said colonization towards land which was, at one time, not so desirable due to the real estate market. In said context, farming represents a key point, capable of recreating a balanced landscape through the conservation and the protection of areas which are not built-up and, where possible, with the recreation of ecological integrity of degraded and fragmented environments. Farming, an essential and long-lasting territorialisation factor, as well as the energy basis of the life cycle, can only be central to a regenerative vision of the landscape, taking into consideration, however, the need to integrate 'farming' subjects with other subject areas, starting with the ecological aspect. The productive function of the countryside must be flanked by the importance of the concept of the countryside as a producer of social cohesion, the environment, the idea of belonging, health and lifestyle. From the urban point of view, there is the problem of defining, perceiving and recognizing the food and energy areas in question, according to conceptual models which focus on those of the ecological footprint and the bioregion (WACKERNAGEL, REES 2004; IACOPONI 2011).

The challenge, therefore, is the conservation of areas that are not built-up, most importantly the peri-urban areas, initiating redevelopment and valorisation of the same, in which the communities who inhabit these areas can concretely participate. The participatory aspect, in fact, is necessary in order to carry out one of the founding principles of the European Landscape Convention, as well as that of the Italian Constitution which establishes the prime importance of the landscape and of participation (articles 3 and 9) (SETTIS 2010). Participation is not to be understood as a mere accessory to democracy, but as a real possibility that citizens and local communities have, on many levels, to affect governmental decision-making within the territory, irrespective of their individual, specific interests.

One can sense the need for urban planning which will be able to guarantee the conservation of the territory, placing farming at the core of the construction of a new habitat, developing constructive mechanisms for the landscape. Managing the territory is another of the many duties carried out by the agricultural establishments, with economic and labour-related repercussions, factors which cannot be ignored in transitional periods such as that of today. The main goal is to create a new culture which, while starting with the enterprises, can stimulate interaction between businesspeople, public authorities and professionals in order to shape new ways of organizing the land which take into account the close connections between urban areas, nature and the world of farming to guarantee that the principles of sustainable development will be respected.

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## Abstract

After the Industrial Revolution, the precarious equilibrium which regulated the co-evolutionary process between man and nature, has decidedly leaned in favor of a society which is continuously in search of new spaces to be explored and inhabited. According to the data in the *Inventario dell'uso delle terre in Italia* (Inventory of land use in Italy - IUTI), from 1990 to 2008 land take is estimated at 500,000 hectares; 75% of the time, this occurs to the detriment of farmland. The ability to evaluate and monitor said phenomenon is essential, first of all, in order to provide the decision makers with valid instruments and, secondly, to lay the basis for a new culture which, placing agriculture at the center of a new, regenerative view of the landscape, is able to outline new ways of organizing the territory which take into account the connections between that which is anthropic and the matrix in which it is inserted, in full respect of the principles of sustainable development.

## Keywords:

Land take, territorialisation, cropland, artificialisation, redevelopment.

## Bios

Marco Marchetti is Director of the DIBT Department at the University of Molise. He leads several projects at national and international level. Chair of the European Forest Institute Scientific Advisory Board. He is also Member of various international Panels

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