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The urban transformation of Italy's Adriatic coastal strip: Fifty years of unsustainability

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ABSTRACT

The study regards the processing of data on urban land conversion along the Italian Adriatic coast in the last 50 years. The results obtained show different aspects of the phenomenon: values were obtained for the average annual speed of transformation of the coastal strip; clustering, dispersion and statistical concentration of the data obtained were studied, which has made it possible to show unparalleled threshold values in the present levels of urbanization; geostatistical surveys were conducted to determine the distribution changes of urban concentration over time; analyses were developed to point out what landscape and morphological elements have emerged, and are tendentially confirming greater sensitivity to land artificialization; a number of comparisons based on specific indicators were produced that show the typological and geographic variations of development taking place in the time period studied; important information has emerged on the different territorial policies implemented by the regions over the long-term. This research has made it possible to investigate one of the largest and most intense land transformation phenomena in Italy which has led to the construction of an urban organism extending along more than 1470 km of coast with very few breaks which, together with railroad and motorway infrastructural elements, forms the longest urban stretch in southern Europe and one of the most extensive in the entire continent. A further result of the work carried out concerned the extraction of data on the remaining coastal stretches, i.e. those not yet affected by urban transformation and thus of extreme importance for policies focused on the preservation of community habitats and the preservation of coastal landscape. In conclusion, it has been possible to draw a map of management responsibilities at the municipal and regional levels for the revision of future urban planning trends in terms of sustainable governance.

Introduction

The study discussed in this paper has produced the interesting processing of data on the quantitative and qualitative development of land urbanization along the Italian eastern coast from the post-war period (1949–1962) to the Noughties, analyzing modalities, extent and environmental impact of this phenomenon on this fragile and vulnerable geographical area.

Over the past years growing attention has been paid to land use as a harmful environmental factor (Lambin et al., 2001; Sala et al., 2000; Ellis and Ramankutty, 2008), but its effects on ecosystems and coastal landscapes are particularly significant and have been neglected throughout the Mediterranean basin for a long time (Catalán et al., 2008).

There are not many studies in international literature on the Italian case (Bonifazi and Heins, 2001; Capello, 2001) and more detailed data on long-term development in some geographical areas of the country have been published only recently (Pileri and Maggi, 2010; Romano and Zullo, 2012; Salvati et al., 2012).

Very few regions (only 4 out of 20) have vector information on land use over the past 50 years, but there are also very few cases in which data on shorter periods of time are available (1970–2000), regarding both the overall extent of urbanization and statistically significant historical series. Furthermore, no coordinated survey activities have been planned by local authorities (regions, provinces and municipalities).

The negative aspects of this phenomenon are still only marginally considered by scientific agencies and in communication and land governance (Grubler, 1994; Heilig, 1994) and only in 2013 did this issue appear for the very first time on the political agenda, one of the candidates in the last national political election unlike other countries, where actions, data and publications are far more numerous (Hall et al., 1973; Mellor, 1983; Yanitsky, 1986; Irwin and Bockstael, 2007; Zaninetti, 2006; Garcia-Call, 2011; Hauri et al., 2006; Illy et al., 2009). Only recently has the need emerged to set up mechanisms to monitor urban transformation dynamics, but we

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are still far from having systematic and consistent data collection that would make credible comparisons and assessments possible (Sharma et al., 2012; Lowry, 1990).

One of the most recent initiatives to this regard is the one taken by the National Land Use Observatory, set up by the Milan Polytechnic and INU (Urban Planning National Institute) (http://www.inu.it/attivita_inu/ONCS_2.html) which however makes use of relatively recent information bases (end of the 1970s) and has very little data available. Towards the end of the 1980s, other authors highlighted landscape change modalities using large-scale national databases (1:250,000) (CNR-IPRA, 1988; Astengo and Nucci, 1990) or European standards such as CLC (Corine land cover) (Bossard et al., 2000; APAT, 2005; Comber, 2008) derived from satellite remote sensing on a nominal scale of 1:100,000 (Falcucci and Maiorano, 2008). Some international organizations, such as the European Environmental Agency (EEA, 2006), have estimated, in the case of Italy, that approximately 8000 ha per year were artificialized between 1990 and 2000, again based on CLC satellite remote sensing.

All these data have in common an insufficient level of detail, which creates, mismatches between assessments and actual conditions and at the same time, a difference in estimates that varies from one geographical area to the other depending on the type of settlement (Romano and Zullo, 2013).

In Italy, a great deal of attention is being paid to the issue of land use nowadays and in many cases estimated data are disseminated in various ways, but with a reduced level of reliability and lacking satisfactory statements regarding sources and methods.

A few years ago, one of the first examples mentioned on many occasions consisted of the information extracted from the databases of the National Institute of Statistics (ISTAT), according to which, between 1990 and 2005, approximately 3 million ha were urbanized. In reality, this area, accounting for 10% of the national territory, is farmland used for agriculture (used agricultural land – UAL), which has changed use in the 15 years considered. It has been converted into urban areas only in part, while most of it has been either abandoned or has become wild, degraded or forestal.

If we take into account that current overall urban areas, calculated using the most recent regional land use maps on a 1:10,000 scale and ISTAT estimates, range between 2 and 3 million ha (even if this figure excludes the road network), the mismatch between actual conditions and UAL data is very evident.

Numerous inaccuracies in the production of land use data may be found even among institutional research agencies which, in applying the statistical estimates based on partial sample data, has calculated land use in Italian regions at 2010 with huge tolerances varying between two and four percentage points, that is to say in many cases greater than the actual figures. As mentioned earlier for the present-day values of urbanized land, it is not very useful to produce "estimates" since almost all the Italian regions have reliable data based on land use maps derived from photo-interpretation at 10,000 updated between 2002 and 2007.

What is missing for the post-war period is a homogenous picture of the entire country reconstructed on the basis of standard data for the entire territory and backed by measurements with a sufficiently high level of accuracy that makes it possible to compare land transformation between the various regions on a level playing field.

The aim of this paper is to provide a contribution to this regard, by focusing on a significant area of the country in terms of features and problems, and is broken down as follows: the specific features of the Adriatic coast – an area subject to strong transformation pressure for many decades – are highlighted in the description of the study area; the section on methodology describes the origin of the data and the data extraction techniques used; the results section illustrates the settlement conditions in the study area in the 1950s and then sets out in detail the changes that have occurred from the post-war period to the post-2000 years, describing the various aspects differentiating the territories studied; the conclusions set out the current conditions, environmental criticalities and margins for the recovery of extremely compromised territorial conditions that even today receive scarce attention from local and central institutions.

Fig. 1. Satellite night vision of the Mediterranean basin highlighting the intense urbanization of the Italian Adriatic coast.
source: Google Earth, 2012.

Study area

The Italian Adriatic coast is an extremely significant sample territory to analyze the phenomenon of urban land conversion in Europe. As a matter of fact, together with the southern coast of France, the south-west coast of Spain and the south-west coast of the Balkans up to Greece, its morphology and climatic conditions are very appealing to settlements in the Mediterranean area (Vallega, 1995; Cori, 1999; Bellot et al., 2007). However, as evidenced by satellite night vision, the Italian eastern coast is undoubtedly the most densely urbanized one in the entire Mediterranean basin (Fig. 1).

This paper refers to data and assessments relating to two geographical units (Fig. 2): the first is formed by a selection of coastal municipalities of the Adriatic sea (CM), while the second is formed by a 500 m wide coastal belt (CB). Along the Adriatic coastline this belt coincides on average with the coastal plain and includes all those areas tied to the sea economy, crossed historically by national infrastructure and then affected by the massive phenomenon of mass tourism.

The coastline studied extends for about 1472 km and accounts for 6% of the overall length of coasts around the Mediterranean sea and 17% of the Italian section. The Adriatic coastal regions are 8 out of the total 20 with 121 municipalities. These municipalities, which form the CM, are numerically only 2% less than the total Italian municipalities and cover only 3.2% of the entire national territory with 9589 km^2. However, the CM includes almost 6% of the entire Italian population censused in 2011 (over 3,476,800 residing inhabitants) and concentrates as far as 20% of the approximately 17,634,000 inhabitants residing in coastal regions (*Source*: ISTAT data, http://demo.istat.it/).

The regions included in this study are Friuli Venezia Giulia, Veneto, Emilia Romagna, Marche, the Abruzzi, Molise and Puglia.