



Zero Net Land Degradation in Italy: The role of socioeconomic and agro-forest factors



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ABSTRACT

In 2012, the United Nations Convention to Combat Desertification has launched a policy strategy called 'Zero Net Land Degradation' (ZNLN), which aims to prevent the degradation of productive land and restore already degraded land. In Europe, and especially in Mediterranean Europe, land degradation is a complex phenomenon affecting both depopulated, marginal agro-forest regions and affluent agricultural areas. In an effort to develop a ZNLN strategy in Italy we identified the socioeconomic variables associated with environmental conditions leading to a long-term (1960–2010) reduction in land sensitivity to degradation. Our results show an increase in ZNLN areas in the last ten years. Rural municipalities classified at ZNLN showed an economy based on services, an agriculture sector oriented towards quality productions and more sustainable cultivation practices, a balanced population structure and the prevalence of a mixed farmland/woodland land-use structure. These results may inform a country-scale ZNLN strategy targeting complex human–natural degradation processes in ecologically-fragile Mediterranean areas.

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1. Introduction

Land degradation (LD) is one of the most relevant environmental problems on a global scale. LD occurs in large areas of the world where soils exhibit a loss in biological and economic productivity. As clearly stated by United Nations Convention to Combat Desertification (UNCCD, 2012), LD resulted from various factors, including climatic variations and human activities. It has been estimated that around 20% of global land area is presumably already degraded (Imeson, 2012), exhibiting a persistent decline in land productivity as well as in the provision of other ecosystem services (food, water, climate security, biodiversity, recreational and cultural values). On a global scale, the surface of affected and vulnerable land was found increasing in the last decades (Geist and Lambin, 2004; Gisladdottir and Stocking, 2005; Romm, 2011).

Empirical evidence indicates that unsustainable land management is one of the key drivers of land degradation (e.g. Briassoulis, 2011). For example, agriculture was regarded either as an

aggravating factor resulting in land over-exploitation or a mitigating one e.g. in areas characterized by high erosion risk (Cawley, 1994; Caraveli, 2000; Wilson, 2008). On the one hand, the intensification of agriculture usually determines an increase in crop surface and greater technical skills that could be a factor of LD (Rubio and Bochet, 1998; Hubacek and van der Bergh, 2006; Wang et al., 2006). On the other hand, the abandonment of marginal and mountainous lands may seriously alter soils – possibly because of the increased erosion risk – and the structure of resident population (Iosifides and Politidis, 2005; Danfeng et al., 2006; Corbelle-Rico et al., 2012). Managing land resources in a sustainable manner is a prerequisite to effective mitigation policies against LD (Montanarella and Vargas, 2012). Sustainable land management requires the adoption of legal frameworks enforcing the implementation of good practices for land protection by landowners and major stakeholders (Bowyer et al., 2009).

Policies may induce land users to take decisions that either protect the land against desertification or expose it to stronger degradation forces (Imeson, 2012). Sector policies have often increased desertification problems. Agricultural policies and subsidies focussing on single crops or products stimulate conversion of traditional, sustainable multi-functional land-use systems into intensive ones, such as mono-cultural systems that are not adjusted

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to the local environmental conditions (Juntti and Wilson, 2004). For example, in marginal lands European Union subsidies have been found to stimulate agriculture with low profits and negative impacts on land quality (Onate and Peco, 2005).

Given the increasing pressure on land from agriculture, forestry, pasture, energy production and urbanization, urgent action is needed to halt LD. The need for quantitative policy targets was recently discussed in the framework of the UNCCD. A new goal of sustainable development agreed at Rio+20 is the reduction of LD rate to achieve LD-neutrality, which is being referred to as 'Zero Net Land Degradation' (ZNLN). ZNLN can be achieved when, over a given period of time, non-degraded land remains healthy and already degraded land is restored, thus reducing to zero the net rate of loss in productive land. The proposed goal is underlined by the following targets: (i) zero net LD by 2030, (ii) zero net forest degradation by 2030 and (iii) drought preparedness policies implemented in all drought-prone countries by 2020 (UNCCD, 2012). Sustainable land management, arresting further degradation and restoring/rehabilitating degraded land, avoiding degradation of non-degraded lands, improving community-based and traditional approaches and, finally, implementing a payment system for ecosystem services were considered as reliable pathways for achieving ZNLN (Imeson, 2012).

Southern Europe offers intriguing case studies to explore the relationship between the socioeconomic context and long-term (or medium-term) changes in land sensitivity to degradation with the final objective to inform effective ZNLN strategies at various spatial scales. Mediterranean rural areas show a wide diversity in agricultural systems, socioeconomic characteristics, land-uses and land tenure regimes, ranging from affluent areas with high value-added agriculture and a mixed industrial/service economy to semi-arid disadvantaged areas with a low-income, agriculture-oriented socioeconomic structure (Salvati and Bajocco, 2011). In this region, LD has been considered a typical phenomenon associated with rural landscapes (Basso et al., 2000). Both disadvantaged, marginal agro-forest regions in mountain areas and high-value added agricultural areas in lowlands are affected by LD processes (García Latorre et al., 2001; Helldén and Tottrup, 2008; Mancino et al., 2013). Southern Europe can be thus a candidate for the application of effective ZNLN policies due to the complex relationship between socioeconomic and environmental factors shaped by the millenary human–nature interactions (Salvati et al., 2013a).

In Italy, Salvati et al. (2013b,c) showed that land sensitivity to degradation increased over the last fifty years with the largest growth concentrating on areas with specific socioeconomic characteristics. Salvati and Bajocco (2011) identified per-capita income, agricultural intensification and topography as crucial variables determining the level of land sensitivity at the regional scale. Salvati et al. (2011) suggest that a number of social and economic factors (among which the structure of the economic system, human capital, population dynamics, territorial characteristics and agricultural practices are supposed to be the most relevant) influence the level of land sensitivity in a non-linear way. Salvati and Carlucci (2011) identified local districts with high-quality, traditional productions (e.g. vine, olive, fruit crops and rain-fed cereals) and with specific demographic, social and economic features (intermediate population density, balanced demographic structure, moderate-to-low internal migration, diversification of the economic structure) as areas with the highest long-term reduction in the level of sensitivity to LD.

Based on these premises, the present study is aimed at assessing the socioeconomic characteristics of local communities that are associated with environmental conditions possibly leading to a medium- or a long-term reduction in the level of land sensitivity to degradation. In an effort to implement a ZNLN strategy in Italy, the

study introduces an original approach to identify ZNLN areas and to profile them based on a large indicators' set. We adapted a consolidated assessment procedure (the Environmentally Sensitive Area scheme: see Salvati et al., 2013a) to the diachronic (1960–2010) monitoring of land sensitivity to degradation (Salvati and Bajocco, 2011) with the aim to identifying ZNLN municipalities according to an original, objective criterion. The territorial profile of ZNLN municipalities in Italy was determined through the multivariate analysis of more than 120 socioeconomic indicators. An *in-depth* knowledge of the economic, demographic, social and institutional characteristics of sensitive and ZNLN areas may inform integrated policy strategies on a country scale targeting complex human–natural degradation processes in ecologically-fragile Mediterranean areas.

2. Methodology

2.1. Study area

The investigated area covers the Italian territory extending for nearly 302,070 km² (23.2% lowlands, 41.6% hills and 35.2% mountainous areas). Italy shows significant disparities in climate, soil, vegetation, population structure, settlements and income distribution between northern and southern regions which possibly influence the size of land sensitivity to degradation (Salvati and Bajocco, 2011). In the present study local municipalities were chosen as the elementary spatial unit of analysis. Municipalities are a relevant spatial unit for environmental reporting of land sensitivity to degradation and to inform sustainable management of rural land (Abu Hammad and Tumeizi, 2012; Briassoulis, 2011; Salvati and Carlucci, 2011). Municipality data provide a reliable description of the local socioeconomic context in countries with considerable territorial disparities, such as Italy. Fig. 1 reports a flow-chart illustrating the main steps of the present study.

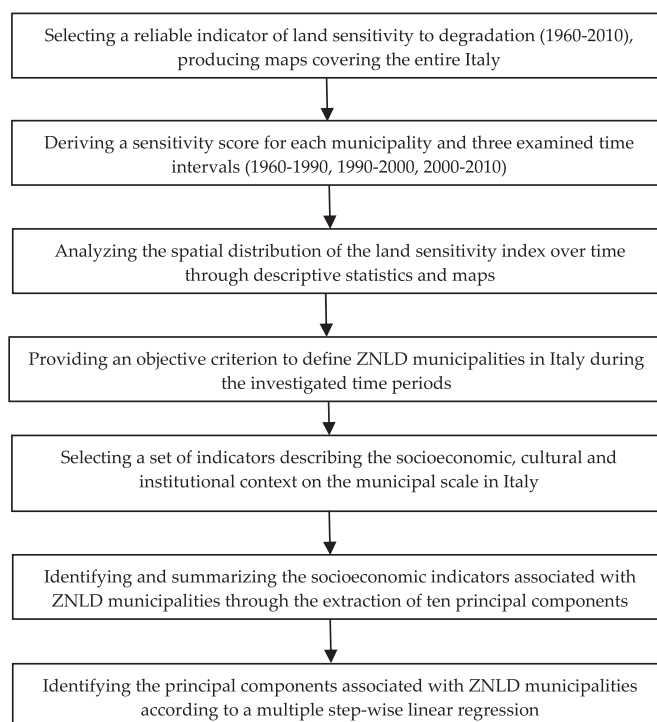


Fig. 1. Flow-chart describing the main steps of this study.

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