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Socio-economic Factors and Land Degradation: Mediterranean Perspectives

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Abstract: Land degradation is a complex phenomenon determining natural resources deterioration that claims for multi-dimensional and multi-scale policies targeting the sustainability of socio-economic development. Mediterranean-type ecosystems are identified as hotspots for land degradation due to the dynamic interplay between climatic change and increasing human pressure on land. However, while the role of population growth, wealth, and policies is still ambiguous, socio-economic disparities are considered an important factor shaping the vulnerability to degradation of Mediterranean land. Territorial disparities determined gaps in the availability of natural capital, increasing rural poverty, and unsustainable management of soil and water especially under climate change scenarios. Understanding the intimate, two-sided relationships between territorial disparities and land degradation is therefore a deserving issue that may inform policies with the final aim to reduce desertification vulnerability and improve socio-economic conditions of local communities.

Key words: Desertification, local economy, social disparities, Sustainable development, Mediterranean Europe.

Although the term 'desertification' dates back to the early 1950s, the problem has jumped in the limelight a few decades before, around the 1930s, when most of the Great Plains in the United States of America turned into a "dust bowl". The causes were identified in a severe and persistent drought and in the type of intensive agriculture that was practiced there. During that time, hundreds of thousands people were forced to temporarily abandon their land and livelihoods. The adoption of appropriate farming methods and a more careful management of water resources has prevented the recurrence of similar disasters in the region. However, from the 1970s, the concept of 'desertification' has experienced a constant evolution that has led, through a gradual transition towards the definitions that account the interactions between human activities and environment (Fig. 1), to achieve a focus that embraces all the phenomena of "land degradation in arid, semi-arid and dry sub-humid areas, resulting from various factors, including climatic variations and human activities". This definition, adopted by the United Nations Convention to Combat Drought and Desertification (UNCCD), defines land degradation as a function of climate and human pressure. Hence, degradation is seen not only as the loss of physical and biological capital, but also of the economic viability. Consequently, arid, semi-arid and dry areas have been identified as the most vulnerable areas of the planet that require urgent attention from both science and policy.

Disparities among countries, and among regions within the same country, have been amplified due to impressive changes of socio-economic structures during the last fifty years, shifting from modern industry-oriented to late-modern service-oriented economies. Moreover, the current crisis is re-drawing the geography of developed and developing regions. It shapes the spatial distribution of wealth and poverty discriminating among economically-resilient and weak-societies. Processes of economic convergence observed during the 1980s and 1990s just partially reduced territorial disparities even in developed regions. Southern Europe is an example of social and economic disparities existing among neighbouring regions. Here, after the World War II, population growth, agricultural intensification, and industrial development consolidated the gap between

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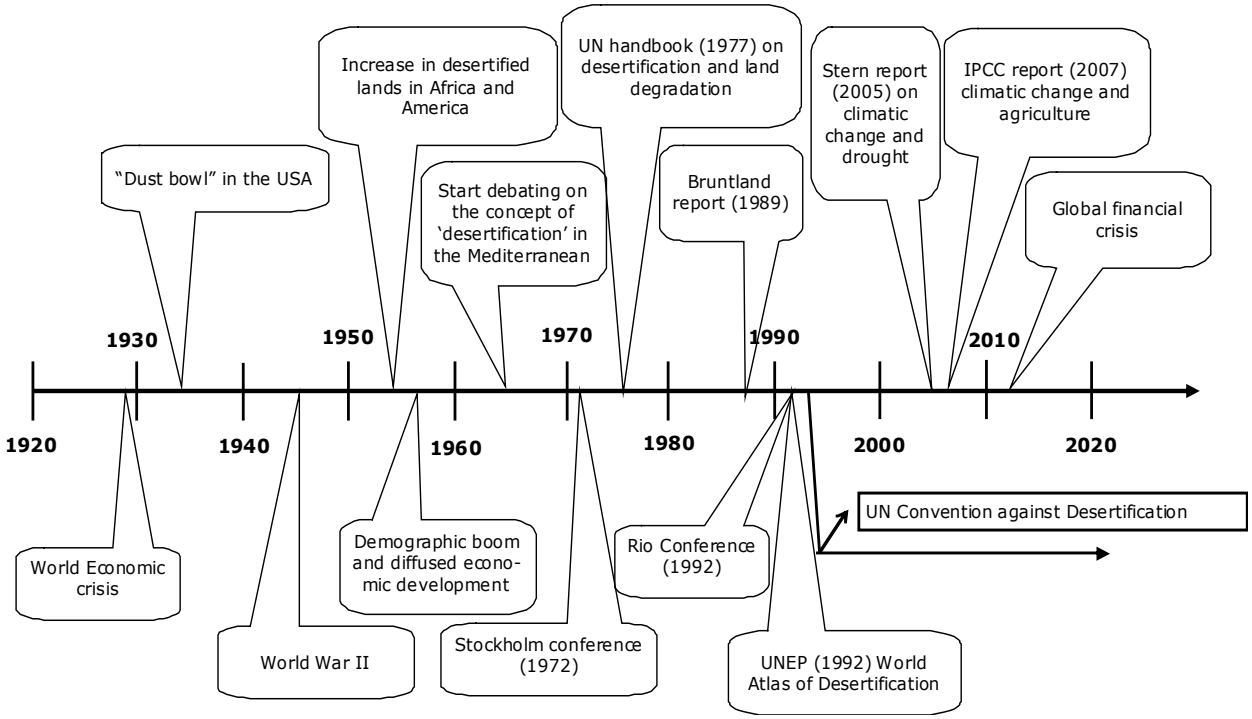

Fig. 1. Selected steps in the evolution of 'desertification' concept.

affluent, economically-dynamic regions, generally placed along the coast, in lowlands or around to the main urban centres and economically-disadvantaged regions, usually located in mountain zones. However, different phenomena, sometimes mirroring, like urban diffusion, land abandonment, and tourism development, persist in the most recent years. The economic geography of Mediterranean Europe therefore changed as far as income distribution and population density is concerned, without altering shape and amplitude of territorial disparities, that continued following the north-south, coast-inland, and elevation gradients, even if with different intensities compared to the past.

These processes caused synergic changes in natural resources distribution by impacting the environmental quality of landscapes and the resilience of ecosystems (Harte, 2007). Together with climate change, these processes amplified the gap between environmentally rich and poor regions. Land degradation (LD) in Mediterranean Europe is therefore a blatant example of interaction of ecologically-fragile environments and traditional landscapes, produced over centuries with evolving economic and social systems. LD may determine an irreversible environmental degradation leading to desertification, i.e. the irreversible loss of capability for a sustainable agricultural, forestry and natural resource (re)production (Thornes, 2004; Ibanez *et al.*, 2008; Salvati, 2012).

Although extensive literature analyses the relationship between LD processes and selected socio-economic drivers in the most threatened countries (e.g. Africa, China, Australia, north/south America), a comprehensive framework is

Table 1. A comprehensive framework to the study of desertification in the Mediterranean: the main research issue

Processes	Themes	Affected landscapes
- Soil erosion	√ Indicators/monitoring techniques	• Natural landscapes
- Forest fires	√ Warning societies about desertification	• Traditional rural landscapes
- Soil salinization	√ Combating desertification through public policies	• Intensive crops
- Land abandonment	at various scales	• Dry agriculture
- Water shortage	√ Regional/national action programmes	• Pastoral landscapes
- Littoralization		
- Climate change		

not yet completely available for Mediterranean Europe, where vulnerability to LD is increasing. One possible interpretative scheme made up by three dimensions (processes, themes, affected landscapes) was provided in the European Project LUCINDA, reported here with some adaptations (Table 1).

The present paper therefore attempts to define degradation phenomena considering their socio-economic dimensions. Emphasis will be given to (i) the institutional, cultural, social, demographic, and economic processes that affect LD at local scale, (ii) the contribution of LD in amplifying the territorial disparities in the Mediterranean Basin, and (iii) the possible responses implemented by societies to mitigate desertification and regional disparities (Briassoulis, 2005). In Mediterranean countries, regional disparities exist especially in rural areas, where per-capita income is significantly lower than the European average, as for example disadvantaged, dry areas in Portugal, Spain, Italy, and Greece. They claim for renewed policy interventions from both the environmental and the economic point of view.

In this scenario, the northern Mediterranean countries represent intriguing case studies given their complex spatial distribution of vulnerable lands to degradation and pronounced economic disparities. This region includes (i) sub-humid, developed and affluent areas with an industrial and service-oriented dynamic economy, (ii) moderately dry areas specialising in various economic activities, including agriculture, and (iii) semi-arid and arid, economically-disadvantaged areas with a (mainly) agriculture-oriented economy (e.g. Briassoulis, 2005). The present review reports examples of proximate causes and consequences of LD in southern Europe, discussing also a possible rethinking of the traditional socio-economic spirals considered as direct determinants of LD. Starting from the provisional results from Salvati (2012), the paper mainly focuses on how regional disparities impact the level and the increase over time of land vulnerability in the Mediterranean region. Finally, the possible socio-economic strategies effective in the mitigation of desertification risk at the regional scale are discussed.

Causes and Consequences of LD in Mediterranean Europe: A Brief Commentary

LD and desertification occur where climate aridity and poor vegetation cover are major constraints (Mouat and Hutchinson, 1996; Mouat *et al.*, 1997; Conacher and Sala, 1998). However, in the Mediterranean-type ecosystems, anthropogenic factors have been recently considered crucial drivers of LD, depending on the natural resource endowments (Wilson and Juntti, 2005). Underdevelopment and rural poverty are decisive in increasing the risk of desertification (Conacher and Sala, 1998; Fernandez, 2002; Iosifides and Politidis, 2005; Rubio and Recatala, 2006; Ibanez *et al.*, 2008). The sensitivity of land to degradation depends on multiplex factors such as soil fertility, crop production, and landscape fragmentation (Kosmas *et al.*, 2003; de Groot, 2006; Montanarella, 2007). For the disadvantaged rural regions of southern Europe, several authors explored the possible relationships among sensitivity of land to degradation, economic marginality, social inequality, and territorial disparities (Iosifides and Politidis, 2005; Wilson and Juntti, 2005; Salvati and Bajocco, 2011). Additionally, LD is considered indicative of agro-pastoral landscapes that are undergoing late economic development. Sometimes this kind of development has been interpreted as a downward spiral fuelled by persistent socio-economic differences between vulnerable areas and competitive regions (Salvati and Zitti, 2007). Table 2 allows summarizing the main 'stilized

Table 2. Selected processes observed after the World War II in southern Europe based on different socioeconomic contexts

Region	1950		->		2010
Developed and affluent	Population growth and industrialization	Agricultural intensification	Tourism development	Polycentric urban development	Suburbanization
Mostly developed with rural specialization	Land abandonment in mountain areas	Important land-use changes observed in peri-urban areas		Increasing population disparities along the urban-rural gradient	
Economically-disadvantaged	Population decline in internal areas	Migration to developed regions	Urban expansion without industrial development	Increasing tourism along coastal areas	Population decline and rural marginalization

facts' observed in the investigated region after the World War II as a consequence of rapid population and economic growth.

Although United Nations Convention to Combat Desertification Annex IV addresses LD in the Mediterranean basin by outlining the significance of socio-economic disparities along different bio-physical gradients and by linking the sensitivity of agro-forest ecosystems to climate change and human pressure (Rubio and Recatala, 2006), few authors describe the relationship between urban expansion and increasing vulnerability of Mediterranean landscapes to deterioration at both regional and local scales (Salvati, 2009). This gap is surprising because urban sprawl, littoralisation, and tourist development often are considered key drivers of LD in developed areas (Conacher, 2000).

On these statements, LD cannot be convincingly explained only as a climate change-dependent process since it was demonstrated that it rarely occurs without irrational human

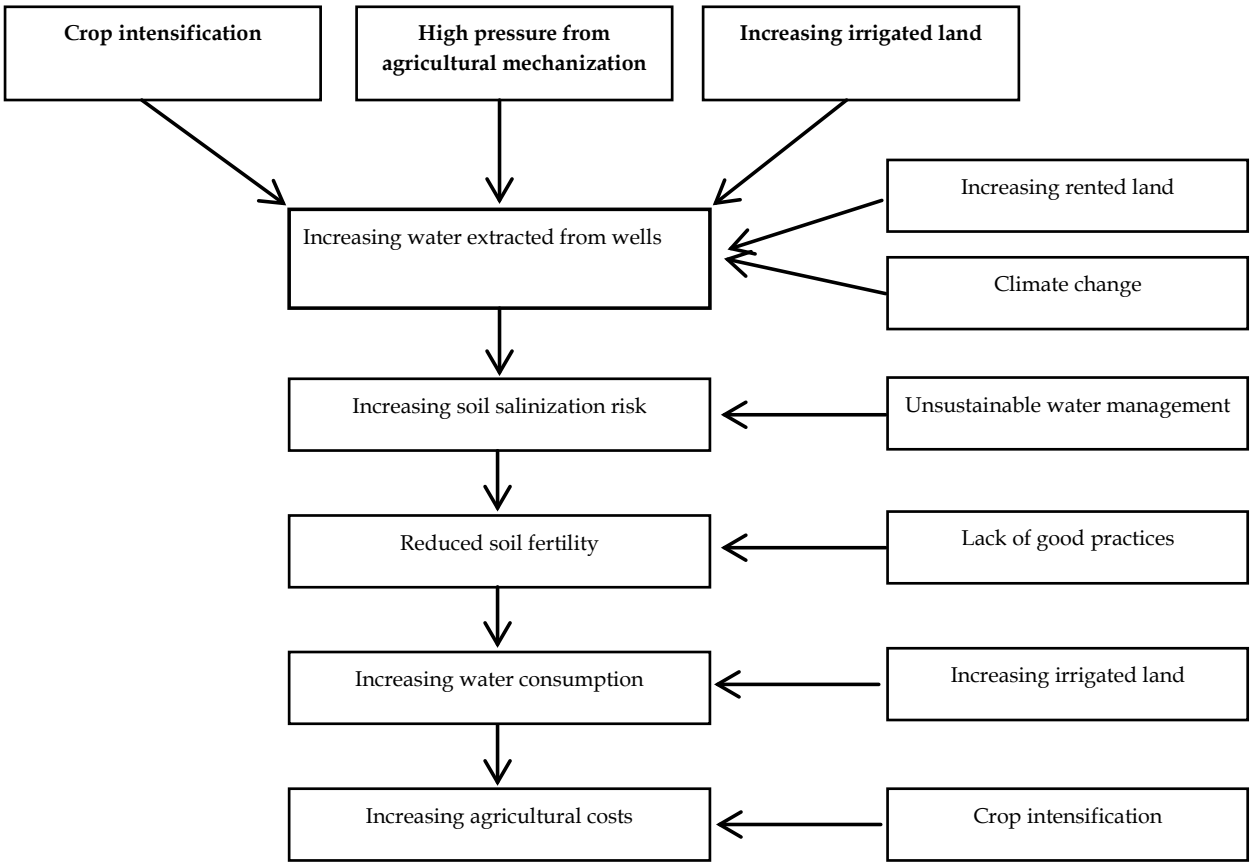

Fig. 2. Example of a spiral characterizing a socio-ecological system in southern Europe.

		Time axis	
		'Fast' variables	'Slow' variables
'Sectoral' axis	Institutional		
	Cultural		
	Social		
	Economic		
	Financial		
	Political		
		'Broad' range factors	'Narrow' range factors
		Space axis	

Fig. 3. A matrix describing the three dimensions of anthropogenic factors affecting LD.

activities in southern Europe (Portnov and Safriel, 2004). Global and regional socio-economic processes are therefore driving environmental degradation in the Mediterranean basin. Relevant are the cases where human interference with nature has produced new socio-ecological systems characterized by natural resource deterioration (Fig. 2). The environmental sustainability of the associated settings should be deeply investigated (Fig. 3): different 'slow' or 'fast' (according to the temporal scale they act) and 'broad' or 'narrow' range factors (according to the spatial scale) accelerate or slow down desertification processes, thus leading to different equilibria of the system (Rubio and Bochet, 1998; Türkeş, 1999; Thornes, 2004).

Given the heterogeneity of cause-effect relationships, few studies evaluated the potential impact of anthropogenic drivers on landscape quality (Seely and Wohl, 2004). Moreover, the conventional wisdom about causes and consequences of LD shows weakness of the supporting evidence. Here, the selection and the discussion of six hypotheses are proposed, although other hypotheses are plausible in defined conditions, which, lead to LD in southern Europe (Briassoulis, 2005).

- *The 'poverty-trap' hypothesis:* Although recent researches have been added to the current knowledge (Abu Hammad and Tumeizi, 2012), little evidence still exists on the link between LD and poverty in southern Europe. As an example, opportunities of off-farm employment have simultaneous effects both on poverty and LD, so any apparent relationship between these variables may actually reflect the off-farm employment-environment connections. The economic growth of Mediterranean countries makes this factor as a possible driver of LD, that should be classified in connection with other processes determining the increase of vulnerability to desertification.
- *The 'population' thesis:* The support of empirical evidence to consider population growth as a direct driver of LD is relatively weak. However, population density can determine indirectly LD, but the multi-face components of this causal chain should be better clarified to allow ad hoc mitigation policies.
- *The 'intensification' thesis:* How improvements in agricultural technology affect LD cannot be determined *a priori*, without information as the type of technology, the output level, and factor market elasticity. On the one hand, intensification programs make farming more profitable and may shift resources to forest clearing and attract new migrants, although this effect may be at least partially outweighed by the resulting downward pressure on agricultural prices and upward push on wages. On the other hand, new technologies for non-frontier agriculture should reduce pressure on the agricultural front. Labor-intensive technological changes are more likely to reduce pressure on land than general yield-augmenting productivity increases and labor-saving technologies.
- *The 'land property' thesis:* Land titles and more secure tenure could be effective on LD in a contradictory manner. For example, where forest clearing gives farmers a claim to the land, increasing the security of such claim may lead to greater forest clearing and possible higher LD. This contradicts the convention that more secure property rights favour environmental quality as farmers are incentivized to have a more sustainable crop production. Therefore the hypothesis is still controversial, and necessitates to be empirically strengthened analysing the driest southern European regions.
- *The 'income' thesis:* The 'inverted-U' relationship (the so called Environmental Kuznets Curve) between indicators of desertification and per capita income in southern Europe was never explored in depth (Salvati, 2012). However, the hypothesis is controversial and often criticised, and still unclear are the driving forces behind the growth-environmental transition. In fact, the question posed is if they have a strictly economic or an exogenous origin. Although the policy implications which stem from the first EKC studies suggest that income growth is sufficient in ensuring environmental protection, correctly managing environmental quality, and mitigating environmental degradation, recent literature highlights criticisms. From these statements empirical investigations on further causes of the LD-income transition in southern Europe are requested. Just partial exploration could follow the assumptions arising from the EKC hypothesis and searching for additional interpretative schemes.

- *The 'disparities' thesis:* Human misuse of land generating territorial divergences seems to be accelerating LD (Salvati and Zitti, 2007). Not clear yet are the measurement about the effects of the human-related spatial dichotomy on LD and the processes linking to social inequality that impact on LD and desertification. Standing to the governance perspective of Lisbon Strategy, challenges in socio-economic dimensions leading to regional disparities should be monitored exhaustively by an holistic approach. This should be managed by a common European-wide governance response that integrates social, environmental and developmental frameworks.

In-depth research on the previous mentioned issues and on others, apparently demised by the recent literature, including technological change, impact of credit markets on LD, and mitigation of social conflicts for environmental resources at the local scale appears, therefore needed at this stage, especially due to the financial crisis greatly impacting the southern European countries in the last few years.

Interpreting the Complexity in the Socio-economic Drivers of LD

A plethora of socio-economic factors underlies LD processes and establishes significant links between them. Macro-economic variables influence the environmental decisions through non-linear paths and are often implicated in complex relations with both micro-economic factors and exogenous variables (Galeotti, 2007). This paragraph describes some of the possible factors underlying LD including, among others, economic and population growth, other anthropogenic pressures on land, technological change, and agricultural policy. Concerning actors' decisions, focus is on their own characteristics and on some possible decision variables (e.g. prices, technology, institutions, services, and infrastructure). These factors determine the set of available choices and the incentives for further, different choices. Obviously, actors' characteristics and decision variables are themselves determined by broader forces (Kok *et al.*, 2004).

These factors underlying LD influence actors' decisions through several channels, including institutions, market, dissemination of new technologies and information, and development of infrastructure. Causal relations can be analyzed only one-way, but relevant effects can be seen in opposite direction: as an example, the decisions actors will have important feedback effects on market prices, as well as actors' collective actions, political pressures, and demographic behavior.

Scarce is the knowledge on how the actors' characteristics affect their behavior (e.g. Wilson and Juntti, 2005) and nothing significant can be generalised from available information, e.g. about the role of farm size or farmer background (see also Pender *et al.*, 2004 from a non-Mediterranean perspective). As an example, the conventional thesis on poverty-environment relation (i.e. poorer families are more likely to display a higher predisposition to behaviors incrementing LD because they have shorter time horizons) needs empirical confirmation for the Mediterranean region. Determinant for LD in Mediterranean rural areas is the unsustainable production behavior by households or companies for agriculture (Mendelsohn and Dinar, 2003). This chapter explores the possible causes of LD, through southern European case studies about changes in agricultural technology, prices of agricultural products and inputs, property regimes, and changes in the socio-economic context.

The evolution of the primary sector

In Mediterranean Europe, the evolution of the agricultural sector was demonstrated to be relevant in determined an increased vulnerability to LD. For example, technology has a direct effect on farmers' behavior (Wiebe, 2003). As noted below, technological changes that increase yields without significantly altering labor or capital requirements, are expected to impact LD e.g. through crop intensification (Pender, 1998). The severity of LD is likely to be even higher if technological changes are labor- or capital-saving, or both, since this will divert resources for farming additional land for intensive cropping (Abdelgalil and Cohen, 2001). Conversely, if new technology is more labor- or capital-intensive and if farmers find it difficult, expensive, or inconvenient to hire wage or to obtain credit, then such changes can lead farmers to devote more labor and capital to their existing farms, leaving them with fewer resources for expansion. Under these

circumstances the net effect is obviously difficult to assess (Pender *et al.*, 2004), suggesting that agricultural research and policies of land quality preservation and LD mitigation should focus on promoting profitable technologies more easily applicable to land already under cultivation (Coxhead and Jayasuriya, 1994). However, empirical evidence is still limited, and certainly needs future research improvements.

Higher prices for agricultural products may stimulate land over-exploitation exacerbating LD. The more agriculture becomes profitable, the more both the existing population and migrants from neighbouring areas begin to shift resources into intensive crops. Higher prices also afford the availability of capital to put additional land into production (Walpole *et al.*, 1996). However, in economically poor, dry areas of southern Europe such rationale seems to find scarce application (Cacho, 2001). Therefore, the fact that increased agricultural prices should have negative effect on LD is as much a product of their initial assumption that farmers maximise profits, as some evidence said (Pender *et al.*, 2004). How changes in agricultural input prices influence LD may lead to unclear evidence by pointing out two conflicting effects. On the one side, higher fertiliser prices lead to the adoption of more extensive production systems that use more land and less fertiliser, incrementing soil consumption. On the other side, higher costs in association with increased fertilisers make the agriculture generally less gainful with indirect effects on the amount of cropland (Pender, 1998).

If property rights are not well-defined, several factors may lead to LD. Although this is especially true in poor countries of Africa, southern America, and eastern Asia (Blaikie and Brookfield, 1987; Beaumont and Walker, 1996; Chopra and Gulati, 1997; Jayasuriya, 2003; Danfeng *et al.*, 2006), no evidence is available for southern Europe. Theoretically, two mechanisms should be considered. First, even though initial profits may be negative, advancements in technology and infrastructures will make cultivation profitable in the future, and for the farmers it is necessary to act now so that others do not claim the land before they do. Second, often land prices mirror the profitable speculation for the purchaser selling the land in the future, rather than the agricultural potential (Hubacek and van der Bergh, 2006). This is for example applicable in restricted areas located at the urban edges of the Mediterranean cities, sensitive to LD due to climate aridity and degraded soils. These processes certainly have limited importance in many southern European areas where property regimes are well-defined in time and space. However, there is scope to investigate the relationship between land rent and unsustainable land management in dry, lowland areas subjected to erosion-driven or salinization-driven soil deterioration (Lemon *et al.*, 1994; Perez-Sirvent *et al.*, 2003).

Technological inputs have also indirect effects on LD. Technologies increasing aggregate supply and lower prices may reduce pressures on land. In some cases this may even offset the initial effects of technology on LD (Pender *et al.*, 2004). For example, this happens when labor-intensive technologies raise rural wages, consequently increasing land profitability. In fact, the more labor-intensive the technology, the more rigid the labor supply, and the higher prices of agricultural products respond to changes in labor costs, the greater will be the effect. On the same way, similar effects might have capital-intensive technologies if farmers have limited access to capital (Pender, 1998). Example of potential feedback mechanism affecting LD are technologies requiring fundamental infrastructure and benefiting farmers with access to markets. Such technologies are likely to increase water consumption, however they could reduce pressure on neighbouring forests and semi-natural landscapes (Wiebe, 2003). The actual knowledge is therefore not able to conclude definite macro-level statements. Quantitative information at regional level and qualitative analysis at local scale are further needed.

An additional example is crop intensification, a concept that refers, in the economic view, to the input of capital, labor, and skills against constant land. Usually, the intensification of agriculture increases croplands and greater technical skills that cause soil degradation. Intensive farming practices (for instance deep water drainage, large-scale irrigation, heavy pesticide use, multiple cropping) are causing degradation of agricultural and semi-natural habitats across vast areas (Marathianou *et al.*, 2000; Otto *et al.*, 2007; Simeonakis *et al.*, 2007). Moreover, overstocking, over-cultivation, and deforestation have a relevant role for LD in rural

areas (Le Houerou, 1993). These phenomena are themselves moulded by socio-economic elements, such as nature of property rights on land, generally defined as 'environmental entitlements', governing institutions, cultural and family traditions, demographic dynamics (Wilson and Juntti, 2005).

Polarized economic growth and lack of convergence

Income level is expected to influence land resource depletion. On the one hand, economic development activities improve off-farm employment opportunities, consequently reducing the demand for agricultural land, having potential impacts on contrasting crop intensification. However, in disadvantaged, inland areas this process could lead to feedback mechanisms linked to rural depopulation and possible human induced desertification (Dimara and Skuras, 1996). Reverse effects derive from stimulating demand for agricultural products, thus enhancing the occupation of (and conversion for) cultivated and intensive use. The cumulative effects of these processes are under-explored. On the other hand, economic growth incentivizes multi-level environmental policies. In fact, it is recognized that high-income countries may demand protection of land resources rather than depletion. Recent studies on the Environmental Kuznets Curve (EKC) address the relationship among environmental degradation and economic growth. These analyses suggest the 'stylised fact' that an 'inverted-U' relationship exists between indicators of environmental quality and level of per capita income (Dinda, 2004; Stern, 2004).

However, this hypothesis is controversial and some criticisms have been pointed out (Galeotti, 2007). First, EKC showed its validity only for some pollutants with local and direct costs and less (or not) for pollutants with dispersed, long-term costs. Second, few are the theoretical bases of the hypotheses about EKC relationship for natural resources depletion, and no studies specifically address this relationship for LD to our knowledge. This is likely because of the difficulties: (i) in measuring land vulnerability as caused by processes (e.g. bio-physical, socio-economic) acting alone or together, (ii) in deriving a theoretical relationship between income and LD, and (iii) in selecting adequate temporal and spatial scales to assess such relationship. Moreover, the forces determining the growth-environment transition are still unclear: they could be strictly economic (e.g. the attraction of off-farm employment, a higher value placed on rural landscape by the public and the government, or the expanded state capacity to enforce land protection) or exogenous drivers. Based on these assumptions, further causes of this transition should be investigated.

Linked to the EKC hypothesis is the concept of economic convergence which applies when the growth rate of an economy is positively related to the distance between the economy's level of income and its own steady-state (Barro and Sala-i-Martin, 2004). Studies on regional convergence in economic, social, and cultural variables are therefore useful when providing basic information to drive developmental policies over complex growth dynamics. Unfortunately, convergence in environmental quality over time has been less frequently assessed than convergence in socio-economic variables (Jorgens, 2005). Salvati and Zitti (2008) applied a standard 'convergence' analysis to the level of land sensitivity to degradation and found a complex pattern of convergence in Italy, showing diverged levels of sensitivity over time in northern and central Italy and the opposite pattern in southern Italy.

This study suggests the need to investigate: (i) the convergence/divergence processes as revealed by composite indexes of desertification risk, (ii) the possible influence of the observation scale on convergence estimates, and (iii) the policy implications of the process of regional convergence at the examined scales. Furthermore, it indicates the relevance of differentiating LD policies in two paradigmatic southern European scenarios: (i) high vulnerable, LD-converging dry areas with disadvantaged economic conditions, and (ii) moderately vulnerable, LD-diverging areas in affluent regions. These regions require different actions and a fine tuning of policy strategies according to their socio-economic characteristics and possible responses to environmental degradation. Furthermore, they need long term *in-depth* field observation and improvement of high-resolution, policy-relevant indicators, to guarantee the effectiveness of mitigation policies compatible with the aim to reduce regional disparities.

Population increase

Human pressure is a leading factor of environmental degradation and is enormously intensified during the last fifty years (Harte, 2007). Population growth and necessities of land for the agricultural production increase LD (Blaikie and Brookfield, 1987): this rationale is typically applicable in poor countries and, with a some caution, in disadvantaged, dry areas from southern Europe. Growing populations affect labor markets, as an abundant supply of labor pushes down wage rates, but induces technological progress and institutional changes, as mentioned about EKC hypothesis. This strengthens the reduction of the environmental pressure on agricultural lands and forests. Although empirical evidence shows a positive correlation between population density (or population growth) and LD (Salvati and Zitti, 2007), these findings appear sometimes weaker and needs extensive corroboration.

A current hypothesis concerning the relationship between LD and demography claims that in dry regions affected by LD population movements could lead to de-linking economic carrying capacity and population density. The carrying capacity of a region is the ability of the economic system to sustain a given population considering the resources required to maintain their standards of life for a long time (Knerr, 1998; Goria, 2000). Hence, this carrying capacity is determined by available physical capital, human resources, exploited technologies, institutional arrangements, possibilities to exchange goods and services (Goria, 2000). The growth of population density is correlated to the increase of the carrying capacity too (Cuffaro, 2001). Otherwise, people might react by emigration, contributing to instability and to potential risks for natural environment, local communities and human settlements (Chopra and Gulati, 1997). This implies that the latter factors, rather than population growth *per se*, are possible causes of LD.

To summarise, high absolute population numbers or population increase does not necessarily lead to LD. More important is the combination of (i) the sensitivity and fragility of land, (ii) the rate of population increase, and (iii) further relevant factors such as land-use and settlements patterns, social and economic conditions, organisation of production, cultivation practices (Genske, 2003). Thus, no simple and clear causal connection seems to exist between population growth and LD or a stable and static "carrying capacity" as the threshold beyond which conditions could worsen (Salvati and Zitti, 2007). However, this potential absence of a direct relationship between population pressure and LD must not lead to the negation of this factor as underlying environmental degradation. In fact, population pressure may catalyze the intensification and aggravation of LD, in combination with other bio-physical and socio-economic factors (Cuffaro, 2001).

Together with population increase, tourism growth affects the level of LD if coupled with other socio-economic factors. For example, tourism pressure in coastal areas exerts a significant impact on land-use patterns. Additionally, unplanned tourism expansion results in the shortage of basic services such as water supply (Venezian Scarascia *et al.*, 2006). In general, summer tourism concentrating on coastal areas puts indirectly pressure on ecologically fragile, dry zones. In the long term, this causal chain may subtract fertile land to the agriculture. However, literature reports contrasting views about the environmental nexus between tourism development and LD (Makhzoumi, 1997; Loumou *et al.*, 2000; Iosifides and Politidis, 2005; Onate and Peco, 2005). Conversely, positive, multi-temporal and spatial environmental effects of tourism could be considered. Tourism development may enhance higher environmental protection through policy-induced responses (Briassoulis, 2004). Moreover, the increasing hedonic value of natural heritage was observed in districts attracting tourists (e.g. Makhzoumi, 1997; Loumou *et al.*, 2000), with positive impacts on the local economy. Further efforts are needed to clarify the causal chain in which tourism could intervene. A meaningful strategy to comprehend this complex matter is to provide for case studies quantitative analyses together with qualitative enquiries (Wilson and Juntti, 2005).

The impact of policies

Land-use change is a crucial mechanism through which policies influence LD. Policies induce land users to make decisions that either protect the land against desertification or expose it to stronger degradation forces. Often sector

policies and subsidies contribute to increase desertification threats. Agricultural policies and single-crop subsidies incentivize to convert the sustainable, traditional multi-functional land-use systems into intensive mono-cultural systems that are not appropriate to the local natural and socio-cultural Mediterranean environment (Juntti and Wilson, 2004). In marginal lands, subsidies stimulated agriculture with low profits and negative environmental impacts. Due to low profitability, when the subsidies stop the areas are abandoned, and consequently the lack of maintenance causes soil erosion. Medaction project demonstrates that, through a comprehensive function-analysis approach, the conversion of traditional land-use systems into intensive agricultural fields presents more costs than benefits (Gagliardo, 2004). The average market-profits of intensive agriculture are higher than the traditional cultivation of crops. Notwithstanding, the costs of the externalities such as erosion, salinization, water shortage, and reduced landscape values by far outweigh these benefits.

The Role of Regional Disparities in LD Processes

As previously observed, the different roles of socio-economic factors leading to LD may be exerted at different spatial scales but, at the same time, LD carries out relevant socio-economic implications. As an example, in the last fifty years, people were forced to abandon the unproductive lands for better income opportunities in urban, coastal areas of southern Europe. Interestingly, this example suggests how different actor's behaviors represent, at the same time, a source of LD and would be affected by LD itself, possibly determining a downward spiral, which is difficult to mitigate without appropriate and specific policies (Scherr, 2000). Finally, LD may as well generate political and institutional conflicts due to the decline of available resources and poorly defined environmental entitlements (Briassoulis, 2005; Raleigh and Urdal, 2007). Additionally, other implications of LD stem from adaptive strategies and responses for mitigation (Wilson and Juntti, 2005). This chapter analyses the possible socio-economic consequences of LD, as for instance losses in cultivated lands, depopulation, migration, poverty, territorial disparities, economic polarisation, social inequality.

Depopulation and land abandonment

In agricultural regions, the living standards of the population are partly determined by natural resources. Agriculture can either be an aggravating factor resulting in land improvement or a mitigating factor, for example in areas characterized by high erosion risk (Kosmas *et al.*, 2000; Atis, 2006; Hein, 2007). Farmers are among the principal victims of LD as the natural resources such as soil and crops are the most severely affected by potential desertification (Chopra and Gulati, 1997; Pender, 1998). One of the consequences of LD is the abandonment of marginal agricultural lands (Rey Benayas *et al.*, 2007) coupled with an unbalanced demographic dynamics between inland and coastal regions (Salvati and Zitti, 2007). The trajectories towards recovery or desertification of an abandoned cropland depend on the conditions of the land when abandonment takes place and on what follows to this (Puigdefabregas and Mendizabal, 1998). In southern Europe, industrialisation processes trough the increase of cultivation cost, decrease in of profits, and changes in trade regulations among countries (Le Houerou, 1993) led to land abandonment since the 1950s (Arnaez *et al.*, 2011), that continues at present also, although at a reduced pace. As a consequence of the densification of coastal and lowland zones, unemployment may rise in more populated areas, especially acting on weaker social actors, such as women and young people, indirectly contributing to social problems of local and regional impact, e.g. young deviance. Local labor markets, especially those traditionally linked to the primary sector, are potentially sensitive to changes in crop production due to LD, but even employment in the tourism sector may be negatively affected by aridity, water scarcity, and environmental degradation (Chopra and Gulati, 1997; Barbier, 2000; Gagliardo, 2004; Kok *et al.*, 2004; Harte, 2007).

The investments' decline in agriculture

Low productivity of resources in dry zones, coupled with fluctuating yields caused by scarce precipitation and droughts, tends to discourage investments and to provide for scientific inputs to conserve and increase land productivity (Le Houerou, 1993; Barbier, 2000). On one side, prioritizing the allocation of development funds in the more productive areas may seem economically justifiable (Pender, 1998; Pender *et*

al., 2004). On the other side, the adoption of such policies often actuates a vicious circle whereby in dry areas lack of an adequate financial and technological investment that thus perpetuates retrogressive management and weak economic performances, due to the breakdown of land resources. This distorts the crop production, making it inefficient. This may fortify disparities within the rural sector itself, for example between "favorable" and "less favorable" areas, locally generating potential disruptive pressures (Gagliardo, 2004).

Poverty in rural areas

Poverty has been analysed both as a causal factor and a consequence of LD (Scherr, 2000). Poverty and impoverishment often coincides with drought, LD, and desertification risk (Barbier, 2000). However, as for population growth, this factor has no clear line of causation with desertification. In the most cases, poverty is a mechanism through which other factors, as institutional mechanisms, governance frameworks, policy measures, markets, lead to environmental degradation (Chopra and Gulati, 1997). Under different conditions of these factors, the poverty-LD link may either be exacerbated or mitigated (Iosifides and Politidis, 2005). In economically-disadvantaged, dry regions of southern Europe, it is supposed that poor (especially rural) are often geographically isolated, vulnerable to natural disasters and socio-economic changes, and powerless due to limited access to public, private or social goods like education, health, information, and social provision (Dimara and Skuras, 1996). These conditions corroborate the association of poverty to socio-economic marginality and fortify its implications for LD.

Migration

Population mobility is a complex phenomenon, directly or indirectly correlated with environmental degradation (Harte, 2007). Migration can have multiplex forms; two of the most important are related to the temporal dimension and the direction of movement (Salvati and Zitti, 2007). In the first case seasonal, semi-permanent, and permanent movements are identified. In the second, migration may be internal (including both rural-rural and rural-urban) or international (Goria, 2000). Although the relationship among the economic carrying capacity, population density, and LD is controversial, it seems clear that in dry lands demographic growth may increase the percentage of people unable to sustain their standard of living (Goria, 2000). Moreover, the consumption of land resources is not just a problem at local scale, but spreads to the national one, potentially also involving the neighbouring countries in a process of spread of poverty (Chopra and Gulati, 1997) and of disparity acceleration that may produce social conflicts, even in disputing for primary resources (Zuindeau, 2007).

Conclusions

As shown, LD and desertification have measurable effects on reducing economic resources in the Mediterranean basin (Tanrivermis, 2003; Atis, 2006; Hein, 2007). Although limited quantitative data are available on the economic loss as a result of LD (Pagiola, 1999), long-term economic and social planning is often hard to set up in environments characterized by fluctuating ecological conditions (Bojo, 1996). LD in southern Europe is largely a society-driven problem that could be managed through an in-depth knowledge of the main ecological, economic, social, cultural, and institutional driving forces associated with land-use and climate change, and of their environmental impacts (Fernandez, 2002). Effectiveness in monitoring could be fortified through an integrated, multi-disciplinary approach that concerns social and natural scientists as well as the stakeholders, as recently demonstrated by various EU-funded projects (Wilson and Juntti, 2005). Furthermore, relevant issues to consider include (i) the development of multi-scale demographic, climate, and land-use scenarios (Millennium Ecosystem Management, 2005), (ii) the inclusion of these projections into quantitative methodologies analysing land vulnerability to degradation over time (Máñez Costa *et al.*, 2011), (iii) the multi-scale analysis of the effects of past policies (Corbelle-Rico *et al.*, 2012), and (iv) the recognition of LD costs and benefits of mitigation measures at the same spatial/temporal scales, through adequate socio-economic models.

Policy analysis has developed increasingly important approaches in any assessment of LD drivers (Blaikie and Brookfield, 1987), particularly in societies where decision-making

is shaped by public policy processes. Policy analysis is crucial in social science research, with special reference to the assessment of the impact of past policies on desertification processes across Mediterranean basin (Briassoulis, 2011). Analysing the possible impacts of policies, three key issues, that present repercussions for grassroots stakeholders affected by LD, have to be considered: (i) formulation of a policy does not necessarily result in a specific impact on the ground; (ii) policies may have explicit and implicit impacts; (iii) recognition is required about the dynamic, non-linear nature of the desertification process by implementing policies which are able to address this complex dynamic (Thornes, 2004; Ibanez *et al.*, 2008). Literature suggests that the formulation of a policy does not necessarily result in a specific impact on the ground. Moreover, also the processes of non-decision-making, non-formulation, and non-implementation of policies have to be considered as tangible policy implementation. As an example, not sufficiently recognized is the so called cost of inaction. As a result, the process of policy implementation should be seen as a fuzzy decision-making spectrum rather than a clear-cut point in time at which a specific decision is being made and put into practice (Briassoulis, 2004).

The participation of stakeholders in the strategic planning against desertification is a crucial point yet highlighted by Briassoulis (2004) and Wilson and Juntti (2005). This is especially true as local changes have greater impact on individual decisions, which in turn could directly or indirectly affect LD (Atis, 2006; Hein, 2007). Lemon *et al.* (1994), Loumou *et al.* (2000), Iosifides and Politidis (2005), and Onate and Peco (2005) describe case studies from Greece and Spain concerning the local context and its effects on individual agent's decisions. Additional studies are required to indicate the best mechanisms to involve stakeholders for problem analysis and solution-finding (Patel *et al.*, 2007; Whitfield and Reed, 2012). One way could be to establish (or to intensify) the dialogue between stakeholders, policy-makers, and the general public (Kok *et al.*, 2004). Participatory processes, field studies, and tools for policy-makers should be the paradigm for the future actions.

It was also demonstrated (i) how policy analysis can be effective in highlighting key dimensions of the poverty-environmental linkages underlying LD, and (ii) how both 'good' and 'bad' policies can affect poor rural household's decisions to conserve or degrade their land (Wilson and Juntti, 2005). Although such topics are clear enough at national and regional scale, local environmental changes are still less known. These may have greater impact on the individual decisions about LD, because people respond to family circumstances and local economic opportunities in the most suitable ways to satisfy the needs of families and households (Zuindeau, 2007). A renewal of the debate on the multi-scale relationships between economic and social factors and LD as well as the possible policies suitable to mitigate drought and desertification effects on the society (Karlsson, 2007), appears urgent for the Mediterranean countries, also in the light of the participation in the European community during one of their most dramatic historical phases.

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