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# Sustainable Mountain Development and the key - issue of Abandonment of Marginal Rural Areas

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**Abstract**
The article aims at providing an interdisciplinary overview of the phenomenon of land abandonment, currently affecting wide European mountain marginal regions and the extent of which is described by considering wood expansion figures. The main environmental, social and economic consequences of land abandonment are taken into account, with particular regard to the impacts on landscape heterogeneity and the resulting bio and eco-diversity depletion. The article is especially addressed to planners: on the one hand the wide-spread disregard they often showed towards marginal mountain territories is seen as one of the main causes at the origin of the current state, while on the other hand their pivotal role in determining the future evolution of mountain territories is highlighted. inquire

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## 1 – Introduction

One of the main threats – maybe even the most crucial one – that mountain territories are nowadays facing is the process of abandonment of agricultural lands and traditional farming practices, a phenomenon reflecting a post war trend of rural depopulation and marginalisation of wide agricultural regions, especially affecting mountain areas. Marginalisation is a *process*, in

the sense that it affects areas, which did not use to be marginal in the past. Marginalisation actually means "becoming marginal", rather than "being marginal". Far from representing just a linguistic detail, such issue is of fundamental importance when analysing the phenomenon of land abandonment and its economic and environmental consequences. Neglect of previously cultivated or otherwise managed land implies, generally speaking, great consequences in terms of loss of stability and ecosystems' resilience, given that a system whose equilibrium has been artificially altered needs continuous flows of energetic inputs in order to be maintained as such. Since these inputs are no longer provided in case of abandonment[1], this might lead to a period characterized by instability and uncertainty of indeterminate length[2].

Therefore, economic marginality should not imply other forms of marginalisation, such as the low level of interest commonly aroused by mountain problems and the consequent scarce political attention towards these territories. One of the reasons for such a neglect might be the lack of stakeholders being interested in raising such issues: more and more mountain inhabitants leave their birth territories, while environmental associations rarely focus on these topics. On the contrary, mountain issues do matter: even in ancient times it was well known that what happens in uplands soon affects what is downstream[3]. As stated by Agenda 21, Chapter 13, mountains still provide a number of essential resources and services (UNCED, 1992): e.g. watershed resources, soil protection, biodiversity maintenance, wood growth, open space for recreational activities, carbon sequestration, natural hazards prevention and sediments' balance along the coasts. Mountains cover about one-fifth of the world's land surface, providing a direct life-support base for about one-tenth of humankind as well as goods and services to

### *Mountains: an International Statements' review*

"*Mountains are an important source of water, energy and biological diversity. Furthermore, they are a source of key resources as minerals, forest and agricultural products and of recreation. As a major ecosystem representing the complex and interrelated ecology of our planet, mountain environments are essential to the survival of the global ecosystem […] Hence, the proper management of mountain resources and socio-economic development of the people deserves immediate action*"
**Agenda 21, Chapter 13, "Managing fragile ecosystems – Sustainable Mountain Development". United Nations Conference on Environment and Development, 1992**

"*The mountain regions of Europe are a heritage belonging to our continent, which cannot be discarded without harm to our society. These lands are rich, but fragile. Any access, over-development or abandonment of human activities can upset the equilibrium of this natural environment*"
**Final Declaration of the Krakow Conference : « Montagnes d'Europe, nouvelles coopérations pour un développement durable ». Euromontana - Krakow, 4-6 September 1995**

*"The fragility of mountain ecosystems means that the impacts of unsustainable development are more rapid, heavier and more difficult to correct than in other areas of the world; thus sustainable approaches to development deserve particular attention in mountain areas".*
**International Year of the Mountain Concept Paper. FAO, 2000**

*"Mountain ecosystems support particular livelihoods and include significant watershed resources, biological diversity and unique flora and fauna*"
**Johannesburg Plan of Implementation, Section IV, Paragraph 42. World Summit on Sustainable Development, 2002**

[1] On this purpose, it is important to distinguish between situations of spontaneous abandonment and planned withdrawal from agriculture, such as the set - aside scheme, where land cultivation is temporarily and/or intentionally suspended.

[2] To give an example, with regard to traditional Spanish land use systems it has been observed that "*their abandonment or their conversion to more intensive land use forms usually produce negative effects, because these systems represent very old biological adjustments and equilibria that include complex foodwebs, migration patterns, symbionts, etc. representing delicate balances*". As a consequence, "*loss of pastoral value, soil erosion, fire risk, decrease in biodiversity and threatened vulnerable species*" resulted (Gonzalez Bernaldez, 1991).

[3] "*El dito desboscar è causa manifestissima del far atterrar questa nostra laguna, non avendo le pioge et altre inundation alcun retegno né obstaculo, come haveano de essi boschi, a confluire in esse lagune...*": such amazing, simple truth was affirmed in a regulation promulgated by the Serenissima Republic in 1476.

more than half the world's population. As far as the European Union is concerned, mountain regions cover 30% of EU-25 territory, while in six member countries, including Italy, mountain areas cover even more than 50% of the territory. Moreover, in 2002 about 20% of the utilised agricultural area was defined as mountain area and 27% of the farms were situated in mountain territories (Price *et al.*, 1998; Dax, 2002).
Nowadays there is increasing recognition of the importance of mountain areas (see also box on the previous page) in terms of biodiversity conservation, as well as for their economic potential, cultural significance and protection of downstream interests and where these resources are threatened, the issue needs to be addressed (UNCSD, 1997). Since neglect and land abandonment create environmental, economic and social impacts affecting the whole society, not just mountain communities, mountain problems need to be raised and faced more effectively, while the disregard so far shown by land planners towards mountain territories strongly affected their development, which in some cases took the forms of underdevelopment, no-development or even regression.

As a consequence of land abandonment mountain regions have been experiencing a radical change of traditional landscape, as once cultivated areas are turning to forests through the process of natural succession. According to a widespread, well-rooted belief, the strong increase in woodlands' surface occurring in most of the industrialized countries represents a positive process, contributing to counteract deforestation trends in other parts of the globe and the loss of large tropical forests' extensions, mainly taking place in developing countries. On the contrary, the uncontrolled development of new forest areas might represent a problem by itself, often implying loss of cultural landscapes and habitat variety, bio and eco-diversity depletion, territorial homogenisation, rewilding[4] of previously cultivated land and, finally, waste of economic and natural resources. Moreover, as already mentioned wood extension is often just the most evident effect of an otherwise less apparent and somehow silent marginalisation, depopulation and ageing trend affecting most of mountain and high-hilly regions in industrialised countries throughout the world, finally leading to the collapse of traditional, land-rooted civil societies.

Although land abandonment and afforestation processes do occur in most of European countries, the magnitude they reach is apparently maximum, both in absolute and relative terms, in Italy, where forest areas have been strongly increased during the past 60 years (Piussi and Pettenella, 2000). One of the reasons for that is the large extension of mountain regions, which cover more than half of the national territory, together with the great variety of mountain landscapes and contexts. For several centuries hilly and mountain culture predominated on the coastal civilisation, which just recently experienced a strong development and it is definitively prevailing in current times. For all these reasons, Italy represents a meaningful case study, both for its passed history and for the land use changes currently taking place at national scale.

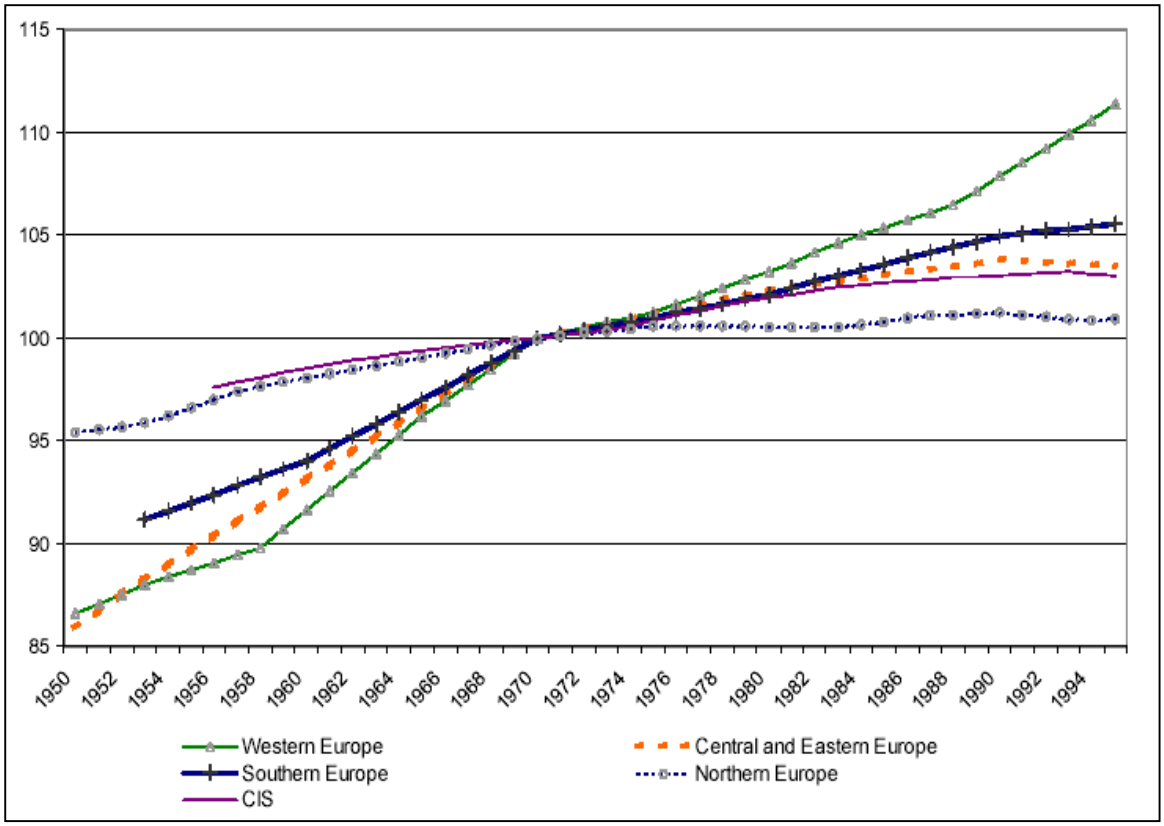
As a whole, international community has for a long time largely underestimated the environmental impact of land abandonment in marginal rural areas, thus just recently recognised in policy development. Yet, while sectoral studies have been successfully undertaken concerning specific aspects of agricultural decline and land abandonment, a broad and interdisciplinary overview has yet to come. Moreover, while in recent times such issues gained considerable importance in several scientific disciplines like forestry, geology, biology, hydrogeology, social science and even architecture, land planners are still largely unaware of the matter, which in some cases it is not even recognised as a problem to be faced. Main aim of

[4] By "rewilding" is meant a process in which a formerly cultivated landscape develops without human control (Höchtl *et al.,* 2004)

the article is actually to provide an interdisciplinary, wide-spectrum overview of the issue of land abandonment affecting mountain marginal lands. The paper is especially addressed to planners, due to their pivotal role in determining the future evolution of mountain territories. The adopted approach is typically focusing on the three components of sustainable development: environmental, economic and social aspects will be considered.

**2 – Spontaneous afforestation as land abandonment indicator: focus on Europe and Italy**

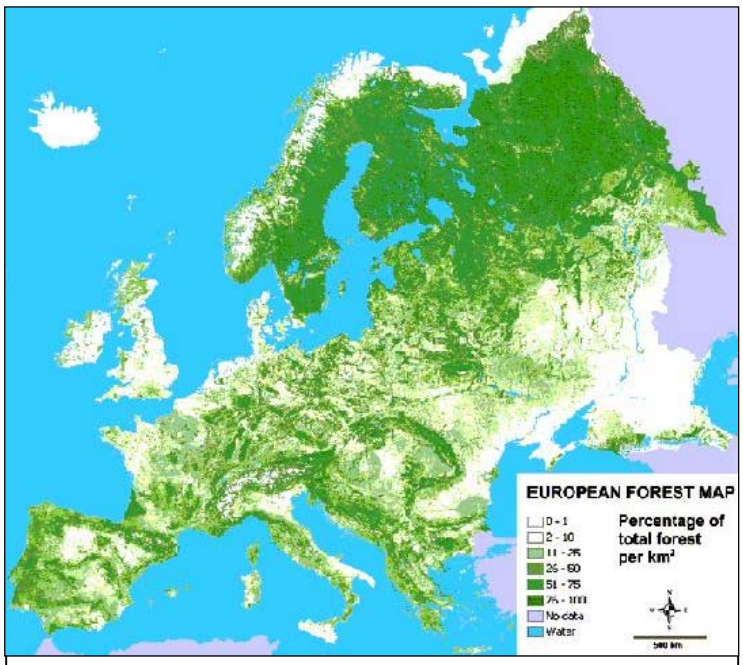
Two opposite, yet specular, processes may be determined by marginalisation: productive intensification on the one hand and depletion of agricultural activities on the other hand. Under certain circumstances, intensification of production represents the most profitable solution, especially where financial incentives are available in the form of production–oriented subsidies. Where greater agricultural productivity is not possible or does not appear as a viable option, a gradual running down of farming activities is likely to occur (Brouwer *et al.*, 1997). The environmental impacts of both intensification and extensification are serious, the first implying risks of pollution as well as over-exploitation of natural resources and the latter often leading to abandonment of agricultural land (Caraveli, 2000) and the consequent loss of differentiated landscape and related biodiversity (EC, 2000).




**Graph 1 -** Development of forest area in Europe by regions (1970 = 100%)
(Source: UNECE/FAO Forest Resources Assessment, in: Gold, 2003)

Wherever marginalisation leads to a process of extensification and, eventually, abandonment of any farming activities, heavy and often irreversible landscape changes take place. Among those, spontaneous afforestation and the consequent expansion of wooded areas is the main and most evident indicator of land desertion. Even though forest areas expansion might sometimes come as a result of planned, artificial afforestation, the dramatic increasing of woods in Europe

is mostly due to spontaneous invasion of shrubs and trees on farmlands or pastures no longer utilized, mainly in mountain and hilly areas[5].
However, small attention is commonly paid to forest expansion, in contrast with the great concern usually associated with deforestation trends. Yet, while excessive deforestation undoubtedly originates enormous impacts both at local and global level, uncontrolled natural afforestation might also cause negative effects. While large forest cuttings mainly take place in developing countries, spontaneous afforestation mostly affects industrialised countries, where marginalisation of mountain farming along with a heavy decline of wood industry have been occurring in the last decades. Between 1990 and 1995, 56 million hectares of forests were destroyed at global level: yet, while the global community lost an extension of 65 million hectares of mostly biodiversity-rich primary forests, an increase of nearly 9 million hectares took place in the industrialized countries, largely due to farmland abandonment (EC, 2001b).




**Picture 1 -** Forest distribution map developed by the Joint Research Centre, the European Forest Institute and VTT Automation by combining satellite data with statistics from EUROSTAT and national statistical data (Source: *Eurostat's Forestry statistics*, EC 2003)

A recent research implemented in the framework of the European Forest Sector Outlook Study (EFSOS) confirms that Europe is characterized by a quite steady general increase of forest area, the intensity of which, however, varies considerably between different countries and regions: in Western Europe, for example, the forest area has increased by almost 30% during the last 50 years (see Graph 1). Policy driven land use change towards forestry and, more recently, natural forest colonisation on abandoned agricultural land were the primary causes for woodlands' expansion. Notably, the growth of forest area has slowed down since the beginning of 1970s in all sub-regions[6], with the exception of Western Europe. Nevertheless, the trend is still positive and - in absolute terms - the increase of forest cover is remarkable (Gold, 2003). Nowadays, about 36% of Europe's land surface (excluding Russia) is covered by forest and other wooded land (FOWL)[7], although this share varies widely, from 1 to 74%; the largest forest areas are in the

[5] One of the main factors directly leading to spontaneous afforestation and the process of "rewilding" of marginal mountain farmlands is the widespread running down trend of extensive zootechnical activities and the consequent decline of traditional grazing practices and abandonment of alpine pastures.

[6] Several factors contributed to slow down forest growth: while in the first times after World War II major afforestation efforts were made in order to compensate for previous clear cutting, in the last decades timber self sufficiency is no longer a political issue due to the current global dimension of timber trade; moreover, urbanisation and the expansion of human infrastructures caused a dramatic contraction of wooded areas in the lowlands (Gold, 2003). Finally, wood industry has been gaining much importance in Eastern European countries during the last decade.

[7] *"Forest"* is defined as land with tree crown cover (or equivalent stocking level) of more than 10% and area of more than 0.5 ha. The trees should be able to reach a minimum height of 5 m at maturity *in situ*; "o*ther wooded land"* is land either with a tree crown cover (or equivalent stocking level) of 5-10% of trees able to reach a height

Nordic countries and in mountainous regions (EC, 2001a; UNECE/FAO, 1999) (see Picture 1).
As far as the European Union is concerned, according to the Temperate and Boreal Forest Resources Assessment (TBFRA), in the year 2000 forest and other wooded land covered around 136 million hectares, equivalent to 43.68% of the then EU-15 territory (EC, 2003), that is 1% more than in 1999, when the total surface was around 135 million hectares, equivalent to 42% of the EU-15 territory (EC, 2002).

| Year | Area (ha) | 1910 = 100 |
|---|---|---|
| 1910 | 4,564,000 | 100.0 |
| 1925 | 5,545,000 | 121.5 |
| 1930 | 5,563,000 | 121.9 |
| 1935 | 5,726,000 | 125.5 |
| 1940 | 5,889,000 | 129.0 |
| 1945 | 5,949,000 | 130.3 |
| 1950 | 5,629,000 | 123.3 |
| 1955 | 5,761,000 | 126.2 |
| 1960 | 5,826,000 | 127.7 |
| 1965 | 6,089,000 | 133.4 |
| 1970 | 6,162,000 | 135.0 |
| 1975 | 6,306,000 | 138.2 |
| 1980 | 6,363,000 | 139.4 |
| 1985 | 6,519,000 | 142.8 |
| 1990 | 6,529,000 | 143.1 |
| 1997 | 6,837,000 | 149.8 |

**Table 1 -** Forest area in Italy between 1910 and 1997 (Source: ISTAT, adapted by Pettenella and Piussi, 2000)

*Note: the remarkable increase of forest area in 1910-25 period is due to the annexation of new territories, while the decrease between 1946 and 1950 is due to the reduction of Italian territory after World War II*

Some data specifically referring to the Italian territory might also give an idea of the extent of the phenomenon (see Table 1): according to the National Statistical Bureau (ISTAT), during the second half of XX century forest areas increased by 14.9%, and the increment was of 7.0% only in the last decade of the century. Invasion of forests into farmlands represents, from a quantitative point of view, the most relevant change in land use which took place in Italy during the cited periods (Piussi and Pettenella, 2000) (see Pictures 2a and 2b).
Two elements need to be kept in mind when taking these data into consideration: ISTAT data are collected using criteria that have been modified through time, and the expansion of forest areas is also consequence of planned afforestation programmes, though for a small portion. Indeed, according to Piussi and Pettenella, afforestation investments played a minor role as a cause of forest expansion, while natural afforestation processes have been representing a primary cause. Moreover, the monitoring of these trends is extremely difficult, since the dynamics of forest cover is very rapid and active. Even classification criteria might be different from one inventory to another: to give an example, the CORINE Land Cover survey for Italy in 1996 estimated a forest area of 7.2 million hectares (that is 0.4 million hectares more than those declared by ISTAT), because CORINE inventory ascribes to forest land areas which ISTAT would not consider as such. In addition, 2.5 more million hectares of different types of shrubland identified by the CORINE survey are to be added, totalling 9.7 million hectares (see Table 2).

For all these reasons, trends are more significant than data themselves, and a qualitative rather than quantitative approach should be adopted when considering land cover changes. To give an example, according to a research focusing on landscape evolution in Tuscany, conducted in 2002 by the Regional Agency for the Development and Innovation in the Agro-forestry Sector (ARSIA), forest areas increased by 33% from the World War II until the end of XX century, so that woodlands cover nowadays about 55% of the current productive surface throughout Tuscany (Agnoletti, 2002), 16% of which being scrub and shrubland, among the first successional stages resulting from the re-colonisation of pastures and formerly cultivated lands by vegetation.

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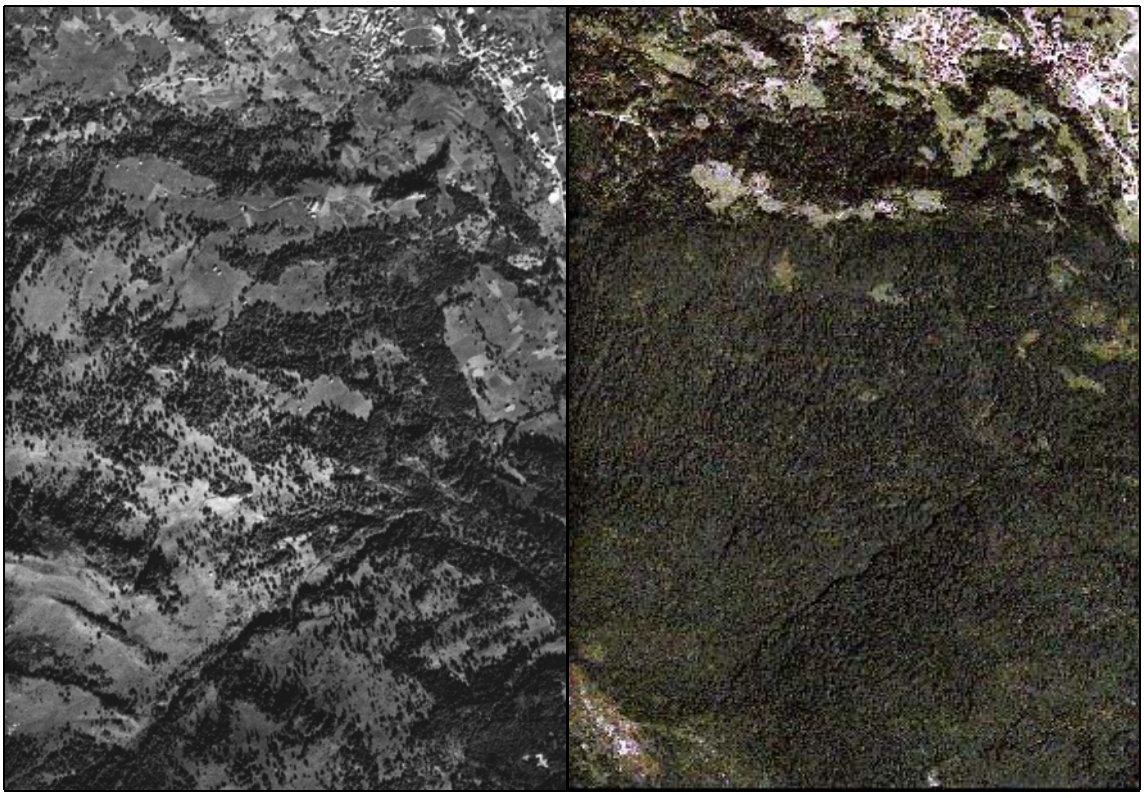
of 5 m at maturity *in situ*; or a crown cover (or equivalent stocking level) of more than 10% of trees not able to reach a height of 5 m at maturity *in situ* (e.g. dwarf or stunted trees) and shrub or bush cover (EC, 2003).



**Pictures 2a and 2b -** Woodlands' expansion in an Italian mountain landscape:
**2a. (left)** - Aerial photo of Mount Talm (Province of Udine, Italy) in 1957
**2b. (right) -** Aerial photo of Mount Talm (Province of Udine, Italy) in 1998
(Source: Candido, 2004)

Nevertheless, in Italy spontaneous afforestation related issues have been initially ignored by the scientific and technical community, while just recently the phenomenon has been analysed through researches which underlined how necessary will be in the next future a deeper investigation focusing on the ecological and social consequences of the mountain and hilly landscape evolution, aiming at evaluating the impacts caused by woodlands' expansion to the detriment of traditional farmed landscapes; besides, a definition of the strategies that contemporary society may adopt in managing such new forests is also needed (Piussi and Pettenella, 2000). As a matter of fact, in all of Europe social and ecological functions of forests are likely to continue to gain importance in comparison to their function of wood supply. This should lead to an improvement of the forests' quality in terms of increased biodiversity, recreational value, and to a better protection of existing forests, rather than to a quantitative increase of the forest cover (Gold, 2003).

| | Nat. Stat. Bureau (ISTAT) (1997) | CORINE Land Cover (1996) | Agricultural Census (1990) |
|---|---|---|---|
| Broadleaves | 5,203,000 | 4,902,000 | 3,728,000 |
| Conifers | 1,439,000 | 1,309,000 | 1,105,000 |
| Mixed forests | 360,000 | 974,000 | 676,000 |
| Total forests | 7,002,000 | 7,285,000 | 5,509,000 |
| Shrubland | n.a. | 2,536,000 | n.a. |
| Total forest land | n.a. | 9,821,000 | n.a. |

**Table 2 -** Forest area in Italy (ha) by different statistical sources (Source: Pettenella and Piussi, 1997)

Notwithstanding, according to a broadly accepted conviction the process of uncontrolled nature development taking place in large European rural areas is seen as a positive phenomenon, representing a sort of reconquest of lost territories by "mother Nature", leading to a gain of naturalness. In many cases "rewilded" areas even inspire a false perception of wilderness and untrammelled landscapes, stimulated or enhanced by the recent practice of designation of abandoned cultural landscapes as "*Wilderness Areas*"[8] (Höchtl *et al.*, 2004). Such a belief originates from a common, though incoherent, ideological framework which considers as anyway valuable concepts such as naturalness or wildness, while what happens to have artificial origins, although somehow remarkable, cannot be posed at the same level of what is considered to be "purely natural". Yet, such premises are erroneous, in the sense that they do not take into account the historical roots of European rural landscapes and the fundamental role that the anthropogenic component played in their evolution. To give an example, even though the notable heterogeneity typically characterizing the Italian landscape is certainly fruit of the significant variety of geographical features, yet the complex cultural ecomosaic, which is one of the most valuable resources of the Italian territory, both in ecological and in economic terms, is primary due to human interactions, since the potential landscape would be more homogeneous, mostly covered by large forest patches.

Likewise, most of negative impacts of land abandonment and the consequent re-afforestation trend are not sufficiently taken into account by large public opinion, nor a broad vision is always adopted when assessing the positiveness of such a phenomenon. Let us briefly take into consideration the main effects caused by such processes.

## 3 – Environmental, social and economic consequences of farmland abandonment

As previously mentioned, farmland abandonment implies several direct and indirect environmental, social and economic consequences, which can be included into the following categories: biodiversity, landscape and soil impacts[9]. All of them are difficult to be determined, as well as largely discussed whether to be considered as negative, neutral or positive effects. Moreover, in some cases there is a sort of temporal variability in the direction of the impact, as when considering the secondary succession[10] following the abandonment of meadows, fields or pastures from a biodiversity point of view. While floristic diversity is likely to increase in the very early stages (Höchtl *et al.*, 2004; Brown, 1991), during the successional process biodiversity tends to decrease, according to the majority of the authors, due to the invasion of aggressive pioneer or dominant species in former species-rich mountain meadows or pastures. During the secondary succession following farmland abandonment, ecologically specialised species actually disappear in favour of more competitive, less valuable ones.

Biodiversity measurements vary significantly depending on the scale of observation, whether this refers to species, community or landscape level. To give an example, a recent research

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[8] According to the IUCN (International Union for Conservation of Nature and Natural Resources), a "*Wilderness Area*" is "a *large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition*". Likewise, according to the US Wilderness Act, "*a wilderness, in contrast with those areas where man and his own works dominate the landscape, is recognized as an area where the earth and its community of life are untrammelled by man; it generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable"* (US Congress, 1964).

[9] The European Commission lists the following environmental problems caused to natural resources by agriculture: air pollution and contribution to climate change, soil degradation, water pollution and hydrogeological changes and adverse effects on biodiversity (EC, 1997). Yet, Euromontana identifies biodiversity, landscape and soil as the three categories mainly affected by farmland abandonment (Euromontana, 1998).

[10] While primary successions start from bared soils, secondary ones develop on a previously vegetated soil, after a disturbing event.

project focusing on various impacts caused by uncontrolled nature development in the Italian Val Grande National Park and Strona Valley[11] revealed a decrease in floristic diversity from lower to higher successional stages, thus a decline of the so-called *alfa* biodiversity at species level. On a larger scale (community level) both a decrease and an increase in the structural diversity have been observed: indeed, while on the one hand the number of vegetation structures decreases in the areas characterized by a mosaic of small plots of formerly cultivated land, commonly located around the villages, on the other hand diversity increases in those alpine areas historically largely utilised as meadows or pastures (Höchtl *et al.,* 2004). Indeed, the existing vegetation and landscape structure is an important factor influencing biodiversity evolution: in mountain areas already dominated by high forest cover, increased woodlands caused by abandonment processes may not be desirable, leading to a biodiversity loss due to a diminished variety of habitats (MacDonald *et al*, 2000). On the other hand, some degree of spontaneously reforested land might be assessed positively when open meadows and pastures represent the otherwise predominant landscape (Höchtl *et al.,* 2004). To summarize, we may say that whenever large patches characterize landscape, then re-afforestation leads to an increase in the habitat variety, except in the case where such large patches are already dominated by forest cover. On the contrary, when small patches of open meadows, woodlands and cultivated fields shape landscape, then forest expansion might result in an increased landscape homogeneity and banalisation, finally leading to a reduction in the habitat variety. Quite obviously, the introduction of new woodlands might be assessed positively where they did not use to be in the past, while the expansion of forest areas might be seen as a negative process where forests were already spread throughout the landscape.

Agriculture has, over long periods, developed and modified those assets commonly characterizing mountain areas, in terms of biodiversity and habitat variety, water and soil resources: the result is a joint natural and cultural heritage, which reflects the particular land management practices traditionally followed in a certain area (Euromontana, 1997). The European Landscape Convention actually defines the landscape as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*" (Council of Europe, 2000), so that landscape protection implies "*actions to conserve and maintain the significant or characteristic features of a landscape, justified by its heritage value derived from its natural configuration and/or from human activity*" (*ib.*). In light of these statements a relatively recent term is particularly appropriate to mean the importance of maintenance of cultural landscapes: the concept of "ecological diversity", or "*ecodiversity*", refers to the biological, ecological, and cultural landscape heterogeneity as a whole (Naveh, 1994). Likewise, the term "*biolandscape*" has been coined by AGER, the international agency for the protection of biocultural landscapes, defined as the "spatial and perceptive expressions of agro systems whose landscape and morphological components join the genetic ones, including traditional *cultivar*, local cultural identities and rural architectures" (De Bernardi, 2004). According to the Council Directive 92/43/EEC "on the conservation of natural habitats and of wild fauna and flora" (the so called "*Habitat*" Directive), natural habitats are "*terrestrial or aquatic areas distinguished by geographic, abiotic and biotic features, whether entirely natural or semi-natural*" (CEC, 1992), which means that "natural" habitats also include "semi-natural" areas, created and maintained by human activities, such as pastures, traditionally farmed lands, cultivated woods[12]. In many cases their natural characteristics would disappear if agricultural work or animal rearing were to cease (Delpeuch, 2004). Hence, nowadays the core performance of mountain agriculture is rather the maintenance of cultural

[11] The research project, titled "*Changes in alpine landscapes resulting from a decline in land use in the Val Grande National Park and Strona Valley – from rural landscape to wilderness*", is run by the University of Freiburg (Germany), Department of Forest and Environmental Sciences - Institute for Landscape Management.

[12] Most of European countries have no forest "undisturbed by man" (UNECE/FAO, 1999), while European forests have been being utilised, managed or even cultivated for several centuries.

landscapes and the related habitats, than the agricultural production itself (Dax and Wiesinger, 1997). The underlying idea is that what is somehow "artificial" is not always biodiversity-poor, while what is natural – well again, what it *has become* "natural" through a secondary successional process – is not always biodiversity-rich. Environmental complexity might sometimes have anthropogenic basis, since the landscapes' mosaic characterising most of European rural areas can be considered as a synonymous of habitat variety, which brings together biological, cultural, historical, social, aesthetic and economic values.

In addition to the impacts on bio and eco-diversity, several short as well as long-lasting changes can be observed as a consequence of land desertion. The development of a biomass of vegetation tending to form a mulch in the cold seasons implies an increased risk of snow-slides, avalanches and associated landslips (Cernusca *et al.*, 1998). Nevertheless, even though in the short term neglect of mown or grazed alpine pastures determines an increased risk of natural hazards, yet in the long term the development of a tree cover may result in a greater slope stability and a considerable reduction of the risks (MacDonald *et al.*, 2000). Thus, even in the case of natural hazards a temporal variability in the direction of the impacts caused by land desertion can be observed.

Concerning the effects of land abandonment on soil erosion, these have been largely discussed: in some cases, it has been observed that managed meadows and pastures are significantly less erodible than abandoned grasslands, the latter being more prone to landslides in topsoils (Tasser *et al.,* 2003). Cernusca *et al.* observed a decrease of upper soil aggregate stability in several research sites, possibly resulting in a reduction of water storage capacity and potential infiltration (Cernusca *et al.*, 1996). On the contrary, in other cases colonisation of abandoned meadows and fields by a dense shrub cover seems to reduce both water runoff and soil erosion, determining a reduction of sediment yield at the basin level: this happens particularly where cultivated fields used to occupy even the most steep slopes and stony soils, thus causing heavy soil erosion and mass movements (García-Ruiz *et al.*, 1995; 1996). Yet, different is the case where are terraced sites to be abandoned: in these contexts, significant land degradation problems occur, since the collapse of such artificial hydrological infrastructures comes together with the cessation of their protective function against soil erosion and runoff (Dunjó, 2003). On this topic, the *Instituto Pirenaico de Ecologia* (IPE) and the *Geographie de l'Environnement* (GEODE) analysed several case studies in the Spanish and French Pyrenees. Significant is also the Italian case of Liguria, a region whose peculiar morphology imposed the creation and maintenance of typical terraced sites, nowadays largely neglected: the consequent land degradation problems have actually been posing serious threats to human settlements located along the coast, because of the vicinity of mountain territories to the coastline. In Liguria, as well as in many other regions throughout Europe, hydrogeological disasters are also caused by obstructions along the rivers due to the uncontrolled invasion of riparian environments by vegetation and a general lack of care of mountain territories. Furthermore, the abandonment of methods for both soil conservation and runoff control affect the hydrologic and geomorphologic functioning of hillslopes and fluvial channels (García-Ruiz *et al.*, 1996).

Abandoned meadows and pastures are also more prone to fire hazards, due to the characteristics of the new vegetation cover (Höchtl *et al.*, 2004; Abramo, 2004; Gonzalez Bernaldez, 1991; Fernandez Ales, 1991; Hubert, 1991). Beyond their ecological value and positive effects on biodiversity, fires, together with landslides and avalanches, pose a serious threat to human settlements. Moreover, the increased fire hazard is of particular importance especially in the drier Mediterranean regions, where repeated fire events followed by heavy rainfalls determine a relevant erosion of productive soil, which may finally lead to irreversible desertification (García-Ruiz *et al.*, 1991).

Among the economic consequences of land abandonment, natural hazards to human settlements, infrastructures and activities might be quite easily determined, while losses of biodiversity and cultural landscapes are more difficult to evaluate. In the latter case one possible, although partial, way to assess such an economic value is based on the perception of landscape change by residents and tourists, which can be considered as a social impact as well. As for habitat variety, perception differs significantly, whether vegetational re-colonisation takes the form of vast homogeneous forest patches or open meadows and fields continue to dominate the landscape structure: indeed, according to some general theories in landscape preference research, confirmed by specific, interviews-based field studies, a partially reforested land might receive the highest preference (Hunziker, 1995). Furthermore, aesthetic and psychological perception of land use changes varies considerably among residents and external visitors: local people, and especially elders, usually conceive the resulting landscape as neglected, dirty and scruffy, even unsafe, far from their traditional concept of "homeland" (Hunziker, 1995; Höchtl *et al.,* 2004) (see Picture 3). This might be mainly due to the fact that local people are usually more aware of the negative impacts of land use changes, especially in terms of increased natural hazards and economic losses. Moreover, they know that such a forest expansion has been taking place in recent times, while landscape looked very differently just a few decades ago. On the contrary, visitors are often unaware of the radical changes occurred and as a consequence they commonly experience the new scenery as highly *natural*, untouched even. External visitors, urban people in particular, might enjoy a positive emotional feeling of *wildness* associated with reforested lands, when ignorant about the former landscape and the losses caused by its evolution. On the other hand, the informed visitors regret the loss of cultural landscape and social heritage caused by land use changes[13] (Höchtl *et al.,* 2004). Moreover, a decline in the landscape's accessibility and the progressive impenetrability affect the possibility to get in contact with nature, thus resulting in an undesirable effect from a tourist point of view. Thus, we may say that both local people and visitors experience spontaneous afforestation in an ambivalent way, though for local people a negative perception prevails.

**Picture 3 –** Evidence of disregard: in Gjaverissino (Province of Udine, Italy) the ruins of a former rural building are nowadays completely invaded by vegetation, while secondary woods took the place of meadows and pastures. (Source: Candido, 2004)

Further direct and indirect economic consequences of land abandonment affect rural areas: among those, economic losses related to the decline of extensive grazing practices are particularly relevant. Secondary pastures[14] represent a unique and precious combination of natural and anthropogenic efforts, being the outcome of a historical co-evolution between humans and environment. Pastures usually result from an initial deforestation, followed by continuous interventions aimed at containing forest

[13] Landscape perception differs significantly depending on cultural and social interpretation of the physical changes (Guillot e*t al.* in MacDonald *et al.*, 2000) and is strongly driven by interests and knowledge about a subject (Nohl in Hunziker, 1995).

[14] While primary pastures are natural grasslands lying beyond the limit of tree vegetation, secondary pastures are somehow "artificial", in a sense that they result form the activities which men have been running over them.

encroachment (Ziliotto *et al.*, 2004), also hindered by summer animal grazing. For this reason abandonment of alpine pastures often results in an irreversible loss, both for economic and for cultural reasons: together with pastures a whole traditional knowledge and the connected cultural and social heritage disappear. Once the know-how has been forgotten, a recovery is extremely difficult, if not impossible. Even the physical restoration of pastures is an onerous process, costly and time-consuming. This topic is of particular relevance when considering the recent tendency towards a re-establishment of extensive mountain grazing, thanks to the greater role acquired by organic and typical products on the market as well as to the national and European financial subsidies aimed at preserving those pastures not yet totally abandoned (Ziliotto *et al.*, 2004).

Therefore we may affirm that abandonment of traditional farming activities results in a number of impacts, which can be summarized as follows: increasing natural hazards; loss of productive lands; diminishing terrain value; loss of natural capital and environmental quality; depletion of environmental services; loss of open or otherwise accessible spaces suitable for various purposes such as tourist, recreation and sport activities; loss of local *cultivar*, typical products and traditional farming practices; diminishing habitat variety and biodiversity; decline of traditional lifestyles and knowledge; permanent loss of cultural landscape; loss of cultural and social heritage and identity; decline of the human presence, and the consequent territorial care, in the mountains.

Most of these impacts determine potential and real income losses that are somehow quantifiable, while some others belong to the sphere of ethics and moral values, thus being extremely difficult to estimate. Moreover, as previously mentioned it is not always possible to determine whether each of these impacts is positive or negative in absolute terms: such an assessment is made even more difficult where different interest groups may interpret impacts differently. Hence, deeper investigations are needed on these themes, since the present state of the research seems not to cover enough such a relevant and broad issue affecting most of the mountain territories in industrialized countries.

## 4 – From desertion to proactive management

Financial measures such as subsidies, incentives or compensation payments represent the main tools so far adopted by European Union, as well as by national and regional governments, in order to counteract marginalisation trends and land abandonment. Presently, the maintenance of low-intensity systems is broadly recognised as a priority for both social and environmental purposes within the European Union; Reg. 1257/99, Article 22, states that agri-environment support "*shall promote an environmentally-favourable extensification of farming and management of low-intensity pasture systems*", together with "*the conservation of high nature-value farmed environments which are under threat and the upkeep of the landscape and historical features on agricultural land*" (CEC, 1999).

Nevertheless, hereinafter both land abandonment and intensification are likely to be strengthened by the 2003 CAP reform, which introduces major changes through the decision to decouple direct payments from production, mainly aiming at enhancing the competitiveness of Community agriculture. The key element of the 2003 CAP reform is actually the introduction of a Single Farm Payment (SFP) independent from production, allowing farmers greater freedom to produce in accordance with the market needs. Because of the decoupling scheme, when the reform will enter into force farmers will receive a fixed single payment[15],

[15] Farmers will be allotted payment entitlements based on historical reference amounts received during the period 2000-02 (OECD, 2004). This means that a farmer may even receive subsidies for lands, which are no longer cultivated.

wholly irrespective of what they produce or even *whether* they produce (Trarieux, 2004). Therefore, from many parts great concerns are raising about the negative effects that such a scheme may have on farming systems in the disadvantaged areas, where there will be no economic interest anymore to produce for farm prices below the production costs (Coordination Paysanne Européenne, 2003; European Landowners' Organisation, 2003*)*.

If on the one hand compensations are somehow justified by the outstanding role of mountain farming in providing essential services and preserving downstream interests[16], which are not covered by agricultural product prices, on the other hand, whether supportive or unsupportive, a subsidies-based policy does not appear to be an effective and sustainable solution. Indeed, financial assistance implies several problems: subsidies are not always understood nor accepted by people who are not directly involved; they develop passive attitudes, sometimes hindering possible innovative actions; they are not economically sustainable in a long-term perspective; they are not in line with the latest decisions about international farm trade, stated by the World Trade Organisation (WTO) through the Doha Development Agenda (DDA)[17]; finally, they do not appear to be conclusive, since depopulation trend (see Picture 4), land abandonment and forest expansion are still widespread phenomena[18] (see Picture 5a and 5b). Moreover, subsidies-based policies represent an indirect acceptance of mountain marginalisation, by recognizing the peripheral role currently played by mountain territories and ignoring the potential function as laboratories of sustainable development that mountains might and should perform, thanks to their rich cultural heritage made of environmentally-friendly farming systems, bio-architectural practices, green energy provision, and so on.

Other kinds of actions, which have been implemented in order to counteract land abandonment, include rural and agri-tourism development, increasing appreciation of typical local products, adding value to traditional farming practices and organic farming. Beyond such initiatives, also a range of relatively new tools can be helpful for addressing land desertion and the decline of traditional farming practices and the rural society as a whole: above all, Environmental Management Systems and Strategic Environmental Assessment can play a fundamental role in facing such issues. In particular, there is a strong need for research studies focusing on large scale planning instruments as tools for the implementation of comprehensive strategies facing the complex issues affecting mountain regions. A widespread phenomenon such as the depopulation trend of mountain regions and the following consequences, largely originated by the disregard so far shown by land planners towards these issues, need to be addressed primarily through land planning instruments.

According to a common conviction, efforts need to be mainly concentrated on contexts characterised by unsustainable development, where problems of pollution, congestion, over-exploitation of natural resources and soil consumption occur. On the other hand, also contexts characterised by unsustainable "undevelopment" need to be considered, since environmental problems do occur even in these cases, as aforesaid.

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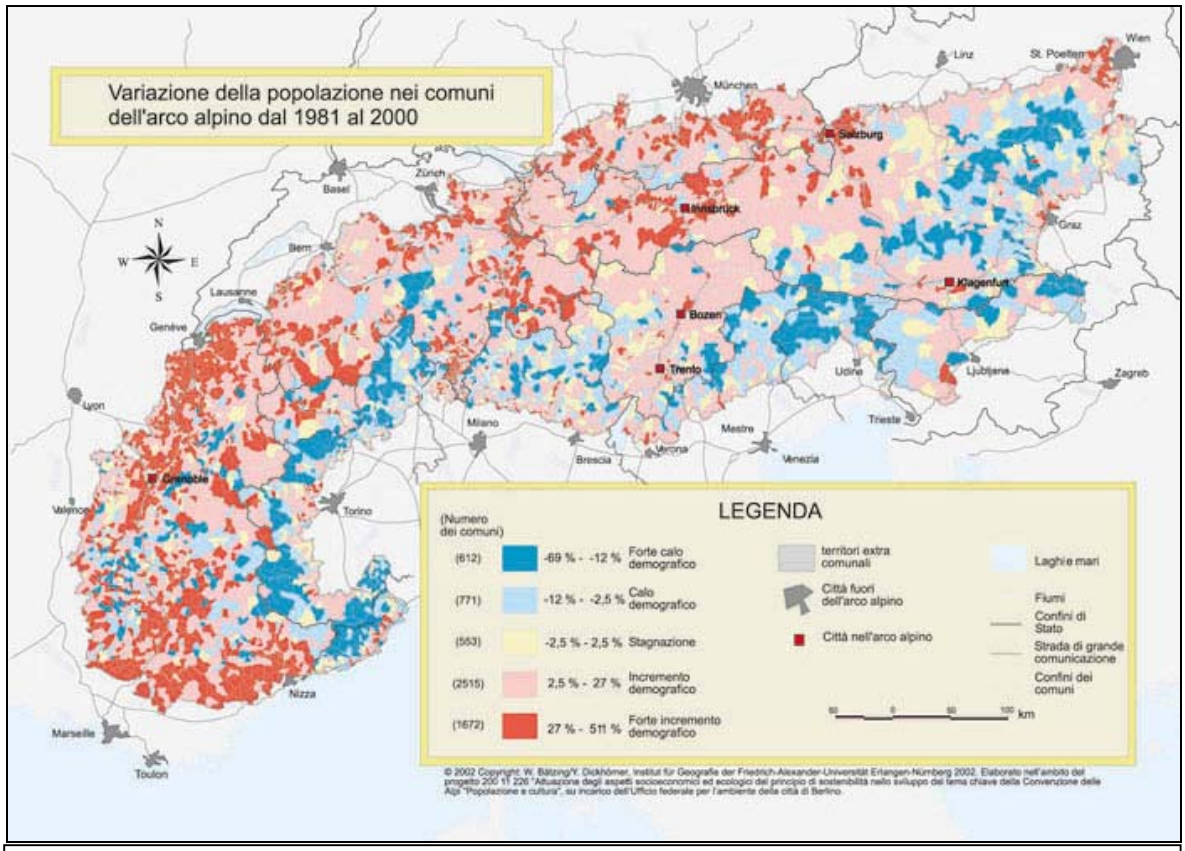
[16] Even though the crucial role played by farming activities beyond their primary productive function is being increasingly recognized, yet it seems that the negative externalities caused by agriculture are more deeply investigated than the positive interactions between mountain farming and the environment (Dax and Wiesinger, 1997).

[17] The main purpose of the Doha declaration of November 2001 was to correct and prevent restrictions and distortions in world agricultural markets, thus including removing of domestic support to farm activities.

[18] As a matter of fact, the 2003 CAP reform itself provides for a system of progressive reduction of direct payments, in order to get funds available for financing measures aimed at promoting rural development as a whole.




**Picture 4 –** Demographic trend into the Alps between 1981 and 2000. Although population increased in many wide areas, a general negative trend can be observed as far as the Italian Alpine side is concerned. (Source: CIPRA-Info 65, may 2002, special insert)

It is important to underline that not just protection from improper use of natural resources is essential, but also defence from "improper non-use" of natural resources, which used to be intensively utilised, has to be taken into consideration. When dealing with natural or semi-natural ecosystems a no-intervention strategy is a strategy by itself, in a sense that the state of the art cannot be maintained as such by simply not acting, while maintenance needs to be proactively planned and managed. In this sense, neglect is the main and most harmful threat to mountain habitats. Therefore, in order to effectively achieve sustainable mountain development of European marginal areas, it is necessary to move from the current attitude, largely characterised by inattention and carelessness, towards a proactive planning and management approach.

## 5 – Conclusions

Despite their increasing marginality, mountains provide a range of vital assets and services for the development of human society and the supply of downstream, flatland and urban areas. Because of their physical restraints, geographical remoteness and climatic conditions, mountain areas of Europe represent an extreme case of economic and social vulnerability. Dramatic changes in the agricultural structure and land use systems are presently occurring throughout Europe, in terms of migration and land abandonment, forest mismanagement, changes in livestock density and animal husbandry systems and so on. In particular, mountain regions are vulnerable to the phenomenon of marginalisation, which represents one of the main threats that mountain territories are currently facing.

**Pictures 5a and 5b –** How the Italian mountain landscape is changing:
**5a. (left)** - The small village of Givigliana (Province of Udine, Italy) in 1960
**5b. (right) -** Givigliana today
(Source: Candido, 2004)

Two opposite, yet specular, trends may be determined by marginalisation: productive intensification on the one hand and depletion of agricultural activities on the other hand. In particular, wherever marginalisation leads to a process of extensification and, eventually, abandonment of any farming activities, heavy and often irreversible landscape changes take place. Among them, the dramatic expansion of forest areas is maybe one of the most relevant indicators of farmland desertion. Contrary to a widespread belief, according to which woodlands' expansion taking place in industrialised countries is a positive process, contributing to counteract deforestation trends in other parts of the globe, the increased forest extension seems to have negative effects in economic, social and environmental terms. Biodiversity, land value, social and cultural heritage seem all to be heavily affected by this process, although the question is still largely debated. In particular, land desertion and spontaneous afforestation pose a serious threat to variety, which typically characterises European mountain areas: the mountain regions are actually "*a reservoir of diversity of environments and cultures*", which expresses itself through a "*magnificent*" variety of "*cultural landscapes*" (Euromontana, 2000), endangered by the current homogenisation trend, which tends to level such a unique richness. According to the final declaration of the High-level Pan-European Conference on Agriculture and Biodiversity, "*the loss of biological diversity of much of Europe's farmland*" is "*largely a result of the continuing decline in traditional, extensive and mixed farming practices, the intensification of agriculture and the abandonment of farming in certain regions*", so that "*action to preserve biological diversity is therefore urgent*". Indeed, low intensity farming systems are more and more valued by society for their potential to contribute to maintaining rich biotopes (EC, 1997). Beyond the biodiversity losses due to the disappearance of habitats, also a decline of cultural and social heritage at the basis of traditional cultural landscapes usually occurs.

Although the fragile state affecting most of the European mountain territories has largely been recognized by European policies, these have not yet solved the underlying social and economic problems, which conversely urgently need to be faced by adequate and effective policies. Such an issue is of particular relevance, because of the increasing concerns about the need to preserve social, economic and environmental services provided by mountain zones, by maintaining their environmental assets (Euromontana, 1997).

Yet, although sectoral studies concerning specific aspects of land abandonment and its consequences have been recently run, an interdisciplinary approach is required in taking into account both the current unsustainability and the potential, future sustainability of such a

process, by considering social, economic and environmental consequences and opportunities related to the present evolution of mountain landscapes. Particularly, while in recent times such issues gained considerable importance in several scientific disciplines like forestry, geology, biology, hydrogeology, social science and even architecture, land planners are still largely unaware of the matter, in the sense that in many cases it is not even recognised as a problem to address. On the contrary, neglect and unconcern represent the main threat currently faced by mountain ecosystems, since even maintenance of the state of the art does require a proactive planning and management strategy, aimed at hindering uncontrolled natural succession and the consequent loss of natural and cultural heritage.

Therefore, the increasing economic marginality of mountain territories should not come together with other forms of marginalisation, such as the lack of interest and the disregard, which still commonly characterise mountain issues[19], since relevant and heavy are the environmental, social and economic impacts that land abandonment creates, affecting not just mountain communities, but the whole society. Since problems presently affecting mountain regions mainly take origins from exogenous factors, sustainable mountain development should not be just one more sectoral discipline within the wide theme of sustainable development; conversely, mountain-related issues should be taken into account when addressing each of the related matters, which means that mountain problems will be effectively addressed only if they will be integrated into sustainable development policies as a whole.

[19] Evidence of such a disregard can be found in the text of the European Constitution, as agreed on the 18th of June 2004 by European Heads of State and Governments, where mountains deserved just a trivial, marginal mention: "*In order to promote its overall harmonious development, the Union shall develop and pursue its action leading to the strengthening of its economic, social and territorial cohesion. In particular, the Union shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions. Among the regions concerned, particular attention shall be paid to rural areas, areas affected by industrial transition, and areas which suffer from severe and permanent natural or demographic handicaps such as the northernmost regions with very low population density, and island, cross-border and mountain areas*".

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