The Concept of Forest Landscape Restoration in the Mediterranean Basin

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Abstract

Mediterranean forests provide a wide range of important benefits and services to the society that go far beyond traditional forest products. Their biological and social heterogeneity makes their management and conservation a complex task, which cannot be reached through the classical management and conservation approaches applied in other parts of the world. A new spatial and temporal reference is needed, combining resources management, biodiversity conservation and restoration. The concept of Forest Landscape Conservation, proposed by IUCN and WWF, seems to address the special social and biological features of Mediterranean forests. The relevance of Forest landscape Restoration in a Mediterranean context is analysed, discussing the value of this approach as a means to regain ecological integrity and enhance human well-being in deforested or degraded Mediterranean forest landscapes. Possible constrains are mentioned and a strategy to overcome them is discussed.

Résumé

Les forêts méditerranéennes offrent une large gamme de bénéfices et de produits à la société qui dépassent largement les produits forestiers traditionnels. Leur hétérogénéité biologique et sociale rend leur gestion et leur conservation complexes, ce qui impose l'utilisation d'approches de gestion et de conservation différentes par rapport à celles adoptées dans d'autres parties du monde. Il est donc impératif de trouver de nouveaux points de repère spatiaux et temporels, capables de réunir la gestion des ressources, la conservation et la restauration de la biodiversité. Le concept de Conservation des forêts, proposé par l'IUCN et le WWF semble tenir compte des caractéristiques sociales et biologiques des forêts méditerranéennes. La pertinence de la Restauration des forêts dans le contexte méditerranéen est donc analysée, en examinant, en particulier, la valeur de cette approche comme moyen pour retrouver l'intégrité écologique et améliorer le bien-être de l'homme dans les milieux déboisés ou dans les forêts dégradées en région méditerranéenne. Les éventuelles contraintes et les stratégies permettant de les surmonter seront également discutées.

1. Introduction

The Mediterranean basin is an area characterized by a great diversity in biological, cultural, economic, social and historical terms (Pons and Quézel, 1985). It is a well-defined bio-geographical region showing a rich biodiversity content, even where nature is restricted to small residual fragments (Di Castri and Mooney, 1973). A wide variability has been recorded at all levels of biodiversity in the region (Papageorgiou, 1997; Quézel et al., 1999; Papageorgiou et al., 2000). The wealth of plant species found in Mediterranean forests is one of the main features that distinguishes them from the forests of central and Northern Europe. The Mediterranean forests have twice as many woody species as the European forests (Quézel, 1985). The diversity of animal species (i.e. avifauna) is very high as well, especially when it is expressed by the ratio between species richness and area (Di Castri and Mooney, 1973; Quézel et al., 1999). Furthermore, Mediterranean populations of species with a Pan-European distribution, such as fir, beech, pine and spruce, are often characterized as the most variable in terms of genetic diversity (Papageorgiou, 1997).

Besides species and genes, diversity is the main characteristic of the Mediterranean landscape as well. The evolution of species and ecosystems has not been uniform, but it followed rather a mosaic-like pattern (Quézel et al., 1999; Fabio et al., 2003). During the geological and climatic history of the region, new elements have been introduced and older elements have constantly been replaced on a small spatial scale. The geographical location, the palaeo-geographical and geo-morphological factors, such as glaciers, as well as the climate, have generated a considerable natural spread of ecotones that produced a variety of habitats (Mooney and Dunn, 1970; Di Castri and Mooney, 1973; Quézel and Barbero, 1985).

Yet, the most important reason for the existence of this wealth in diversity is the influence of human populations. The Mediterranean region exhibits closer interrelations than any other region in the world between its landscapes and the human activities that have been shaping them for more than 10.000 years (Papageorgiou, 1997; M'Hirit, 1999; Quézel et al., 1999). The long-lasting transformation of rural areas and the development of settlements have shaped complex, non-repetitive landscapes, in a rather harmonious combination that became aesthetically, spiritually and culturally important (Pons and Quézel, 1985). Natural and semi-natural systems, such as shrub lands, pastures and woods are connected with each other and with fields as well as plantations over extensive areas. Such an anthropogenic mosaic is in itself a further source of biodiversity and produces important transition zones, edge habitats and corridors (Quézel et al., 1999; Papageorgiou et al., 2001; Poirazidis, 2003).

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Human activities have not produced only positive effects on forest biodiversity. There were periods in history when wars, extensive use of timber and overgrazing caused large-scale deforestation. These phenomena have become more intense during the last decades, where changes in demographic, social and economic conditions of the Mediterranean countries have defined a completely different range of pressures against the traditional Mediterranean landscape (Di Castri and Mooney, 1973; Papageorgiou, 1997). It seems that the balance between man and nature has been disrupted by over-exploitation of natural resources (mainly in North Africa and the Middle East) and through a general shift of human populations and interests away from the land (EU-Mediterranean countries). In the first case, the ecosystems have been pushed beyond the point of self-recovery and they experience pressure from grazing, fuel wood collection and other uses. Their resources are gradually exhausted and vegetated areas become deserts (Di Castri and Mooney, 1973; Quézel et al., 1999). The countries in the northern part of the Mediterranean basin – especially the EU member states – have experienced rapid economic development followed by large social changes. This has caused migration of the rural population towards the cities and it has reduced the quantity and quality of management of the forests and other terrestrial ecosystems (Quézel et al., 1999; Papageorgiou and Arabatzis, 2001). The traditional human-ecosystem balance was disrupted in this case as well. Land abandonment was frequently followed by wildfires, un-sustainable use and conversion of forests to other land uses (settlements, tourism, and agriculture). In addition, desertification poses a major threat to these countries (M'Hirit 1999; Nasi et al., 2002).

Fig. 1. *The classical approach to Sustainable Forest Management; goods and services besides timber are externalities*

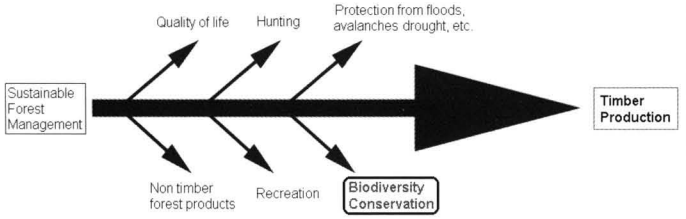
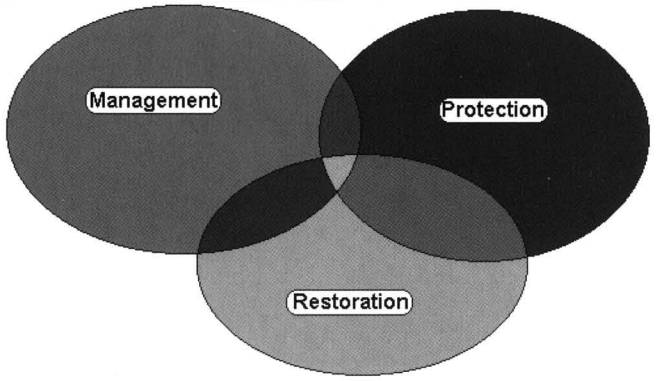


Fig. 2. *Forest Management, Protection and Restoration create a complete framework for addressing the complexity of Mediterranean terrestrial ecosystems*



The disturbance of the balance between human and nature in forest ecosystems has altered the biodiversity profile of the Mediterranean (Bengtsson et al., 2000). The term biological diversity is not only understood in terms of spatial distribution of systematic taxa, but it also includes the dynamics of evolution and succession of ecosystems over time (Papageorgiou et al., 2001; Papageorgiou and Kasimiadis, 2004). This temporal character of biodiversity applies to the Mediterranean region, mainly due to the human activities. The forests and other terrestrial ecosystems have co-evolved with human populations, their settlements and their needs. When forest ecosystems are degraded beyond the point of recovery, the main reason lies in the disturbance of the dynamic systems (genetic, ecological, nutrients, water, energy, etc.). Such ecosystems can not continue to provide goods and services in the long run (White, 1979; Naeem and Li, 1997; Naeem, 1998; Bengtsson et al., 2000). The restoration of the Mediterranean ecosystems ability to still fulfil their dynamic function should be the target of any conservation effort in the region (Papageorgiou et al., 2001).

2. Forest management and protection approaches in the Mediterranean region

Several conservation and management efforts have been made in the Mediterranean region in order to stop desertification and to try and solve the above problems. Silvicultural management became widespread practice in the Mediterranean region during the late 19th century. However, since the forestry science has its roots in the countries of Central and Northern Europe, management strategies and techniques have been imported from these countries and have mainly been applied to the productive and more temperate forests of the Mediterranean region (Papageorgiou ,1997; M'Herit, 1999; Fabio et al., 2003). Their focus is the production of timber and "multi-purpose forestry" is often restricted in the production of benefits as positive externalities (figure 1) (Papageorgiou et al., 2001). Forest management in the Mediterranean countries is mostly based on the principles of sustainability and has contributed to the maintenance of the forest cover in many areas of the region. However, the classical sustainable forest management approach fails to capture the complexity of forest ecosystems in the Mediterranean and ignores the non-productive terrestrial ecosystems that are most endangered by mismanagement, abandonment and desertification. The spatial reference of forest management is usually the stand and not the broader landscape, which is more appropriate for the description of the inter-relation between nature and humans.

Forest protection has an important role to play in the Mediterranean (Quezel et al., 1999). However, the main

protection strategies are based on the "set-aside" principle, since they were influenced by the conditions existing in the northern countries, where empty spaces and large areas of productive forests dominate the landscape. In these cases, the influence of human populations can, to a great extent, be separated from nature, something impossible for the Mediterranean (Papageorgiou and Arabatzis, 2001; Papageorgiou and Catsadorakis, 2001). Most of the conservation efforts focus on the protection of specific biological entities (species, habitats), mainly through the establishment of reserves. These attempts are based on the restriction or the regulation of human activities and they are static, resulting in biodiversity changes, due to the modifications of management intensity and practices. The selection and management of reserves leave behind a large area of terrestrial ecosystems that cannot be categorized as either managed or protected forests (Papageorgiou et al., 2000). These are usually called "other wooded land" in the inventories, covering large areas, rich in biodiversity and important for the maintenance of the benefits for human welfare. These ecosystems are directly threatened by desertification and the need for their restoration is increasingly emerging (Mather 1993; Savill et al., 1997).

Many conservation strategies prepared by national, international and non-governmental institutions consider the combination of forest protection and sustainable forest management as sufficient for the maintenance of forest biodiversity. As explained above, this theory does not apply to the Mediterranean, since it misses 50% of the regional forest area and fails to cope with the dynamic nature of Mediterranean forests. Forest protection and the development of sustainable forest management techniques are important, but a third pillar is needed in order to have a complete spatial and temporal reference. The restoration of forest ecosystems and their functions should be combined with management and protection strategies, in view of developing a full set of measures that can effectively and practically maintain the rich forest biodiversity in the region (figure 2) (Vallauri, 2000).

3. Forest restoration in the Mediterranean

Forest restoration has been a target in the policy documents of most Mediterranean countries and several smaller or larger programmes have been implemented on the ground, in the form of reforestation activities (Vallauri, 2000). Impressive results have been recorded, especially during the 60s and the 70s, where countries, such as Spain, have increased their forest cover dramatically through the implementation of large-scale afforestation. Planting trees is the main measure taken after forest fires, floods or windstorms. Furthermore, afforestation is promoted in many parts of the Mediterranean, either as a tool to combat desertification (i.e. North Africa), or as a priority for the exploitation of marginal agricultural land (E.U.) (Arabatzis 2000 ; Anagnos et al., 2001).

Recent studies have shown that the reforestation activities in the Mediterranean region are inadequate and in many cases inappropriate (Vallauri, 2000). Influenced by countries with a longer forestry tradition and temperate climates, most actions have aimed at the creation of the so-called "high forest" stands, an attempt that has been limited in many cases due to adverse environmental conditions. Restoration has always been used as a different term for reforestation carried out through planting of seedlings grown in nurseries. Other methods, such as direct sowing, were only used rarely (Yidraw, 2002).

Other problems that have been reported include the lack of organisation on a broader scale, the lack of continuity, the absence of support from the public during all stages of restoration, the use of wrong materials and techniques, etc. (Vallauri, 2000). The society has been under political pressure to undertake reforestation activities mainly after catastrophes, such as fires. Volunteers and organized groups are usually only interested in planting trees for a few hours and then, they ignore the needs of the new forests and do not contribute to their maintenance. A few weeks after the catastrophe, the public opinion forgets about restoration and the political pressure is reduced (Tampakis 2000; Tsantopoulos, 2000).

The underlying cause is probably the wrong level of spatial and temporal reference. Reforestation usually occurs on an ad hoc basis, without prior planning carried out in accordance with management and conservation targets and programmes. The plants used are the ones available at the time of the maximum demand, and in most cases they are inappropriate (Hatzistathis and Dafis, 1989; Kerr, 1999; Honnay et al., 2002). A typical example is the case of the Taygetos Mountain, a biodiversity hotspot. When the black pine forests of the mountain were burnt, the reforestation activities, that took place a few months after the fire, established a new forest with plants from a nursery 900 kilometres to the north of the burnt location. The reason for this transport was the fact that the local nurseries did not have enough black pine seedlings (Georgilas, personal communication).

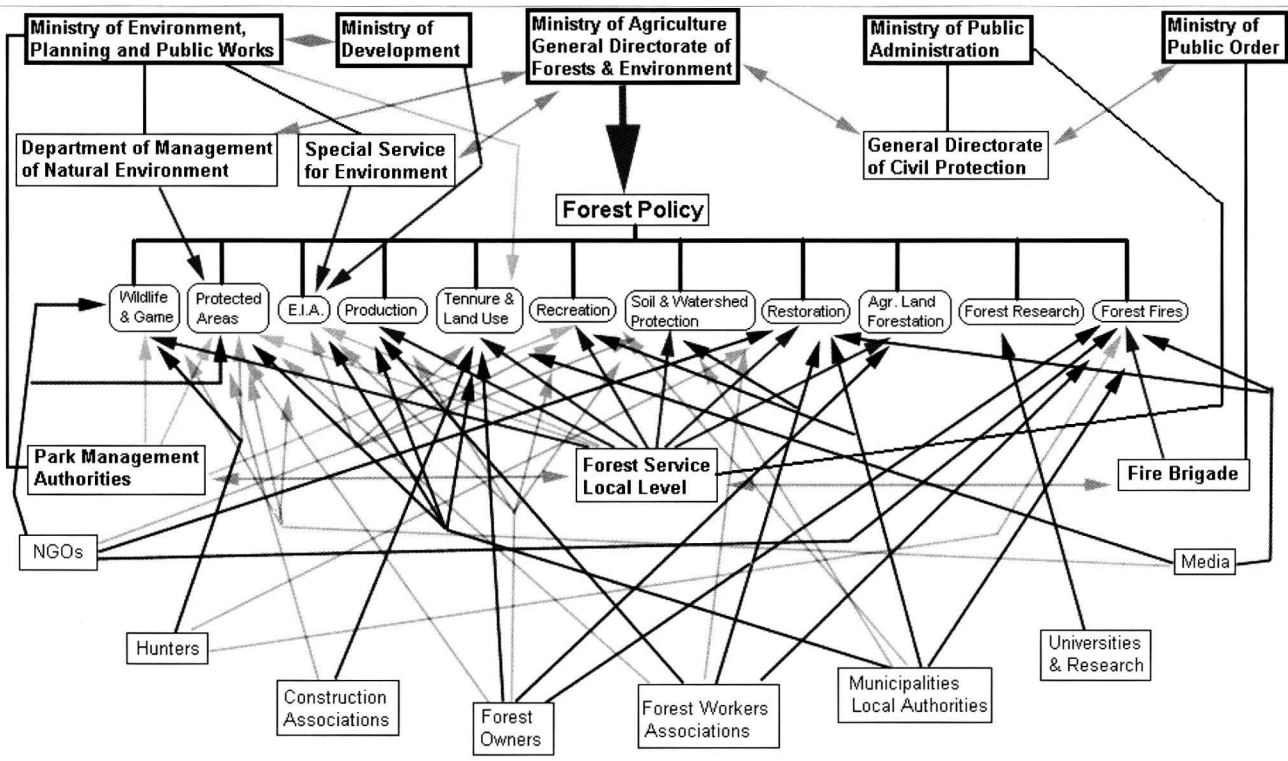
Another major issue is the fact that restoration is planned at the stand level and the broader landscape context – including economic and social issues – is not considered. So far, the aim of restoration activities has always been to return to the previous situation and not explicitly to re-establish the dynamic ecosystem functions (Papageorgiou and Kasimiadis, 2004).

4. Forest Landscape Restoration: a concept for the Mediterranean

Obviously, the classical reforestation approach does not apply to the Mediterranean and cannot guarantee the long-term production of goods and services for the society. A new approach is needed, which combined with sustainable forest management and forest protection can account for a promising conservation strategy for the region.

The concept of Forest Landscape Restoration (FLR), de-

Fig. 3. *The Greek Forest Policy Network*



veloped by IUCN and WWF (Maginnis and Jackson, 2003; Sayer et al., 2003) seems to be an appropriate basis for the maintenance and enhancement of biological and social values in the Mediterranean forests and other terrestrial ecosystems. This concept lays emphasis on the restoration of landscape functionality and respects their dynamic nature, as well as their complexity. It considers landscapes in a broader meaning, including biological and social values and parameters. the concept of Forest Landscape Restoration fills the gap between the sustainable management of productive forests and the protection of specific habitats and species and complements the protection and enhancement of ecosystem integrity, especially as far as degraded forests are concerned.

A main parameter of Forest Landscape Restoration is the effective involvement of stakeholders that can act positively in the Mediterranean, where most problems occur due to the lack of communication between several parties involved. Participation is encouraged and the long-term benefits for the society are maintained.

The concept of Forest Landscape restoration seems to be most appropriate for combating desertification in the Mediterranean, due to its holistic approach and the integration of social, economic and ecological parameters in planning procedures. Recent studies have described the lack of coordination between existing environmental and social policies, as one of the main reasons for the occurrence of desertification in the region (Briassoulis, 2004). Gaps and overlaps are recorded at the horizontal level between agencies and at vertical level, between policy makers and practitioners. A typical example of such a situation is the Greek forest policy, as it is organised in the Greek forest policy network. The ministry of Agriculture is responsible for the coordination of the national committee of the UNCCD and the development of strategies against desertification, but the implementing agents, that are mainly the local forest authorities, belong administratively to the Ministry of Public Administration (figure 3) (Papageorgiou et al., 2003).

Forest Landscape Restoration can facilitate the identification of this type of gaps and overlaps and act as an integration mechanism for existing policies, strategies and measures as well as combine land use planning with the management of resources, in a proper and sound way. From a biological point of view, desertification occurs when the dynamics of forest populations and ecosystems are disturbed to such an extent that they cannot recover from deforestation. The improvement of existing restoration efforts can contribute to the establishment of well-functioning forest ecosystems that can adapt to new environmental conditions and can enhance the desertification control.

5. Conclusions

The restoration of forest ecosystems, viewed at a landscape level, should not be regarded as a completely new concept in the complicated Mediterranean context. It should rather be introduced as a framework, where existing tools and mechanisms can be organized and become more effective. Restoring forest functions is beneficial for most of the related policies and sectors.

However, the application of Forest Landscape Restora-

tion on the ground will not be simple, mainly due to the differences within the Mediterranean region and the complexity of Mediterranean landscapes in a biological and socio-economic context. Possible constraints that may arise are:

- Negative reactions from existing forest authorities, due to the confusion of existing concepts and systems dealing with natural resources management and conservation.
- The Forest Landscape Restoration framework would be introduced in complex administrative and legal structures, where coordination and harmonious co-existence between different authorities is lacking.
- Participation does not have a legal and institutional basis in many Mediterranean countries, where the state is the one and only player accepted.
- Many Mediterranean countries do not have sufficient inventories, reliable data and appropriate land use regulations upon which a restoration strategy could be based.
- The success of such concepts often depends on the application of "good practices" in other activities and sectors.
- Forest Landscape Restoration is a tool to provide long-term benefits for the society. However, forces acting on the basis of short-term economic interests rule our world and they would probably oppose this approach.

These constraints can be removed, when the Forest Landscape Restoration approach is explained to all parties. It should not be seen as a new concept, but rather as a framework for coordinating existing mechanisms. The challenge for the success of this concept on the ground lies in the recognition of the need to shift to a broader temporal and spatial level. Some proposals on how to overcome the above-mentioned constraints are:

- Explain that FLR is not a "cookbook" and the approach cannot be applied everywhere, but it is rather dynamic and flexible allowing adaptation to each case. Stress that FLR combines the efforts of existing actions and measures.
- Involve local authorities from the beginning, asking for the views of experienced foresters and other people responsible for nature management. Accusations regarding inappropriate practices in the past should be avoided. In contrast, good examples from previous activities should be brought forward during the discussion.
- Seek for the added value of existing projects and try to influence "good practice" guidelines and strategies.
- Develop strategic alliances with state and private authorities in seeking for long-term maintenance of the production of goods and services in the forests.

The idea behind Forest Landscape Restoration is not only to improve restoration techniques, but also to influence practices and ways of operation of other sectors as well as policies that can contribute to the enhancement and maintenance of dynamic cycles within forest landscapes in the Mediterranean. Any step towards this target should be supported and multiplied and negative activities should be changed or improved. This requires a long-term perspective, which will contribute to the development of the complex and valuable Mediterranean forest ecosystems.

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