

MANAGEMENT OF ECOLOGICAL NETWORKS

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ABSTRACT

Preserving nature is a concern with quite a long tradition, but also with a long list of weaknesses that hinder the withstanding capacity against the most important economic and social pressures. Most of these drawbacks stem in the difficulties of assessing the value of ecosystem services, although their contribution to human welfare is beyond question. The paper addresses this topic by analyzing the concept of ecological network and the managerial approaches that attempt the integration of conservation efforts with sustainable use and equitable share of benefits.

KEYWORDS: *nature conservation, biodiversity, ecological networks, ecosystem approach*

Introduction

In the last decades environmental issues entered the global political agenda and several international programs focus on creating more and more effective programs for policy making. Biodiversity preservation comes as second in on the global environmental agenda. Considering the financial effort invested, it could be considered of similar importance as climate change (33% of GEF* funding is allocated for each of these issues).

Natural areas and their biodiversity are considered valuable as long as their preservation does not impair the use of resources or the level of potential income perceived by local communities. In other terms until a certain pressure, being it social or economic, does not exist local communities manage to preserve enough natural ecosystems to obtain their benefits in terms of provision, regulation or cultural services.

For a long while protected areas represented the “one and only” means of nature and biodiversity preservation. Alternatives to this approach were few, and much less effective. Nonetheless, protected areas and their management have little strength in fighting with real pressures and biodiversity loss continued, along with deforestation, hunting, fishing, tourist crowds and other means with proven economic benefits on short run.

After the second world summit on environment and development (Rio de Janeiro, 1992) one of the strategic visions on biodiversity preservation was adopted (Framework Convention on the Conservation of Biological Diversity - FCCBD, signed in 1994, Nairobi) and by its general goal it is recognized an important shift in approaching this issue. Within

* Global Environmental Facility

this framework and continuous increase of pressure in natural areas several new approaches appeared and their analysis could provide insights that will support more effective policy design and decision making in this field.

Characteristics of nature conservation problems

Ecosystem management addresses from a renewed perspective the early acknowledged need of nature preservation. Although it is enacted today based on a relatively recently developed theoretical framework, the concept itself was outlined well before. Thus, as early as 1935 it was noticed that a protected area does not represent an ecosystem. Further the concept of nature sanctuary inventory was advanced for the projection of resource management at landscape level. This neither gained too much success.

The main clash over any terrain emerges than its natural resources become valuable for more or less wide community. Demographic growth and economic development enlarged continuously human's need for space and for other resources. This increased pressure reduced both the surface occupied by natural ecosystems and their capacity to provide service type benefits. In fact, nature conservation it was likely to function well in case that the pressures were low to moderate. But it cannot withstand the assault of an oil company or a tourism development.

The characteristics of nature conservation problems were outlined by Lackey (1998) as being the following:

- fundamental public and private values and priorities are in dispute, resulting in partially or wholly mutually exclusive decision alternatives;
- there is substantial and intense political pressure to make rapid and significant changes in public policy in spite of disputes over values and priorities and the presence of mutually exclusive decision alternatives;
- public and private stakes are high, with substantial costs and substantial risks of adverse effects (some also irreversible ecologically) to some groups regardless of which option is selected;
- technical facts, ecological and sociological, are highly uncertain (after all, how certain are we over the long term consequences of farming nearly all of the tall grass prairie?);
- ecosystem policy problems are meshed in a large framework assuring that policy decisions will have effects outside the scope of the problem (think about the "taking" issue: which "rights" take precedence in public policy?).

Usually accomplishing nature conservation objectives imposes strong restriction on the deployment of human activities. Moreover, the delimitation and administration of "island" type protected area did not bring the expected benefits.

New approaches to nature conservation

Administration problems along with the ecological drawbacks of protected areas lead to the recognition that a wider approach is needed and that this approach will have to consider conservation beyond the territorial limits of parks and reserves.

In terms of authority the strongest contribution in this respect comes from the ecosystem approach. This was finalized and accepted as framework of post-Rio nature conservation and the fifth parties Conference signed at Nairobi in 2000.

Ecosystem approach is a landscape management strategy that promotes the conservation along with sustainable use and equitable repartition of benefits. It looks beyond the limits of protected areas and promotes inter-sector cooperation by putting humans in the core of the conservation efforts. The motivations that lie behind this new approach stem in the followings:

- Without an efficient ecosystem management economic development that human support welfare cannot be achieved;
- Without the involvement of various sectors of social and economic activity in ecosystem management biodiversity conservation cannot be made efficiently.

Ecosystem approach is based on the application of a proper scientific methodology, starting with the level of biological organization that comprises structure, processes, functions and interactions among organisms and their environment. Meanwhile it is recognized that humans, by their cultural diversity, are integral part of many ecosystems.

The operational models that allow the implementation of ecosystem approach are named ecological networks. According to Bennett (2004) these could have different forms such as: biosphere reserves; ecological networks; reserves networks; bioregional planning; conservation (biological) corridors; and ecoregion grounded conservation.

The characteristics that define the territories designated by the ecological network are the connectivity between natural areas and allowance for the use of natural resources within the limits of their recovery rate. These will be secured within an ecological network by delimitation of areas with different management objectives, as it presented in fig.1.

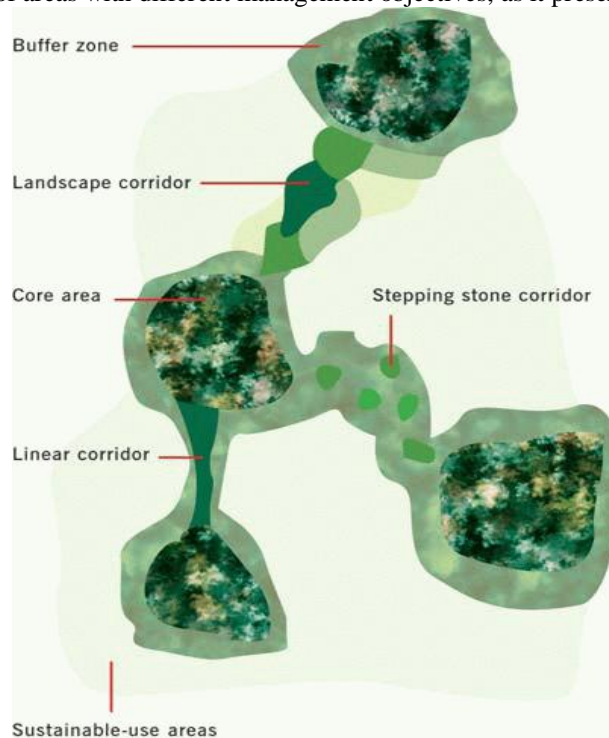


Figure 1 Structure of ecological network

Hence, the ecological network will comprise:

- ✓ Core areas (usually banned for extractive uses and restricted for non-extractive uses, such as visits);
- ✓ Buffer zones that surround core areas;
- ✓ Corridors that allow populations from different locations to have the chance to meet or migrate and results in equilibrium at meta-population level. These could be of three types: linear corridor, stepping stone corridor, and landscape corridor;

Such structures were implemented well before the approval of ecosystem approach and are easily recognizable in biosphere reserves Danube Delta (fig.2) or Mont Ventoux (fig.3) biosphere reserves.

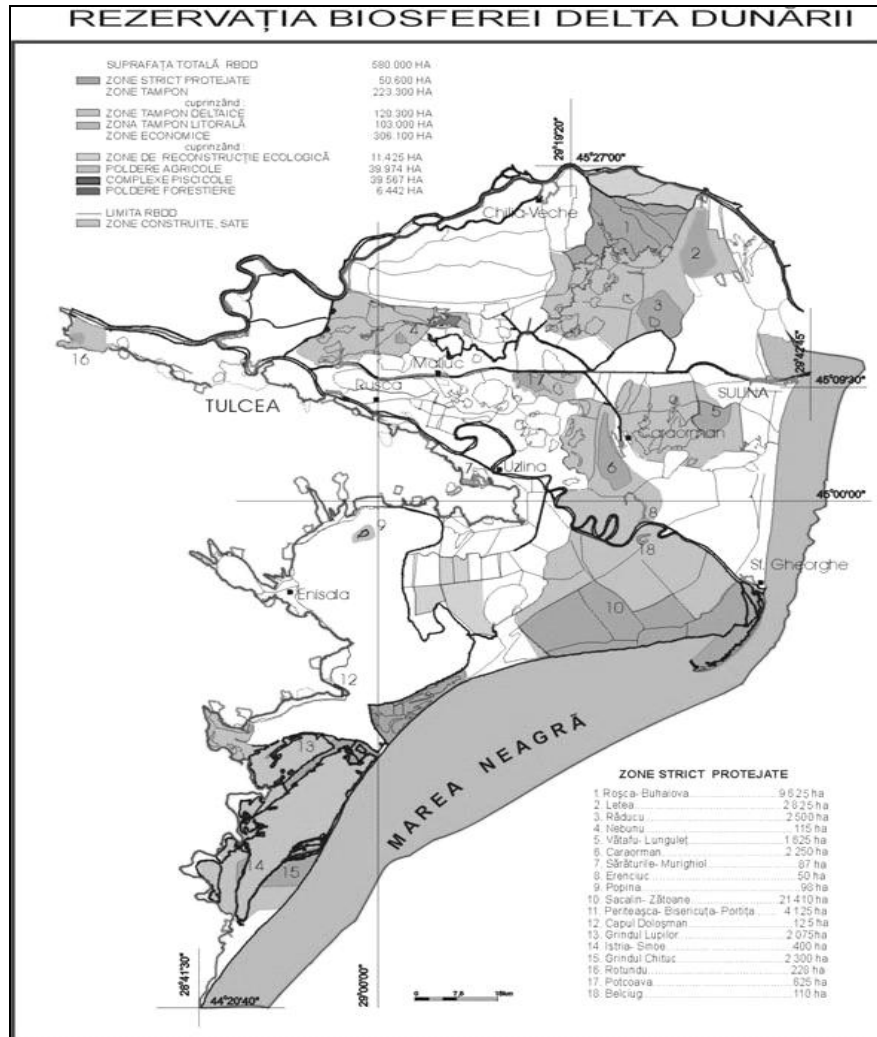


Figure 2 Structure of different management areas in the Danube Delta Biosphere Reserve

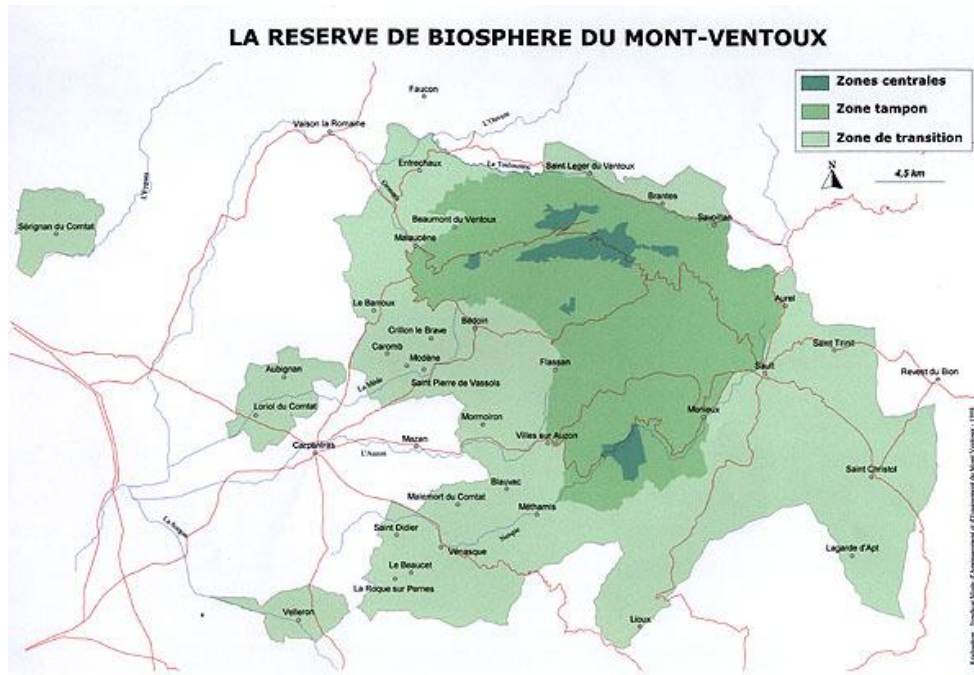


Figure 3 Structure of different management areas in the Mont Ventoux Biosphere Reserve

Principles to be considered in the management of ecological networks

In order to improve the application of ecosystem approach, twelve principles were drawn aimed to serve as guidance for reshaping or starting ecosystem management (see box 1). Although most of the studies refer to this set (Bran et al., 2004), there are also other guidance lines that envisage improving management of ecological networks (see box 2).

Box 1 *Ecosystem approach* principles

Principle 1: The objectives of management of land, water and living resources are a matter of societal choice.

Principle 2: Management should be decentralized to the lowest appropriate level.

Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.

Principle 4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem management programme should:

- (a) Reduce those market distortions that adversely affect biological diversity;
- (b) Align incentives to promote biodiversity conservation and sustainable use;
- (c) Internalize costs and benefits in the given ecosystem to the extent feasible.

Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.

Principle 6: Ecosystems must be managed within the limits of their functioning

Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.

Principle 8: Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
 Principle 9: Management must recognize that change is inevitable
 Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and sustainable use of biological diversity.
 Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.
 • Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

Source: Bran, F., Ioan, I., Trică, C.L. (2004), *Eco-economia ecosistemelor și biodiversitatea*, Editura ASE, București.

Box 2 Ecosystem management *pillars*

- Ecosystem management reflects a stage in the continuing evolution of social values and priorities; it is neither a beginning nor an end.
- Ecosystem management is place-based and the boundaries of the place of concern must be clearly and formally defined.
- Ecosystem management should maintain ecosystems in the appropriate condition to achieve desired social benefits; the desired social benefits are defined by society, not scientists.
- Ecosystem management can take advantage of the ability of ecosystems to respond to a variety of stressors, natural and man-made, but there is a limit in the ability of all ecosystems to accommodate stressors and maintain a desired state.
- Ecosystem management may or may not result in emphasis on biological diversity as a desired social benefit.
- The term sustainability, if used at all in ecosystem management, should be clearly defined — specifically, the time frame of concern, the benefits and costs of concern, and the relative priority of the benefits and costs.
- Scientific information is important for effective ecosystem management, but is only one element in the decision-making process that is fundamentally one of public or private choice.

Source: Lackey, R.T. (1998), Ecosystem management: paradigms and prattle, people and prizes, *Renewable Resources Journal*. 16(1), pp.8-13.

Comparing these two approaches it could be noticed that the narrow framework of conservation biology and the single goal of biodiversity preservation became obsolete than the conservation activity is looked from an efficiency perspective. The needs of humans are, after all the ones that count. Biodiversity and natural ecosystems are means of delivering goods and services that satisfy direct needs such as food, timber, fiber, or indirect needs such as climate regulation, soil preservation, and water availability.

Conclusions

Biodiversity loss is one important environmental concern at global level, coming second after climate change. Although conservation efforts started quite early (in the nineteenth century) their outcomes are not conclusive since no protected area could not withstand serious economic or social pressures.

The conservation philosophy was rethought after 1992 and in 2000 a new approach emerged that added up to conservation of biodiversity as single goal, the need to provide a framework for sustainable use of resources and for an equitable share of benefits from this use.

The operational forms of applying this new vision is represented by ecological networks and within each of them territories are differentiated in terms of management objectives. Guidance for the implementation of the new approaches is provided by principles that highlight the need for consultation, proper assessment of economic implications and to use not only scientific knowledge but, traditional one too in the management of ecological networks.

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