

Effectiveness of conservation policies for the maintaining of Natural capital

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Abstract

The landscape that we observe should be understood as a Social Ecological System (SES), where there is a narrow interdependence between ecological processes and economic-manufacturing processes. The identification of areas that are worthy of protection (SPZ, CIS etc.) and the subsequent institution as natural protected areas, is an instrument that society use to preserve Natural Capital (NC) and ecosystem services that it provides. The aims of this paper is to analyse the role that different conservation policies play in maintaining the flow of the NC. So, a retrospective analysis was carried out in two protected areas with different degree of protection: the Natural Reserve of "Torre Guaceto" and the Regional Park of "Saline Punta della Contessa". Both natural protected areas are localized along the coast in the Apulia region, and the first was designated as a natural protected area in 2000 while the second was designed in 2002. With the aim to realize a multi-temporal analysis of NC flow, we have used the economic coefficients proposed by Costanza et al in 1997, as surrogate of NC. This study highlights that the institution of a natural protected area produces positive effects for the maintaining of NC independently from the type of management. Indeed, although in both areas the natural value was recognized in the past, they have suffered the loss of NC flow during the time until their official institution. This study shows that to make effective the conservation policies, it is necessary to identify a management authority that can monitor carefully some landscape transformations, setting, where necessary, the appropriate limitations.

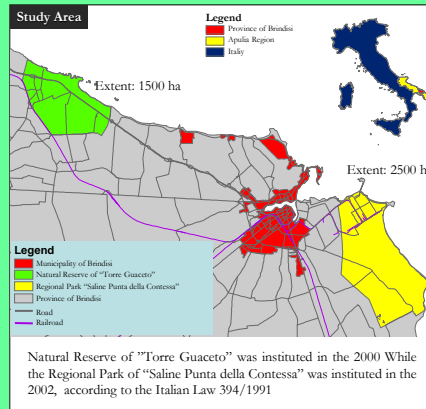
Introduction

In Europe, landscape is the expression of continuous and overall millennium interactions between human activities and natural processes. Human activities have shaped and sculpted landscape with a distinctly touch, altering the natural disturbance regime (Moloney and Levin; 1996, MEA, 2005). Currently, Land-use/Land Cover changes are the underlying cause of fragmentation and habitat loss (Alcamo and Bennett, 2003). Therefore, landscape can be meant as a Social Ecological System, SES (Westley et al., 2002), or rather a complex and adaptive system (Levin, 1998) where the interactions among ecological patterns and processes, economic-manufacturing processes and administrative political organization of society, interact each other. Considered the complexity that characterizes this interaction, a way to understand better the dynamics of landscape may be the study of Natural Capital (NC) dynamics associated with the landscape. The NC consists of a mix of goods and services provided by multi-functional landscapes (de Groot, 2006). It represents the overall result of a wide range of processes and interactions through which the natural components of SES, and the species that are part of them, help, sustain and fulfill human well-being and quality of life (Costanza et al., 2007). The idea of NC is a useful framework in which it is possible to consider as a whole, the output of goods and services associated with an entire landscape, viewed as a mosaic of different land cover elements (Haines-Young, 2000).

In this context the aims of this research is to carry out a retrospective analysis of the SESs of Natural Reserve of "Torre Guaceto" and Regional Park of "Saline Punta della Contessa" to: assess the temporal dynamics of land use and land cover mosaics across the natural capital that they support, using the economic valuation of ecosystem goods and services as surrogate; verify if all the past environmental conservation policies has been effective to foster the NC in these natural protected areas.

Even if this approach is not very accurate, it is useful to arrange a first-approximation of the change of overall NC flow under the current and the past managements regimes.

Results



Material and Methods

We compiled a time series of land use and land cover maps for the years 1943 1954, 1987, 1997 and 2004 for the Natural Reserve of "Torre Guaceto" and for the years 1954, 1997 and 2006 for the Regional Park of "Saline Punta della Contessa", by interpreting 1 x 1 meter rectified aerial photos.

We identified 16 terrestrial land-use and land-cover classes to describe both spatial and temporal landscape dynamics as well as to assess changes in Natural Capital Value (NCV) based on Costanza et al's (1997) ecosystem services valuation biomes model (Table 1).

The most representative biome was used as a proxy for each class (Table 1).

Natural Capital Value

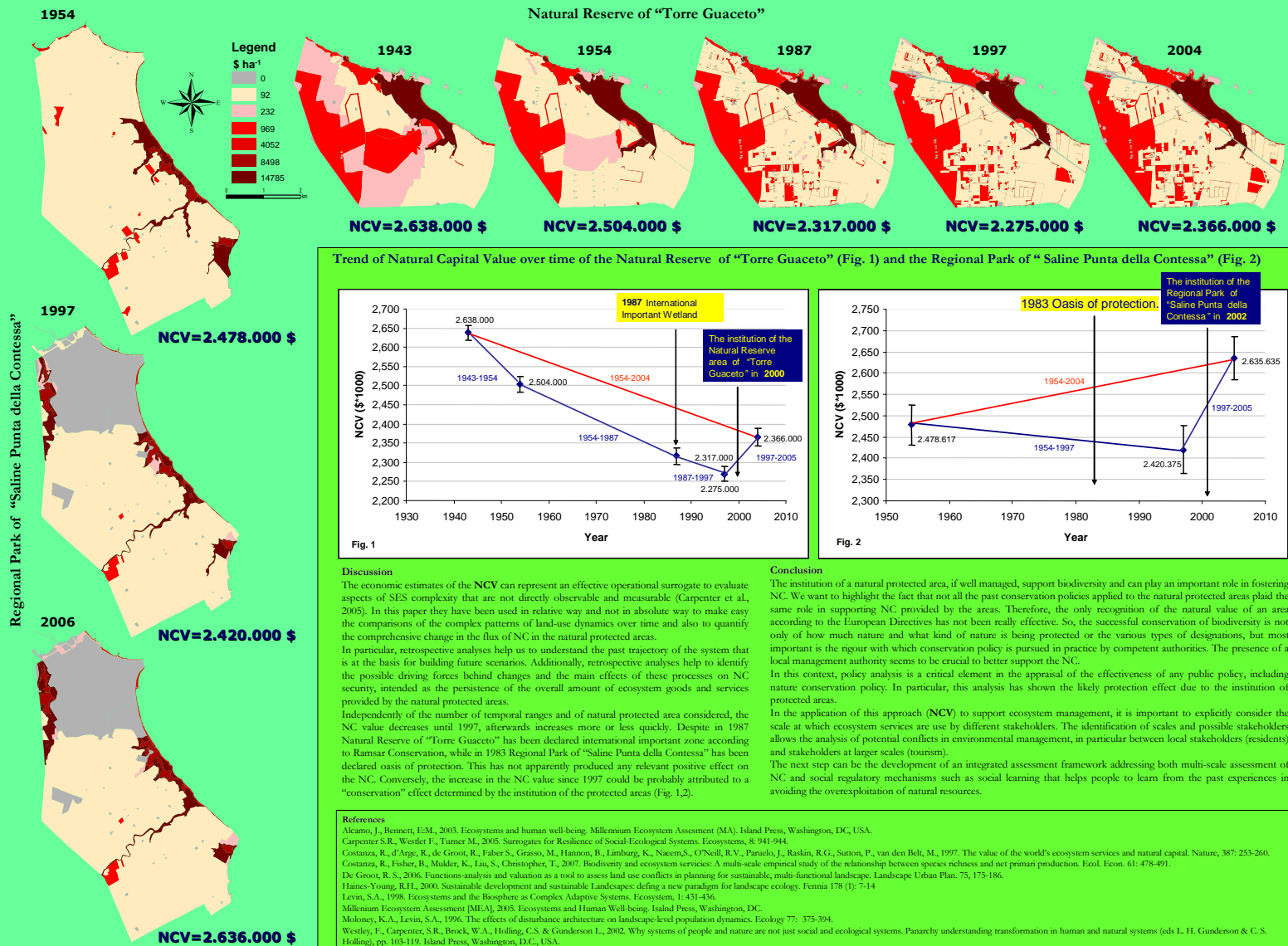
$$NCV = \sum_k A_k * VC_k$$

Where:
 A_k is the area (ha);
 VC_k is Costanza's Value coefficient (\$ha-1 per year) for Land-use/Land-cover class 'k'.

(Table 1).

Land cover categories	The most representative biome	Ecosystem service coefficient (\$ ha ⁻¹ per year)
Urban	URBAN	0
Railroad		
Street		
Rocky coast	ROCK	
Snow-able ground	CROPLAND	92
Uncultivated ground		
Grassland	GRASSLAND	232
Mediterranean scrub		
Almond land		
Olive grove	FOREST	969
Reforestation area		
Tamarisk		
Juniper		
Coastal beach	COASTAL BEACH	4052
Periodically under inundation land	WETLANDS	14785
Wetland		

Map of Natural Capital Value



Trend of Natural Capital Value over time of the Natural Reserve of "Torre Guaceto" (Fig. 1) and the Regional Park of "Saline Punta della Contessa" (Fig. 2)

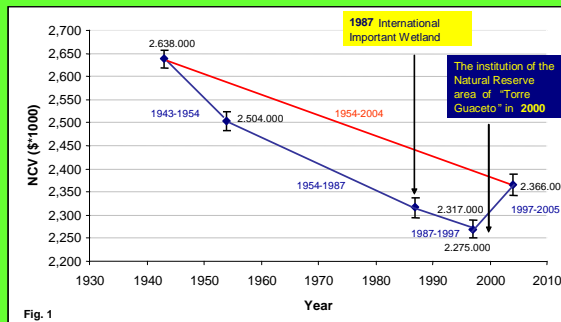


Fig. 1

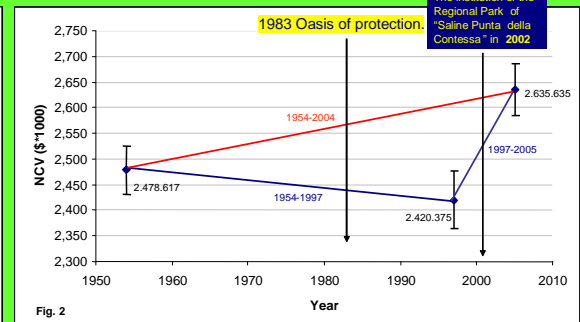


Fig. 2

Discussion

The economic estimates of the NCV can represent an effective operational surrogate to evaluate aspects of SES complexity that are not directly observable and measurable (Carpenter et al., 2005). In this paper they have been used in relative way and not in absolute way to make easy the comparisons of the complex patterns of land-use dynamics over time and also to quantify the comprehensive change in the flux of NC in the natural protected areas. In particular, retrospective analyses help us to understand the past trajectory of the system that is at the basis for building future scenarios. Additionally, retrospective analyses help to identify the possible driving forces behind changes and the main effects of these processes on NC security, intended as the persistence of the overall amount of ecosystem goods and services provided by the natural protected areas. Independently of the number of temporal ranges and of natural protected area considered, the NC value decreases until 1997, afterwards increases more or less quickly. Despite in 1987 Natural Reserve of "Torre Guaceto" has been declared international important zone according to Ramsar Convention, while in 1983 Regional Park of "Saline Punta della Contessa" has been declared oasis of protection. This has not apparently produced any relevant positive effect on the NC. Conversely, the increase in the NC value since 1997 could be probably attributed to a "conservation" effect determined by the institution of the protected areas (Fig. 1,2).

Conclusion

The institution of a natural protected area, if well managed, support biodiversity and can play an important role in fostering NC. We want to highlight the fact that not all the past conservation policies applied to the natural protected areas played the same role in supporting NC provided by the areas. Therefore, the only recognition of the natural value of an area according to the European Directives has not been really effective. So, the successful conservation of biodiversity is not only of how much nature and what kind of nature is being protected or the various types of designations, but most important is the rigour with which conservation policy is pursued in practice by competent authorities. The presence of a local management authority seems to be crucial to better support the NC. In this context, policy analysis is a critical element in the appraisal of the effectiveness of any public policy, including nature conservation policy. In particular, this analysis has shown the likely protection effect due to the institution of protected areas. In the application of this approach (NCV) to support ecosystem management, it is important to explicitly consider the scale at which ecosystem services are use by different stakeholders. The identification of scales and possible stakeholders allows the analysis of potential conflicts in environmental management, in particular between local stakeholders (residents) and stakeholders at larger scales (tourism). The next step can be the development of an integrated assessment framework addressing both multi-scale assessment of NC and social regulatory mechanisms such as social learning that helps people to learn from the past experiences in avoiding the overexploitation of natural resources.

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