

A FRAMEWORK FOR NON MARKET VALUATION OF CULTURAL ECOSYSTEM SERVICES IN BIOSPHERE RESERVES



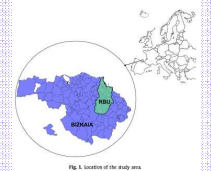
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1. Introduction

In the last decades, changes in land use and management have led to the degradation of many ecosystem services (provision, regulation and cultural). However, the cultural services are perhaps the most fragile actually (Villa, 2010) because these services have not market values and they are not included in the decision making process. This fact is more worrying in areas devoted to social–environmental protection, as it is the case of *Biosphere Reserves*. Thus, there is a need to generate methodological frameworks able to value the cultural services at different scales for its inclusion in the management decision-making process (Mooney et al., 2005).

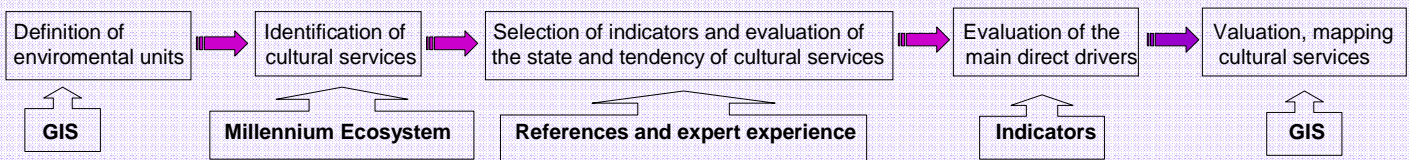
The *Urdaibai Biosphere Reserve* (UBR) located in the Northern region of the Iberian Peninsula was a typical agrarian mosaic landscape where smallholdings and multiple land uses are present. Over time, this area maintained a high level of landscape diversity together with a viable and ecologically sustainable production system. However, the changes of land uses occurred in the last decades have led to the homogenization of the landscape increasing its vulnerability to the spread of disturbance and, thus altering its capacity to supply ecosystem services.



The main objective of this study is to generate methodological frameworks to value (no economic) the cultural services in the *Biosphere Reserves*.

2. Methods

The methodological procedure followed was as follows:



3. Results

Map of Environmental units

Cultural Services	Indicators
Recreational activities	- Nº of visitors /year - Nº of tourist accommodation and overnight stays - Tourist activity (€/year) - Nº hunting and fishing licenses - Hunting and fishing activity (€/year) - Nº of new recreational activities
Scientific knowledge	- Nº of publications - Nº of research projects
Environmental education	- Nº environmental education programs - Nº of visitors/year to Interpretation Center
Traditional knowledge	- Study cases
Aesthetic enjoyment	- Visual quality
Cultural identity	- Nº of speakers of different languages - Local variety of plants - Average age of population - Centers of population loss

Cultural Services	Tendency	Importance	State
Recreational activities	↗	High	😊
Scientific knowledge	↗	High	😊
Environmental education	↗	High	😊
Traditional knowledge	↔	High	😞
Aesthetic enjoyment	↘	High	😞
Cultural identity	↘	High	😞

Service importante: Low (red), Medium (yellow), High (green).
Service tendency: Improvement (green arrow), Tendency mixed (yellow arrow), Deterioration (red arrow).

Indicators used to value the tendency and importance of cultural services in Urdaibai

Direct Drivers	Indicators
Land uses changes	- Land use changes area (ha)
Climate changes	- Precipitation average (mm/year) - Evapotranspiration (Kg/m ² /s) - Temperature average (°C/year) - Emissions of GHG (MTm)
Contamination	- Air Quality - Waste quantity (kg) - Nº of cars - Nº of industries - Nº of waste to river, estuary... - Water quality of rivers
Invasive species	- Nº invasive species
Changes in biogeochemical cycles	- Resilience - Soil loss by erosion (T/ha)
Overexploitation	- Nº of the threatened species - Hunting and fishing quantity (Tm) - Nº and area of exploitations (ha)
Destruction and abandonment	- Farming population (%) and age - Destroyed or abandoned property (%)

Cultural Services	Direct Drivers					
	Land use changes	Climate change	Contamination	Invasive species	Changes in biogeochemical cycles	Overexploitation and abandonment
Recreational activities	↗	↗	↗	↗	↗	↗
Scientific knowledge	↗	↗	↗	↗	↗	↗
Environmental education	↗	↗	↗	↗	↗	↗
Traditional knowledge	↔	↔	↔	↔	↔	↔
Aesthetic enjoyment	↘	↘	↘	↘	↘	↘
Cultural identity	↘	↘	↘	↘	↘	↘

Drivers intensity: Low (red), Medium (yellow), High (green).
Tendencies: Improvement (green arrow), Tendency mixed (yellow arrow), Deterioration (red arrow).

Indicators used to value the intensity and tendency of direct drivers

Maps of valuation of recreation and aesthetic enjoyment services

4. Conclusions

The “Plan de acción de Madrid” adopted by the MAB (2008) states that it is essential to strengthen the role of Biosphere Reserves to address issues related to the provision of ecosystem services. Thus, it is necessary to generate methodological frameworks able to value the ecosystem services at different scales for its inclusion in the management decision-making process, specially cultural services because they have not market value and they are not included in the decision-making process.

This study has showed that in the case of Urdaibai Biosphere Reserve this methodology is very valid to value the cultural services. Moreover, this methodology has showed that in recent years some of the cultural services, despite being very important in the reserve, have suffered a deterioration mainly due to land uses changes and to the destruction and abandonment of heritage. Thus, It can be said that even those ecosystems that are in reserve areas may suffer a loss of ecosystem services, so it is very important to perform studies of this type.

5. References

- Mooney, H., Cooper, A., Reid, W. 2005. Confronting the human dilemma: How can ecosystems provide sustainable services to benefit society? *Nature* 434, 561-562.
 - Villa, A., 2010. *Servicios ecosistémicos en las Reservas de la Biosfera de Andalucía, España: expresiones culturales y turísticas*. pp. 101-118. En: *Reservas de la Biosfera: su contribución a la provisión de servicios de los ecosistemas; experiencias exitosas en Iberoamérica*. Ed. Valente.

Acknowledgements

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