

COST ASSESSMENT FOR BIODIVERSITY CONSERVATION AND SUSTAINABLE USE OF ITS COMPONENTS IN MACIN MOUNTAINS AREA

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Abstract

The diagnosis of economic and financial activity on biodiversity conservation in protected areas is an important support for improving their management. By conducting this approach, we propose some criteria of classification and of characterization of activities, as well as, the informational and methodological support to assess the costs. The applicability of the proposals is exemplified for the Măcin Mountains area from Romania. So, in the absence of locally longer experience, cost evaluation of biodiversity conservation might be based in certain circumstances, on the transfer of information arising from alleged ongoing projects in the field of application of EU Directives and these projects could support the creation of a database that is so needed to assess the costs of biodiversity conservation.

Keywords

biodiversity conservation, costs, information, sustainable use.

Introduction

Legislative and institutional support of protected areas management has known a permanent consolidation on the background of the knowledge to improve relations between natural capital as a system, and socio-economic system, both at global, regional and national level. From a practical standpoint, the operational difficulties of management of protected areas, at least in Romania, derived from socio-economic performance, which limits the amount of resources that can be allocated for this purpose, and the lack of an adequate framework for assessing the costs and implicitly for establishing the costs. In this paper, we proposed an algorithm presentation to ensure consistency and objectivity needed to assess the costs as a prerequisite for increasing the efficiency of biodiversity conservation.

1. Literature review

The assessment of environmental costs represents a highly debated issue internationally, because the negative effects of human activities on biodiversity and environment has increased a lot in the last century and the attribution of a value on biodiversity loss or environmental degradation is hard to address. Many species and ecosystems are endangered that is way they must be protected. In this context, the biodiversity conservation is vital. Hooper and al. (2012) have assess the impact of biodiversity losses on ecosystem change and their analysis showed a clear dependency of ecosystem change on the local losses of species, which generate an effect on changes in productivity and decomposition. Mittermeier and al. (2003) have proposed a methodology for assessing the value of biodiversity conservation focusing particularly on assessing the irreplaceability in terms of species endemism. Groot and al. (2010) made a classification of ecosystem services and presented some ways of quantifying and valuing the ecosystem services, because nowadays “the investments in conservation, restoration and sustainable ecosystem use are increasingly seen as a “win-win situation” which generates substantial ecological, social and economic

benefits". Christie and al. (2012) consider that is required to build a capacity on valuing biodiversity in developing countries and present an evaluation of monetary and non-monetary techniques for assessing the value of biodiversity to people in least developed countries, because the biodiversity conservation is important in increasing the social welfare.

Economic valuation of biodiversity is important for the development of policies that protect biodiversity and alleviate poverty

2. Results and discussion

2.1 Categories of activities

Activities contained in the action plan can be grouped considering the field of deployment, content and technical characteristics of the results.

1. Depending on the field of deployment:
 - environmental activities,
 - industrial activities,
 - activities in agriculture,
 - activities in construction and transportation,
 - activities in the field of services.
2. Depending on the content:
 - drafting studies and documentaries,
 - database creation,
 - elaborating strategies and sectorial action plans,
 - providing technical and material support,
 - providing financial support,
 - promoting best practices,
 - communication and education.
3. Depending on the technical features of the results:
 - technical assistance,
 - investment,
 - management (operation and maintenance, administrative).

We appreciate that from the perspective of assessing the costs of premises and determining priorities, the second criterion is more relevant. In this case, the group activities in the Action Plan are as follows:

- drafting studies and documentaries: A2,3,4, B2,6,18, C1, C1.1.,1.3, C2.1,2.2.,2.4,3.1,4.1,4.3,6.2,6.6, D1, F1;
- creating the database and information: B4,5;
- elaborating strategies and sectorial action plans: B6,14,17, C1.2,2.3,2.5,2.6,4.2, E2, G1;
- providing technical and material support: B 10,11,12,13,14,16, C1.4,1.5,1.5,1.7,3.7,3.8,3.9,3.10,5.2,5.3,5.4, 5.5, 5.6,6.4,6.5, F3,4;
- providing financial support: A1, B1,7,8,9, C3.3,3.4,3.5,6.1, E1;
- promoting best practices: C3.6,5.1,5.7, D2, F1,2,5;
- communication and education: G2,3,4.

2.2 Informational and methodological support

2.2.1 The income and expenses budget: It represents a standard document prepared by the Administrations of National Parks, based on a methodology which responds, on the one hand, to the requirements of the analysis of each budgetary year, and, on the other hand, to the reflection of the activities of the National Parks in the System of National Accounts. We emphasize, however, that the budget proposals and their execution does not reflect the gap

between the necessary resources for the functioning of protected areas and those actually used for this purpose. The degree of failure of the objectives assumed by national parks administrations would allow, however, an approximate evaluation of the potential costs, taking into account the nonlinear nature between the funding (underfinanced) and the attainment of the objectives. For example, in the case of the National Park Nera Gorges, the annual expenditure for 2008 were evaluated at an average of 3 € per hectare (at an exchange rate of 3.93) of which:

- maintaining trails and refuges: 0.012 €
- ecological activities: 0.17 € .
- public awareness and education: 0.15 €

2.2.2 Technical assistance to comply with the Directive on Environmental Impact Assessment (EIA), project EUROPAID /112525/D/SV/RO

In order to estimate EIA costs have been assumed an empirical approach and a macroeconomic one; the empirical approach involved analyzing the data provided by several companies which have developed EIA in various fields (industry, agriculture, etc.) while the macroeconomic approach was intended to express the EIA costs as a share of gross fixed capital formation, respectively of investment value. To this was added also the analysis of other EU countries (UK, Netherlands, Denmark, the Baltic countries). The average cost of EIA was calculated based on an acceptable number of EIA divided into three size categories of projects value, resulting in a weighted average cost of \$ 1389 per project (calculations were made in 2000 at an exchange rate of 21692.74 lei / \$. In the case of 18 investment projects (on different fields and levels of investment), for which EIA have been developed, EIA costs ranged between 0.01% and 2.6% of the investment, the weighted average being of 0.5%.

2.2.3 Technical assistance to assess environmental costs and to develop the investment plan, project EUROPAID/113747/D/SV/RO

Assessing the costs has covered critical investment projects, grouped in four sections - water, wastewater, air pollution and industrial pollution, nature protection - 2007-2013. Data analysis and projections referred to:

- private projects,
- projects proposed by the National Environmental Protection Agency,
- urban environmental infrastructure projects proposed by the Ministry of Environment,
- other projects in preparation for co-financing with the support of International Financial Institutions (IFI).

The findings and results relevant to assess the costs of applying the Action Plan for the conservation of protected areas in the area of Măcin Mountains are:

Table 1. Investments for critical projects in the areas of „water”, „waste”, during 2007-2013 (mil.€)

Area \ Field	Drinking water	Urban Wastewater	Nitrates	Waste *
Romania	1963.2	3124.6	163	1002
South-East Region	250.6	364.3	27	127

* Waste Framework Directive and storage

Table 2. Expenditure for "nature protection" during 2007-2013 (mil.€)

Area \ Field	Field	Technical assistance	Non-recurrent management	Recurrent management*	Total
Romania		170.4	22.3	206.3	399
South-East Region		66.5	8.7	80.4	155.6

* daily activity and monitoring

Table 3. Non-recurring management costs, species and habitat inventory* during 2007-2013 (€/ha)

Area \ Field	Non-recurrent management		Species and habitat inventory	
	Total	Yearly	Total	Yearly
Mountain	3.78	0.54	15	2.1
Hillside	3.51	0.50	7	1
Wetland	3.24	0.46	13	1.85
Plain	2.97	0.42	5	0.71

* Based on a pilot project for inventorying the species and habitats in the five biogeographical regions of Romania.

Table 4. Level of expenditure per person to implement the Directives "water", "wastewater", "waste" (€/person)

Directive	Period of time	Annual cost	Cumulative cost
Drinking water	2006-2015	3.06	30.6
Wastewater	2006-2018	4.72	61.3
Municipal waste	2006-2017	4.22	50.7

Table 5. Unit cost* for national protected areas for future Natura 2000 sites during 2007-2013 (€/ha)

No.crt.	Activity	Total	Annual
1	communication	4.5	0.64
2	public awareness	1	0.14
3	administration	1	0.14
4	scientific research	2.5	0.36

*unit costs (operation, maintenance, administrative) of standard protection and conservation measures were calculated on the basis of expenditure from 2004; the average unit cost in Romania was 2.57 € / ha, and for the Măcin Mountains National Park, 1.86 € / ha.

For Natura 2000 sites, the average unit cost was 99 € / ha, but the estimates were based on 25 € / ha, as some areas targeted by LIFE Nature (for which were developed projects and therefore are known the costs) will represent only 25% of sites Natura 2000.

2.3 Expenditure assessment

2.3.1 Expenditure on "technical assistance"

Projected expenses for South-East Region during 2007-2013:

Cumulative expenses:	66.5 mil €
Annual expenses:	9.5 mil €
The population of South-East Region (at 1.07.2010):	2 806 204
Annual expenditure on "technical assistance" on a person:	3.4 €
Population of the Măcin Mountains area:	65 444 persons

Annual expenditure on technical assistance in the Măcin Mountains (2007 prices) : 222 thousand €/year

annual expenditure on technical assistance in Măcin Mountains area (2010 prices): 211 thousand €/year

2.3.2 Expenditure with "investments"

Annual expenditure per hectare per landforms (2010):

- mountain : 0.51 €/ha
- hill: 0.47 €/ha
- plain: 0.40 €/ha
- wetland: 0.43 €/ha

Distribution of protected areas in Măcin Mountains area, per landforms:

- mountain: 29 695 ha
- hill, plain: 65961 ha
- wetland: 1400 ha

Annual expenditure of investments in Măcin Mountains area

$$29695 \text{ ha} \times 0,51 \text{ €/ha} + 65961 \text{ ha} \times 0,435 \text{ €/ha} + 1400 \text{ ha} \times 0,43 \text{ €/ha} = 44\,440 \text{ €/an}$$

2.3.3 Administration costs (operational, maintenance, administrative)

Administrative expenses will be assessed in two ways:

- Option A: Based on the average cost of standard measures of Măcin Mountains National Park;
- Option B: based on the average cost of standard measures of Romania's National Parks (version B is also taken into consideration for reducing the effect of "underfunding" nature protection on cost estimation).

In the "standard measures" taking into account the practice from Romania until 2004, are not included (fully or partially) the following activities:

- communication,
- public awareness,
- administration,
- scientific research.

a) Administration costs of protected areas of national interest from Măcin Mountains Area:

Considering that the area of protected areas of national interest from Măcin Mountains is 11150 ha, than in table 6 are presented the "standard" expenses and "full cost" (2010 prices).

Table 6. Expenses on protected areas of national interest from Măcin Mountains

Expenses	Version	€/ha/year		Thousand €/year	
		A	B	A	B
Standard expenses		2.6	3.5	29	39
Full expenses		4.4	5.3	4.9	59

b) Management costs of protected areas Natura 2000

Considering that the surface of Natura 2000 protected areas in the Măcin Mountains is 85 907 ha, than the standard expenses is 35 €/ha/year and full expenses is 36.8 €/ha/year (2010 prices). So, the total expenses are $36.8 \text{ €} \times 85\,907 \text{ ha} = 3161.4$ thousand €/year.

c) Total administrative expenses (2010 prices) are as follows:

Version A: $49 + 3161.4 = 3210.4$ thousand €/year

Version B: $59 + 3161.4 = 3220.4$ thousand €/year

2.3.4 Environmental expenses with infrastructure (2010 prices) are presented in table 7.

Table 7. Environmental expenses with infrastructure (2010 prices)

Environmental infrastructure	Forecasted cost for South-East Region (thousand €/person/year)	Population of Măcin Mountains Area (thousand €/year)	The cost for Măcin Mountains Area
Drinking water	12.1	65 444	792
Waste water	17.6	65 444	1152
Waste	6.1	65 444	399
Total	-	-	2343

2.3.5 „Other expenses” (rehabilitation of monuments, flood protection, rehabilitation of irrigation systems, manufacturing and service activities, etc.) may be approximated as a percentage, taking as a basis for calculating the costs already identified.

2.3.6 Expenditure on biodiversity conservation and sustainable use of its components, in the Măcin Mountains area are detailed in table 8.

Table 8. Expenditure on biodiversity conservation and sustainable use of its components in the Măcin Mountains area

No.crt.	Category of expenditure	thousand €/year	
		Version A	Version B
1	Expenses with technical assistance	211	211
2	Expenditure with investments in nature protection	44.4	444
3	Expenses for the management of protected areas (operating, maintenance, administrative)	3210	3220
4	Environmental expenses with infrastructure	2343	2343
	Total	5808.4	5818.4

Conclusions

In the absence of locally longer experience, cost evaluation of biodiversity conservation might be based in certain circumstances, on the transfer of information arising from alleged ongoing projects in the field of application of EU Directives. The activities of the Action Plan of the protected area must represent to a greater extent the reflection of the goals and the objectives of the Management Plan and not to answer the principle "The more resources we request the more we receive", thus reinforcing the perception of a situation of underfunding. The information from Income and Expenditure budgets of protected areas, at least at national level should be subject to relevant tests, whose results to feed a database needed to assess the costs of biodiversity conservation.

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