

MEDITERRANEAN MARINE AND COASTAL ECOSYSTEMS: AN ECONOMIC VALUATION

Didier Sauzade ^{2*}, Anaï Mangos ² and Jean-pascal Bassino ¹

¹ University Montpellier III

² Plan Bleu - dsauzade@planbleu.org

Abstract

This study proposes a first exploration at the scale of the 22 Mediterranean countries of the economic value of sustainable benefits to society provided yearly by marine and coastal ecosystems. The methodology is adapted from the System for Environmental and Economic Accounting of the United Nations. Using available data at national and regional level, total benefits for all the riparian countries are estimated at 29.4 billion € i.e. 15% of Greek Gross National Income (GNI), or 130 % of Tunisian GNI.

Keywords: *Coastal Management, Economic valuation, Ecosystem services, Eastern Mediterranean, Western Mediterranean*

Blue Plan (UNEP/MAP), whose mission is to inform stakeholders for sustainable development in the 22 Mediterranean countries, has been entrusted to assess the economic value of benefits provided by Mediterranean marine and coastal ecosystems. The objectives are to enhance awareness of these benefits to society and offer policy makers a common metric for better management [1].

Material and methods

Benefits provided by ecosystems to people are obtained from ecological services (Tab. 1), following a widely accepted classification. The economic valuation method used is adapted from SEEA [3] and is restricted to sustainable and direct benefits (e.g. fishing excluding over fishing and seafood processing). Estimation of benefits is based on computable substitutes, or proxy values (see Tab. 2) computed for the reference year 2005 using available ecosystem characteristics and national or regional level data extracted from various public databases (Fishstat, Labor-stat, UNdata, AQUASTAT, Eurostat...) such as fish catches, value added (VA), labor force... Various value transfer methods had been used when necessary. All calculations are available.

Tab. 1. List of the estimated benefits, adapted from [2]

Category	Ecological services	Estimated benefits
Production services	Food production	Resource rent of fisheries & aquaculture
	Raw materials	Resource rent of marine sand extraction
Regulation services	Gas & climate regulation	Global climate regulation (value of CO ₂ sequestration)
		Regional climate regulation (value of rainfall due to sea evaporation)
	Disturbance prevention	Coastal protection due to <i>Posidonia</i> meadows
	Bioremediation of waste	Storage, burial & recycling of waste water
Cultural services	Leisure and recreation	Resource rent of tourism, hotels & restaurants and real estate in coastal areas
	Cognitive benefits	Not counted
	Cultural heritage & identity Future unknown & speculative benefits	
Support services	Various supports to other ecological services	Not counted to avoid double counting

In short, the resource rent of fisheries and aquaculture was estimated on the sector VA, overfishing and other non sustainable practices being expressed by an overall coefficient valued to 80% derived from [4]. Resource rent for tourism, hotels, restaurants and real estate was evaluated at 5% of their VA in coastal areas through a multiple regression analysis of the coastal attractive effect computed on NUTS-3 Eurostat data. Erosion protection was appraised on the basis of the avoided coastal protection expenditures for approximately 1000 km of coast length, this figure being derived from available data on coastal erosion, protections in place, and presence of *Posidonia* meadows. Global climate regulation was estimated from recent data on the amount of anthropogenic CO₂ sequestered by the Mediterranean sea [5] and the average value of the carbon market. Value of the rainfall water evaporated from the Mediterranean Sea was estimated on the basis of quantities derived from [6], [7] and a shadow price for the agricultural water in Morocco given by [8]. Sustainability constraint was specially constraining for the estimation of the waste treatment, the benefit of which was valued considering the consumption of domestic water and the amount of a pollution compensation fee deducted in a real French situation considered as sustainable.

Results

Main results are summarized in table 2, giving a total amount of 29,4 billion €

i.e. 15% of Greek GNI or 130% of Tunisian GNI. A focus has been made on two countries, Greece and Tunisia, giving respectively 3,2 and 0,6 billion € or 2% and 3% of their GNI.

Discussion and conclusion

Results of this exploratory study show that the restriction to sustainable uses of ecosystem services leads to underestimation of benefits. Full application of the SEEA framework to marine and coastal ecosystems would require an extensive data base not presently available. Future extension of the work may concern coverage to additional sectors such as marine transportation or sand extraction. Benefits provided by remarkable ecosystems like *Posidonia* meadows could be also investigated, beyond the coastal protection service.

Tab. 2. Estimated values of the benefits provided by Mediterranean marine and coastal ecosystems

Benefits	Proxy values	Values (M€)
Fisheries and aquaculture	VA x Sustainability coefficient (=0,8)	2 869
Hotels and restaurants	5% VA in coastal areas	4 133
International tourism	5% VA in coastal areas	3 804
Real estate in coastal areas	5% housing expenditure	11 198
Erosion protection	Coastal protection expenditures avoided	530
Global climate regulation	Sequestered anthropogenic CO ₂ by value of CO ₂ ton	2 220
Regional climate regulation	Rainfall agricultural water by water shadow price	2 490
Waste treatment	Domestic water by pollution compensation fee	2 570
Total benefits (year 2005) :		29 814

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