Marine and coastal ecosystem services

Valuation methods and their practical application











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Preface

Marine and coastal ecosystems provide a wide range of services to human society including supporting, regulating, cultural and provisioning services. These services influence human welfare both directly, through human use, and indirectly, via impacts on supporting and regulating services in other environments. But they are increasingly under threat from widespread and growing pressures on marine and coastal resources such as overfishing, water contamination, coastal habitat destruction, and general loss of biodiversity.

The principal means for communicating the consequences of ecological change for human wellbeing is to document the impacts on ecosystem services. This improves understanding of the importance to humans of coastal and marine ecosystems, informs decision making processes, and supports attempts to influence human behaviour. Impacts on ecosystem services can be examined in qualitative terms, by quantitative measurements, or through economic valuation.

Economic valuation seeks to quantify the ways in which ecosystem services provide benefits to human populations, and expresses these values in monetary units that can be compared with other sources of value to society. Several methods have been developed and refined over recent decades: the choice of valuation method will depend the service under consideration and also on factors such as the scale of assessment, the policy context and the resources available. Economic valuation methods are useful tools, provided they are treated appropriately as methods for developing and structuring evidence in a decision-making process. They are not a substitute for deliberation and decision-making.

This report sets out some of the most commonly used methods for economic valuation of ecosystem services, and explore their pros and cons in practical contexts for assessing management interventions in marine and coastal environments. Examples are used to illustrate a range of applications in policy development, decision making and communication, and to highlight some of the main challenges for valuation, and solutions. The aim is to provide initial guidance on the ways in which valuation can be useful in practical decision-making and management contexts.

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Women collecting fish at sunset in Dili District, Timor-Leste. Photo: UN Photo/Martine Perret

Chapter 1 Marine and coastal ecosystem services: why and how to value them

The main purpose of this document is to set out some of the most commonly used methods for economic valuation of ecosystem services, and to explore their pros and cons in a practical context in marine and coastal environments.

Measurement of ecosystem services and their values to humans is rapidly becoming the principal means for communicating the impacts of ecological change on human well-being.

- **Change** can be externally driven, or in response to human activities and/or management.
- Values can be estimated and expressed in monetary or non-monetary terms.
- Reliable and appropriate valuation and appraisal methods are needed to take these services into account.
 - Valuation can be useful and/or relevant at all levels of governance, including strategic policy setting, project appraisals, decision making, day to day management, and communication with stakeholders.
 - The choice of valuation method used in a practical situation can depend on governance scale, decision context, scientific understanding, and various other factors.

Why value marine services?

The ultimate aims of defining and measuring the value of the natural environment are to better inform management choices, and/or influence human behaviour. There are two main types of reason for valuing ecosystem services:

- To assess the costs and benefits of an action or policy, as an aid to decision making;
- To improve understanding of the value of benefits to society from an ecosystem or series of linked ecosystems.

Ecosystem valuation can assist in a wide range of tasks, including:

- Demonstrating and communicating the importance of an ecosystem;
- Guiding national development plans;
- Policy, programme and project appraisal;
- Setting priorities within a sector plan or across different sectors;
- Green national and corporate accounting;
- Setting a framework to establish marketbased instruments such as taxes, charges, fees, fines, penalties, subsidies and incentives and tradable permit schemes;
- Determining liability and compensation in environmental litigation.

A simple framework for valuation is illustrated in Figure 1 (p. 8) – elements in this figure are explained in more detail in the following sections. In essence, changes in the marine environment result in changes in the delivery of intermediate and final services.

Valuation methods are selected based on their suitability to assess change in ecosystem services. Note that this does not imply that only final services are of value, but simply that the value of intermediate services is experienced and measured via their impact on final services (see also "Double counting", p. 39). Depending on the purpose of the valuation exercise, there may be further steps involved in carrying out appraisal, summing costs and benefits over time, in communication and dissemination, in design of policy instruments such as entrance fees, and so on.

Figure 1 Steps in valuation

If a change in the marine environment occurs ('resource change'); the potential impacts of this change on specific ecosystem services are identified and assessed ('intermediate service'); then, the effects this change of ecosystem services has on human welfare are considered ('final services'); and finally, the economic value of changes in ecosystem services are calculated ('valuation').

Resource change	Inter-mediate services	Final services	Valuation	
Specific change(s) in marine environment	Primary production Nutrient cycling Food chain dynamics etc.		Commercial fish harvest Greenhouse gas regulation Biodiversity conservation etc.	Market value of fish Market, official or WTP values of GHG regulation Non-use values of conservation from stated preference studies etc.
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What ecosystem services do we need to value?

For assessing the value to humans of changes in the marine environment, we need to focus primarily on changes in those ecosystem services that directly influence human health, welfare and economic activities.

The concept of ecosystem services is covered in considerable detail in the Millennium Ecosystem Assessment (2005), in previous work (such as Daily, 1997), in many subsequent publications (see for

- Marine environments provide **ecosystem services** that can be classified as:
 - Supporting: ecosystem functions that support and enable the maintenance and delivery of other services;
 - Regulating: natural regulation of ecosystem processes and natural cycles;
 - Cultural: benefits associated with experiences of natural environments; or
 - > **Provisioning**: raw materials, food, energy.
- These influence human welfare:

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