

Key points

Assessing the ecological services of aquatic environments

The success of the Nagoya Conference in 2010 ushered in heightened awareness of the fact that biodiversity loss represents a major issue for humanity. In particular, The Economics of Ecosystems and Biodiversity (TEEB) report stressed the importance of the goods and services provided by biodiversity that contribute to human well-being, including the resources used, climate regulation, free-time activities and educational services.

Generally called "ecosystem services" (we prefer "ecological services"), these services would appear to be all the more important and diversified when they come from aquatic environments. Identifying, characterising and assessing ecological services constitutes a process that water managers will have to use increasingly often in the future. This will require a combination of different types of analysis, including ecological, economic, legal, sociological and political.

This book identifies the main issues involved in these assessments, discusses the required concepts and methods, and suggests specific ways in which they can be put into practice.

Until now, water managers have addressed the availability and quality of water resources, which were qualified in chemical or bacteriological terms in view of the intended use, i.e. for agriculture, industry or drinking water. The difficulties encountered by managers in these fields are well known, whether they concern upgrading urban wastewater treatment to meet European standards or controlling agricultural pollution. Today, they must confront challenges of at least equal proportions to achieve the goal of good ecological status set by the Water framework directive for 2015. In response to this new requirement to take into account aquatic environments and their overall ecological operation, managers must equip themselves with the means to observe and understand the dynamics of natural environments, enhance their ecological-engineering capabilities and develop new governance tools that involve stakeholders and users more directly in environmental protection. In this context, the assessment of ecological services is a means to assist in defining strategic management guidelines and launching debate on these guidelines.

We consider it important to distinguish between the various concepts.

■ Environmental services and ecological services. "Environmental services" can include services from the physical compartment (mineral resources, transport capacity, etc.), but that do not depend on the operation of the biological compartment, whereas "ecological services" include the biological compartment.

■ Ecological services and benefits obtained from ecosystems. The term "ecological services" should include only the specific contribution of natural capital. "Benefits obtained from ecosystems", on the other hand, may include the human investments made to draw benefit from these services.

To justify these distinctions, we emphasise in particular the fact that the maximisation of environmental services or benefits obtained from ecosystems can turn out to be unfavourable to ecological services in the strict sense of the term.

🌍 The ecological-service approach cannot be used directly to assess ecosystem operation. It is also necessary to analyse the different functions of these ecosystems and it would be best to summarise that analysis with indicators such as "good ecological status", which needs to be perfected to that end.

🌍 In operational terms, the unit whose ecological services are to be assessed must be carefully defined. This book suggests using the notion of "hydrosystem" to go beyond the conventional notion of ecosystem, take into account the physical, biological and socio-economic dimensions of an aquatic environment and acknowledge the difficulty in drawing a clear distinction between the "natural" and "anthropogenic" aspects of these environments. It then sets out a step-by-step approach to identifying spatial units that are relevant both ecologically speaking and in terms of their management.

🌍 Ecological services can be grouped according to different criteria and the four groups of the Millennium Ecosystem Assessment (supporting services, provisioning services, regulating services and cultural services) are useful for educational purposes, but less so for operational purposes. This book stresses the need to choose criteria suited to the objectives of the policy to be implemented.

🌍 In economic terms, the concept of ecological services makes a clear distinction between the environment as natural capital, a source of wealth to be preserved for present and future generations, and as an area in which goods and services are produced ("ecological services" contribute to social well-being and the conservation of natural resources). This distinction is the means to establish a link between sustainability and protection of natural environments through effective management of the ecological services they provide.

🌍 The ecological services that are genuinely valued by society are, for the most part, developed or "secondary" services, a combination of different primary supporting, provisioning or regulating services. Economic valuation is useful for assessing these developed services, but it appears futile to assess primary services using this method.

🌍 Two other concrete limits to assessment are worth highlighting. One concerns the difficulty in distinguishing the intrinsic value of services provided by nature from the value of man-made equipment enabling society to make use of them. The other arises from the volatility of demand and the possible distortion of users' and citizens' perceptions of the value of such services.

🌍 Different methods can be used to assess ecological services, most of which seek to measure the benefits obtained by users from these services. We also explore other approaches which are useful from the cost-effectiveness point of view advocated by the WFD and better suited to operational management of the supply of ecological services.

🌍 To conclude, we expect the assessment of ecological services to help develop a results-based culture in water policy. But this objective calls for a double approach. The concerned scientific communities must improve assessment methods and managers must adopt and implement assessment tools. This double approach implies greater dialogue between environmental scientists and decision-makers.