



## Foreword

Assessing the services provided to humans by ecosystems and their resources is of the utmost relevance today. It spans diverse concerns from the microeconomic study of the impact of manmade structures, the subject of a recent report by the Centre for Strategic Analysis (CAS) in 2009, to analysing the consequences of the loss of biodiversity worldwide. This was the subject of *The Economics of Ecosystems and Biodiversity (TEEB)*, a study initiated in March 2007 during the German presidency of the G8 meeting in Potsdam and coordinated by economist Pavan Sukhdev, who presented its definitive findings in Nagoya in the autumn of 2010.

The perception that biodiversity is rapidly eroding, that we still have no control over the phenomenon and the resulting sense of increasing rarity, including that of "ordinary" biodiversity, is certainly what prompted this study into the value of this resource.

**Aquatic ecosystems**, often considered solely from the point of view of their ability to provide water for diverse uses, are particularly concerned by these questions on a number of levels.

- **Biologically speaking**, they often harbour novel forms of biodiversity represented by countless zoological or botanical groups that are not or are only infrequently present in terrestrial ecosystems.
- **As "receptacles" of products of numerous human activities**, their biodiversity would appear to be especially vulnerable.
- **Economically speaking**, initial studies (discussed in this book) have often revealed high values for the services provided by these environments.
- **Finally, in the regulatory field**, various texts, above all the Water framework directive in 2000, have made mandatory the use of evaluations in conjunction with management policies, particularly by introducing the notion of "disproportionate costs" as a criterion to justify not meeting the objective of good ecological status for water bodies by 2015. This notion of disproportionate costs evidently calls for a metric (to determine disproportionality) and this could be the benefits expected from good ecological status.

The Scientific council for water and aquatic environments, managed by Onema, decided to draw up a discussion paper on the issues involved in such assessments, the concepts required and the methods to be used. In June 2009, it set up a working group chaired by Bernard Chevassus-au-Louis and comprising members of the Scientific council and Onema staff. The group regularly reported its findings during the plenary sessions of the Scientific council.

A **number of decisions** made prior to drafting this book should be mentioned here.

- First, unlike the CAS report, this book does not produce reference values. The CAS report (p. 123-124) contains a number of bibliographical references on this topic, to which we can add the French studies by Laurans *et al.* (1996) on the Seine-Normandy basin, EcoWhat-ACTéon (2009) on the Adour-Garonne basin as well as the recent compilations by Morardet (2009) and Aoubid and Gaubert (2010). However, the primary objective here is to offer a framework for critical analysis of existing and future research because, as we shall see below, these studies are extremely varied in both their methods and findings.
- Even though the goal here is to provide managers with relevant information for their policies, this book focuses solely on the assessment of services, i.e. it does not address how findings should be used for such

diverse management tools as incentives, taxes, regulations, payment of services, user rights, etc., nor, consequently, the relative merits and limits of such tools. These aspects are an important, but complex field that would exceed the scope of this discussion.

- This book does not reiterate the analyses that have already been covered in-depth in the CAS report (especially the question of the links between biodiversity and ecological services and the long-term approach), but does refer to them when necessary. On the other hand, it does take into account a number of recent articles presenting progress in certain analyses, particularly concerning the definition of concepts associated with the notion of services.

- Finally, the book deliberately ventures outside the strict framework of aquatic environments, particularly concerning two aspects. First, many of the analyses presented here can be applied to all terrestrial and aquatic ecosystems. Secondly, as will become apparent below, we encourage readers to consider aquatic environments in the broader context of landscape ecology, i.e. that of an entire territory comprising diverse terrestrial and aquatic environments and their functional interactions.

**This book begins with "key points" and an analytical summary, and is then divided into three main sections.**

- **The first section discusses the issues involved in assessing ecological services.** It focuses on the consequences of shifting the water-management perspective from the human water cycle to the much larger natural water cycle including aquatic ecosystems. It then analyses how these issues are addressed by policy makers via two examples. The first deals with the role of water in the national biodiversity strategy (SNB), adopted in 2004 and reviewed in 2011 prior to adopting a new SNB for the 2011-2020 period. The second deals with the impact of the Water framework directive on planning in each river basin.

- **The second looks at the required concepts.** It particularly questions the relevance of the notion of aquatic ecosystems and proposes a technique to define the spatial and functional units that must be taken into account for service assessment. It also clarifies the notions of environmental versus ecological services, benefits, services and functions of ecosystems and sets out diverse typologies for these services.

- **Finally, the third section examines economic valuation, its concepts and tools.** Based on a precise definition of ecological services, it shows that economic valuation lies at the interface between a supply of services subject to specific infrastructure and demand influenced by socio-economic behaviour. It elaborates on the idea that, from a cost-benefit point of view, valuation falls under the framework known as a "collective environmental responsibility system". It ends with a presentation of the main valuation methods and their operational potential for use in water management.