Chapter 22
Introduction of Assessments

Joao G. Ferreira and Jens K. Petersen

Abstract The quantitative assessment and evaluation of services is a complex topic, and there is controversy over what currency to use for comparisons. These issues are particularly challenging for e.g. regulatory and cultural services, whereas for provisioning, market mechanisms furnish the price. However, for a complete picture, an integrated evaluation of the the different services is needed. In this section, various case studies are presented to exemplify the application of different types of decision-making tools used to assess and evaluate services.

Keywords Modelling · Valorisation · Nutrient credit trading · Indices

The assessment of services provided by bivalve shellfish is a complex and controversial theme. The complexity arises from the range of services supplied, as discussed in the preceding sections of this book, the currencies that may be employed for evaluation, and from over-arching questions such as whether such an assessment should be applied only to cultivation or for the full range of services.

The controversy is associated for instance to different visions of the role of aquaculture. In the European Union the two key legislative instruments governing water—the Water Framework Directive (WFD – 2000/60/EC) and Marine Strategy Framework Directive (MSFD – 2008/56/EC) classify aquaculture only as a pressure; this ignores the fact that 56% of aquaculture in the EU (Ferreira and Bricker 2016) is extractive in nature as no feed is added to the production. Likewise, in the United States, farmed bivalves make up 50% of aquaculture.

Despite these numbers, and the consequent role of bivalve aquaculture in top-down control of eutrophication, there is a frequent misconception that bivalves pol-

J. G. Ferreira (✉)
DCEA, FCT, New University of Lisbon, Monte de Caparica, Portugal
e-mail: joao@hoomi.com

J. K. Petersen
Danish Shellfish Centre, Institute of Aquatic Resources, Danish Technical University, Nykoebing Mors, Denmark
e-mail: jekjp@aqua.dtu.dk

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lute the environment rather than cleaning it up. It must therefore be emphasized that organisms that sequester organic particles in order to grow must by definition cause a net removal of both phytoplankton and detrital organic matter from the water column. The only persuasive approach for demonstrating this thermodynamic axiom is through the quantitative assessment of bivalve services.

Assessment is therefore defined herein as the quantitative estimate of the value of such services—this requires that robust methods may be applied for its determination. The valuation of services can potentially be represented by various metrics (e.g. mass of nitrogen removed, area of habitat created) but ultimately a comparative assessment is by definition monetary, since this is the standard indicator for comparison of trade-offs (Costanza et al. 1997).

While for provisioning services this is straightforward, since it relies on financial and landings data, for other types of services valuation is more complex. This may be further complicated by considerations such as non-use value, e.g. when considering landscape aspects, biodiversity or uniqueness.

The final section of this book consists of five chapters outlining the current knowledge on the assessment of bivalve services. Mathematical models, of various types and differing complexity, are at the core of this assessment. By definition they combine techniques developed within the natural and social sciences, and deal with a range of aspects:

(i) the value of bivalves in the context of wider ecosystem functioning. Models and indices that deal with carrying capacity at an ecosystem scale are particularly important as managers consider plans for aquaculture expansion—the value of current production is relatively easy to calculate, but expected increases in spatial occupation must be assessed in the light of food depletion and co-use of marine space;
(ii) the various ways in which the role of bivalves in nutrient removal can be priced. It is recognized that comparative pricing of competing technologies yield estimates orders of magnitude apart, and that the use of downstream approaches such as top-down control may be an important complement to source control, particularly when dealing with diffuse nutrient loading;
(iii) which ecological and economic instruments can be used to execute an informed assessment of the mass balance of substances of interest, and create a market in which benefits of both cultivation and restoration may be traded.

At a time when Europe, the United States, and Canada, are committed to expanding marine cultivation, and doing so in a sustainable manner, an integrated assessment of the value of bivalve shellfish will help to improve social acceptance, promote food security, economic growth, and employment.

References

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