

# Ecosystem services provided by the Baltic Sea and Skagerrak - Baltic

## 1. Policy Objective & Theme

- SUSTAINABLE ECONOMIC GROWTH: Developing Europe's regional seas sustainably
- SUSTAINABLE ECONOMIC GROWTH: Balancing economic, social, cultural development whilst enhancing environment

## 2. Key Approaches

- Knowledge-based
- Ecosystems based approach
- Socio-economic

## 3. Experiences that can be exchanged

Ecosystem services can be divided into supporting, provisioning, regulating and cultural services. Provisioning services are the most well-known, supplying goods that can be traded and consumed. However, benefits from acknowledged services such as food and opportunities for recreation are directly dependent on a variety of less appreciated ecosystem services which inter-operate to provide the foundation for ecosystem function.

## 4. Overview of the case

This case translates the complexity of marine biodiversity, and its prerequisites, into services or functions of economic or societal value which can be more readily understood, for example, by

policy makers and non-scientists.

## 5. Context and Objectives

### a) Context

Ecosystem services are benefits obtained from the environment. They are defined as functions and processes through which ecosystems, and the species that they support, sustain and fulfil human life. Ecosystem services are essential to society, both to maintain human health and economic activities. Although many of the ecosystem services are far from inexhaustible, they are typically taken for granted. Demand for certain ecosystem services, like marine food sources, often surpass the capacity of which the ecosystem supplies them. An ecosystem in which diversity, food web dynamics and habitat are well maintained typically provides society with a variety of cherished goods and services. Most important among the provisioning services, and of highest economic value, are food fit for consumption and recreational opportunities. In addition, inedible goods, chemical substances to promote human health or bio-technological development and genetic resources to secure conservation and improve aquaculture are provided. Energy and surface space for transport and development are among the few services not directly dependent on supporting and regulating ecosystem services. Development of sea-based wind power, wave and tidal energy can reduce dependence on fossil fuels, and hence mitigate climate change. However, all use of sea surface space, particularly in coastal regions, may reduce the value of scenery as well as have adverse consequences for e.g. diversity, food web dynamics and habitat. In addition to the traded or easily valuated services, there are a number of cultural services which also add benefit to human well-being; cultural heritage, education and inspiration for art are examples.

## b) Objectives

The goal of the project was to provide decision-makers with the information available regarding the economic benefits of ecosystem services, the cost of measures required to protect these services as well as the estimated costs of non-action.

## 6. Implementation of the ICZM Approach (i.e. management, tools, resources)

### a) Management

The Swedish Environmental Protection Agency, by assignment of the Swedish Government, gathered and analysed the information about the economic impacts of the human influence on the Baltic Sea and the Skagerrak environment.

### b) ICZM tools

People are affected by the environmental status of the Baltic Sea in the sense that its marine ecosystems provide goods and services from which people enjoy well-being when consuming them and firms enjoy profits when using them as inputs in their production. If there is an improved environmental status resulting in an increased provision of ecosystem services, this will cause an increase in well-being and profits which would constitute the benefits of the improvement. Conversely, a deterioration of the environmental status would result in a decrease in well-being and profits which would constitute the costs of the deterioration. An important task for environmental economists is to assess the size of benefits and costs due to environmental change and express them in monetary terms as far as possible. This is done by using various valuation methods. Valuing environmental changes economically is about analysing the trade-offs individuals are prepared to make between the environment and other resources. Economic theory suggests that such trade-offs reveal the influence that environmental changes have on human well-being. In other words, economists measure the influence of an environmental change on well-being as the resources individuals would be willing to give up in order to have the change (or prevent the change). Another word for this willingness to give up resources is willingness to pay (WTP). In some situations it is more relevant to study another kind of trade-off, namely what people require as compensation if the environmental change takes place (or is prevented), i.e. their willingness to accept compensation (WTA). WTP and WTA are closely linked to the concept of consumer surplus. Consumer surplus is the difference between the maximum amount an individual is willing to pay for consuming a good and the amount that he/she actually has to pay for the good. Economic theory suggests that changes in well-being can be measured as changes in consumer surplus. Most of such studies in the Baltic Region have been made in Denmark, Finland, Germany and Sweden and few or no primary studies in Estonia, Latvia, Lithuania, Poland and Russia.

Among the 24 ecosystem services revised in this case (bio-geochemical cycling, primary production, food web dynamics, diversity, habitat, resilience, climate & atmospheric regulation, sediment retention, eutrophication mitigation, biological regulation, regulation of hazardous substances, food, inedible goods, genetic resources, chemical resources, ornamental resources, energy, space & waterways, recreation, scenery, science & education, cultural heritage, inspiration, the legacy of the sea) only ten are considered to be in good condition. Both the provision of food and inedible goods are considered to be in poor condition. Seven are highly threatened, among them four of the six supporting services (food web dynamics, biodiversity, habitat and resilience). Although some services are relatively unaffected by environmental threats (like primary production and the provision of space and waterways), others seem to be impacted by many environmental threats at the same time (e.g. biodiversity, habitat, food provisioning and enjoyment of recreation). The results suggested that large-scale actions against the excessive loads of nutrients should be taken, at least if actions are designed in a cost-effective way and not according to a principle that all nutrient sources in all countries should reduce their loads by the same percentage.

## 7. Cost and resources

The report on ecosystem services was financed by the Swedish Environmental Protection Agency with a budget of 20 000 Euros. The report is one of seven background reports in the project Economic Marine Information with a budget of 360 000 Euros.

## 8. Effectiveness (i.e. were the foreseen goals/objectives of the work reached?)

By promoting sustainability in all resource use, the consequences for underlying supporting and regulating services will be minimized and economic value will be enhanced over the years to come. To be able to promote sustainability, it is necessary to take an ecosystem approach and to understand the interactions, flows and feedbacks of the ecosystem. From the current over-use of imperiled resources, management of marine and coastal environment should aim at achieving a resilient ecosystem, in which all ecosystem services are valued (though not necessarily equally).

## 9. Success and Fail factors

In regard to most services, there are extensive knowledge gaps. By directing research effort towards the less understood fundamental services, like food web dynamics, habitat, biodiversity and resilience, valuable information about other services may concurrently be obtained. In reality, the profit from one service is commonly obtained at the expense of another. Provided with increased knowledge about the supporting processes regulating the extent of each service, stakeholders are better prepared to make the best possible use of resources, and to avoid environmental drawback.

## 10. Unforeseen outcomes

Quantitative conclusions which are valid for the whole Baltic Sea area are more inaccessible. This is because there have been very few coordinated valuation efforts and the studies have in most cases focused on specific scenarios or occurrences in specific geographical areas of the Baltic Sea. Neither the scenarios or occurrences, nor the geographical areas are instantly comparable. A research network with researchers from all Baltic Sea countries is involved in the project Baltic STERN, with its secretariat situated in Stockholm, building on the project Economic Marine Information.

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## 13. Sources

- Ecosystem services provided by the Baltic Sea and Skagerrak (Report 5873, 2008) K. Garpe
- Swedish Environmental Protection Agency
- The Economic Value Of Ecosystem Services Provided By The Baltic Sea And Skagerrak (Report 5874, 2008) T. Söderqvist And L. Hasselström Swedish Environmental Protection Agency



Ecosystem services provided by the Baltic sea (3.59 MB) 



The economic services provided by the Baltic (4.2 MB) 