The Need for Marine Management illustrated by the Costs of Degradation of Ecosystem Services

Kristin Magnussen

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Content

- Goods and services from the sea
- Ecosystem Services (ES)
- Examples of Marine Ecosystem Services
- The Costs of degraded marine environments (and the benefits of improved environments)
- How IMME can improve management of the seas

The sea provides us with plenty of goods and services

Renewable Goods	Renewable Services
▪ Marine animals for food ▪ Marine animals for recreation (e.g., whale watching) ▪ Seaweed ▪ Medicines ▪ Other raw materials (e.g., building materials) ornaments ▪ Energy (e.g., wind, wave, tidal, thermal) ▪ Water	▪ Habitat (e.g., nursery areas for fish) ▪ Protected areas ▪ Flood and storm protection ▪ Erosion control ▪ Nutrient cycling ▪ Biological regulation ▪ Waste processing ▪ Marine transportation routes ▪ Atmospheric and climate regulation ▪ Carbon sequestration ▪ Tourism, leisure and recreation ▪ Cultural heritage and identity ▪ Education and research ▪ Aesthetics
Non-Renewable Goods	
▪ Oil and gas ▪ Sand and gravel ▪ Marine minerals	

What are Ecosystem Services?

Ecosystem Services are the benefits (goods and services) people receive from nature

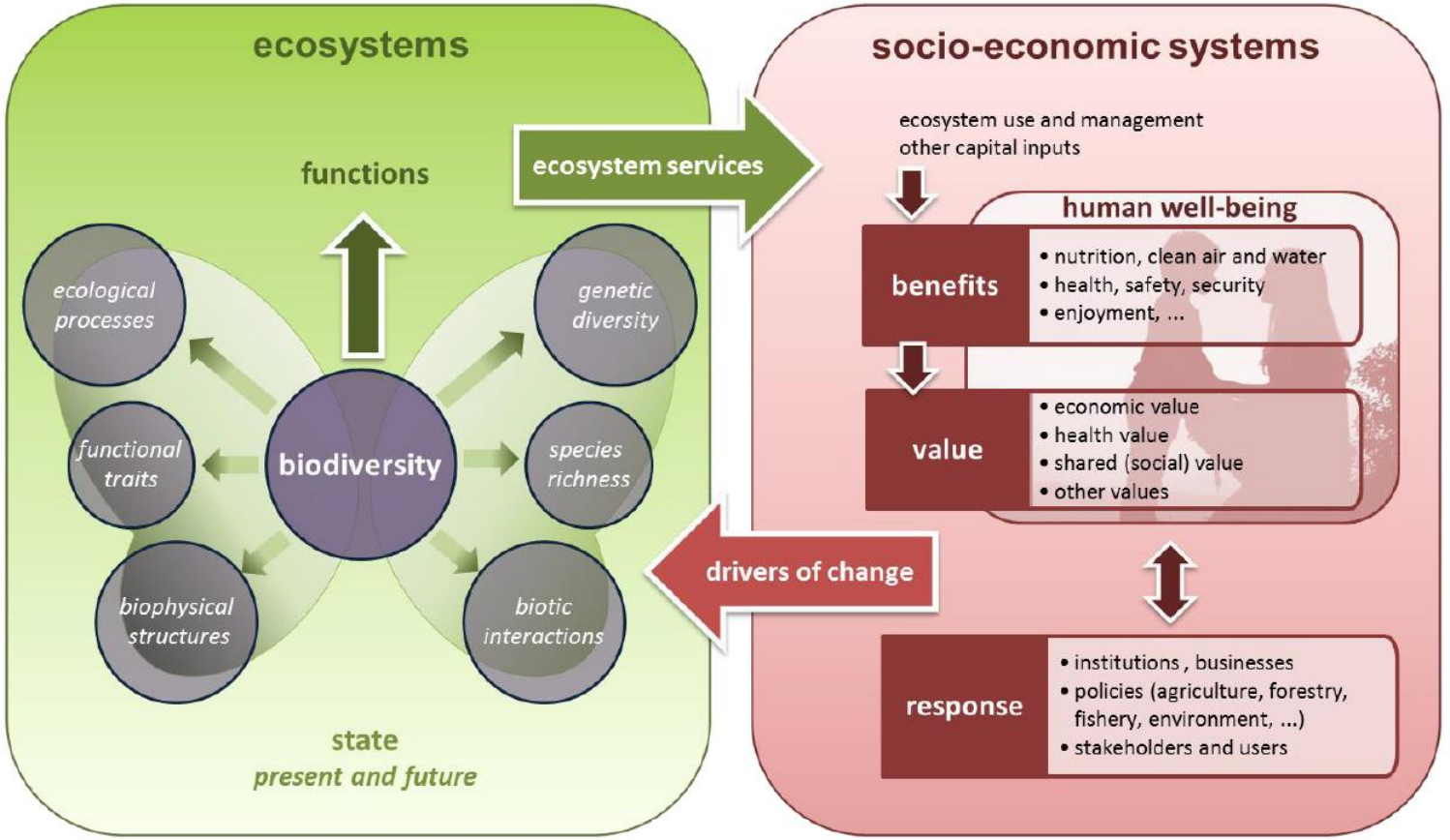
The ES approach was developed to better understand and recognise the relationship between healthy ecosystems and people's welfare

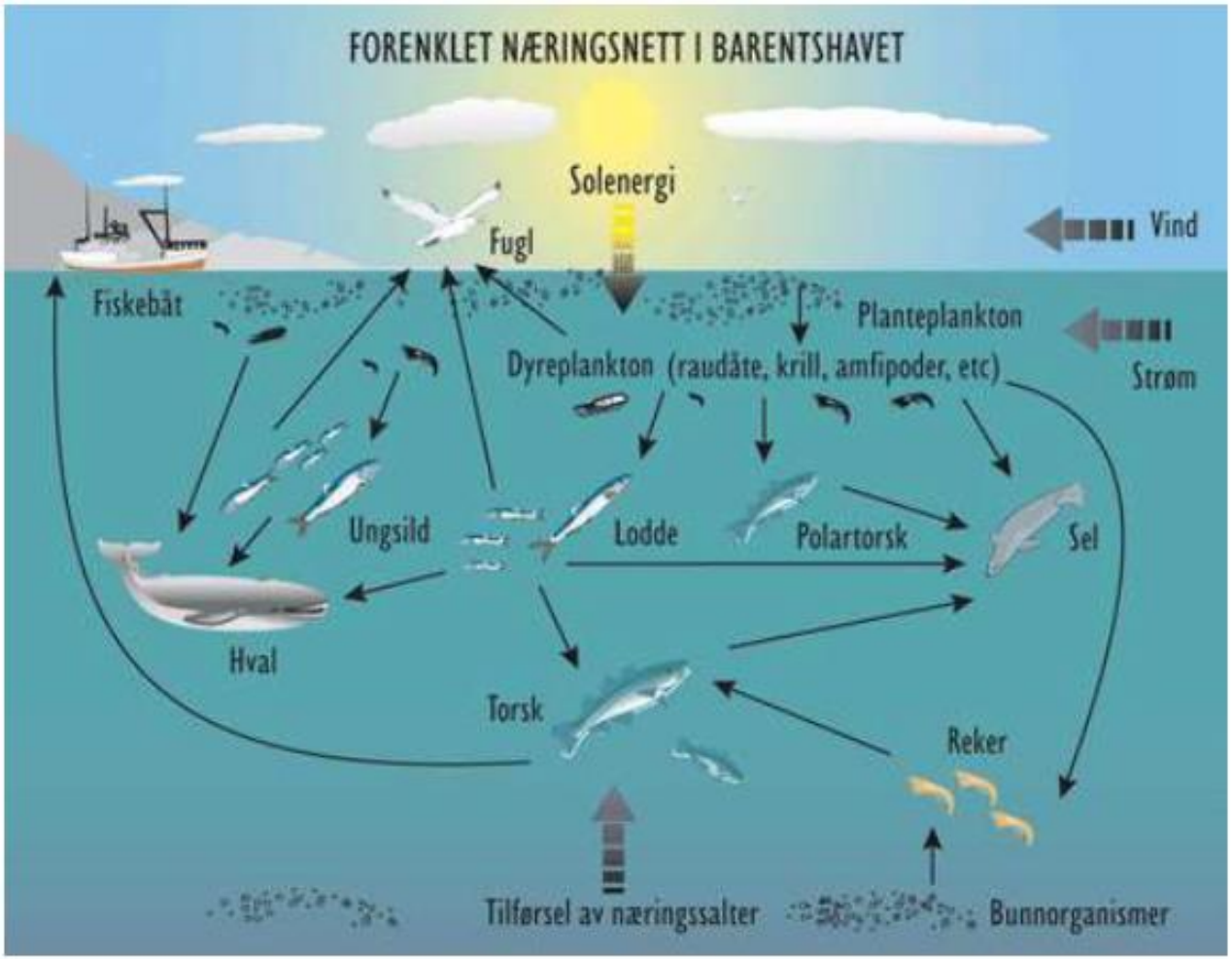
Background:

- Millennium Ecosystem Assessment (MA)
- The Economics of Ecosystems and Biodiversity (TEEB)

The Ecosystem Services Approach

MAES 2013: (Mapping and Assessment of Ecosystem Services)



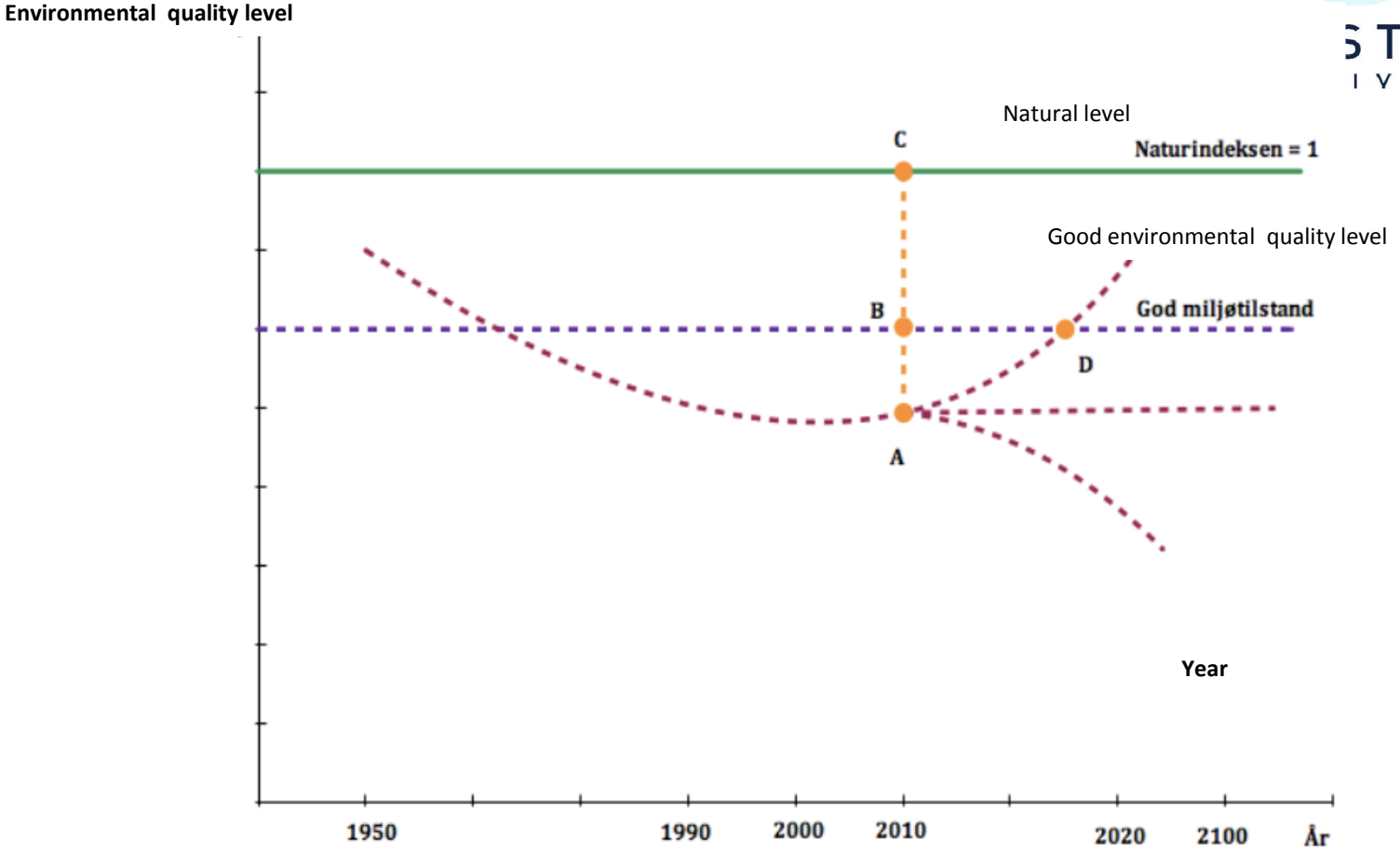


Source: Institute of Marine Resources, as reprinted in the Management Plan for the Barents Sea and Lofoten

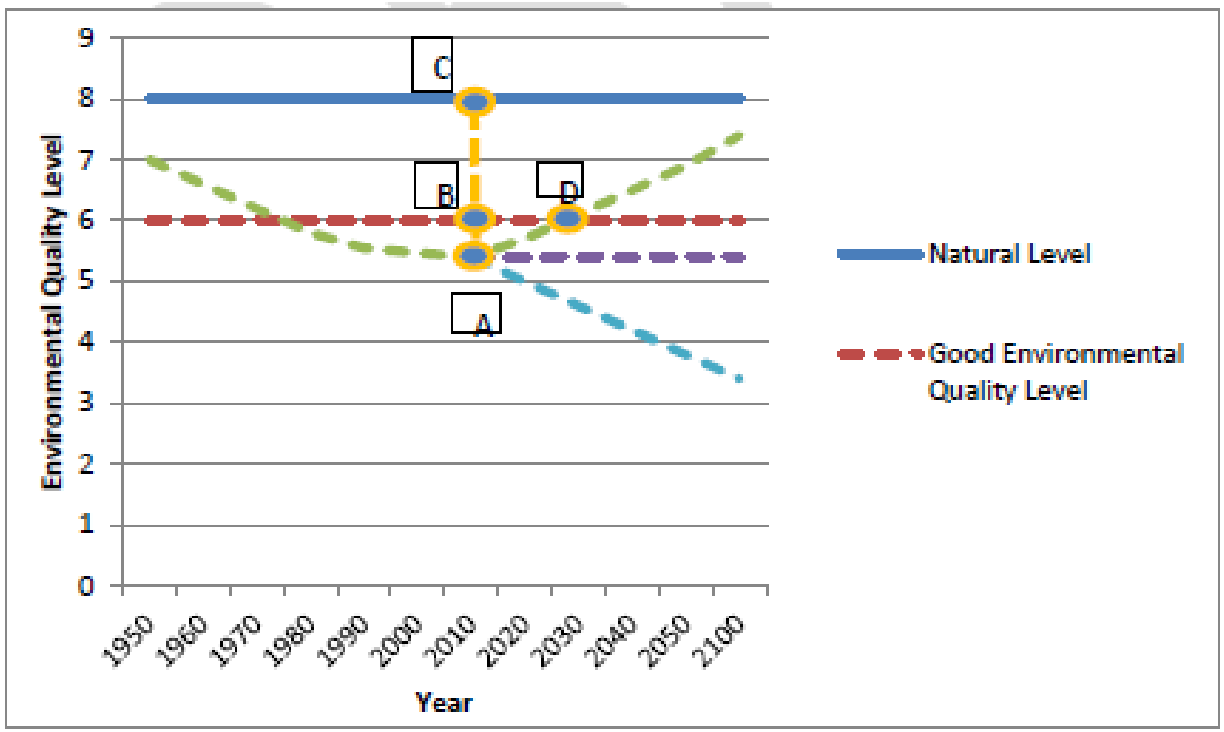
Major threats to the environmental status of oceans

- Overfishing
- Habitat changes, including disturbances
- Pollution (contaminants, eutrophication, marine litter)
- Climate change

The cost of degradation



The costs of degradation



The negative impacts of NOT having good environmental quality

- It is easy to see and realise that measures to reduce pollution and other negative environmental effects will be costly, and these costs are often calculated (or estimated).
- However, it is important to remember that:

NOT having good environmental quality – now and in the future – also have costs and negative impacts on several sectors and ecosystem services. (or: Put the other way round: Achieving good environmental quality give benefits to society, some of which may be measures in economic terms, and some, not.

- The ES approach can be used to estimate these costs (or benefits of improvements)

CATEGORIES OF ECOSYSTEM SERVICES

SUPPORTING ECOSYSTEM SERVICES

Maintenance of basic ecological structures, like habitats and biodiversity

PROVISIONING ECOSYSTEM SERVICES

Examples: Fish, aqua culture, energy, genetic resources

CULTURAL ECOSYSTEM SERVICES

Examples: Tourism and recreational services, aesthetic values, cultural heritage and identity, preservation of the ocean for the future

REGULATING ECOSYSTEM SERVICES

Examples: Regulation of climate gases and harmful substances

Provisioning Ecosystem Services

- **Production of food for people**
  Like fishing, aqua culture

- **Non edible products**
  Fish for feed, bio energy

- **Genetic resources;**
  Like wild salmon genes as a ”gene pool” for salmon in aqua culture

- **Resources for pharmaseutical, chemical and bio-technological industry**
  Like marine bio prospecting

- **Decorative resources**

Photo: Institute for Marine Resources/Mareano

Cultural Ecosystem Services

- **Tourism**

Tourism based on marine resources, along coast and sea

- **Recreation**

Like angling, bird hunting, sailing, scuba diving, etc.

- **Aesthetic values**

People value good views

- **Natural heritage**

Non-use values of preserving the sea in good shape for future generations

Regulating Ecosystem Services

- Regulation of climate gases

Marine water and plants are important for sedimentation and sequestration of CO_2.

- Regulation of harmful substances

Marine water break down nutrients, harmful substances etc. (to a certain limit)

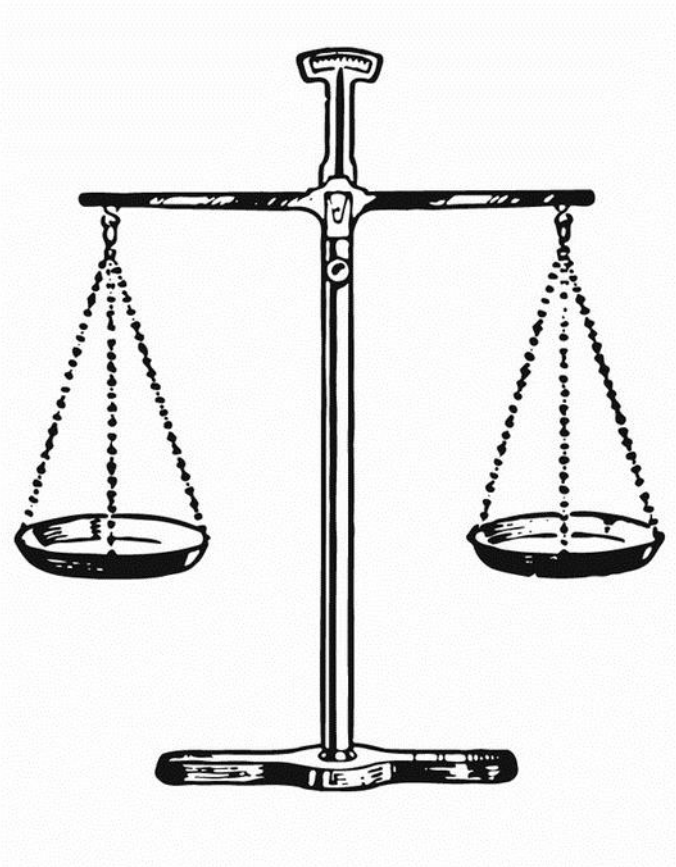
Values and trade-offs

The benefits (values) of Ecosystem Services – and the changes in these - need to be:

- Identified (described)
- Quantified (to the extent possible)
- Valued in monetary terms (to the extent possible)

There will be necessary trade-offs:

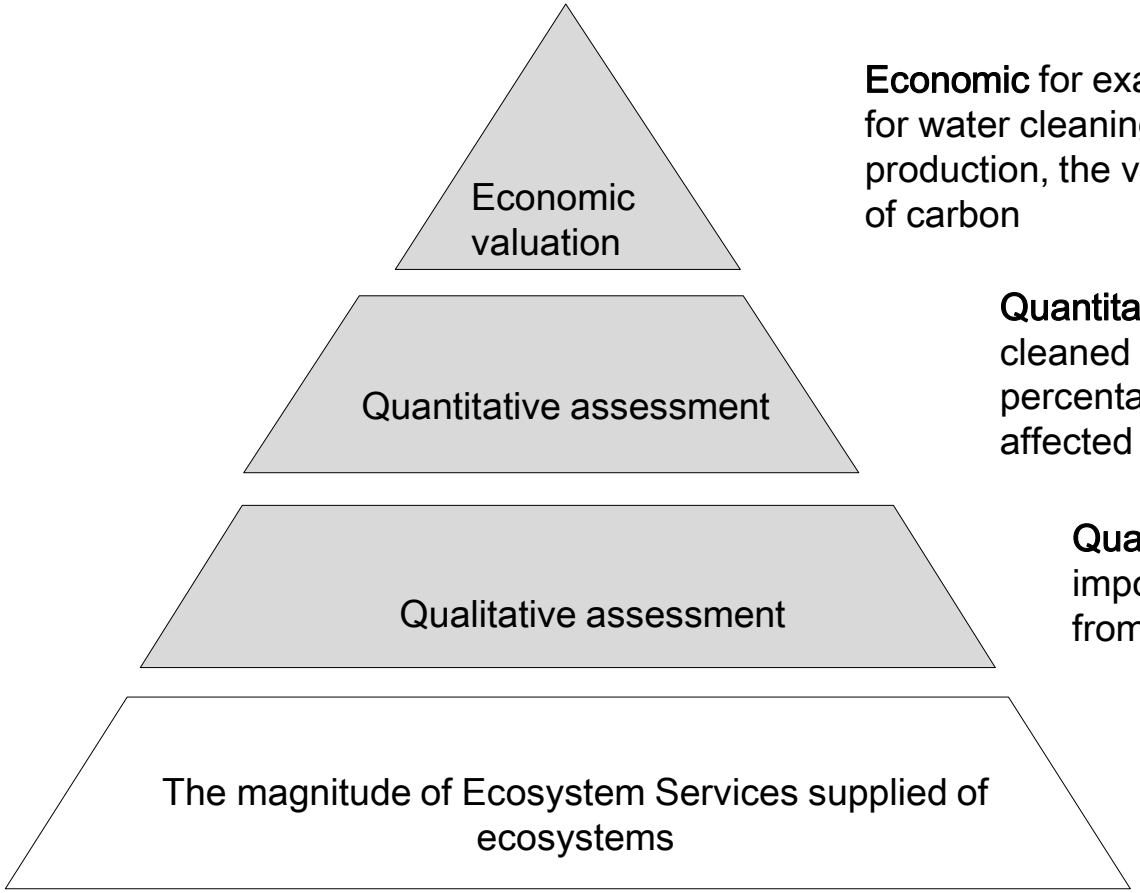
- Between ES
- Over time (and generations)
- Between spatial areas
- Between interest groups



Why do we need to value Ecosystem Services?

- Ecosystem Services often are public goods
- You don't have to pay to over-exploit ES, and the market prices do not necessarily reflect over-exploitation
- Demonstration of values shows the importance of good nature management – also due to human welfare and well-being in the short and long run

Different ways of presenting values of Ecosystem Services



Economic for example avoided costs for water cleaning, the value of food production, the value of sequestration of carbon

Quantitative: for example cubic meter cleaned water, tons of carbon, percentage of population who will be affected of lost food production

Qualitative: Amount and importance of Ecosystem Services from different ecosystems

Kilde: Based on Brink (2008) and replicated in TEEB (2008) and Magnussen et al. (2010)

Why economic valuation?

- Many decisions are governed by price signals
- Economic values are easy to communicate
- By use of economic analyses the value of nature can be included on equal terms with other economic values

Integrated Management of the Marine Environment (IMME)

The purpose of IMME is to:

- Support welfare production from the seas through sustainable use of resources and ecosystem services of the ocean
- Keep and preserve the structure, functioning, productivity and biodiversity of the marine ecosystems.

- Provide a planning tool to balance objectives from different sectors in a transparent manner

How can the ES approach and IMME contribute to improved management of marine areas?

- The oceans provide goods and services vital to our welfare and well-being
- Lots of these are difficult to value – and very difficult to put a price tag on
- Goods and services without a price tag are necessary parts of plans and management of the oceans. Otherwise huge and important values are left out
- The Ecosystem Services Approach is developed to better understand and recognise the relationship between healthy ecosystems and people's welfare in the long run
- The IMME Approach is a tool to balance different sectors and interests in a transparent manner – taking into account the ecosystem's boundaries and the cumulative effects of all human activities

Thank you for your attention!

kristin.magnussen@vista-analyse.no

Source: Institute of Marine Resources/Mareano,