

# From ecosystem functions to ecosystem services – a key to sustainable use of marine environment

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'Gulf of Finland – natural dynamics and anthropogenic impact'



S Y K E

# From ecosystem functions to ecosystem services – a key to sustainable use of marine environment?

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# Sea use increases

- Natural resources
  - Fish, other biomasses
  - Oil, gas, wind, waves
  - Seabed minerals, sand, gravel
- Space
  - Marine infrastructures
  - Energy
  - Aquaculture
  - Military
  - Maritime traffic
  - Tourism, recreation
  - Nature values
  - Cultural and historical values
  - ...



# Sustainable use of marine resources?

## Sea use should be sustainable

- What is sustainability?
  - Sustainable fishing
    - Fish catch quotas?
    - No-catch zones?
    - Protection of fish reproduction areas?
  - Sustainable maritime traffic
    - Restrictions on pollution?
    - Ship structure and speed?
    - Sustainable activities in ports?



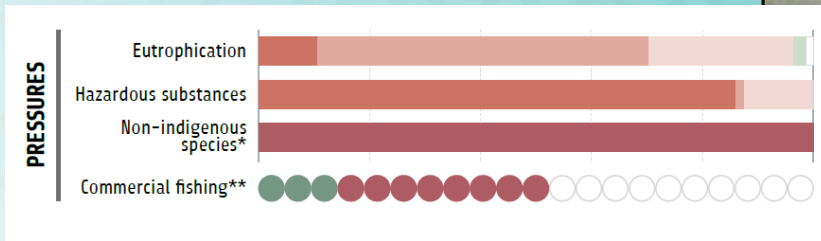
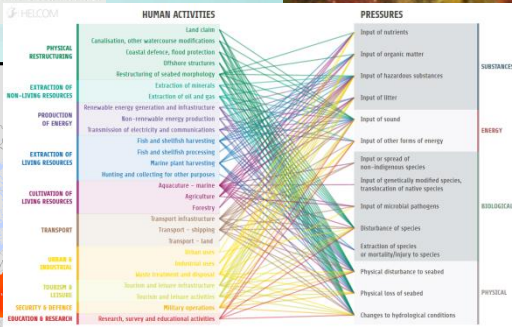
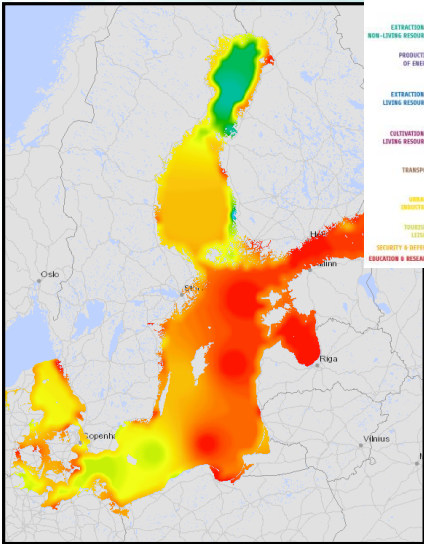
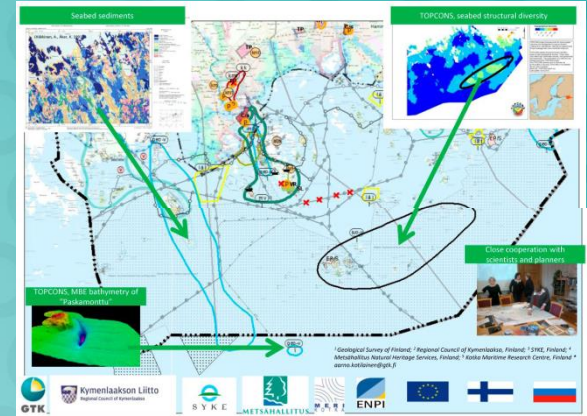
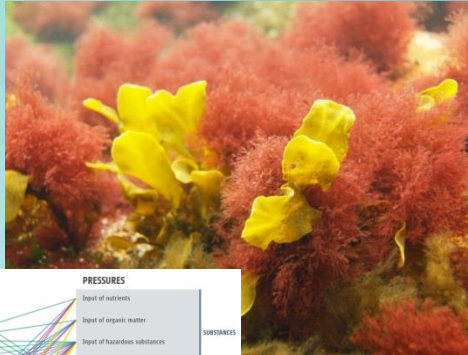
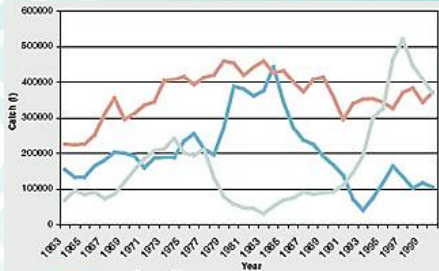
# Sustainable use of marine resources

Sustainability requires:

- Sustainable planning of marine and coastal areas
  - Ecosystem-based, transboundary and participatory process
- Comprehensive Environmental Impact Assessment processes (EIA)
  - Assessment of environmental and socio-economic impacts of planned activities
  - Cumulative impacts
- Monitoring



# Excessive amount of data available



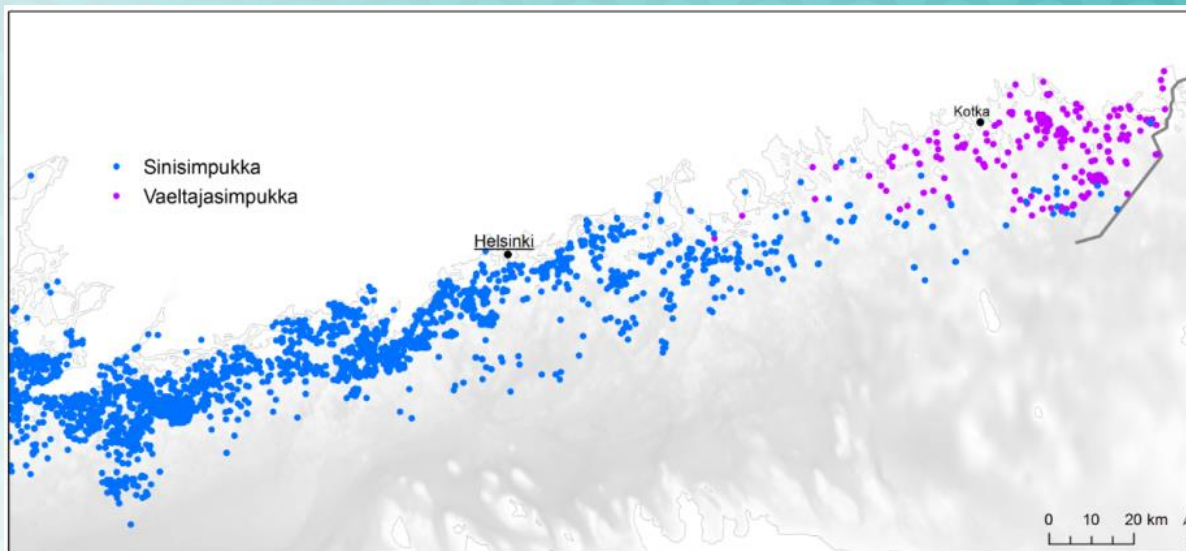
# Ecosystem functions

- Individual species have traits that result in ecosystem functions
- Blue mussel:
  - Filtrates carbon and nutrients from seawater
  - Provides habitats for algae and invertebrates
  - Food for fish and birds



# Mussels in hard bottoms in the Gulf of Finland

*Mytilus edulis* vs. *Dreissena polymorpha*





# Ecosystem services

**Ecosystem services are the direct and indirect contributions of ecosystems to human well-being (TEEB D0).**

**They support directly or indirectly our survival and quality of life.**



# Ecosystem services

Ecosystem services can be categorized in four main types:

## Provisioning services

The products obtained from ecosystems such as food, fresh water, wood, fiber, genetic resources and medicines.

## Regulating services

The benefits obtained from the regulation of ecosystem processes such as climate regulation, natural hazard regulation, water purification and waste management, pollination or pest control.

## Habitat services

The importance of ecosystems to provide habitat for migratory species and to maintain the viability of gene-pools.

## Cultural services

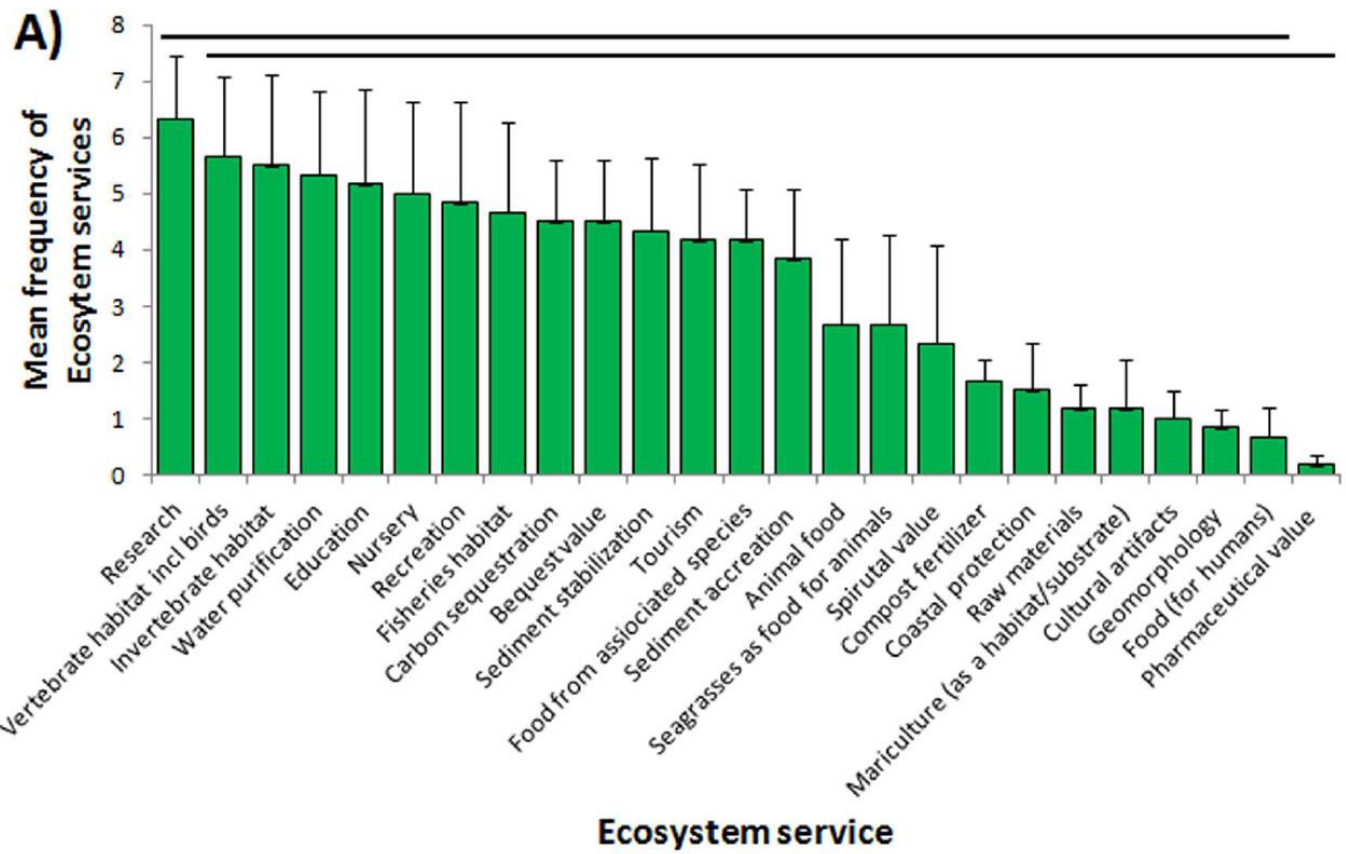
Non-material benefits that people obtain from ecosystems such as spiritual enrichment, intellectual development, recreation and aesthetic values.



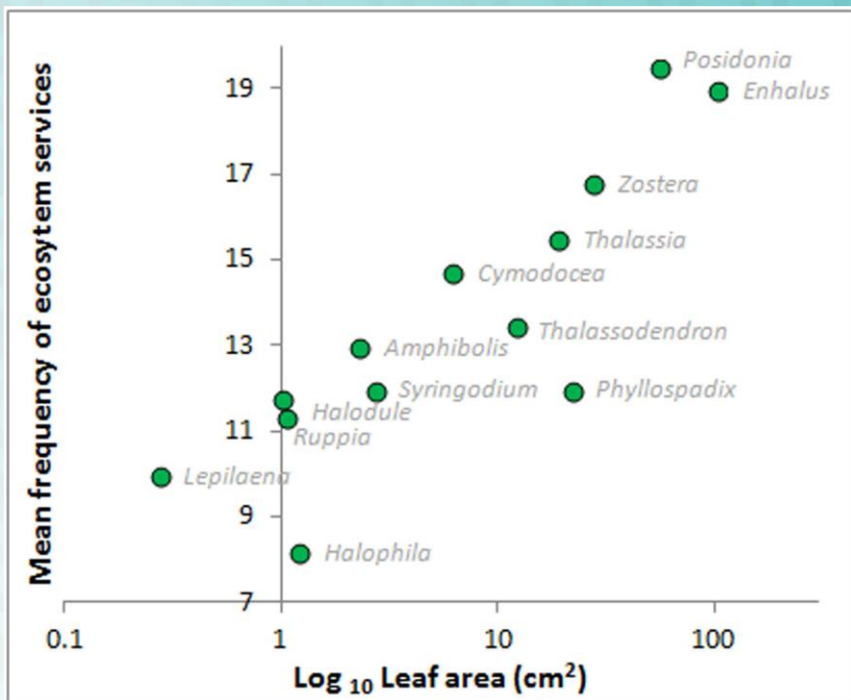
# Seagrass meadows

- Seagrasses form underwater meadows worldwide
  - *Halophila, Ruppia, Halodule, Syringodium, Phyllospadix, Thalassodendron, Cymodocea, Thalassia, Zostera, Posidonia*
  - *Ruppia, Zostera, Potamogeton, Zannichellia, etc.*
- Several important ecosystem functions:
  - Habitat, food and shelter for associated species
  - Carbon sequestration
  - Sediment stabilization
  - Fish nursery
  - Birds, mammals
- Seagrass meadows have declined worldwide during last decades





# Seagrass meadows





# Seagrass meadows

- Condition of the seagrass meadows influences the quality and quantity of provided ecosystem services
- Can the value of ecosystem services be assessed based on possible human gains?



# Ecosystem services in sea se planning

- Identification and value for natural values that have been previously only been described
- Intrest comparisons between economic interests and environmental values
  - Local economic/environmental values - gains and conflicts
  - Regional economic/environmental values – gains and conflicts
  - National economic/environmental values – gains and conflicts
  - ...





# Conclusions



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# Conclusions

## Questions

- How can we describe the marine (and coastal) environmental values to support sustainable development of marine areas?
- What is relevant data for sustainable planning?
- What tools are available?
  - Maps? Models? Reports?



**Thank you!**



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