MULTI-LEVEL GOVERNANCE IN MARITIME SPATIAL PLANNING THROUGHOUT THE BALTIC SEA REGION

PartiSEApate

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Marine Spatial Planning in the Baltic Sea
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Economic valuation of balancing the effects of eutrophication processes – regulating ecosystem services in brackish estuary (the Southern Baltic Sea)

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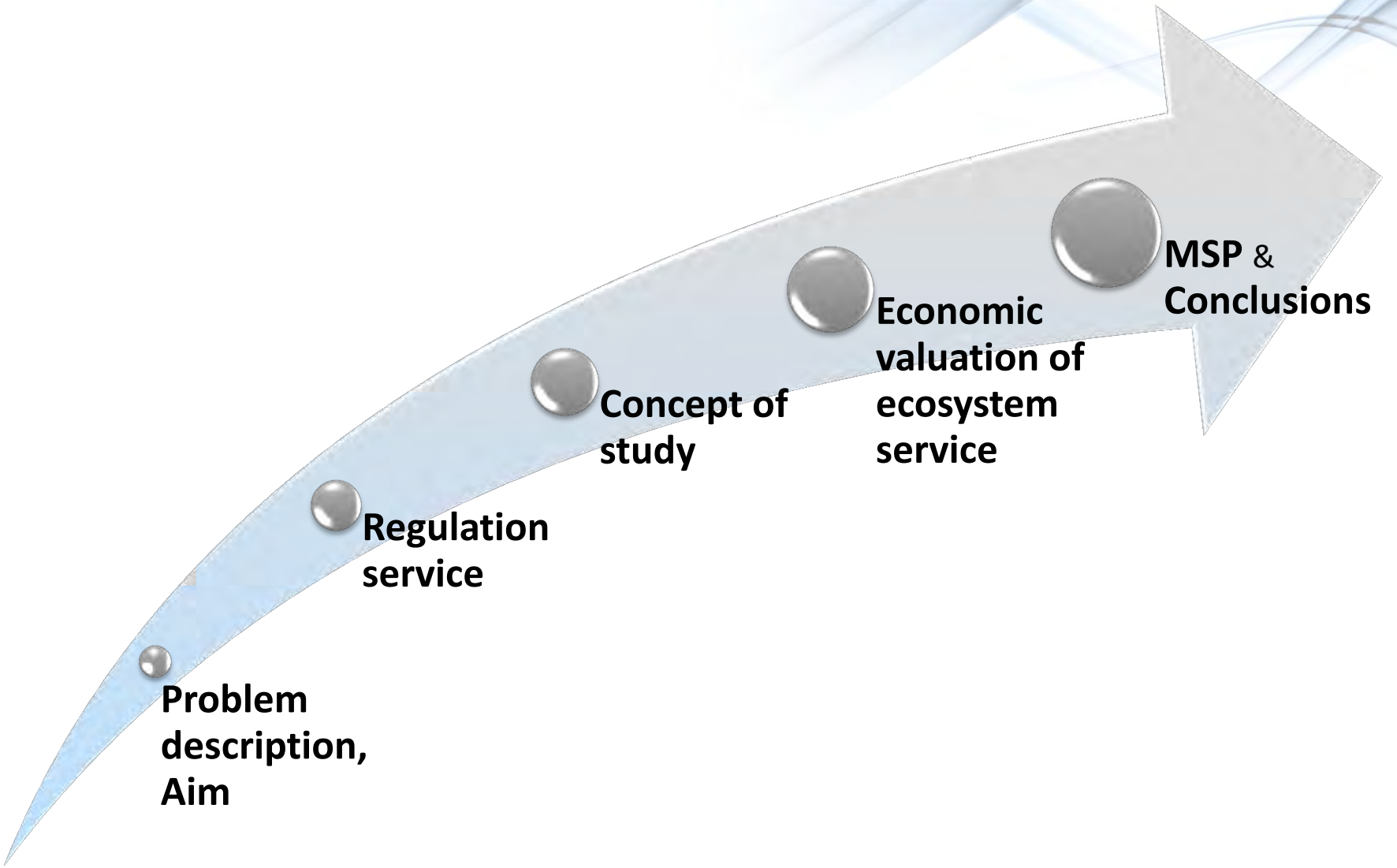
Structure of the presentation



Problem description

Managing nitrogen is one of the major environmental **challenges** for the 21st century.

Since the industrial revolution N inputs to the coastal ocean have **increased**.

Enclosed seas with high river runoff like the Baltic Sea are especially **affected by the increasing riverine nutrient loads.**

Eutrophication is a serious problem in the entire Baltic Sea area.

The Baltic Sea

Source: www.helcom.fi

Problem description

Negative effects of eutrophication on the marine environment:

- intense algal growth
- decreased water transparency

(turbid water)

- oxygen deficiency

(benthic azoic deserts)

- toxic cyanobacteria blooms
- fish kills

Thick surface cyanobacteria accumulations visible in Southern Baltic on 07.25.2012

Source: http://spg.ucsd.edu/Satellite_Projects/BalticCyano2012/ htm

Problem description

DENITRIFICATION

removal mechanisms for nitrogen

global nitrogencycle

regulation of active nitrogen species
NO^{3-} and N_2O

mitigation of eutrophication /
climate change

EU's Marine Strategy Framework Directive states under article 1.3:
"Marine strategies shall apply an ecosystem-based approach to the management of human activities".

Aim of the work

The economic valuation of mitigation of eutrophication

(regulating ecosystem service)

Economic valuation of …

Regulating ecosystem services

Mitigation of eutrophication

balancing the effects of eutrophication - the removal of excess nitrogen and phosphorous from the sea through the following processes:

1) The uptake of nutrients by marine organisms (accumulation in living tissues).
2) Denitrification - conversion of biologically available nitrogen to atmospheric nitrogen (N_2) by bacteria.
3) Anaerobic removal of nitrogen including anaerobic nitrification and anaerobic ammonium oxidation.
4) Accumulation in sediments.

Economic valuation of …

Regulating ecosystem services

Mitigation of eutrophication
balancing the effects of eutrophication –
the removal of **excess nitrogen** through the **denitrification**

Ecological role of denitrification

- it reduces eutrophication
  - ✓ it permanently removes excess nitrogen from the ecosystem
  - ✓ it is the only natural mechanism by which nitrogen is truly removed from the ecosystem

Economic valuation, HOW?

combination of two non-market goods valuation methods

Replacement Cost Method (RC)

and

Contingent Valuation Method (CVM)

Economic valuation, HOW?

Replacement Cost Method

The **best way** to estimate the economic value of mitigation of eutrophication is **the replacement cost method**.

Under certain conditions it can be used for evaluating **the indirect use values**.

three conditions

(1) The chosen artificial substitute for ecosystem services should be similar in terms of processes;

(2) The substitute for the ecosystem services should be as cheap as possible;

(3) The society has to demonstrate their willingness to pay (WTP) for the services provided artificially, if the ecosystem will not be able to provide the service (Shabman & Batie, 1978).

Concept of study

The assessment of the monetary value of ecosystem service
mitigation of eutrophication using
the replacement cost approach

IV STAGES

identification and quantification of the mitigation of eutrophication (ecosystem function)

definition of substitute and its cost

economic valuation of the ecosystem service

verification of the estimated value

Marine Spatial Planning

MSP's goals
vs.
economic valuation of regulating services

MSP's goals	RESULTS OF ECONOMIC VALUATION
Protect, **maintain**, and **restore** the marine resources , ensure resilient ecosystems and their ability to provide ecosystem services.	**Economic reasons** for the needs of protection the marine environment.
Enhance communication and collaboration between society and government.	Denitrification in monetary terms **is better understood** than its scientific definition.
Providing a coordinated way to allocate **marine spaces** to simultaneously **achieve ecological, economic, and social goals**.	**Economic justification** and **support** for decision making processes.
Taking into consideration **possible future changes** of the factors affecting the state of the sea.	Data on denitrification and its economic value - **good input** to the **modeling** environmental status in the future.

Conclusions – lessons learned

Economic value of mitigation service 2,5 mln € – 3,1 mln € (RCM)

Mitigation of eutrophication in connection with definition has much border range in terms of involved processes.
Thus, this value might be regarded as **the lower bound** of the socio-economic value of this service.

Replacement cost method is supposed to be rather easy to understand and therefore might be suitable to enhance social perception of indirect use values

The increasing intensity of the marine resources exploitation requires a more in-depth description of all the benefits which we obtain thanks to the sea, especially that a certain proportion of these benefits can be classified as **positive external effects.**

Argument for allocation of founds into mitigation of eutrophication.
Support of the maritime policy objectives by their **economic justification**.

Thank you for your attention

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