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**Innovative Sediment Management:
How to do more with less**



Introducing ecosystem services of sediments into maritime spatial planning with the focus on Polish experience

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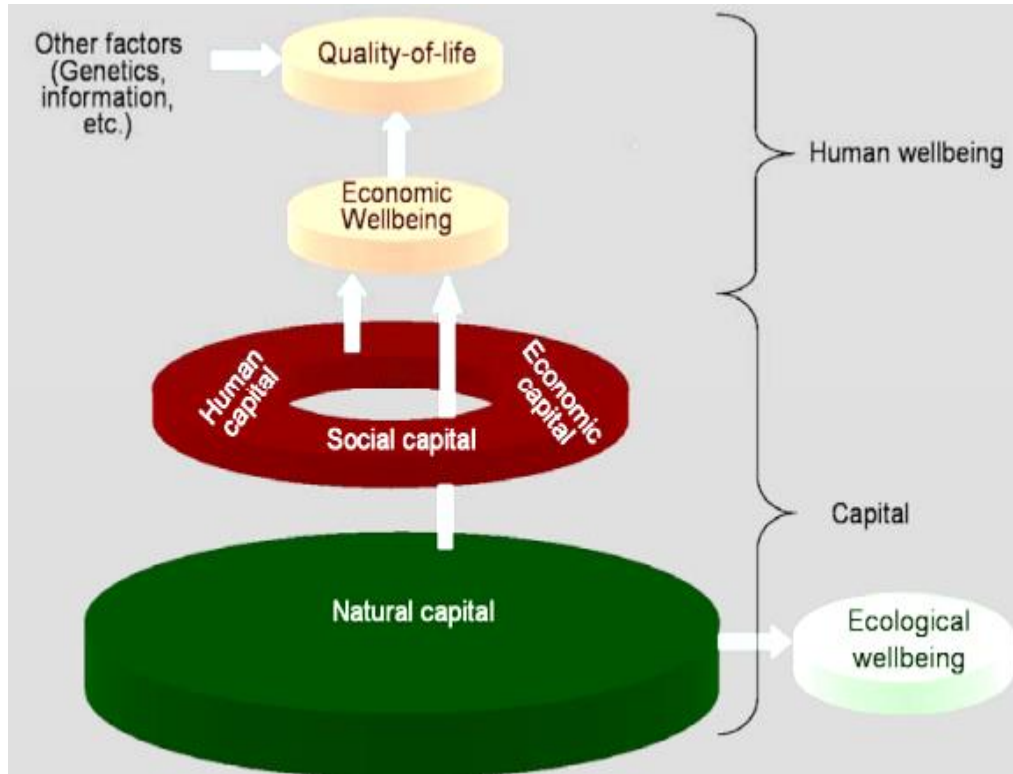
POLAND

Structure of the presentation

- **Problem description**
- **Definition of Maritime Spatial Planning**
- **Concept of ecosystem goods & services**
- **Goods & services provided by sediments**
- **Economic valuation of environment. How? Why? For what?**
- **Polish case study – Gulf of Gdansk**
- **Sediments in Maritime Spatial Planning in Poland**
- **Conclusions – lessons learned**

Problem description

Human wellbeing and its relation to capital



Source: ESA (2011)

NEW POLICY FRAME

- ✓ **Natural Capital as important factor of human well-being.**
- ✓ **Growing pressure on natural capital of the sea** (new uses e.g. wind mills, shale gas, aquaculture).
- ✓ **Better understanding** of benefits and goods provided by the natural capital of the oceans.

But sediments somehow **outside** this new policy frame

NEW POLICY CONCEPTS:

- **Integrated maritime policy**
- **MARITIME SPATIAL PLANNING**
- **ECOSYSTEM GOODS AND SERVICES**

Definition of Maritime Spatial Planning

MSP is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process.

Source: EHLER C., DOUVRE F. (2009)



Source: European Commission (2010)

Concept of ecosystem goods & services

Goods and services

“the direct and indirect benefits people obtain from ecosystems”

Source: Beaumont et al. (2007)

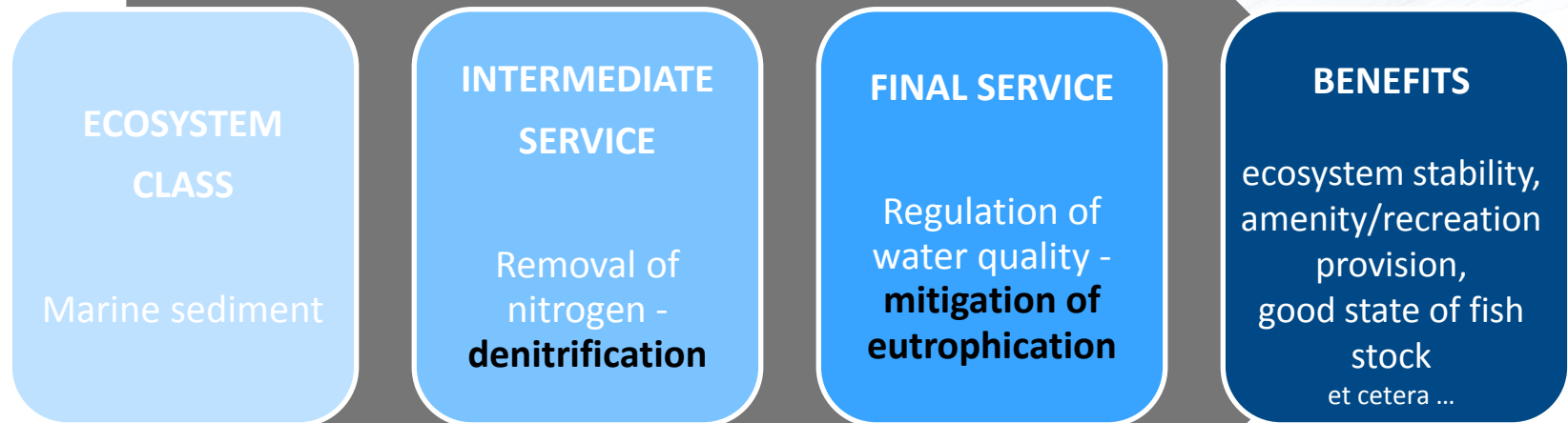
Classification of ecosystem goods & services

Category	Definition
Production services	products obtained from the ecosystem
Regulating services	the benefits obtained from the regulation of ecosystem processes
Cultural services	the nonmaterial benefits people obtain from ecosystems
Supporting services	necessary for the production of all other ecosystem services, but do not yield direct benefits to humans

Source: Millenium Ecosystem Assessment (2003) and Hein et al. (2006)

Concept of ecosystem goods & services

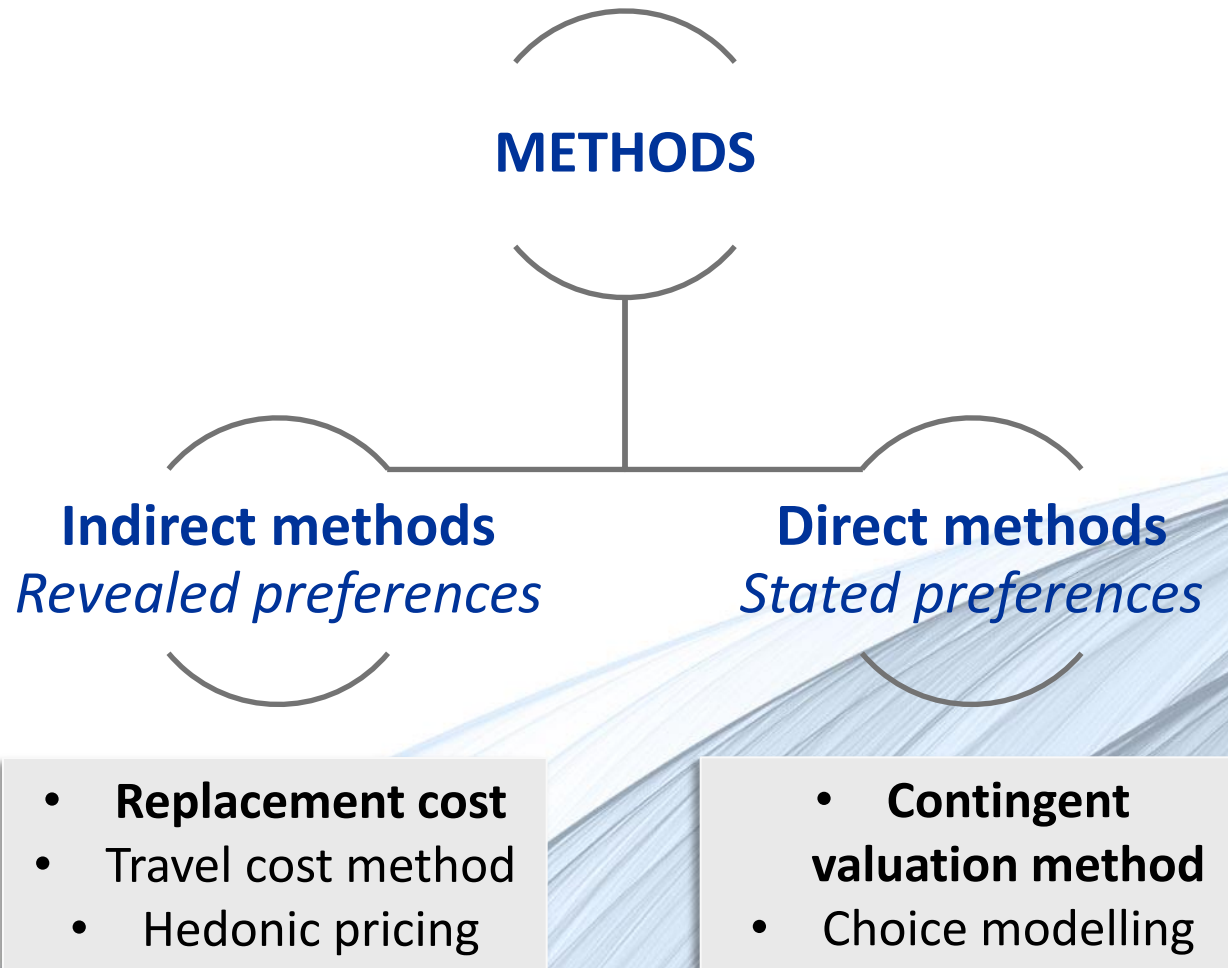
Example of relationships between
intermediate services,
final services and benefits



Goods & services provided by SEDIMENTS

CATEGORY	GOOD OR SERVICE
Production services	Food provision (plants and animals) Fuels, energy Fiber
Regulating services	Bioremediation of waste, <u>mitigation eutrophication</u> Remineralization Biological control Gas and climat regulation Disturbance prevention (Erosion and sedimentation control)
Cultural services	Leisure and recreation (tourism) Cognitive benefits (education)
Supporting services	Resilience and resistance (life support) Biologically mediated habitat
Option-use value	Future unknown and speculative benefits

Economic valuation methodologies



Why? For what?

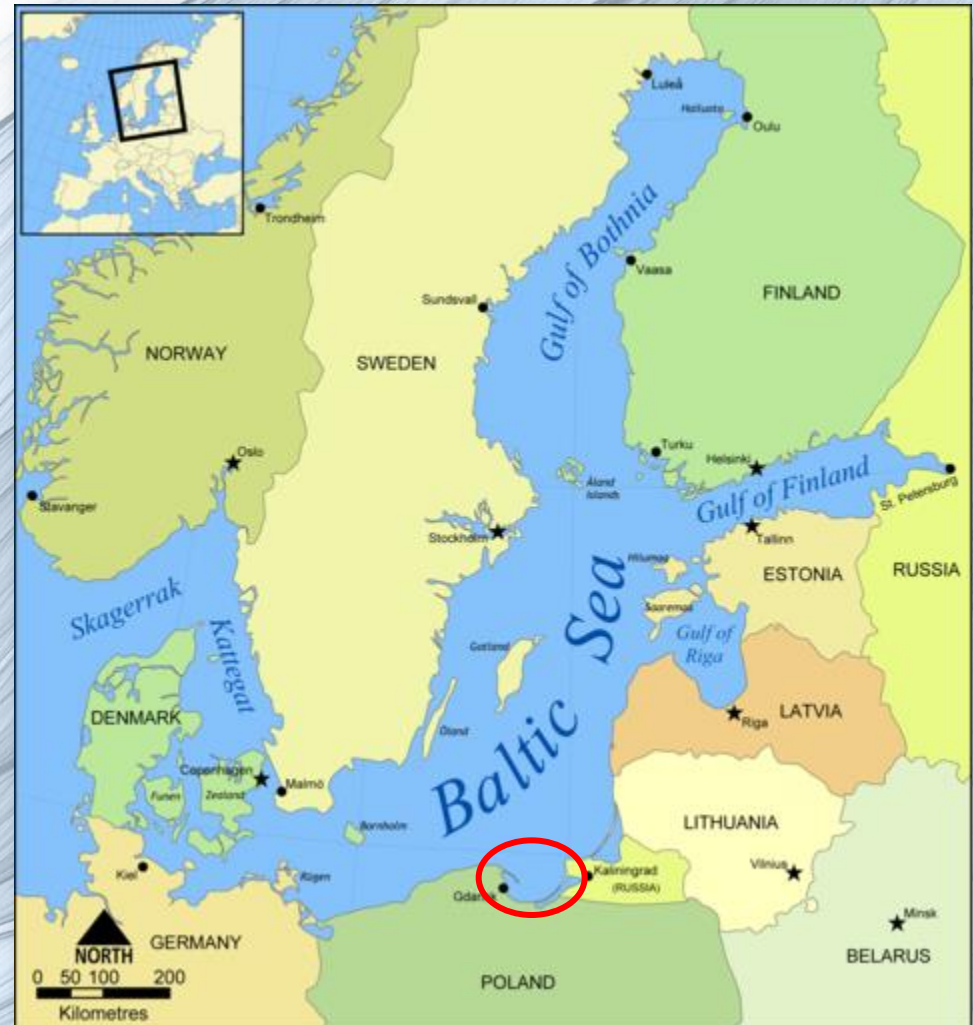
- ✓ to **make better decisions** about the environment (solving the specific spatial conflicts - different uses of the sea)
- ✓ to **make rational choices**, which consequences are changes in the environment.
- ✓ to **ensure safe** and **sustainable use** of the sea
- ✓ to **better protect** the environment
- ✓ to **better manage** natural resources



Case study area – Gulf of Gdansk brackish estuary (the Southern Baltic Sea)

AIM of the study

the economic valuation of
mitigation eutrophication
(regulating ecosystem service)



Economic valuation of..

Regulating ecosystem services



Mitigation eutrophication
the removal of excess NITROGEN and PHOSPHOROUS
from the sea through the following processes:

- 1) Accumulation in living tissue
- 2) Denitrification.
- 3) Anaerobic nitrification/anaerobic ammonium oxidation.
- 4) Accumulation in sediments.

Source: SWEDISH EPA, report 5873, p.78 (2008)

- ❖ it reduces the amount of nitrogen in the ecosystem
 - ✓ it permanently removes 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

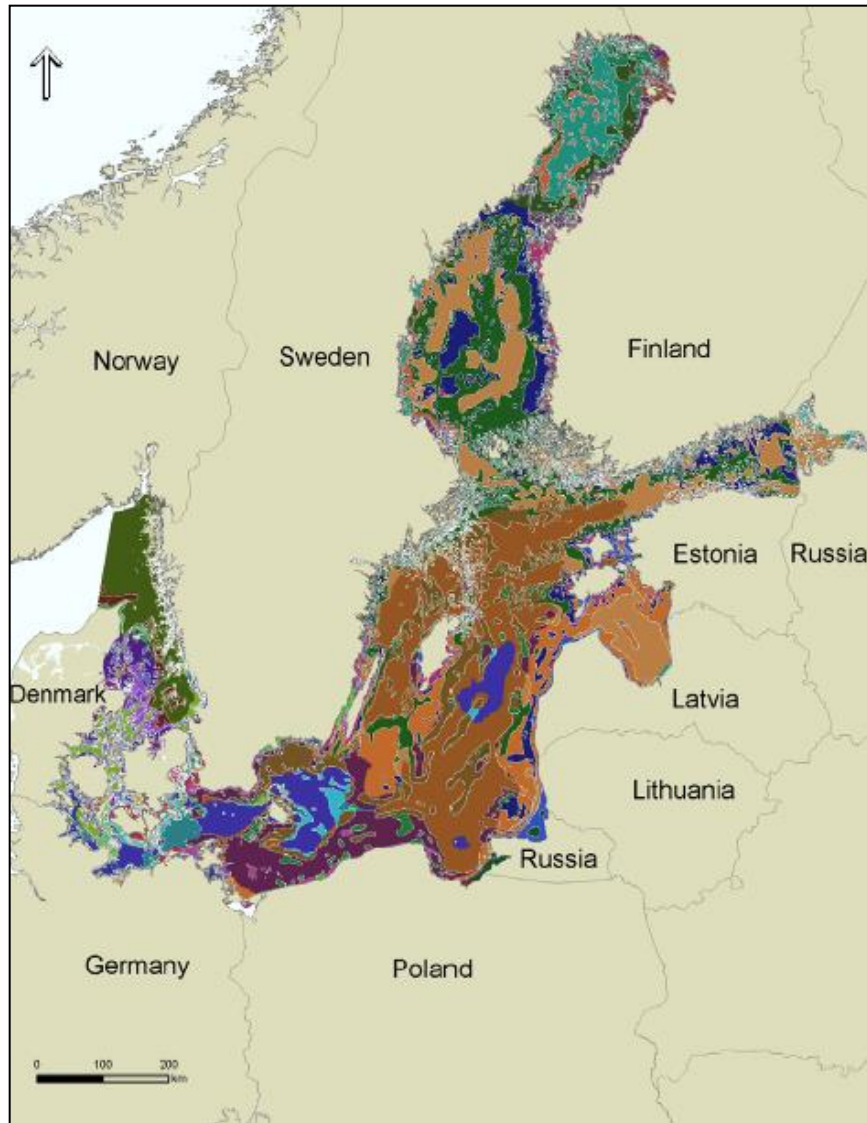


- I. The artificial substitute for ecosystem services - **similar in terms of processes**;
- II. The substitute for the ecosystem services - **as cheap as possible**;
- III. The society has to demonstrate their **willingness to pay (WTP)** for the services provided artificially, if the ecosystem will not be able to provide the service.

Source: Shabman & Batie (1978)

Sediments – benthic marine landscape

Benthic marine landscape map of the Baltic Sea



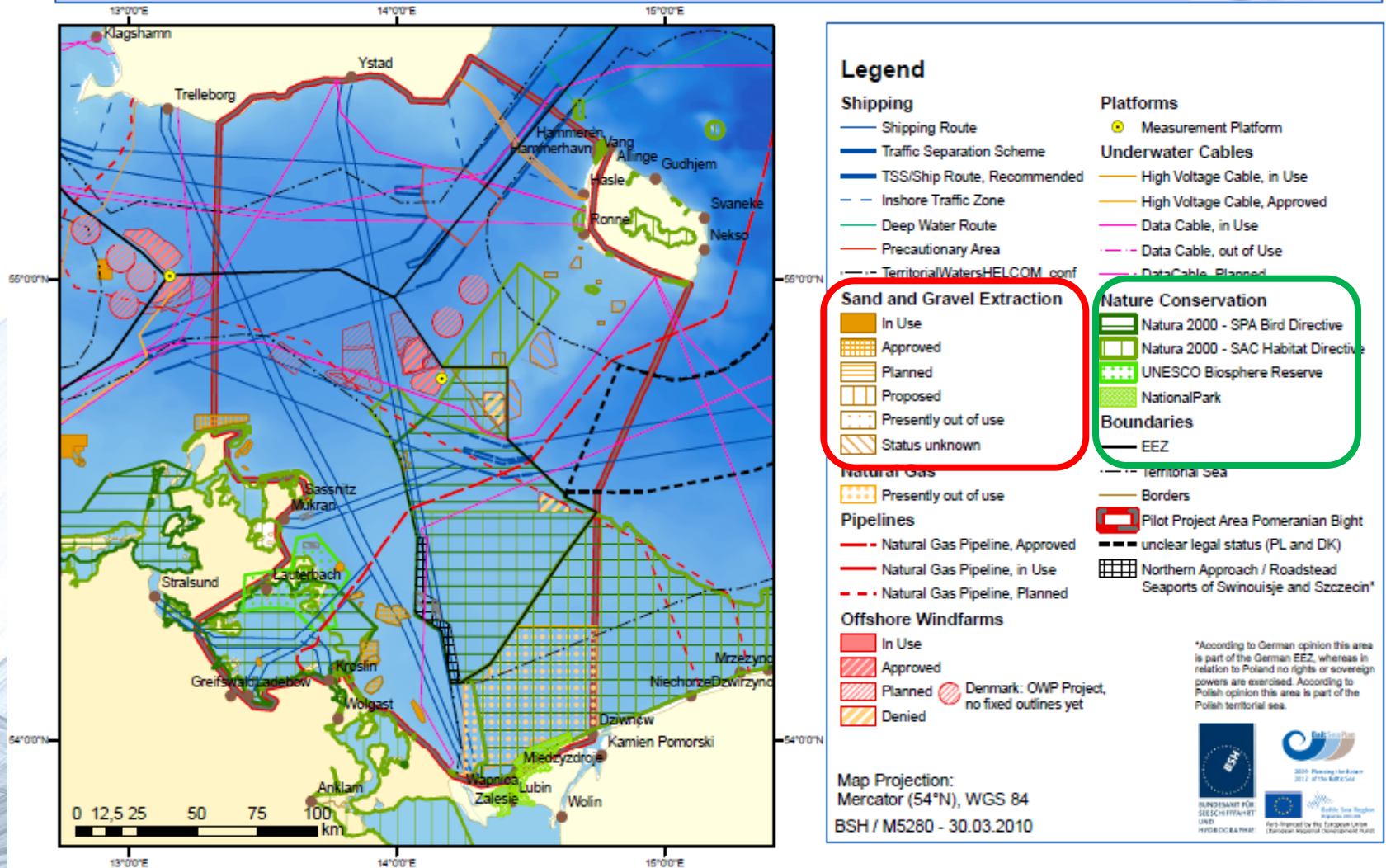
60 MARINE LANDSCAPES

- Identification based on **sediment, salinity and light (not processes)**.
- *Which type of marine landscape is rare?*
- *Which places are more **vulnerable** /**valuable** on an ecosystem level?*

**Economic value of functions
provided by sediments –
NEW LAYER OF DATA**

Sediments in Polish MSP considered as a gravel, ...

Pilot Project Area - MSP Pomeranian Bight / Arkona Basin - Provisional stocktake -



Conclusions – lessons learned

So far we could only use those services which have **market value (gravel)**.

„Intangible services,, or intermediate services of sediments related to regulating and supporting ecosystem services have been almost **neglected**.

Allocating the space we **could not compare** value of sediments in terms of a building lot for a new sea construction to a mitigating eutrophication function .

As the results the **sediments were out of planning agenda** due to lack of knowledge and information (with exception of gravel extraction).

But a huge effort was done **to examine the role of sediments in habitat creation** (the concept of marine landscapes) and to **estimate economic value of services**.

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

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

Thank you for your attention

Acknowledgements

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