Swedish Agency for Marine and Water Management

Ecosystem-based management approach to MSP

Linus Hammar
SwAM Unit for International Affairs
Regional MSP workshop, Dar es Salaam
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Swedish Agency for Marine and Water Management

Ecosystem-based management approach to MSP

Ecosystem based management

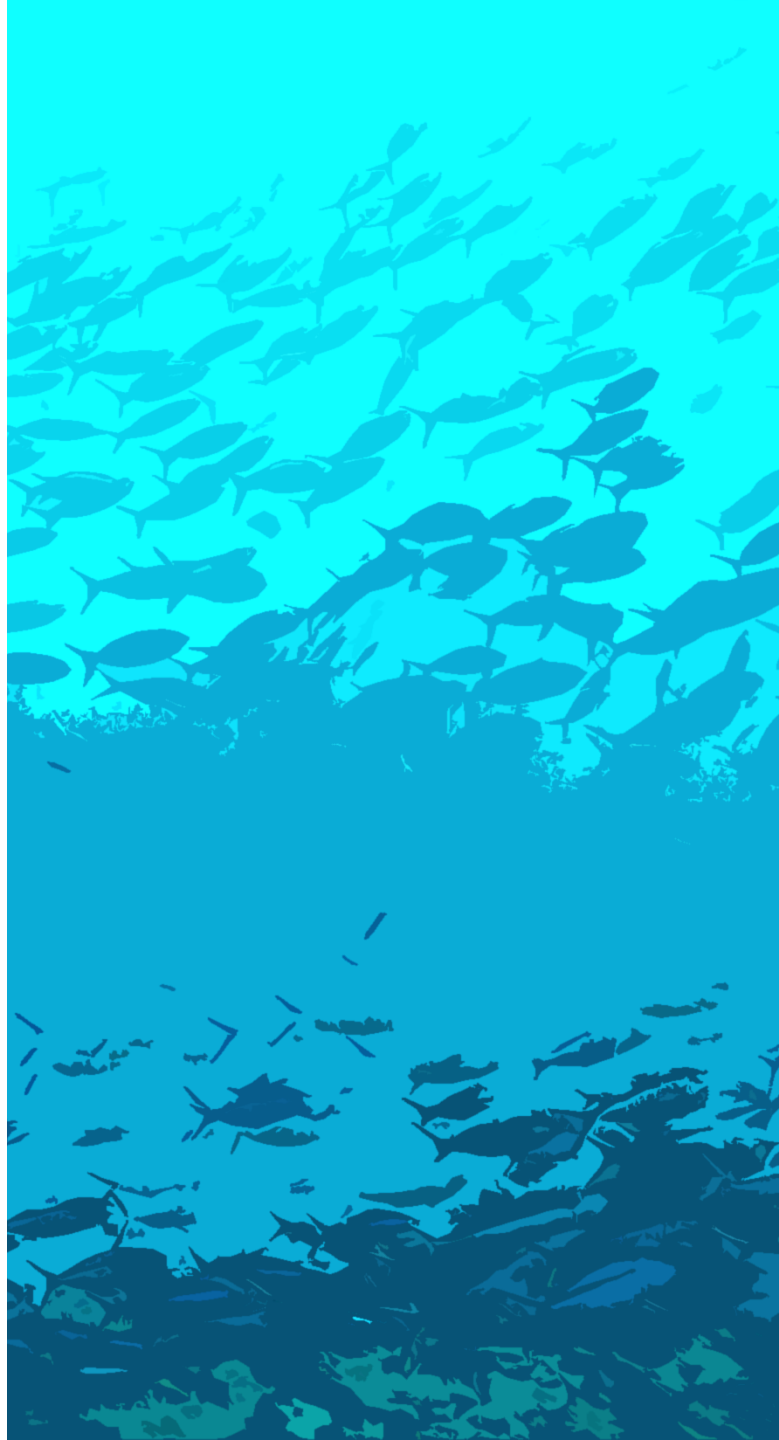
is what

UNEP (2018) on the development of an African Strategy for Ocean Governance:

EBA "..address **all human activities** that affect the **functioning** of the **whole ocean ecosystems** for sustained economic, social and environmental benefits .. This eventually implies that **cumulative impacts** in the ecosystems are appropriately assessed.."

UNESCO (2009) on the practical guide for marine spatial planning:

EBA "..considers the **entire ecosystem**, including **humans**.. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the **cumulative impacts** of different sectors. Specifically, ecosystem-based management emphasizes the protection of ecosystem structure, **functioning**, and key processes.."



Ecosystem based management

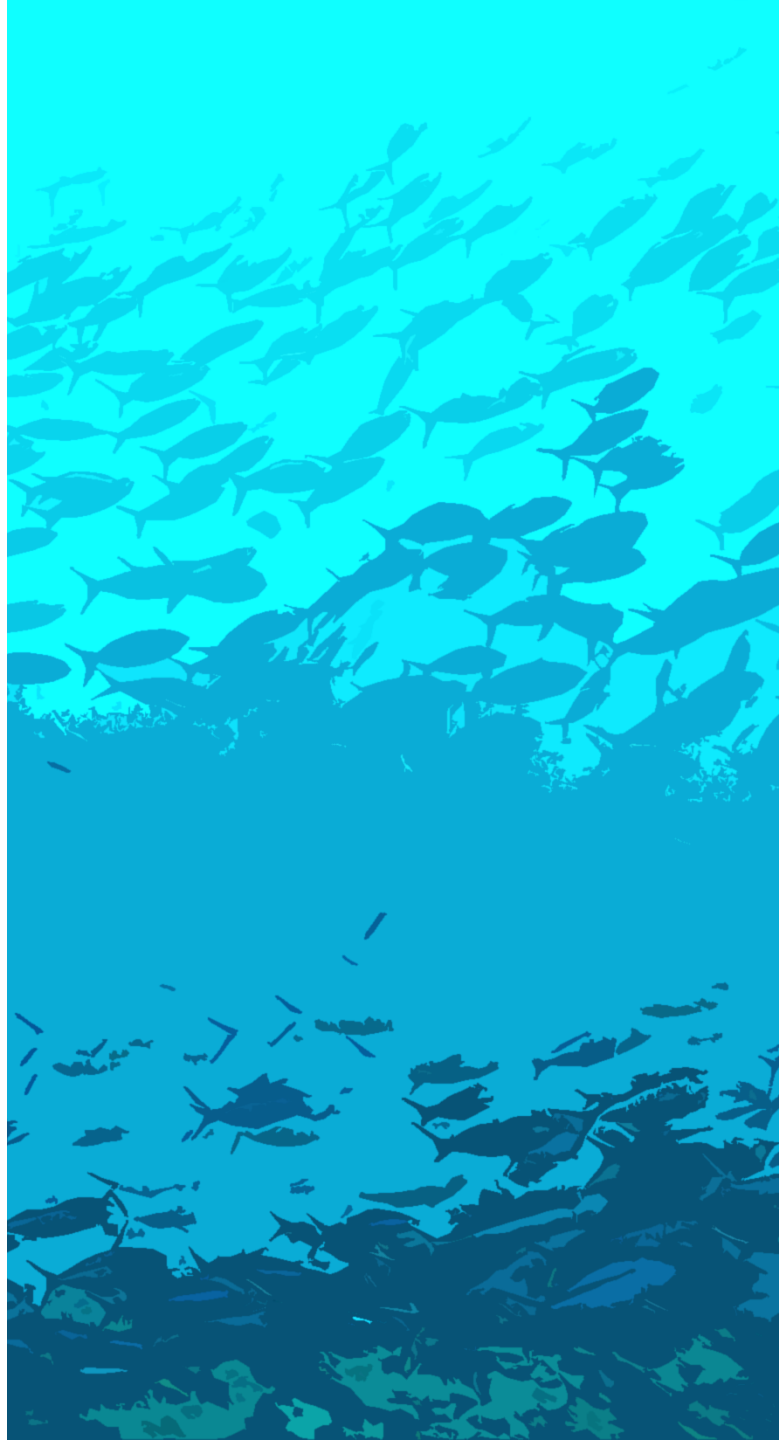
adopted in European MSP

MSP Framework directive 2014/89/EU by the European Union:

"The application of an ecosystem-based approach will contribute to promoting the sustainable development and growth of the maritime and coastal economies and the sustainable use of marine and coastal resources .. ensuring that the **collective pressure of all activities** is kept within levels compatible with the **achievement of good environmental status** and that the **capacity of marine ecosystems** to respond to human-induced changes is not compromised.."

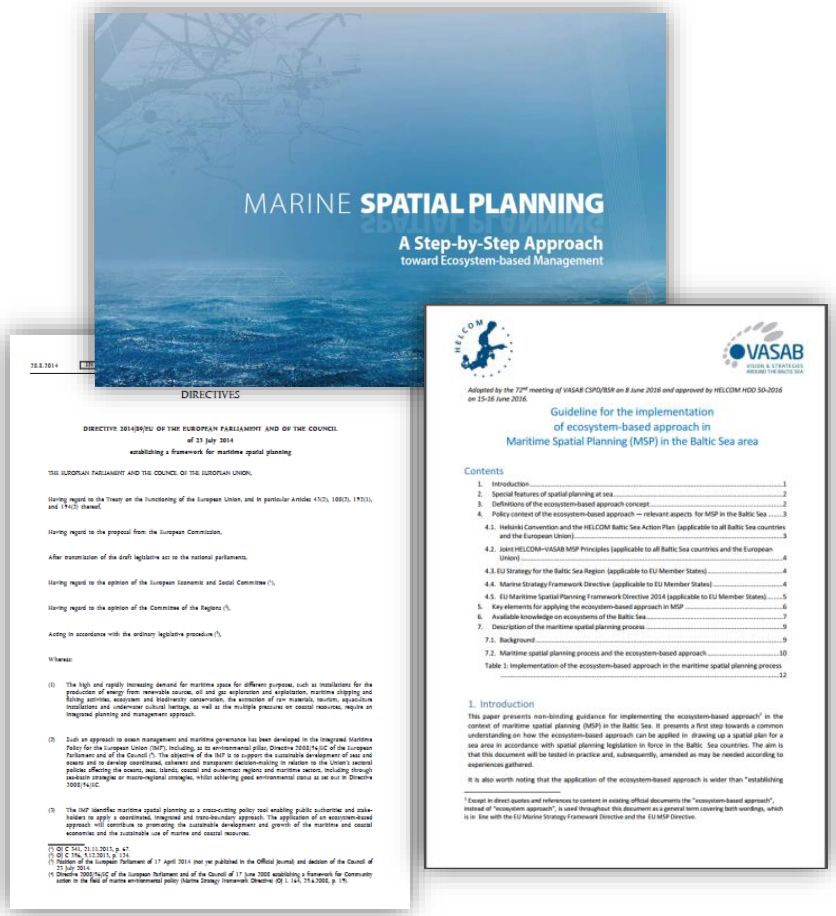
National implementation of the MSP Framework: Apply an Ecosystem Approach to be interpreted with reference to the **Malawi Principles** (CBD 1998)

Strategy for the integrated management of land, water and living resources that promotes **conservation** and **sustainable use** in an **equitable** way, with the aim to ensure that human use of ecosystems is kept **within the limits of ecosystems' capacity** to regenerate with regard to their structure, dynamics and **function**.



A common understanding

but how in practice?

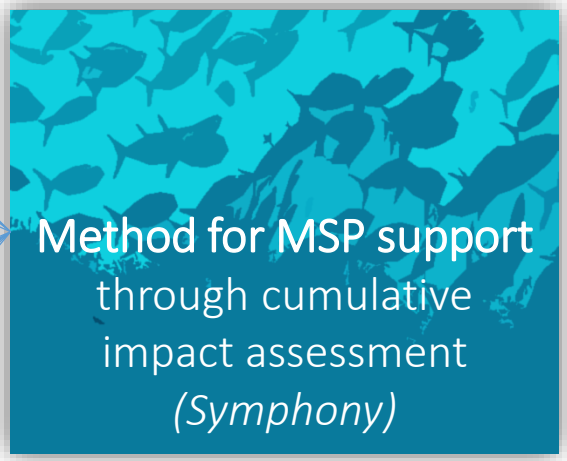


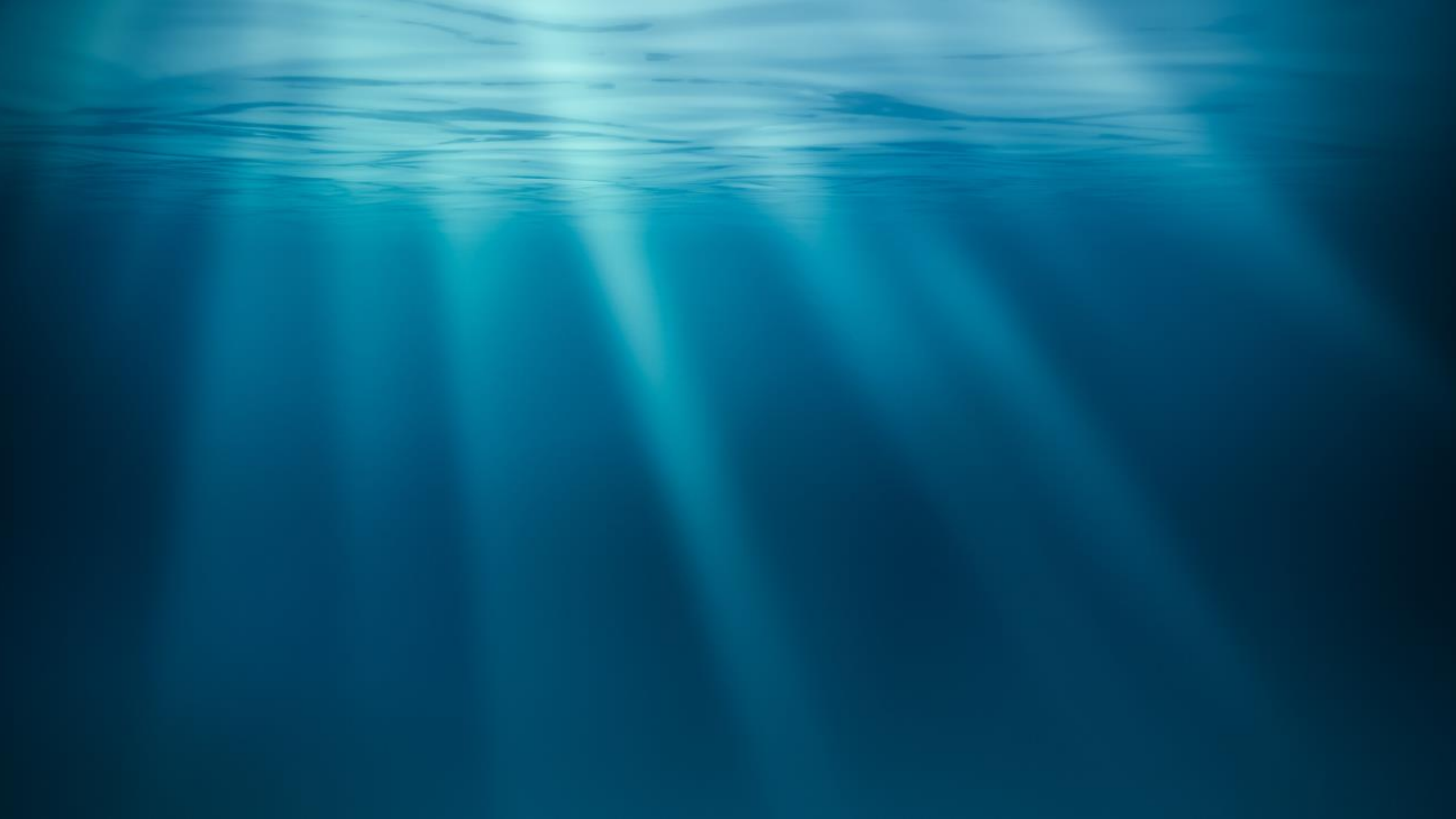
General key elements for ecosystem-based MSP:

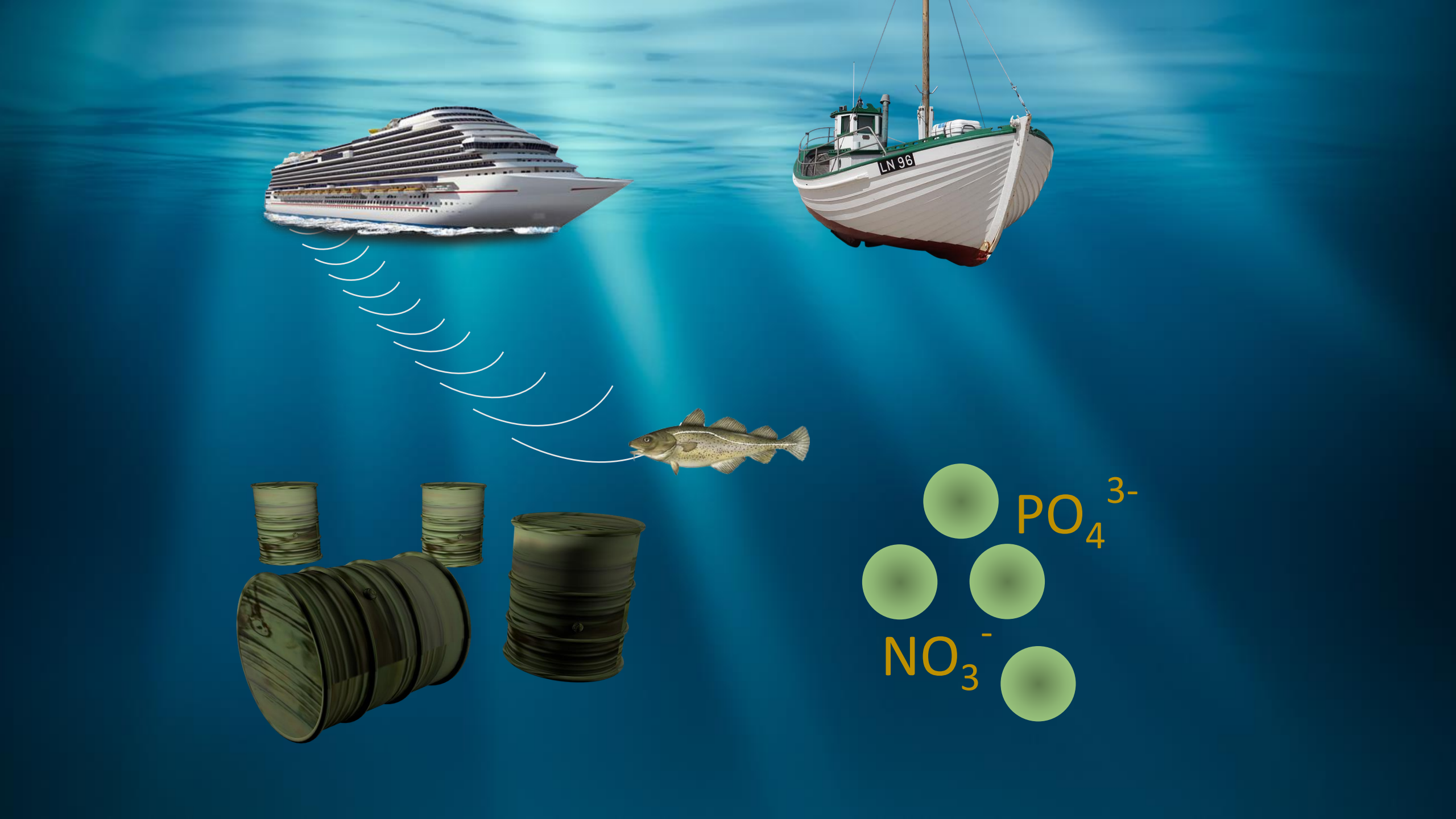
- Consider whole ecosystem
- Include all human activities
- Address cumulative effects
- Do not compromise ecosystem functioning
- For the benefit of sustainable equitable development and prolific blue growth

HELCOM/VASAB The Ecosystem Approach is implemented in the planning process through key elements:

- Environmental objective: Good Environmental Status
- Best Knowledge and Practice
- Precaution
- Alternative development
- Identification of ecosystem services
- Mitigation measures
- Relational understanding
- Participation and Communication
- Subsidiarity and Coherence
- Adaptation






LN 96
PO_4^{3-}
NO_3^-

Climate change temperature

Oilspill shipping

Climate change acidification

Heavy metals background

Explosions peak pressure

Noise boating

Anoxia background

Pollution boating

Noise 125Hz wind power

Catch gillnet

Explosions SEL

Noise 125Hz shipping

Habitat loss fish farm

Catch pelagic trawl

Phosphorous overload

Synthetic toxins treatment plant

Habitat loss coastal exploitation

Noise 2000Hz shipping

Electromagnetic field

Bird hunt

Heavy metals mine dump

Toxic munition dump

PO_4^{3-}

Catch bottom trawl

Habitat loss sand extraction

Habitat loss dumping

Nitrogen overload

Turbidity bottom trawl

Heavy metals military area

NO_3^-

Turbidity sand extraction

Heavy metals fiber bank

Synthetic toxins background

Turbidity shipping

Synthetic toxins harbor

Nutrients fish farm

Abrasion bottom trawl

Habitat loss mussel farm

Habitat loss infrastructure

Oilspill wreck

Heavy metals mercury dump

Synthetic toxins industry

Climate change acidification
Climate change temperature
Angiosperms
Haploops reef
Oilspill shipping
Heavy metals background
Explosions peak pressure
Noise boating
Rough bottom photic
Anoxia background
Seabird coastal wintering
Grey seal
Rough bottom aphotic
Noise 125Hz wind power
Pollution boating
Shoreline
Hard bottom aphotic
Catch gillnet
Porpoise north sea
Explosions SEL
Coastal birds
Habitat loss fish farm
Noise 125Hz shipping
Catch pelagic trawl
Synthetic toxins treatment plant
Phosphorous overload
Plankton pelagic
Seabird offshore wintering
Noise 2000Hz shipping
Soft bottom photic
Habitat loss coastal exploitation
Cod
Hard bottom photic
Sprat
Electromagnetic field
Harbour seal
Fish spawning
Bird hunt
Eel migration
Toxic munition dump
Heavy metals mine dump
Herring
Transport bottom photic
Catch bottom trawl
Vendace
Porpoise baltic sea
Habitat loss sand extraction
Deep reef
Nitrogen overload
Habitat loss dumping
Turbidity bottom trawl
Heavy metals military area
Soft bottom aphotic
Porpoise belt sea
Mussel reef
Rivermouth fish
Turbidity sand extraction
Heavy metals fiber bank
Synthetic toxins background
Turbidity shipping
Transport bottom aphotic
Rough bottom deep
Synthetic toxins harbor
Artificial reef
Nutrients fish farm
Hard bottom deep
Abrasion bottom trawl
Habitat loss mussel farm
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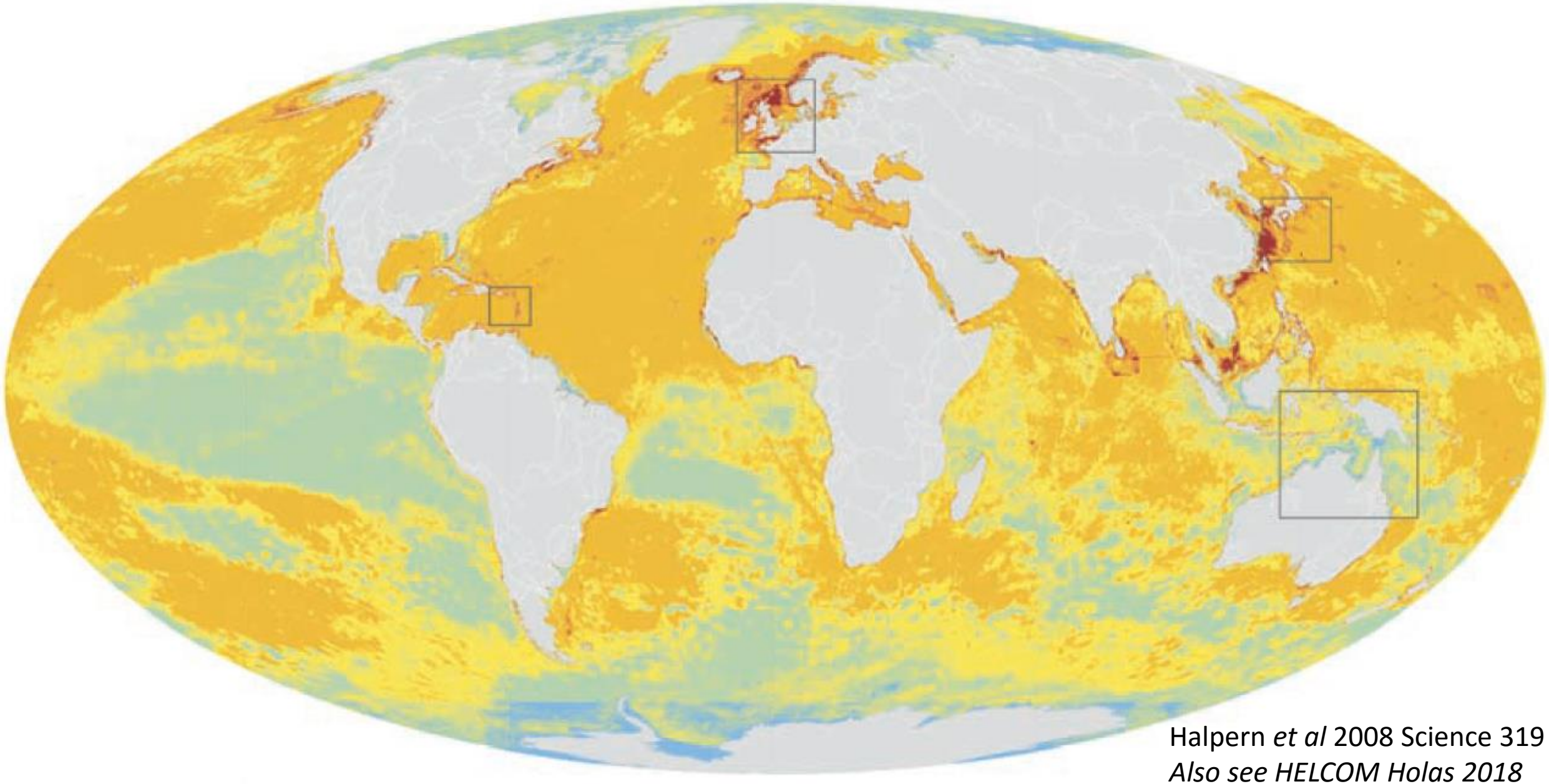
Synthetic toxins industry
Transport bottom deep
Soft bottom deep



Halpern *et al* 2008 Science 319
Also see HELCOM Holas 2018

The model behind the map

Equation

$$P_{sum} = \sum_{i=1}^{n}\sum_{j=1}^{m} B_i \times E_j \times K_{i,j}$$

Cumulative impact (*P*) is calculated as the sum of the product of all pressures' (*B*) effects on all ecosystem components (*E*), given the particular sensitivity (*K*) of every ecosystem component to every pressure.

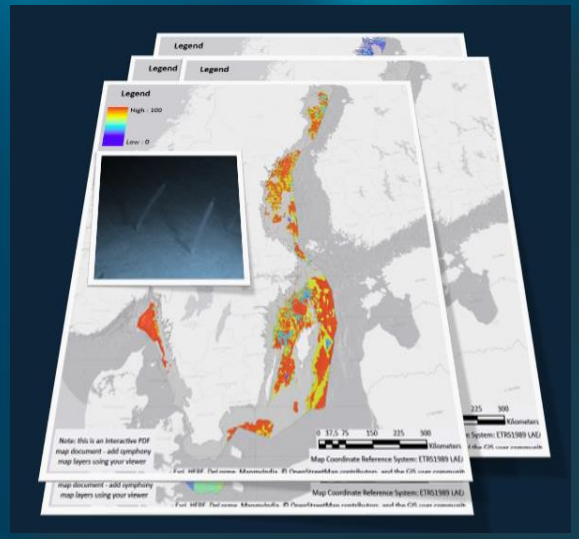
Pressures

From human activities

×

Ecocomponents

Nature values



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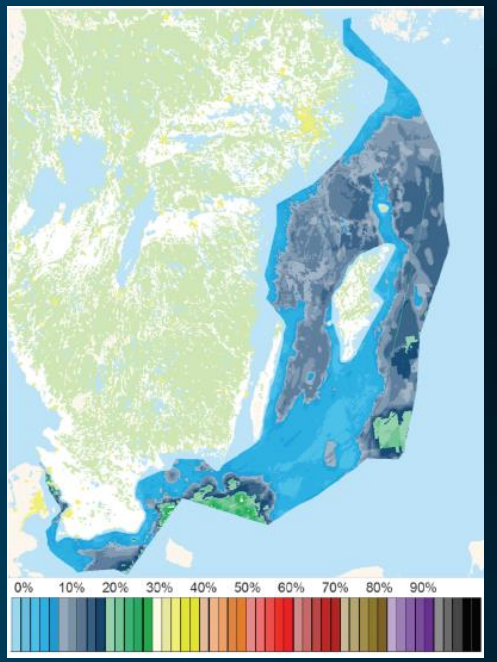
Sensitivity matrix

Describes the specific effect of each pressure on each ecocomponent

=

Results

Figures and tables



Pressures

From human activities

Ecocomponents

Nature values

Legend

High : 100

Low : 0

Note: this is an interactive PDF map document - add symphony map layers using your viewer

0 37,5 75 150 225 300

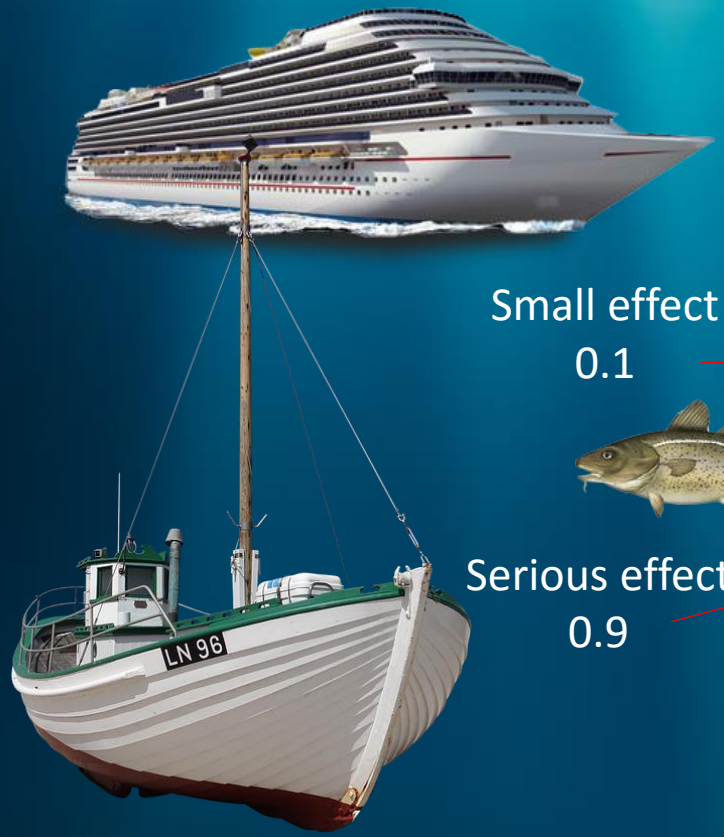
Kilometers

Map Coordinate Reference System: ETRS1989 LAEA

Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

Sensitivity matrix

Describes the specific effect of each pressure on each ecocomponent



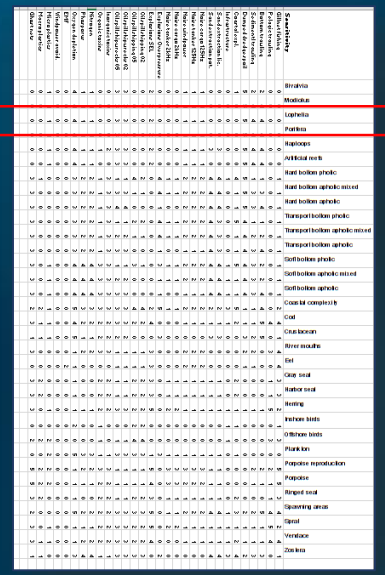
Small effect
0.1

Serious effect
0.9

Higher effect
0.2

PO_4^{3-}

NO_3^-



Cod

The model behind the map

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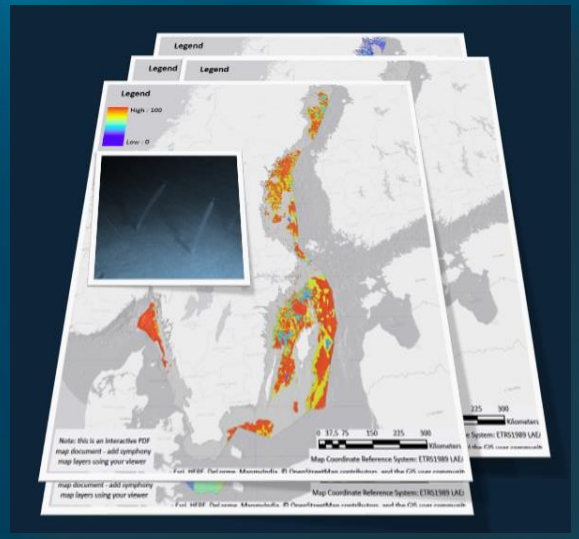
Pressures

From human activities

×

Ecocomponents

Nature values



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Sensitivity matrix

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Results

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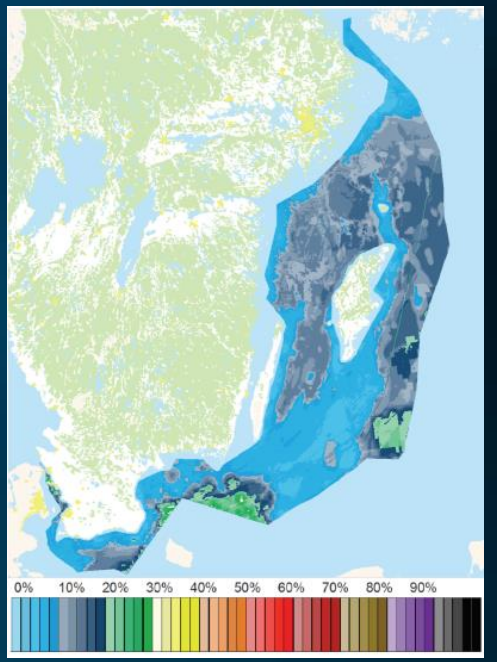
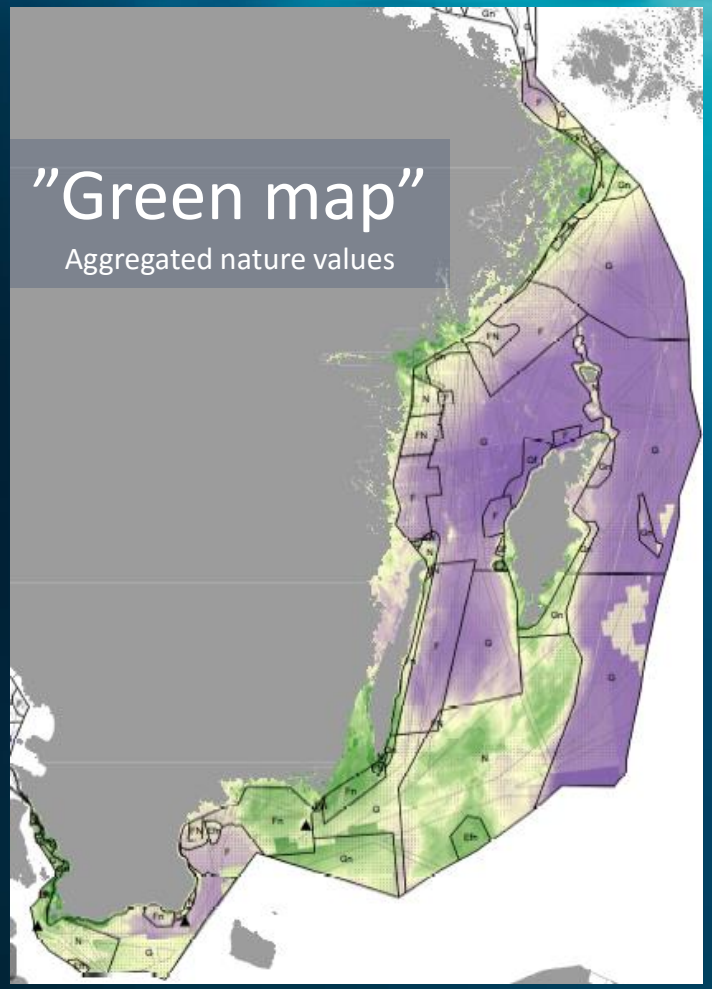
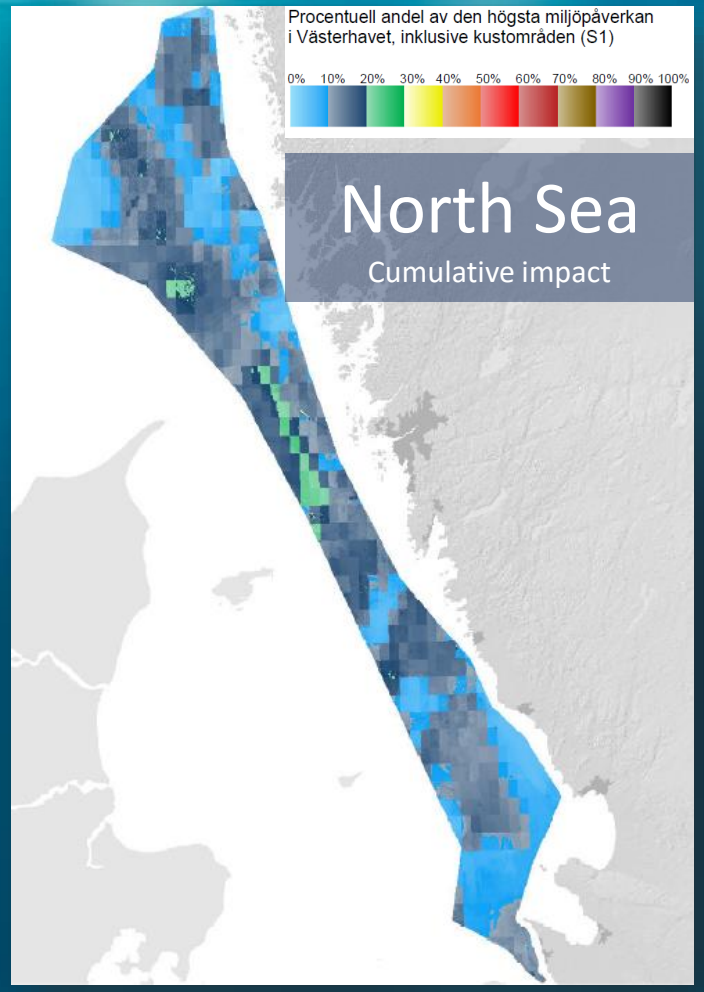


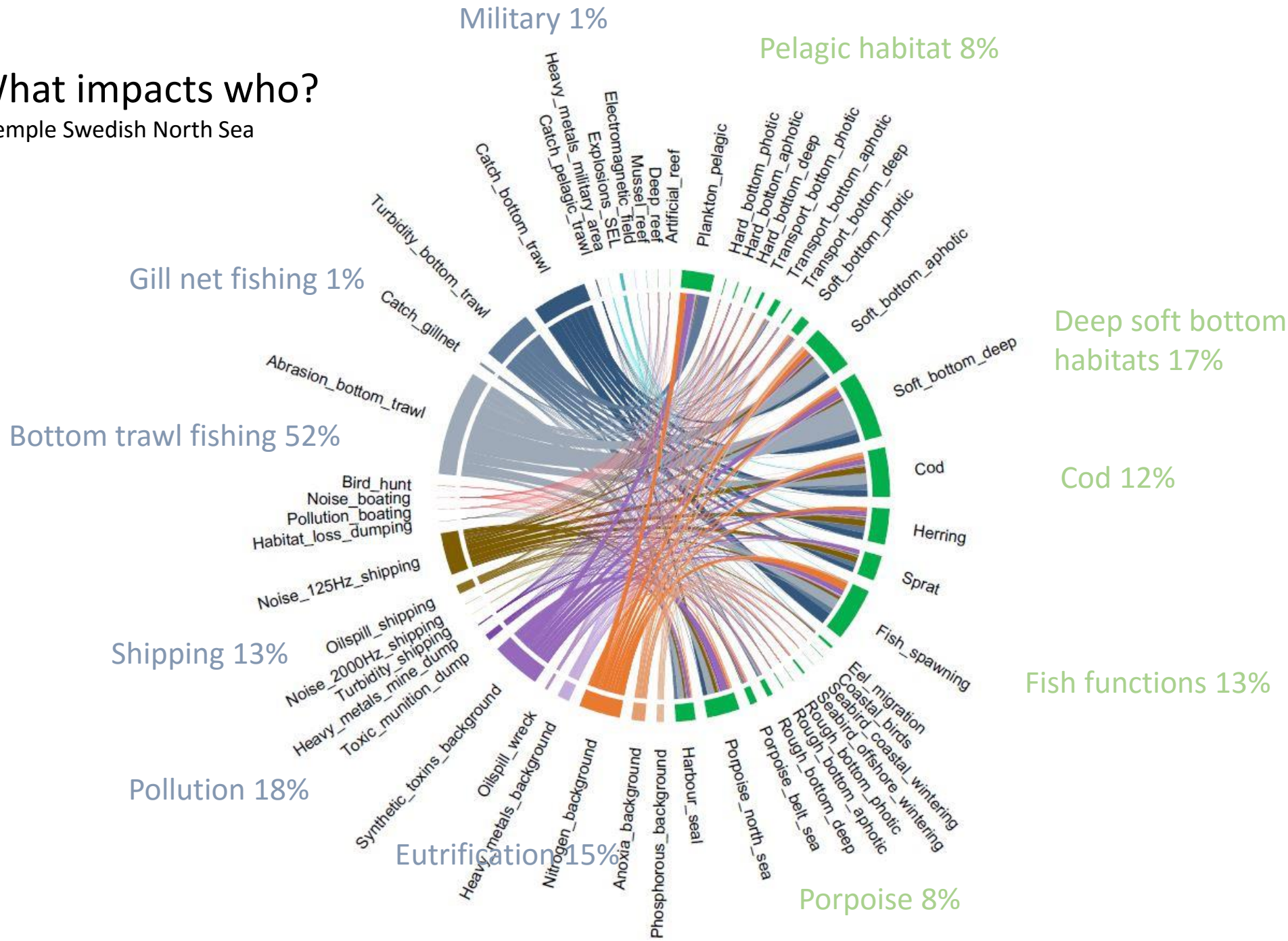
Results for supporting MSP



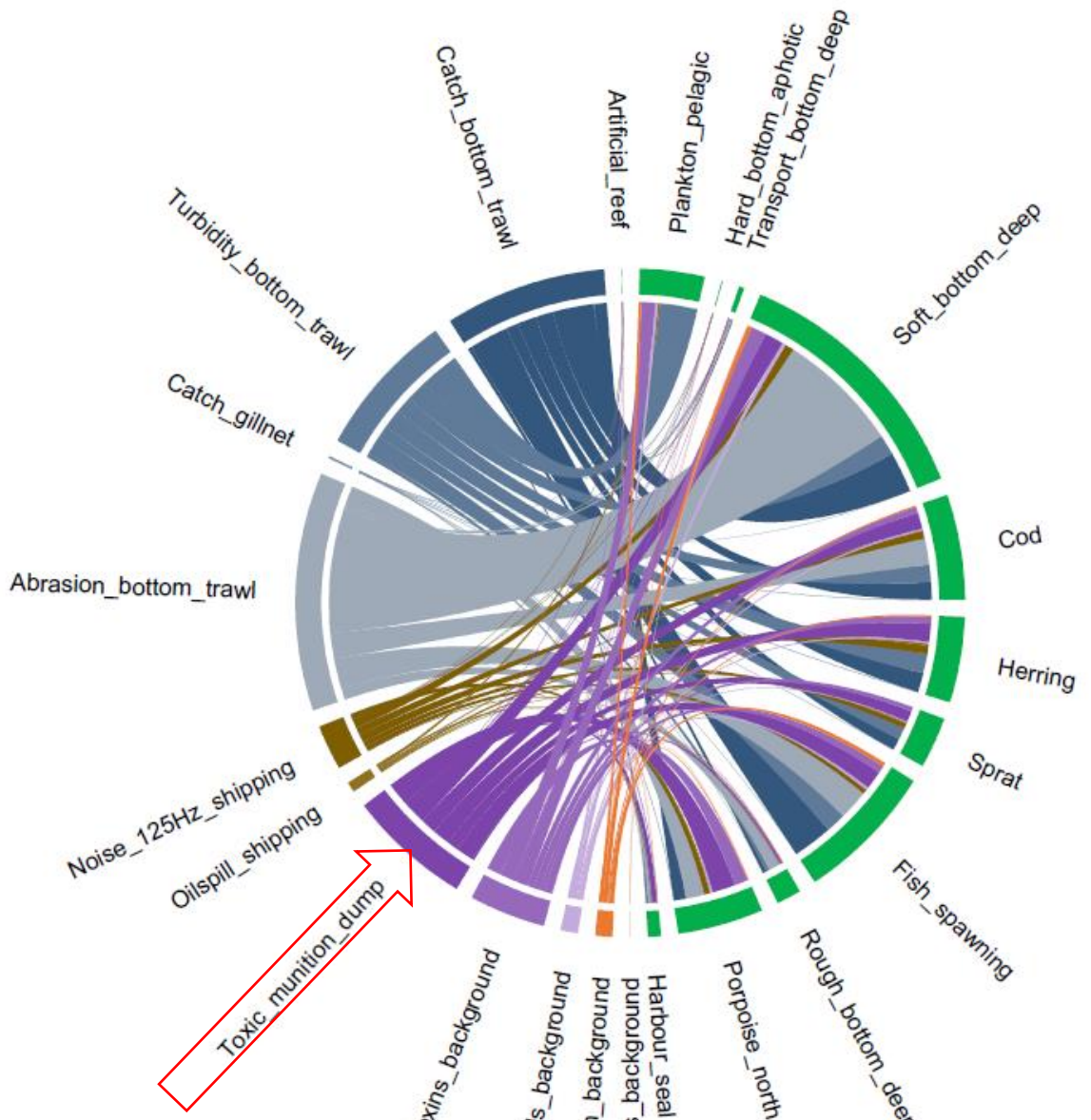


What impacts who?

Exemple Swedish North Sea



Investigate specific areas

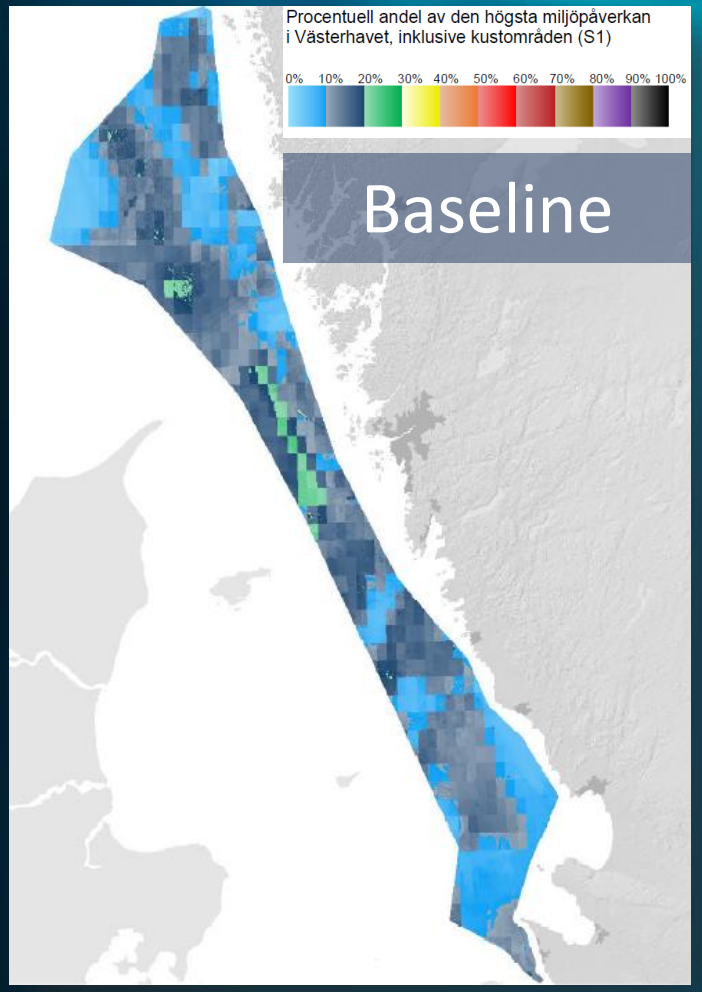


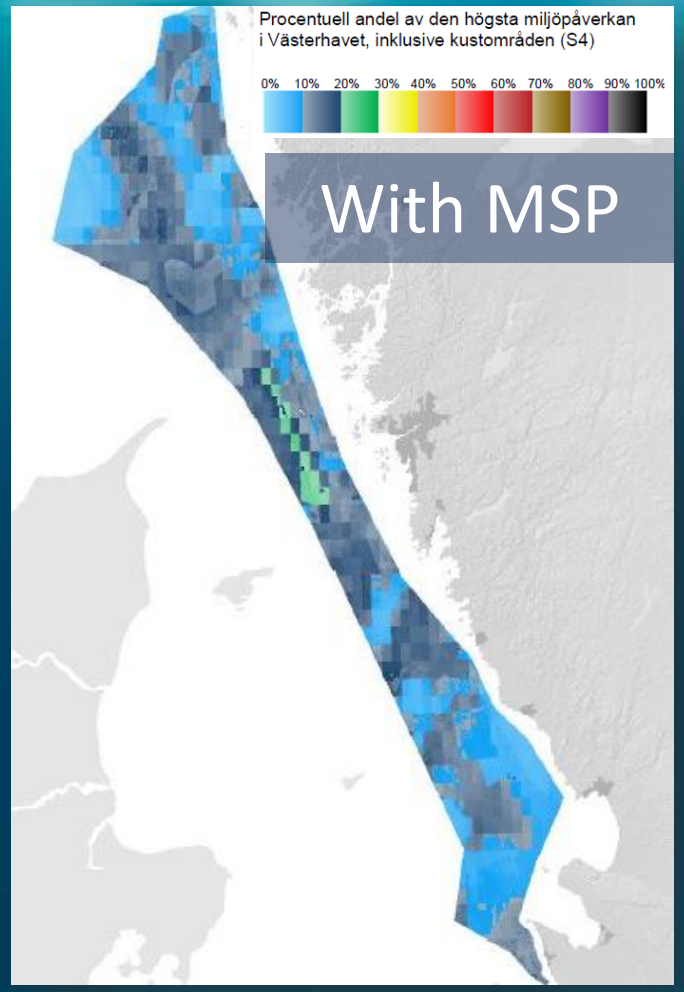
In this specific area

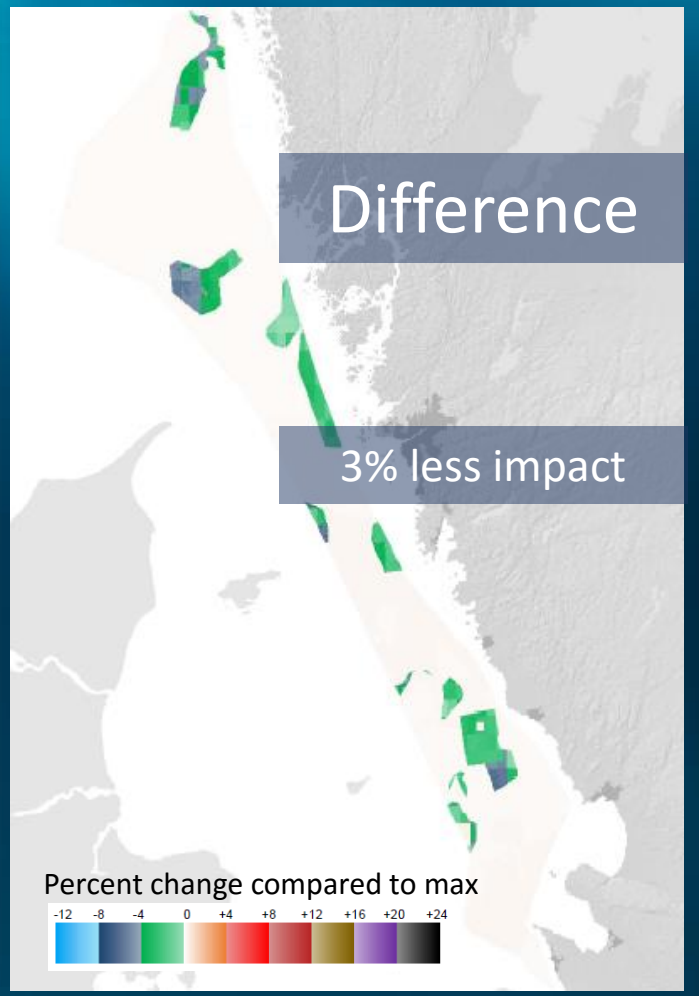
155% impact compared to average

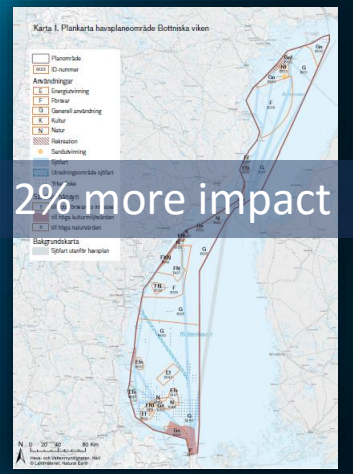
Munition dump site

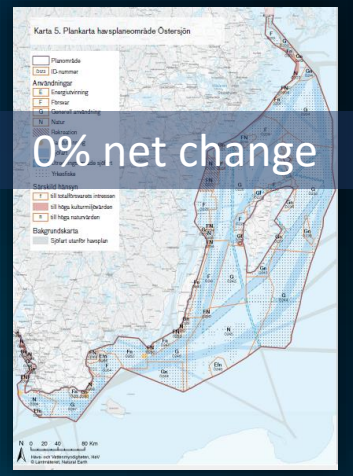
Evaluate MSP scenarios









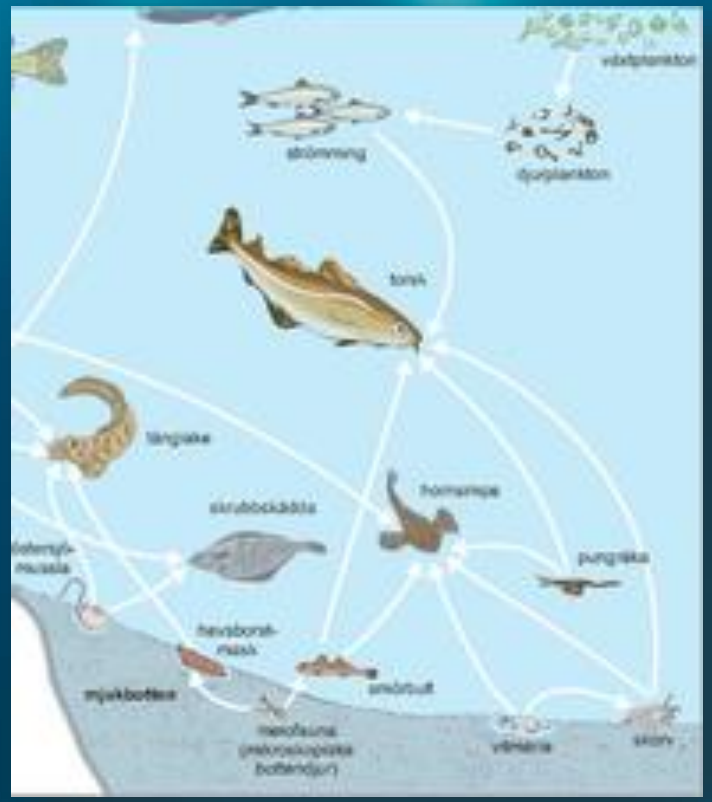


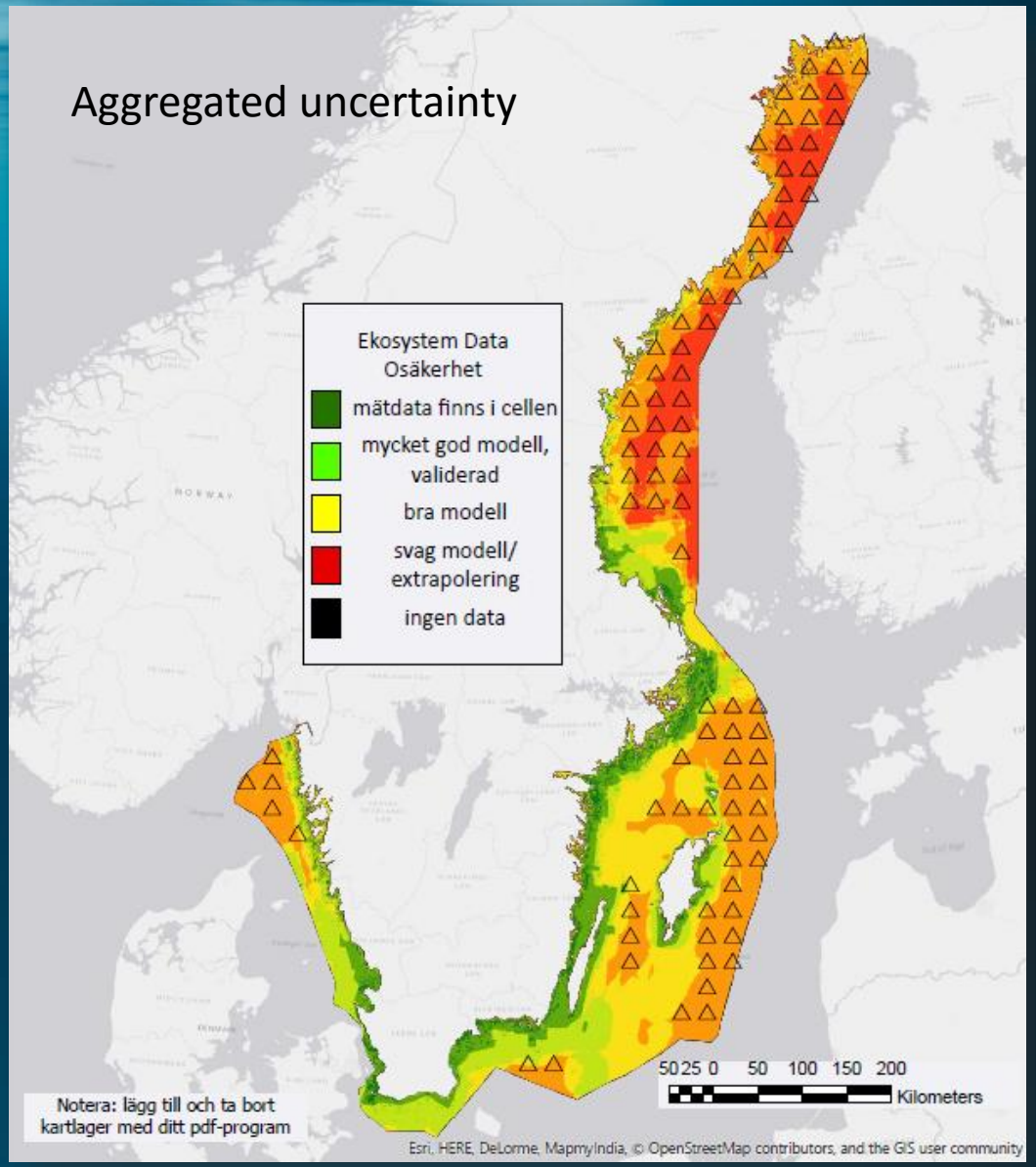
This is not the (whole) truth

Ecosystem dynamics missing

Connectivity missing

Historical impacts missing



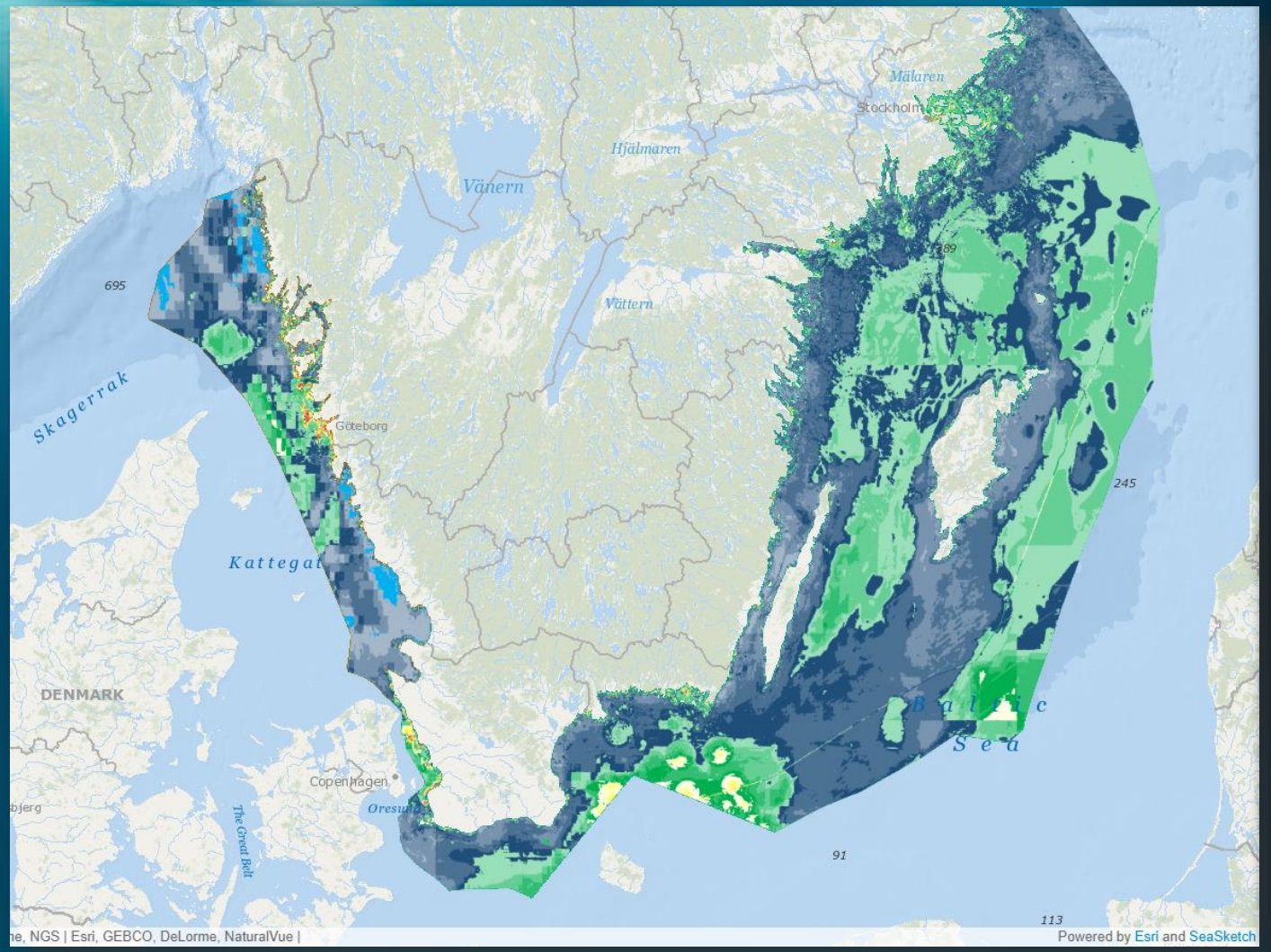


Climate change…

Cumulative impact expected to increase with 50-100%

This climate model is being refined

ClimeMarine



Stop.

For.

Thought.

Is Swedish MSP ecosystem-based?

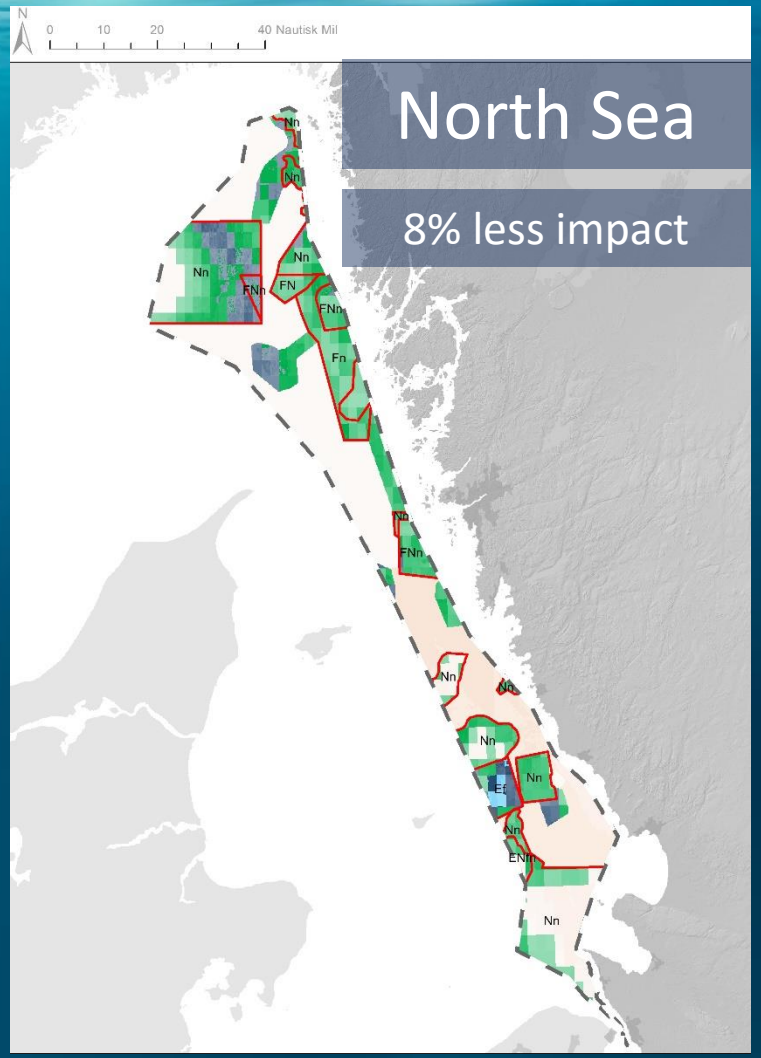
Testing alternatives in the Strategic Environmental Assessment

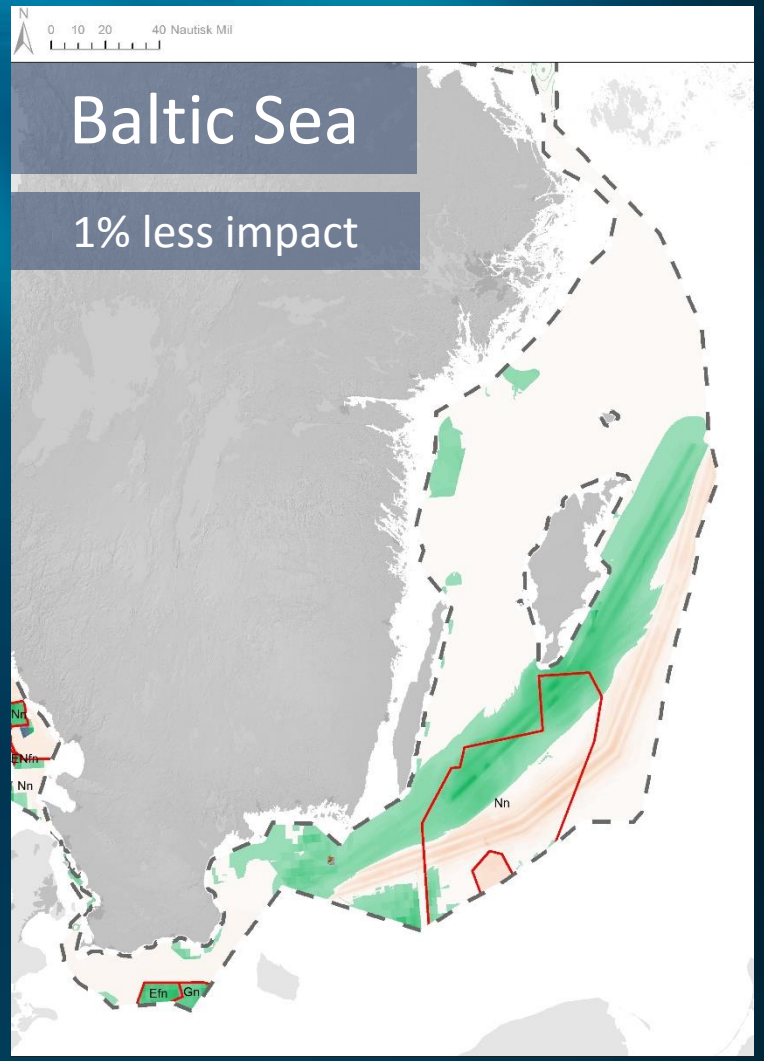
What would the MSP look like if it:

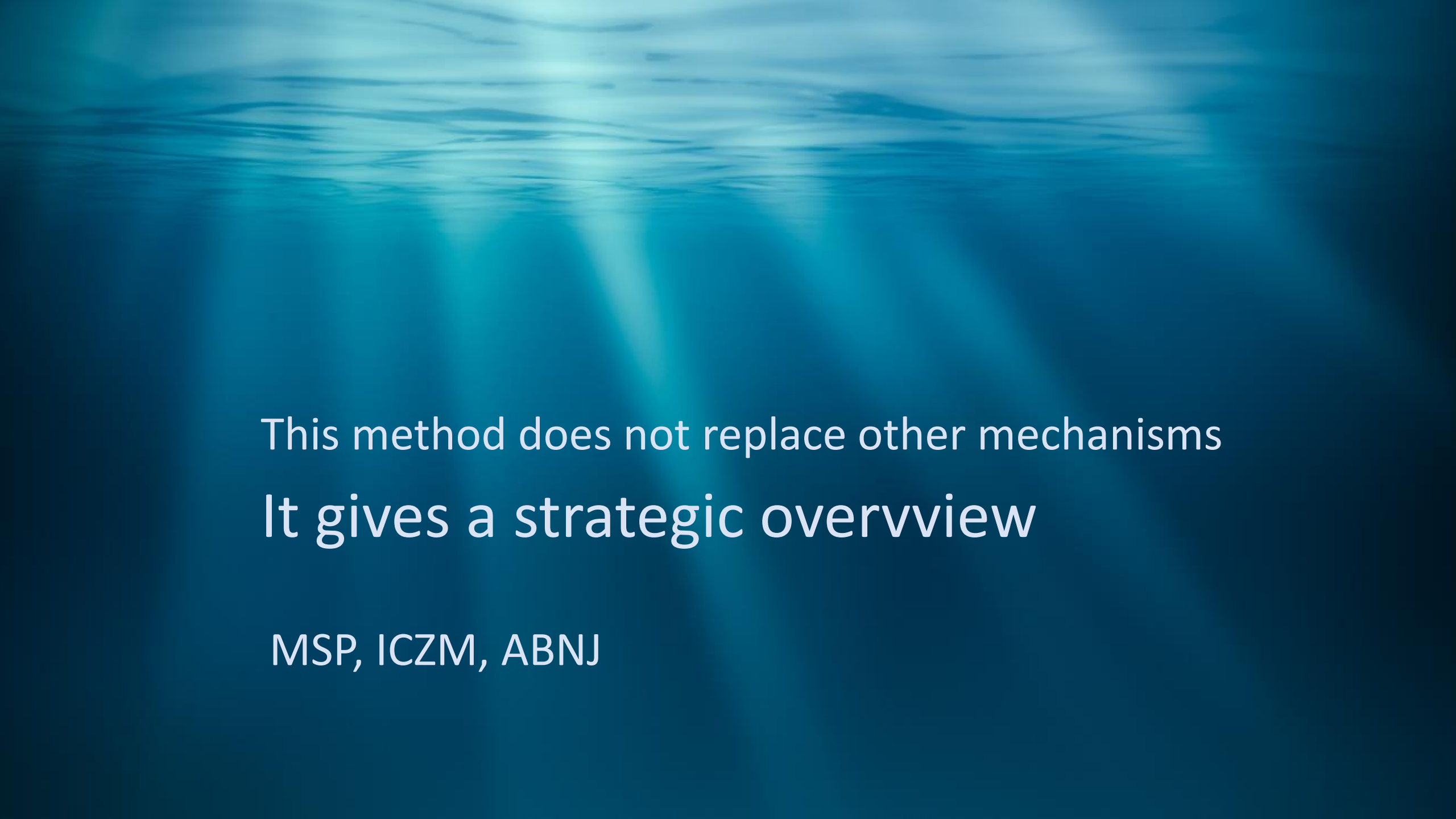
- Strictly contributed to safeguard **ecosystem functions**
- Strictly strived for **good environmental status**

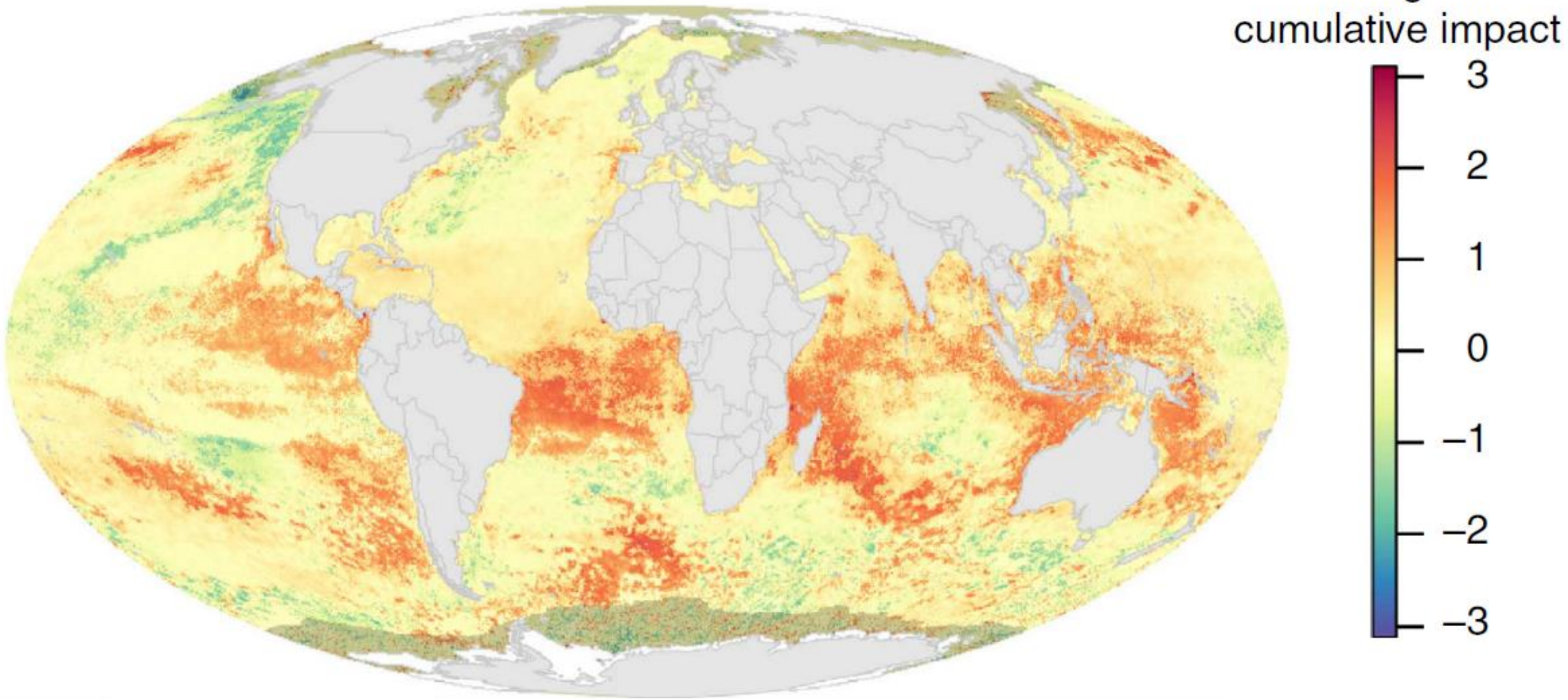
Strictly ecosystem-based alternative

- More wind energy
- More adjustments for fishing sector
- 1 less sand excavation
- 1 alternated ship route






This method does not replace other mechanisms
It gives a strategic overvview
MSP, ICZM, ABNJ



Halpern *et al* 2015 *Nature*

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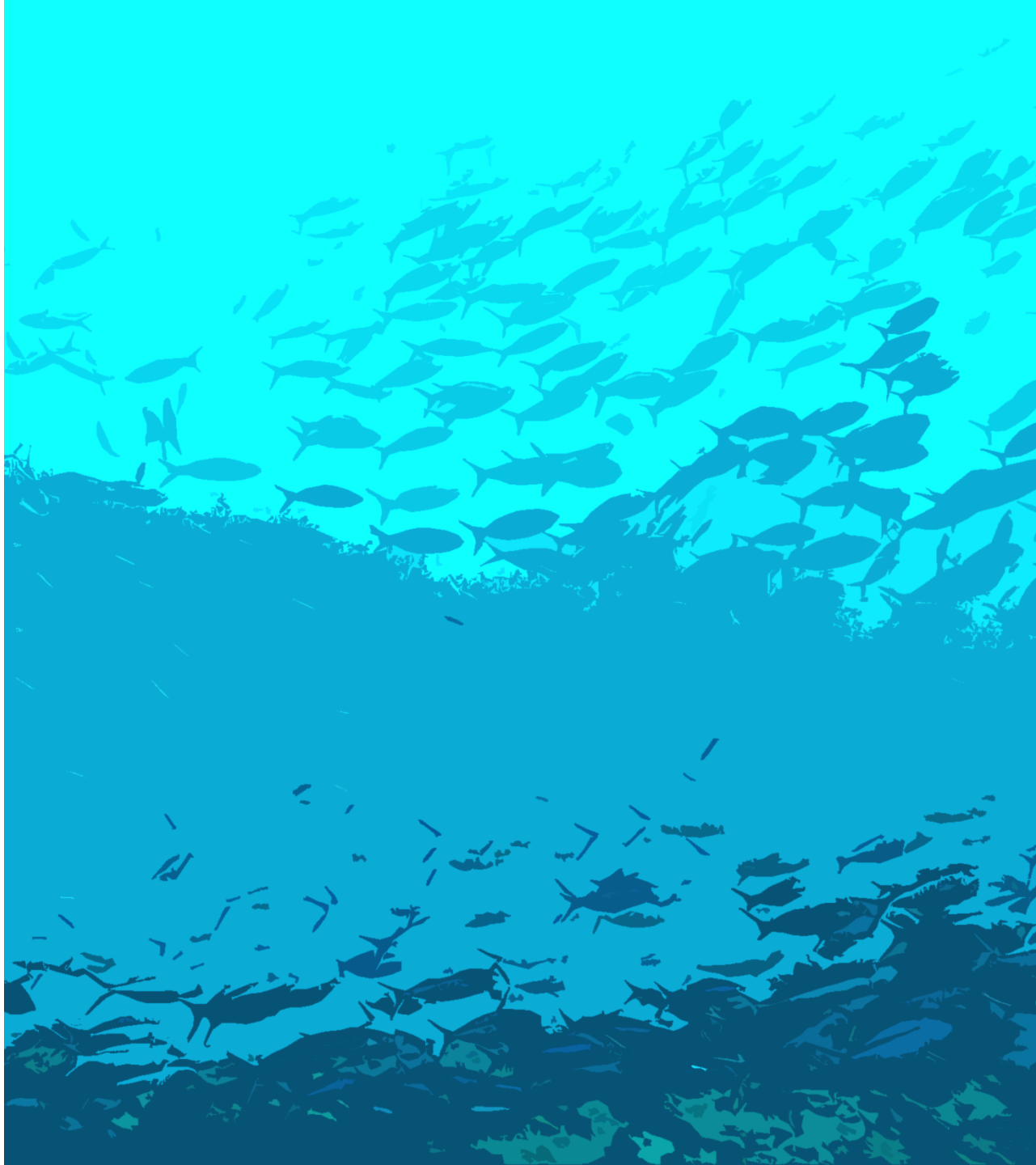
Remarks

- Most data are better than no data
- Strategic-level analyses
- Supports ecosystem based MSP
- Regional conventions can facilitate



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Time and resources for engagement and cooperation

SwAM OCEAN

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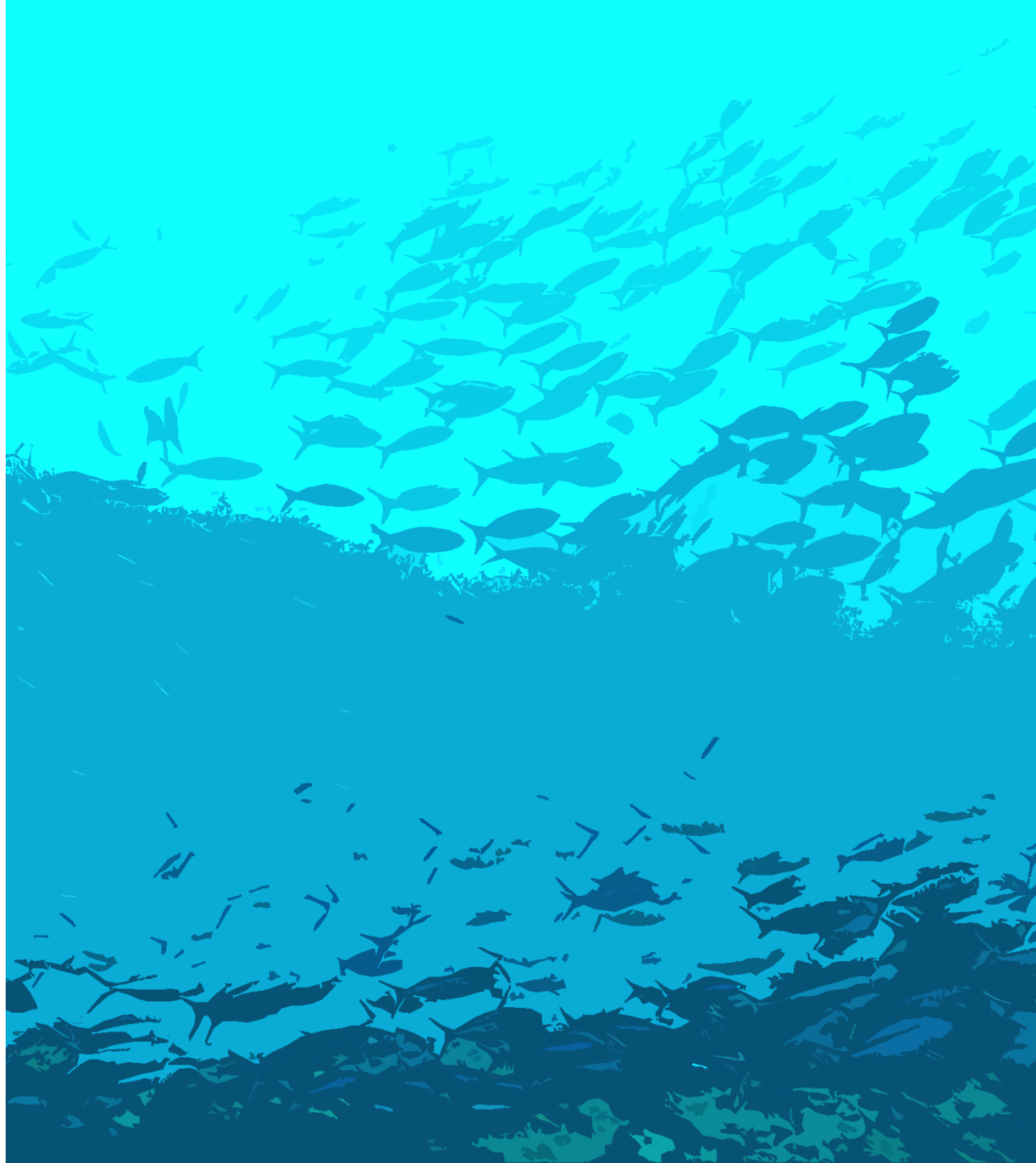

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Thank you

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