The HELCOM Baltic Sea Impact Index

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Building marine policy on best available knowledge,
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Why an impact index?

- For an overview of potential impacts from anthropogenic pressures to the ecosystem
- For an estimate of spatial distribution of pressures and impacts
- Use of BSII in the HELCOM Initial Holistic Assessment of Ecosystem Health of the Baltic Sea
- Facilitation of the production of initial assessments for the EU MSFD
Why just now?

- Technical development, especially GIS
- Availability of georeferenced data from the Baltic
- Examples from elsewhere, e.g. *A Global Map of Human Impact on Marine Ecosystems* (Halpern et al. 2008)
- Needs arising from the EU MSFD
Example:

Shipping

Pressures (A), data [normalized to 0-1]
- AIS (Automatic Identification Systems) data + modeling
- EMEP N deposition data
- AIS data in shallow waters as a proxy

Biotope-specific weight scores (μ) [range 0-4]
- to give an estimate of the intensity of the impact (if any) of pressures on different ecosystem components present in the 5kmx5km area

Ecosystem components (B) [0, absence or 1, presence]
- Presence or absence of ecosystem components in the 5kmx5km area

Index value for the 5kmx5km area
- All combinations of A x B x μ summed up for the 5kmx5km area
Data on anthropogenic pressures

- Anthropogenic pressures in GIS
- 5 km x 5 km scale
- 52 data layers, use of proxies
- Normalisation to 0-1 scale
Data on ecosystem components

"Biological Ecosystem Components":

- 14 data layers: benthic and pelagic (species, biotopes or biotope complexes)
- Sum of the number of "components" in each 5 km x 5 km square

Source: Bagge et al. 1994

Source: HELCOM

Data on ecosystem components

"Biological Ecosystem Components":

- 14 data layers: benthic and pelagic (species, biotopes or biotope complexes)
- Sum of the number of "components" in each 5 km x 5 km square
The weight score ($\mu$)

- "Which pressure impacts which ecosystem component and with how much intensity?"
- Derived by expert judgement by the experts in HELCOM Contracting Parties and the Secretariat
  - Questionnaire
  - Workshop
  - Use of the Halpern et al. 2008 weighting principles as a starting point:
    - Biotope's resilience to and recovery from a pressure
    - Whether the pressure affects one or several species, one or several trophic levels, or the whole community
    - $\mu$, 0-4 scale
- Defined for all combinations of a pressure (A) and an ecosystem component (B)
Baltic Sea Impact Index (BSII)

- In each 5x5 km² square, all AxBxμ results are summed up to give the index value. Thus, the more there are pressures and ‘ecosystem components’, the higher the BSII score.

- Human activities put a pressure on the entire sea area with the least pressure and potential impact in the northern areas and the most in the southeastern, southern and eastern areas.
How do we benefit from the BSII?

• It improves our understanding of the pressures the marine ecosystem faces
• The cartographic presentation has high communication value
• The BSII can be used in Maritime Spatial Planning, as well as the initial assessments of the EU MSFD
• It adds a new tool to the HELCOM assessment tool box which already contains:
  - HEAT: “HELCOM Eutrophication Assessment Tool”
  - BEAT: “HELCOM Biodiversity Assessment Tool”
  - CHASE: “HELCOM Hazardous Substances Status Assessment Tool”
  - HOLAS: “Tool for the Holistic Assessment of Ecosystem Health Status”
Do we have room for improvement?

- Yes, strengthen the weighting:
  - improve the scientific knowledge on the mechanisms of how various pressures actually impact the ecosystem
  - replace expert judgement with statistical analysis
  - meanwhile, deepen and harmonise the expert judgement procedure

- Yes, improve the data:
  - more precise ecosystem data on biotopes and species
  - better data on pressures, e.g. less use of proxies
  - finer scale data

- Yes, make the data and the improved tool available for use on the HELCOM webpage
Next steps ...

Publishing of:


Thank you!

www.helcom.fi