Cumulative impacts in MSP

Workshop Session 4
Our schedule & our tasks

• Presentations and ask questions
• Discussion
• Recommendations

• Talk or write on screen!
Cumulative impact assessments in MSP of the Baltic Sea

Lena Bergström, HELCOM
Why should we worry about cumulative impacts?

Our use of the sea have impacts on marine ecosystems

Cumulative impact assessment is:

• a way to support long-term sustainability
• an integrated aspect of the ecosystem-based approach
• a legal necessity in many countries
What is the Problem?

• The environmental status of the sea is not good enough

• Environmental issues are important for human well-being and transboundary

Source: stateofthebalticsea.helcom.fi
Cumulative impact assessment in Pan Baltic Scope

A way to understand how past, current and foreseeable future human activities may affect the marine environment to help us minimise risks and support long-term sustainability.
What did we do?

✓ Share understanding of how cumulative impacts can be assessed with available tools today (and to what extent)

✓ Outline key concepts of cumulative impact assessment

✓ Develop on relationships between cumulative impact assessment in MSP & Marine environmental assessment
Coherent assessment approaches

• Common concepts (!)
• Embedded in a shared tool

The **BSII-CAT** hosted by HELCOM
- ”Baltic Sea Impact Index Cumulative impacts Assessment Tool”
- Openly available including code and regional data
Linkage models to connect and explore coherence of policies

Example of human activities
- Offshore windfarm
- Aquaculture
- Capital dredging
- Bottom trawling

Pressures
- Loss of habitat
- Disturbance of the seabed
- Nutrient input
- Extraction of fish
- Underwater sound

Ecosystem components
- Seabirds
- Marine mammals
- Fish
- Benthic habitats
- Pelagic habitats

MSP

MSFD
A. Cumulative impacts under scenarios for off shore windfarm development

B. Approach to address cumulative impacts on Green infrastructure using maps

Green infrastructure = key areas for ecological value & ecosystem services
Achievements and findings

➢ Continued need to refine assessment methods
➢ Data availability and knowledge on ecological relationships are still major knowledge gaps

Enhance data-driven analyses, so that planning can be supported by data and avoid opinion-based decisions

Follow coherent assessment approaches - to improve comparability of policies and geographical areas
Thank you!

Find out more in our report:
Cumulative Impact Assessment for Maritime Spatial Planning in the Baltic Sea Region
Available at panbalticscope.eu
PlanWise4Blue

A model for better decisions at sea

Triin Lepland
Estonian Ministry of Finance
Why we needed a model?

• How can we assess economic impacts and how to conduct cumulative impact assessment?

• Experts can make assessments and assumptions about impacts

• How can we make it understandable for decision makers and for public?

• We need something tangible and simple to understand for everybody– we need a model!
PlanWise4Blue

- Combines models of marine economy and cumulative impact assessment;
- Spatial resolution: 1 km$^2$
- Temporal timescale 1 year
Algorithm for cumulative impact assessment

- **Meta-analyses** and calculation of effect sizes
- Combine effect coefficients with distributions in impact assessment tool
- Extract data from existing relevant publications
Uses of the model

- Assesses economic benefits of sectors such as fisheries, aquaculture, reed harvesting, wind energy, maritime transport and recreation;
- Assesses cumulative impacts of human uses on various natural resources;
- Displays values of ecosystem service (provisioning, regulating and maintenance services) indicators across Estonian sea space;
- Assesses the effect of various scenarios to model output.
Aquaculture economic model output
Cumulative impact of different human pressures on nature assets
Limitations

• usable rather as a discussion platform
• 1 km\(^2\) might not be enough for managing coastal areas
• Does not account for indirect benefits to the economy
• Only accounts for Estonian sea space and does not consider cross-border effects

Enhancements

• Periodically update input data layers and algorithms;
• Enhance predictive capacity and reduce uncertainty;
• Analyse model sensitivity;
• Add a component to account for value added chain in the economy model;
• Integrate new economic developments into the model;
• Expand the model spatially.
Thank you!

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Methods for cumulative effects assessment of wind farm development in the North Sea

Marie Dahmen & Rob Gerits
Wind energy development in the North Sea

Political Declaration on energy cooperation between the North Sea countries in 2016

• to facilitate the further cost-effective deployment of offshore renewable energy, in particular wind, through voluntary cooperation, with the aim of ensuring a sustainable, secure and affordable energy supply in the North Seas countries

• Wind energy installed: 15 GW > Planned for 2030: 50 GW > Scenario 2050: 180/250 GW

Work areas for energy cooperation

SG1: Maritime Spatial Planning + CEAF
SG2: Development and Regulation Offshore Grids
SG3: Support Framework and Finance
SG4: Standards, Technical Rules and Regulations

Dec 2019: Decision on new declaration
Strategic Environmental Assessment on North Sea Energy

DG Mare Project: 02.2018 – 01.2020

Objective: To develop a coherent approach to Strategic Environmental Assessments with a focus on renewable energy in support of the development and effective implementation of MSPs.

• Developing a coherent approach to SEAs, with a focus on renewable energy and testing it in practice through case studies;

• Creating a coherent understanding of how and when to use SEA as a support tool for decision-making in MSP through knowledge transfer and information exchange;

• Demonstrating the benefits of the implementation of a coherent SEA approach [...]
A Common Environmental Assessment Framework

CEAF = a tool for cumulative ecological effect assessment of wind farm developments in the North Seas to support MSP decision making

Approach
- Stepwise approach based on OSPAR approach
- Effect assessment of wind farm developments per (selected) species

Input
- Species specific information of the biogeographic population
- Technical, temporal and spatial characteristics of all wind farms developed in this biogeographic region

Results
- Total and national numbers of disturbed or killed animals (birds), population impacts (harbour porpoise)

Scoping
→ Defining stressors
→ Defining stressor-receptor pathways
→ Defining spatial/temporal scale
→ Assessment of cumulative effects
→ Evaluation
SEANSE case studies

Different scenarios of North Sea wide wind farm developments – 2023, 2030, 2030 +

- for prioritized pressures: pile driving noise, collision, displacement
- RWS/BSH study on 5 representative species of international concern;

**Harbour porpoise** (*Phocoena phocoena*) on underwater sound during construction;
  - tools: Aquarius + iPCOD and DEPONS

**Black-legged kittiwake** (*Rissa tridactyla*) and **lesser black-backed gull** (*Larus fuscus*) on collision risk;
  - tools: SOSS Band (2012) and Stochastic CRM (2018)

**Red-throated diver** (*Gavia stellata*) and **common guillemot** (*Uria aalge*) for displacement/habitat loss
  - tools: SeaBord/Matrix (MSS), BSH/RWS calculation approaches
Expert workshop on cumulative effects offshore wind

Goals

• Gain a broader and deeper understanding of the variety of methods and models used for marine wildlife and environmental assessments

• Map out different experiences in working with these methods and models

• Explore complementarities, conflicts and common grounds between these methods and models and their application

• Identify concrete and immediate steps for improving and integrating these methods and models
Conclusions and points for discussion

<table>
<thead>
<tr>
<th>Complexity of the ecosystem</th>
<th>Need to measure environmental impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Models can help to assess environmental impact</td>
<td>Models can be misleading if results are used for SEA</td>
</tr>
<tr>
<td>Red lines for the decline of population size are needed</td>
<td>Thresholds only apply for a certain location and are not transferable</td>
</tr>
<tr>
<td>Precautionary approach on ecosystems should be ‘the default setting’ of EIA</td>
<td>Renewable energy development as a means to combat the global climate crisis includes rapid upscaling of offshore-wind</td>
</tr>
</tbody>
</table>

- Modelling approaches can be applied under conditions for comparing MSP options on national and international level
- The results of the case studies do not facilitate evaluations on acceptability of effects on international level
Recommendations and further steps

• **Applying an adaptive management approach and developing a roadmap** to improve existing methods and models that support decision-making in MSP

• **Improving data accuracy** by acknowledging existing gaps and generating further data on distribution and behavior through monitoring and research cooperation

• **Comparing outcomes of different models** (e.g. DEPONS and iPCoD) and potentially integrating them (e.g. CRM and displacement approaches)

• **Developing individual-based models**: Taking individual behavior into account can be complex, but could increase the understanding of environmental impacts over time

• **Providing guidance for authorities** on how to use model results (data processing and advice by environmental working group)

• **Discussing alternative approaches** to assess and manage cumulative environmental effects, e.g. through mapping of sensitive habitats

• **Institutionalizing the dialogue** among authorities, researchers and model builders on how to assess, evaluate, monitor and mitigate cumulative effects of offshore wind energy development
Thank you!

SEANSE Final Conference
9-10 January 2020
Rotterdam

More information: https://northseaportal.eu
Climate change as pressures for cumulative impact assessments

Dr Jonas Pålsson
Swedish Agency for Marine and Water Management
Symphony

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.

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

40 pressures × 32 nature values × Sensitivity matrix = Results
Climate refuges

- Climate into MSP 2017
- Simple habitat model
- IPCC 2007 adaptation
  - SMHI 2011
- Special consideration nature
- Future protection?
Update

• IPCC 2014
• SMHI 2019 adaptation
  • (Saraiva et al., 2019)

• 2085
• RCP 4.5
• RCP 8.5

• New pressures
  • Salinity (bottom/surface)
  • Temperature (bottom/surface)
  • Ice cover
Baltic Sea 2085

Now

RCP 4.5

RCP 8.5
West coast 2085

Now

RCP 4.5

RCP 8.5
Bothnian Bay 2085

Now

RCP 4.5

RCP 8.5
Eelgrass today
Eelgrass 2085 RCP4.5
Eelgrass 2085 RCP8.5
Blue mussels today
Blue mussels 2085 RCP 4.5
Fucus sp. today
Fucus sp. 2085 RCP 4.5
Fucus sp. 2085 RCP 8.5
New climate refuges?
Conclusion

• Climate as new pressures?
  • Simple modelling
  • Problems setting sensitivity scores
    • Expert opinion
    • What is impact of mean change?
  • Overestimates impact?
    • Everything is affected

• Climate as new layers?
  • Lots of modelling
  • More accurate
    • Data driven
    • Species specific models
  • Underestimates impact?
    • Species disappear – less impact
Thank you!
Conceptual understanding and applicability of cumulative impact assessment in MSP. The Western Mediterranean case.
Cristina Cervera Núñez, IOC-UNESCO
Cumulative impacts in the MSP process

- Not a specific section, but
- Cited:
  - The identification of CI one of the benefits of MSP
  - Criteria for selecting a spatial use scenario
  - Criteria for selecting spatial management measures
  - One of the components of the evaluation of the spatial management plan

“Ecosystem – based management considers the cumulative impacts of different sectors”
Which is the place of CIA in the MSP process?
The Western Mediterranean case

- MSPglobal pilot project
- SIMWESMED Gulf of Lion case study
  - Maps of potential exposure risk for marine mammals and seabirds regarding pressures of navigation, fishing, marine litter and marine noise.
  - Seasonal data
  - Modelization of habitats of marine mammals and seabirds

(Delleau, C. et al, 2018)
Transboundary challenges
(SIMWESTMED example)

- Collecting and harmonizing coherent datasets
  - Different methods
  - Different units
  - Availability of datasets over common time periods and geographical areas
  - Right of access not sufficient

- Some can be faced with methodological development, but some others cannot be solved at the technical level (accessibility)
- More time and lots of efforts to reach a permissible level of confidence.
Needs for an applicable CIA in the transboundary dimension of MSP

- Building trust, create partnership, establish coordination
  1. Technical level
  2. Political level
- Common standards
  - Terminology
  - Formats
  - Methodology
- Assess limitations of methods
- Appropriate communication of methods and results
The importance of data (analysis) in MSP

- Data analysis is an essential (and continuous) principle, but **not an end** in itself.
- Accuracy and confidence levels are essential in determining how valid the data analysis is to support decision making.
Maritime Spatial Planning Forum

Global Meets Regional

¡Muchas gracias!
Merci!
Thank you!
Спасибо
谢谢

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