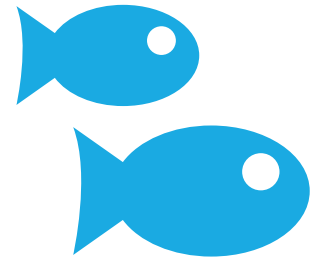


# Cumulative Impact Assessment

## Background



# What is a cumulative impact assessment?

- Cumulative impact (effects) assessment is an umbrella term for a broad range of methodologies, driven by numerous drivers, that seek to assess how different pressures from past, current and future activities may act together on species and habitats, and lead to changes in the environment.
- It stems from the need to identify, mitigate and manage the effects of the continuum of human activities which accumulate over broad temporal and spatial scales to change the environment. and on the potential for contributing to ecosystem services.
- Since many human activities, pressures and species are widely dispersed, transboundary aspects are often important. The relative importance of each relationship is based on ecological information on how sensitive different species are towards different pressures. Usually, the assessment focuses on species or habitats (ecosystem components). However, a more developed assessment could also address impacts on ecosystem processes (functions), in order to inform better on further potential impacts on the provision of ecosystem services.

# Why do we need to think about cumulative impacts?

- Using the sea is closely interlinked to the function of marine ecosystems.
- Understand how past, current and foreseeable future human activities may affect the marine environment, to help minimise risks and support long-term sustainability.
- Cumulative impact assessment is also important for developing a shared understanding of key issues and priorities in the regional environmental.
- CIA can be use to inform management decisions and measures.

# What should CIA show?

- Realising the potential of CIA to support holistic marine management requires the assessment to provide information about the effects, current and forecast, of human activities on an ecosystem, including accounting for:
  - Temporal accumulation
  - Spatial accumulation
  - Endogenic (direct) and exogenic (indirect) sources of pressure
  - Connectivity between elements of the biophysical world and of society to ecosystems.

# Benefits

- Get an overview and an understanding of how things are connected to each other
- Provide guidance on how to minimize negative impact
- Show what the activities means for the environment: Assess if the expected change will be positive or negative compared to the current situation
- supports the identification of areas with high ecological value or high potential provision of ecosystem services, as well as areas with low existing pressures, supporting the green infrastructure concept.

# Why do we need to worry about cumulative impacts?

- However, a prerequisite for achieving this is that there is:
  - a shared understanding of for what purpose the assessment is done.
  - coherent assessment approaches applied and data and tools which are fit for purposes.
  - shared understanding among users on how to interpret and understand the results.
- Moreover, since cumulative impacts can be understood in different ways, it is important to clearly define what is meant by a cumulative impact in each specific assessment (Judd et al. 2015).

# Current situation

- A simplified additive model for mapping human impacts on marine ecosystems was made by Halpern et al. (2008) (See also Halpern et al. 2015).
- A variety of assessment methods developed since, many with strong similarities.
- Cumulative impact assessments are conducted in several marine regions globally (see reference library for more information), but for varied purpose and at varied scale.

# Varied focus and scale

- Focus: ranges from individual species (e.g. harbour porpoises, Heinis and de Jong, 2015), to habitats (e.g. seagrass, Grech et al., 2011; fish habitat in estuaries, Teichert et al., 2016), to ecosystem functions and services (e.g. biodiversity; Andersen et al., 2015)
- Scale: from boundaries defined by the extent of pressures arising from a single development, by species distribution (e.g. seabirds and bats, Leopold et al., 2014), to ecologically meaningful areas (the Baltic, Korpinen et al., 2012), increasing to global marine areas (e.g. Halpern et al., 2008a, 2008b).



# General gaps

- There is a continued need to refine the developed methods, and to improve the ways in which the tools incorporate information on the relationships between human activities, pressures and impacts on the ecosystem.
- Data availability, coverage and/or resolution.
- Knowledge on underlying ecological and causal relationships are still major knowledge gaps.
- In most cases, a transboundary perspective is lacking.

# Key considerations to advance CIA in integrated marine management

- Define a meaningful area and the ecological components that provide insight into the health and functions of the ecosystem therein
- Establish a baseline, level of variability and the 'most' important components that require assessment and monitoring (a targeted approach may be a necessary starting point if there are many components)
- Define appropriate spatial and temporal scales, depending on the ecological patterns and the level/magnitude of activities
- Integration at all levels: cross sectoral, cross border and multidisciplinary approaches are a must, whilst attempting to understand what is a complex and multidisciplinary problem.
- Validation of predicted effects as well as critical assessment of the significance of changes for an individual or multiple activities in a given area.
- Define the significance of changes in ecological and management terms.
- Explore and integrate indirect effects into CIAs, for example using ecological modelling. Compare whether assessments focussed on ecological functions or indicators thereof are more informative in support of marine management ambitions than the current approach of assessing e.g. isolated species protected by legislation.
- Accept and acknowledge the level of uncertainty of these changes, as there will be areas that require further data collection, dedicated specific tools and distinct approaches (e.g. cross-border collaboration for migratory species, different methodologies for sessile and mobile species).
- Directed research targeted at priority cause-effect relationships a scales relevant to key ecosystem components would enable CIA to advance specific to and activity.
- Recognise the temporal component of activities (e.g. short term construction effects, long-term operational effects, unknown decommissioning effects) and integration of variable effects into the management processes.
- Consider implications of environmental change due to activities and pressures on social aspects and welfare, including the potential for short-term effects as well as long-term changes to have significant impacts.

# For more information please see e.g.:

## References in Meeting reference library

- Afflerbach et al. 2017 Cumulative human impacts in the Bering Strait Region
- Andersen et al. 2013 Human uses, Pressures and Impacts in the Eastern North Sea
- Andersen et al. 2015 Baltic Sea biodiversity status vs. cumulative human pressures
- Ban et al. 2010 CI mapping Advances, relevance and limitations to management and conservation, Canada's Pacific waters
- Grech et al. 2011 A broad-scale assessment of the risk to coastal seagrasses from cumulative threats (not available in meeting reference library))
- Halpern et al. 2008 A Global Map of Human Impact on Marine Ecosystems
- Halpern et al. 2009 Mapping cumulative human impacts to California Current marine ecosystems
- Halpern et al. 2015 Spatial and temporal changes in cumulative human impacts on the world's ocean
- Hammar et al. 2020 Cumulative impact assessment for ecosystem-based marine spatial planning
- Heinis and de Jong, 2015 Framework for Assessing Ecological and Cumulative Effects – Cumulative effects of offshore wind farm construction on harbour
- HELCOM 2018 BSEP159 Cumulative impacts thematic assessment
- Jones et al. 2017 Capturing expert uncertainty in spatial cumulative impact assessments
- Judd et al. 2015 An effective set of principles for practical implementation of marine cumulative effects assessment
- Knights et al. 2013 Ident. pressure pathways from a complex network of human activities to support ecosystembased management
- Korpinen et al. 2012 Human pressures and their potential impact on the Baltic Sea ecosystem
- Korpinen and Andersen, 2016 A Global Review of Cumulative Pressure and Impact Assessments in Marine Environments
- Leopold et al. 2014 A first approach to deal with cumulative effect of birds and bats of offshore windfarms and other human activities in Southern North Sea
- Micheli et al. 2013 Cumulative Human Impacts on Med and Black Sea Marine Ecosystems Assessing Pressures and Opportunities
- Murray et al. 2015 Advancing marine cumulative effects mapping An update in Canada's Pacific waters
- PBS\_Cumulative\_Impacts\_report, 2019
- Singh et al. 2020 Mapping cumulative impacts to coastal ecosystem services in British Columbia
- Stelzenmuller et al. 2010 Quantifying CI of human pressures on the marine environment a geospatial modelling framework
- Stelzenmuller et al. 2018 A risk-based approach to cumulative effect assessments for marine management
- Teichert et al. 2016 Restoring fish ecological quality in estuaries: Implication of interactive and cumulative effects among anthropogenic stressors (not available in meeting reference library)

# HELCOM CIA and HOLAS III preparation

Task	Responsible	May	June	July	August	September	October	November	December
Questionnaire	TG								
Consolidation	Secretariat								
WS Planning	TG								
Submission	Secretariat								
Online scoping meeting (length to be confirmed)	WGs					8-9.9			
Draft MetDev WP	Secretariat					DL 14.9	5-9.10 S&C review and endorsement	9-11.11 GEAR review and endorsement	
Technical online WS (length to be confirmed)	TG							3-4.11	
Finalized MetDev WP	Secretariat								9-10.12 HOD 59 approval

# This Meeting Day 1

- Conceptual/policy and deliverables related discussions
  - developing a common understanding of what the uses of a Cumulative Impact Assessment are, both short and long term;
  - developing a common understanding of what is required from a Cumulative Impact Assessment, both short and long term;
  - what is the added value of Cumulative Impact Assessment, compared to other existing assessment products
  - what results and information should a Cumulative Impact Assessment deliver and how should they be presented to be of most use,
  - how should results be interpreted,
  - how uncertainties are handled and presented,
  - the need and possibility for validation of the results;



# This Meeting Day 2

- Review existing tools, provide recommendations and plan future work:
  - develop a shared understanding of what the various existing tools can accommodate, using the requirements identified under agenda item 3 and 4 as a framework.
  - agreed guidance for further development (e.g. prioritized functionality) and recommendation for what tool(s) to consider as a basis for further work.
  - planning for the technical meeting
  - provide guidance for the development of work package 1 in the HELCOM MetDev project.

# Thank you for your attention!

