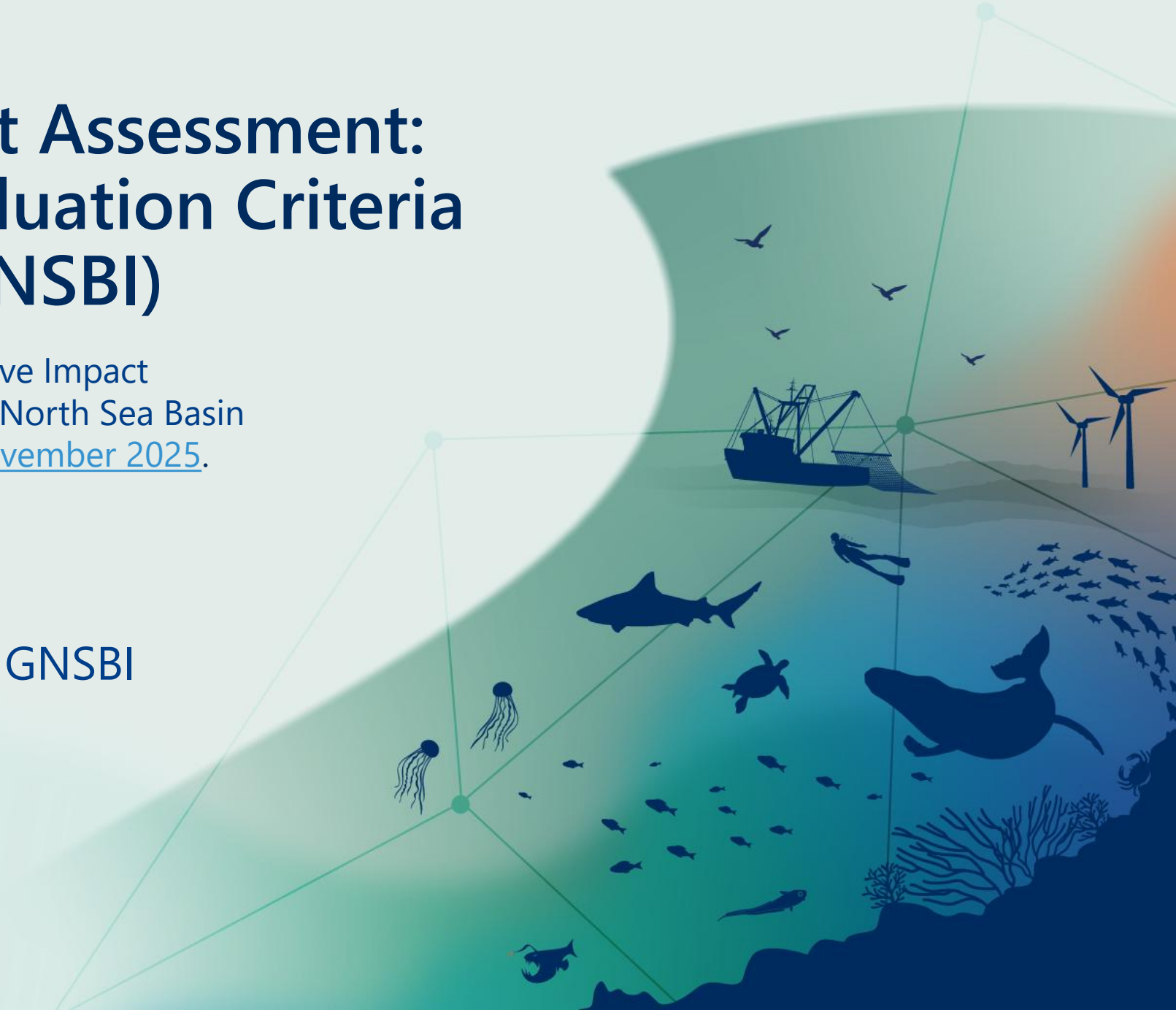
Cumulative Impact Assessment: Principles and Evaluation Criteria (ICES advice for GNSBI)

The Netherlands request on Cumulative Impact Assessment, on behalf of the Greater North Sea Basin Initiative (GNSBI). ICES advice of 5 November 2025.



CIA Community of Practice, GNSBI
BSH, Hamburg, 1 July 2026

Presented by Simon Jennings
ICES Advisory Committee, vice-chair

ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

Cumulative Impact Assessment

Request from Netherlands on behalf of GNSBI: four elements

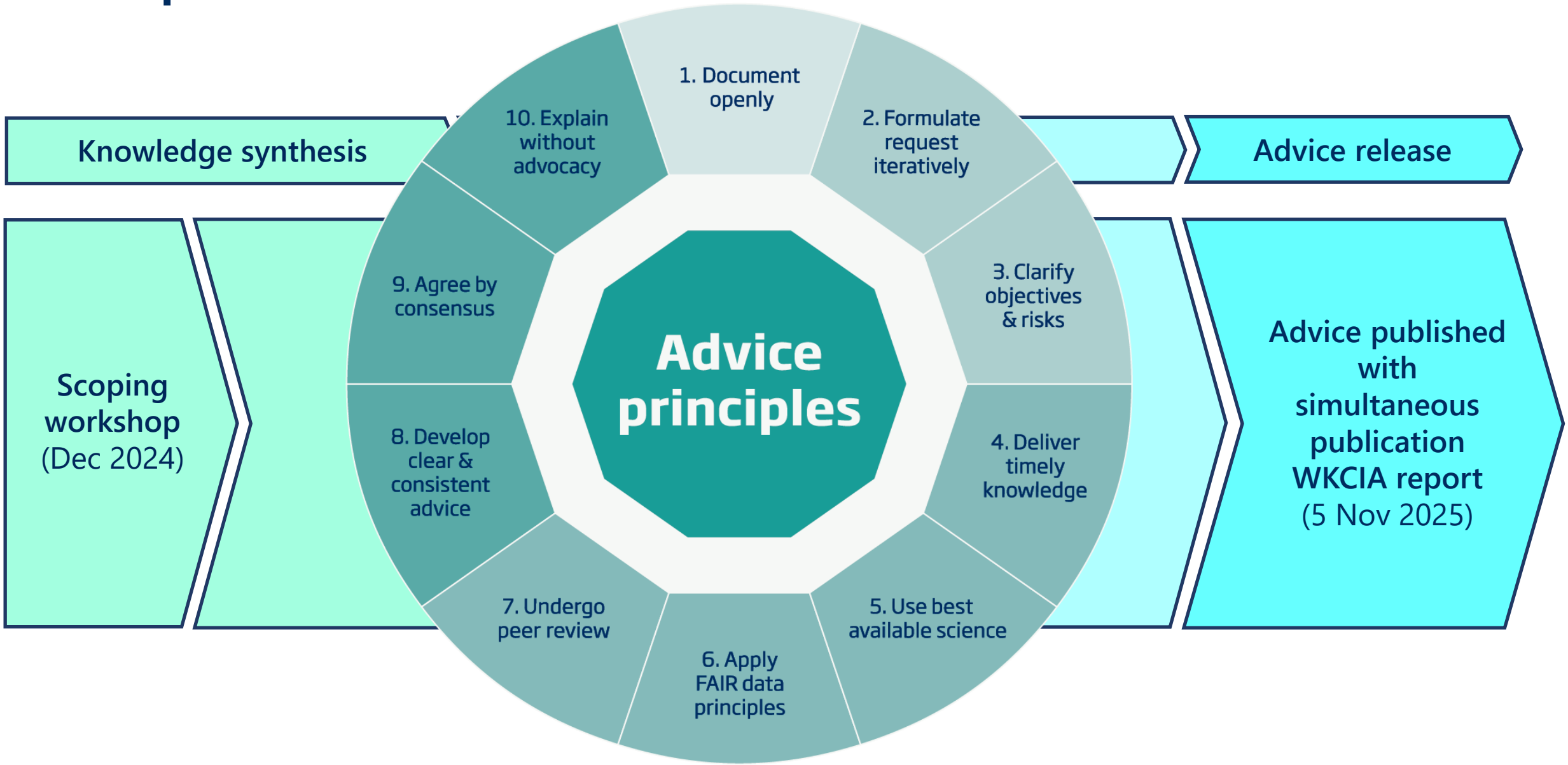
1. Overview of methods	Provide an overview of relevant CIA methods aimed at an applied setting and informing management decisions.
2. Principles and evaluation criteria	Define common principles of CIA to inform applications, questions and decisions relevant to GNSBI, and identify criteria for evaluation of CIA methods.
3. Recommended CIA methods	Recommend CIA method(s) to address questions posed by GNSBI (what are: the cumulative impacts (and how distributed), sector contributions, knowledge gaps/ uncertainties; can CIA be simplified; impacts on life stages; land-based pressures).
4. Process to develop the knowledge base	Define a process to further develop the knowledge base (to assess threats to achieving GES; evaluate planning scenarios; inform MSP; evaluate effectiveness of management measures to mitigate pressures and reduce impacts).

Focusing today on principles and evaluation criteria

Request from GNSBI

Addressing the request: a stepwise approach

Request from GNSBI



Cumulative Impact Assessment

Common principles and evaluation criteria

Common principles are intended to define good practice in Cumulative Impact Assessment methods development and application.

Common principles address terminology; uncertainty, confidence and transparency; flexibility and transferability; integration; and implementation practice.

Common principles are intended to apply broadly to many Cumulative Impact Assessment methods and applications.

Evaluation criteria are criteria to identify suitable Cumulative Impact Assessment methods for addressing the questions and applications in the GNSBI request

For a Cumulative Impact Assessment method to address the GNSBI questions and applications, it should follow the **common principles** and fulfil the **evaluation criteria**.

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Common principles: categories

(a) Terminology

(b) Uncertainty, confidence and transparency

(c) Flexibility and transferability

(d) Integration

(e) Implementation practice

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Common principles (a) terminology

Adopt common and consistent terminology and definitions in a given CIA process.

Explain terminology and methodological approach for non-expert audience.

Clearly define purpose of the CIA method.

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Common principles (b) uncertainty, confidence, transparency

Document quality of the information/data (quantitative/qualitative and expert opinion) and methods transparently, including uncertainties and assumptions made.

Evaluate the strength of evidence and confidence in assessment outcomes; Highlight limitations in use of assessment outputs; Communicate knowledge gaps effectively.

Ensure treatment of uncertainty invcentivises, rather than discourages, collection of more data and information. Additional evidence should result in a higher confidence.

Method should allow the effects of climate change to be included.

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Common principles (c) flexibility and transferability

Method should be widely applicable and transferable (despite differences in the scope and quality of data and information among regions or future scenarios).

Method should be capable of utilizing different types of data (i.e. qualitative, semi-quantitative, and quantitative) without introducing a systematic bias.

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Common principles (d) integration

Method should inform a wide range of management interventions and support integration of policies.

Method should allow for integration of information from stakeholders.

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Common principles (e) implementation practice

Align method with capabilities and resources of contributors.

Align content and presentation of outputs with needs of stakeholders..

Incorporate participatory processes to engage stakeholders.

Be guided by operational objectives as/where available and appropriate.

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Evaluation criteria (1)

(a) Does method make effective use of all relevant data and information by allowing for qualitative and quantitative analyses?

(b) Can method be improved incrementally as new data and information become available and without compromising short-term operability?

(c) Is method based on a comprehensive linkage framework allowing for inclusion of all manageable activities at appropriate scales and every pressure?

(d) Are categories in the linkage framework directly relevant for, or do they replicate, those adopted in policies and of interest to stakeholders?

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Evaluation criteria (2)

(e) Does method cover the full extent of the relevant region or ecoregion at sufficient resolution to support links to spatial assessment and marine spatial planning?

(f) Does method incorporate resistance, sensitivity, and resilience estimates based on measurements where these exist?

(g) Does method have potential to be embedded in a management framework, when other components of the framework (e.g. objectives) are in place?

(h) Has the method been tested and applied in relevant regions or ecoregions and are many of the relevant data and information sources identified and used?

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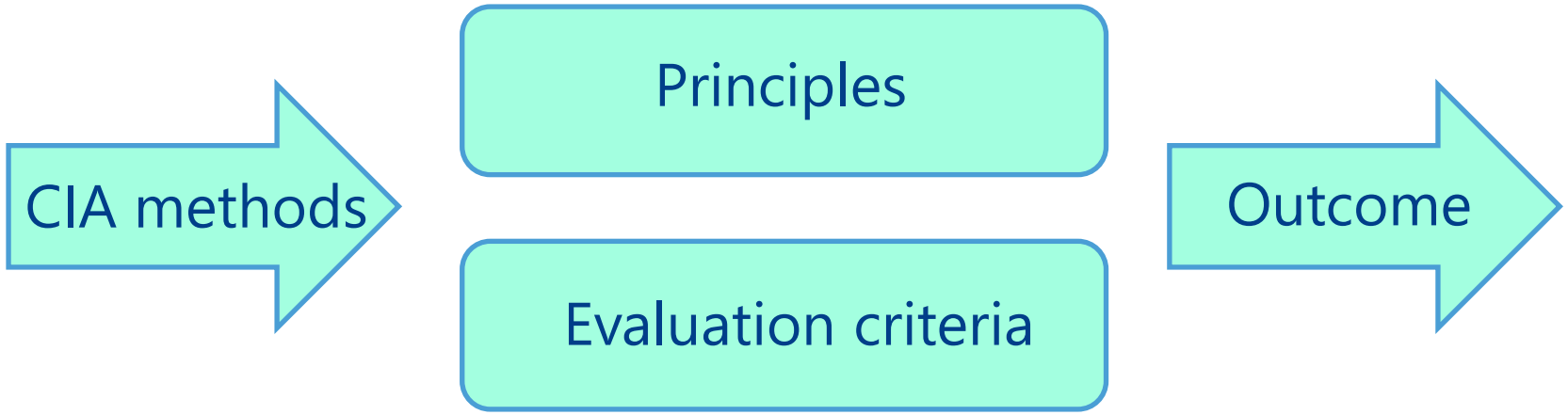
Evaluation process



- The evaluation assessed whether CIA methods were suitable to address questions and applications listed by GNSBI.
- The evaluation did not assess whether CIA methods fulfilled purposes originally defined by their developers and proponents.

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Thank you

Link to the Netherlands request on Cumulative Impact Assessment, on behalf of the Greater North Sea Basin Initiative (GNSBI). ICES advice of 5 November 2025.

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Overview of methods- scope of review:

- Relevant: operational CIA methods enabling evaluation of the cumulative impacts of all human pressures acting on components of ecosystems.
- Applied: CIAs that may inform management.
- Reviewed properties of selected CIA methods, rather than full range of variants and applications.
- Five CIA methods addressed in the advice:
    - ICES Ecosystem Overviews
    - Cumulative effects assessment for the OSPAR Quality Status Report 2023
    - HELCOM Spatial Pressure and Impact Assessment
    - Symphony
    - Spatial Cumulative Assessment of Impact Risk for Management

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Overview of methods- comparisons

Methods were reviewed and compared in terms of:

Linkage framework: How comprehensive are links between human activities, pressures, and ecosystem components?

Risk calculation: Is a score, impact index or impact risk used to assess the likelihood and/ or magnitude of impact on an ecosystem component?

Management focus: Does this address the evaluation of measures or scenarios in context of MSP, MSFD etc?

Scope: How are activities, pressures and ecosystem components defined?

Other properties: Is qualitative, semi-quantitative or quantitative information used, what is the spatial resolution, what are links to management frameworks?

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Overview of methods- conclusions

- If CIAs are to support management in GNSBI regions, it is necessary to strengthen links between CIA and other parts of the management framework and process.
- The reviewed CIA methods focus on finding, recognizing, and describing risks (risk identification) and not the entire risk-management process.
- Process-based models are required to assess and refine the selection of candidate management measures for activities at project and/or sectoral levels.
- Substantially more data and information are required to move from risk scores to more elaborate metrics like impact risk.
- The reliance of some CIA methods on expert judgement renders them less repeatable, and no methods directly address synergistic or antagonistic impacts.

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Recommended CIA methods:

- No CIA method met all evaluation criteria.
- To address GNSBI questions and applications, a CIA method needs to be spatially resolved.
- Spatial Cumulative Assessment of Impact Risk for Management (SCAIRM) is a spatially resolved CIA method and met most evaluation criteria.
- SCAIRM is structured in a way that can be incrementally extended while remaining operational and has been applied in the Greater North Sea.
- ICES advises SCAIRM is a suitable method to begin addressing GNSBI questions and applications.
- For subsets of the questions and applications, especially those requiring ordinal comparison of risk, other CIA methods are also appropriate.

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Addressing GNSBI questions:

- **Identifying the main anthropogenic threats that compromise the achievement of GES** requires outputs showing which human activities and pressures have impacts on those ecosystem components for which GES has been defined.
- **Evaluating planning scenarios for offshore wind farms (OWF) and floating offshore wind farms (FLOW)** requires information on the full range of pressures resulting from OWF and FLOW and other human activities.
- **Informing MSP decision-making on a sea basin level** requires CIA that is spatially resolved.

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Addressing GNSBI questions:

- **Evaluating management measures aimed at mitigating human activities and their pressures** requires that CIA is spatially resolved because some management measures are spatial.
- **Assessing the effectiveness of spatial measures to reduce human-induced impacts in the context of the MSFD Program of Measures and the Natura 2000 Directive** requires a spatially resolved CIA, and that the differentiation of activities, pressures, and ecosystem components in the linkage framework of the CIA is consistent with, or can be mapped to, their differentiation in the relevant legislation.

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Process to develop knowledge base:

- **Assessment of impact on different life stages**, requires information on the effects of pressures on different life stages and the area used by a population at different life stages. Priorities are to develop and make more widely available spatial information on habitats used by different life stages.
- **Land-based activities** should be included in CIAs if their pressures potentially impact the marine ecosystem. Activities are included indirectly if pressure layers incorporate pressures that result from land-based activities.
- **Spatially resolved CIA methods** have high data and information demands. Harmonized data collated across countries for the main human activities and their pressures need to be available at appropriate scales.