

A systems approach to cumulative effects assessment

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Environmental Impact Assessments and Strategic Environmental
Assessments in areas beyond national jurisdiction (BBNJ)

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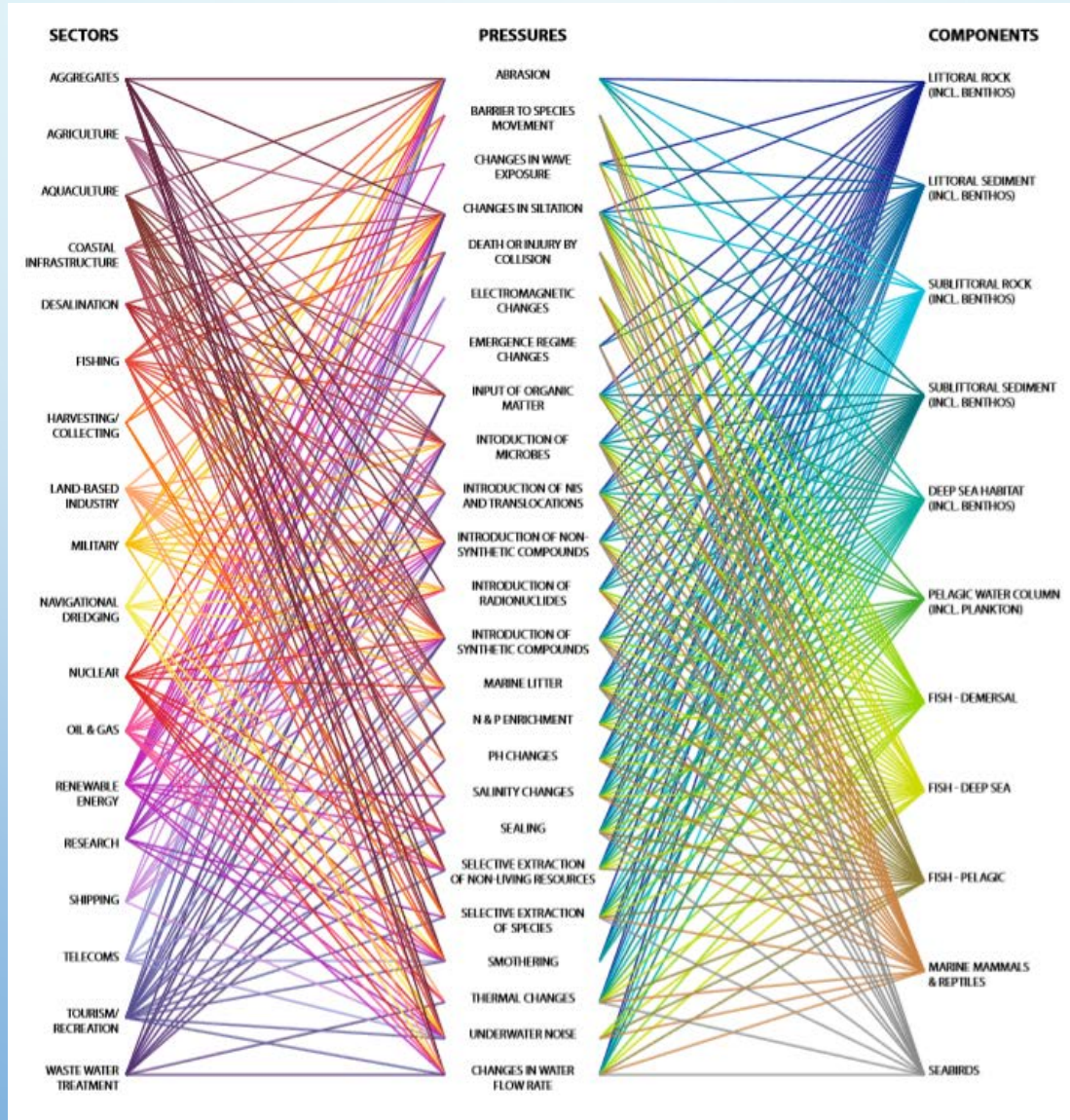
CUMULATIVE EFFECTS ASSESSMENT

“... a systematic procedure for identifying and evaluating the significance of effects from multiple sources/activities and for providing an estimate on the overall expected impact to inform management measures. The analysis of the causes (source of pressures and effects), pathways and consequences of these effects on receptors is an essential and integral part of the process.”

Judd et al 2015 (adapted from Cooper 2003)

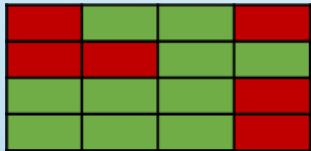
CONNECTING CAUSES AND CONSEQUENCES

Human activities exert pressures causing changes to ecosystem components.



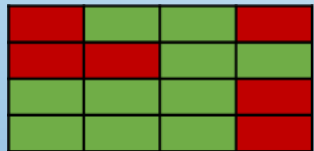
Activities

Sectors



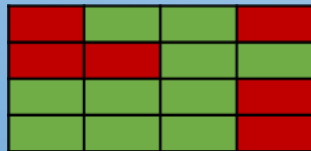
Pressures

Activities



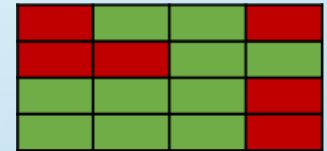
Management measures

Activities



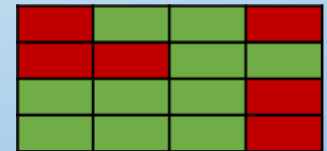
Ecological components

Pressures



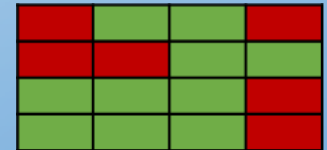
MSFD Descriptors

Ecological components



Ecosystem goods & services

Ecological components



Question based approach – establishing purpose of the CEA

- What are the issues most important to society in managing the area (ABNJ)?
- What are the individual / cumulative impacts associated with these issues?
- What indicators can be used to simplify, quantify and communicate responses to cumulative environmental impact?
- What are the input parameters (data availability)?
- What are the consequences / risks for the environment, society and the economy?
- What are we doing to manage impact?
- Does it work (effectiveness of management measures)?
- How can / should the data be presented (e.g. maps, trends, tables, matrices)?
- What do we need to do in the future?



OSPAR
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REGIONAL ASSESSMENT – NORTH EAST ATLANTIC

Pressures from human activities

Indicators describing trends in:

- Hazardous substances (D8, 9)
- Eutrophication (D5)
- Marine litter (D10)
- Invasive non-indigenous species (D2)
- Impulsive noise (D11)

Biodiversity

Indicators to assess biological diversity:

- Marine mammals (D1)
- Marine birds (D1)
- Fish communities (D1)
- Benthic habitats (D1, 6)
- Pelagic habitats (D1, 4)
- Food webs (D1, 4)

Thematic assessments

- Trends in discharges, spills and emissions from offshore oil & gas (D8)
- Radioactive substances (Annex III)
- Eutrophication (D5)
- Trends in dumping and placement of dredged material (D8)
- Status of OSPAR network of Marine Protected Areas (D1, 4, 6)

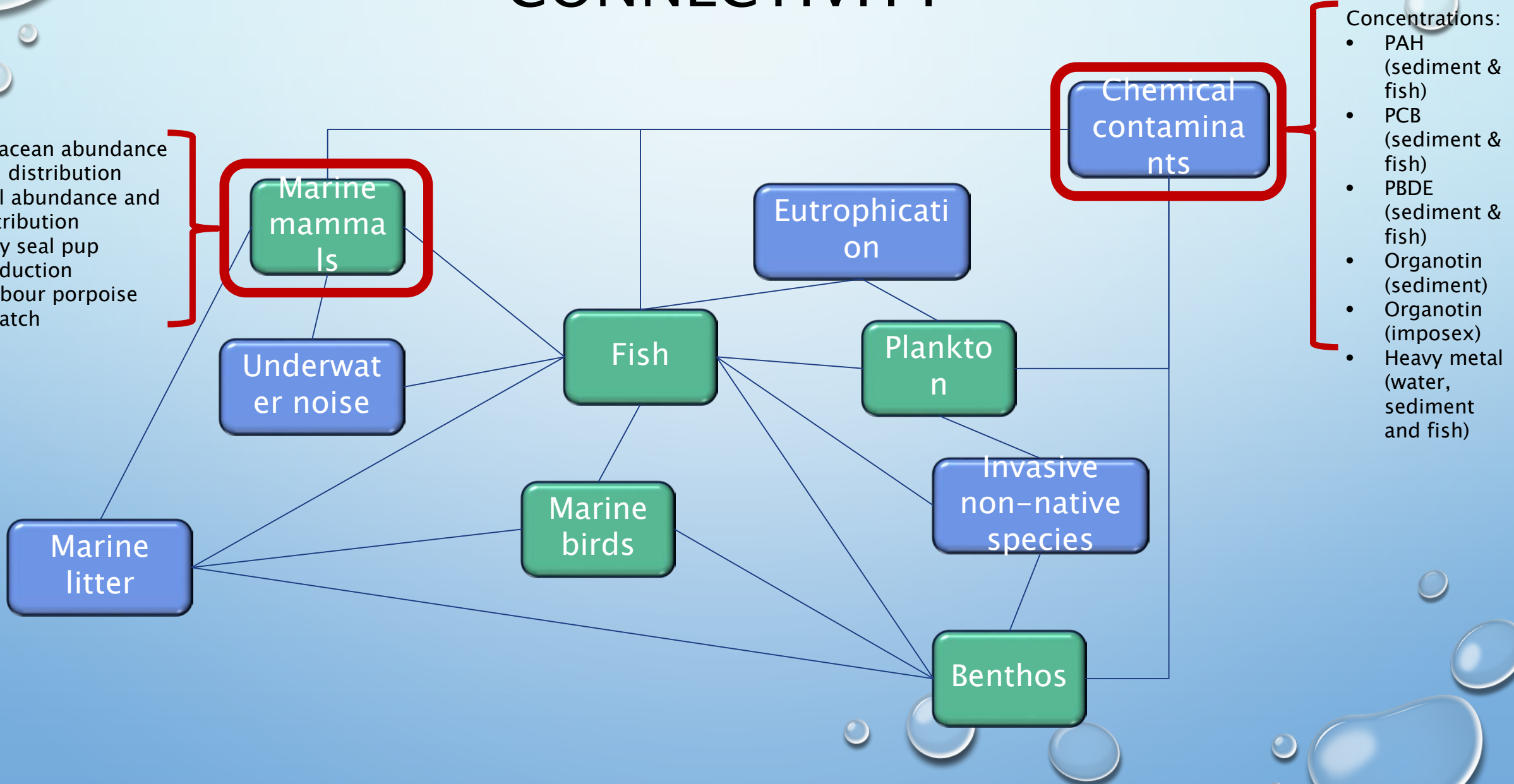
MSFD Descriptors

D1 – Biological diversity; D2 – non-indigenous species; D3 – populations of exploited fish & shellfish; D4 – marine food webs; D5 – eutrophication; D6 – seafloor integrity; D7 – hydrographical conditions; D8 – contaminants in water and sediments; D9 – contaminants in fish and other seafood; D10 – marine litter; D11 – introduction of energy (including noise)

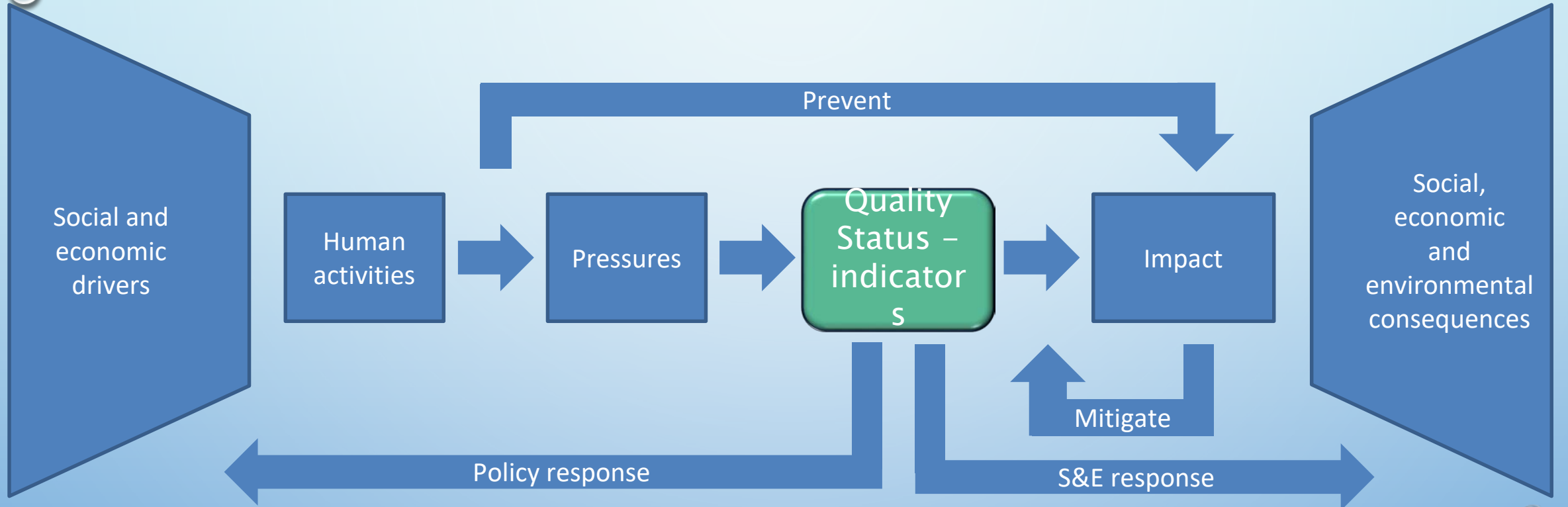


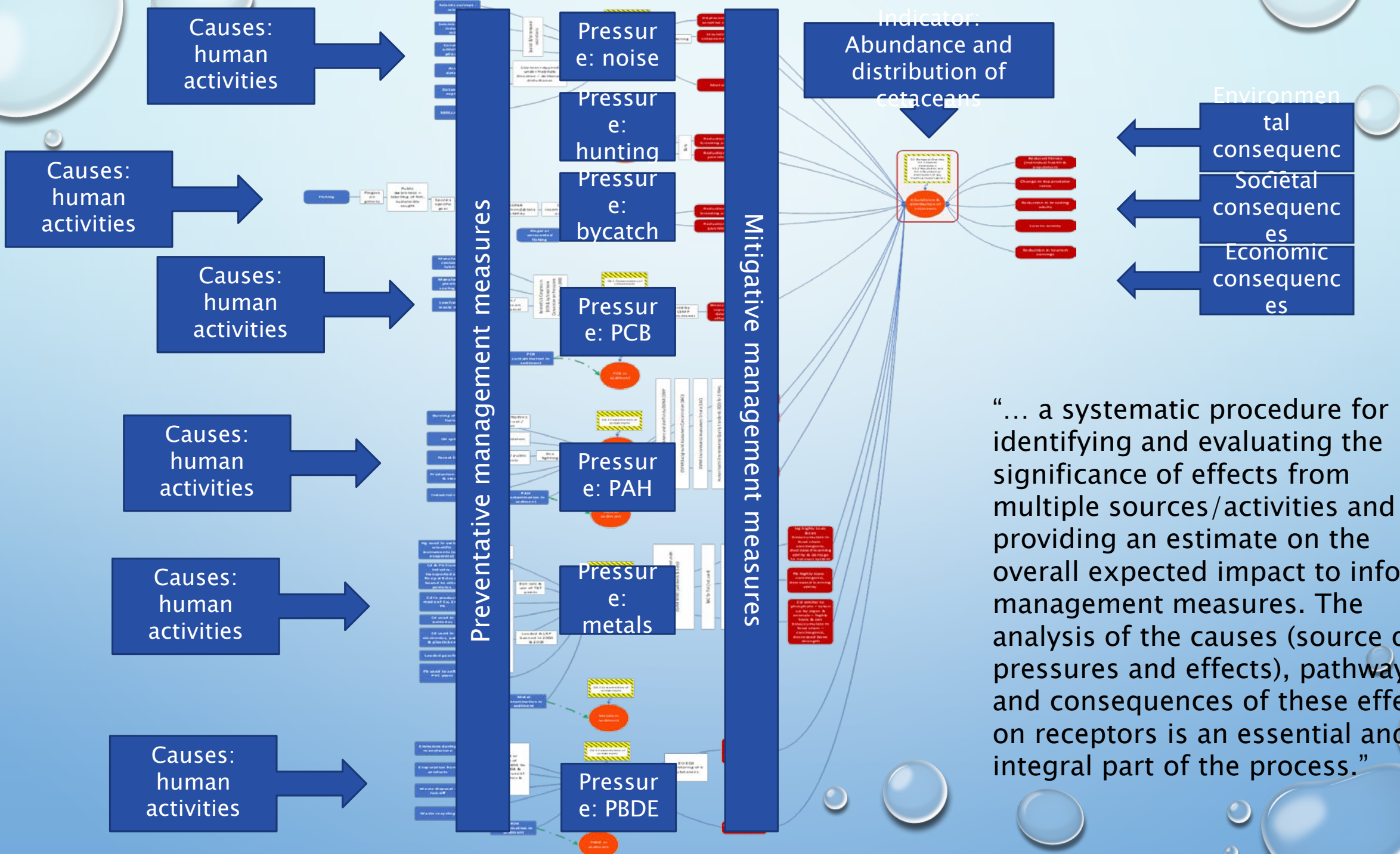
ECOSYSTEM APPROACH: INDICATOR CONNECTIVITY

- Cetacean abundance and distribution
- Seal abundance and distribution
- Grey seal pup production
- Harbour porpoise bycatch



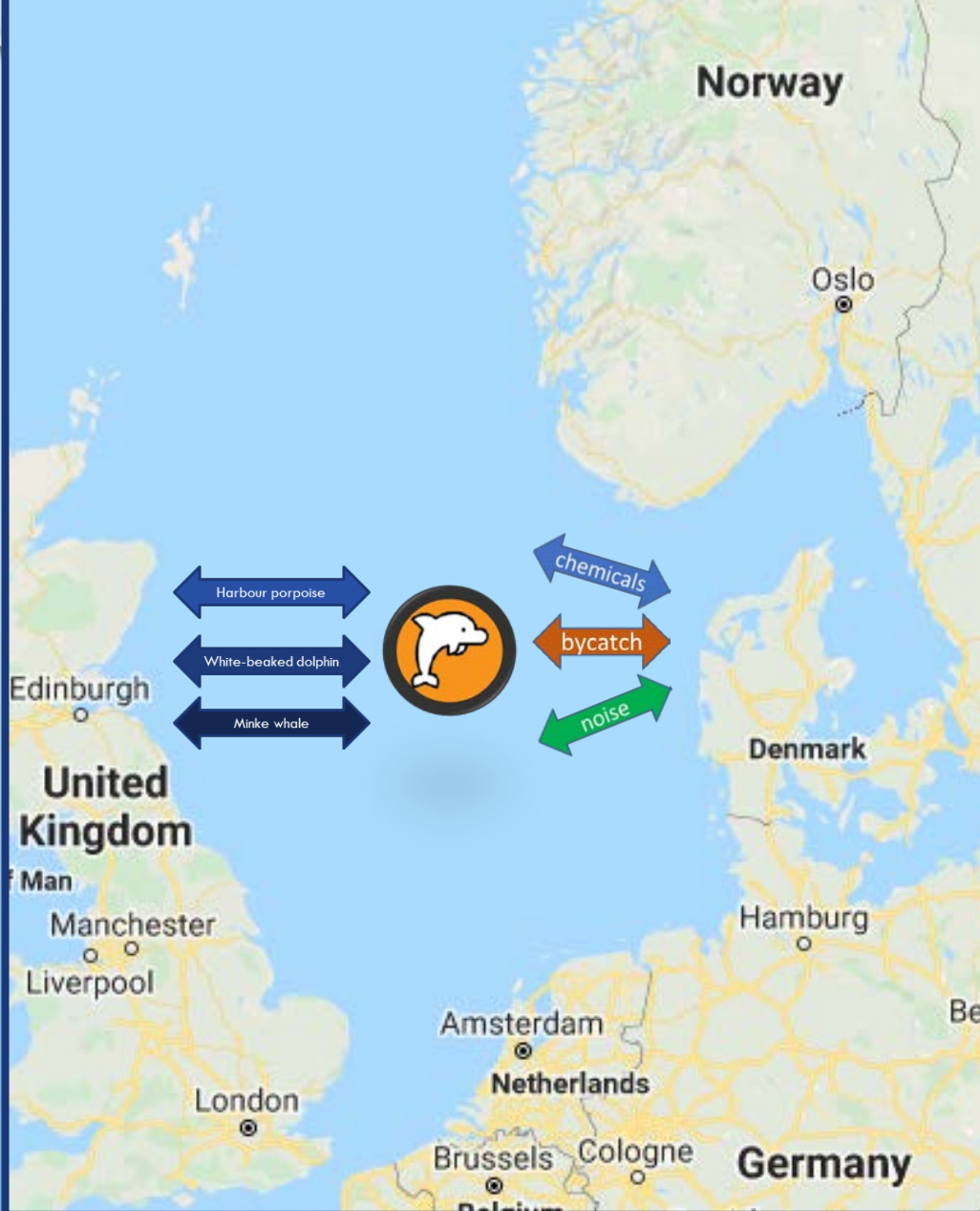
INDICATOR COMPONENTS FOR CUMULATIVE EFFECTS ASSESSMENT



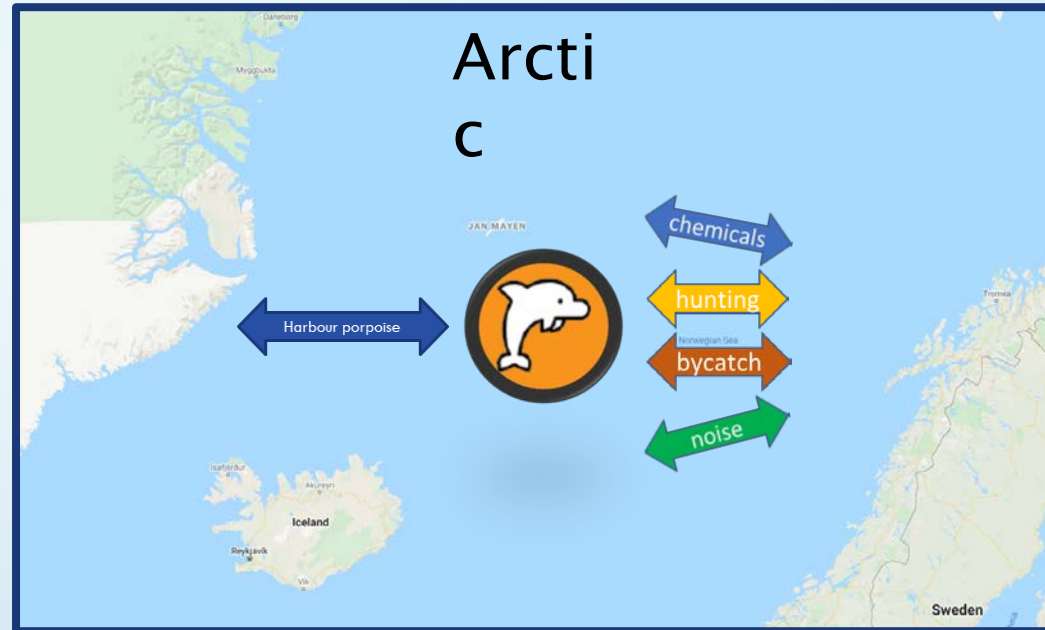


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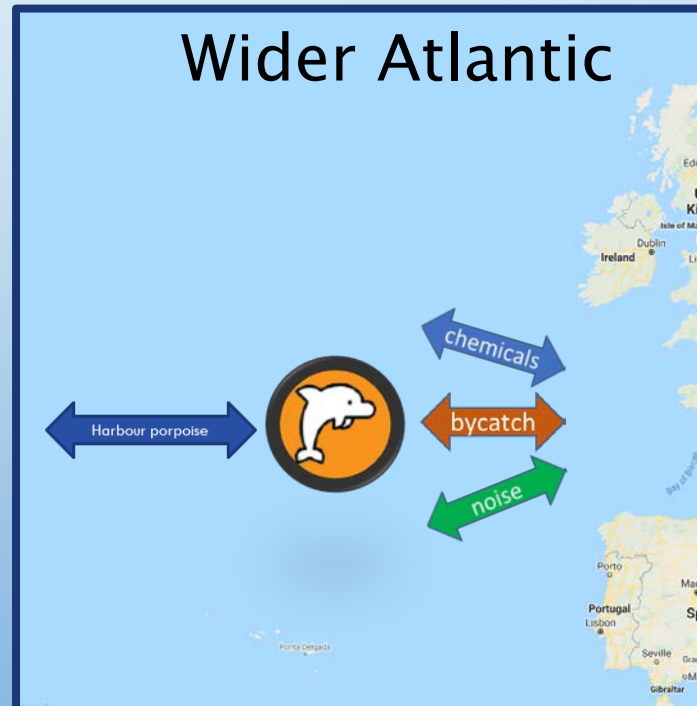
Greater North Sea



Arctic

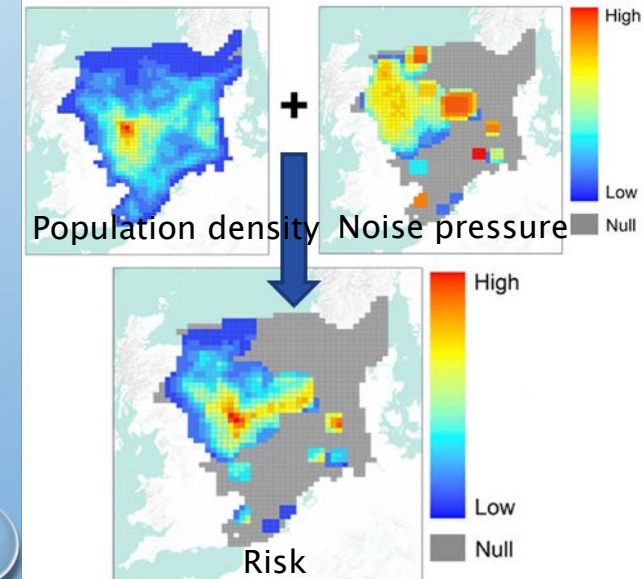


Wider Atlantic



Underwater noise

(Merchant et al (2017) Marine Noise Budgets in Practice. Conservation Letters)





SUMMARY

- Actions have consequences → management requires an understanding of pathways & likelihood of connections and impact
- Cumulative effects:
 - Single actions → multiple effects
 - Multiple actions → multiple effects
- Often impractical to assess all interactions – indicators can help target (limited) resources
- Apply risk assessment principles – prevention better than cure
- Optimise use of available data:
 - Spatial and non-spatial
 - Quantitative and qualitative
 - Temporal variations in human activity and ecosystem sensitivity
- Consider social and economic drivers of change
- Consider environmental, social and economic consequences of change