

Linking science and policy: The development of plankton indicators for the Marine Strategy Framework Directive

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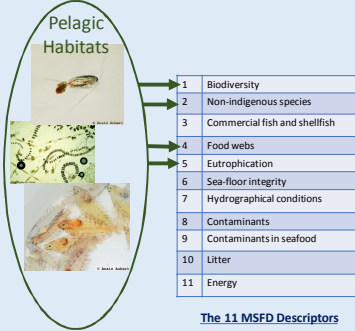
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General context

Increasing concern for marine surveillance and management

→ In Europe, building of the Marine Strategy Framework Directive (MSFD) (2008/56/CE)



Goal = Good Environmental Status (GES) of marine waters within the economic exclusive zone

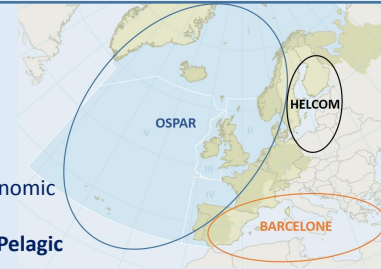
Ecosystem approach → Divided in 11 descriptors – Zooplankton = part of **Pelagic Habitats** (cf. table on left)

Need for **indicators** as ecosystem management tools (indicators linked to anthropogenic pressures and with assessment values)

Monitoring program mainly based on existing monitoring

Each member state is responsible for its own MSFD application but **regional approaches** are necessary

Development of indicators at local, national/local and regional scale (**Regional Sea Conventions** such as OSPAR, HELCOM or BARCELONE)



Geographical work areas of the different Sea Conventions

OSPAR Pelagic Habitats Indicators

Plankton Lifeforms (PH1)

- Ratio of ecologically-meaningful lifeform pairs considered (e.g. large/small copepods)
 - Reference conditions based on the state-space approach developed by Tett. et al (2008)
 - Provide information on food-web functioning, diversity, eutrophication and sea-floor integrity
- More info: cf. ICES/PICES 6ZPS 2016 W1 abstract of Tett et al. and Cook et al.

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Plankton Biomass/Abundance (PH2)

- Total copepod abundance considered (or also total biovolume of copepods (for imaging system analysis)) (also developed for phyto. with Chl a)
- Based on time series analysis
- Calculation of monthly and annual anomalies

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Plankton Community Diversity (PH3)

- Taxonomic abundance (for phyto. and copepods)
- Based on time-series data sets from coastal stations
- Calculation of several indices: richness, dominance, succession rate, compositional dissimilarity, temporal beta diversity....
- Future consideration of other facets (functional, phylogenetic, etc....)

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Development pursuing and future aggregation of the 3 indicators (EcApRHA project)



HELCOM Convention

- 1 core indicator: Zooplankton mean size and total abundance
- More info : <http://www.helcom.fi/baltic-sea-trends/biodiversity/indicators>

BARCELONA Convention

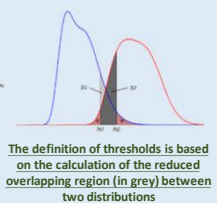
- No indicators yet in development

Local/National Scale

- Goal:** To have indicators linked to anthropogenic pressures and to be able to define assessment values
- Many national indicators are based on Regional common indicators but member states can develop their local indicators for specific locations
- Example of local indicator developed for a French zooplankton time-series from Toulon, Mediterranean coast of France (Serrano et al., 2016)



Localization of the two time-series stations (S1 and S2) in Toulon Bay, South of France



The definition of thresholds is based on the calculation of the reduced overlapping region (in grey) between two distributions

How can you contribute!?

- **Why?** To bring science at the management level and to fill the science-politic-management gap - greater involvement of scientists = better indicators!
- **Collaboration** wanted for further indicator development and additional case studies (enhanced publication output)
- **Interest** for other indicators fitting the MSFD objectives, any new ideas welcomed!

Literature cited:

Tett, P. et al. 2008. Use of a phytoplankton community index to assess the health of coastal waters. ICES Journal of Marine Science 65: 1475-1482.
Serrano et al. 2016. Proposition of indicators of anthropogenic pressure in the Bay of Toulon (Mediterranean Sea) based on zooplankton time-series. Continental Shelf Research (in press).



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