

Taking the pulse of regional seas: the IndiSeas-MEECE initiative

The IndiSeas project is a multi-institute collaborative effort which supports the implementation of the Ecosystem Approach to Fisheries (EAF) through the selection of indicators to describe the impact of fishing on marine ecosystem state. IndiSeas provides graphic web-based indicators to inform the public, and fisheries managers, of the relative state and recent trends in the world's exploited marine ecosystems for information and policy development.

In its second phase the IndiSeas initiative continues to evolve, focusing on evaluating the status of the world's exploited marine ecosystems subject to multiple drivers. In response to policy drivers such as the European Commission Marine Strategy Framework Directive (MSFD), the set of eight ecological indicators used in the early stages of the project has been extended to include a complementary set of biodiversity and conservation-based indicators, and a set each of environmental and human dimension indicators. This will assist in the interpretation of trends observed in ecological indicator series providing a comprehensive set of comparative tools to assess the state of 34 marine ecosystems worldwide.

IndiSeas Phase 2

In its first phase IndiSeas focused on eight ecological indicators from a set of case studies. It became apparent that additional information was needed to interpret and make use of the information in response to new policy drivers (e.g. the MSFD). Five new questions are explored in the second phase of the initiative:

1. **Which complementary indicators (climate, biodiversity/conservation, social and economic indicators) should be used to refine and communicate ecosystem status and to inform fisheries decision-makers?**
2. **What additional methods (integration, reference levels, modelling) would be effective for analysis of the broader suite of indicators being proposed for IndiSeas2?**
3. **How can we compare the status of exploited marine ecosystems under multiple drivers (fishing, climate) and objectives (ecological, social, economic)?**
4. **How well do indicators reflect actual change (performance testing of information content)?**
5. **How well do indicators help decision-makers make better decisions about keeping fisheries sustainable (performance testing of decision support)?**

To address these questions, the second phase of IndiSeas includes a new set of indicators to better capture environmental change as well as human activities, recognising that anthropogenic and environmental impacts interact in complex ways. IndiSeas2 aims to identify reference levels needed for management and policy implementation purposes to assess the performance of indicators and to propose ways of integrating information across multiple, fundamentally different indicators.

Indicator task groups

IndiSeas is structured across six indicator task groups, responsible for developing and evaluating proposed indicators:

- Climate and Environmental Indicators
- Biodiversity and Conservation-based Indicators
- Human Dimension Indicators
- Reference Levels for Indicators
- Performance of Indicators and Links to Management
- Integration of Indicators



Linking IndiSeas to policy: the case of the MSFD

How IndiSeas ecological indicators link to the European Marine Strategy Framework Directive (MSFD) showing corresponding attributes for assessing good environmental status (GES)

From IndiSeas phase 1 (ecological indicators)	MSFD Attribute
Total biomass of surveyed species	Population size, Habitat condition
Mean length of fish	Population condition, Proportion of selected species at the top of food webs, Population age and size distribution
Trophic level of landings	Ecosystem structure, Level of pressure of the fishing activity
Proportion of under to moderately exploited stocks	Ecosystem structure, Abundance/distribution of key trophic groups/species
Proportion of predatory fish	Proportion of selected species at the top of food webs, Abundance/distribution of key trophic groups/species, Ecosystem structure
Mean lifespan of fish	Population condition, Abundance/distribution of key trophic groups/species
Biomass stability	Reproductive capacity of the stock
Biomass/Catch	Level of pressure of the fishing activity
From IndiSeas phase 2 (biodiversity and conservation-based indicators)	MSFD Attribute
Biomass (abundance) trend of flagship species	Abundance/distribution of key trophic groups/species, Population size
Mean intrinsic vulnerability index of fish catch	Habitat condition, Level of pressure of the fishing activity
Mixed trophic index (TL>=3.25)	Proportion of selected species at the top of food webs, Level of pressure of the fishing activity
Trophic level of the community	Habitat condition, Proportion of selected species at the top of food webs, Abundance/distribution of key trophic groups/species
Proportion of all exploited species with declining biomass	Habitat condition, Reproductive capacity of the stock
Discards	Level of pressure of the fishing activity

*Full table including MSFD descriptors and indicators can be found at <http://www.meece.eu/kt/fs.html> along with other supporting information on this topic.

IndiSeas indicators extend beyond the needs of the European Marine Strategy Framework Directive, and include information on impacts of fishing on species of conservation concern or those vulnerable to disturbance.

New environmental indicators added in IndiSeas2 to assist in interpretation of the ecological effects of fishing:

- Sea Surface Temperature
- Chlorophyll a
- GLOBAL climate indices
- Regional environmental indices specific to ecosystem type

Human dimensions indicators selected to assess:

1. Effectiveness, efficiency and fairness of fisheries management and quality governance
2. Contribution of fisheries to food provision, economic and social well being
3. Well being and resilience of fisher communities

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Further information on MSFD: Reports at <http://www.ices.dk/projects/projects.asp#MSFD>

Supporting information on this fact sheet available at <http://www.meece.eu/kt/fs.html>

