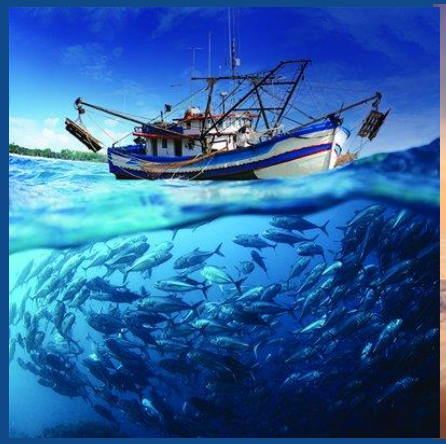
Sustainable Fisheries:
Mitigating the Ecological Impacts of Removing Commercially Valuable Fish and Shellfish from Marine Ecosystems: the context of EAFM

Patrícia Gonçalves (patricia@ipma.pt)



Mitigating the Ecological Impacts of Removing Commercially Valuable Fish and Shellfish from Marine Ecosystems:

- Implementing Sustainable Fishing Practices
- Establishing Marine Protected Areas (MPAs)
- Restoring Degraded Habitats
- Adopting Ecosystem-Based Management
- Promoting Aquaculture
- Engaging Stakeholders and Communities

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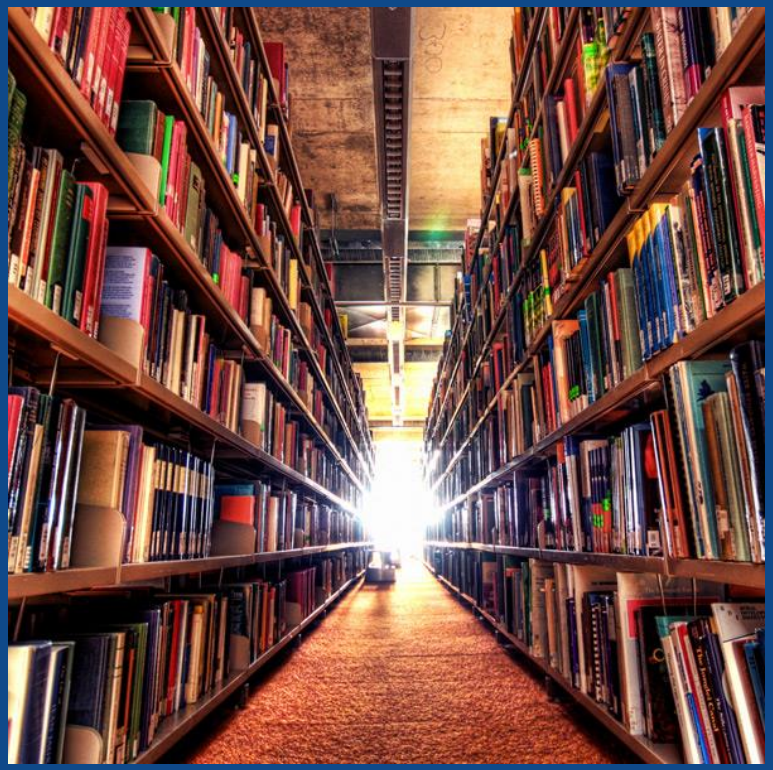
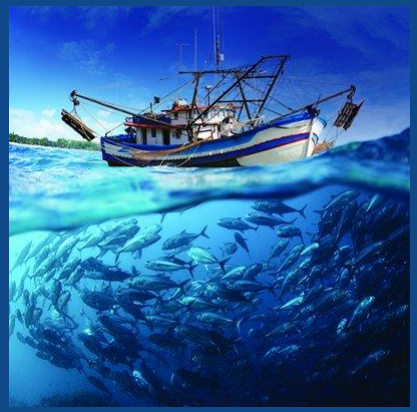


Main aim:

1 Brief summary of EAFM concept.

2 Present the conclusions drawn from the literature review on EAFM challenges. Address solutions [2+].

3 How close are we to integrating the EAFM main drivers into routine stock assessment models?



1 EAFM description and concepts

1 Ecosystem-based Approach to Fisheries Management (EAFM)

A fisheries governance framework:

conceptual principles and operational methods from single-species fisheries management and ecosystem management.

1 Ecosystem-based Approach to Fisheries Management (EAFM)

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Also considering sustainability and recognizing fisheries management.

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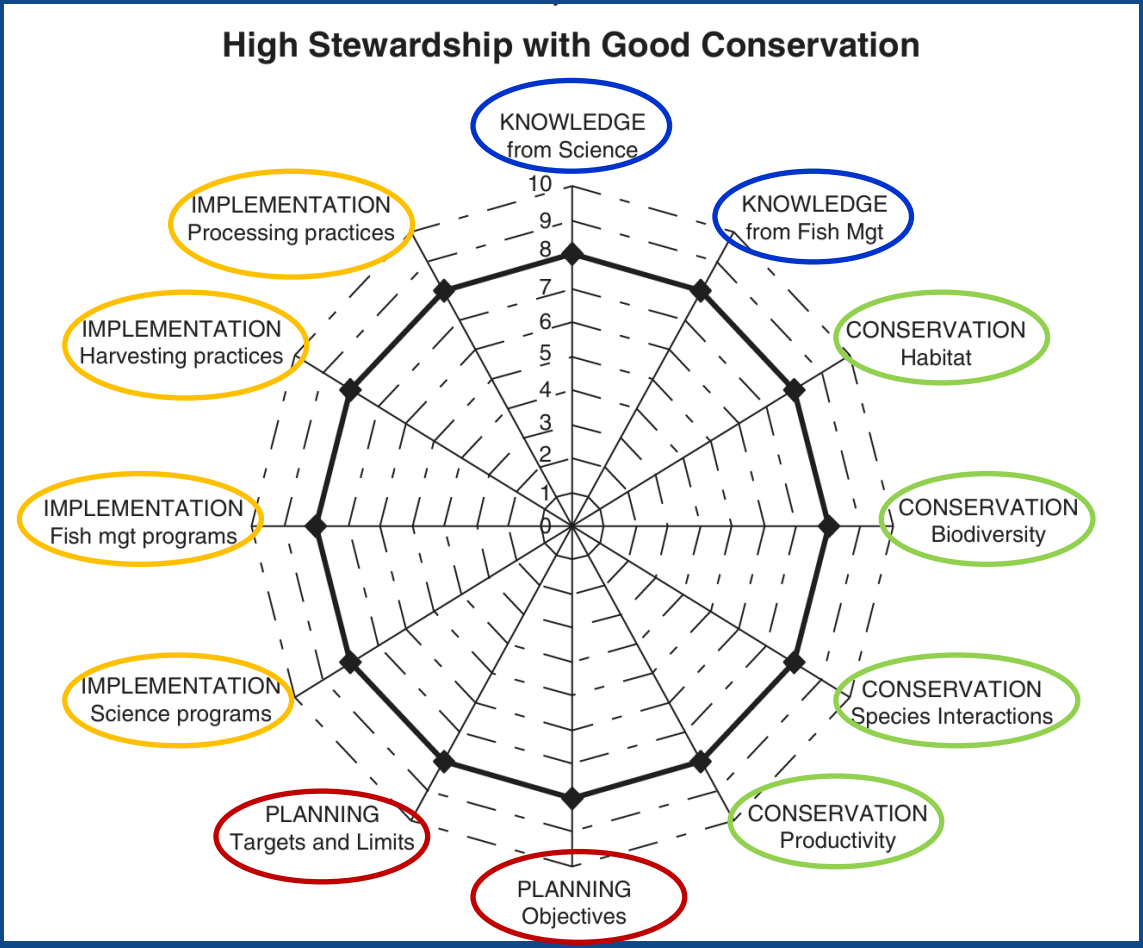
… account for the dynamic nature of ecosystems, their ecological integrity, and biodiversity.

Also considering sustainability and recognizing fisheries management, and acknowledging fisheries management as part of a socio-economic-ecological system.

1 Axes of Stewardship and Conservation
(Stringer, Clemens and Rivard 2009)



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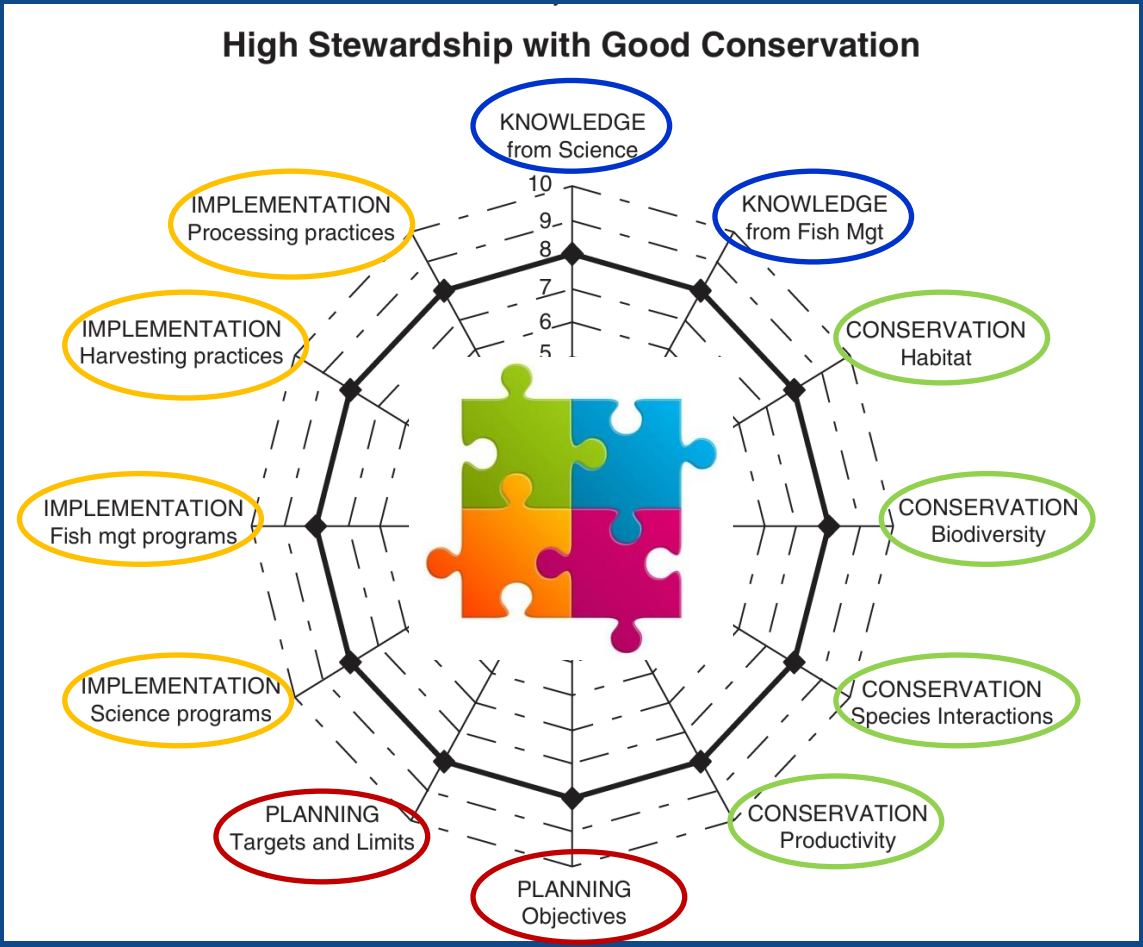
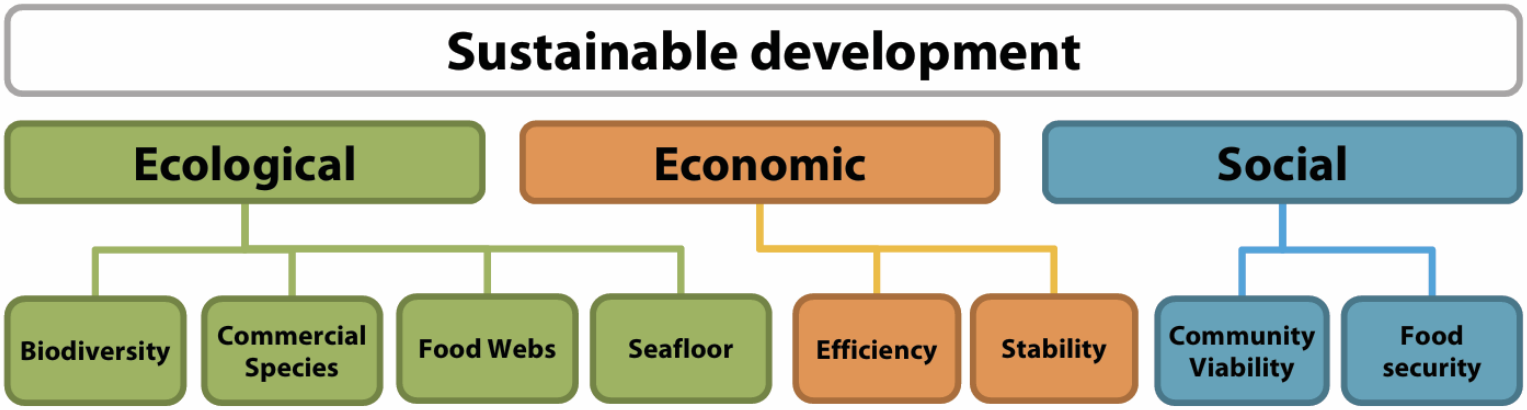


1 Fisheries Ecosystem Plans (MEFEPO*, 2009)

THREE PILLAR approach to explore potential impacts of different Management Strategies on Multiple Objectives for the Marine Environment:



MEFEPO approach to the development of regional Fisheries Ecosystem Plans (FEPs).

* **M**aking the **E**uropean **F**isheries **E**cosystem **P**lan **O**perational

1

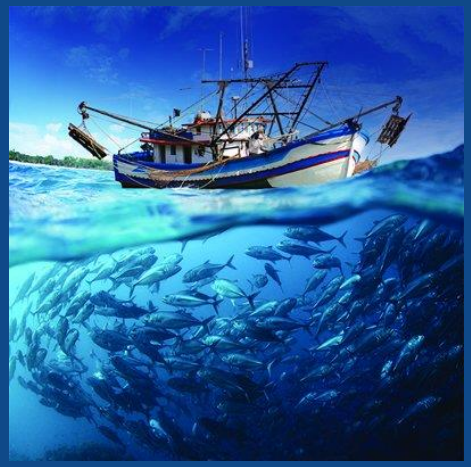
15 Principles (Long et al. 2015)

- Consider ecosystem connections
- Use distinct boundaries
- Apply appropriate spatial and temporal scales
- Account for the dynamic nature of ecosystems
- Consider ecological integrity and biodiversity
- Apply adaptive management
- Use scientific knowledge
- Apply interdisciplinarity
- Use appropriate monitoring
- Acknowledge uncertainty
- Integrate management
- Apply sustainability
- Recognize coupled social-ecological systems
- Reflect societal choice
- Involve stakeholders

1 + 11 Principles (Long et al. 2015)

- Acknowledge ecosystem resilience
- Consider economic context
- Apply the precautionary approach
- Consider cumulative impacts
- Monitor organizational change
- Explicitly acknowledge trade-offs
- Consider effects on adjacent ecosystems
- Commit to principles of equity
- Develop long-term objectives
- Use all forms of knowledge
- Use incentives

2 Review on EAFM challenges



2 EAFM challenges (Piet et al. 2022)

Type 1: Mitigate fishing impacts on fishing opportunities and the wider ecosystem (e.g. by-catch, impacts on habitat and food webs).

- Catch and by-catch of commercial species/stocks.
- By-catch of other ecosystem components and habitat disturbance.
- Indirect effects through the food web.

Implementation:

- Single-stock assessment models;
- Defining the list of by-catch species;
- Data-poor species: define biological reference limits;
- Develop ecosystem models to identify potential indirect effects.

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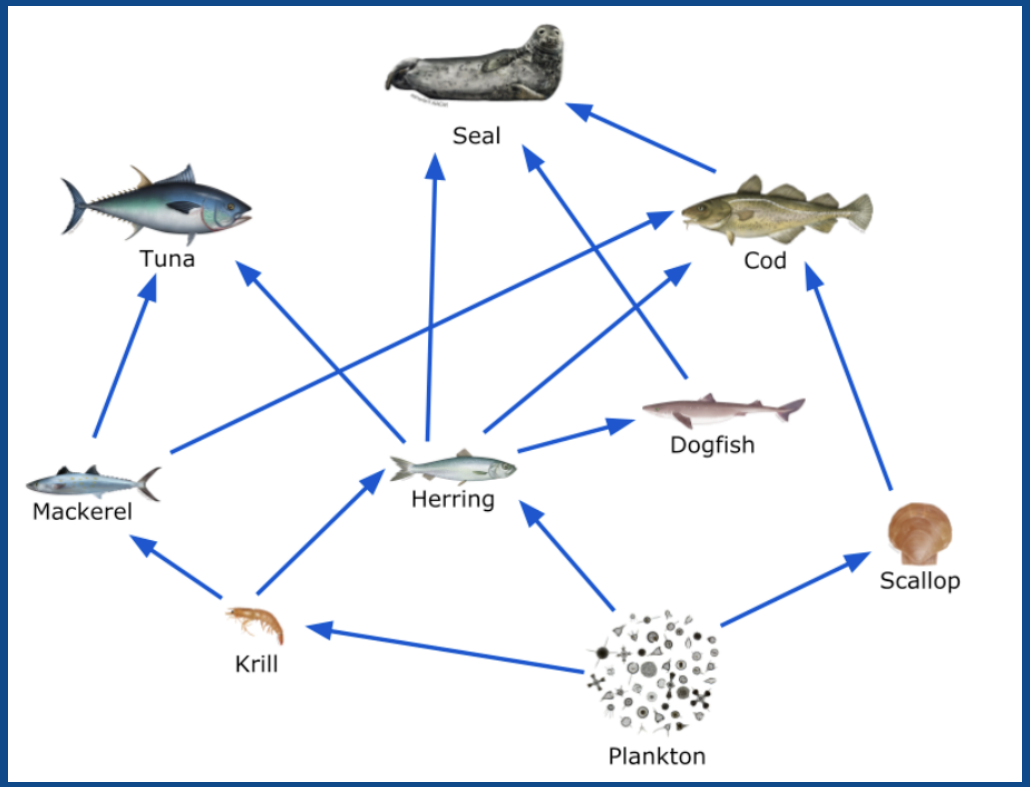
Multi-species stock assessment models

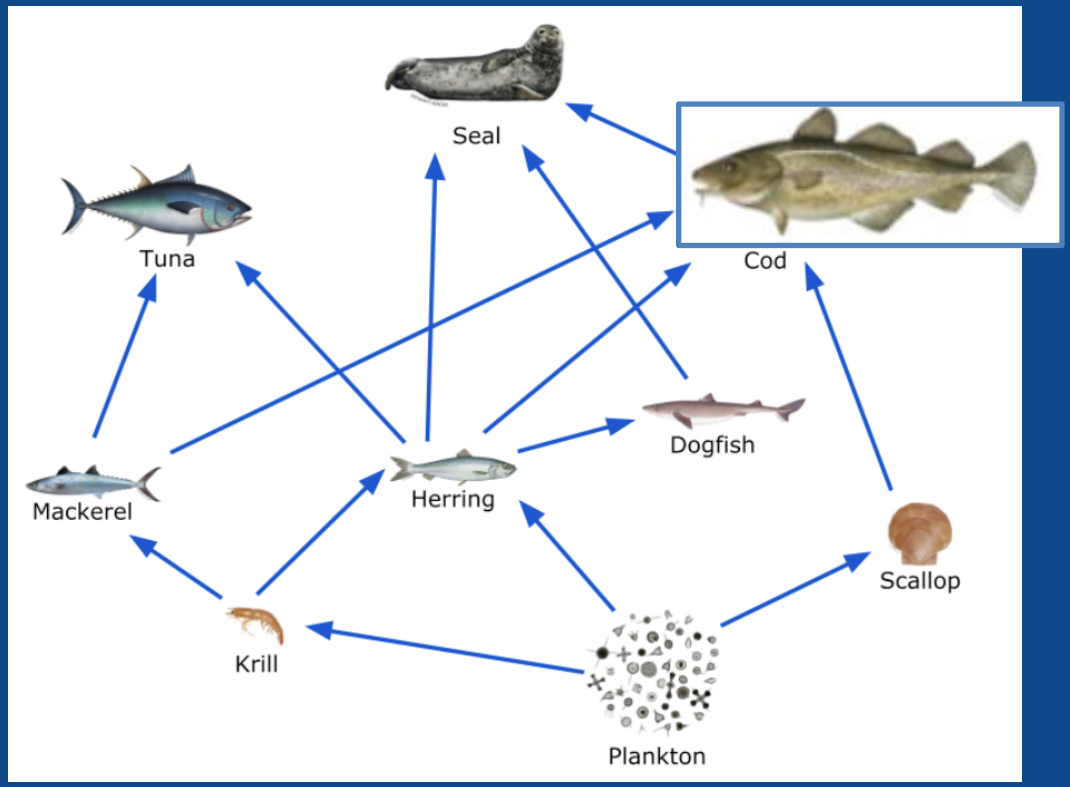
2

Removing commercially fish and shellfish



2

Removing commercially fish and shellfish?



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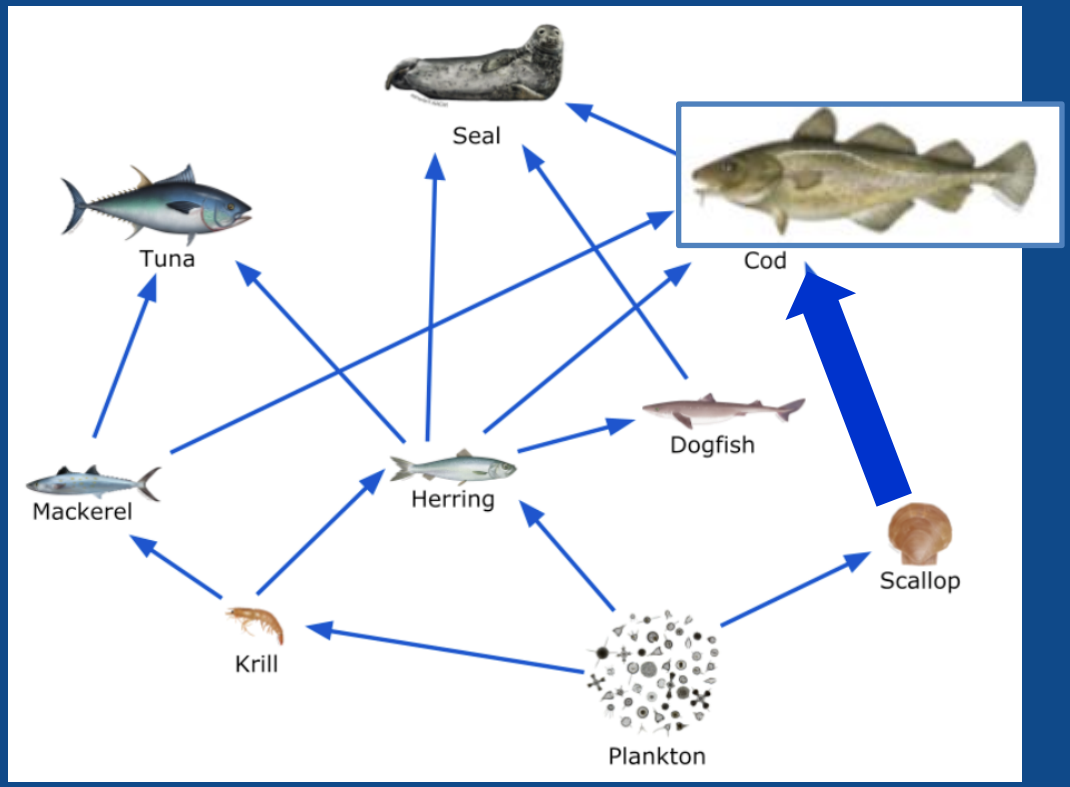

- Abundance may not decline, the predator switches diet.
- Other prey to replace the lost production.

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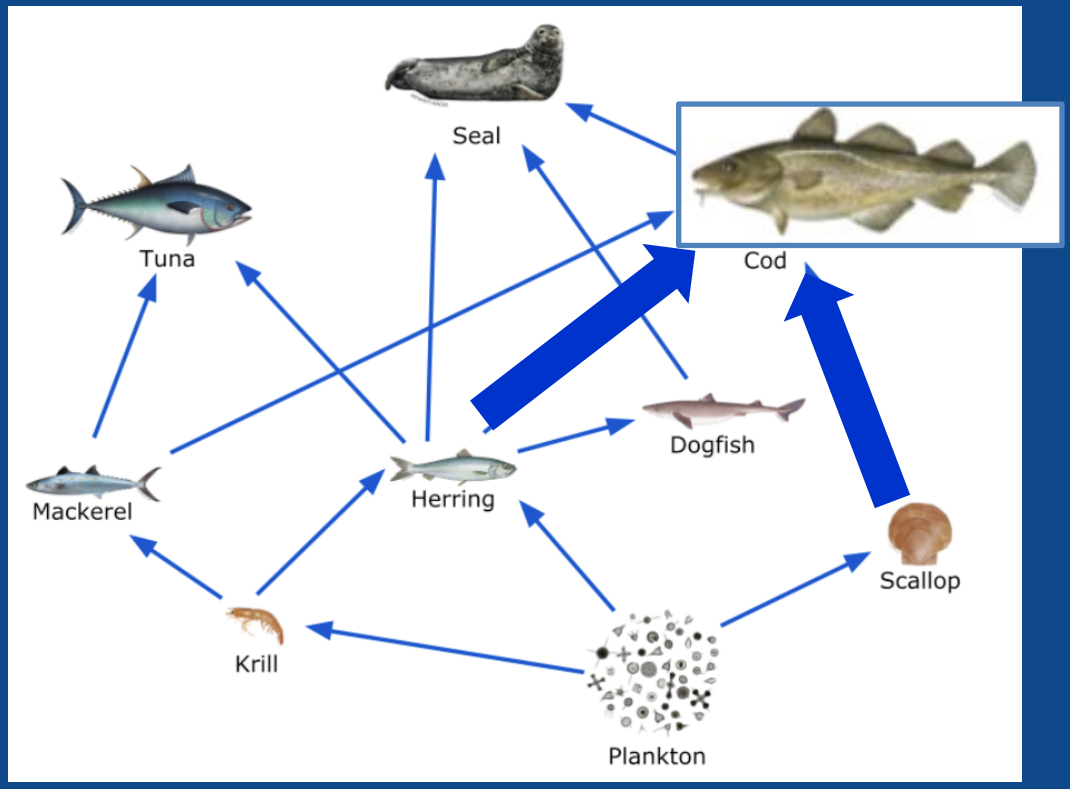

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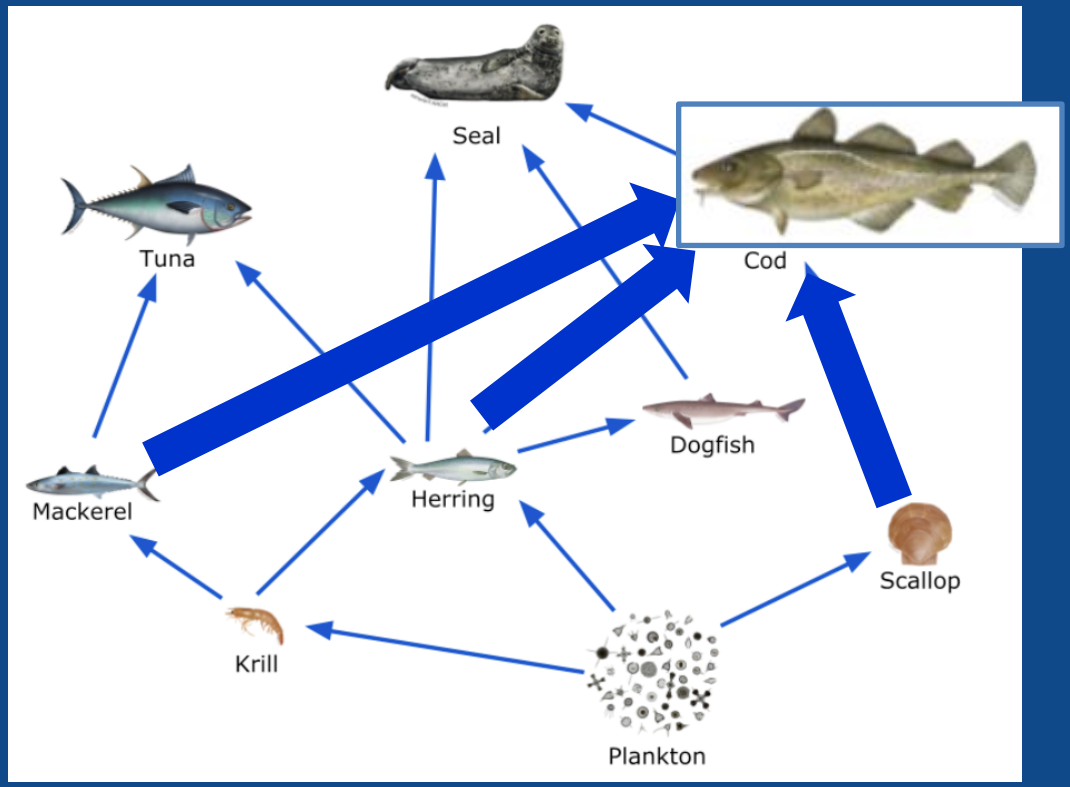

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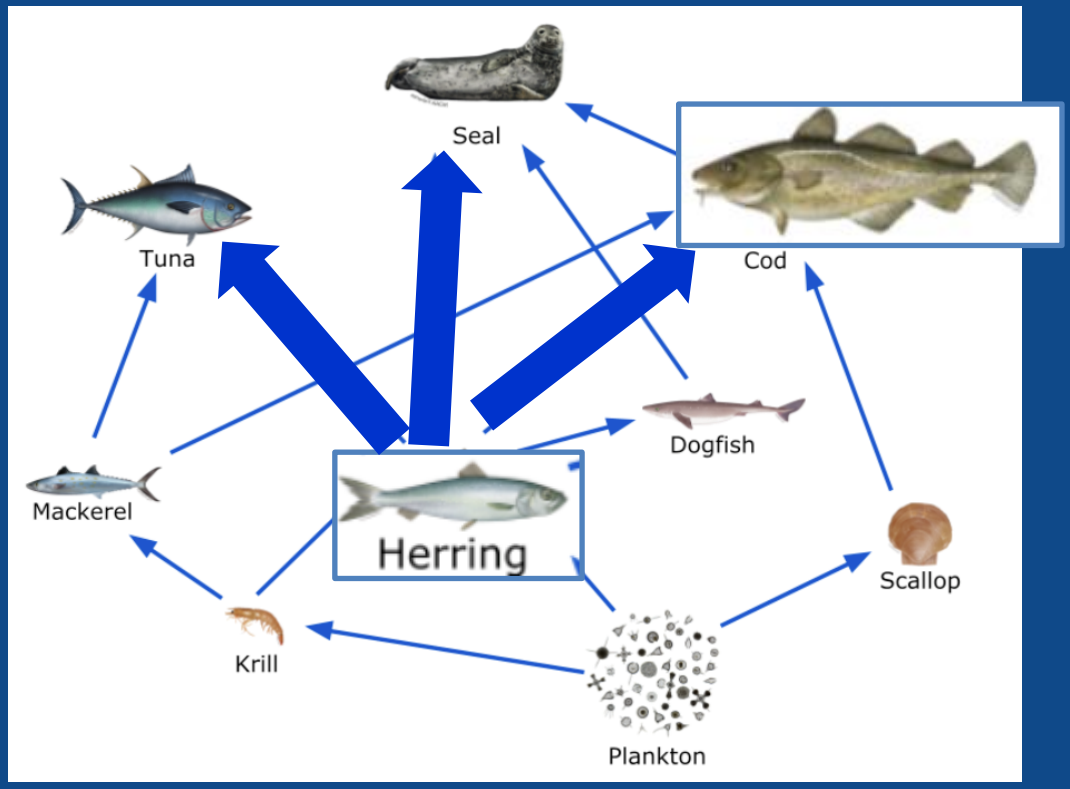


- The ability of a predator to compete with other predators.
- The relationship between prey availability-predator production may be non-linear and are dynamic (e.g. time and space).

2 EAFM challenges (Piet et al. 2022)

Type 2: Improve the advisory process by incorporating the effects of the environmental on fish, fishing opportunities and fisheries or the effects (e.g. on productivity) of other anthropogenic pressures.

- Inherent “natural” variability of the fishing opportunities.
- Anthropogenic (e.g. other sectors) and environmental changes/trends (e.g. climate) interact with fishing opportunities.

Implementation:

- Understanding the effects of environmental drivers and other anthropogenic pressures;
- Improve parameterization of stock assessment models;
- Account for the uncertainty.

2 EAFM challenges (Piet et al. 2022)

Type 3: Improve the decision-making process.

- Socio-economic context and its impact on the exploitation and management of fishing opportunities.
- Governance of the EAFM process: addressing conflicting, inconsistent, or poorly informed policy goals across industries and stakeholders.

Implementation:

- A transdisciplinary knowledge base is essential for achieving sustainability across all dimensions, including environmental, social, and economic.

2 EAFM challenges

Implementation:

Type 1
Type 2
Type 3

Enhance our capacity for data collection (e.g., spatial and temporal dimensions):
- Target and non-target species
- Environmental variables

2 EAFM challenges

Implementation:

Type 1
Type 2
Type 3

Enhance our capacity for data collection (e.g., spatial and temporal dimensions):
- Target and non-target species
- Environmental variables

Current Status:

Optimization of the number of samples for providing biological data in single-species stock assessments is in place (allowing saving resources: time and money).

Allowed to increase the number of species being sampled.

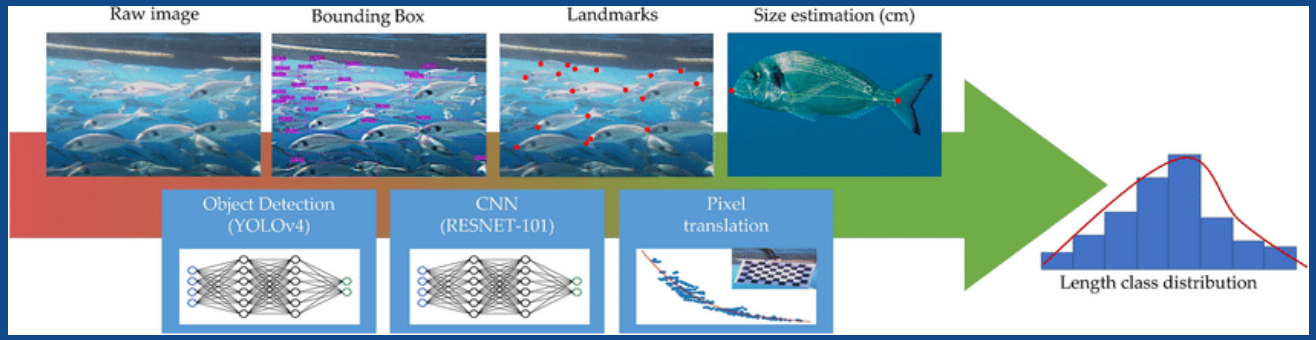
How it is?

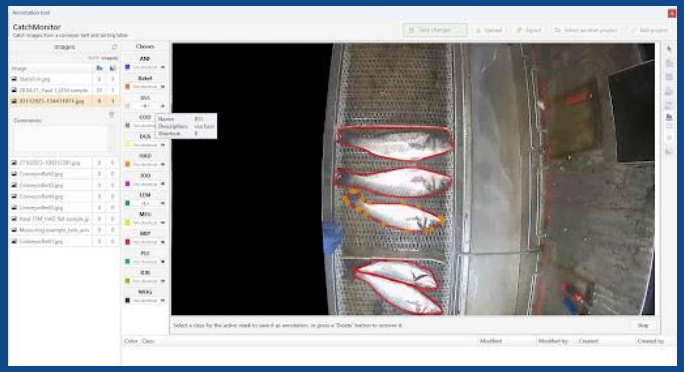
How it was?

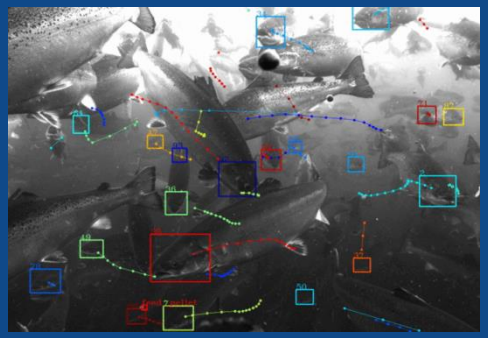
Laboratory in the 70s

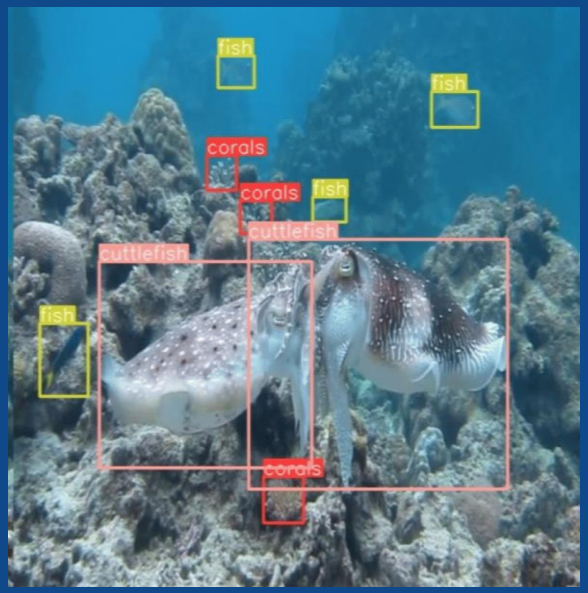
Laboratory in the 80s

How should it be?

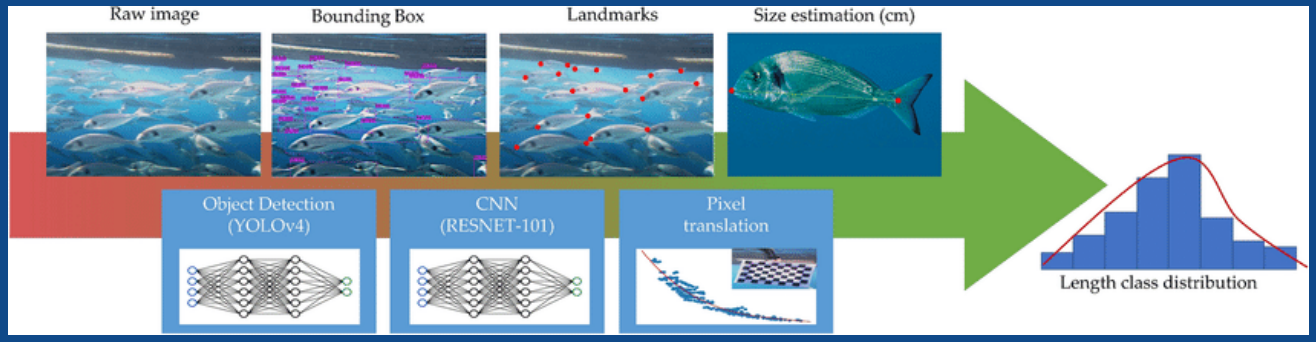


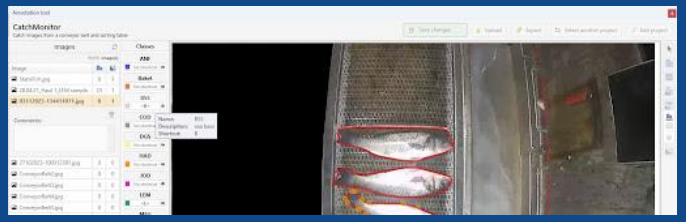




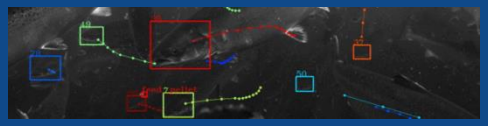


2 + Type 1 and 2: Solutions



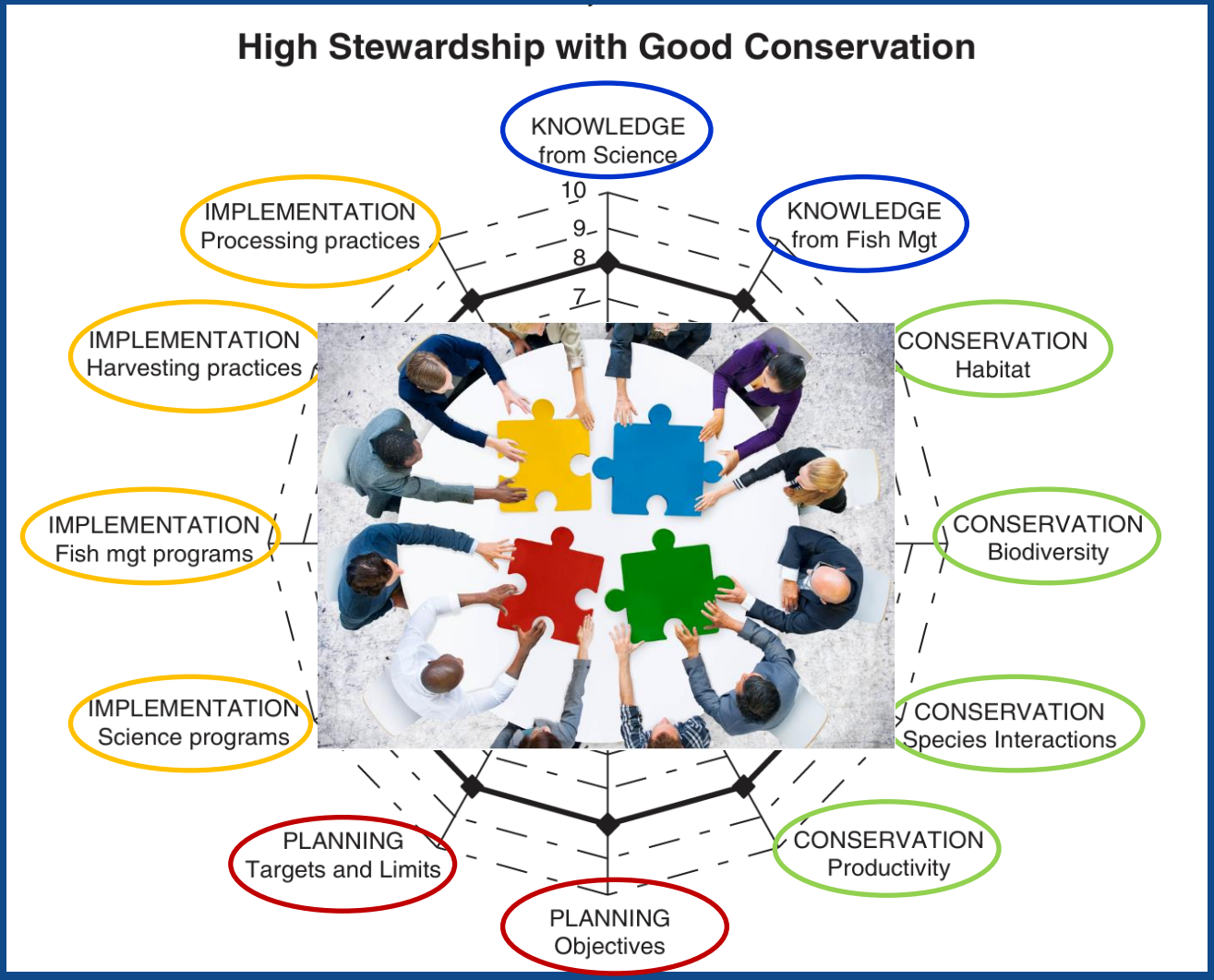


- Optimize sampling routines for regular data collection.
- Re-evaluate/re-think the concept and functionality of fish biology laboratories.



2 +

Type 3: Solutions



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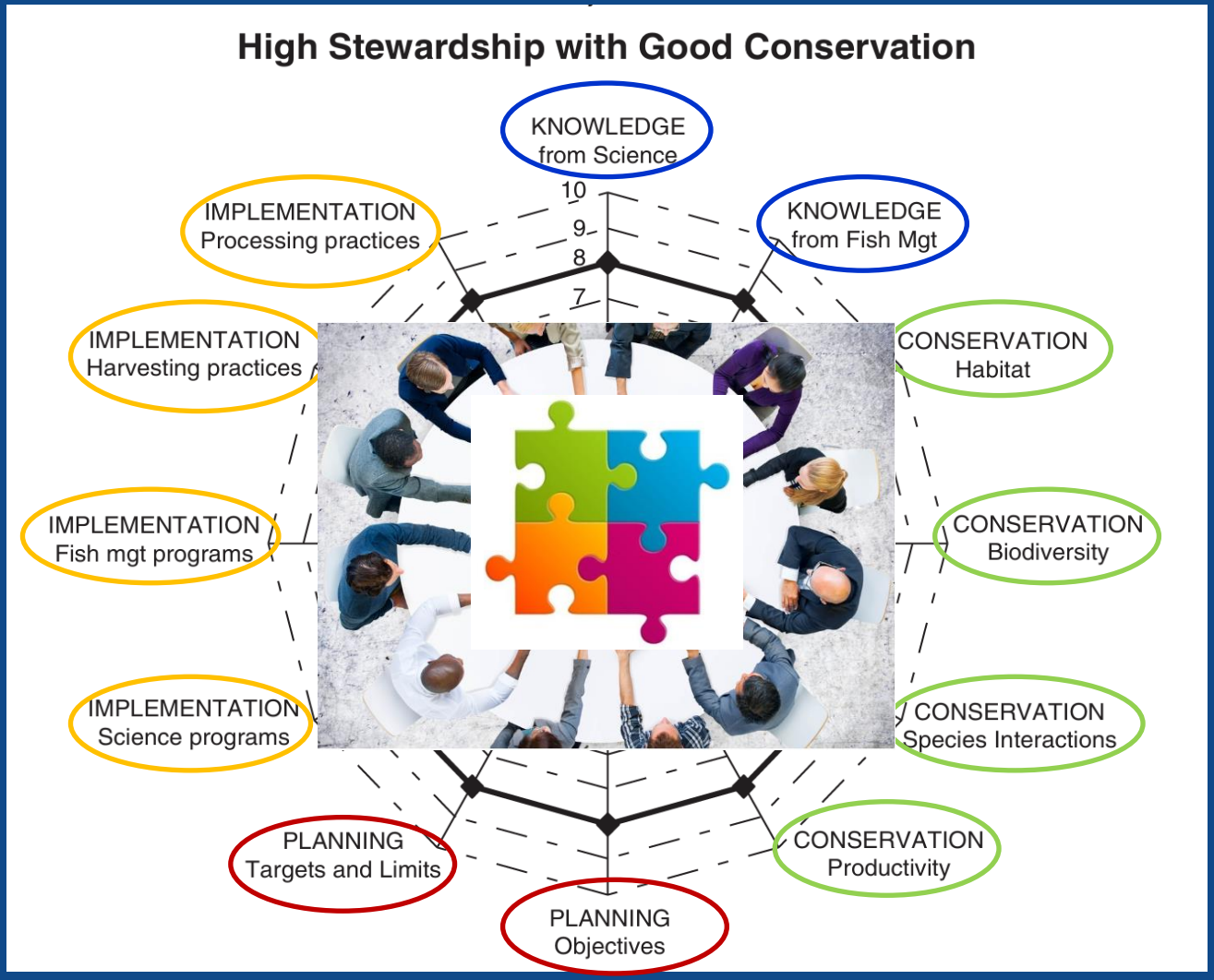

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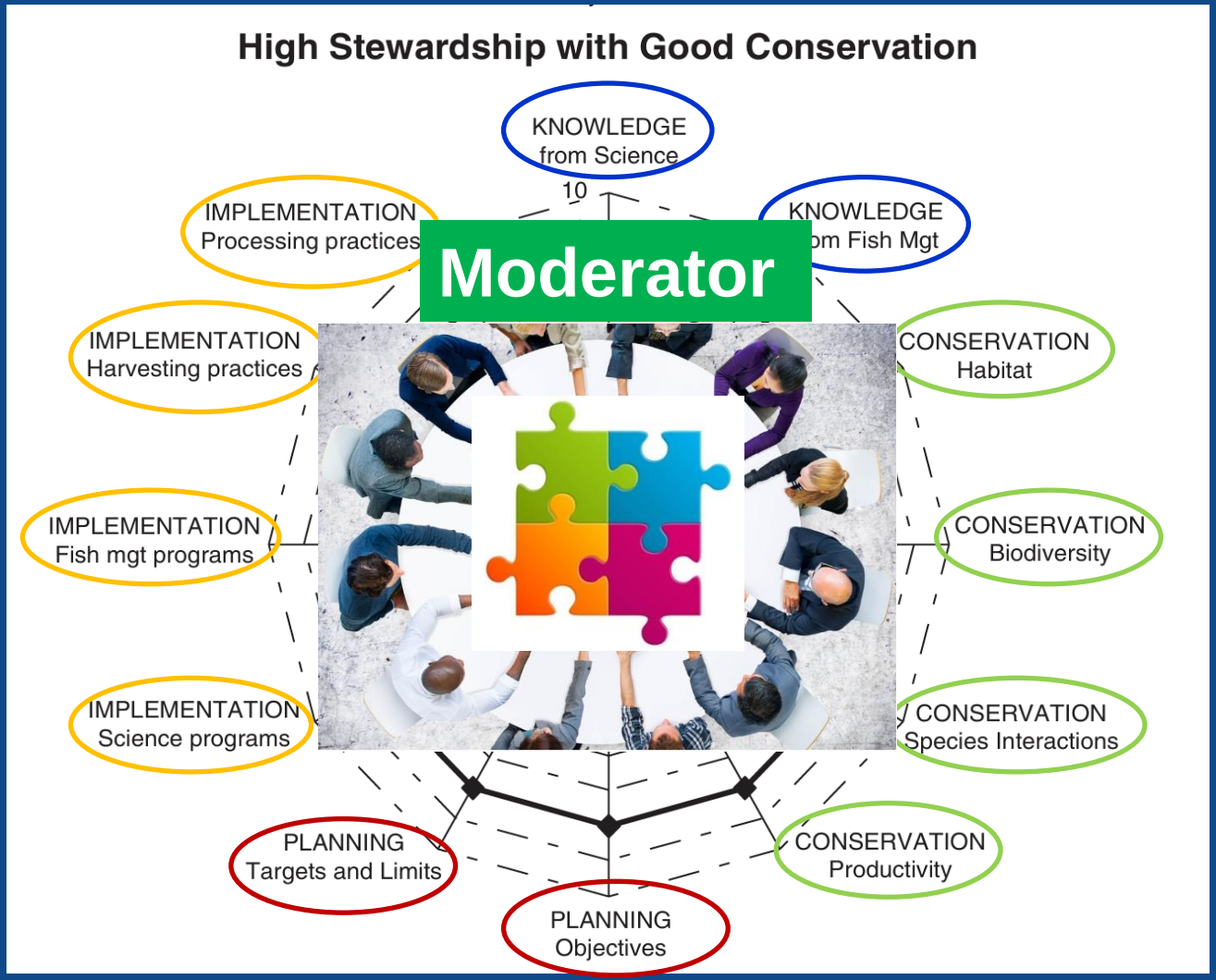


2 +

Type 3: Solutions

High Stewardship with Good Conservation

KNOWLEDGE from Science

IMPLEMENTATION Processing practices

KNOWLEDGE om Fish Mgt

IMPLEMENTAT Harvesting prac

TION

IMPLEMENTATION Fish mgt programs

RVATION iversity

IMPLEMENTATION Science programs

CONSERVATION Species Interactions

PLANNING Targets and Limits

CONSERVATION Productivity

PLANNING Objectives

Moderator

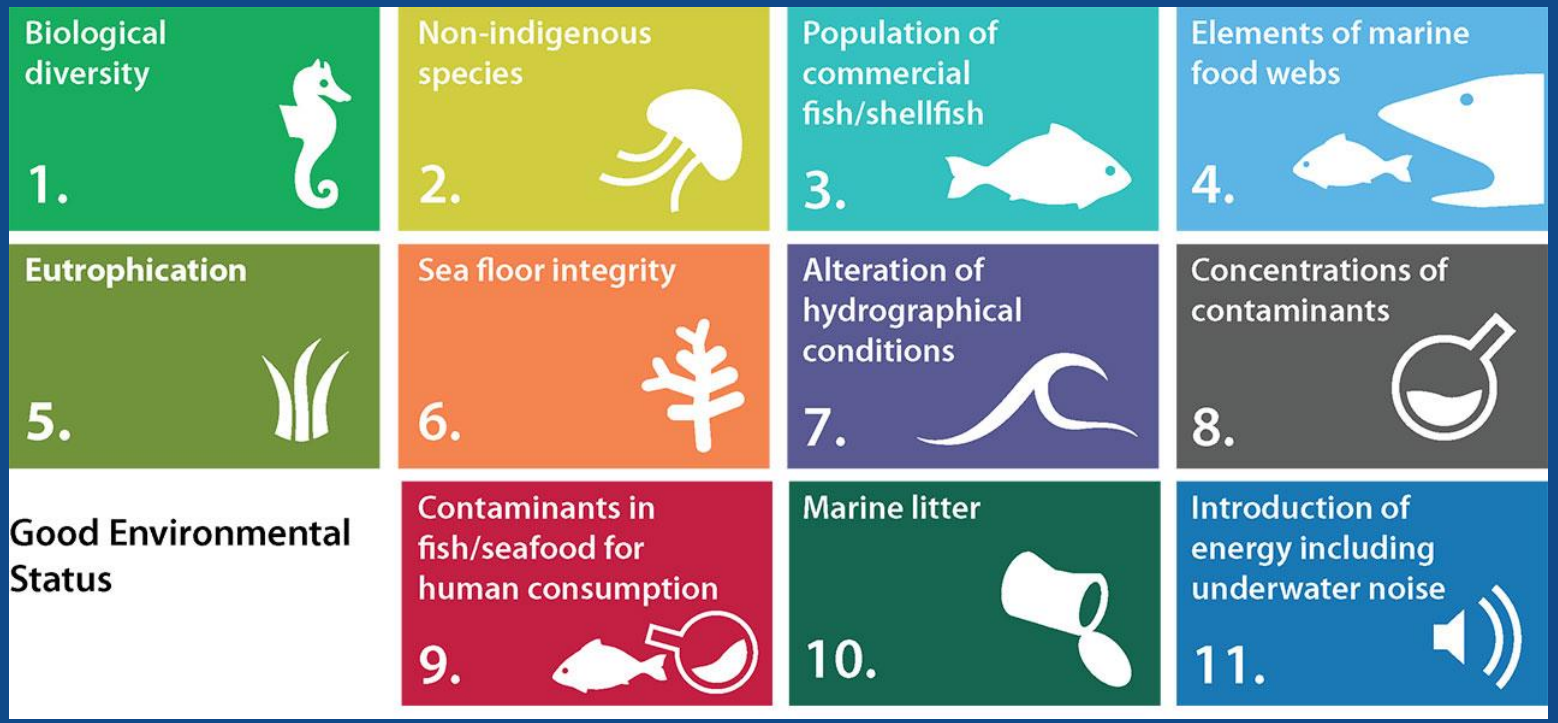
NEUTRAL & OBJECTIVE

- Doesn't show bias or favoritism toward any particular side, faction or person.
- Knows enough about the topic, terms, key issues and acronyms to guide the conversation.
- Withholds own personal opinions and judgment.

3 How close are we to integrating the EAFM main drivers into routine stock assessment models?

3 Marine Strategy Framework Directive (MSFD)

11 Descriptors:



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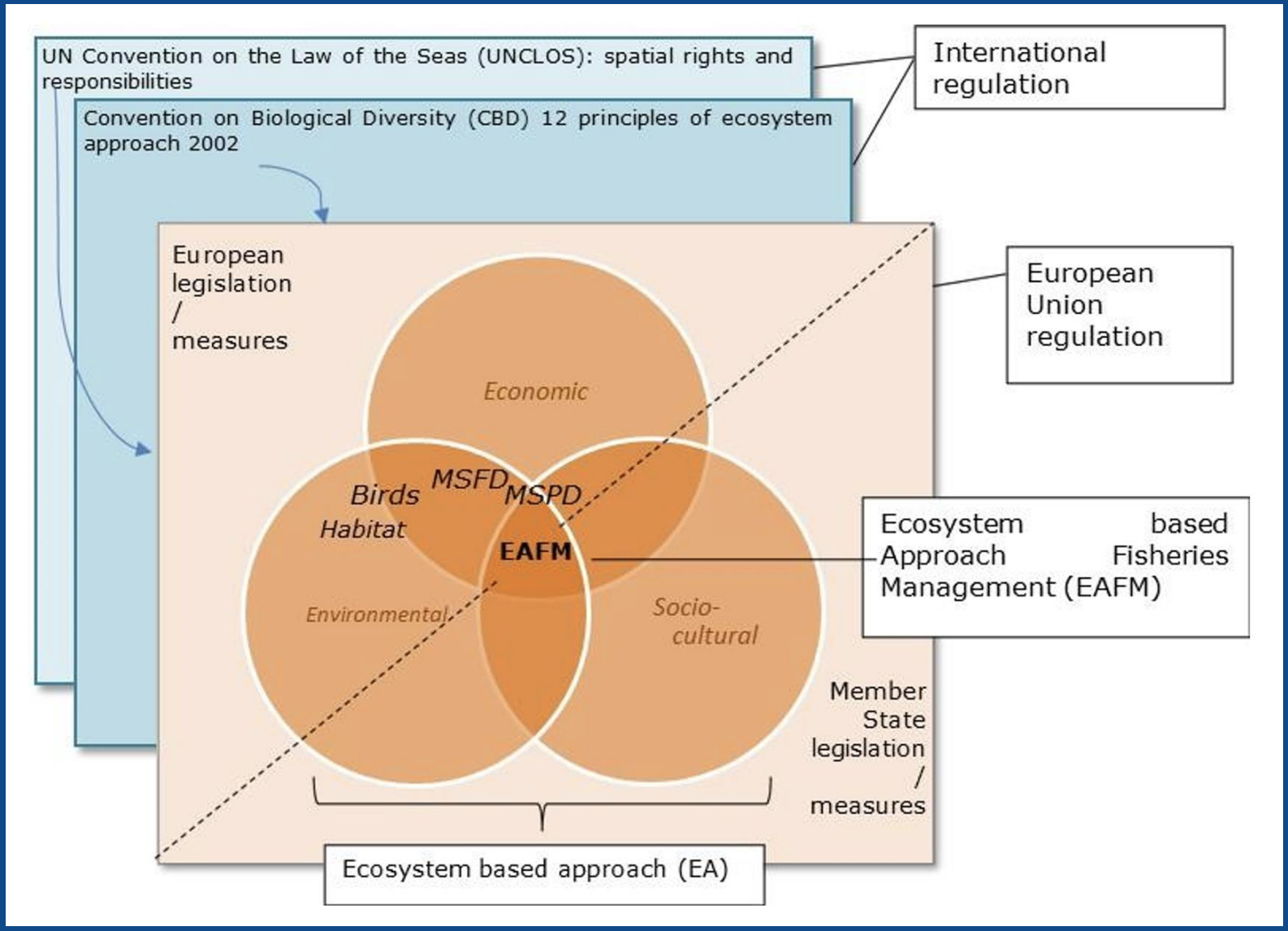

(from Piet et al. 2022)

Conclusion

FAO guidelines on the EAFM (FAO 2003):

- Focus of fisheries management is to provide food and income/livelihoods for humans.

- Ecosystem approaches need to accommodate the broader uses and users of the marine environment (including fishing).

- Ensure that future generations can also derive the full range of goods and services provided by the ecosystem.

Conclusion

Ecosystem management measures must satisfy both human and ecosystem needs.

Human beings are an integral part of ecosystems and not an entity outside the ecosystems with conflicting interests.

Acknowledgments:

Thank you