Towards Ecosystem Based Fisheries Management in the Sargasso Sea

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Strategic Action Programme

Conduct a multi-stakeholder assessment of an **E**cosystem-**B**ased approach to **F**isheries **M**anagement including a road-map for delivery

- What is EBFM?
- An Example from an RFMO:
  - ICCAT - International Commission for Conservation of Atlantic Tuna
- Who is doing it in Sargasso Sea?
  - NAFO - Northwest Atlantic Fisheries Organization.
- Feedback

Ecosystem-Based Fsheries Management

- A holistic way of managing fisheries and marine resources by taking into account the entire ecosystem of the species being managed.
- The goal is to maintain ecosystems in a healthy, productive, and resilient condition so they can provide the services humans want and need
- Facilitates trade-offs between different stakeholder priorities, balancing social and ecological needs
- Forecast pressures and impacts on both single and aggregated components of a marine ecosystem, and provides a better understanding of how ecosystems and their components respond to multiple stressors.

ICCAT - Towards EBFM

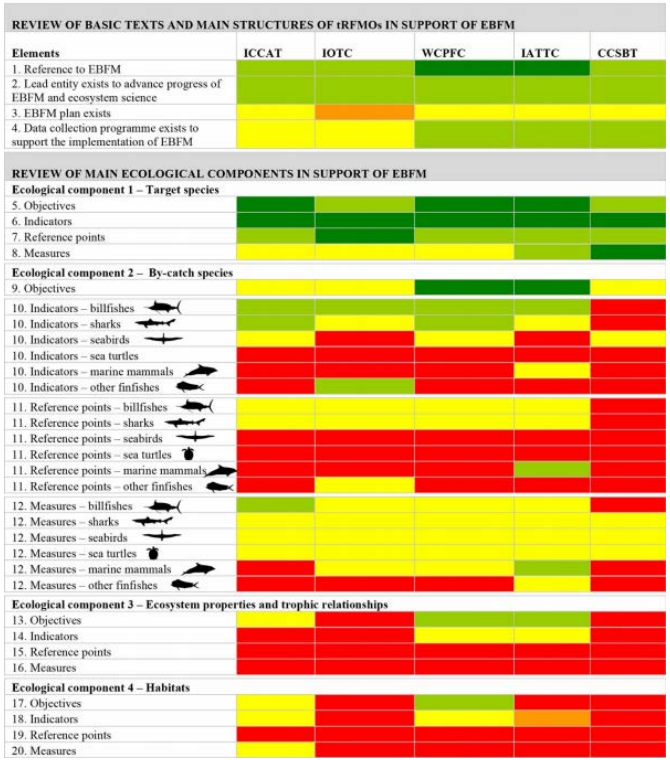
Actions under ***Science Strategic Plan 2015-2020***

- Workshops to review, evaluate, and develop EBFM relevant to tuna fisheries
- Support dialogue on Integrated Ecosystem Assessment approaches within and between RMFOs
- Take advantage of GEF/ABNJ funding to facilitate the process.
- Define the data collection requirements for the implementation of EBFM through application of Integrated ecosystem models to identify key ecosystem components which need to be monitored in order to more broadly apply EBFM.

ICCAT - Actions

- Monitoring
  - Inventory of by-catch species
  - Monitor and improve information on interactions e.g.
    - sea turtles, sea birds, sharks
- Research
  - Characterise the by-catch of non-target species and
  - Investigate the impact that changes in fishing gears or fishing technology have on the catch of target and non-target species
- Ecosystem Report Card
  - Developed using DPSIR (**D**river-**P**ressure-**S**tate-**I**mpact-**R**esponse) Framework
- Modelling
  - Develop ecosystem indicators
  - Develop models for mixed-fisheries, multi-species, by-catch and ecosystem processes

Tuna RFMOs – EBFM

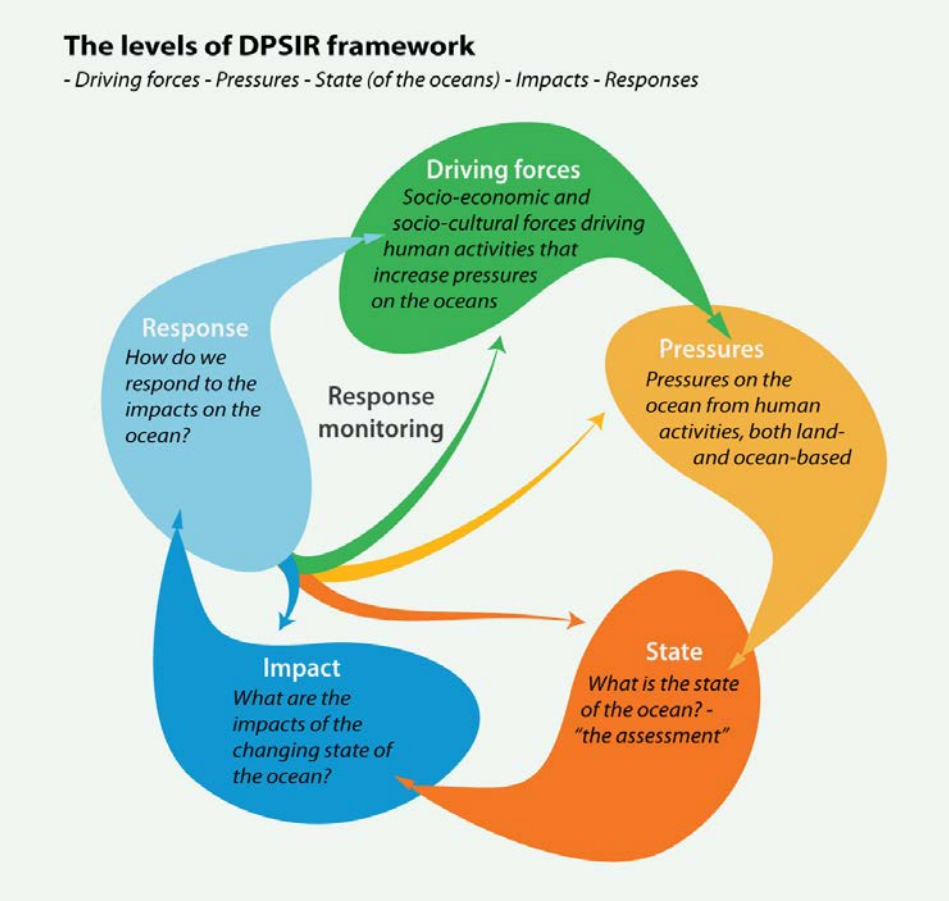


Progress made on reference points for main commercial stocks

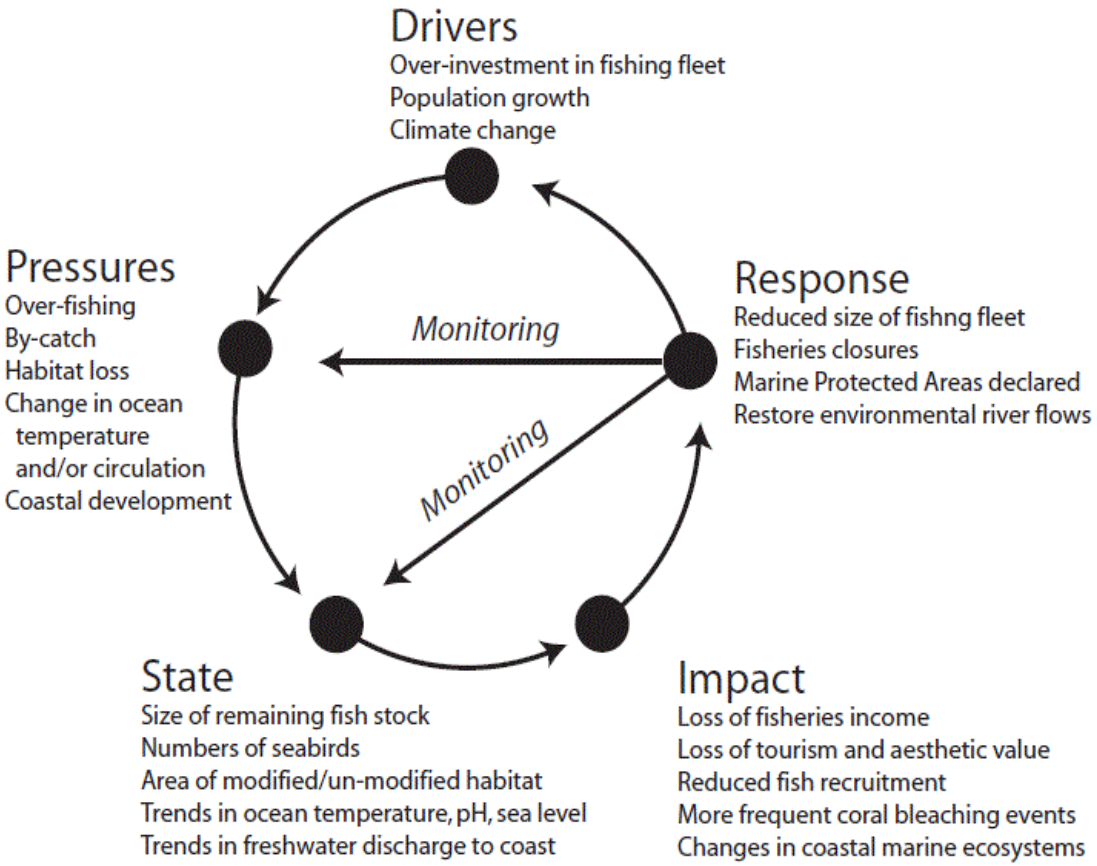
Work still required for By-Catch Species

More Work Required on Trophic Relationships and Habitats.

Driver-Pressure-State-Impact-Response



DPSIR - Fisheries



ICCAT - Sargasso Sea

- Sargasso Sea Commission (Kell and Luckhurst, 2018) used the DPSIR framework to show how the Ecosystem Report Card could be extended to develop a common understanding of how human activities affect the Sargasso Sea and the Atlantic ecosystem

- The Sargasso Sea provides an ideal case study for ICCAT to collaborate with other RFMOs and management bodies, who have responsibility for implementing EBFM within the Atlantic and adjacent regions.

NAFO – Northwest Atlantic Fisheries Organization

- RFMO active in northern Sargasso Sea at seamounts

- Building a Roadmap to implement an EAF (Ecosystem Approach to Fisheries)

- Core Principles: 1) Objective-driven
  2) Considers long-term ecosystem sustainability
  3) Place-based
  4) Consequences of trade-offs in managing human activities explicitly defined

Roadmap defines a recursive path where scientific information feeds into the management process

- Leads to adapting ecosystem objectives and/or management practices which generates a feedback loop into the science process where results are used to refine the process

- Roadmap intended to be adaptable by providing a basic structure and general principles on which to build an EAF

- Details evolve as the Roadmap is developed and implemented

- Developing and implementing EAF requires research but also developing trust amongst different players (scientists, managers, stakeholders)

Roadmap designed as a modular approach

- Information generated at each step can be used as it becomes available

- Modularity contributes to: 1) gradual transformation of management practices 2) development of a framework which can adapt to available resources and changing priorities

- Roadmap does not explicitly incorporate socio-economic and cultural elements into the EAF process but important to have mechanism for stakeholders to have input on these issues

Ecological foundation for Roadmap

- Considers ecosystems as nested, hierarchical structures that integrate biological, chemical and physical processes in different temporal and spatial scales

- Considers two elements: 1) Effects of ecosystem plus FISHING on target stocks 2) Effects of fishing on other ecosystem elements e.g. by-catch (turtles, sea birds, sharks)

- Defines sustainable harvest rates of target stocks using a 3-tier approach which sequentially considers sustainability at the ecosystem, multispecies and stock levels.

Roadmap – Principal components

- Goal-setting – Definition of ecosystem level objectives for fisheries
- Ecosystem State Assessment (Tier 1) – Definition of spatial management units
- Multispecies Assessment (Tier 2) – Descriptions of species interactions, food webs
- Stock Assessment (Tier 3) - Stock identification and status of stocks
- Stock Management - Reference points, Harvest control rules, MSE
- By-catch – Evaluation of by-catch of commercial and non-commercial species

Roadmap – Additional elements

- **Habitat Impact Assessment** – pertains mainly to benthic ecosystems e.g. Impact of trawling on seamounts

- **Risk Assessment** - Assess the likelihood of fisheries having significant adverse impacts on ecosystem structure and function

- **Monitoring** - Collection, analysis and interpretation of data pertaining to ecosystem status and human activities

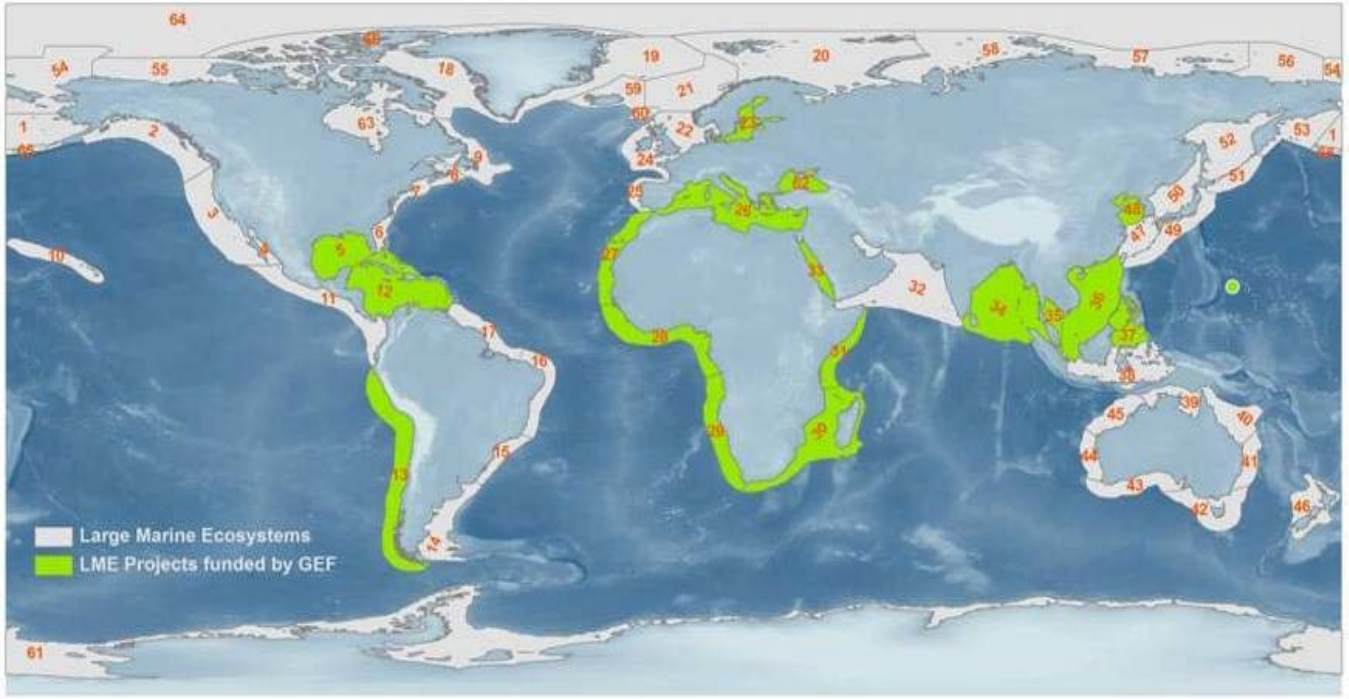
  - Use of available data to track the effectiveness of management measures

Roadmap – Lessons learned and challenges

1. An institutional vision is good but a practical and concrete template of how that vision translates into reality is much better.
2. Science is not the main roadblock for EAF implementation, governance is.
3. Keeping the science advice at arm's length of the management process is important but bringing scientists and managers together can be very effective.
4. Natural sciences are foundational for EAF but are not enough.
5. Short, highly connected organizational structures more effective.
6. Be pragmatic, A bird in the hand is worth two in the bush.
7. Implementing EAF is a marathon, not a sprint.
8. Effective communication is essential for EAF development.

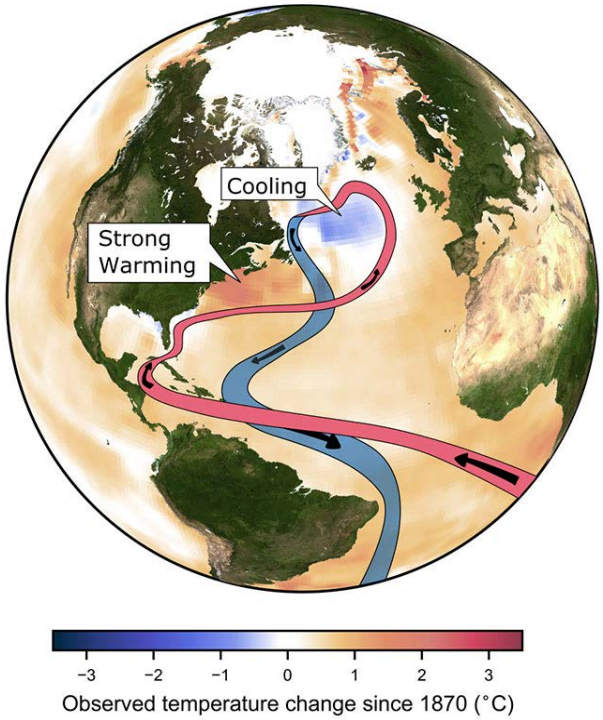
Large Marine Ecosystems (LMEs)

Sargasso Sea has no Boundary States, only Bermuda in the middle



Climate Change Impacts

Gulf Stream is slowing, North Atlantic is cooling. AMOC brings warm water north from the tropics and returns south with cold water. This oceanographic heat pump is weakening.



- Atlantic Meridional Overturning Circulation has slowed down by approx. 15% since 1950s.
- Weakness of AMOC is unprecedented in at least the last 1,000 years.
- Global warming is principal influence on AMOC
- Meltwater from Arctic sea ice and Greenland ice sheet is diluting the waters of the North Atlantic reducing salinity making water less dense and thus harder to sink

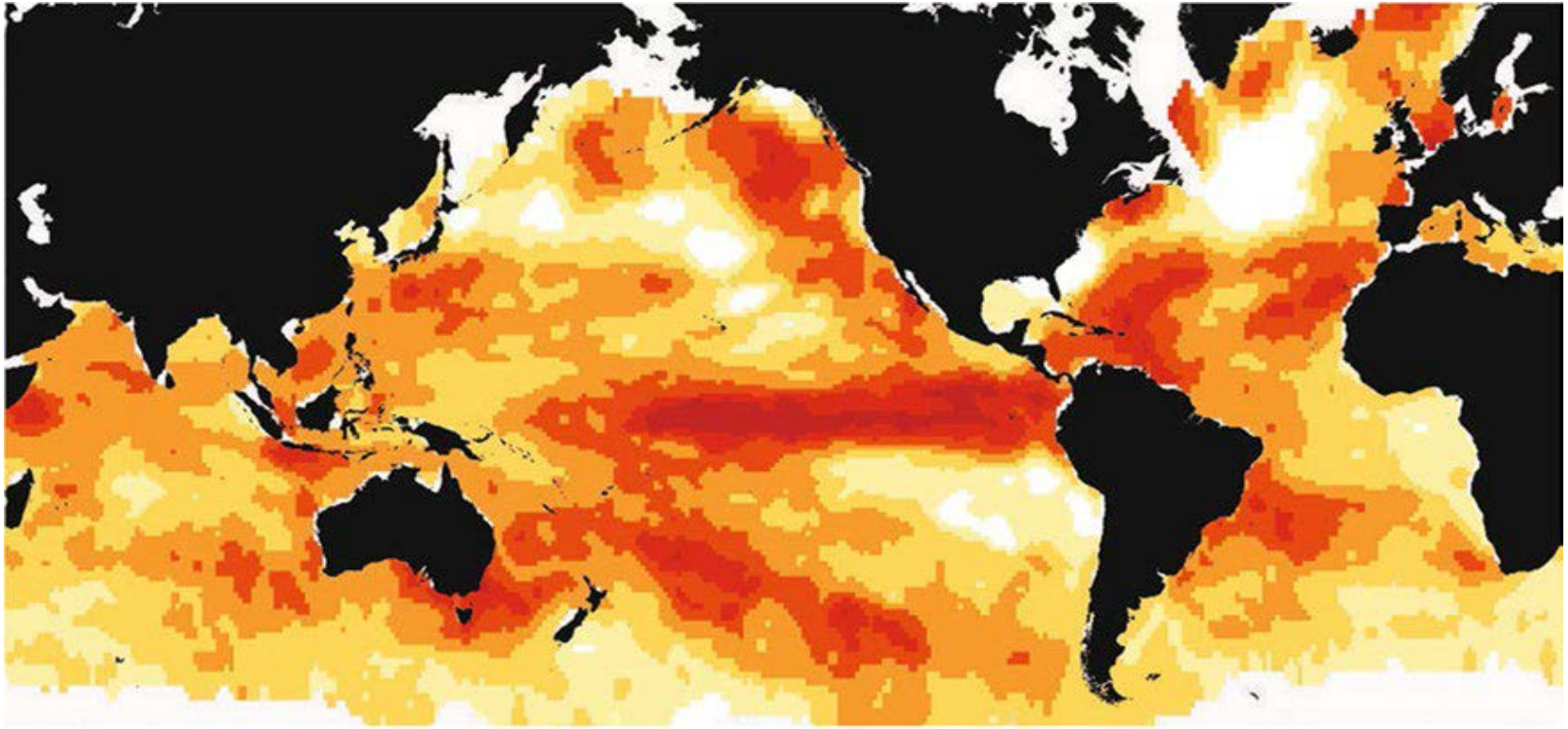
Marine heatwaves threaten global biodiversity and the provision of ecosystem services – Smale et al. Nature Climate Change (2019)

- **Global ocean has warmed substantially over the past century, with far-reaching implications for marine ecosystems.**
- **Concurrent with long-term persistent warming, discrete periods of extreme regional ocean warming (marine heatwaves, MHWs) have increased in frequency.**
- **Regional case studies have documented how MHWs can alter the structure and functioning of entire ecosystems by causing widespread mortality, species range shifts and community reconfiguration.**
- **By affecting ecosystem goods and services, such as FISHERIES landings and biogeochemical processes, MHWs can have major socio-economic and political ramifications.**

Impacts of MHWs on Services provided by marine ecosystems

Service	Ecosystem Service	Impact
Provisioning	Living Resources (Non food)	Extreme temps. cause mortality, local extinctions, range contraction
	Food	Changes in distribution,abundance of commercial fisheries species
Regulating	Carbon sequestration	Reduced sequestration due to high mortality of seagrasses
	Moderation of extreme events	Benthic habitat degradation
	Nutrient cycling	Decreased phytoplankton production
Habitat	Diverse habitats for spp.	Local extinctions, range contractions

Global pattern of MHW intensification – Globally averaged trend in # of annual MHW days. Note ENSO and Sargasso Sea.



Sargassum Influxes – Started in 2011

- The Atlantic Meridional Overturning Circulation (AMOC) has slowed down and has affected the North Brazil Current, the dominant feature of the North Brazil LME which is responsible for bringing episodic nutrient-enriched, lower salinity, South Atlantic water into the Caribbean.
- Sargassum influxes are disrupting fishing operations, fish landings and fisher livelihoods as well as tourism particularly in the eastern Caribbean
- Data shows changes in the abundance and distribution of flyingfish, Need to reassess limit and target reference points adopted by the Eastern Caribbean Flyingfish Management Plan.
- Also large numbers of small juvenile dolphinfish caught by pelagic fleets in the Lesser Antilles.
- Massive accumulation of Sargassum, also occurred recently on the coasts of several tropical countries in West Africa.

DPSIR – Feedback from respondents

- *“No framework leads to a single answer, rather all frameworks provide the information and knowledge to facilitate exploring the space for decision making and policy development”*

“DPSIR focused on Pressures and Impacts rather than goods and services, so ended up saying what is bad and not what is good.”

“Importance of co-production of knowledge, ways of working together across disciplines to create user-led, people-centred systems”

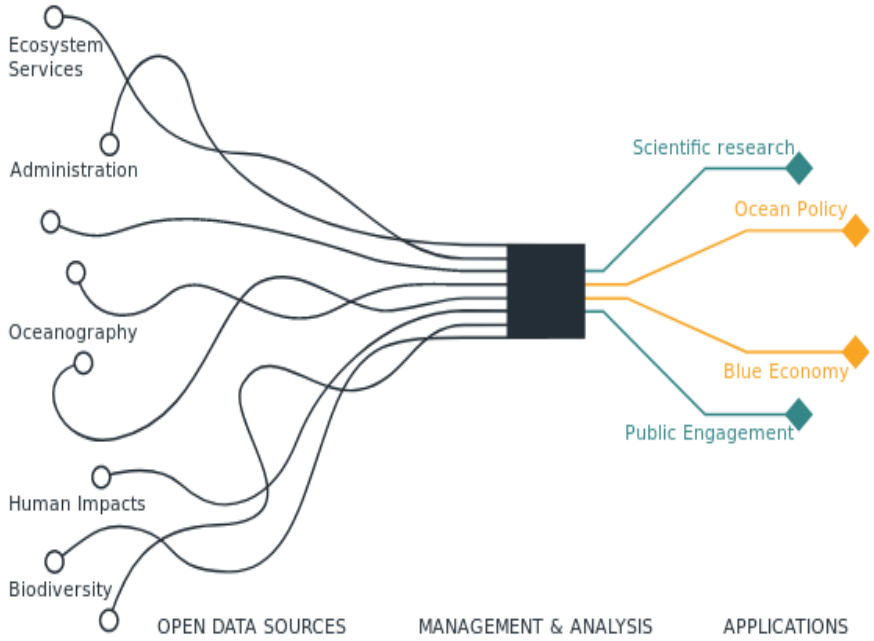
“ICCAT currently focused on bycatch and has limited capacity to look at ecosystem, so SSC an example for others to follow.”

“Implementing EBFM is a marathon, not a sprint, need to manage expectations, NAFO a good example”

“How to move from conceptual to operational objectives”

“Need for data, prognosis and cloud based tools”

***OcToPUS* - Ocean Tool for Public Understanding and Science**



An open source gateway to spatial and temporal data

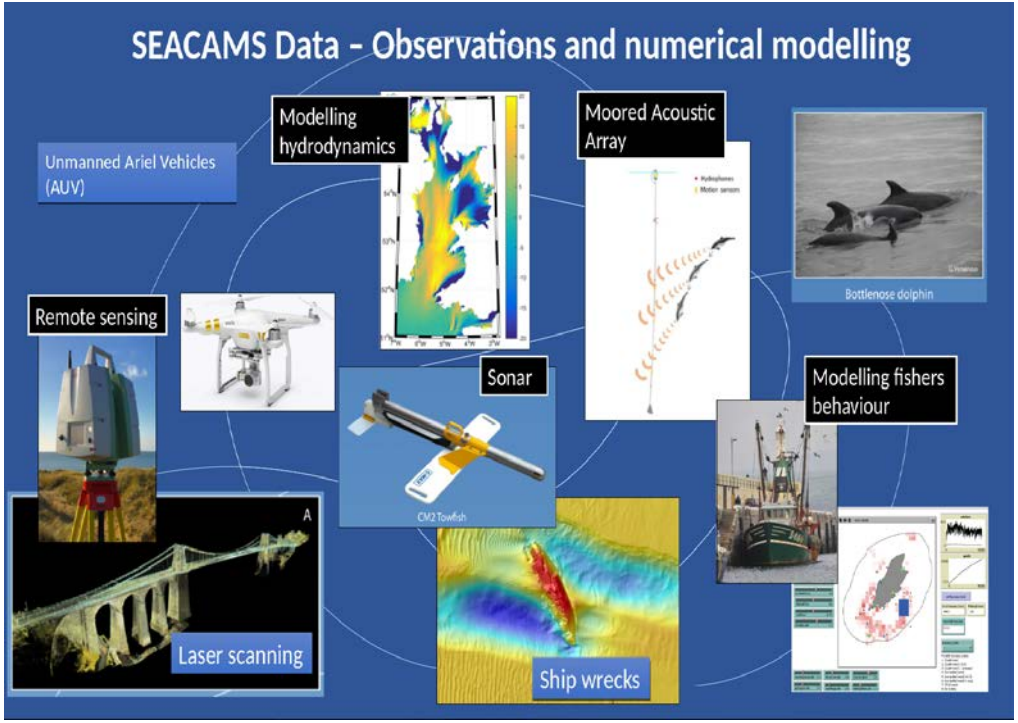
Intended to allow modelling of Human impacts

Current applications include

- Ocean Data Explorer
- Habitat Suitability Modeller

Looking to develop customised applications

iMarDIS - Integrated **Mar**ine **D**ata and **I**nformation **S**ystem

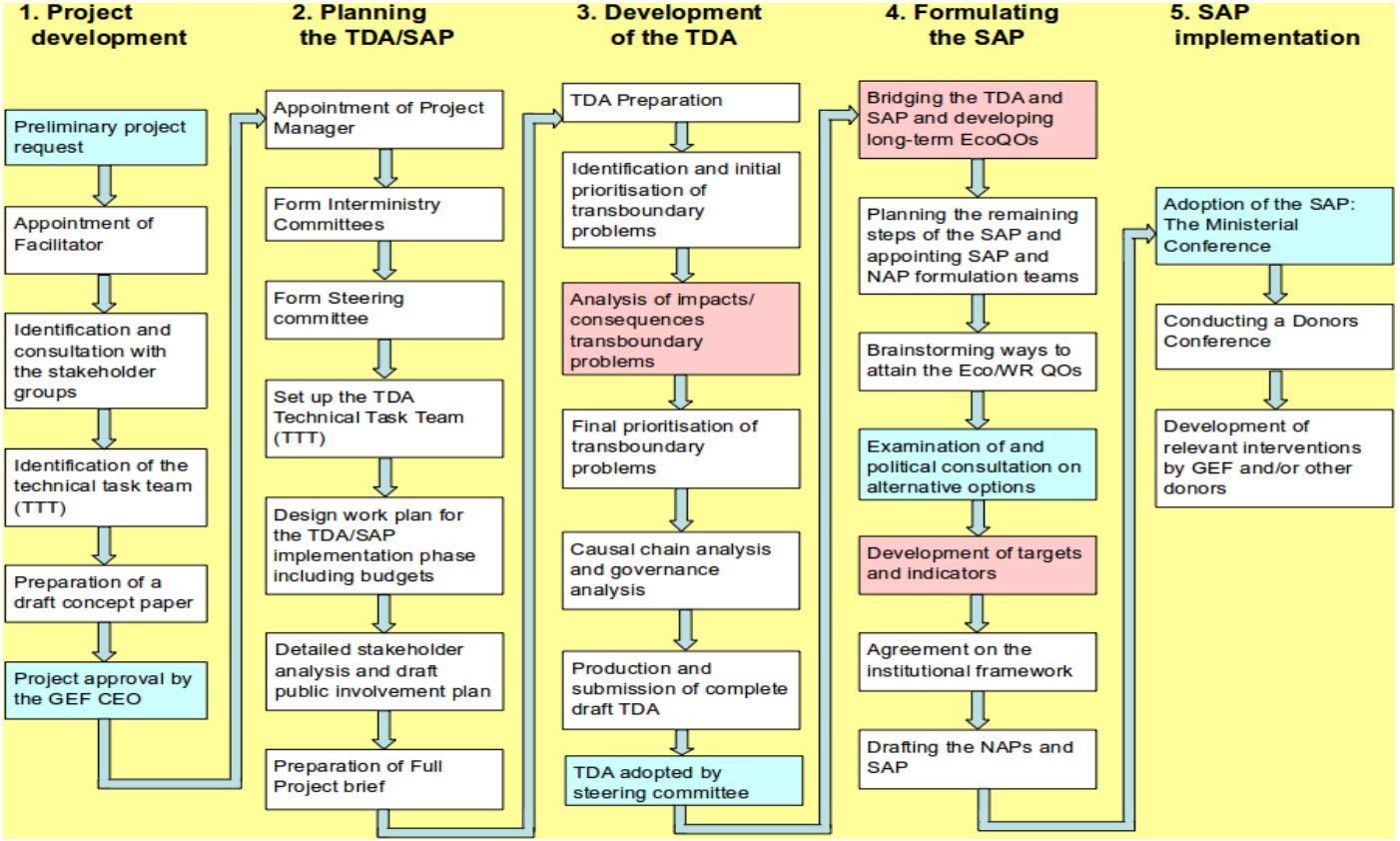


A Cloud based Solution, cheap and extendable that provides an ‘end to end’ approach

Provides

- Secure access to fisheries and environmental data
- State of the art analytics making innovative use of data to create better evidence.

SAP and TDA


1. Project development
Preliminary project request
Appointment of Facilitator
Identification and consultation with the stakeholder groups
Identification of the technical task team (TTT)
Preparation of a draft concept paper
Project approval by the GEF CEO
2. Planning the TDA/SAP
Appointment of Project Manager
Form Interministry Committees
Form Steering committee
Set up the TDA Technical Task Team (TTT)
Design work plan for the TDA/SAP implementation phase including budgets
Detailed stakeholder analysis and draft public involvement plan
Preparation of Full Project brief
3. Development of the TDA
TDA Preparation
Identification and initial prioritisation of transboundary problems
Analysis of impacts/ consequences transboundary problems
Final prioritisation of transboundary problems
Causal chain analysis and governance analysis
Production and submission of complete draft TDA
TDA adopted by steering committee
4. Formulating the SAP
Bridging the TDA and SAP and developing long-term EcoQOs
Planning the remaining steps of the SAP and appointing SAP and NAP formulation teams
Brainstorming ways to attain the Eco/WR QOs
Examination of and political consultation on alternative options
Development of targets and indicators
Agreement on the institutional framework
Drafting the NAPs and SAP
5. SAP implementation
Adoption of the SAP: The Ministerial Conference
Conducting a Donors Conference
Development of relevant interventions by GEF and/or other donors

How to

“*Conduct a multi-stakeholder assessment*”

and

“*Develop a road-map for delivery*”