Further enhancing the effectiveness of RFMO performance reviews: Possible roles of emerging BBNJ instrument

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14th Informal Consultation of States Parties to the UN Fish Stocks Agreement
Discussion Panel Segment 4
Friday AM 3 May 2019
Overview

- Rising challenges
- Common concerns
- Possible roles of the emerging UN instrument for marine biodiversity beyond national jurisdiction
- Bringing it all together
Rising CO$_2$ has created a deadly trio of stressors:

- Global Warming
- Declining Oxygen Levels
- Ocean Acidification

[Link](http://www.nereusprogram.org/policy-brief-bbnj-climate-change/)
Impacts of historical warming on marine fisheries production

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Climate change is altering habitats for marine fishes and invertebrates, but the net effect of these changes on potential food production is unknown. We used temperature-dependent population models to measure the influence of warming on the productivity of 235 populations of 124 species in 38 ecoregions. Some populations responded significantly positively (n = 9 populations) and others responded significantly negatively (n = 19 populations) to warming, with the direction and magnitude of the response explained by ecoregion, taxonomy, life history, and exploitation history. Hindcasts indicate that the maximum sustainable yield of the evaluated populations decreased by 4.1% from 1930 to 2010, with five ecoregions experiencing losses of 15 to 35%. Outcomes of fisheries management—including long-term food provisioning—will be improved by accounting for changing productivity in a warmer ocean.
Fig. 4. Percent change in mean MSY between the period from 1930 to 1939 and the period from 2001 to 2010 by ecoregion. Points are scaled to the MSY at average temperature, and the number of populations in each ecoregion is shown inside the point. Dashed lines indicate FAO major fishing areas. Aust., Australian; NZ, New Zealand; mt, metric tons.
Low oxygen zones are spreading around the globe

Red and blue = O2 @ 2 milligrams per liter or less

Deoxygenation affects nearly all biogeochemical and biological processes in the ocean, including structure, function and ecosystem services.

(Credit: GO2NE working group. Data from World Ocean Atlas 2013 and provided by R. J. Diaz)

Common Concerns

Quick guide to the
Aichi Biodiversity Targets
Sustainable management of marine living resources

By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Overexploitation is a severe pressure on marine ecosystems globally, and has led to the loss of biodiversity and ecosystem structure. Harvests of global marine capture fisheries have been reduced from the unsustainable levels of a decade and more ago. However, overfishing still occurs in many areas, and fisheries could contribute more to the global economy and food security with more universal commitment to sustainable management policies. This target should be regarded as a step towards ensuring that all marine resources are harvested sustainably.

Moving towards an ecosystem-based approach in a changing ocean
Report card on ecosystem-based fisheries management in tuna regional fisheries management organizations

Maria José Juan-Jordá | Hilario Murua | Haritz Arrizabalaga | Nicholas K Dulvy | Victor Restrepo

Figure 3: A conceptual ecological model for a best case tRFMO based on the Driver-Pressure-State-Ecosystem services-Response (DPSER) framework (Kelble et al., 2013)

Figure 6: Progress of tRFMOs in implementing each of the ecological components of EBFM against the best case tRFMO.
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Conference of Parties

- Discuss shared challenges
- Look at how competent bodies, including RFMOs, could improve implementation of biodiversity objectives
- Develop and implement joint solutions
- Proactively protect marine biodiversity and reduce cumulative and sector-related impacts
Global scientific advisory body

- Enhance multi-disciplinary and cross-sectoral cooperation
  - share data and knowledge
  - build research capacity
  - develop and transfer technologies.

- Ensure equal access to tools and technologies
  - understand, predict and respond
  - impacts of global ocean change on marine biodiversity and ecosystems
Areas of particular interest to ecologists:

- Characterize the ecological **composition and distribution** of BBNJ
- Identify natural and anthropogenic stressors on BBNJ
- Identify and address spatial or taxonomic gaps

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[Slide courtesy G.O Crespo]
Editorial: Seasonal-to-Decadal Prediction of Marine Ecosystems: Opportunities, Approaches, and Applications

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Keywords: marine, forecasting, prediction, fish, fisheries, seasonal to decadal prediction, climate

A quiet revolution is taking place in marine science. Like a caterpillar entering its chrysalis, marine biology is metamorphosing into something new. Leaving its empirical origins behind, the first signs of the predictive skill that characterizes sciences such as physics and chemistry are now also emerging in biology. Climate scientists and oceanographers, taking advantage of the tremendous advances in observational technology, scientific understanding, and computing power in recent years, can now make skillful forecasts of the state of the ocean seasons, years, and in some cases up to a decade into the future (Doblas-Reyes et al., 2013; Meehl et al., 2014). Such forecasts are an exciting opportunity for marine ecologists and fisheries scientists, who finally may be able to realize the dream of predictive skill present at the very birth of their field (e.g., Helland-Hansen and Nansen, 1909). The first such pioneering products have already been operational for some years now (e.g., Hobday et al., 2011; Eveson et al., 2015), and a second wave of products, inspired by the successes of the first, is now building. A revolution is indeed, underway.
Bringing it all together

Shared principles and obligations

Global Conference of Parties

Global scientific advisory body

→ foster greater resilience in a face of accelerating climate risks

→ support long-term conservation and sustainable use
Not the End

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Additional information
### RESOLUTION BY ICCAT ON ECOSYSTEMS THAT ARE IMPORTANT AND UNIQUE FOR ICCAT SPECIES

**RECALLING** the Resolution by ICCAT on Pelagic Sargassum [Res. 05-11] which called upon the Standing Committee on Research and Statistics (SCRS) to examine the available and accessible information and data on the status of pelagic Sargassum and its ecological importance to tuna and tuna-like species;

**ALSO RECALLING** the Resolution by ICCAT on the Sargasso Sea [Res. 12-12] which called upon the Standing Committee on Research and Statistics (SCRS) to examine the available data and information concerning the Sargasso Sea and its ecological importance to tuna and tuna-like species and ecologically associated species;

**RECOGNISING** that a report on the findings of this work was presented to the Commission in 2015;

**ALSO RECOGNIZING** that, in its 2015 report, the SCRS noted that the Sargasso Sea is an important and unique ecosystem for some ICCAT species, and at the same time it was acknowledged that there are other ecosystems in the Atlantic Ocean that are also important and unique for ICCAT species;

**FURTHER RECOGNIZING** that in 2013 the SCRS noted that the basic biological and ecological data provided for the Sargasso Sea offers a useful foundation for adopting this region as a basis for a case study in Implementing the Ecosystem Based Fisheries Management (EBFM) approach within ICCAT;

**NOTING** that the United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks calls for the protection of biodiversity in the marine environment and refers to the need to take ecosystem considerations into account;

**RECALLING** the Resolution by ICCAT Concerning the Application of an Ecosystem Approach to Fisheries Management [Res. 15-11] which called upon the Commission to apply an ecosystem-based approach to fisheries management when making recommendations pursuant to Article VIII of the Convention;

**THE INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS RESOLVES THAT:**

1. **As part of advancing the work of Ecosystem Based Fisheries Management**, the SCRS will examine the available information on the trophic ecology of pelagic ecosystems that are important and unique for ICCAT species in the Convention area.

   - The SCRS will provide an update on the progress of this work in 2018 and report back to the Commission with available findings in 2019, if possible.

2. **2011**

3. **2012**

4. **2013**

5. **1995**

6. **2015**

7. **2019?**
Overall, tRFMOs have made considerable progress monitoring the impacts of fisheries on target species, moderate progress for bycatch species, and little progress for ecosystem properties and trophic relationships and habitats. The tRFMOs appear to be halfway towards implementing the ecological component of EBFM, yet it is clear that the “low-hanging fruit” has been plucked and the more difficult, but surmountable, issues remain, notably the sustainable management of bycatch. All tRFMOs share the same challenge of developing a formal mechanism to better integrate ecosystem science and advice into management decisions. We hope to further discussion across the tRFMOs to inform the development of operational EBFM plans.
Deep-ocean climate change impacts on habitat, fish and fisheries