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Tools for Ecosystem approach to purse seine fishery management

Depletion of fish stocks worldwide signal a failure of conventional fisheries management practices and ineffective governance. Therefore, the scientific community and Common Fisheries Policy (CFP), emphasise the necessity to integrate environmental concerns and move towards a more holistic ecosystem approach to fisheries management (EAFM). Key characteristics of this approach include multispecies consideration, trophic interactions, socio-economic dimension, and impact on habitat and ecosystem. Consideration of EAFM, in Portuguese continental waters is especially important, taking into consideration, severe decline in sardine biomass, observed in the Iberian waters in the last decade. As a result, a framework that demonstrates the utility of GIS to support fisheries management in the context of an ecosystem approach, has been developed. Design of the framework includes five scenarios that enable not only to identify the areas that are of highest importance to conservation but also, to address multiple conflicting objectives and imply trade-offs between conservation and fisheries objectives. The analyses indicate that some areas are suitable for conservation in several scenarios, such as the area near Aveiro and the area near the Tejo estuary. However, conservation measures implemented in the area near Aveiro would imply higher economic trade-offs when compared with the actions applied in the region near the Tejo estuary. Results also suggested some of the conservation objectives, such as the protection of sardine eggs and juveniles, to not be compatible. Moreover, a time-dynamic ecosystem model (Ecosim) representing Portuguese continental Shelf ecosystem (PCSE) was developed in order to explore the drivers needed to simulate the observed food-web dynamics between 1986 and 2017. The preliminary results, showed that the main drivers that explain ecosystem dynamic in the studied period, are trophic interactions considered with fishing followed by environmental factors. When considering only sardine dynamic, the main contributors to its changes are trophic interactions and fishing. The development of both methods, GIS framework that can address conflicting objectives during conservation sites selection process, and dynamic ecosystem models that improve an understanding of the complex ecosystem dynamics and its drivers, demonstrate their importance as useful tools supporting EAFM in Portuguese waters.
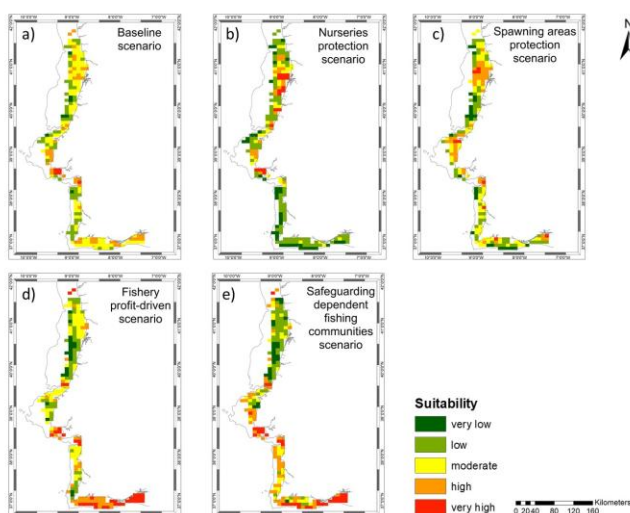
About the presenter:
Dorota Szalaj, with MSc in Oceanography from University of Gdansk (2011, Poland) and MSc in Water and Coastal Management from University of Cadiz (2015, Spain), currently is doing a PhD at Faculty of Sciences at the University of Lisbon. Her project deals with the development of tools and methods that can assist sardine fishery management in Portuguese continental waters, considering Ecosystem Approach. During her PhD she is working with GIS tools to designate MPA for sardine conservation and with Ecosystem models to better understand sardine dynamics and support sardine fishery management.
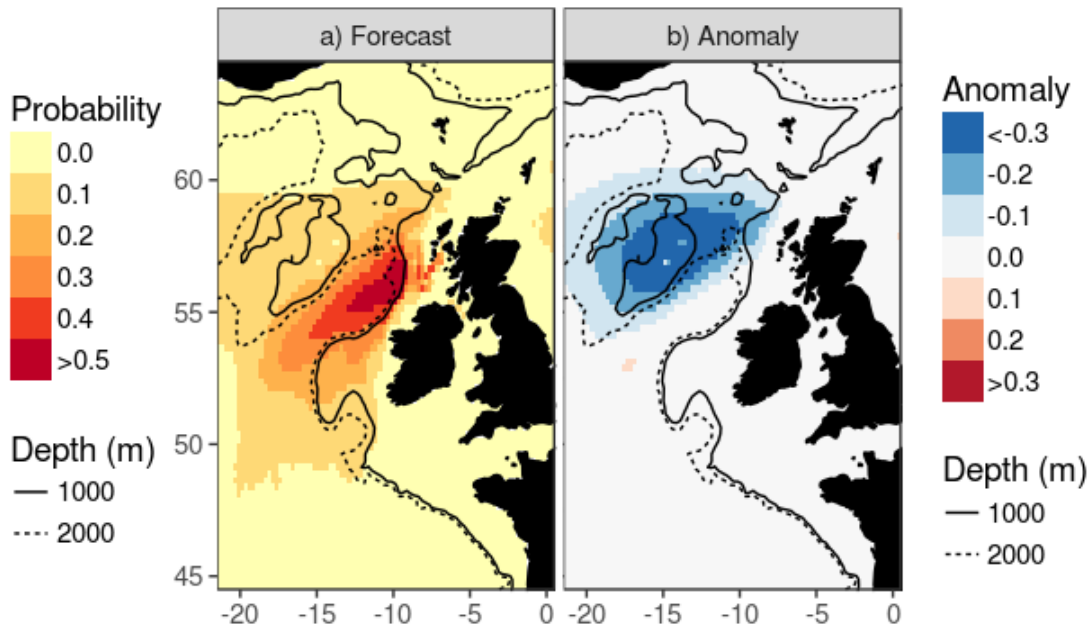
Figure 2. Example of an ecological forecast product, showing the forecast spawning distribution for blue whiting (*Micromesistius poutassou*) in March 2018. Distribution is represented here as the probability of observing blue whiting larvae and is plotted as a) the value and b) the anomaly relative to the climatological probability (1960-2010).

About the presenter:

Mark R. Payne is an Associate Professor at the Technical University of Denmark (DTU-Aqua) in Copenhagen, Denmark, whose research examines the impacts of climate change and climate variability on life in the ocean. His work is pioneering the development of Climate Services for monitoring and managing life in the ocean in Europe and involves coupling biological knowledge to climate models to produce predictions that are of direct relevance to end-users. Payne has published over 40 articles in a wide range of scientific journals including Nature and Proceedings of the National Academy of Sciences, and is the leader the Climate Services work package within the EU project "Blue Action".