



How Science can Improve Marine Ecosystem Predictions: the BlueBRIDGE Case

by Sara Garavelli

BlueBRIDGE - Building Research environments fostering innovation, decision making, governance and education - is a European project aimed at providing innovative data services to scientists, researchers and data managers to address key challenges related to sustainable growth in the marine and maritime sectors.

Imagine yourself wanting to build a wonderful new three storey house in the countryside. You go to the local authorities and they say that unfortunately you can only have two storeys, due to birds nesting nearby and having a higher building will affect their habitat. Or imagine that a local council wants to move a flood defence system seaward but it's not possible because the beach and environment in the surrounding areas will be damaged. Human decisions are highly influenced by ecosystems.

A central problem in ecology is determining the processes that shape the complex networks known as food webs formed by species and their feeding relationships. The topology of these networks is a major determinant of ecosystems' dynamics and is ultimately responsible for their responses to human impacts.

A real example is documented by the Vancouver harbour case. The Robert Bank Terminal 2 (RBT2), Vancouver, BC, project proposed to increase the size of the port, adapting to the increase in demand for container shipping traffic which is expected to triple by 2030. To understand the impact of this change on the ecosystem, the project leaders enlisted help from food web models, in particular of the Ecopath with Ecosim (EwE) model.

Jeroen Steenbeek, Head Technical Committee at Ecopath Research and Development Consortium, explains that "Making predictions of the future state of the marine ecosystem of the Vancouver port was an exciting experience because we were able to see how ecosystem models could impact real world decisions. Single-species fisheries models, which are usually adopted for management evaluation, must be complemented as they are unable to capture interactions between species and information on their spatial distribution. The ecosystem modelling approach of EwE offers a means to incorporate interactions and spatial constraints into a useful tool for ecosystem-based fisheries management".

"Through the EwE models available via the software provided by the Ecopath Consortium the project leaders of the Vancouver port were able to understand in advance the impact of the extension of the port on the marine resource dynamics", continues Steenbeek, "EwE in fact has shown that the building of the extension to the port may not be that environmentally impactful and that not all of the counter measures foreseen by the initial project may be needed".

EwE has proved how useful it can be displaying its potential in the research toward the impacts of climate change and human activities on marine ecosystems. However, today there are still a set of technical limitations that prevent a wider adoption of the EwE approach. The key for good predictions are, in addition to thorough understanding of a marine ecosystem, good data. Different data in different formats, which correspond to a majority of the situations in which the users of EwE work, requires a huge effort and resources just too initially set up the simulation models. In addition, running ecosystem simulation models requires large computational resources to which nor everyone has access.

That's why the Ecopath Consortium has joined the BlueBRIDGE project. BlueBRIDGE - Building Research environments fostering innovation, decision making, governance and education - is the newly funded H2020 project aimed at providing innovative data services to scientists, researchers and data managers to address key challenges related to sustainable growth in the marine and maritime sectors referred to as the "Blue Growth long term strategy".

BlueBRIDGE can support the process of Ecopath model creation by making available for Ecopath a seamless access to different species, fisheries and environmental data sources.

In the doing this, users of Ecopath do not need to worry about data harmonization or conversion and can focus on the ecosystem modelling, which inevitably speeds up their research. In addition, the BlueBRIDGE underlying infrastructure D4Science, can equip Ecopath with cloud capabilities on which they can run their model (at the moment EwE is only available via a desktop version). BlueBRIDGE can enhance the EwE capabilities and expand its usage to a wider audience, contributing to the creation of more powerful and accurate instruments for the prediction of human activities on seas and ecosystems. The results of the BlueBRIDGE and EwE collaboration will be available for all the researchers worldwide. Keep your eye on BlueBRIDGE!

The project is coordinated by ISTI-CNR, the ERCIM Office contributes with expertise for administrative and financial management.

Links:

<http://www.bluebridge-vres.eu>

[@BlueBridgeVREs](#)

<http://www.ecopath.org>

<http://www.d4science.org>

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