EURO-BASIN
BASIN SCALE ANALYSIS, SYNTHESIS AND INTEGRATION

SEVENTH FRAMEWORK PROGRAMME THEME 7 Environment

Collaborative project (Large-scale Integrating Project)

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Project Acronym: EURO-BASIN

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Deliverable 7.7 A user-friendly integrated model allowing users to build their own scenarios & evaluate consequences

Contributors: Christian Mullon, IRD

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Organisation name of the lead contractor of this deliverable:

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Project Coordinator: Michael St John, DTU Aqua

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Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including the Commission)	X
RE	Restricted to a group specified by the consortium (including the Commission)	
CO	Confidential, only for members of the consortium (including the Commission)	

Deliverable 7.7 A user-friendly integrated model allowing users to build their own scenarios & evaluate consequences is a contribution to
Task 7.2 Predict the distribution and production of key fish stocks based on climate change projections
Task 7.3 Develop a bio-economic model of fish commodities in the North Atlantic
Responsible: Christian Mullon
Start month 1, end month 36

1. Executive Summary:

The goal of WP7.3 is to develop and run a model according to hypotheses examining the effects of global change on primary production (productivity), ecosystem functioning (changes in the structure of the mixed layer, trophic pathways) and the effects of economic globalization (changes in demand, costs). A special focus is put on the communication between scientists and other stakeholders that is provided by an integrated model.
We deliver here a user-friendly interface that has been developed to allow the definition of scenarios, their running and the visualization of resulting dynamics.

This interface is accessible on a web page of the EuroBasin site.
http://eurobasin.dtuaqua.dk/eurobasin/documents/deliverables/D7.7/CDF/BASIN.html
The user can define a scenario by choosing an IPCC scenario: A1B, RCP2, RCP8 and by giving a value to the 16 control parameters of the model. These parameters are related to demand for fish, fishing efficiency, fishing costs, subsidies to aquaculture, etc.
Then the algorithm is run: it takes a few minutes.

Finally, the user can observe resulting dynamics of biomass, catches, fishing capacity, farming, consumption and trade.

2. Relevance to the project and potential policy impact

Recall that typical scenarios for the future of the North East Atlantic basin have been defined during the workshop that was the object of deliverable 7.5. At this workshop, were present scientists from WP5 and WP8. The running and the analysis of these scenarios were the object of deliverable 7.6.

The conclusions of this analysis are (1) the importance of the economic framework on fisheries and the importance of fisheries on exploited stocks, (2) the importance of the interplay between aquaculture and fisheries, (3) the necessity of taking account of the variability of fleets profit.

Now that the user-friendly interface is available, we intend to organize new workshops with different stakeholders. We expect that network formalism may contribute to more widely open discussions. By this way we intend to help putting interest on an integrated view of the North Atlantic basin, and its dynamics during the next decades.

The user-friendly interface will now contribute to WP8 (1) for the evaluation of the economic

consequences of combined effects of climate change on ecosystems and fish stocks as well as fisheries management measures and (2) for defining future monitoring and assessment systems and procedures that provide the scientific advice for fisheries management for a basin system under the double exposure of climate change and economic globalization.

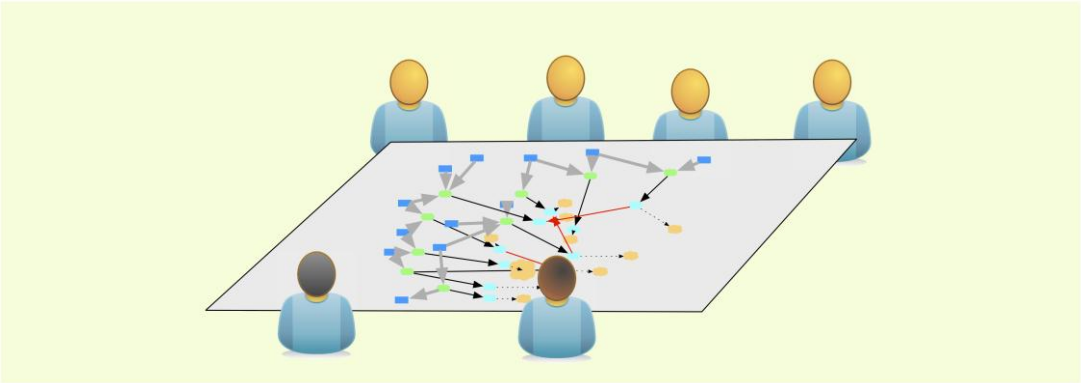

Figure 1: Discussions about the future of the North East Atlantic basin using network formalism.

3. Report:

Introduction: scenarios, modeling, communication

The objectives of WP7.3 were building a model (1) coupling ecological features and economic features (deliverable 7.6), (2) allowing scenarios (deliverable 7.6), (3) allowing communication between scientists and other stakeholders that is provided by an integrated model. Thus, a special interface should allow one of these to observe the consequences of his scenarios. This last part is the object of present deliverable.

Model structure, calibration and parameterization

Main features of this model are as follows. (1) This is a bio-economic model; representing stock dynamics, farming, fisheries, fish trade and fish markets. (2) It represents an oceanic basin under the double exposure to climate change and economic globalization. (3) It uses network formalism. It represents the system as a network of which nodes are fish stocks, fleets, transformation industries, trade systems and fish markets. (4) Its dynamics consist in the coupling of a market equilibrium process and production (stocks) or investment functions

User's interface

User's interface is shown in figure 2. Opening the views on the left part of the screen allows the user to control the building, the running and the analysis of scenarios.

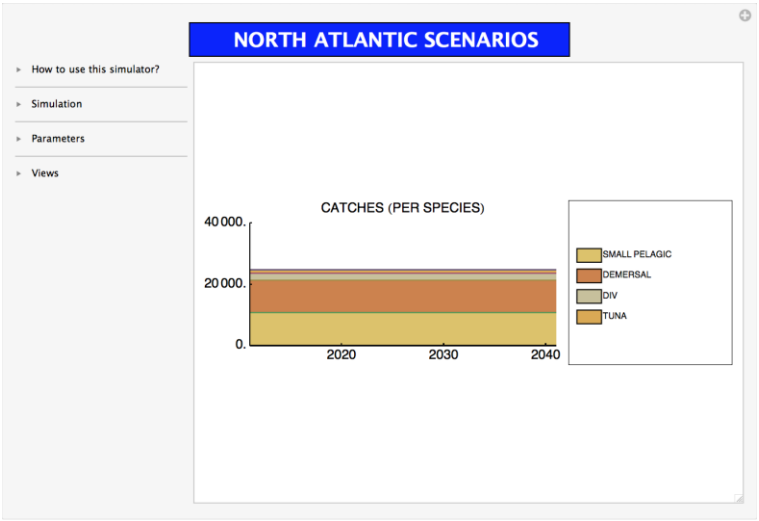

Figure 2. A screen shot of the interface.

Here is a list of control parameters. Climate scenarios, Change of European demand, Change of extra European demand, Change catch limitations (MSY), Change of fishing efficiency, Change of farming efficiency, Subsidies to farming capacity, Change of trade costs, Change of fishing costs, Change of import costs, Change of export costs.

Here is a list of the views the user can get once the algorithm has been run. Stocks (per area), Stocks (per species), Stock status (per area), Catches (per area), Catches (per species), Catches (per fleet), Catches limitation (per area), Fishing capacity (per species), Fishing capacity (per country), Fisheries income (per species), Fisheries income (per country), Farm production (per species), Farm production (per country), Fish production price (per commodity), Fish production price (per country), Fish consumption price (per commodity), Fish consumption price (per country), Trade intra EU, Import EU, Export EU, Fish consumption (per commodity) , Fish consumption (per country) Figures 3 and 4 shows two views about the dynamics resulting from a scenario. These are part the numerous possible views that have been enumerated before.

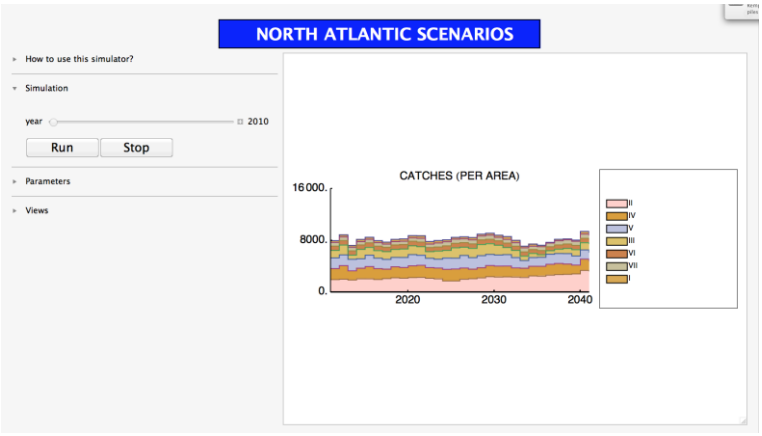

Figure 3. A view on the results of a scenario. Plot of a series.

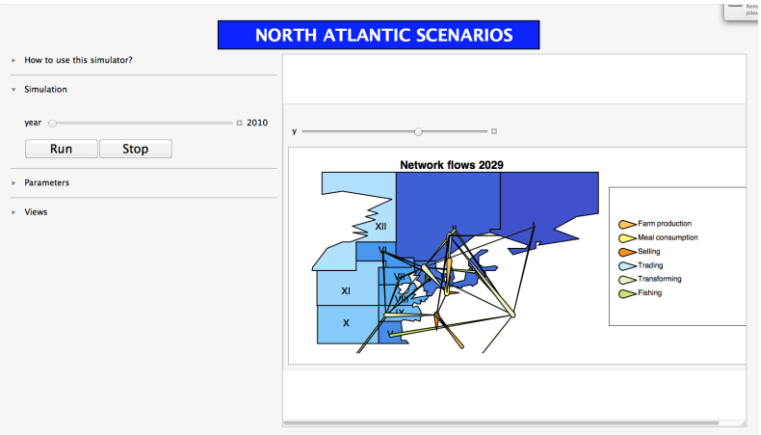

Figure 4. A view on the results of a scenario. Dynamic map of the flows of the network.

Specifications

This interface has been developed using Mathematica and the CDF facility.

Manual

- Load web page:

http://eurobasin.dtuaqua.dk/eurobasin/documents/deliverables/D7.7/CDF/BASIN.html

- The first time you download this page, you are asked for installing the Mathematica CDF player. Accept and follow the instructions. It takes about 10 minutes.
- The next times, downloading the code of the simulator takes less than a minute.
- To build a scenario, select values for control parameters.
- Running a scenario takes about 5 minutes. While running a scenario, you may observe the progress on the selected view.
- Sometimes, according to the chosen values for control parameters, the algorithm fails to find network equilibrium. In this case, plots represent the system at ulterior steps at the last equilibrium value that has been computed.

Planned/submitted publications

This work has been presented at the conference of the International Environment Modelling and Software Society at San Diego in June 2014. It has been published in the proceedings of this conference.

C. Mullon, G. Merino, J. Fernandez, W. Cheung and M. Barange. 2014. *A modeling framework for oceanic basins under double exposure*. International Environmental Modelling and Software Society (iEMSs). 7th International Congress on Env. Modelling and Software, San Diego, California, USA. D. P. Ames, N. W. T. Quinn, and A. Rizzoli (Eds.). http://www.iemss.org/society/index.php/iemss-2014-proceedings.