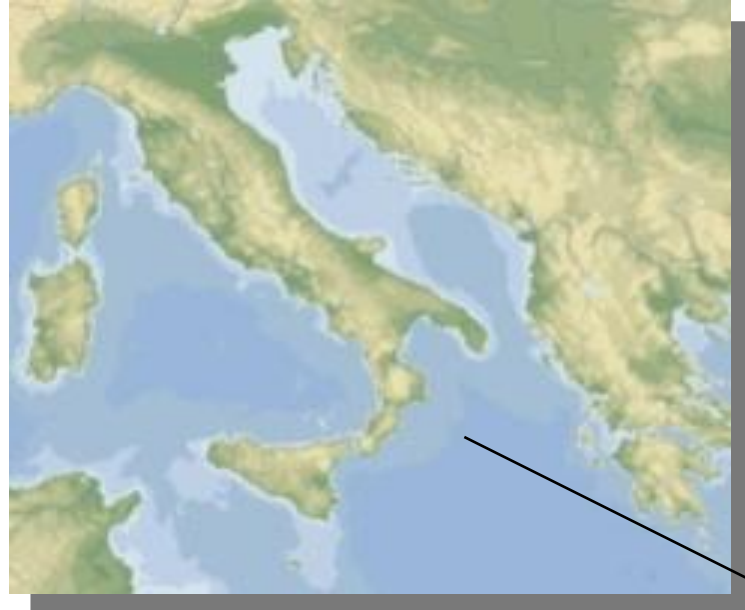


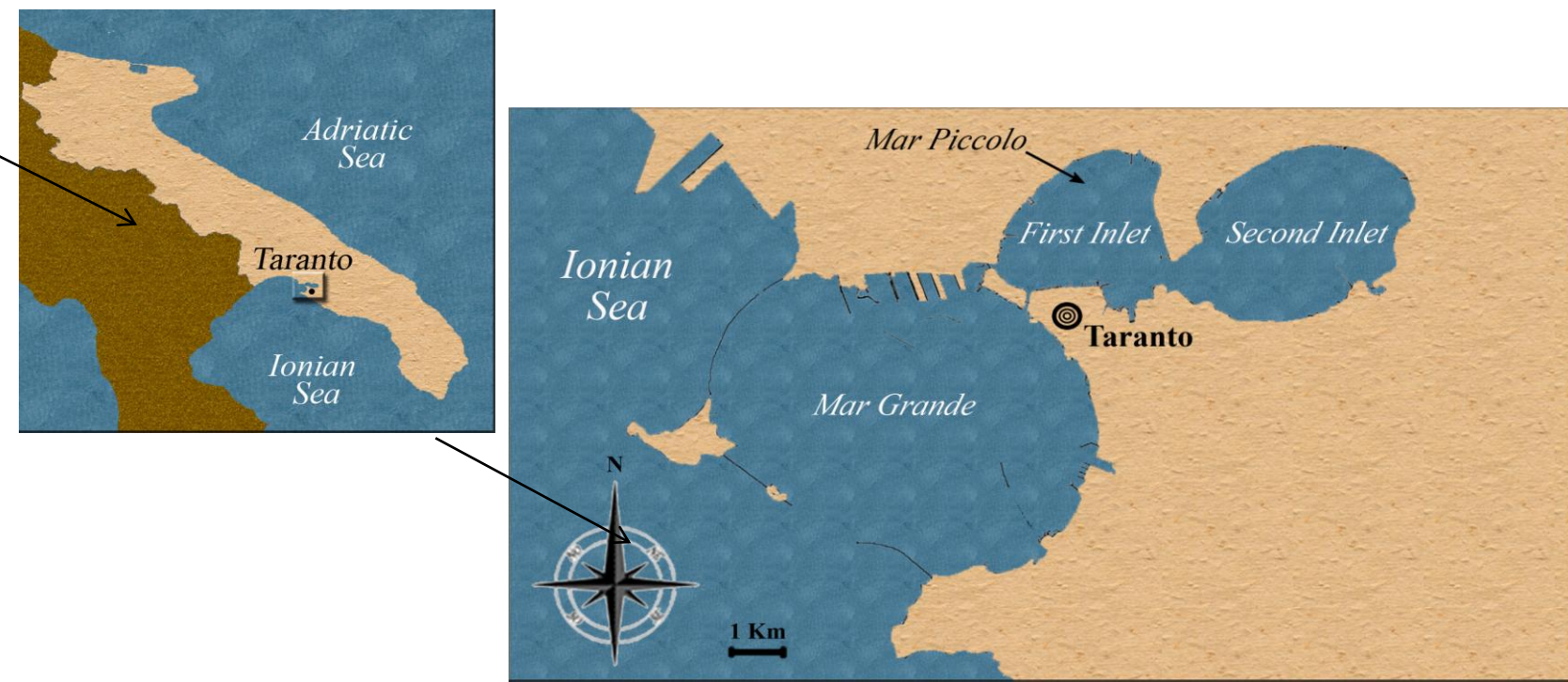
Caroppo C.¹, Giordano L.², Bellio G.¹, Bisci A.P.¹, Palmieri N.², Hopkins T.S.²

¹ Institute for Coastal Marine Environment – National Research Council, Taranto UOS - Via Roma 3, 74100 Taranto (Italy)

² Institute for Coastal Marine Environment, National Research Council, Napoli UOS – Calata Porta di Massa, 80133 Napoli (Italy)



Mar Piccolo is a shallow, nearly enclosed estuary of 21 km² consisting in two basins. The estuarine circulation in Mar Piccolo is driven by a positive water balance of ~23 mil. m³ yr⁻¹. Tidal-mixing is low, of ~ 30-40 cm.



Up until recently, the organic and nutrient loading was practically uncontrolled deriving from 13 sewage pipes, or the equivalent at about 18,272 m³ d⁻¹.

Starting from 2000 the number of sewage outfalls has been reduced to nine and the levels of nitrogen and phosphorus have been correspondingly reduced. During this period, an additional policy change was enacted to allow mussel farms to occupy more area.

Impact

The significant decline in quality of mussel culture.

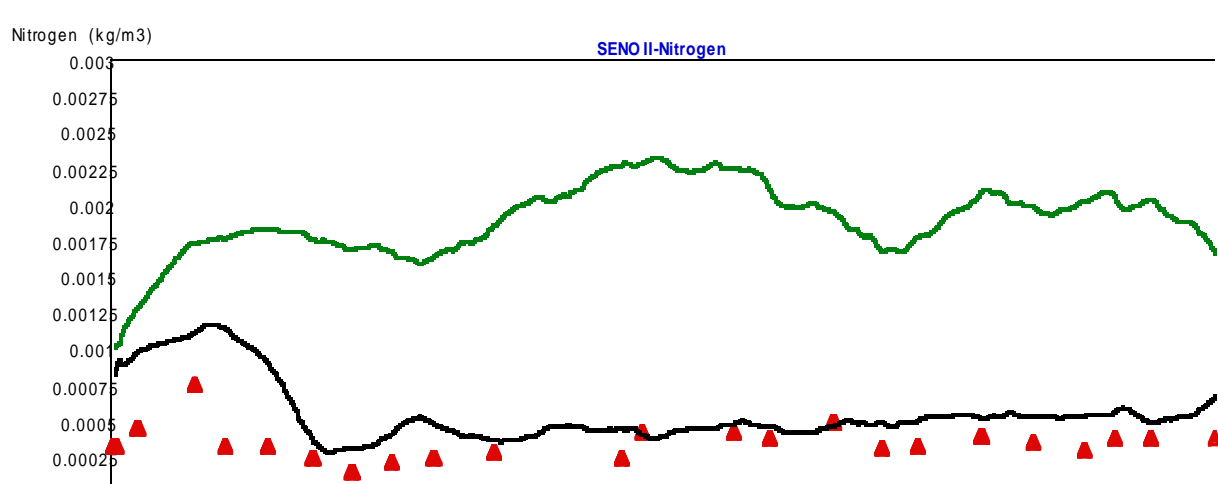
Policy Issue

How to include mussel culture in a management plan for the sustainable use of the Mar Piccolo resources?

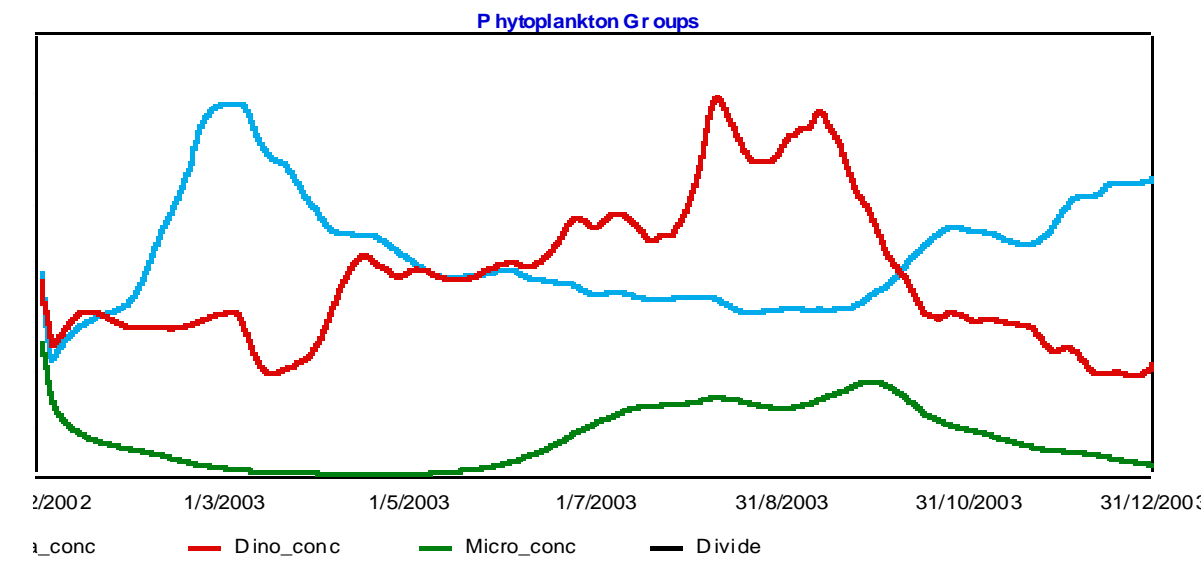
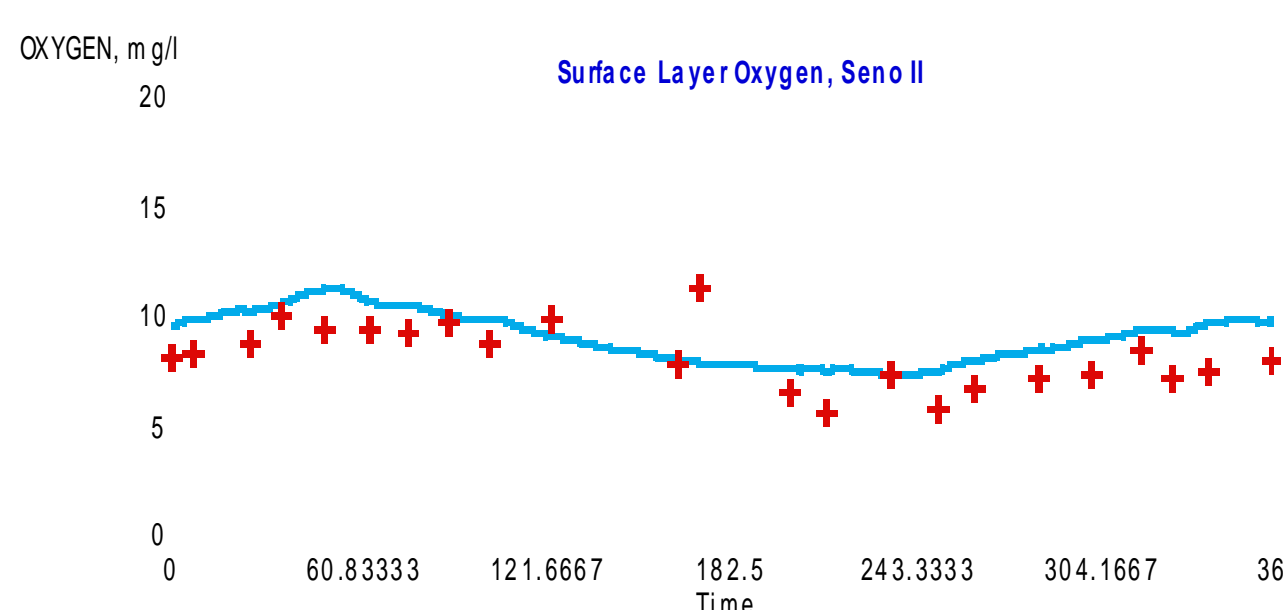
System Approach Framework (SAF)

The main aspects of our simulation analysis that, in our opinion, could contribute significantly to the SAF methodology are:

1) The feasibility of a real-time simulation model to evaluate mussels productivity.



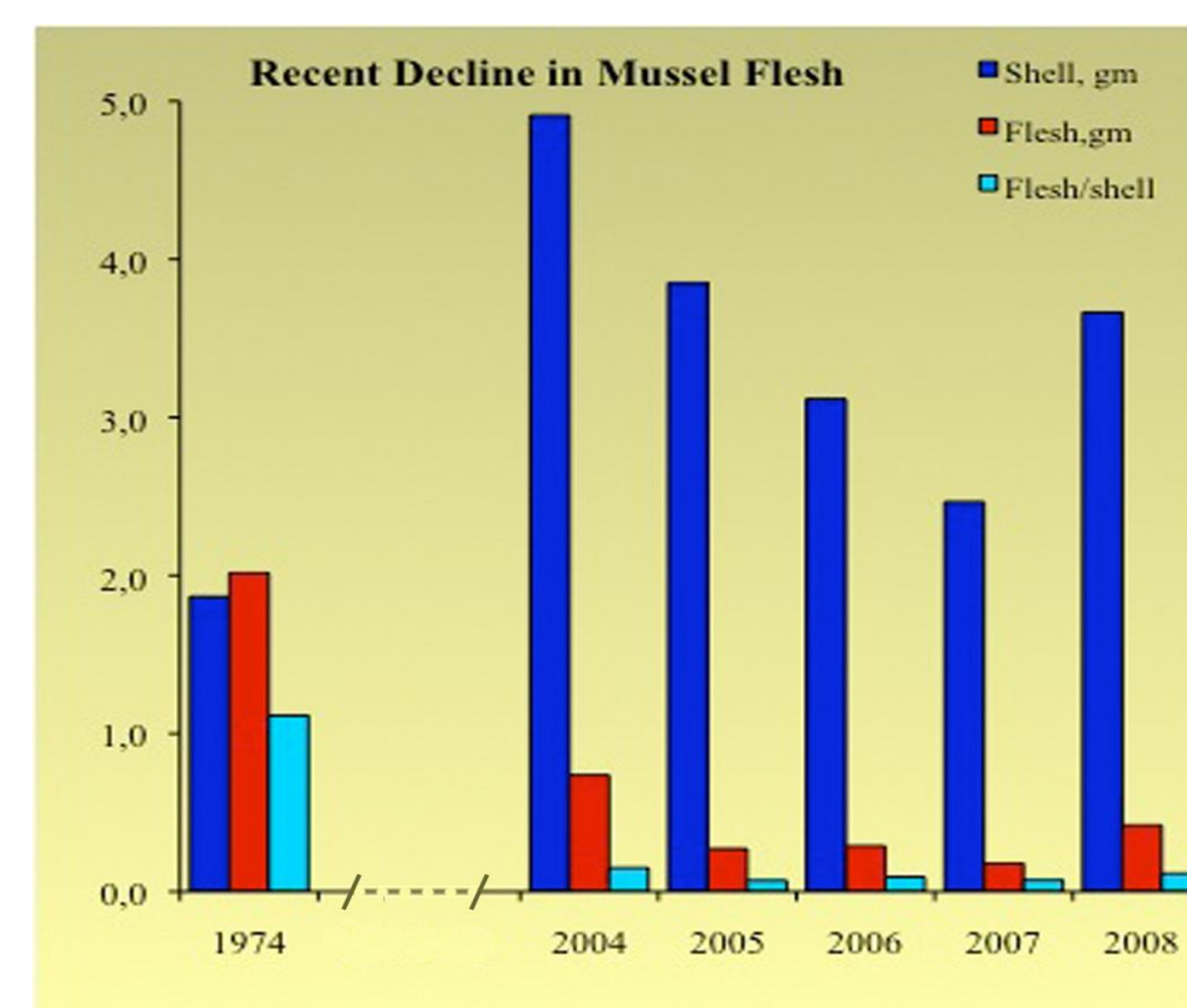
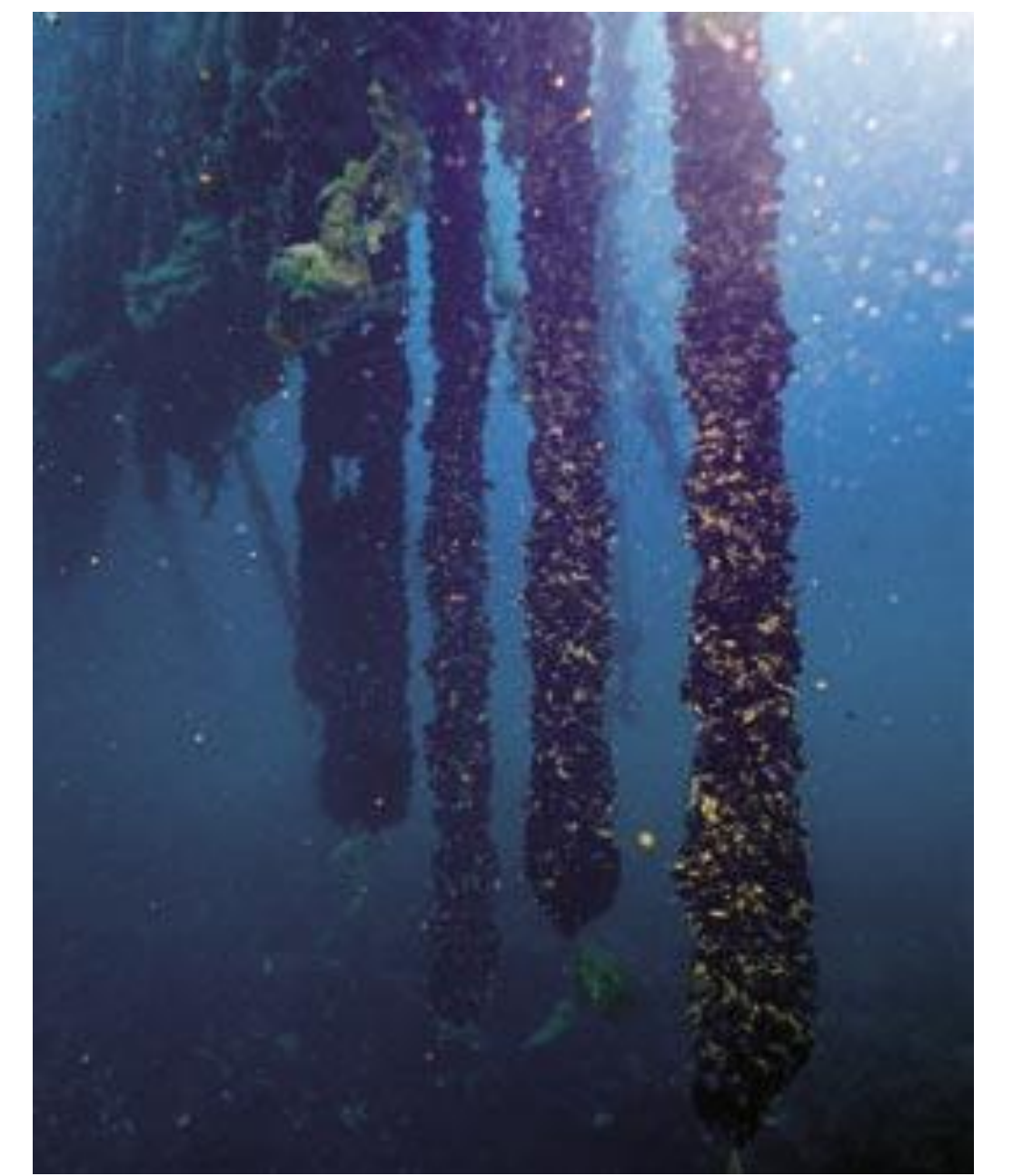
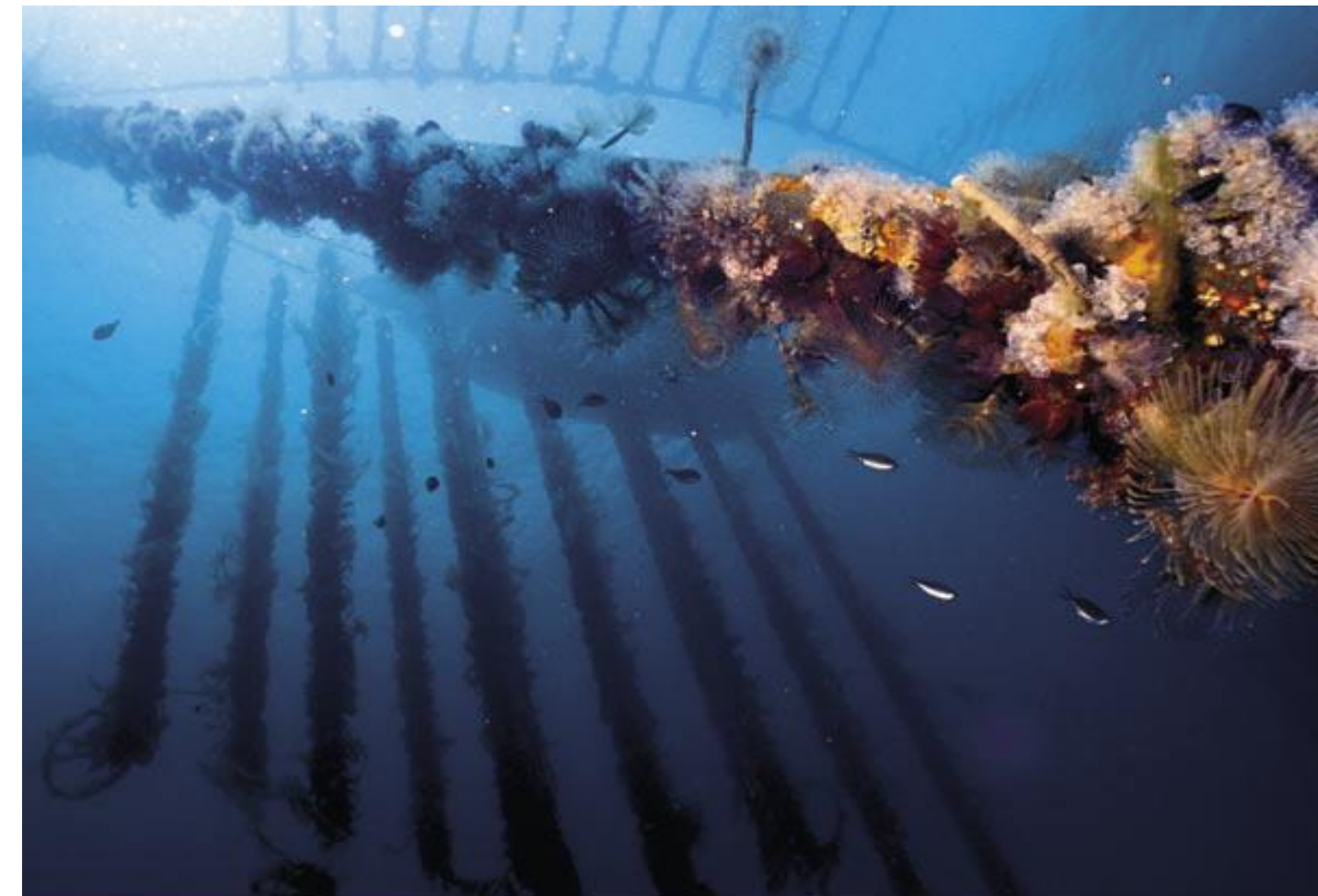
We have designed a simulation model to reproduce the ecological functions connected to the mussel productivity in Mar Piccolo.



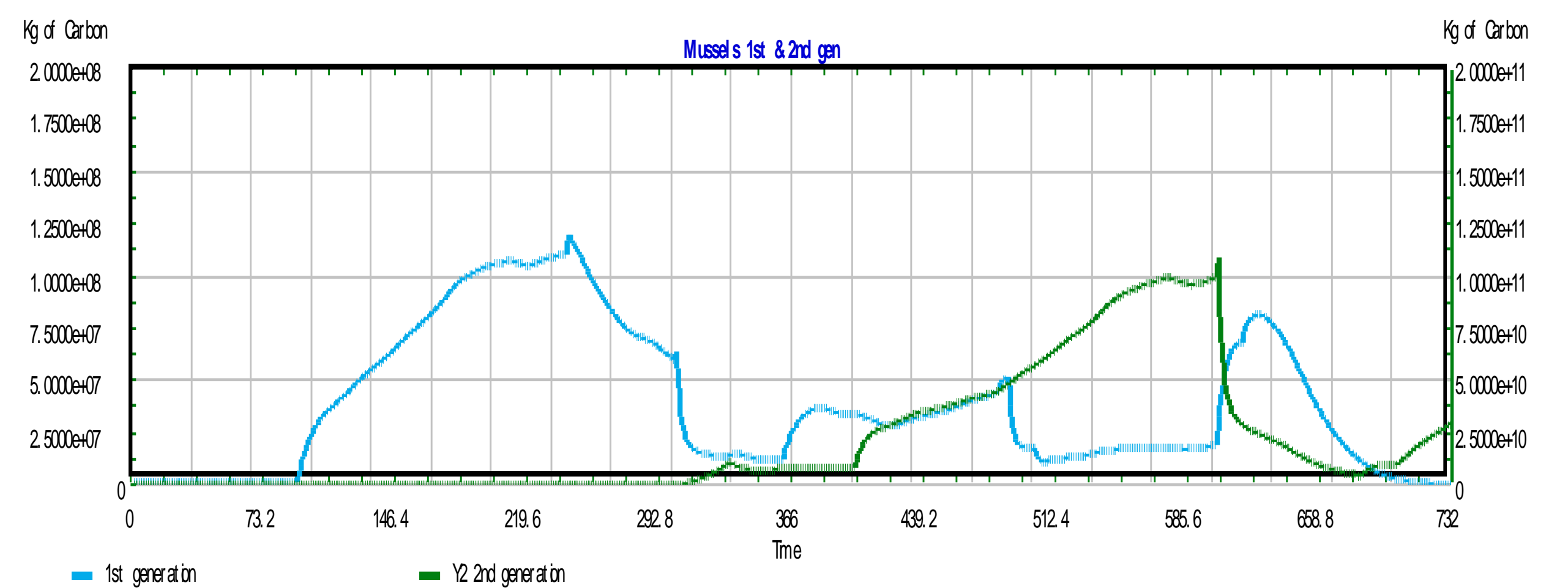
Human activities

Mar Grande and Mar Piccolo are strongly utilised by:

- an intensive mussel commercial fishery at ~30,000 tons per year
- the moorage for the regional fishing fleet
- the largest Italian Navy base
- a major port
- a large heavy industry site



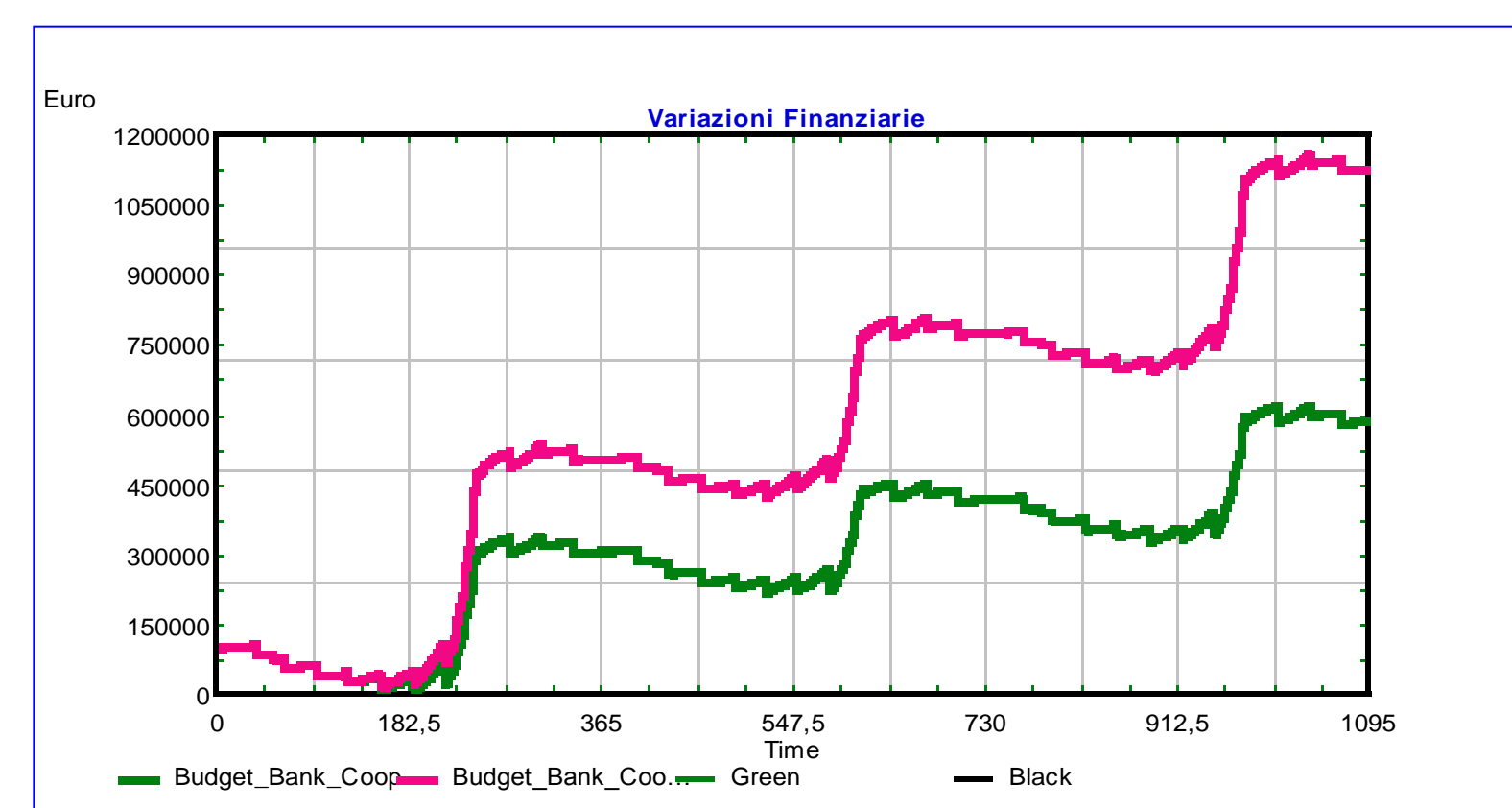
Changes in Tarantine mussels quality expressed by flesh/shell ratio.



Particularly, we are trying to demonstrate how the main external sources of nitrogen affect the mussel growth and sustenance. This aspect will allow us to reproduce scenarios and then consider the most important criteria for sustainability SAF based strategies.

2) The evaluation of management options for aquaculture in form of a "Consortium" and/or a "District" of Cooperatives in Mar Piccolo in the context of optimizing socio-economic benefits.

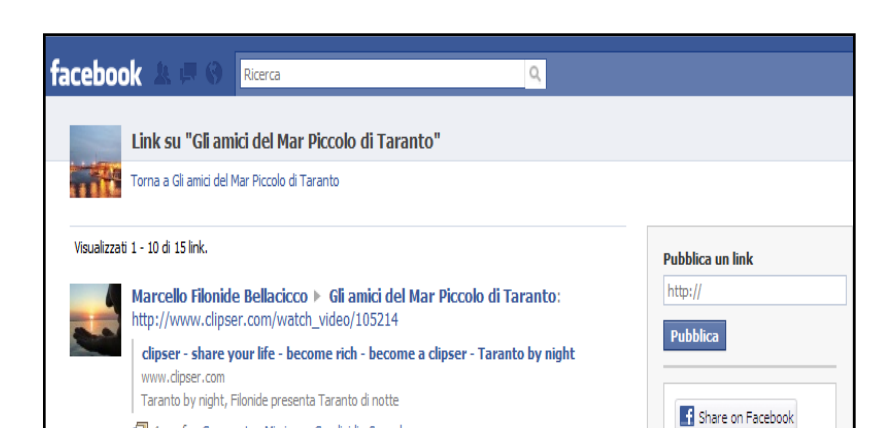
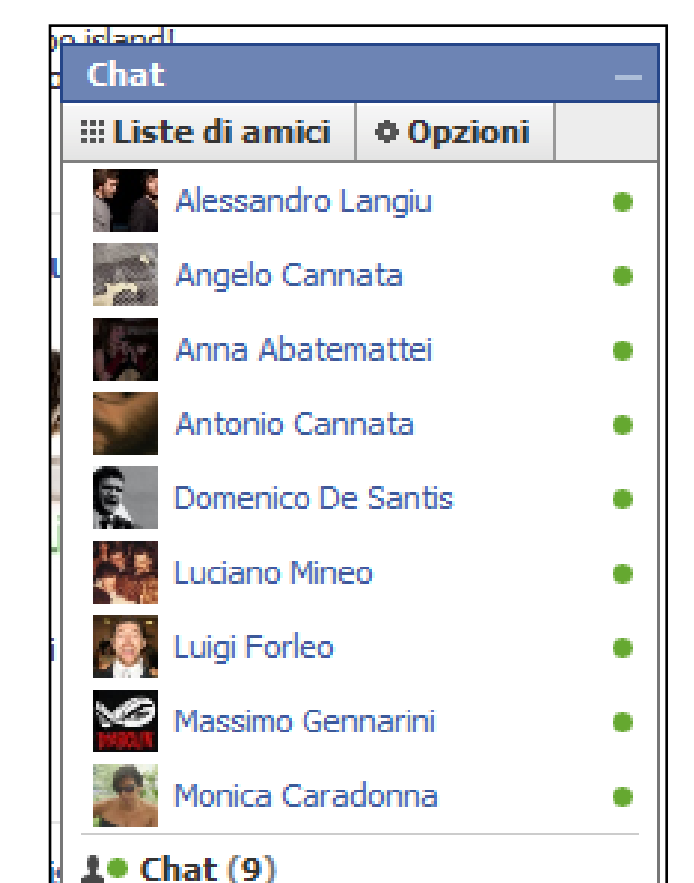
This scenario involves comparing all costs and revenues of the present management configuration, of ~30 individual cooperatives, with the those from the two management options: of a joint cooperative and of a Consortium or "District".



The District has great advantages not only from an economic point of view, but also because it promotes the development of infra-structures and services.

3) How the SAF experiment has improved the relationship between Researchers and Stakeholders.

- They actively participated in all meetings and gave assistance to the ESE model development.
- For the first time our Institute (IAMC-CNR) has represented the host of meetings where stakeholders and politics straight discuss about problems such as illegal use of sea, concessions and black economy.
- To improve the stakeholders and a broader social perception we created a "Facebook group" named "The friends of Mar Piccolo" that will help us to communicate, and to share information, opinions and purposes.
- The goal is to involve also the "common people" that could find of interest the SPICOSA objectives, helping us gathering useful suggestions.



Conclusions

The results of SSA 7.14 exercise, even if preliminary, put the basis of stakeholders-policy collaboration for the sustainable management of the Mar Piccolo. Particularly,

- 1) The ecological model, in terms of utility, is very important in order to produce a performing instrument such as a real-time modeling for future management issues.
- 2) The socio-economic aspects are relevant not only for system economy but also to demonstrate the connectivity in terms of ESE assessment due to the link between mussel farming techniques, type of management (Consortium or District) and carrying capacity of Mar Piccolo ecosystem.
- 3) The exposure and dialogue with city officials, regional environmental agencies, and stakeholders has been proving to be a beneficial experience.