

# Working together with managers to upgrade a tool for Integrated Coastal Zone Management of a Greek mussel-farming area

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**Abstract:** The mussel-farming areas of Thermaikos gulf, Greece, are facing a number of management issues, regarding environmental carrying capacity, spatial planning, cultivation techniques, economic sustainability and institutional adequacy. The implementation of the System Approach Framework (SAF) in the mussel farming area of Chalastra, the most problematic of all, proved a positive step in the communication effort between policy, science and society. Yet, although the results of the developed management model proved a useful dialogue facilitator between conflicting stakeholders, the policy makers were reluctant to work with the tool and explore its possibilities in practice. In order to develop a more substantial relationship between scientists and managers, a closer collaboration was pursued. Three basic, regional administrative managers, holding responsibility over different areas of mussel farming activity in Thermaikos gulf and a governmental administrative manager holding responsibility for the spatial planning of the activity nationally, are participating in this effort, aiming at: a) evolving the relationship between science and policy from passively exchanging information to actively collaborating and b) upgrading the existing version of the management model by enhancing it and by expanding it to other areas than Chalastra. The goal of this work is to investigate, in a face-to-face practice, if and how scientific tools -incorporating environmental, economic, social and institutional components- can effectively contribute in the establishment, development and implementation of integrated coastal policies, especially in a country with underdeveloped legal framework regarding Integrated Coastal Zone Management (ICZM).

**Keywords:** mussel-farming; decision-makers engagement; management tool; capacity building

## 1 INTRODUCTION

Integrated Coastal Zone Management (ICZM) has accurately been defined as the process by which decisions are made for the sustainable use, development, and protection of coastal areas and resources [Cicin-Sain *et al.*, 1998]. Yet “decision making environment” is comprised by a variety of factors, some tangible and measurable as the available system’s knowledge and information but also several others inexplicit and vague as the collaboration initiatives between decision-makers [Westmacott, 2001]. The System Approach Framework (SAF) is a sustainability-issue driven methodology, targeted in coastal zone management and committed in comprehending stakeholders’ opinions in decision-resolution and decision-making process, through the use of Ecological-Social-Economic (ESE) assessment models

[Hopkins *et al.*, 2011; Tett *et al.*, 2011]. One of the fundamental principles of the SAF is that the most efficient, fair and sustainable solutions are most likely to be reached when stakeholders take part in identifying the problem, the building of scenarios and in appraising the results of the scientific simulations and findings [Mette *et al.*, 2011]. Yet it is deeply acknowledged that cultural and societal differences reveal alternative best practices regarding stakeholders' participation and engagement patterns. This paper discusses an effort to overleap certain boundaries and obstacles acknowledged in science and policy integration in a Greek coastal area, by utilizing scientific tools to contribute in the establishment, development and implementation of integrated coastal policies.

### 1.1 Study area and activity

The coastal zone of Thermaikos gulf is a system significantly affected by the delta of Axios-Loudias-Aliakmon Rivers. Various socioeconomic activities are taking place in the vicinity of the gulf, as intense urban development, agriculture, fisheries, mussel-culture, small scale industry, recreational use and navigation. The selection of the sustainable development of mussel farming activity as the trial management issue through the SAF, during SPICOSA project [Hopkins *et al.*, 2011], was based upon the small scale of the activity, its minimum invasive character and the absence of serious conflicts with other activities. It was acknowledged that a straightforward issue will serve in evaluating the challenges of the SAF implementation in the Greek institutional management framework that is underdeveloped and fragmented.

Approximately 90% of the Greek mussel production is cultivated in Inner Thermaikos Gulf, north-western Aegean Sea [NCOMR, 2001]. The activity is taking place in 7 areas (Figure 1). Although the activity was highly promising in the past and thus attracted many investments from the local communities, the last ten years a number of unresolved issues have occurred transforming the socio-economic profile of mussel farming [NCOMR, 2001].



Figure 1. Thermaikos gulf & the mussel farming areas in GoogleEarth.

### 1.2 Moving forward from Chalastra

The initial implementation of the SAF in the area of Chalastra, Thermaikos gulf, concluded in the development of a simulation model, aiming to explore management scenarios in order to assist stakeholders' engagement and decision making [Konstantinou *et al.*, 2012]. At the time intense effort has been dedicated in mapping and engaging the decision makers and stakeholders related to the management of mussel farming. The institutional stakeholder mapping process revealed the co-authority of 14 public bodies, only in the management of Chalastra.

Additionally it brought to light varying levels of commitment of the decision-makers, related both to incidental parameters (opinions regarding ICZM, personality) and to the level of involvement on the jurisdictional aspects of the activity. Yet, no matter the different level of involvement and interest to the procedure and to the management tool's outputs, none of the decision makers, nor the stakeholders showed interest in exploring the model. All the discussions were centralised around the scenarios' results and there were few and very general comments regarding the possible expansion and improvement of the tool [Konstantinou *et al.*, 2012].

In order to work deeper to the implementation and adjustment of the SAF methodology in the Greek societal framework, we considered necessary the expansion of the application in a way that it will incorporate all the mussel-farming areas of Thermaikos gulf. At the same time we considered necessary both to a) improve the management platform in order to incorporate more information and explore extra management alternatives and b) explore further more suitable communication formulas in order to achieve solid science and policy integration. Thus, comprehending the "lessons learned" from the initial effort of stakeholders' engagement in Chalastra [Konstantinou *et al.* 2012], we decided to return in a personalised approach, that will engage, in the initial stage, specific administrative managers. Three of them occupy the head position in the Directorate of Fisheries and Aquaculture in each of the Regional Unities of Central Macedonia that developed mussel-farming activity in Thermaikos gulf, whereas the last one is representative of the Spatial Planning Directorate of the Ministry of Environment, Energy and Climate Change.

## **2 METHODS**

### **2.1 The management platform**

The associated research and the communication results around the simulation model indicated that i) several aspects required more detailed simulation and ii) there was a great deal of information left outside the actual model. In order to comprehend the available information in a concrete and well organised tool that will: a) be able to explore several management scenarios, ii) provide inputs and interface for results deriving from other models, iii) provide in a user friendly, graphic interface all the results and information, and iv) serve as a database for available data, the relevant legislation, conceptual models and related publications, a management platform is under development [Mongruel *et al.*, 2011]. One of the main additions made concerns the effort for more detailed simulation of the water circulation inside and around the mussel farming units.

The final form of the platform is a point of discussion among the stakeholders as the tool is meant to be used by them and should serve their needs. During the engagement processes discussed in this paper, the draft version of the platform was placed at the core of the conversations in terms of utility, usability and importance.

### **2.2 Participants' selection**

The selection of the participants followed a number of criteria. One of the main issues highlighted during the initial institutional mapping process was the fragmentation of responsibility to a variety of authorities, that most of the times have a secondary and consulting character regarding the activity. In that second round of interaction the effort focused in the central authority, responsible for the spatial planning of aquaculture nationally, and to the regional authorities responsible for the crucial aspects of the mussel-farming activity, as i) licensing and ii) local supervision and control.

The institutional mapping process revealed the interconnection of the regional authorities with most of the other local public bodies holding responsibility over bivalve-farming. These aspects provide to their representatives a full knowledge of a) the institutional structure of the activity, b) the related legal framework and c) the overall operational framework of the activity in the gulf. Their engagement is considered most crucial as they can assist in bringing together the secondary levels of authority and the rest of the stakeholders.

The representative of the ministerial Spatial Planning Directorate holds the responsibility for the formulation and juridical promotion of the new legislative framework for the planning and regulation of aquaculture nationally. Additionally this Directorate will receive the final decision for the legal enactment of the new regional areas for aquaculture, beginning from the mussel-farming areas in Thermaikos gulf that have applied for licensing more than 10 years ago. As these legal enactments will specify the environmental management parameters for each area, the engagement of the authority that will define them was considered essential.

From the selected participants, only the representative of the Regional Unit of Thessaloniki was engaged in a regular basis to the initial SAF implementation and thus was familiar with the SAF and most of the results of the management tool. The ministerial representative participated in one of the Chalastras' stakeholder forums in 2010, but had no other interaction with the scientific team. Yet in order to maintain equality and insure the reforming character of this, more personalized, engagement effort, all the participants were considered as new to the process.

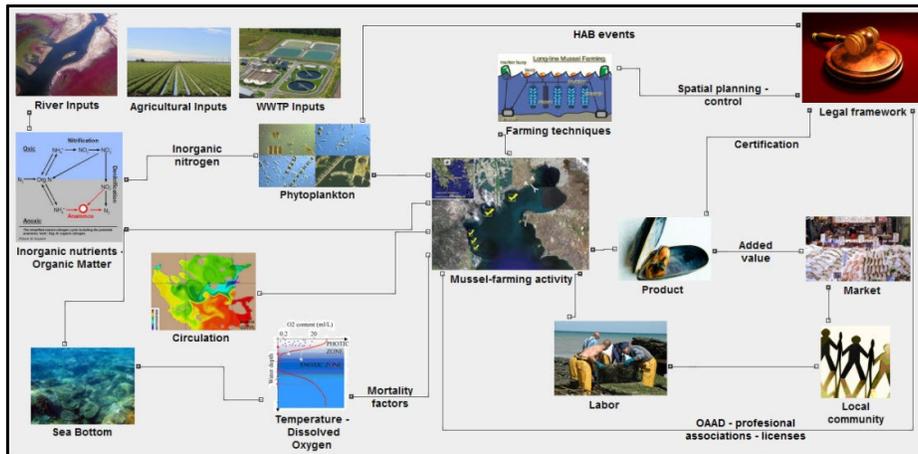
### **2.3 Personal interview**

A personal interview was conducted with each of the selected participants. Prior to the meeting, through phone conversation, a familiarization procedure took place, where the purposes of the meetings were explicitly explained. Accordingly the engaged participants received via e-mail: a) an information package developed in the end of the initial SAF implementation, describing explicitly the state of the management tool, the explored scenarios and the overall results and b) a new document describing the views of the writers regarding the evolvement of the tool. The structure of the meetings involved a) a short introduction to the SAF and its principals b) a demonstration of the key aspects of the management platform and c) an interview / discussion session. To facilitate the discussions and keep a common, thus comparable, framework to all of them, an informal questionnaire was put together. The questions were posed sporadically in a rather informal type of interview. The former experience of stakeholder engagement in Chalastra showed that this type of conversation is more likely to reveal crucial operational aspects and opinions, compared to a firm-structured interview. The questions concerned the potential use of the management tool and the amendments according to the participants' perspectives and as a result were utterly connected to the operational framework of the activity. The interviews had an average duration of three hours.

### **2.4 Common meeting**

During all the personal interviews we have expressed the will to organize a common meeting between, at least, the three regional representatives in order to explore in a more substantial way the functionality and potential of the management tool. The ministerial representative was circumstantially excluded by this meeting due to the long journey required in order to attend. Nevertheless, the regional participants responded to this informal invitation and came to

communication on their own initiative in order to organize the common meeting. The goal of this meeting was to put the participants around the management platform and let them interact with the tool and each other, in order to explore its potential use and to fully understand its functionality in order to critically comment it. The main comments of the participants regarding the amendment of the management platform were incorporated in a new conceptual model of the system, in order to stimulate a discussion around the necessary changes and the possible ones, under the perspective of the available data and information (Figure 2). Additionally, between the time of the personal interviews and the common meetings certain structural additions were made to the platform, in order to provide the potentials of the tool to support discussion and decision making in management. Finally the whole platform, the conceptual model and the demonstration of results were translated in Greek, as the first demonstration in the English platform proved off-putting for the participants.



**Figure 2.** Conceptual model of mussel-farming activity as resulted after the interviews with the participating decision makers.

### 3 RESULTS

The participants have responded positively to the perspective of a closer collaboration of science and policy integration regarding the management of mussel-farming activity. Yet, although an in depth analysis took place, and the tool was available to them in order to download it and have a round of tests on their own, all the Regional representatives claimed that their Departments oppose the installation of unauthorized software in their computers and preferred to follow the initial demonstration process as interactive audience. On the contrary the Ministerial representative downloaded the tool in advance of the interview and during the discussion inquired the interviewer regarding the parameters' estimation methods and the assumptions made during the initial formulation. Nevertheless, besides the un-willingness of the regional participants to explore the actual platform, both the long discussion during the interviews as well as their own initiative to organize the common meeting indicate a genuine interest both to the tool and the process.

Table 1 presents a brief summary of the responses of the participants during the private interviews, regarding the usefulness of the management tool and the environmental, economic, social and institutional parameters that are necessary to be incorporated in the tool.

During the personal interviews only the Ministerial representative, that got familiarized with the actual platform, seemed to recognize the limitations of such a tool, connected mainly to the unavailability of data and information. Yet, this misunderstanding proved the trigger point of a discussion regarding the data necessary in order to attempt an expansion of the management tool to the other mussel-farming areas of Thermaikos gulf. The Regional representatives of Imathia and Pieria confirmed the almost absolute lack of environmental data for their areas of responsibility and all the Regional representatives admitted that the socio-economic data of the activity available are considered unreliable. The Ministerial representative admitted that the spatial planning of the whole aquaculture activity was based on the limited information deriving from the areas with pre-existing activity and "logical" assumptions regarding the carrying capacity of the areas. This severe lack has already been a problem during the initial development of the tool and will create limitations during any attempt for expansion. Yet, the "missing points" identified during the conceptualization of the system were used in order to demonstrate the importance of the science-policy interaction in evolving the understanding of the system.

**Table 1.** Participants' comments regarding the management platform and the environmental, economical, social and institutional parameters that should be incorporated.

Authority	Comments	Environmental	Economic	Social	Institutional
<b>Regional Dep. of Fisheries Thessaloniki</b>	How can the managers ensure the optimum solutions?	Carrying capacity Dissolved oxygen Circulation	Product price & added value Market control	Associational behaviour of mussel – farmers	Legal overlays and gaps Co-authority Legal inconsistency
<b>Regional Dep. of Fisheries Imathia</b>	The data inadequacy creates restrictions	Mussel-units placing Risk events: Contamination Extreme weather	Market control.	License transfer limitations – Closed-off professions	Legal structure and criteria
<b>Regional Dep. of Fisheries Pieria</b>	How the tool incorporates law? Concern about the suitability of the approach for Greece.	Circulation: the way the available mussel food is distributed.	Product price and market distribution	Conflicts and inequities	Licensing process & structure
<b>Ministry of Environment –Directorate of Spatial Planning</b>	Focus on the spatial planning potentials Who will finance the implementation?	Circulation: the optimum spatial planning	-	Social perception & acceptance regarding the activity	Legal inconsistency & structure

The main issue that have commonly emerged through the private interviews and dominated the discussion during the common meeting, is the structure of the legal framework around the environmental managing parameters of the activity and the way that the management tool can determine the optimum values or the appropriate limits for these parameters. More specifically, it is the spatial planning of the areas regarding water circulation that concerns the managers, in correlation to the carrying capacity of those areas. These two aspects are connected to others, very important for the development of the activity as: a) the number of licenses to be distributed and thus local labor, b) the quality of the product and thus its price and its competitiveness to international markets and c) the occurrence of environmental restrictions, as Harmful Algal Blooms, that pose a great financial risk for the activity. As all of the participants are responsible for either determining or imposing regulation that will raise conflict around the aforementioned aspects they are interested in exploring alternatives regarding those issues. The presentation of preliminary graphic results regarding the effect of mussel farms to the water circulation around them, although not yet connected to the rest of the model and

although incomplete, catch the policy-makers interest regarding the potential use of the platform in reforming environmental regulation.

#### 4 DISCUSSION

From the aforementioned it is made clear that all the discussions around management tools and objectives for the area drive back to the way the legislation is formed and imposed in Greece. It is clear in any case that the efforts for ICZM in countries with weak legal framework, based in volunteer participation of stakeholders and decision makers are doomed to stay in a primitive theoretical level [McKenna and Cooper, 2006]. Every new political administration is using its personal interconnections to move forward in management, basically ignoring the previous attempts, a situation documented in other countries also [Worrapimphong *et al.*, 2010]. The engagement of the representatives was dominated by this understanding: as any political change could lead to administrative changes, it is very likely that policy makers will change, and new engagements would be necessary, creating an endless and expensive loop, of demonstrations and discussions.

At the same time all the management efforts are suffering from data inadequacy. Although the new legal framework regarding aquaculture demands monitoring of various parameters of the activity, it fails to assign a specific responsibility or to determine a firm framework in which these actions will materialize. The demands of policy towards science are sometimes unrealistic. The value of the process through both the new conceptualization of the system and the deepening on the management tool formulation was exactly this understanding of the limitations that are created due to knowledge and information gaps. This assisted trust building and highlighted the importance of a tool that can explore management alternatives even in an investigative way. It also placed the role of science towards policy in a more realistic framework, that of assisting management than providing "the correct answers".

The policy makers' greatest concerns are related with the way the legal framework is structured and implemented. The fragmented form of the Greek administration, although implicating a great number of people in the management of every activity or area, provides very thin margins when it comes to the exploration of different alternatives. At the same time the structure of this same framework is inconclusive thus allowing alternative interpretations. In this context managers and decision-makers are struggling to avoid unbalance and overexploitation of the natural resources based on assumptions. This pressure towards natural resources exploitation is magnified from the economic crisis, creating social agitation. Accordingly policy makers want to avoid open stakeholders' deliberations as they fill that they cannot defend adequately the management decisions that they receive from time to time. It was acknowledged that the use of the management platform can assist that process.

The selection of stakeholders to implicate in a participatory modelling effort is a difficult issue, incorporating imponderable factors connected to trust, luck and societal structure [Voinov and Bousquet, 2010]. In what concerns the actual discussion about the utility of a management platform, the selection of a small, specialized group of people proved more effective than a larger and more variable group, as it allowed interaction and exchange of information that was previously missed. Although the selected participants declared their interest in the continuation of this co-construction effort, in several times they expressed their concerns regarding the appropriateness of the attempt in the Greek operational framework, that has little history in participatory and co-management efforts. The role of science in this process is going even further than modelling and facilitating

[Voinov and Bousquet, 2010] to introducing new approaches that require different social behaviours. The development of management tools can assist the process, but only when is based to strong science-administration integration and most importantly, to institutional and legal prerequisites for policy changes.

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