Watch Letter

CIHEAM

The Mediterranean Sea: Fisheries and Beyond

www.ciheam.org
International Centre for Advanced
Mediterranean Agronomic Studies

N° 31
December 2014

About CIHEAM

Founded in 1962, the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) is an intergovernmental organisation composed of thirteen member states (Albania, Algeria, Egypt, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Spain, Tunisia and Turkey).

The CIHEAM is at the service of its member states to promote multilateral cooperation in the Mediterranean in the fields of agriculture, food, fishery, and rural territories, aiming to respond to the needs of the States. The CIHEAM works for the Mediterranean and therefore with Mediterranean populations. Providing concrete solutions, sharing experiences and avoiding the waste of knowledge are among the main objectives of each one of its actions.

The CIHEAM pursues this cooperation mission through specialised training, networked research, scientific diplomacy and political partnership. Thanks to its activities, the CIHEAM therefore contributes to the elaboration of a global, structural and engaging vision for development in the Mediterranean.

170 permanent agents and hundreds of consultants regularly work within the 5 headquarters of the Organisation: the 4 Mediterranean agronomic institutes (MAI) based in Bari (Italy), Chania (Greece), Montpellier (France), and Zaragoza (Spain); the General Secretariat is located in Paris (France).

The Watch Letter

This Quarterly Letter has been published since 2007 and is devoted to major topics in Mediterranean Agriculture, Food and Environment.

While enabling the CIHEAM to gain a widespread recognition, it circulates analyses aimed at a heterogeneous public (policymakers, researchers, journalists, etc.) on emerging agricultural and food issues. The objective of the Watch Letter is to provide brief analyses which will fuel both the discussion on the Mediterranean and the broader global debate on food and agriculture.

The General Secretariat of Paris is responsible for the direction and the management of this bilingual publication (English and French), also available in Arabic.

Watch Letter's Organization Chart

Watch Letter N°31

Collaborators in this Issue

Amina Afaf Chaieb, Bernardo Basurco, Duarte Bue Alves, Biagio Di Terlizzi, Nicola Ferri, Elizabeth Grech, Gokhan Kurtar, Denis Lacroix, Gianluca Manganelli, Rafik Moualek, Mohammed Ouazzani Tnacheri, Audrey Petiot, Massimo Zuccaro.

ISSN 2114-3129

How to quote this document:
The Mediterranean Sea. Fisheries and Beyond Paris: CIHEAM, December 2014 - Watch Letter n°31

Contact & Subscription

CIHEAM, General Secretariat
Sébastien Abis
11 rue Newton, 75116 Paris, France
+33 (0)1 53 23 91 00
abis@ciheam.org

To subscribe to this publication register on **ciheam.org**

Table of Contents

Editorial

Cosimo Lacirignola
CIHEAM Secretary General

No wonder the Mediterranean region is named after the sea that it borders. The sea "in the middle of the land" is a geographical peculiarity: it is located between three continents and is almost entirely enclosed by land. This proximity has both united and divided nations and civilizations since the beginning of mankind, making the Mediterranean, a mere 1% of the planet's oceans, a millennial epicentre of History. Today, the Mediterranean Sea is still the busiest maritime route in the world. 90% of world merchandise trade is routed via maritime traffic through the different seas and oceans of the planet and the Mediterranean Sea is at the core of this global trade process.

The shared access to this common sea requires strong and long rooted economic, social and cultural ties between Mediterranean countries. To various extents, these countries share a similar climate and a similar geology. Thus, they also face similar environmental risks whether resulting from human activity or climate change. Ultimately, this implies a greater demand for access to the limited resources available in the Mediterranean Sea but also a crucial need for cooperation to preserve it from a "tragedy of the commons". The Mediterranean region is inhabited by approximately 450 million people, 40% of which live on the coast and depend on the sea for their food, work and leisure. This important source of income and nutrition is however very vulnerable: because it is a closed sea, the warm waters of the Mediterranean are not easily renewed. This means that the impact of any damage is long lasting.

Today the diversity of species and the sustainability of the fisheries in the Mediterranean are threatened by over-fishing, pollution, the invasion of alien species and the degradation of marine environment. There are many challenges. Over-fishing is a major issue. The situation is already alarming: 95% of fish stocks in the Mediterranean are exploited beyond their ability to replenish. This compromises the entire ecosystem and productivity for future generations. The fate of the blufin is the most emblematic of all but the list of endangered Mediterranean species is growing longer. Preserving the biodiversity of the Mediterranean, which is the home of more than 10,000 different species, is complicated by the presence of invasive species from the Red Sea and more recently, the Atlantic. The development of protected marine areas is a very positive stance but we cannot measure the impact on fish stocks. It is a question to be further explored. Innovative experiments such as artificial reefs developed in Portugal and Italy are particularly interesting since these initiatives can provide prospective means of recovering part of the Mediterranean biodiversity.

The Mediterranean is not only being depleted of its fish, it is also becoming increasingly polluted. The Mediterranean basin has always been characterized by population concentration and urbanisation along the coasts. The beauty of its coastline and its rich culture and history make the Mediterranean the world’s leading touristic destination. It is also the busiest trade route crossed, every year, by one third of the world's merchant ships including oil tankers. The major consequence of such intense economic activity is the environmental impact. More than a third of the cities situated along the Mediterranean coasts directly discharge their sewage into the sea, thus altering the chemical composition of water and affecting the fauna and the flora that grow in it. The industrial activity in the region is responsible for the disturbing amounts of toxic elements such as mercury, cadmium and other heavy metals that contaminate sea water. Agriculture is also another source of pollution due to fertilizers carried to the sea by streams and rivers. Weakened by the harmful impact of human activity, the Mediterranean is extremely sensitive to climate change and its impact on sea levels and temperatures.

The degradation of Mediterranean Sea has direct socio-economic impacts. Seafood products are among the most traded food commodities in the world. Developing countries and poor populations particularly benefit from their trade. In the Mediterranean, fish resources are the basis of economic and cultural fabric composed mainly of small-scale and labour-intensive companies, which play a fundamental social role in their areas of activity. Their very existence is threatened by the depletion of Mediterranean fisheries and by the globalization of the fisheries markets. It is therefore crucial to recognize the contribution of small-scale fisheries to poverty alleviation, local development and food security in the global agenda.

In this perspective, given that 2014 has been declared "International Year of Family Farming" by the United Nations, it would have been more appropriate to combine the concept of "family farming" with that of "family fishing". Issues such as illegal and unregulated fishing as well post-harvest waste should also be addressed. The sustainability of fishery resources and their contribution to food security and nutrition depends on the quality of their control and the stability of management policies. Hence the need for strategic Mediterranean cooperation, especially between the northern and southern shores where the realities of the sector are rather contrasting. The differences in the structures of supply and demand, in the social, technical and organisational contexts of fisheries production as well as their asymmetrical consequences on food security and poverty alleviation must be considered.

The trade balance of Mediterranean fishing shows a deficit and the tendency to import will only increase in the majority of the riparian countries at different levels according to their demographic and economic development. Nevertheless, the situation is not that bad. Fish farming has increasingly developed in the past decades to compensate for the depletion of natural fish resources. The production of farmed fish is the fastest growing food production sector and will play an important role in meeting the ever-increasing demand for seafood products in the Mediterranean. Today, aquaculture provides 50% of the fish consumed in the world and the Mediterranean is a region where the aquaculture industry is growing rapidly. Egypt is the largest net seafood importer in the Mediterranean region and the top supplier of aquaculture products. Although the decline of the traditional Mediterranean ancient fishing know-how is regrettable, it is true that aquaculture provides a constant and affordable supply of good quality seafood products (FAO, 2012). It also creates new socio-economic structures that generate employment, especially for women, which are strongly present in post-harvest processing activities.

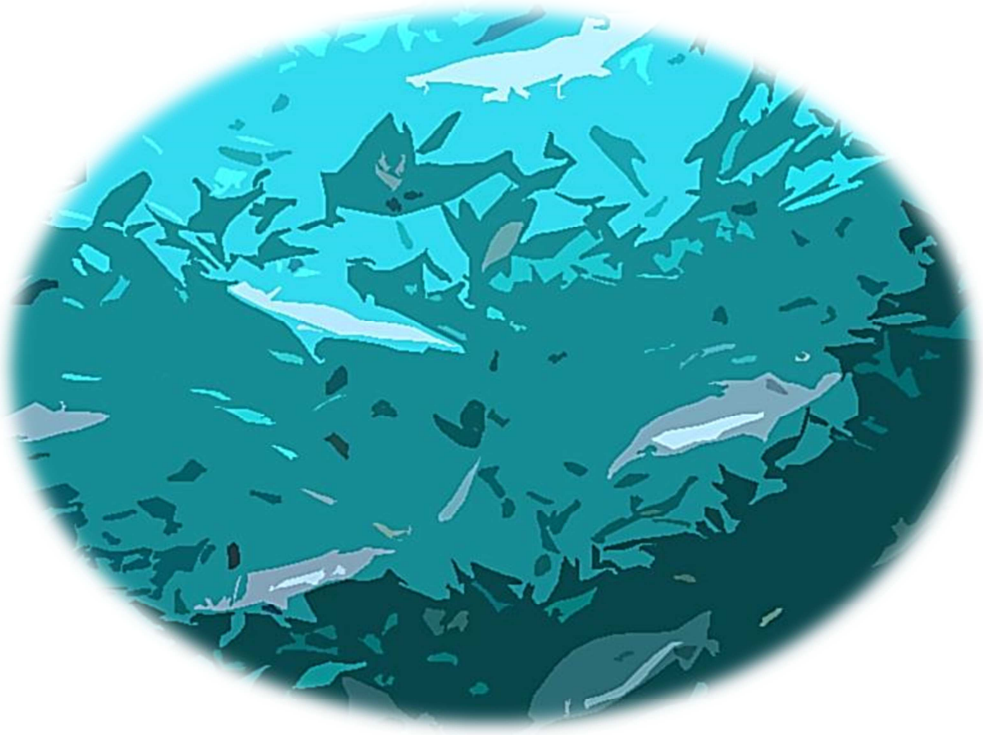
Nevertheless, one should be cautious. Aquaculture had developed without a previous assessment of the environmental footprint. In fish farms that are close to marine areas, the chemicals administered to fish or discharged into water seriously raise the issue of pollution and contamination. It is therefore crucial to pay special attention to the sustainable development of the sector. In light of these ecological and economic changes and the challenges they pose, fishing can no longer be considered as an isolated activity but rather one that is related to a variety of other activities such as agriculture, tourism, navigation and aquaculture. Most importantly, fishing and fisheries are to be considered in the context of a broader ecosystem, as part of this versatile Mediterranean Sea. This approach leads us to observe the recurrent lack of scientific expertise and statistical data on the Mediterranean Sea, which is a major obstacle when it comes to formulating appropriate solutions to its complex and interrelated problems. The CIHEAM's 7th Ministerial meeting held in Saragossa in February 2008 had stressed the fact that scientific knowledge is at the foundation of any effective and sustainable fishery management system. In the framework of the Barcelona Convention and the Convention on Biodiversity, Mediterranean countries have pledged to share the responsibility of protecting this "mare nostrum" as well as the efforts to achieve it.

Since its inception, the CIHEAM has always taken into account, the conservation of marine resources in its conception of a sustainable Mediterranean food system. More than ever, an integrated approach between land production with farming and sea resources with fisheries and sea products is required. Food security cannot only be envisaged through the increase of land productivity. Mediterranean Food Security but also the Food Safety need to be improved through the preservation of fisheries and the enhancement of aquaculture sustainability. The CIHEAM's raison d'être is to bridge the information gap not only between its members but also vertically, i.e. between local stakeholders, researchers and decision-makers in order to promote cooperation.

The CIHEAM therefore is very active in the field of education through its institutes, offering graduate programs in sustainable fishery management and aquaculture, and through its involvement in research and technical networks such as CREAM (Coordinating research in support to application of EAF - Ecosystem Approach to Fisheries- and management advice in the Mediterranean and Black Seas), FISHINMED (Mediterranean Network of sustainable small-scale fishing communities) or PESCAMED (Development of cooperation in the Mediterranean fishery sector). More recently, the NEMO project was launched. This new initiative aims at enhancing the cross-border socio-economic development among coastal communities in Libya and in Neighbouring Countries. In particular, in Tunisia the project is promoting sustainable socio-economic development process for coastal communities in the Medenine governorate, especially at the ports of Zarzis and El Ketf. This is just an example of what CIHEAM is accomplishing in close cooperation with national and local authorities and with regional organisation, particularly the General Fisheries Commission for the Mediterranean (GFCM).

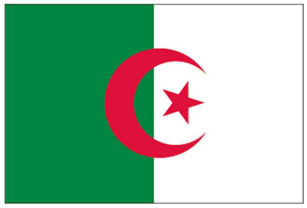
This *Watch Letter* 31 is a continuation of the CIHEAM's efforts to promote the exchange of best practices, the improvement of knowledge on the environmental impact of human activities and the promotion of sustainable fisheries and food chains. The goal of this new issue is also to present the interrelations that exist between the challenges related to the Mediterranean Sea and those related to fishing, one of the most important activity in the region and together with farming, it is probably the oldest one. The publication, presented at the occasion of the regional conference on aquaculture organized in Bari from 9 to 11 December 2014 by the Italian Presidency of the Council of the European Union, together with the GFCM of FAO and in cooperation with the European Commission, also aims to fuel the debate related to "Blue Growth" and "Blue Economy" in the Mediterranean Region by recalling the fact that the Sea remains a strong resource for nutrition and employment but also a major field for innovation. These issues are also highlighted within the Palermo Declaration adopted on November 28, 2014, by the Countries participating in the Euro-Mediterranean Conference on Agriculture under the presidency of the Italian Minister in charge of Agricultural, Food and Forestry Policy, M. Maurizio Martina and the Egyptian Minister of Agriculture and Land Reclamation, M. Adel El-Beltagy.

I express my sincere thanks to the authors and all the persons that have contributed to this new Watch Letter. I would like to thank, in particular, Ms Assunçao Cristas, the Portuguese Minister of Agriculture and Sea, Mr. Sid Ahmed Ferroukhi, the Algerian Minister for Fisheries, Ms. Zakia Driouich Sebbata, Secretary General for Marine Fisheries at the Moroccan Ministry of Agriculture and Marine Fisheries and Mr. Abdallah Srour, the Executive Secretary of the GFCM who kindly agreed to participate to this issue of the *Watch Letter*.



INTERVIEW

Sid Ahmed Ferroukhi
Ministre de la Pêche et des Ressources Halieutiques, Algérie



Pourriez-vous, Monsieur le Ministre, nous donner brièvement les chiffres clefs de la pêche et de l'aquaculture en Algérie, sur le plan économique et social ?

En Algérie, le secteur de la pêche et des ressources halieutiques se caractérise essentiellement par une économie productive renouvelable de 9,5 millions d'hectares de zones de pêche et d'aquaculture, exploités et exploitables au bénéfice direct en matière de revenus et d'emplois, de 550 000 habitants.

Il constitue un potentiel d'impacts significatifs sur l'économie maritime intégrée et le développement local (sur environ 1 600 km de ligne de côte, concernant plus de 14 millions d'habitants, soit 40% de la population totale algérienne).

Le secteur emploi plus de 70 000 professionnels, relativement jeunes (60% des inscrits maritimes ont moins de 40 ans), exerçant au niveau de 39 ports et abris de pêche, avec des moyens de production appréciables, dont 4 500 bateaux.

La consommation apparente de produits de la pêche est issue essentiellement de la production nationale (plus de 80%), contribuant ainsi au renforcement de la sécurité alimentaire dans le pays.

Au début de votre nouveau mandat de ministre de la pêche et des ressources halieutiques, en mai 2014, vous avez annoncé un plan participatif algérien pour développer une approche consensuelle et promouvoir le secteur dans le cadre du prochain programme quinquennal (2015-2019). En quoi consiste-t-il ? Quelles sont les nouveautés par rapport aux politiques précédentes ?

Effectivement, le Plan « Aquapêche 2020 » est le nouveau programme de développement du secteur de la pêche et de l'aquaculture pour la période 2015-2019. Celui-ci s'inscrit dans le cadre de la stratégie de développement et de diversification du système productif national.

Il est attendu de ce nouveau programme une contribution plus effective de l'économie de la pêche et de l'aquaculture aux objectifs de préservation et de création d'emplois, d'impacts sur le développement local au niveau du littoral et des zones intérieures, d'accroissement et de diversification significatifs de l'offre en produits halieutiques et de développement des industries et services liés aux filières de la pêche et de l'aquaculture.

A ce titre, l'innovation apportée par ce nouveau plan réside plus dans l'approche adoptée que dans les domaines à développer. La nouvelle approche prône principalement la concertation élargie et soutenue, avec l'ensemble des acteurs partenaires, dans l'élaboration et l'exécution des différents programmes (i), l'approche filières, pour le développement des actions avec une attention particulière aux marchés (ii), l'intégration intersectorielle (iii) avec la «pescatourisme», l'aquaculture intégrée à l'agriculture et l'intégration de la dimension environnementale dans le développement des activités (AMP) et la coresponsabilité entre les différents acteurs du secteur (iv), notamment les professionnels et l'administration publique (Charte pour une pêche responsable…)

Les systèmes de financement du secteur de la pêche vont-ils évoluer ? Comment traiter plus particulièrement les enjeux des pêches traditionnelles et aider les communautés de petits pêcheurs ?

Les efforts consentis, au cours de cette dernière décennie, tant en matière d'investissements publics qu'à travers l'accompagnement et le soutien des investissements privés, auront permis de développer des capacités nouvelles en matière de capture, de production, de transformation et des services liées à l'économie de la pêche.

Aussi et dans le cadre de la nouvelle stratégie du Secteur à l'horizon 2020, nous avons mis en place un Système d'Accompagnement à l'Investissement Productif dans les filières de la Pêche et de l'Aquaculture (SAIPA), qui constitue un instrument primordial pour la relance et la modernisation du secteur et sa contribution effective au processus en cours de ré-industrialisation et de développement et de valorisation des systèmes productifs nationaux.

En matière de réhabilitation et de distinction de l'activité de pêche artisanale, il sera question de revaloriser cette pêche, dont la flottille représente plus de 50% de la flottille nationale. Dans ce cadre, il est prévu la mise en place d'un programme intégré de la pêche artisanale intitulé « SAIDHIRAFI », basé sur la réalisation d'études socio-économiques localisées, la mise en place de dispositifs législatifs et réglementaires spécifiques, la réalisation de sites de débarquement aménagés, la valorisation de l'outil de production, la formation adaptée des pêcheurs, ainsi que l'intégration des produits de la pêche artisanale au système de commercialisation. Pour renforcer ce programme, un affinement du plan opérationnel et de sa mise en œuvre sera opéré dans le cadre du projet initié, avec l'appui du PNUD et de la FAO, ayant pour objet la formulation d'un programme opérationnel de développement de la pêche et de l'aquaculture, avec une attention particulière à la pêche artisanale.

Les relations entre l'Algérie et l'Union européenne dans le domaine agricole se renforcent. Qu'en est-il dans le secteur de la pêche ? Des accords de jumelage technique et scientifiques sont-ils en préparation ? Peut-on envisager un accord algéro-européen plus large qui concernerait aussi le commerce des produits de la mer ?

La coopération avec l'Union européenne s'est concrétisée à travers les deux principaux projets inscrits entre les deux parties, à savoir, d'une part le projet P3A, relatif à la mise à niveau des capacités du Centre National de Recherche et Développement de la Pêche et de l'Aquaculture (CNRDPA) et qui va aboutir à la signature d'un mémorandum d'entente entre ce Centre algérien et l'IFREMER en France, en vue d'un partenariat stratégique futur entre les deux structures, et d'autre part, le projet DIVECO II, qui est axé sur la modernisation du système productif national.

En matière d'échanges commerciaux entre les deux parties, il convient de rappeler l'accord euro-méditerranéen établissant une association entre l'Algérie et la Communauté Européenne et ses États membres qui a été signé le 22 avril 2002. A cet effet une liste de produits de la pêche a été admise à l'exportation dans les communautés en exemption des droits de douanes et une liste admise à l'importation dans les mêmes conditions.

La coopération internationale dans la pêche et l'aquaculture, comme dans celui de l'agriculture, revêt une importance essentielle. Avec qui l'Algérie entretient-elle des relations et échange-t-elle expériences et projets dans ce domaine ? Quelles sont vos attentes spécifiques vis-à-vis des pays méditerranéens et du rôle du CIHEAM dans cette perspective ?

En matière de coopération bilatérale dans le domaine de la pêche et de l'aquaculture, l'Algérie entretient des relations avec des partenaires privilégiés, notamment avec la République de Corée du Sud, qui se sont matérialisées par une assistance dans le cadre du projet de réalisation d'une ferme pilote pour l'élevage de crevettes marines au niveau à la Wilaya de Skikda (Est d'Alger) et qui est en phase d'exploitation depuis 2011, ainsi qu'un large programme sur la stratégie de modernisation de l'industrie de la pêche.

Aussi, dans le cadre de la coopération entre l'Algérie et l'Espagne, nous avons conclu une assistance technique pour la réalisation d'une ferme d'élevage de poissons marins à Bou Ismail (à l'Ouest d'Alger).

Des discussions sont également en cours avec le Japon dans le cadre du renforcement des capacités pédagogiques de l'Institut National Supérieur de la Pêche et de l'Aquaculture.

En matière de coopération multilatérale, outre les deux initiatives menées dans le cadre euro-méditerranéen mentionnées à la question précédente, il y a lieu de citer par ailleurs :

- Le projet MPRH/FAO/PNUD, relatif à l'« Appui à la formulation de la stratégie nationale de développement de la pêche et de l'aquaculture (avec une attention particulière sur la pêche artisanale) 2015-2020.

- L'accompagnement technique de la FAO pour la mise en œuvre du programme de développement de l'aquaculture marine en en off shore 2014-2020 ».

En matière de perspectives, deux axes importants peuvent être envisagés en matière de renforcement de la coopération et pour lesquels le CIHEAM pourrait y contribuer. Il s'agit du renforcement des capacités humaines dans le domaine de la pêche et de l'aquaculture, à travers la formation, ainsi que le soutien à l'organisation de la profession.

A ce titre, suite aux discussions que j'ai eues avec le Secrétaire général du CIHEAM, en marge de la rencontre à Alger des Ministres de l'Agriculture du CIHEAM le 6 février 2014, il a été envisagé de mettre en place une convention cadre de coopération dans le domaine de la pêche et de l'aquaculture entre l'Algérie et le CIHEAM.

Les produits de la mer sont-ils bien perçus par la population algérienne et comment évolue leur consommation dans la société ? Sont-ils pleinement intégrés dans les politiques de nutrition-santé développées par le gouvernement algérien ?

L'étude sur « la consommation de poisson des ménages », réalisée en 2007 et qui a touché plus de 14.000 ménages, a démontré que les produits marins sont appréciés par les consommateurs, tandis que les produits dulçaquicoles le sont un peu moins du fait des habitudes culinaires et alimentaires des ménages algériens.

La consommation moyenne de l'Algérien en poisson a nettement évolué depuis l'an 2000. Celle-ci est passée de 4,06 à 5,9 kg par an et par habitant en 2007, proche du minimum de 6,2 kg préconisé par l'OMS. Cette amélioration s'expliquerait notamment par l'augmentation de l'offre, qui est passée de 113 160 tonnes en l'an 2000 à 147 363 tonnes en 2007.

L'Algérien consomme essentiellement du poisson frais (93% de la consommation moyenne par habitant). Les consommations effectives, en quantité, font ressortir environ 83% de sardines, alors que les espèces préférées font ressortir seulement 50,6% des ménages pour cette espèce. La crevette, le merlan et le rouget recueillent des proportions de préférence largement plus élevées que la part de ces espèces dans la consommation.

L'amélioration de l'état nutritionnel de la population constitue un enjeu majeur dans la politique nutritionnelle menée en Algérie. L'objectif étant d'augmenter l'offre en protéines animales, notamment par l'amélioration de la consommation du poisson sous toutes ses formes (frais, congelé, etc.). L'aquaculture constitue, à cet égard, l'un de nos axes de développement les plus prometteurs pour l'amélioration de la disponibilité de ces produits.

Merci*

** Interview conduite en octobre 2014 par Sébastien Abis.*

INTERVIEW

Assunção Cristas

Minister of Agriculture and Sea, Portugal

Madame Minister, Portugal is a country that is related to the "ocean" both historically and geographically. What does the sea represent for the Portuguese culture and peoples?

In Portugal we have distributed a map, across all schools, whose title is "Portugal is Ocean" *(see below)*. I guess that is pretty clear about our purposes and the relevance we attach to the ocean. With that map, in every single classroom of Portugal, young students get acquainted, very soon in their school life time, about how relevant the sea is in our geography, in our history, in our literature, in the way we see the world.

We are very determined that each Portuguese citizen is aware that 97% of our territory is sea! With this simple initiative we want to show everyone in Portugal that one of our greatest historical resources (for which Portugal has been known all over the world) is, still, one of our greatest values.

In our history, the ocean has been a route of knowledge. Today, being an "oceanic country", as you mentioned in your question, is a challenge and a responsibility: we want to be active players in both using and preserving the ocean, in a sustainable way, creating wealth and jobs and guided by a deep sense of innovation. This is the heart of "blue economy" which is at the forefront of my daily work.

Fishery and aquaculture are an important part of the economy of Portugal. Could you give us the general date and indicate the main strengths of this sector?

Fisheries, aquaculture and related industries accounted for 21% of the total Gross Added Value (GAV) of the Sea Economy, in 2010, as well as for 28% of the employment. This is recent data we have collected for our "National Ocean Strategy 2013 - 2020", recently approved by the Council of Ministers.

Aquaculture, for instance, is one of the fastest growing activities in the most recent years: its production increased 29% in tons and 15% in euros, from 2010 to 2012. We have a National Plan for the Development of Aquaculture, in line with our broader economic purposes. The key idea of our National Ocean Strategy is this: we want to increase in 50% the weight of the Blue Economy in our GDP, from the 2,7% we had in 2012 to approximately 4 to 5% in 2020.

For this we can spare no efforts – from traditional fisheries to aquaculture; from our traditional and renewed canning industry to marine tourism or energy; from biotechnologies to algae, just to name a few.

What are the current policies that Portugal is implementing to develop its blue economy of which the fisheries sector is an integral part?

Smart, Sustainable and Inclusive Blue Growth presents enormous challenges and opportunities for the country. In the framework of our Ocean Strategy we need to value economic, social and environmental sustainability of ocean and coastal areas for the benefit of all.

Portugal has implemented an Interministerial Commission for the Sea, coordinated by the Prime Minister: it brings Ministers together, for a dedicated and consistent reflection on the ocean. We are also developing an instrument, called ITI Mar (Integrated Territorial Investment for the Sea), in the context of the Partnership Agreement between Portugal and the European Commission, to make strategic monitoring and strategic advice in what concerns the utilization of these funds in the ocean, including blue growth.

We are focused on employment hand in hand with sustainability, in a dynamic perspective. We have to create jobs in the blue economy! Thus, it is very important to involve young people, considering training and nautical skills, nautical tourism and coastal and fisheries culture, as well as getting their attention to highly skilled capacities related to the sea opportunities. A better trained society is a more performative one, more motivated and more dynamic.

With which countries in the world does Portugal cooperate most in terms of fisheries and aquaculture? Are there any specific initiatives at Mediterranean level or with some countries of this region?

Portugal is the second largest per capita fish consumer in the world! That means we have to work a lot on that – and we have to fish abroad and to buy a lot of fish to meet the leverage of consumption.

Apart from Norwegian fishing grounds and Svalbard, where Portugal has important cod fishing quotas under the EEA Agreement, the Portuguese fleet benefits from access to fishing possibilities for demersal and pelagic species, crustaceans, tuna species and alike, in the framework of twelve EU Partnership Agreements, mostly in Africa (Morocco, Mauritania, Cape Vert, Guinea-Bissau, São Tomé e Príncipe, Mozambique) but also in the Indian and Pacific Oceans. In international waters outside Exclusive Economic Zones, Portuguese fleet operates in the Atlantic, Indian and Pacific Oceans, in the framework of the various regional fisheries organizations.

An important long distance fleet operates in the North Atlantic and share available fishing quotas such as cod, greenland halibut, redfish and shrimp, in different grounds located in and outside Exclusive Economic Zones, namely in Norwegian waters, in Svalbard international waters and in regulatory areas managed by regional fisheries organizations.

In Central and Southern Atlantic, an important fleet segment (around 350 vessels) operates in waters managed by ICCAT and catch tuna species and swordfish. Portugal has also in place Cooperation Agreements on Fisheries with Angola, Cape Verde, Guinea-Bissau, Mozambique and São Tomé and Principe.

On a multilateral level, we work very closely with the Portuguese speaking countries community, under an agreement established in 1995, in Luanda, at the Conference of Ministers Responsible for Fisheries.

Could you suggest a few recommendations in terms of training, research and agricultural and fisheries cooperation to the CIHEAM of which Portugal is a founding member country since 1962?

I don't want to give any recommendation to CIHEAM or to its members! We are very happy with the relevant work we have been doing in this context. Nothing is done without research and scientific data. If I mentioned innovation a few minutes ago, it goes without saying where innovation comes from: from research, done both at public and private level, by stakeholders at national and international level. In that context, CIHEAM is crucial and we have many scientists who have done part of their careers within CIHEAM and from which we have highly beneficiated.

Cooperation in training and research is a crucial tool for everyone! In particular professional training, related with fisheries and aquaculture are of great importance to support the development of coastal communities and a sustainable use of the Mediterranean.

And, of course, I cannot finish without mentioning that Portugal will host in September 2015 the Ministerial Meeting of CIHEAM, for the first time in decades! We are very happy to welcome CIHEAM and its members in Portugal to discuss, at political level, the challenges ahead for the Mediterranean countries. We are waiting for you! *

** Interview conducted in November 2014 by Sébastien Abis with the support of Duarte Bue Alves*

In the framework of the Italian Presidency of the Council of the European Union, on the 28 November 2014, the Italian Authorities have organised a Euro-Mediterranean Conference on Agriculture in Palermo (Sicily). At the invitation of H.E. M. Maurizio Martina, the Italian Minister of Agriculture, Food and Forestry Policies, the Ministers or the Representatives of 27 countries from the European Union, the Balkans, North Africa and the Middle East as well FAO Director General, M. José Graziano da Silva and several international and regional organisations (European Commission, UfM, ICARDA, CEJA, SWG-RDD) participated to the Conference. The Conference was co-chaired by the Egyptian Minister of Agriculture and Land Reclamation, M. Adel El-Beltagy, who is also the current President of the CIHEAM's Governing Board. The Italian Authorities had mobilised our Organisation to provide scientific support and accompany the preparation of this Conference. The CIHEAM Secretary General, M. Cosimo Lacirignola, also participated to this event during which Euro-Mediterranean countries have discussed issues related to young generations, research and agriculture. Indeed, this Conference intended to enhance the debate on the need for a better Euro-Mediterranean dialogue in the field of agriculture and a greater attention to young people wishing to invest in the agro-food sector and in rural areas.

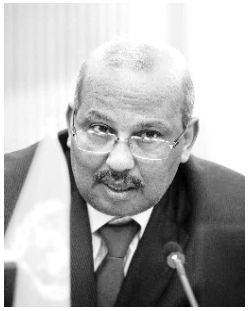
Recognising the progress made in the past years in terms of multilateral cooperation and welcoming the strengthening of agricultural and rural policies pursued by Euro-Mediterranean countries, the Declaration of Palermo was adopted unanimously by the delegations. The text presents several ways to improve the installation of young farmers in agriculture and promote agricultural and rural entrepreneurship. The countries have stressed the fact that jobs in agriculture and in rural territories could be facilitated by the implementation of sustainable political measures and financial resources. They also recalled the importance of international cooperation to address the challenges of food security and the struggle against social and economic exclusion in rural areas.

Convinced by the strategic nature of the sector today and tomorrow, the delegations have also wished to highlight the different opportunities provided by agriculture in the countries of the Euro-Mediterranean region. As such, they have highly stressed the role of sharing knowledge and experiences and therefore research partnerships. The enhancement of best practices and innovation can be combined in the framework of a necessary scientific and agricultural diplomacy in order to adapt to climate and environmental changes.

The Declaration of Palermo presents the specific recommendations intended for national governments, international and regional organisations and the European Union. These recommendations all converge towards the same objective, that of placing agriculture, food security, fisheries and rural development at the heart of Euro-Mediterranean relations. In addition, these recommendations are in line with the framework of issues related to greener, more inclusive and more responsible growth in the Euro-Mediterranean. They form a coherent set of principles and proposals able to contribute to the discussions on the post-2015 agenda and sustainable development goals.

Œuvrer pour une pêche et une aquaculture durables en Méditerranée et en mer Noire

Abdellah Srour
Secrétaire Exécutif
CGPM



Dominique Bourdenet
Rédactrice scientifique
CGPM

Ahmed Siliman
Juriste consultant
CGPM

Nicola Ferri
Responsable des pêches
chargé des questions juridiques et institutionnelles
CGPM

La Commission générale des pêches pour la Méditerranée (CGPM) comprend actuellement 24 membres, dont 22 pays du pourtour de la Méditerranée et de la mer Noire (Albanie, Algérie, Bulgarie, Chypre, Croatie, Égypte, Espagne, France, Grèce, Israël, Italie, Liban, Libye, Malte, Maroc, Monaco, Monténégro, Roumanie, Slovénie, Syrie, Tunisie, Turquie) ainsi que l'Union européenne et le Japon qui contribuent à son budget autonome assurant le financement de ses activités.

La Commission a son siège à Rome (Italie) et gère ses activités par le biais de son Bureau et de son Secrétariat. Elle se réunit une fois par an et travaille grâce à l'appui fourni par ses comités techniques : le Comité scientifique consultatif (CSC), le Comité de l'aquaculture (CAQ), le Comité d'application (CoC), le Comité de l'administration et des finances (CAF) et leurs organes subsidiaires, y compris le Groupe de travail ad hoc pour la mer Noire (WGBS).

Zone de compétence de la CGPM

Promouvoir la croissance bleue dans un secteur en pleine expansion

Aujourd'hui, le secteur de la pêche et de l'aquaculture a un rôle essentiel à jouer pour relever l'un des plus grands défis mondiaux : nourrir une population mondiale qui devrait atteindre 9,6 milliards de personnes en 2050[1]. Face à une demande internationale croissante de poisson et de produits de la pêche, une source vitale de protéines et de nutriments essentiels, les États s'efforcent de tirer parti des possibilités offertes par ce secteur.

D'après l'Organisation des Nations Unies pour l'alimentation et l'agriculture (FAO)[2], la production halieutique mondiale (production de l'aquaculture et pêche de capture) a régulièrement augmenté au cours des cinq dernières décennies et l'offre mondiale de poisson destiné à la consommation a progressé avec un taux de croissance annuel moyen de 3,2 %. Avec 93,7 millions de tonnes en 2011, la production mondiale de la pêche de capture a quant à elle établi son deuxième record historique (93,8 millions de tonnes en 1996).

Dans ce contexte, il est plus que jamais indispensable que bien-être environnemental et bien-être humain convergent de façon harmonieuse et cohérente, notamment grâce à une pêche et une aquaculture responsables, afin de garantir une prospérité durable à long terme. La nécessité d'assurer un développement durable des pêches est préconisée par la Convention des Nations Unies sur le droit de la mer (UNCLOS), entrée en vigueur en 1994, et elle est ancrée dans les principes du Code de conduite pour une pêche responsable de la FAO, qui remonte à 1995. Pour assurer une gestion écosystémique plus généralisée et une meilleure gouvernance du secteur, la FAO promeut en outre la Croissance bleue, cadre cohérent d'une gestion socioéconomique durable de nos ressources aquatiques qui met l'accent notamment sur la pêche de capture, l'aquaculture, les services écosystémiques, le commerce et la protection sociale.

Les organisations régionales de gestion des pêches : un outil essentiel pour la gestion responsable des ressources biologiques marines

En vertu de la législation internationale, les pays intéressés par l'exploitation de ressources biologiques marines dans certaines zones géographiques sont tenus de coopérer. Le rôle principal des organisations régionales de gestion des pêches (ORGP) est de fédérer les efforts des États pour veiller à la gestion, la conservation et la protection des ressources biologiques marines, conformément au mandat de leurs conventions respectives. Il s'agit d'organismes internationaux mis en place par des pays ayant des intérêts communs en matière de pêche dans une zone géographique spécifique.

Certaines organisations sont chargées de gérer l'ensemble des stocks de poissons d'une zone donnée, par exemple l'Organisation des pêches de l'Atlantique Nord-Ouest (NAFO), l'Organisation des pêches de l'Atlantique Nord-Est (NEAFC) et la Commission générale des pêches pour la Méditerranée (CGPM), tandis que d'autres se concentrent sur des espèces hautement migratoires évoluant au sein de zones géographiques beaucoup plus vastes, par exemple la Commission des thons de l'océan Indien (CTOI).

Les ORGP sont constituées à la fois de pays dits « côtiers », situés dans la région concernée, de pays ayant des intérêts dans les pêcheries de cette région et d'organisations d'intégration économique, telles que l'Union européenne. Les ORGP n'ont pas seulement un rôle consultatif : elles ont aussi le pouvoir de fixer des limites aux captures et à l'effort de pêche, de définir des mesures techniques et de contrôler l'application des obligations.

Créée en 1949 en vertu des dispositions de l'article XIV de la Constitution de la FAO, la CGPM est une ORGP dont la compétence s'étend à la Méditerranée et à la mer Noire. La CGPM a pour objectif principal de promouvoir la conservation, la gestion et l'utilisation rationnelles des ressources biologiques marines ainsi que le développement durable de l'aquaculture dans sa zone d'application. Elle offre à ses membres un appui scientifique, technique et juridique et représente également un levier pour le partage d'informations et de connaissances dans l'ensemble de la région.

Relever des défis majeurs pour l'avenir des pêches et de l'aquaculture en Méditerranée et en mer Noire

Aujourd'hui, le constat dressé par les évaluations scientifiques sur l'état des stocks halieutiques dans la région est alarmant : plus de 75 % stocks de poissons en Méditerranée et en mer Noire font l'objet d'une surpêche[3].

Face à cette situation, il est urgent de se mobiliser pour mettre en place des stratégies concertées en agissant sur plusieurs fronts. La Commission a le pouvoir d'adopter des mesures contraignantes pour ses membres et peut jouer par conséquent un rôle décisif dans la conservation et la gestion des pêches en Méditerranée et en mer Noire

Dès 2005, la CGPM a été l'une des premières à bannir au-delà de 1 000 mètres le chalutage de fond, la technique de pêche en eau profonde la plus commune. Une avancée considérable vers une pêche durable en Méditerranée qui a permis à la région de se propulser au premier rang en matière de gestion de la pêche.

[1] *FAO. 2014. La situation mondiale des pêches et de l'aquaculture. Rome. 255 pages.*
[2] *Idem.*
[3] *Évaluations des stocks validées par le Comité scientifique consultatif de la CGPM en 2014.*

Parmi les décisions récentes, l'adoption en 2013 d'un plan de gestion des stocks de petits pélagiques en mer Adriatique et la mise en place de mesures de gestion harmonisées en mer Noire visant à réduire la mortalité du turbot et à minimiser les effets de cette pêche sur les autres espèces telles que les cétacés et les oiseaux marins ont été saluées comme des efforts efficaces et prometteurs. La CGPM poursuit également son travail avec ses États membres et avec la FAO en vue de mettre au point des instruments de gestion applicables à d'autres pêches dans la région, d'améliorer la sélectivité des engins de pêche et de contrôler l'effort de pêche.

Parallèlement à ces mesures contraignantes, la CGPM encourage l'établissement de zones marines protégées (y compris les zones de pêche à accès règlementé) afin de conserver les stocks menacés ainsi que les actions visant à renforcer le contrôle des navires et à lutter contre la pêche illégale. La pêche illicite, non déclarée et non réglementée (INDNR) représente en effet une menace dont l'ampleur est difficile à évaluer. À travers l'adoption de deux feuilles de route pour lutter contre la pêche INDNR en Méditerranée et en mer Noire et la diffusion d'une liste des navires présumés pratiquer la pêche INDNR, la CGPM déploie tous ses efforts afin d'enrayer ce fléau.

Depuis plusieurs années, la CGPM se penche en outre avec intérêt sur la pêche artisanale, une tradition séculaire dans l'ensemble des pays du bassin méditerranéen et de la mer Noire. Malgré son importance, ce secteur doit encore gagner la place qui lui revient au sein des politiques régionales des pêches. Après le succès remporté par le Premier symposium régional sur la pêche artisanale durable en Méditerranée et en mer Noire[4], organisé à Malte en décembre 2013, la Commission vient de lancer un premier programme régional de coopération visant à promouvoir le développement durable de la pêche artisanale et s'apprête à organiser une deuxième manifestation régionale qui se tiendra en Algérie en mai 2015.

Face aux enjeux actuels en matière d'environnement, de sécurité alimentaire et de développement durable, l'aquaculture a, elle aussi, un rôle non négligeable à jouer. Elle offre en effet un énorme potentiel pour fournir des produits sains et nutritifs afin de répondre à la demande croissante de produits de la pêche. Promouvoir le développement durable de l'aquaculture constitue aujourd'hui plus que jamais un impératif, et c'est la mission que s'est donnée la CGPM afin d'assurer une croissance cohérente et responsable de ce secteur dans l'ensemble de la région.

C'est dans ce contexte qu'a vu le jour, fin 2013, la première plateforme aquacole multi-acteurs de la région, sous l'égide de la CGPM. Grâce à la participation active de toutes les parties prenantes, elle offre un forum novateur pour partager les expériences et les connaissances sur des aspects cruciaux tels que la réglementation, l'environnement et la gestion des maladies, la qualité des produits et le marché, la technologie et l'innovation.

Vers une meilleure gouvernance des pêches et de l'aquaculture en Méditerranée et en mer Noire

Toutefois, les acteurs de la région ont récemment pris conscience que le moment était venu de passer à une vitesse supérieure et de promouvoir un engagement politique des pays afin d'appuyer le développement durable de l'aquaculture à l'échelle régionale tout en tenant compte des priorités et des spécificités locales. Pour tirer parti de l'élan imprimé par cette volonté, une Conférence régionale intitulée *« la Croissance bleue en Méditerranée et en mer Noire : développer une aquaculture durable à l'appui de la sécurité alimentaire »* sera organisée du 9 au 11 décembre 2014 à Bari, au siège du CIHEAM, dans le cadre de la Présidence italienne du Conseil de l'Union européenne. Cette manifestation constituera un moment fort pour examiner les enjeux du secteur et mobiliser tous les acteurs afin d'établir une stratégie concertée pour l'aquaculture en Méditerranée et en mer Noire.

Dans le domaine de la pêche également, la situation actuelle et les défis à l'horizon appellent à un renforcement de la coopération, non seulement entre les États mais aussi entre les différentes organisations compétentes en matière de pêche. La CGPM collabore activement avec d'autres ORGP et des organisations telles que le CIHEAM par exemple, avec l'appui des Nations-Unies et de ses institutions spécialisées, afin de coordonner les efforts des États dans la région, de renforcer les capacités et de mener à bien des activités présentant un intérêt commun, dans le droit fil du Code de conduite pour une pêche responsable de la FAO.

C'est dans cette même optique que la CGPM s'attache à renforcer ses liens avec les pays membres et non-membres des bassins de sa zone de compétence, par exemple dans le cadre de son Groupe de travail ad hoc pour la mer Noire, et encourage le dialogue avec tous les États riverains afin d'atteindre des objectifs de gestion intégrée des pêches à l'échelon régional.

Afin de renforcer son efficacité et de mieux relever ainsi les défis de demain, la CGPM a lancé un processus de modernisation de son cadre juridique et institutionnel. En mai 2014, les membres de la Commission ont approuvé un quatrième amendement à l'accord portant création de la CGPM. Une révision du règlement financier et du règlement intérieur est également en cours. La Commission espère ainsi se doter de mécanismes plus efficaces pour renforcer la gouvernance du secteur et assurer une meilleure application des décisions adoptées, et ce, dans une perspective de durabilité à long terme des pêches, de l'aquaculture, de leurs ressources et de leurs écosystèmes en Méditerranée et en mer Noire.

[4] *Site de la manifestation : ssfsymposium.org*


Presidenza Italiana del Consiglio dell'Unione Europea
italia2014.eu
MINISTERO DELLE POLITICHE AGRICOLE ALIMENTARI E FORESTALI
European Commission
Regional Aquaculture Conference 2014
Blue Growth in the Mediterranean and the Black Sea: Developing Sustainable Aquaculture for Food Security
9-11 December 2014
CIHEAM-IAM, Bari, Italy
Food and Agriculture Organization of the United Nations
GFCM
CGPM
www.aquaculture2014.org

Le plan Halieutis : une ambition renforcée du Maroc pour le secteur de la pêche maritime

Zakia Driouich Sebbata
Secrétaire Générale du Département de la pêche maritime
Ministère de l'Agriculture et de la Pêche Maritime, Maroc

La pêche, secteur stratégique

Le Royaume du Maroc, en tant que puissance halieutique par excellence, dispose d'une importante flotte de pêche active constituée de quelques 15 249 barques, 1 769 navires de pêche côtière et 305 navires hauturiers. En 2013, l'ensemble de cette flotte a réalisé l'équivalent de 1 252 000 tonnes (t.), toutes espèces confondues, avec une prédominance de 83% des variétés pélagiques, notamment la sardine (56%) et le maquereau (11%). Cependant, la valeur totale de ces prises ne représente que 27% du chiffre global.

Avec 48 000 t. de poulpe et 22 000 t de seiche, en particulier, les céphalopodes interviennent modestement en volume pour 7% du total des captures, mais significativement en valeur (43%).De son côté, si le poisson blanc ne dépasse pas les 8% du total des captures, les valeurs engendrées par cette pêcherie restent très importantes, soit 20% du chiffre global. Même constat pour les crustacés qui interviennent pour seulement 1% en volume mais pour 9% en valeur.

En matière de valorisation des produits de la mer à terre, le Maroc dispose de 374 unités composées de 45 conserveries, 34 usines de semi-conserve, 15 unités de farine de poisson, 53 établissements dédiés au poisson frais, 178 unités de congélation et 49 de traitements divers. Pour la même période, le Maroc a exporté un total de 540 000 t. pour une valeur de 1 718 000 USD, dans lequel les céphalopodes congelés et la conserve de sardine représentent respectivement 29% et 26% des valeurs totales. La farine de poisson (6%), la semi-conserve (9%) et le poisson frais (4%) réalisent un modeste chiffre d'affaires à l'export de 19%.

La stratégie Halieutis

Sous la présidence effective de Sa Majesté le Roi Mohammed VI, le Plan « Halieutis » a été lancé à Agadir le 29 septembre 2009 en présence, notamment, de toutes les filières professionnelles affiliées au secteur de la pêche maritime marocaine.

Il s'agit d'une stratégie globale, imprégnée d'une vision holistique pour la relance de l'ensemble des segments d'activité liés à la pêche en mer. Une approche intégrée qui serait à même de booster la profession en optant pour une exploitation rationnelle de la ressource halieutique et en ouvrant des voies d'appui qui viendraient renforcer le capital biologique marin afin d'assurer une véritable pérennité à ses différentes composantes. Un patrimoine national, en croissance continue, qui fait appel à une panoplie de mesures d'accompagnement parallèles en vue de lui insuffler un nouvel élan pour le mettre au diapason des nouvelles donnes écosystémiques, socioéconomiques, et environnementales.

A spectre multidimensionnel, la stratégie « Halieutis » vise, à l'horizon 2020, à tripler la contribution du secteur des pêches maritimes au PIB national pour le porter à presque 22 milliards de Dirhams et à augmenter, d'une manière significative, la consommation du poisson au Maroc pour atteindre la moyenne internationale des 16 kg par habitant.

Pour les filières satellitaires à terre, pas moins de 16 projets sont programmés afin de booster les segments de transformation et de valorisation des produits de la mer. Parallèlement et au titre de la compétitivité, trois nouveaux pôles ont été identifiés sur la façade atlantique : Tanger, Agadir et Laâyoune-Dakhla.

Les effets induits du Plan « Halieutis » permettront l'emploi direct à terre de quelques 115 000 personnes ; des effets qui sont générés par une production en mer équivalente à 1,660 million de tonnes et des exportations de plus de 3 milliards de dollars US. Notons que 16 projets stratégiques ont été prévus par ce Plan et qui ont pour axes principaux la durabilité de la ressource, la performance et la compétitivité du secteur, avec des actions d'accompagnement transversales visant en particulier le contrôle, l'attractivité des métiers et une meilleure gouvernance du secteur.

Enfin, pas moins de 5 outils liés à la gouvernance du secteur ont été mis sur place, à savoir l'agence nationale pour le développement de l'aquaculture, le Comité national de la pêche, le Centre de valorisation des produits de la mer, l'Observatoire de l'emploi du secteur halieutique et le Fonds pour l'ajustement et la modernisation de l'effort de pêche.

Etat d'avancement de la stratégie

En matière des réalisations de la stratégie « Halieutis », six axes importants peuvent constituer d'ores et déjà sa déclinaison sur le terrain. Il s'agit en particulier des plans d'aménagement des pêcheries, du programme national d'aménagement du littoral, de la construction de halles nouvelle génération, des marchés de gros de poisson, de la lutte contre la pêche illicite, non déclarée et non réglementée, et de la promotion de l'aquaculture.

Les plans d'aménagement des pêcheries

Trois principales pêcheries bénéficient, à l'heure actuelle, d'un plan d'aménagement spécifique. Il s'agit en l'occurrence des petits pélagiques du stock C dans le Sud du Maroc, du poulpe et des crevettes. Ces plans visent très particulièrement la préservation de la ressource et des écosystèmes marins et à procurer une meilleure visibilité aux professionnels afin de stimuler l'investissement, aussi bien en matière de modernisation des navires que pour le développement de l'industrie de transformation, en général.

Le programme national d'aménagement du littoral

Il s'agit de réaliser les infrastructures de base pour l'exercice de l'activité de pêche et de créer des micro-pôles de développement qui sont à même de booster l'emploi et toutes activités de nature à sédentariser la population et à atténuer le phénomène de l'exode rural. 43 sites aménagés, dont 7 sont en construction. Pour couvrir l'ensemble du littoral national, il est prévu d'avoir 1 site tous les 55 km. Il s'agit d'un investissement de 250 millions USD.

Les halles de nouvelle génération dans les ports de pêche

Parmi les objectifs assignés à ces infrastructures, il y a lieu de signaler la séparation des flux des produits et des personnes, l'application du principe de « la marche en avant », du contrôle de la température et de l'optimisation de la qualité des produits de pêche. 13 halles de ce type sont prévues, dont 7 sont opérationnelles, le reste est en cours de construction ou en phase d'études. Le montant d'investissement prévu pour cette composante est de l'ordre de 50 millions USD.

Les marchés de gros de poisson

Parmi les objectifs assignés à cette opération, on peut citer l'accroissement de la consommation du poisson au niveau national, doter les régions du Maroc en infrastructures normalisées pour assurer une disponibilité permanente d'un produit halieutique de qualité, et enfin permettre un contrôle permanent des conditions d'hygiène et de salubrité des produits de la mer. Il s'agit d'un investissement de 60 millions USD pour la réalisation de 8 marchés.

La lutte contre la pêche illicite, non déclarée et non réglementée (INN)

Cette action s'inscrit dans le cadre de la lutte contre le secteur informel, en général, et par conséquent l'alignement du secteur sur la réglementation internationale qui vise à prévenir, voire à éradiquer la pêche INN. Le statut avancé du Royaume avec l'UE incite également les pouvoirs publics marocains à se mettre au diapason de la réglementation européenne en la matière. A cet effet, le Département de la Pêche Maritime a mis en place une procédure pour lutter contre cette forme de pêche et ce, notamment, en assurant une traçabilité le long de la chaîne de valeur des produits de la mer et en informatisant le processus de certification.

La promotion de l'aquaculture

Pour ce faire, le Maroc a créé une Agence Nationale de Développement de l'Aquaculture (ANDA) qui a pour mission, en particulier, de mettre en place une stratégie spécifique à cette composante, de promouvoir les activités aquacoles et de développer les échanges à l'export comme sur le marché national, et de créer un « guichet unique » pour accompagner l'investissement dans cette filière. A cette fin, trois projets sont en cours de réalisation et qui visent à définir un cadre juridique adapté, à élaborer des plans d'aménagement du littoral à des fins aquacoles et à lancer des projets pilotes (écloseries, fermes de conchyliculture et d'algoculture).

Le salon Halieutis, rendez-vous incontournable

La 3ème édition du Salon Halieutis aura lieu du 18 au 22 février 2015 à Agadir. L'événement à dimension internationale, est le plus important au Maroc et dans la région à être dédié aux métiers de la pêche maritime, de l'aquaculture et de la valorisation des produits halieutiques. Il intervient dans une conjoncture marquée par la mise en œuvre d'une ambitieuse stratégie de développement intégré du secteur halieutique marocain à l'horizon 2020, laquelle repose sur trois axes : la durabilité, la compétitivité et la performance. La tenue de cet événement, d'envergure internationale, vise à mieux faire connaître les développements et les perspectives d'évolution de la filière pêche au Maroc par le biais de la stratégie « Halieutis ».

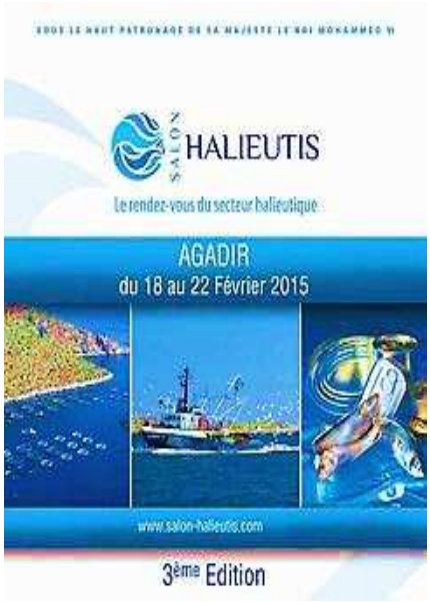
A plus grande échelle, le Salon «Halieutis » a pour ambition de créer de nouvelles opportunités d'échange et de partenariat à travers :

- La facilitation des échanges et des relations d'affaires (nord-sud et sud-sud) dans la filière pêche en agissant en tant que plate-forme (HUB) de promotion des échanges et de la coopération entre le Maroc, l'Europe et les pays du Continent Africain,
- L'organisation de rencontres « BtoB » entre professionnels intéressés par des contacts ciblés à l'avance,
- Des espaces privilégiés d'exposition et d'échange,
- L'invitation de plusieurs délégations ministérielles et d'opérateurs de nombreux pays pour des contacts fructueux de haut niveau.

Le Salon Halieutis 2013 a rassemblé 225 exposants et 350 marques, issues de 33 pays. 45000 visiteurs ont parcourus les 16000 m² d'exposition. Le Salon était organisé autour de six pôles thématiques : flotte et engins de pêche, valorisation et Process, Ressources halieutiques, Formation, International et Institutionnels.

L'ambition 2015 est ambitieuse. 350 exposants sont attendus et le nombre de visiteurs est prévu à la hausse sachant que ce sont désormais 20000 m² d'exposition qui seront proposés. La prochaine édition du Salon Halieutis reposera cette fois-ci sur 7 pôles thématiques suivants : Flottes et Engins, Valorisation et Process, Ressources, Formation, International et Régions, Institutionnels, Animation.

Plus de 35 pays devraient participer à cette nouvelle édition, qui confirmera la volonté du Royaume du Maroc à poursuivre un développement multidimensionnel de son secteur de la pêche, afin qu'il soit économiquement performant et écologiquement durable. Pour ce faire, le soutien aux pêcheurs est indispensable, tout comme à tous les acteurs de la filière halieutique pour permettre de rapprocher l'offre avec une demande plus forte et plus exigeante.

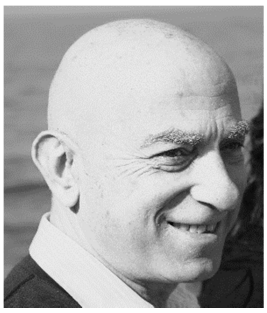


Contact pour le Salon Halieutis 2015

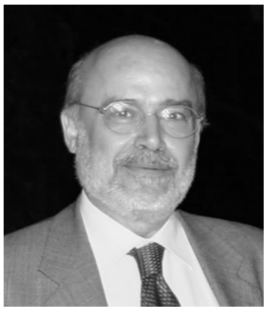
Commissariat Salon Halieutis
Avenue du Prince Moulay Abdellah,
Immeuble A – 1er étage - Apt 20 - 80000 Agadir
Tél : +212 (0) 528 84 09 57 /+212 (0) 6 61 19 50 17
E-mail : commissariat@salon-halieutis.com

Research Vessel CANA-CNRS
Five years of research activities in the Eastern Mediterranean Sea

Gaby Khalaf
National Council for Scientific Research, CNRS Lebanon

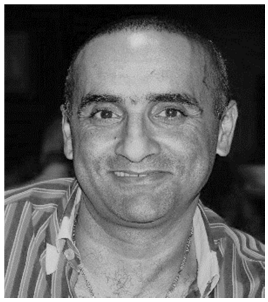


Alexandre Sursock
National Council for Scientific Research, CNRS Lebanon



Stefano Lelli
National Council for Scientific Research, CNRS Lebanon

Milad Fakhri
National Council for Scientific Research, CNRS Lebanon



Mouïn Hamzé
National Council for Scientific Research, CNRS Lebanon

The Research Vessel (R/V) CANA-CNRS, a former fishing trawler, reveals the story of a success based on mutual support and collaboration resulting in placing science at the service of the Lebanese community. This story was jointly initiated by the Lebanese National Council for Scientific Research (CNRS-L) and the CIHEAM-Mediterranean Agronomic Institute of Bari that played a major role in the rehabilitation of the vessel.

Five years after the acquisition of the vessel, donated by the Italian Government (2009), marine research activities undertaken by the CNRS-L have experienced a remarkable growth. CNRS' Marine and Geophysical Centres in particular benefitted from the acquisition of up to date equipment (Multi-Beam Echo-Sounder, Rosette with 12 bottles, CTD, Box Corer, Sea Level Recorders) that allowed scientists to approach new horizons for marine research in Lebanon.

Research Vessel CANA-CNRS

This scientific research activities described in this paper were conducted as part of the four programs of scientific investigation tackled by the CANA project on "Establishing Monitoring and Sustainable Development of the Lebanese Sea", funded by the Italian Government and the CNRS-L. The four programmes are as follows: coastal bathymetry, fisheries and cetaceans, pollution. During its 5 years of implementation, CANA worked as a platform to attract international donors and partners (CIHEAM, WHO, RAC / SPA, FAO, the Italian Government, ACCOBAMS, Lebanese Public Sector) to underpin its field of intervention both at local and regional level (Khalaf et al., 2013a).

Scientific activities and Results

Sea Physical Environment

Mapping the topography of the seabed, and producing a morpho-bathymetric map represents a priority for Lebanon in order to valorise the biological and cultural resources of the sea. Task 1 of the CANA project aims at conducting a bathymetric study in the area of coastal waters to complete the study executed by a French-Lebanese team with the naval means of the IFREMER in 2003.

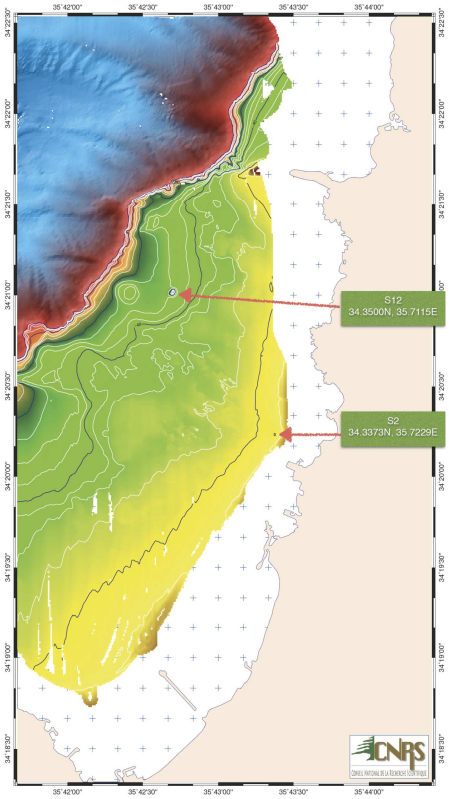
This cruise called Shalimar revealed important morpho-bathymetric features offshore Lebanon but left a strip of coastal waters unsurveyed. This strip represents the core of our research and for this purpose the high-resolution MultiBeam Echo-Sounder (MBES) system Kongsberg EM 710 was installed on R/V CANA-CNRS. The MBES has already revealed extraordinary information on the Lebanese seafloor such as steep dramatic canyons cutting the continental shelf of Beirut and Jounieh, objects of different nature hidden by the profundity of the sea, i.e. shipwrecks, etc. Down to 700 meters depth, the EM 710 performed to provide high quality and reliable data that can be used for hydrographic and nautical maps.

After 600 Km of navigation, almost at constant speed of about 6 knots, data were acquired over Central Lebanese coastal waters. Data were subsequently converted by the associated software into a universal text file where the measurements are represented in xyz file format, one depth measurement per line. The basic document is constituted by 20 million lines of genuine unprocessed depths.

Following the request of the Lebanese Prime Minister, CANA team performed a survey (August-September 2014) to establish the presence of marine fresh water resurgences and monitor water quality in northern Lebanese waters. The areas of Jounieh and Enfeh/Chekka were surveyed over more than 60 hours of navigation with the goal of determining those crater-like structures that are believed to produce resurgences.

Two major structures were mapped and thoroughly investigated and different water parameters (temperature, pH, dissolved oxygen, salinity and conductivity, nutrients and bacteria) were examined. These structures attracted the interest of geophysicists for their uncommon features and further studies are needed to provide a comprehensive understanding of the intricate submarine hydrologic system in Lebanese waters.

Figure 1
The result of the survey conducted between Chekka and Anfeh in September-October 2014



Hydrology, Hydrobiology and Biodiversity

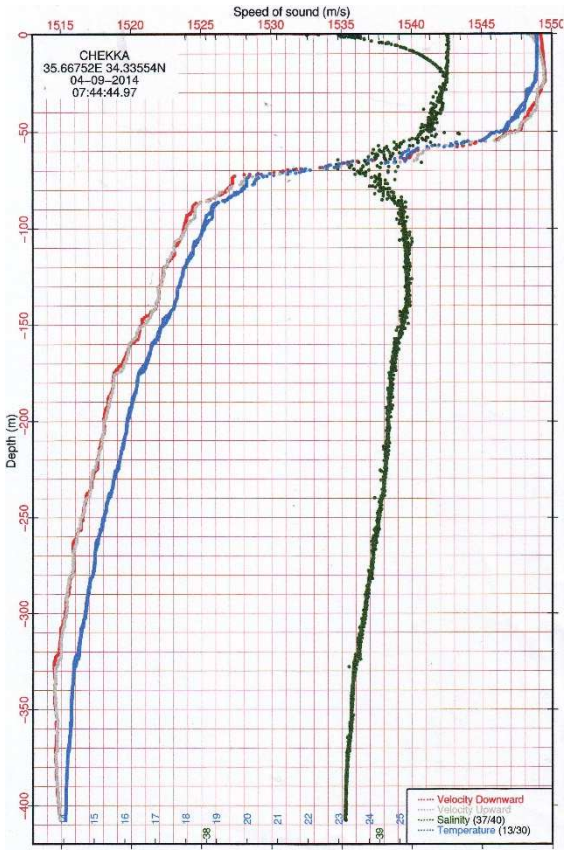
This research programme aims at determining and monitoring the quality of marine waters, studying vertical variations of the physic-chemical parameters and plankton populations and examining the sediments and the associated fauna. Mapping and analysis of the Lebanese marine biodiversity may support the identification of stakeholders' priorities and interests leading to a correct identification of conservation areas and, in general, to an efficient management of the coastal zone.

In the period between June 2010 and April 2014, 21 sites along the coastal area have been inspected to monthly determine surface inshore parameters such as temperature, salinity, nutrients, chlorophyll-a, pheopigments and microbiological features (i.e. faecal coliforms & faecal streptococci). Two sites (coastal and offshore stations) have been monthly surveyed in the area of Batroun to collect data on temperature, salinity, nutrients,phytoplankton, microzooplankton, zooplankton, chlorophyll-a, pheopigments, CO_2 acidification of the sea & partial CO_2.

In the same period, Toxic algae with particular focus on the dinoflagellate *Ostreopsis siamensis* were closely examined in 2 rocky sites (Abboud-Abi Saab et al., 2013).

Several water column profiles down to 750 m were collected with CTDs in order to study seasonal variations of seawater characteristics and to relate them to water contamination and global warming as well as to recalculate the variation of sound velocity, a crucial parameter for the calibration of the MBES transducer.

Figure 2
September 2014. Vertical evolution of water temperature, salinity and sound velocity over the water column in Chekka (North of Lebanon)



CANA has joined in the project ALTIFLOAT which was set up and implemented by multiple Mediterranean partners. The outputs gave information on surface currents generated mainly by winds and the use of verified algorithm and provided information on the dispersion of different types of contaminants along the Lebanese coastal and Eastern Levantine waters. Up till now, CANA deployed 12 Iridium drifters 2014 as well as one Argo float in the offshore water of Tyre between August 2013 and August 2014.

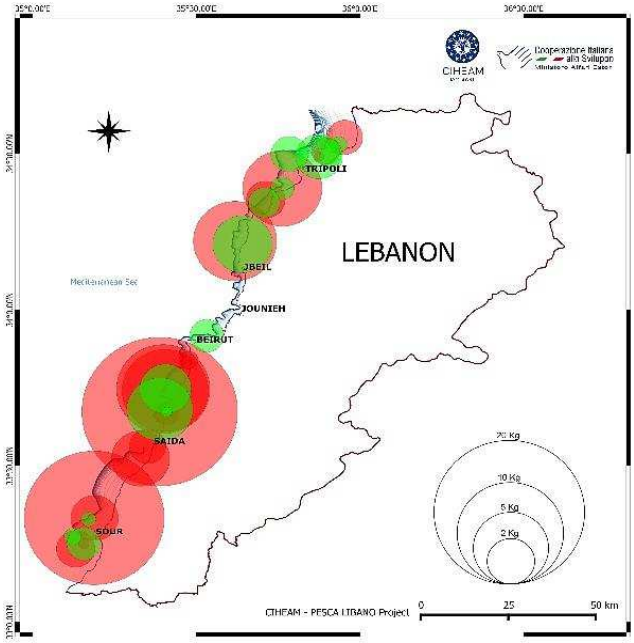
Under the coordination of international institutions, in the framework of the "Strategic Action Programme for the Conservation of Biological Diversity (SAP BIO) in the Mediterranean Region", aiming at establishing a well-managed, ecologically coherent network of Marine Protected Areas (MPAs) in Lebanese waters, CNRS-L carried out activities through the constant support of the CANA-CNRS vessel's staff and crew. In 2012 and 2013, two teams of international researchers had extensively surveyed the regions of Enfeh, Heri and Chekka (north) and Naqoura, Sarafand, Tyre and Saida (south) to study the benthic and nektonic biodiversity, through various field trips supplemented by satellite images. 18 MPAs coastal and marine sites, from Naqoura to Aarida and including estuaries and deep waters sites, have been proposed.

Fisheries and Mammalian

Capture fisheries and aquaculture are considered as a strategic component of the CANA project. A continuous collaboration with the Lebanese Ministry of Agriculture (MoA) has been developed in order to maximise the effectiveness of its efforts, creating synergies with the actors involved in the sector.

The project "Technical Assistance to the Ministry of Agriculture in the field of fishery development, CIHEAM-PESCA LIBANO" funded by the Italian Ministry of Foreign Affairs was run in partnership by CIHEAM-IAM Bari (leading partner), Istituto Agronomico per l'Oltremare, MoA and CNRS-L. With the support of CANA staff and its facilities; the NCMS-CNRS performed the action "Marine resources mapped, identified and better exploited" implementing two national fishing surveys aiming at collecting quantitative abundance and biological data on the main fish and shellfish stocks occurring along the Lebanese coasts. Data collected are a prime in Lebanon. They were acquired lowering experimental nets in semi-random points to reduce bias associated with the activities of the fishermen oriented to specific fishing grounds. 120 species of bony fishes, selaceans, cephalopods and crustaceans were collected, 16 of which are Lessepsian species particularly abundant in shallower waters. The most abundant species in all Lebanese waters is by far the redcoat, *Sargocentron rubrum*.

Nets filled with individuals of redcoat, *S. rubrum* *(picture below).*



Geographical distribution of *S. rubrum* in Lebanese waters (bubble plots of the observed abundances). Green bubbles: survey 2012; Red bubbles: survey 2013 *(map on the right).*

Autochthon species prevail in assemblages of deeper waters. Those assemblages are mainly characterised by commercially valuable species such as the red mullets, the European hake and the red giant shrimp, *Aristaeomorpha foliacea* (Lelli et al., 2014).

A research project on cartilaginous species along the Lebanese coast aiming at establishing the ecology, relative abundance and distribution of sharks, rays, and chimeras found off the Lebanese coast at different depths has been initiated. In the study 225 specimens of cartilaginous fish were sampled constituted of 25 cartilaginous fish species (11 sharks and 14 batoids). Batoid species such as guitar fishes, the bluntnose sixgill shark, and requiem sharks (family Carcharhinidae) showed high commercial significance in Tripoli and in Sidon.

The presence of cetaceans in Lebanese marine waters was analysed for the first time between 2009 and 2013. The results highlight the regular presence of bottlenose dolphins in a central area of the Lebanese coast, adding a piece to the puzzle of the Mediterranean knowledge of this species' distribution. 91 individuals were detected in 32 sightings. The size of the groups ranged between a minimum of one individual and a maximum of 7 young and adult individuals. The individual's relative abundance and sighting rate are higher in Beirut area (0.11 ind·km-1 and 0.032 sighting·km-1, respectively) compared to values obtained for the entire Lebanese coast (Khalaf et al., 2013b). Noteworthy that this higher abundance in Beirut waters should conduct to identify this zone as an area of special interest for the conservation of this species in the Lebanese waters.

On the other hand, *Tursiops truncatus* occurs in higher numbers beyond the continental shelf, indicating that the bottlenose dolphins in the Lebanese waters belongs to the offshore ecotype. These results also constitute a solid base to other research that can study the impact of anthropogenic factors on these species and evaluate their heavy metal and organic contaminant levels.

Coastal Pollution

The "Coastal pollution" task is concerned with human activities causing pollution and performs measurements of chemical contamination levels along the Lebanese coast, in addition to bacteriological, organic (hydrocarbon) and heavy metal contaminants (HMCs). The main output is the pollution risk map and the proposal for coastal protection.

Research activities for the analysis of sediment characteristics of different coastal areas of the Lebanese sea were executed between 2011 and 2014 aiming to evaluate the state of environment of these zones subject to the impact of various anthropogenic stresses such as chemical industries, treated and untreated sewage water and urban development explosion. Some of these studies have been published in the last year and others are still on-going. The nature of chemical by-products discharged from the phosphate fertilizers plant at Selaata and the factory of cement at Chekka in combination with the hydrodynamic movements and the geographical distribution of the investigated marine zones greatly influenced the structure and composition of the sediment and led to the variability of the obtained results. These two chemical plants appear to increase the level of stress toward the marine environment of the Lebanese northern coast (Fakhri at al., 2014). Further studies on sediments characteristics are still on-going and covering hot spots of the Lebanese coast.

The CANA experts working on HMCs are carrying on with analyses of the levels of lead, cadmium and copper in marine sediments in different ports. This assessment is enabling researchers to evaluate for the first time the extent of trace metal contamination in these sediments. To evaluate the risk that these metals represent to living organisms, a study of their mobility in the presence of chemical reagents (ethylene diamine tetraacetic acid) is performed. On the other hand, analyses on the levels of some organic contaminants (Polycyclic Aromatic Hydrocarbons, PAHs) present in these sediments is carried out. In March 2013, a sediment sampling campaign was performed in the port of Tripoli. The port was characterized by many anthropogenic activities: urban and industrial wastewaters, small boats effluents, ancient boats and solid wastes, etc. The calculation of geochemical index showed that the sediment quality of the fishing port of Tripoli, varies between moderately and highly polluted, for the three trace elements (Pb, Cu, Cd). Studies on mobility show that extremely small percentage of copper is in ion exchange position thus representing the highest risk to the water column and to living organisms. In addition, in the presence of a complexing agent like EDTA, the mobility of the three elements increases tremendously, especially for Cd that represents the highest risk in the long term.Organic contaminant analysis conducted by GC-MS in the department of Chemical engineering in Balamand University were mostly concentrated on PAH levels. The sediments of the port of Tripoli were found to be mostly contaminated with high molecular weight 5- 6 ring aromatic hydrocarbons, which are highly toxic and carcinogenic. This is potentially due to diesel fuel consumption and incomplete combustion of fossil fuels. Same studies are now in the phase of implementation in the fishing port of Dora.

Map showing lead (Pb) distribution in the fishing port of Tripoli

Conclusions and Perspectives

CANA is a scientific tool designed to respond to the needs of communities and territories on a Mediterranean scale. Activities undertaken promoted research, improved awareness of civil society to the essential value of the environment and biodiversity, educated key-actors, gave sustainability to project actions. It is a matter of fact that marine research is increasingly becoming key to strengthening the capabilities of countries for socio-economic progress while contributing to the wellbeing and sustainable development of human communities.

Recent achievements in the field of mapping of the Lebanese seafloor led to the discovery of unprecedented and impressive features that need to be properly studied and evaluated. Unexpected results have been obtained in the field of fisheries sciences and several studies (i.e. pollution, toxic algae, etc.) may affect the whole marine environment on the one hand and directly the life of the Lebanese communities on the other.

For the future, cost, scale, and complexity of marine research require clear vision and strategic goals, domestic commitment, international cooperation, and integrated plans. The road is still long but the CANA project has planted its seeds:

- A continuous enhancement of the cooperation with concerned institutions in Lebanon and throughout the Mediterranean.
- A strong commitment to establish long-term observation systems, databases and systematic evaluation, providing for long-term time-series datasets on the marine environment.
- The promotion of regional advancement and improvement of marine research, through the acquired technical facilities of the project: such as vessel, seafloor mapping system, and water sampling system.
- The continuous building of capacities of individuals, researchers, technicians, and the crew of the vessel that will improve Lebanese CNRS' capacity and efficiency while also initiating a positive multiplier effect for human capacity development in marine research fields in Lebanon.
-

- The outstanding expansion of knowledge of the marine environment as a whole, its physical and biological parameters and processes, with emphasis upon its characteristic as a habitat for living resources, its geological and geophysical properties, including non-living resources in shallow and deep areas.

- Research and monitoring of marine pollution to measure and assess the effects of human activities, notably those resulting in degradation and contamination, especially in the coastal zones.

- The enforcement of channels of communication between the academia and the general public, raising awareness on the status of the marine environment and on the impact of people's common behaviour on it.

During five years of activities, CNRS-L and the CANA project have been catalysing the attention and gaining the credibility of experts and institutions providing high-level scientific contribution. The Lebanese Administration (i.e. Ministries of Agriculture, Environment, Transport, Water & Energy), universities, NGOs as well as engineering enterprises are requesting CANA technical assistance and support to undertake their projects in the fields of fisheries, aquaculture, water quality monitoring, sea ports expansion, establishment of marine fresh water resurgences, topographic surveys of main ports entrances, and major coastal construction projects.

To provide proper responses, CANA developed an original and virtuous model of intervention where researchers and scientists can play a significant role in supporting projects aiming at the sustainable development of the Country.

Bibliography / More information

- Abboud-Abi Saab M., Fakhri M., Kassab M.T., Mattar N. (2013) *Seasonal and Spatial Variations of the Dinoflagellate Ostreopsis siamensis in the Lebanese Coastal Waters (Eastern Mediterranean).* Cryptogamie, Algologie, 34(1):57-67. 2013. Published By: Association des Amis des Cryptogames.

- Fakhri M., Abboud-Abi Saab M., Najjar E. (2014*) Impact of chemical industries on the variability of Northern Lebanese marine sediment's characteristics. Submitted to "Estuaries & Coastal Protected Areas* " ECPA 2014, 04 - 06 November 2014, Izmir – Turkey

- Khalaf G., Abboud-Abi Saab M., Fakhri M., Abi Ghanem C., Lelli S. and Mouawad R. (2013a) *Surveillance permanente de la région côtière libanaise et développement durable, Project CANA- CNRS*. On Chouikhi A., Khalaf G. and Abboud-Abi Saab M., (eds). Proceedings of LANDSI 2012; pages 1-9

- Khalaf G., Fakhri M., Ohanian C., Abi-Ghanem C. and David L. (2013b) *Distribution and relative abundance of the Tursiops truncatus in Lebanese marine waters (eastern Mediterranean).* November 2013, Vol. 7, No. 11, pp.1196-1203. Journal of Life Sciences, ISSN 1934-7391, USA

- Lelli S., Lteif M., Jemaa S. and Khalaf G. (2014) *First information on abundance, biology and distribution of the red giant shrimp (Aristaeomorpha foliacea) in Lebanese waters.* 20th LAAS International Science Conference - Advanced Research for Better Tomorrow. March 27-29, 2014.

Fishery and aquaculture cooperation for the development of Mediterranean coastal communities

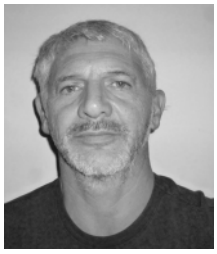
Massimo Zuccaro
FISHINMED and READYMEDFISH Project Coordinator
CIHEAM-Bari

Roberta Trevisi
BIG Project Coordinator
CIHEAM-Bari

Stefano Lelli
PESCALIBANO Project Coordinator
CIHEAM-Bari

Daniele Galli
NEMO Project Coordinator
CIHEAM-Bari

Roberto Ugolini
MADE Project Coordinator
CIHEAM-Bari



Giulio Malorgio
Professor in Agribusiness and Food Marketing
Department of Agricultural and Food Sciences
University of Bologna

Biagio Di Terlizzi
Principal Administrator,
Head of Planning and Cooperation Office
CIHEAM-Bari

The Mediterranean region shares common resources, and the coexistence of culturally, ethnically and economically heterogeneous countries means that the problems related to the sustainable management of marine and coastal resources cannot be solved by unilateral actions. Cooperation for the protection of the environment and of marine and coastal resources, the sustainable management of fisheries and the socioeconomic development of coastal communities are tools that can help different countries move towards the implementation of common strategies shared at the Euro-Mediterranean level. Ensuring the sustainable development of fisheries and fishing communities in the Mediterranean is a major goal for the future of the sector in coastal countries, and also to preserve this common heritage for future generations.

Focus on the Mediterranean: features and criticalities of fisheries and marine aquaculture

Fishing is a primary activity that still plays a very important socioeconomic role in the Mediterranean. Fish caught in the Mediterranean accounts for 1.6% of the world total, but corresponds to 4% of its worth, because the species caught have a high value. Total catches in 2012, including the Black Sea, accounted for about 1.3 million tons, of which one third, i.e. about 360.000, was caught by North African and Eastern Mediterranean Countries[1].

Over the last decades, the fishing industry has seen gradually depleting fish stocks set against growing consumption, which for Mediterranean countries was 9,631,000 tons[2] in 2011. The 2012 catch in the Mediterranean and Black Sea fell by 10.8% from the previous year, compared with a 3.5% decline worldwide[3]. The Mediterranean EU member countries, where fishing is more strictly regulated, have experienced the highest decline in catches at 12%, against the 2.3% growth seen in North Africa and Eastern Mediterranean countries; this growth is mostly due to a more permissive system, which risks repeating the mistakes made by developed countries in the uncontrolled exploitation of fishery resources[4].

83% of Mediterranean fishing is done by boats less than 12 m long, using production strategies based on the seasonal use of different equipment (multi-specific fisheries) and targeting species with a high commercial value. Small-scale fisheries still play an important socioeconomic role, but are experiencing a steady decline of employment levels, mostly due to the falling stocks and the general decline of the sector's profitability.

At present, the data released by the European Commission confirm that over 96% of Mediterranean fish stocks are overexploited and that fishing should be reduced by an average of 45-51%[5] in order to allow recovery of the sustainability level. These alarming data require appropriate actions aimed at integrating and diversifying the economic activities associated with the sector.

In this context, aquaculture would provide an opportunity for development of the fish supply chain to reduce pressure on fish stocks, while at the same time safeguarding employment in the sector. Fish-farming produces about 66.6 million tons worldwide, with a value of 137.7 billion dollars (the EU produces 4.3% of the world quantity and 8.9% of the value). At present, the main European fish-farming nations are Norway, Spain, France, United Kingdom and Italy, which together account for¾ of the quantity and value[6] of fish caught.

In the Mediterranean area, aquaculture is booming in Egypt, Turkey and Tunisia. In Egypt alone, aquaculture output rose progressively from 139,000 tons in 1998 to 635,000 in 2007 and 986,820 in 2011, providing new employment and income opportunities with economically relevant initiatives. According to the General Authority for Fish Resources Development (GAFRD), total production amounts to 1,371,975 tons[7]. In the next decade this is expected to increase further, due to Egyptian governmental support in stimulating important private investments in aquaculture in the area between Alexandria and the Sinai Peninsula.

However, the development of aquaculture is currently linked to technologies requiring highly developed skills and professional and operational expertise, making it necessary to ensure appropriate training and a system of support to business start-ups.

Figure 1
FISHINMED: "A sea of dialogues" events
23rd August 2014, Polignano (Ba) – Italy

[1] *Morocco, Algeria, Tunisia, Egypt, Israel, Libya, Jordan, the Palestinian Authority, Lebanon and Syria*
[2] *Based on FAOSTAT, 2014 processed data*
[3] *FAO Fisheries and Aquaculture Department.2014 - Global Capture Production Statistics 2012*
[4] *Based on FISHSTAT, 2014 processed data.*
[5] *Report of the scientific, technical and economic committee for fisheries (STECF), Assessment of Mediterranean Sea stocks, 2012*
[6] *Based on FISHSTAT, 2014 processed data.*
[7] *GAFRD, Fish Statistic Book, 2014*

International cooperation for the integrated and sustainable development of coastal communities

Over the last few years, the activities developed by CIHEAM-Bari in the Mediterranean fishing sector have involved international and non-governmental organizations, national institutions, research institutes and professional associations in Mediterranean countries, and this has enabled us to identify the needs for a common growth of the sector aimed at:

- Studying social issues and fishery governance in various geographical locations;
- Developing networks for the exchange of good practices and information, pointing the way to a system of common rules for correct/rational exploitation of shared resources;
- Highlighting the ecological, technological and socioeconomic features of the Mediterranean fishing industry to help define a specific code for responsible fishing across the whole region;
- Setting up a system to detect alien fish species in the Mediterranean;
- Developing responsible marine aquaculture in order to reduce fishing and provide greater protection of marine resources;
- Improving the skills and professional expertise of the public and private operators involved in management and planning of marine and coastal resources;
- Supporting fisheries through diversification and the development of multifunctional activities.

CIHEAM-Bari has promoted several partnerships, capitalizing on the opportunities given by the 2007-2013 EU programmes and on the bilateral cooperation projects promoted by the Italian Government. These activities have enabled important results.

Strengthening Mediterranean institutional capacities for the enhancement of marine and coastal resources

The provision of technical assistance, training and trans-national mobility has helped strengthen the institutional capacities of the public and private authorities in the Mediterranean region, by encouraging communication, awareness and the ability to understand and share the needs of Mediterranean coastal areas. CIHEAM-Bari has been a strong promoter of the dialogue between southern and eastern Mediterranean countries (institutions and society) on major themes including workers' rights in the fishing industry.

The *PESCAMED*[8] project has focused on the International Work in Fishing Convention (ILO C188) and has also highlighted the different operational procedures of the professional associations and unions engaged in helping fishermen to develop a common philosophy to regulate and integrate the choices of all those involved in the supply chain. The associations and unions must attempt to overcome the limitations and weaknesses of the sector by providing training and information, along with services to businesses, and by promoting innovation and initiatives aimed at upgrading production, shortening the chain, ensuring legislative harmonization, internationalization of businesses, and diversification of income-producing activities.

CIHEAM-Bari has also promoted institutional strengthening targeted at the development of marine aquaculture, in particular in the Mediterranean coastal area of Sinai (Egypt). The *MADE*[9] *project* has improved the skills and professional level of the competent public Egyptian authority (GAFRD) by providing international training, *in loco* technical assistance and the design of new marine hatcheries.

Figure 2
MADE project: Training in Italian marine hatchery (Sea bass sea bream reproduction)

[8]*PESCAMED – "Development of cooperation in the Mediterranean fishery sector: world of labour, producers' organizations, consuments' associations and training" (funded by the Italian Ministry of Agriculture, Food and Forestry Policies Directorate-General for Fisheries. Project area:Italy, Albania, Algeria, Croatia, Egypt, Lebanon, Morocco, Montenegro, Syria, Tunisia, Turkey).*
[9]*MADE – "Marine Aquaculture Development in Egypt" (funded by General Authority for Fish Resources Development (GAFRD) trough Italian Egyptian Swap Program. Project area: Egypt)*

The programme involved the professional training of 9 Egyptian technicians in a marine fish breeding facility, selected for its technological reproducibility in Egypt. The technicians were trained in real production conditions and acquired the planned operational abilities, as proven by testing and their individual final written work. Technical Assistance involved 6 Italian experts working in Egypt to start up innovative production processes for Egyptian conditions and to prepare a sector-based "Road Map", with a view to contributing to the dialogue between the private and public sectors which has great strategic value in the country's present transitional phase.

Sustainable local development of small-scale fishing communities and coastal areas

Inter-sector and income-diversification initiatives (multi-functionality) provide an opportunity for the sustainable development of fishing communities by generating income, producing direct and indirect employment, facilitating and stimulating generational turnover. Important opportunities may be provided by upstream and downstream activities of the fishery chain that are often neglected; these may include the building and repair of boats and gears, port services, fish direct sale and processing, and catering.

An additional contribution to sustainable development of fishing communities may come from fishing-related tourism activities and attractions. However, inducing local communities to diversify their activities is a complex action involving a number of problems (legislative, social, financial, training issues), which are sometimes specific to different areas. The CIHEAM-Bari cooperation projects in this field have helped to strengthen an international and local network (of public bodies, scientific institutions, professional associations, coastal action groups) which can facilitate the exchange of knowledge and good practices, and can operate synergically in various areas to overcome criticalities and resistance to the process of modernizing the fishing industry. These actions are based on the following:

- Networking: *the Observatory on the diversification of fishing economic activities,* established in the *FISHINMED*[10]project, has identified the main factors limiting the development of multi-functionality in the Mediterranean region, related to both the socioeconomic features of small fishing communities and to the limitations of a regulatory framework as yet unable to meet the fishermen's needs in terms of multifunctional development.
-
-
-

- Support to employment: The *READYMEDFISH*[11] project aims to identify and promote innovative professional profiles in the Mediterranean region, for targeted training activities to improve the professional skills of young fishermen. The objective is to stimulate private enterprise within a modern legal framework, concentrating on the need of multifunctional fishermen to innovate.

- Improvement of local governance: with the participation of local operators, the *NEMO*[12] project will strengthen the dialogue between coastal rural communities and local institutions by promoting a model of integrated and sustainable governance of coastal maritime resources (establishment of Coastal Action Groups) for the enhancement of natural resources, typical products and local crafts.

Figure 3
NEMO project: Typical variety of sponge of Zarzis

Protection, monitoring and management of marine and coastal resources

The cooperation activities of CIHEAM-Bari have enabled the development of tools for the monitoring, planning and proper management of marine and coastal resources. A priority of the *PESCA LIBANO*[13] project has been to set up a territorial information system for the Lebanese coast, the *Marine Coastal Information System* (MCIS); this has collected geo-referenced information already held by Lebanese institutions which is potentially useful for appropriate management of the coastal area and the fishery sector (infrastructures, services, economic activities, water quality, land use and protected areas).

[10]FISHINMED– "Mediterranean Network of sustainable small-scale fishing communities" (funded by ENPI CBCMED 2007-2013Programme. Project area: Puglia, Sardinia and Sicily (Italy), Greece, Lebanon, Tunisia and Egypt).

[11]READYMEDFISH– "Requalification of Employment and Diversification for Youth in the Mediterranean" (funded by the ENPI CBCMED 2007-2013Programme.Project area: Puglia (Italia), Lebanon, Tunisia and Egypt).

[12]NEMO– "Cross-border rural coastal communities development in Libya and neighbouring countries" (funded by the Italian Ministry of Foreign Affairs– Directorate-General for Development Cooperation. Project area: Egypt, Libya and Tunisia).

[13]PESCA LIBANO– "Technical assistance to the Ministry of Agriculture in the field of fishery development" (funded by the Italian Ministry of Foreign Affairs– Directorate-General for Development Cooperation. Project area: Lebanon)

For the first time in Lebanon, efforts were made to collect as yet available and/or obsolete data on the distribution and abundance of the main coastal fishery resources. Together with other information gathered about fish marketing, the study of benthic species assemblages and fishing monitoring systems (VMS), this has supplemented the information possessed by the Marine Coastal Information System (MCIS). Because the MCIS is able to manage complex information involving different spatial and temporal scales, it can supply the Lebanese government with the information required in order to manage and regulate the fishery sector.

Figure 4
PESCALIBANO: Researchers collecting bio-morphological information on giant red shrimps harvested in the waters off Saida, Lebanon

Within CIHEAM-Bari activities in support of the development of environmental (coastal and marine) themes and/or planning strictly related to the territory, it is worth mentioning the *BIG*[14] project which involves the establishment of MARE – Mediterranean Outpost for monitoring coastal and marine ecosystems. This observatory will contribute to the work of the Regional Observatory for Biodiversity, which will play a fact-finding and proactive role in the conservation, use and enhancement of biodiversity and of the environmental heritage of Puglia Region. It will also try to sensitize and stimulate the participation of Puglia society on the themes of sustainable development and environmental protection.

The *CSMON*[15] Project focuses on the participation and active collaboration of scientists, public administrations and citizens in monitoring and protecting biodiversity. The *citizen science* tools will be used to involve citizens in data collection and validation (using smartphones and tablets to gather geo-referenced primary data on biodiversity); this will contribute towards achieving the objectives of the 2020 European Strategy for biodiversity and help to train new professionals for a "green" economy.

[14] *BIG– "Improving governance and sustainability of coastal and marine protected areas and contributing to the implementation of the NATURA 2000 provisions in Italy and Greece"(funded by Interreg Greece-Italy 2007-2013Programme. Project area: Italy, Greece)*
[15] *CSMON-LIFE PROJECT – "Citizen Science Monitoring" (funded by LIFE+ Programme. Project area: Italy)*

Conclusions

The fishing industries of Mediterranean coastal countries face a major challenge, but also have an opportunity for dialogue and exchanges regarding joint and sustainable management of resources, environmental policy and research. The future of this sea, which has historically been such an important cultural and commercial crossroads, will largely depend on the will of these states to rationalize and regulate the fishing. This will involve a sustainable and integrated approach that combines environmental protection (sustainability of fish stocks) with the social cohesion of coastal communities (increase in employment, enhancement of coastal resources, economic diversification of fishery activities).

In this framework the fishery may still be considered as a strategic sector to enhance the quality of life of the local communities and create the professional and economic opportunities capitalizing on the specificities of the coastal area. On the other hand, the development process of the coastal areas needs to be supported by a strengthened network including the institutional and economic actors of marine and maritime sector, and focused on a correct data-based planning and management of marine and coastal resources.

CIHEAM-Bari cooperation initiatives have encountered some difficulties caused by the lack and heterogeneity of statistical data, especially in North African and eastern Mediterranean countries. This limits the development and elaboration of strategies to ensure a correct balance between the protection of fish stocks and the economic benefits resulting from their exploitation and the integrated development of coastal areas.

Via the Bari Institute, CIHEAM will pursue multilateral cooperation to develop transnational activities and to achieve shared international objectives for the extremely strategic fishing and aquaculture sectors, by promoting regional and inter-institutional dialogue and by supporting technical assistance, applied research and know-how transfer with the Mediterranean countries.

Coordinating research in support to application of Ecosystem Approach to Fisheries and Management advice in the Mediterranean and Black Seas

Dunixi Gabiña
Deputy Director
CIHEAM-Zaragoza

Antonio López-Francos
Cooperative Research Administrator
CIHEAM-Zaragoza

More information
about the CREAM project and its results is available at the project webpage:

http://www.cream-fp7.eu

The present article presents a brief summary of the project "Coordinating research in support to application of EAF (Ecosystem Approach to Fisheries) and management advice in the Mediterranean and Black Seas" with acronym CREAM, funded by the EU-FP7 Programme (Call: FP7-KBBE-2010-4, Grant agreement no: 265648) with the purpose of establishing an effective collaboration network among key role players in Mediterranean and Black Sea fisheries research and management addressed to provide scientific bases to promote the Ecosystem Approach to Fisheries (EAF) in the Mediterranean and Black Seas.

To reach this objective the CREAM project aimed to fulfil the following partial objectives:

1. Establishing mechanisms for the coordination of data collection and exploitation through common methodologies across both regions in order to identify data and research gaps and opportunities for greater research coordination that could be promoted by the EU and concerned States in support through scientific advice for fisheries management and EAF.
2. Coordinating methodologies to assess the ecosystem and socio-economic impacts of fishing.
3. Reinforcing a participatory dialogue between researchers and assessment and management bodies in order to identify data and research gaps and opportunities for greater research coordination that could be promoted by the EU and concerned States in support of scientific advice for fisheries management and EAF.
4. Developing recommendations on how to improve cooperation with third parties in order to enhance research and resource status and reinforce social and economic welfare from exploitation of fishing resources and where practical to strength frameworks for Monitoring, Control and Surveillance (MCS) in order to counteract Illegal, Unreported and Unregulated (IUU) fishing.
5. Contributing to the dissemination of the CFP principles and challenges through the improvement of dialogue with research communities, policy-makers and stakeholders in the geographic areas concerned.

The CREAM project of a three year duration, started on 1st May 2011, and counted on a consortium of 22 partners from 17 countries (Bulgaria, Croatia, Cyprus, Egypt, France, Georgia, Greece, Italy, Lebanon, Malta, Morocco, Romania, Russia, Spain, Tunisia, Turkey and Ukraine), from national research institutes and one international organization, from Mediterranean and Black Sea countries, with a long history and active participation in fisheries research and assessment, and who provide advice to national, regional and international fisheries management organisms. The project has also maintained an active collaboration with regional and international fisheries management organisms: the Fisheries and Aquaculture Department of Food and Agriculture Organization of the United Nations (FAO), the General Fisheries Commission for the Mediterranean (GFCM), the Black Sea Commission (BSC), The International Commission for the Conservation of Atlantic Tunas (ICCAT) and the Regional Activity Centre for Specially Protected Areas (RAC/SPA), all of them members of the External Advisory Committee of the project. The project developed strong training and capacity building and dissemination components in order to help to harmonize data collection and methodologies used in fisheries assessment and management in the Mediterranean and Black Sea.

The Mediterranean Agronomic Institute of Zaragoza was the Project coordinator, supported by the scientific leadership of the partner Spanish Institute of Marine Science of the Spanish National Research Council. IAMZ likewise performed the tasks of project management, consortium leadership, reporting and deliverables coordination, established dialogue with the institutions of the External Advisory Committee and the European Commission, and also provided administrative support for partners. The administrative support is particularly important when the consortium includes institutions with little experience in European projects. Furthermore, IAMZ was in charge of the training and dissemination activities, which were of particular importance given CREAM's nature of Coordination and Support Action. The details of these activities are commented below.

As specific tasks carried out to provide a sound background to the establishment of the network, CREAM has reviewed current knowledge and the state of the art in data collection and methodological practices in stock assessment and management and fishery effects on marine ecosystems of the Mediterranean and Black Seas. It has provided meta-analysis of existing data in terms of needs, quality, harmonization, and the available methodologies and models for EAF, and the possibility of their application to the region. CREAM has also established coordination with the assessment and management international/regional bodies, such as the GFCM or the BSC, and has strengthened the scientific basis of EAF application in Mediterranean and Black Sea fisheries.

As a final product, CREAM has created, under the acronym EMBASEAS, a scientific network in support of the application of EAF in the Mediterranean and Black Seas, with the overall objective of enhancing technical co-operation among the national, regional and intergovernmental organizations concerned, particularly the exchange of information and experiences between the members in order to promote the scientific approach of EAF in the region.

In quantitative terms, CREAM has provided 32 deliverables, amongst which 22 were made available to the general public, it has organised 4 coordination meetings, 7 specific workshops or meetings, 2 training courses and one international dissemination conference and has produced several peer reviewed scientific publications. Two of these were collective publications integrating many of the consortium researchers and external authors: the special issue in the Scientia Marina Journal "The Ecosystem Approach to Fisheries in the Mediterranean and Black Seas" (Sci. Mar. 78S1: 2014), with 11 original research articles, and the article "The scientific strategy needed to promote a regional ecosystem-based approach to fisheries in the Mediterranean and Black Seas" signed by 16 members of the consortim in in the journal Reviews in Fish Biology and Fisheries. The list of the main publications of the project is provided below.

As for capacity building and training actions, the two training courses organized within the framework of the project have been mentioned. The first, "Ecosystem approach to fisheries in the Mediterranean and Black Seas. Scientific bases", Varna (Bulgaria), 3-7 February 2014, had 12 lecturers, 67 applicants and 31 participants from 16 countries. The second, "Ecosystem approach to fisheries in the Mediterranean and Black Seas. Management and decision making", Zaragoza (Spain), 10-14 March 2014, had 12 lecturers, 66 applicants and 27 participants from 14 countries. In the International Dissemination Conference (Barcelona, 9-10 April 2014) there were 82 participants from 18 countries. Other 12 dissemination activities have been organized by the consortium members in their countries: Morocco (6), Russia, Ukraine, Egypt and Georgia.

Bibliography / More information

- Lleonart J. and Maynou F. (2014). *The ecosystem approach to fisheries in the Mediterranean and Black Seas.* Scientia Marina, 78S1. Barcelona: CSIC/CIHEAM/European Commission, 120 pp. doi: *http://dx.doi.org/10.3989/scimar.04020.17A*

- Coll M., Cury P., Azzurro E., Bariche M., Bayadas G., Bellido J-M., Chaboud C., Claudet J., El-Sayed A.-F., Gascuel D., Knittweis L., Pipitone C., Samuel-Rhoads Y., Taleb S., Tudela S., Valls A. et al. (2013). *The scientific strategy needed to promote a regional ecosystem-based approach to fisheries in the Mediterranean and Black Seas. Reviews in Fish Biology and Fisheries*, 23, pp. 415-434. Springer Academic Publishers, The Netherlands, DOI 10.1007/s11160-013-9305-y

- Zarrad R., Alemany F., Rodriguez J.-M., Jarboui O., López-Jurado J.-L. and Balbín R. (2013). *Influence of summer conditions on the larval fish assemblage in the eastern coast of Tunisia (Ionian Sea, Southern Mediterranean).* Journal of Sea Research, Vol. 76, February 2013, 114-125 Elsevier. DOI: 10.1016/j.seares.2012.08.001

- Zarrad R. and Jarboui O. (2013). *Physical spawning environment of Sardina pilchardus (Walbaum, 1792) in the eastern coast of Tunisia* (Ionian Sea, Mediterranean). Cahiers de Biologie Marine, Vol. 54 (1), 93-102.

- Chaouch H., Ben Abdallah O., Ben Hadj Hamida N., Ghorbel M. and Jarboui O. (2013). *Diet Composition and food habits of Diplodus puntazzo (Sparidae) from the Gulf of Gabès (Central Mediterranean).* Journal of the Marine Biological Association of the United Kingdom, 93 (8), 2257-2264. Cambridge University Press. DOI: 10.1017/S0025315413000805

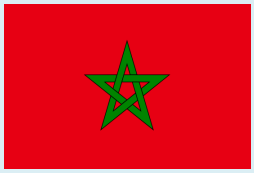
- Hadj Taieb A., Ghorbel M., Ben Hadj Hamida N. and Jarboui O. (2013). *Sex-ratio, reproduction and growth of gilthead sea bream Sparus aurata (Pisces, Sparidae) in the gulf of Gabes, Tunisia*. Ciencias Marinas, vol. 39(1), 101-112. Universidad Autónoma de Baja California, Mexico. http://www.scielo.org.mx/scielo.php?pid=S0185-38802013000100008&script=sci_arttext

- Grishin A.N. and Shlyakhov V.A. (2012). *Effect of modern changes in the pelagial of the Black Sea on the state of fishery.* Journal of Ichthyology, V. 52 (9), 613-618. DOI 10.1134/s0032945212050013

- Shlyakhov V.A. and Shlyakhova O.V. (2011) *Dynamics of trawl catch structure of Black Sea sprat on the Black Sea Ukrainian shelf and impact of natural factors and fishery on them (in Russian). Main results of complex research in the Azov-Black Sea basin and the World Ocean,* V. 49, 12-33. CEEMaR. http://10.0.0.196:8080/jspui/handle/1/1685

- Shlyakhov V.A., Mikhailyuk A.N., Bondarenko I.V., Evchenko O.V., Ershova O.V., Korkosh V.V., Merzlikin V.L., Chashchin A.K. and Shlyakhova O.V. (2012). *Fishery and biological indices of Ukrainian fishery in the Black Sea in 2002 – 2011. Main results of complex research in the Azov-Black Sea basin and the World Ocean*, V. 50, 12-29. CEEMaR, 10.0.0.196:8080/jspui/handle/11099/1540

Signature d'un arrangement bilatéral (MoU) entre le ministère marocain de l'agriculture et de la pêche maritime et le CIHEAM



A l'occasion de sa visite officielle à Rabat le 13 octobre 2014, M. Cosimo Lacirignola, Secrétaire général du CIHEAM a été reçu par M. Aziz Akhannouch, Ministre de l'Agriculture et de la Pêche Maritime.

Cette rencontre s'est tenue en présence notamment, de M. Gianni Bonini, délégué de l'Italie auprès du CIHEAM. Il a par ailleurs tenu une réunion de travail avec M. Mohammed Sadiki, Secrétaire Général du Ministère de l'Agriculture et de la Pêche Maritime, également délégué du Royaume du Maroc auprès du CIHEAM, accompagné des directeurs Centraux du Ministère et des directeurs de l'Institut agronomique et vétérinaire Hassan II et de l'Institut national de la recherche agronomique.

Cette visite a été marquée par la signature d'un arrangement bilatéral entre le Ministère de l'agriculture et de la pêche maritime et le CIHEAM, illustrant la volonté des deux parties de renforcer leur coopération, initiée depuis l'adhésion en 1991 du Royaume du Maroc à l'Organisation.

Cet arrangement bilatéral vise à concentrer les activités de coopération dans le domaine de l'agriculture, de la sécurité alimentaire, des territoires ruraux et de la pêche maritime, à travers l'utilisation des instruments de la formation spécialisée, de la recherche en réseaux, de la diplomatie scientifique et de l'assistance technique au développement.

Le Ministère de l'agriculture et de la pêche maritime et le CIHEAM se sont accordés sur une liste de domaines prioritaires de coopération afin de préciser les contours de leur arrangement bilatéral autour de mesures d'accompagnement des politiques institutionnelles (i), d'environnement et de durabilité (ii), de développement des territoires ruraux (iii) et de développement économique et à l'international (iv).

Invisible Workforce of Women in the Fisheries and aquaculture sector in Turkey

Çağla Tozlu Yilmaz
Deputy European Union Expert
Ministry of Food, Agriculture and Livestock, General Directorate of European Union and Foreign Relations
Turkey

Gender means not only biological differences between men and women, it also includes social, political and economic relationships and roles between them. It is obvious that power relations between men and women are unequal and this lead to disadvantaged positions of women while reaching resources and services. Women are working in every part of the daily activities of fishing and aquaculture sector, such as paperwork, sales, preparing nets and cleaning. However their presence in the workforce is rarely seen. Because, they are generally unpaid and working in the family business. This paper will try to examine the disadvantaged situation and invisible workforce of women in the fisheries sector and intends to provide some solutions for this problem.

The women in fisheries and aquaculture field

According to FAO, 5.4 million of women are engaged in fisheries and aquaculture in 2008 and this means that 12% of overall workforce of the sector in the world. Also, in the European Union women constitutes 12% of the total workforce in the fisheries and aquaculture sector according to a survey in 2012. In addition to that, the comprehensive data does not exist but it is estimated that women constitutes 30 percent of the workforce in the fisheries and aquaculture sector. Gender development policies usually approach women in the fisheries sector as processors. However, women are important part of the fisheries sector. The sector has to include and recognize women's strategies in the policy formulation, and unfortunately it does not (FAO, 2007).

In 1975, with the announcement of the United Nations International Year for Women, awareness of women's problem became evident all over the world. Gender sensitive policies have started by the governments, women problems were taken into agenda (FAO, 2007). UN organized World Conferences on Women the first one was took place in Mexico City in 1975. The second one was in Copenhagen in 1980, the third one was in 1885 and the last one was in Beijing in 1995 (UN, 2014b).

Next year UN Commission on the Status of Women will organize its 59th Session in New York between the dates of 9-20 March 2015 (CSW59/ Beijing+20). At this Session of CSW59/Beijing+20 after Beijing Conference in 1995, 20 years of progress in achievement targets regarding women's status will be analyzed and discussed (UN, 2014a).

In 1997, United Nations Economic and Social Council (ECOSOC) in order to reach advancement of women and gender equality goals adopted gender mainstreaming as the methodology of the United Nations. Millennium Development Goals, which was agreed by UN Member States and Organizations in 2000, emphasized promotion of gender equality and empowering women. The main idea was regardless of looking the gender and sector differences providing men and women equal rights and protecting their interest. Despite of these efforts we may say that nothing much changed in the fisheries sector (FAO, 2012).

The role and importance of women in these sectors

Moreover, gender analysis in the fishing sector mainly focused on different participation of occupational burden between men and women. Men are seen as doing the actual fishing and women are seen as involved with post-harvest and marketing activities. This lead to a common understanding that women's role are not as important as men's. Therefore, the problem of male catching understanding should be focused on immediately (FAO, 2012).

According to an expert panel paper which was held in Thailand in 2012, women are probably more involved in the aquaculture sector. But, due to the lack of studies in the aquaculture sector, this could not be identified. Furthermore, power positions of men and women are really different from each other. As a consequence of this difference, women have less control on the means of production and value chain and their activities are less profitable than men. Due to this, they have access to fish with poorer quality. Despite of the fact that women constitute the majority of the workers in the post-harvest sector, they usually excluded from the most profitable markets, enterprises and highly paid positions in the factories dealing with fish processing. Market globalization, poor services and catch declines are affects women more terribly than men. Women realize the most important role in artisanal and industrial fisheries sector in processing and marketing stages. Women take different roles in the fisheries sector all over the world. For instance, in some countries they become entrepreneurs. Actually, mainly they deal with processing stage either in household level or being wage laborers (FAO, 2012).

There are some factors that decrease the abilities of women while participating in the decision making process; lower literacy and educational levels of women, time burdens and constrains in the daily routine of women, mobility burdens and constrains of women, women's participation in the less formal and weaker organizations, lower organization skill of women. As a result of participating in the non-formal organizations they could not be president or secretary due to their lower literacy skills. Additionally, as a consequence of lack of statistical data in the mostly post-harvest stage, it could not be possible clearly indicate the number of women working in the sector and their contributions and value additions to sector. On the other hand, inequalities in the fisheries and aquaculture sector started to be quantified and publicized (FAO, 2012).

Furthermore, according to EU, women are mostly working in the family enterprises. They are responsible from many things in the family enterprises in addition to household while their spouse is away from home. They sell fish, mend nets, prepare hooks and even they manage book-keeping and paying the invoices. These contributions of women are really important because it saves the family money. In addition to this, generally women do not see working as the family enterprise as a job, due to the reason that they are doing it at home while looking after their children. As a result of these, the work carried out by women remains invisible. Women were not paid, so they could not benefit from social protection and their work could not be recognized until recent time (EU, 2013).

To a recognition of the importance of women

On the other hand, women contribution gained visibility thanks to the European Union initiatives and policies. The process started in 11 December 1986 with the Council Directive 86/613/EEC. That directive includes equal treatment between men and women in self-employment capacity and provides protection working pregnant women and mothers. This directive replaced in 2010 with the Directive 201041/EU. With this directive some improvement realized such as maternity leave and appoint of replacement during this period, but most remarkable one was the idea of "life partner" which was proposed by the European Parliament and the Council. Before that, only spouses were benefited from such a status, with this directive life partners can benefit from social protection of the self-employed workers as their spouses. Also, Directive 2010/41/EU put a deadline for the implementation in member states until 6 August 2012. Some members states demanded extra time some others are still in the infringement process (EU, 2013).

However, whether countries adopt the directive this does not guarantee its effective implementation in the national laws of member states. For example, France was the only member state who applied Directive 86/813/EC to the fisheries sector but during ten years after 1998, very few women benefited from the status of collaborating spouse. The reasons behind this were high social security contributions, disbelief to the effective system of pensions and unawareness about the option.

In 2006, it became obligatory to choose status between collaborating spouse, employee or associate. Since then the number of women in the collaborating spouse status doubled. Moreover, life partners were also recognized to benefit from social security systems. All these attempts were resulted with women's recognition in fishing enterprises. Moreover, there are different examples in other member states such as in Portuguese, it is not obligatory but by contributing fish workers' pension fund women grant a status and continue to be a member of a fisheries pension fund. In Greece, spouses of small-scale enterprisers have right to draw a pension from the fund; but, spouses of medium-scale enterprisers do not have. Also, in Italy women are trying to get their recognition status as participating in the fishing enterprises (EU, 2013).

However, in Turkey, situation is really difficult, there is no evident data regarding women working in the fisheries sector. Actual fisher women exist in the especially Aegean Sea costs, they are fishing alone or with their husbands, but most of them did not registered to the fisheries cooperative of the region as active fishers. Like women all over the world, they are generally dealing with the post-harvest period.

For example, they realize paperwork, sale fishes in the market, prepare nets and clean their boats. Unfortunately, they are not registered to the social security system and could not benefit from any social protection options adopted for fishermen's. Comparing to the its neighboring European Union member states Turkey has a lot more work to do for bridging the gap (Öğünç, 2012, İnce, 2012).

Solutions and Gender policies for sustainable change

There are some possible solutions offered by FAO in 2012. The first one is the need to have more comprehensive and accurate sex-disaggregated statistics. This need has to be taken into account immediately. If those studies will be realized in the fishing communities, it could be understood that whether adopted gender policies successful or not. Secondly, mainstreaming gender equality should be the first target of gender policies in the macro level.

Those policies should provide women equitable resource access rights, accession to markets, benefiting from aquaculture and codes of conducts for the industry. Thirdly, women's accession and control over resources are really important. Because it will have a great impact on their economic situation and improve their position in the society. Furthermore, there are several important steps to manage gender equality.

For example, generating gender statistics, conducting gender analysis in relation to gendered division of labor, accession to resource etc., identifying entry points for projects for mainstreaming gender equality, increasing organizational abilities of stakeholders in different levels so that they can translate gender problems in the other platforms, creating a gender sensitive monitoring and evaluation system for measuring gender equality objectives and observing changes in gender relations. Last but not the least, in order to strengthen women's organizational abilities their capacities should be developed to take leadership positions and they should be active in decision making process (FAO, 2012).

European Union published some recommendations about this issue in 2013. Firstly, female employment should be increased to understand their position in the fisheries sector. It is important to have a harmonized definition of the categories used for data collection purposes. Secondly, social indicators should be included to data collection obligations that will give way to calculate contributions of unpaid workers within the family enterprises. Thirdly, women rights regarding accessing benefits deriving from the allocation of fishing rights should be guaranteed.

Besides, in order to support women and women related organizations that demand to join together to establish networks, European Structural Fund should be used. Finally, Women's organizations should easily access to the decision making instruments and processes in the fishing sector. Their participation in those platforms will increase awareness regarding women's problems (EU, 2013).

Conclusion

Women placed in an essential point of fisheries and aquaculture sector. They are working in every part of the daily activities of fishing and aquaculture sector, such as paperwork, marketing, preparing nets and cleaning. However, as it is mentioned above they are usually working in the family enterprises and getting no payment. So, their presence was not calculated by the governments until the end of 20th century. Gender related policies have stated in all sectors nowadays. But importantly, from now on fisheries and aquaculture policy agendas should include gender considerations in both geographical and international level.

While giving attention to gender problems it is possible to increase women productivity and provide gender equality. Today, increasing the awareness on gender issue are not enough anymore, highly educated and qualified people like researchers, advocates, experts etc. should work about this issue to solve the problem. We can also say that, women are more tend to deal with subject such as poverty, food security etc. Therefore, they should be in the first place while dealing with the sustainable use of the fisheries and aquaculture (FAO, 2012).

Bibliography / More information

- FAO, 2007, *Gender policies for responsible fisheries – Policies to support gender equity and livelihoods in small-scale fisheries, New Directions in Fisheries* – A Series of Policy Briefs on Development Issues, No. 06, Rome, 8 pp.
- FAO, 2012, *Selected issues in fisheries and aquaculture - Mainstreaming gender in fisheries and aquaculture: from recognition to reality*, Rome, 107-114 pp.
- Williams, M.J., Agbayani, R., Bhujel, R., Bondad-Reantaso, M.G., Brugère, C., Choo, P.S., Dhont, J., Galmiche-Tejeda, A., Ghulam, K., Kusakabe, K., Little, D.,Nandeesha, M.C., Sorgeloos, P., Weeratunge, N., Williams, S. and Xu, P. 2012, *Sustaining aquaculture by developing human capacity and enhancing opportunities for women*. In R.P. Subasinghe, J.R. Arthur, D.M. Bartley, S.S. De Silva, M. Halwart, N. Hishamunda, C.V. Mohan and P. Sorgeloos, eds. *Farming the Waters for People and Food. Proceedings of the Global Conference on Aquaculture 2010*, Phuket, Thailand
- EU, 2013, *Women In Fisheries: A European Perspective*, European Union
- Öğünç, P. (2012, August 7). *Denizin maharetli elleri: Kadın balıkçılar*. Retrieved October 1, 2014, from http://www.radikal.com.tr/yasam/denizin_maharetli_elleri_kadin_balikcilar-1096414
- İnce, Ş. (2012, April 22). *Kadın balıkçı S.O.S. verdi*. Retrieved October 1, 2014, from http://www.yeniasir.com.tr/ekonomi/2012/04/23/kadin-balikci-sos-verdi#
- UN, (2014a, October 23), *CSW59/Beijing+20 (2015), UN Women – Headquarters*
- UN, (2014b, October 23), *World Conferences on Women, UN Women – Headquarters*

Gendering the Fisheries and Aquaculture Sector in Egypt

Assem Abu Hatab
Researcher Department of Economics & Rural Development, Faculty of Environmental Agricultural Sciences, Suez Canal University, Egypt

Introduction

"Gender" has been receiving a special attention in the global agriculture and food security agenda in recent decades. This is in part because women who play a major role in the agricultural production and food supply in many developing countries face more severe constraints than men in access to productive resources that could help them improve their productivity. Moreover, women in developing countries are confronted by diverse types of discrimination in agricultural labor markets and have lower level of influence in decision-making processes.

Women contribution to agricultural production systems and rural economy in developing countries cannot however be underestimated; they comprise about 40 percent of the agricultural labor force, produce between 60-80 percent of the food, and they are the main producer of staple crops which provide up to 90 percent of the rural poor's food intake (FAO, 2014).

In Egypt, women contribute to most of the agricultural and farming-related activities including producing crops, tending animals, harvesting, post harvesting activities, and marketing of commodities. It is estimated that about 46 percent of female work force in Egypt is employed in agriculture. Furthermore, women make up more than 30 percent of the agricultural labor force and represent about 75 percent of the employment in harvesting, handling, sorting and packing processes within the post-harvest centers in Egypt (CAPMAS, 2013; UN, 2013).

This article is based on the primary results of a larger research project led by the author that investigates challenges for women participation in the Egyptian fishing and aquaculture industry.

Women in fisheries and aquaculture industry in Egypt

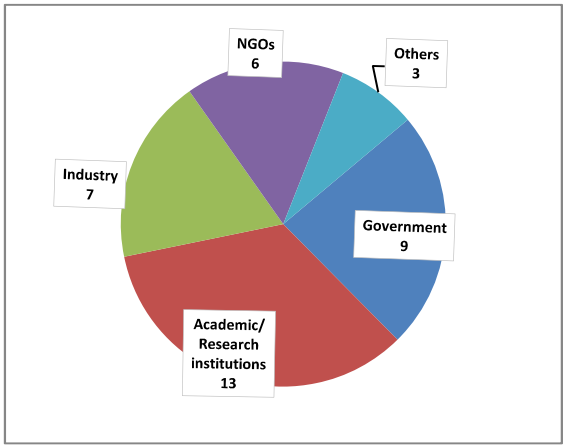
There has been a growing commonsense in the literature that more women's involvement in fisheries and aquaculture (F&A) is a major step to increasing fish production and achieving food security in developing countries. A look at the Egyptian case however shows that F&A is one of these sectors where the role of women is not yet fully recognized.

Although this sector has grown remarkably over the last three decades and the country has presently the largest aquaculture industry in Africa with a market value of over USD1.3 billion, significant gaps still exist between men and women in terms of value chain participation and employment opportunities. For instance, available statistics reveal that women represent no more than 1 percent of the over 150,000 people employed in the Egyptian F&A sector.

Constraints hindering women participation in fisheries and aquaculture sector

This section summarizes the primary results of interviews carried out with 38 key informants in Egypt on the major barriers that constrain more involvement of Egyptian women in the F&A industry and the potential interventions to tackle these challenges. Interviewees included people occupying middle or senior level position in one or more of the following categories; government-related agriculture and fishery departments, academic and research institutions, industry-related organizations, non-government organizations, and people with experience in the area of women's roles and contributions to agricultural and rural industries in Egypt (see figure 1).

Figure 1
Distribution of interviewees by institutional affiliation (*n*= 38).



Source: Results of the interviews

According to the interviewees 'opinions, the involvement of Egyptian women in F&A sector was envisaged of having the potential to not only uplift the social and economic conditions of poor rural households, but it also has the potential to improve family nutrition. Non-the-less, the interviewees pointed out that Egyptian women are challenged with a set of barriers that narrow down their options for involvement and employment in the F&A industry. The following paragraphs briefly summarize these barriers based on their relative importance as identified by the interviewees.

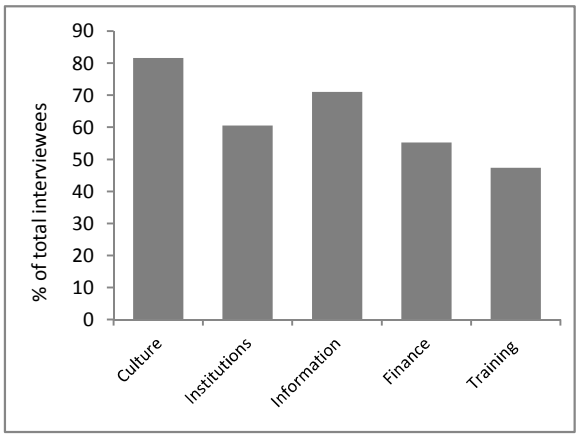
Sociocultural barriers

Gender-based barriers related to the customary cultural norms remain the main obstacle that restricts Egyptian women from participation in the F&A. Despite numerous policies adopted by the Egyptian government along with several projects carried out by women-mainstreaming institutions and NGOs to socially and economically empower women, there are several economic sectors and activities that Egyptians still consider as men's job and not suitable for women, including F&A. Such gender norms remain tenacious and the result being that women are at a disadvantage in in the F&A industry. According to Madanda (2003), these socio-cultural factors imposed on women by the society as well as psychological factors imposed internally by women concerns and aspirations inhibit their participation and employment in different activities within the fish value chains.

Lack of information

The issue of the almost complete absence of gender disaggregated data across the F&A value chain has come out strongly during the interviews. Interviewees indicated that women are significantly involved in the F&A sector but this is not captured by labor statistics because much of their involvement is informal, unpaid or unreported. This in turn contributes to an underestimation of women's role in the F&A sector and makes it difficult to address gender-related issues including unequal employment opportunities. Also, it partially explains the little policy attention given to the gender dimension (women) of this sector and the reason that sectorial support cannot be channeled properly to women. A reason for gender information unavailability originates from the obvious gap in research on women in Egyptian F&A industry, while to the best of the author's knowledge this issue seems to be almost completely neglected by researchers within both the social and natural sciences.

Figure 2
Major constraints to women involvement in the F&A sector in Egypt



Source: results of the interviews

Weak Institutions

Several interviewees acknowledged the inefficiency of government departments, women NGOs and fishing societies and cooperatives in Egypt as a factor determining the little attention that has so far been given to women role and potential within the F&A industry. Women-targeted income-generating activities implemented by these institutions revolve predominantly around traditional small scale agribusiness activities, ignoring the F&A businesses, and they rarely include programs for addressing gender inequalities in the F&A sector. Furthermore, a number of interviewees pointed out that women are not well-represented in fishing-related organizations and relevant decision-making authorities in Egypt. Besides, aquaculture extension services in Egypt were viewed as under-performing and rudimentary due to the lack of skilled staff and financial constraints.

Limited access to finance and credit facilities

By and large, government funding for F&A sector was described by the interviewees as limited and insufficient to the sector's needs and potentials. Many interviewees agreed that women are always encountered by multiple obstacles to access to finance and loans from banks and other formal financial institutions to invest in their F&A businesses. This was mainly attributed to the nature of most of rural micro-finance programs and credit schemes in Egypt which are basically designed to target male clients and tend to be biased against women. More often than not, financial institutions are usually reluctant to provide credit to women because they neither have land titled under their name nor they own assets or other resources to which they have access to borrow against. In many rural communities, even if women own land and assets, they lack full independence in controlling and managing these assets. Furthermore, from banks' point of view, lending to women is perceived risky as they are regarded less qualified to manage businesses towards growth and profitability.

Therefore, banks pose stricter collateral requirements on female borrowers. This result from the interviews coincides with the findings of El-Mahdi (2006) which reveal that Egyptian women are required to provide collateral on average 25-30 percent higher in value than that required from men. El-Mahdi shows also that female-owned small and medium sized enterprises experience higher rates of rejection from banks. Another factor that was highlighted during the interviews is the higher levels of illiteracy among females in rural and coastal communities which limit their ability to understand the terms and conditions of financial products which are available to them. All these constraints discourage women from full participation in F&A activities and keep them trapped within the low nodes of the value chain.

Lack of learning and training opportunities

The interviewees from academic and research institutions specially spotlighted the lack of skills as one of the main constraints for entry of women into F&A sector. It was also highlighted that the numbers of female students in F&A higher education programs are much lower than male student numbers. However, some interviewees indicated that the number of female students have been on the rise since the last decade. This goes in line with the results of several studies which revealed that access to productive resources is often associated with low levels of educational attainment. Inadequate technical training for women on related F&A skills and techniques was cited also another impeding factor. The majority of training programs offered by public and non-governmental organizations were viewed by interviewees as non-women friendly and very few of them are targeting women. Another dimension of the lack of training for women in F&A was attributed to other factors by which women are confronted including time burdens; women are usually involved in productive and reproductive tasks within the household, therefore they have little time to attend training and educational programs. Such lack of education and training opportunities for women results in persistent employment barriers that do not allow their full potential to be exploited.

Concluding remarks

To empower the role of Egyptian women in the F&A sector and realize their full potential, it is essential to address social and cultural norms resisting women participation along the F&A supply chain. Efforts by respective government and non-government organizations should be undertaken to appropriately address the gender dimension in agricultural and fisheries development policies, and to fully recognize the contributions and the positive effects of women participation in the F&A industry on poverty alleviation, local development and food security in Egypt.

There is a need also to develop an accurate database with disaggregated statistical information on women's role and participation in F&A industry. This should be seen as a first step in raising awareness of gender issues in the F&A industry. Further research is also needed to help understand the problems of gender inequality in F&A and to best address them.

In most cases, it is crucial to strengthen the capacity of different actors within the F&A industry in gender issues to raise awareness of major drivers of gender inequality and to explore the best ways to promote equality in the F&A so that different stakeholders incorporate that into their programs and projects within the sector. Facilitating the access of women to affordable start-up capital and financial services for F&A purposes is pertinent. This could be achieved by motivating financial institutions to provide more credit schemes and make loans available to women at low interest rates and with adequate period of moratorium.

Last but not least, several cross-country studies concluded that education and participation in training programs is a key-influencing factor that can give women access to a greater range of employment in F&A. More training opportunities, incentives should therefore be provided to equip women with knowledge and skills that can encourage their entrepreneurship in the F&A.

Bibliography / More information

- FAO (2014), *Gender-equitable governance of tenure of land, fisheries and forests: a right to food perspective*, Rome.
- CAPMAS (2013), *Statistical Year Book*, Cairo
- UN (2013), *Advancing Gender Equality: Promising Practices. Case Studies from the Millennium Development Goals Achievement Fund*.
- Madanda, A. (2003), "*Commercialization and gender roles among Lake Victoria shore fishing communities of Uganda*", Research report. Kampala: Department of Women and Gender Studies, Makerere University.
- El-Mahdi, A. (2006), *Analysis of Economic Situation of Women in Egypt*, Euromed Women's Rights.

Ecomuseum: a model to enhance the traditions and cultural heritage of Mediterranean fishing communities

Damiano Petruzzella
Project Coordinator, Magna Grecia Mare Association
CIHEAM-Bari

Massimo Zuccaro
Researcher
CIHEAM-Bari

Antonio Errico
President
Magna Grecia Mare Association

Roberta Trevisi
Researcher
CIHEAM-Bari

Biago Di Terlizzi
Principal Administrator,
Head of Planning and Cooperation Office
CIHEAM-Bari

Introduction

Fishing has always been an important sector of the Italian and Mediterranean regional economies. For centuries it has been a resource and an opportunity, playing a major social and economic role in the numerous coastal communities of the Mediterranean. Today, a severe crisis is undermining the fishing-related economy. The data in the European Commission report are alarming: 96% of the Mediterranean's deep fish stocks are over-fished, and overfishing exceeds 71% for pelagic species like sardines and anchovies[1].

The Mediterranean is the most overfished of the world's seas. The lack of strategies to reduce fishing's impact on fish stocks will also have devastating effects not only on marine fauna, but also on the coastal economies based on fishing. Given the importance of coastal fishing communities for employment and social cohesion, it is vitally important to focus not only on protection of marine fish resources, but also to promote the socioeconomic growth of these communities, via product diversification, and also taking into account that the tangible and intangible cultural heritage is an aspect of the identity of a community and is a tool for the integrated and sustainable promotion of coastal areas.

Figure 1
Western docks of Tricase port museum

[1] *COMMISSIONE EUROPEA, Statistica dati pesca, 2014*

The cultural heritage of fishing communities

The cultural heritage of an area has an increasingly wide sense; it includes both tangible and intangible cultural resources, since the intangible assets of communities also refer to expressions of identity and to a legacy to pass on to future generations[2]. In 2003 UNESCO recognized the importance of this intangible component, creating a new mean stoprotect these resources for the benefit of future generations.

In accordance with UNESCO[3] objectives, the intangible cultural heritage of fishing communities may be the following:

- Oral traditions and expressions (popular sayings, stories, adventures and tales of the sea), including language as vehicle of the intangible cultural heritage;
- Social practices, rituals and festive events, propitiatory and superstitious rites associated with seafaring and fishing-trips;
- Traditional craftsmanship and trades (ropers, sail makers, boat-builders, etc.) connected with the production of tools and equipment for fishing, navigation and sailing;
- Knowledge and skills concerning navigation (routes), and the fishing sites and seasons;
- Traditional recipes used ashore and onboard ship.

These elements may also be found in the Mediterranean Diet and the "life-style" it inspires. This was given official UNESCO recognition in 2010 for the importance and the intrinsic value of the food and cultural traditions of the Mediterranean local communities.

The objective is to demonstrate that the intangible cultural heritage, i.e. the skills, knowledge, practices and traditions that range from the landscape to the table, including crops, harvesting, fisheries, food storage, processing and preparation, can become a driving force for social and economic growth and for the development of coastal communities.

Figure 2
Illustrator Chiara Rescio meets the community of Tricase's port to put the finishing touches to the community map

[2] Ferruccio F., *Il futuro dei territori antichi*, CUEBC, 2013
[3] UNESCO, *Convention for the Safeguarding of Intangible Cultural Heritage*, 2003.
Art. 2 of the Convention defines the intangible cultural heritage as *"the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artifacts and cultural spaces associated therewith– that communities, groups and, in some cases, individuals recognize as part of their cultural* heritage *".*

The Ecomuseum model applied to coastal communities: integrated enhancement of the cultural heritage of fishing communities

Protection and enhancement of tangible and intangible cultural heritage can be a growth factor and a boost to socioeconomic development for the whole territory (not only for tourism), when based on the involvement of the whole community. Via the participatory approach during planning and implementation, the Ecomuseum model can have important spill-overs for the community, tying economic development closely to cultural growth and to the choice of a life-style which is more environmentally friendly and more attuned to local experience[4]. The main beneficiaries of the Ecomuseum model are fishermen, custodians of the traditions and skills at the heart of Ecomuseum enhancement. The benefits for fishermen lie in the recognition of their skills as a unique and distinctive heritage for the whole community, and also in the many potential activities the Ecomuseum offers for refreshing and keeping alive the traditional fishing skills.

Therefore, the cultural and educational activities, the services offered to visitors and citizens and the development of tourism-related opportunities all make it possible to maintain alive and useful the knowledge and skills that would otherwise disappear, by diversifying and increasing the development potential of the sector, no longer associated only with the sale of fishing products. Traditional food, sailing, maritime trades, traditional fishing techniques, fish storage techniques and sailor's knots are only some of the areas the Ecomuseum covers, and it will also directly involve fishermen in supplying services for tourists (e.g. catering and hospitality, trips to discover the marine and coastal ecosystem, fishing)[5]. This model is thus related to the search for innovation and is an interesting experiment "grafted" onto local roots.

The methodology applied to the design and implementation of the Ecomuseum is based on the participation of the whole community, especially its fishermen. They are asked to exchange knowledge and views about how they see, perceive and attribute value to their territory, its memory, transformations, present conditions and expectations for the future. The principal tool used for participatory design has been a hand-drawn *"community map"*, depicting the existing relations and interrelations between the people and their heritage, the stories, memories and knowledge that they feel are their own. The community map is a shared summary of studies and analyses (study of the territorial context, target analysis, analysis of criticalities and "regenerative" elements, management models) and proposals that have determined the final design choices.

Case Study: "Tricase Port Ecomuseum –Ecomuseo di Venere" (Lecce, Italy)

The experience of Tricase, starting with the creation of the Port Museum (Magna Grecia Mare Project- Interreg Greece-Italy 2007-2013), has recently resulted in the creation and request for recognition of the "Ecomuseo di Venere" as a regional ecomuseum (L.R. No 15 of 2011 - "Establishment of Apulian ecomuseums").

The Ecomuseum, proposed by the *Associazione Magna Grecia Mare* in collaboration with the Municipality of Tricase, CIHEAM-Bari, the "Costa Otranto S.M. di Leuca - Bosco di Tricase" Regional Nature Park and the University of Salento, has created a system for the many initiatives to upgrade and enhance the tangible and intangible cultural heritage of the Tricase port area. The focal elements of the ecomuseum's identity are the following:

Tricase Port Museum

An educational tour at the dock that preserves and recounts the local culture, seafaring traditions, fishing industry and fish products. The Port Museum extends along the quay and includes the fishing village and the dockyard building (the "Casotto sul Porto").

Permanent Cultural Centre for Maritime Traditions

Established in 2004 and run by the *Magna Grecia Mare* Association in partnership with Tricase municipality, this is on the first floor of the evocative and historical "Casotto sul Porto" on the Tricase docks. It is dedicated to the research, collection, exchange and study of knowledge associated with the sea-faring traditions of the coastal areas. It also hosts the adjacent *Boat Museum*, the *Museum of the Municipal School of Lateen Sails, the Multimedia Marine Library, a Taste Building Site* and the newly established *Ecomuseo di Venere*. Since 2010, thanks to the contribution provided by the "A Sea of Dialogues 2010" project promoted by CIHEAM-Bari and funded by MIPAAF, the Cultural Centre has also become the *"Laboratory of the sustainable development of Mediterranean coastal areas"*, a physical and virtual place facilitating the exchange of knowledge via the sharing of documents and objects from the Mediterranean area.

- Museum of Traditional Boats and Maritime Crafts**:** this contains a fleet of 13 traditional fishing boats and the flagship *Portus Veneris*, a 14-metre two-masted, lateen-rigged traditional sailing vessel (or "goulet"), which is a hundred years old. It has been a training ship (SVMMI) for a project coordinated by the Magna Grecia Mare Association, together with CIHEAM-Bari and ART publishing company (funded by the Presidency of the Council– Department of Youth); *Portus Veneris* will also become a floating library, a laboratory for young maritime writers. In addition, the museum has a collection of objects, equipment, and models of traditional vessels, all with a story to tell about the culture, art, trades and maritime traditions of the Mediterranean Sea.

-

[4] Tucci R., *Beni culturali immateriali, patrimonio immateriale*, VOCI
[5] Progetto Magna Grecia Mare, *Linee guida per la progettazione dei porti museo*, 2014

- Municipal School of Lateen and Traditional Seamanship: a seamanship school teaching ancient navigational techniques, maritime crafts, boat and equipment maintenance.

- Multimedia Maritime Library: the Multimedia Library contains over 700 texts and a large collection of photos, videos and interviews on themes related to Mediterranean fishing; it has been computerized using the SEBINA Open Library management software and is connected with the CIHEAM-Bari Documentation Centre (Interreg Greece-Italy 2007-2013).

- Taste Centre for research, experimentation and training about the ancient food traditions of the coastal areas in and outside Puglia (Interreg Greece-Italy 2007-2013)

- An Information Centre for young entrepreneurs or aspiring entrepreneurs interested in innovative development of sustainable tourism themes (Interreg Greece-Italy 2007-2013).

"Sand and the Seven Mouths", Tricase's old harbor

Subsequently, the Port Museum has launched other initiatives to extend the port area. A project funded by POIn (Cultural, environmental attractors and tourism), involves the renovation and development of the old beach/harbour in the port, and of traditional fishermen's houses. It also includes the adjoining cave complex, once used in the pastas housing and as storage space for agricultural and fishing equipment and stables. Following conservative renovation, these areas will be used for the following activities: cultural hubs for young innovators involved in developing business projects linked with the enhancement of marine and coastal environments; a Show room of local food and wine products; a service to guide tourists in their discovery of sites of environmental excellence; a *Centre for Environmental Education* with educational and training activities for traditional trades, tourist and environmental guides.

MARE – Mediterranean outpost for the monitoring of the marine and coastal ecosystem

Located to the south of the port (BIG Project - Interreg Greece-Italy 2007-2013), is a working environment open to tourists and visitors, dedicated to the following activities:

- Observatory on the biodiversity of coastal and marine ecosystems
- Marine biological laboratory
- Education
- Information and dissemination: a service to welcome visitors and guide around the working environment; activities to give information about marine and coastal ecosystems and raise awareness about the importance eating "humble fish";
- Organization of activities at sea.

All the actions described are shared with the community of Tricase port and primarily with its fishermen. They form the "Tricase Port Ecomuseum" and have been linked together to enable management via clear governance, based on the active participation of the local community. The Magna Grecia Mare Association and its partners and collaborators are driving force in this project, ensuring its efficient operation and guaranteeing a close connection with the territory.

Conclusions

The Ecomuseum model can be a concrete opportunity for the protection and enhancement of the tangible and intangible cultural heritage of a community. This can take place within a general framework of economic, social and cultural development based on implementing diversification of economic activities, business start-ups, training for local operators, and economic innovation of production systems. However, these results may be achieved only through an accurate and constant effort to involve, inform and sensitize the community, which then becomes the conscious custodian of the territory and of its cultural heritage. Simple and prompt management, active but not cumber some participation, a well-plotted route, a few well-defined navigation principles, and the seafaring skills of the crew are the key elements for the success and sustainability of the Ecomuseum experience.

The *Ecomuseo di Venere* in Tricase Port is based on the value of the cultural and environmental heritage of small-scale fishing communities, the true custodians of "treasures" that must not be lost and/or wasted. Their traditions, their culture, their environment, and their traditional approach to the management of marine resources are the best model of socioeconomic development for ensuring opportunities in the future, while satisfying the needs of the present.

Mediterranean Sea, despite its small dimensions, is a hot spot of endemism (Quignard and Tomasini, 2000). This sea is connected to the Atlantic Ocean and to the Red Sea through respectively the Strait of Gibraltar and the Suez Canal. The Suez Canal and the Gibraltar Strait are two exotic species spillways. These invasions together with other ways of introduction (fooling, aquaculture, ballast waters etc…) make the Mediterranean Sea as the biggest receptacle of exotic species in the world (Streftaris et al., 2005).

Figure 3
Community Map of "Tricase Port Ecomuseum– Ecomuseo di Venere"

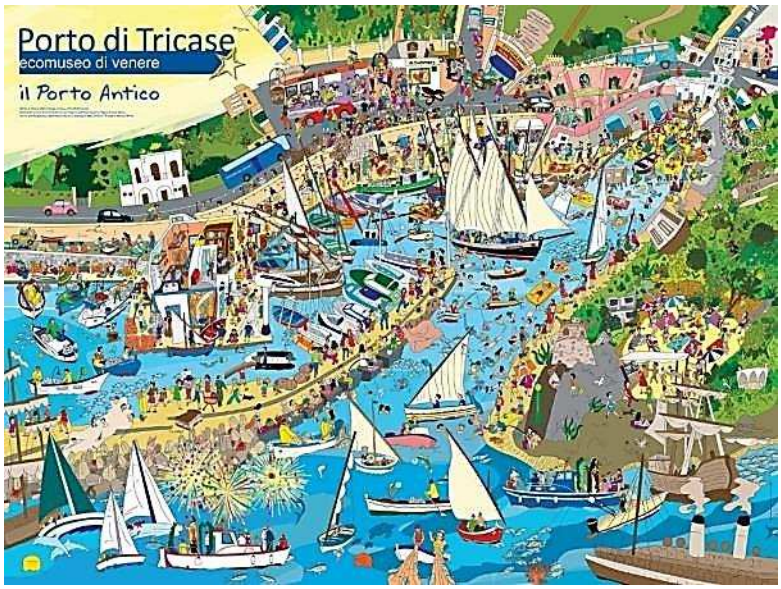


Figure 4
The launch of "Prospero", a fishing boat built in1961 and restored for inclusion in the port museum collection

Small Scale Fisheries from past to present in Turkey

Mürsel Yilmaz
Aquaculture Engineer
Ministry of Food, Agriculture and Livestock, General Directorate of European Union and Foreign Relations
Ankara, Turkey

Introduction

Small scale fisheries can, basically, be defined as fisheries activities which are applied in littoral areas mostly by family members using physical strength, without large capital but also with minimum use of technological instruments, on fishing vessels that are smaller than 12 meters (generally 5-8 meters), by using fishing gears such as long liners, fishing rods, gill nets and baskets. In Turkey, more than 90 % of fishing vessels consist mainly of small scale fishing vessels. Small scale fisheries which are applied traditionally from past to present in littoral areas of Turkey, are still the main livelihood of many families.

Defining small-scale fisheries by combining all characteristic dimensions is a challenge yet the FAO Glossary indicates that small scale fisheries are:*"traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amount of capital and energy, relatively small fishing vessels (if any), making short fishing trips, close to shore, mainly for local consumption. In practice, definition varies between countries, e.g. from gleaning or a one-man canoe in poor developing countries, to more than 20-m. trawlers, seiners, or long-liners in developed ones. Artisanal fisheries can be subsistence or commercial fisheries, providing for local consumption or export. They are sometimes referred to as small-scale fisheries"*.

While small-scale and artisanal fisheries clearly differ from industrial and recreational fisheries, the subtle distinctions between them are hard to pin down. The FAO Glossary tends to equate "artisanal" with "small-scale". From a technological point of view, however, these are connected but have somewhat different concepts related, on the one hand, to the size of the fishing unit (the scale) and, on the other hand, to the relative level of technology (or "artisanality") expressed as the capital investment / man-on-board.

The current status of fisheries in Turkey

Turkey is a Mediterranean country located in the northern hemisphere and its climate type is mostly Mediterranean. Turkey is a peninsula that is surrounded by the Black Sea which is located in the North and connected to the Mediterranean Sea by the Bosphorus and the Dardanelles, The Marmara Sea which is located between the Dardanelles and the Bosphorus, the Aegean Sea in the West and the Mediterranean Sea in the South. Turkey's total length of coastline is 8.333 kilometers. Furthermore, there are dam lakes, natural lakes and ponds that are over 200 in number and this provides opportunity for inland fisheries. Different salinity rates of the surrounding seas (0,16-0,18 % for the Black Sea, 0,24-0,25 % for the Marmara Sea and 0,36-0,38 % for the Mediterranean Sea) have caused to diversifying of fish species. Aforementioned characteristics of Turkey have made fisheries an important and longstanding labor.

Turkey's surrounding seas that have different characteristics are rich in fish species. Although, it's been stated by researchers that the Black Sea has around 247, the Marmara Sea has around 200, the Aegean Sea has around 300 and the Mediterranean Sea has around 500 fish species, many of these species are about to be extinct nowadays (Hoşsucu H., Kınacıgil T., Kara A., Tosunoğlu Z., Akyol O., Ünal V., Özekinci U. 2011). It can be observed that increased fisheries technology, unconscious fishing activities, pollution and over exploitation of stocks have led to a decrease in the number of economically important species. A recent improvement worldwide is the increase of aquaculture production in order to meet the need for food.

There are around 20.100 licensed fishing vessels in Turkish fishing fleet (17.000 marine fishing vessels and 3.100 inland waters fishing vessels). There are 1.870 fishing vessels (trawlers and purse seiners) which are above 12 meters and these vessels carry out 90 % of total fisheries. 15.130 fishing vessels that are below 12 meters are mostly used in coastal fishing and they carry out about 10 % of total fisheries (Kayabaşı Y. 2013). It's been stated at a workshop in 2013 that there are about 15 000 fishing vessels and 35 000 fishers that are performing small-scale fishing activities. About 10 per cent of the total fishing production is from traditional fisheries and this is about 45 tons per year (Tosunoğlu Z. 2013).

Although, Turkey is a country that is surrounded by three seas, rate of aquaculture product consuming per capita is behind the world average. Average annual consumption rate for aquaculture products is 7,0 kg per capita in Turkey while it's 23,3 kg per capita in Europe and 17,8 kg per capita worldwide (Ünal V. 2013). In coastal areas of Turkey, consuming rate is higher than the central Anatolia where the consuming rate is scarcely any.

Production data

Total aquaculture production of Turkey is 607.515 tons according to 2013 data. 339.047 tons of this production is from marine fisheries. Anchovy is the most caught fish species in Turkey, which is 179.615 tons. Horse-mackerel, sardine and bonito are also among popular fish species in Turkey. There are 2.353 fish farms in Turkey and total aquaculture production is 233.394 tons. Trout is the most produced fish species which is about 128.059 tons (Anonymous, 2013). Total fish production worldwide is 154 million tons according to 2011 data and Turkey's ratio in production is 0,40 % (Ünal V. 2013). After giving information about the current status of fisheries in Turkey, it is useful to glance at the historical development process of fisheries.

The historical development process of fisheries

Fishery as an activity or a hunting method is one of the first occupations of humans. It's been stated that, in 5000 BC, primitive men used to tie special stones made of clay to lead line and floating woods to cork line of nets. Historical findings also show that there had been use of fishing tools such as fishing rod, harpoon and fish traps. Primitive harpoons had been used in Ancient Egypt. Nearly 4000 years ago, gouged trunks had been used in shorelines and shallow waters as rafts to catch fish. First written document on fisheries which gives information on simple shore seine methods belongs to Egyptians, in 3000 BC. Phoenicians and Romans had improved beam trawls and used them as fishing gear in sailboats. Fishing gears and methods had improved in parallel with the increasing importance of aquaculture in human nutrition (Atar H.H., Ateş C. 2009).

Historical findings and engravings found in archaeological researches had shown that Turkish folk had been occupying with fisheries through their journey from Central Asia to Anatolia. People who had lived in the northern Altai used to work in agriculture, herd sheep and cattle, and occupy with fisheries in fourth and third centuries BC. It can also be observed that deer hunts, wild ducks, fish and fish nets had been mentioned on Orkhon inscriptions. Due to geographical conditions fishing activity had taken place on rivers and lakes. Traces of fisheries had been found from the archives of the Ottoman Empire. It seems that during the reign of Sultan Mehmet II, fish had been included in palace cuisine and there is information on fish cooking methods. Fishermen had been organized as a guild and fishgarths had been taxed in 17th century. Fish consumption had been more popular through non-muslim folk, especially the Rums, and traditional fisheries had been selected as occupation mostly by the Rums (Atar H.H., Ateş C. 2009).

Evliya Çelebi, a famous Ottoman traveler, had written about fisheries of the places that he had travelled, in his works. He had mentioned about fish schools flooding through the Bosphorus on certain seasons, fish processing to get salted bonito or pickles, and the use of sailboats for fishing. Another historical source for fisheries is the book called "Fish and Fisheries" written in 1915 by Karekin Deveciyan who had been the Central Director of İstanbul Fish Market between 1910 and 1917. In this book, firstly, all marine and inland waters fish species inside the Ottoman Empire borders had been examined by a general classification, secondly, fishing gears had been introduced, and finally legal regulation on fisheries, tables and a fifty page French-Turkish dictionary had taken place (Sarıkaya M. 2009). This work gives information on fish species, fishing methods, fishing gears, fishgarths, drive-in fishery spots, statistical information on fisheries and evaluation methods of the collected data. There are also information on little fishing vessels such as "kancabaş, alamana, kürekli", the importance of fishgarths, and drawings of drive-in fishery spots.

It had not been possible to separate industrial fisheries and small-scale fisheries until the beginnings of the 21st century, both in Turkey and the World. Applying the improved engine technologies to fishing vessels and building vessels which are capable of travelling long distances had led to the main enlargement and improvement in fisheries. In parallel with the Turkish development movement which had happened after the formation of the new republic, fisheries production which had been obtained only from coastal fisheries had begun to transform into industrial fisheries by exporting vessel engines. However, fisher families whose livelihoods are from traditional fishing activities due to the lack of capital are still parts of daily life.

As mentioned above, there are 15100 fishing vessels which are less than 12 meters and used for coastal fisheries. Seine nets, drift nets, entangling bottom nets, common bottom nets, fishing lines, longliners, fyke nets, beam trawls and dredges are the main gears for coastal fisheries. In small scale fisheries, depending on the time and the season, haddock, red mullet, bonito, blue fish, gray mullet, garpike, seabream, seabass, blackspot seabream, two banded seabream, boops boops, hake, amberjack, striped seabream are the main marine fish species alongside the invertebrates such as seasnail, sand mussel, shrimp, lobster and octopus while carp, catfish, pearl mullet, perch are common in inland waters. In small scale fisheries, family members are the main employees yet if there is a need for more work forces, one or two paid deck hands are employed for a fee or a share from the total production. Similarly, in inland waters, small vessels, seine nets and various traps are used for small scale fisheries.

There are also families living in rural areas and running family owned business in aquaculture sector. Following the beginning of trout farming in 1970s, many families had made small investments to the sector. In years, facilities have begun to increase their capacities and commercial enterprises have raised the production rate by using net cages in seas and dam lakes. Still, many families live off running family owned businesses near water resources with a production that is less than 5 tons per year and provide fish which is rich in protein, to the people in the rural Anatolia.

Concluding remarks on the future of fisheries and aquaculture in Turkey

One of the grant programs of Agricultural and Rural Development Support Institution in Turkey is for the improvement of aquaculture. In order to enhance livelihood income to rural population, creating employment and providing animal protein for rural areas, there is a 50 % grant support by IPARD Program (Anonymous 2014).

Small scale fishers have an important role socially, culturally and economically in coastal areas by providing fresh fish to the local markets and touristic restaurants, creating employment, contributing sustainable fisheries and representing a traditional culture (Tosunoğlu, Z. 2013).

A SWOT analysis for small scale fisheries showed that the powerful aspects are; short termed yet continuous fishing, high quality products, being the market's providers, low management and infrastructure cost, acceptance of low income, chance of participation by female family members, providing employment for many people (including the related sectors), having less negative effects to the environment, being selective for targeting a specific species and size, richness because of biodiversity and endemism, contribution to tourism, forming an important community as a social structure and sustaining the fishing culture.

Weak aspects of small scale fisheries are; lowness of economic dynamism and income, the lack of effective fight against illegal fishing, ineffective use of marketing, the lack of strategy for pricing the products, challenges in competing with farmed fish, fishermen's irresponsibility at following their own financial status, declining number of people who work (actively) at fisheries sector, security risks of fishing alone, the lack of technical infrastructure and inadequacy at adopting new technologies, focusing on short term targets and decreasing fish stocks (Tosunoğlu, Z. 2013).

All these findings show that traditionally applied small scale fisheries will continue to sustain its existence by being the main livelihood income source of many families even if there are negativities such as challenges in competition, exhausted stocks and low income rate in Turkey and the World.

Bibliography / More information

- *FAO Fisheries & Aquaculture - Small-Scale & Artisanal Fisheries*.
- Hoşsucu, H., Kınacıgil, T., Kara, A., Tosunoğlu, Z., Akyol, O., Ünal, V., & Özekinci, U. (2001). *Türkiye Balıkçılık Sektörü* ve 2000'li Yıllarda Beklenen Gelişmeler.
- Türkiye İstatistik Kurumu, Su Ürünleri İstatistikleri.
- Ünal V. (2013). *Türkiye Balıkçılığının Sosyo-ekonomik Yapısı ve Örgütlenme*, 1.Balıkçılık Çalıştayı, Antalya.
- Kayabaşı Y. (2013). *Su Ürünleri Avcılığı ve Denetimler, Türktarım Dergisi,* sayı 211.
- Tosunoğlu Z. (2013). *Küçük Ölçekli Balıkçılık*, 1.Balıkçılık Çalıştayı, Antalya.
- Atar H.H. & Ateş C. (2009). *Türklerde Tarih Boyunca Su Ürünleri Avcılığı*, Acta Turcica, sayı 1.
- Sarıkaya M. (2009). *Karekin Deveciyan'ın 1915 Tarihli "Balık ve Balıkçılık" Eseri*, Acta Turcica, sayı 1.
- T.C Kalkınma Bakanlığı, (2014). *On Yıllık Kalkınma Planı 2023 Su Ürünleri Özel İhtisas Komisyonu Raporu*.

Exploring the role of diversification as a sustainable livelihood strategy for small-scale fisheries in the east coast of Sicily

Giuseppina Carrà
Professor, DiGeSA, University of Catania, Italy

Iuri Peri
Professor, DiGeSA, University of Catania, Italy

Clara Monaco
PhD student, DiGeSA, University of Catania, Italy

Gabriella Vindigni
Professor, DiGeSA, University of Catania, Italy

According to FAO guidelines, UNESCO recommendations and EU fishery policy, small-scale fisheries are seen as caretakers of cultural heritage and environmental knowledge. Mediterranean fisheries are influenced by several factors such as decrease in natural resources, changes of marine biodiversity, fluctuating consumer demands and shaky economic environment, in addiction to an unexpected evolution of regulatory systems. In this context, the challenge is to develop a sustainable and a multifunctional perspective.

We consider fishers strategies that express a diversification approach in the form of fishing activities conducted together with others that are in continuation with their primary productive function. The broading process of the range of activities ensures to fishers to earn complementary incomes that can maintain or create employment in local fishing communities. For this reason it plays an important role in the sustainable development of coastal areas.

This paper provides a description of the implementation of an approach for evaluating various fishery diversification strategies that has been conducted by the Department of Agri-food and Environmental Systems Management of the University of Catania in the framework of the project "DiverSO" promoted by the Fishery Department of the Sicilian Region. It studies the development of alternative and complementary activities generating income in small-scale fisheries and the livelihood diversification as an adaptive strategy to increase household well-being and responsive approach to changes in resources state, environmental conditions and market or regulatory constraints. The study area is the south-east coast of Sicily which includes fishing communities of three urban areas (Messina, Catania, Siracusa), where anthropic pressure, environmental changes and inappropriate local policies are jeopardizing the survival of small traditional family-run fishing enterprises.

The importance of a livelihood strategy in sustainable diversification

Diversification represents an essential strategy for livelihoods of small-scale fisheries in Mediterranean and one that has tended to be ignored by policies that are sectorally based. Sustainable livelihoods strategies allow us to identify the combination of activities that people choose to undertake and the factors behind their decisions in order to achieve their livelihood goals. They have a dynamic attitude and prioritize types of development people-centred, responsive and multi-level which help to mitigate against constraints (Horemans, 2005).

The difficulty of new generations of fishing household in adapting to the changeable occupation system, above all susceptible to seasonal fluctuations in stock size and location, makes small-scale fisheries much more fragile and endangers the survival of ancient and traditional crafts.

Diversification can reduce the risk of livelihood failure by increasing the number of income source, helping in decrease vulnerability and generating financial resources that could encourage fishers and their families to keep fishing practices. A sustainable livelihoods approach seeks also to improve development policies and practices of coastal communities by recognizing the cyclical complexity of the strategies, and identifying ways of making livelihoods more able to cope with adverse trends for a better understanding of natural resource management systems.

Sustainable fisheries diversification furthers conservation of fish stocks by reducing dependence on the resource through a combination of environmental management and incentives for alternative and complementary activities. However, diversification must include actions that maintain a link with fishing business in order to ensure social and cultural long-term viability of coastal communities. Their integration into the local labour market through diversification into inshore and onshore activities could contribute to household viability by raising its income levels and stability.

Which diversification?

The sustainable development of small-scale fisheries needs enhancing fishers' livelihoods as well as developing livelihood alternatives. In this context, multifunctionality, diversification and pluriactivity become a solution to cope with increasing constraints of the sector.

Fishers develop new fishing alternatives based on their unit of production in order to sustain it by alternating relations with environment, institutional players, scientists, local stakeholders and customers. The complexity of such multifunctionality is that fishers must follow strategies that allow to maintain fishery in a sustainability way, without losing contact with the reality of the activity from which they come. So the practice of diversification can be seen as a rediscovery of traditional activities which could create opportunities for new business.

Diversification means for fishers to develop new sources of income practicing fishing activities simultaneously with others complementary to them. Then, new activities contribute to create additional value, employment and complementary incomes; sharing traditional practices and promote fishing products; encouraging the conservation of local patrimony and maintaining small-scale fisheries activities; developing new networks within coastal areas. The most common types of diversification concern innovative market strategies, development of services for the environment and the tourism, and participation in scientific programs (Henichart *et al.*, 2010). They represent a form of social and economic sustainability of the fishing sector, where fishers develop individual and collective actions to defend their own interests and to face various pressures. However, diversification is also ecologically sustainable as it contributes to maintain or decrease fishing effort and pressures on the environment. Adapting the model proposed by van der Ploeg & Roep (2003) for rural areas, to the case of small-scale fisheries, a new classification of diversification fishing activities was performed. Here (Figure 1) multifunctionality is categorized in three trends: a deepening of fishing production; a broadening of functions activated by fishing activities; a re-grounding of production processes.

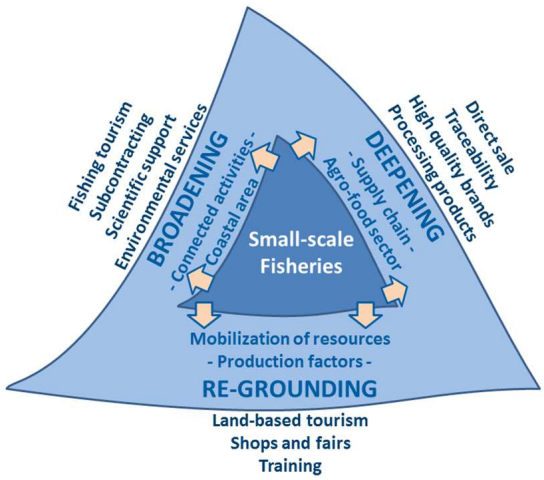


Figure 1 – Adaptation of the model of van der Ploeg & Roep (2003) for small-scale fisheries activities.

Thus fishers might decide to process and sell their products directly to different types of consumers (i.e. direct sales, short distribution chains); or they might choose to utilise fishing household resources to expand income-producing activities (i.e. fishing tourism); or they can increase income from non-household sources (i.e. socio-cultural and environmental services also in land). Our study aims to focus the attention only on the approaches related to fisheries that allow the development of value-added products and services.

How can the authenticity survive the modernization?

Diversification plays a crucial role in the identity of fishing households. It represents a source of values, language, knowledge and traditions which is being increasingly recognised. Culture linked to handicrafts fisheries is expressed with unique local practices ranging from cooking methods to fishing techniques that represent a strong authenticity of heritage of coastal areas. This authenticity is dynamic and draws vitality from the ability of adapting to changes as result of globalization and homogenization that affecting cultures.

Fishers are the main defenders of cultural heritage linked to small-scale fisheries and coastal communities. Their cultural heritage is local, traditional and sustainable. It is seen as a common good and source of local added value, trade and fishery development, particularly when based on knowledge of tradition, that globalization tend to makes less authentic.

The EU underlines the important connection between the preservation of nature, cultural heritage and territory, in a process of diversification where different activities are usually overlaps. Traditional fisheries could point to associated practices leading to quality products, environmental services, tourism and local investment, thereby involving an important potential for the future and representing an opportunity for not losing their local identity. Management and preservation actions of cultural heritage in coastal areas, not only ensures the community identity but also a potential for economic development, mainly linked to tourism.

In this perspective, fishing and the tourism business depend on each other, so fisheries need additional income from tourism related activities and tourism needs to develop products based on people, food, history and traditions of coastal communities. For these, cultural heritage is a resource that represents the non-material part of the attraction and a basis for new business development.

The most common actions undertaken for diversification in tourism are various such as restoring typically buildings, practicing old techniques using traditional fishing gears, proposing ancients recipes for food products. However, there is a risk that tourism might replace, rather than celebrate, fishing. The touristic exploitation could destroy the identity of fisheries dependent communities through a devaluation and trivialization process caused by commercialization that could reduce the coastal culture and identity to a caricature of itself. Therefore the traditional fishing risks to disappear, because of the isolation of small fishers that are often not supported by appropriate policies enabling them to compete with large-scale fishing industry.

Diversification of fisheries activities in Sicily

A study of diversification of fishing activities and sustainability of coastal zones of Sicily has been conducted by our team for the project DiverSO. It started in 2012 with the objective to identify existing local practices of diversification and their potential of development by analysing fishers' acceptability.

In Sicily fishery sector is characterized by a reduction in the size of local fleets, the volume of fish landed and the number of local fishers employed, accentuated by the increase of fuel price and the lack of a rational and efficient organization of the supply chain.

Our study area lays in the south-east coast of the Ionian basin, between Messina (Giardini Naxos) and Siracusa (Portopalo), covering over 150 km of coast and 10 Maritime Directions. The territorial analysis concerning socio-economic and environmental context has shown that more than half of local fleets belong to small-scale artisanal fisheries, which use multi-purpose fishing systems, especially driftnets and longlines. Moreover, even if there is a good number of fishers authorised to make diversification activities, they don't use this opportunity.

The participatory approach, developed within a multi-methodology framework, has involved different actors in the assessment of different fishery diversification activities. The research method was based on questionnaires and focus group for actors, experts and stakeholders active in local coastal area, and on a participatory process aimed at creating shared visions of sustainable strategic actions directed to the policy makers.

A cognitive map was used to show interviewed participants' perception of the adoption of diversification activities (Vindigni *et al*., 2013). Later the Analytic Hierarchy Process Method (AHP) was used in order to organise ideas, criteria and objectives of the actors in a hierarchical structure and to understand how different diversification strategies can enhance resilience of small-scale artisanal fisheries and make them more sustainable (Carrà *et al*., 2014).

Preliminary investigations show that, to improve a sustainable livelihood strategy in coastal small-scale fisheries, is required a combination of different activities. Among these, the increase of the fish products *added value*, especially through quality brands, is resulted the first additional opportunity of income. However, the lack of cooperation between fishers is an obstacle for this strategy. The second opportunity to be considered is *tourism activity* that has great potentiality, but it is thus far much fragmented and needy to a coordination network. Only few interviews are interested in *ecological and scientific activities*, because of the unclear remunerated aspect.

The next step of the project goals to promote the formation of clusters in order to cope the constraints of Sicilian small-scale fisheries and to facilitate the implementation of measures aimed at improving the socio-economic conditions and the sustainability of production systems, as well as the preservation of cultural heritage.

Concluding remarks

The multifunctionality of fishing households is crucial for development of the fishing industry. This phenomenon contributes to contain the exodus of fishers and consequently prevents depopulation of coastal areas. It also favours conservation of marine environment and landscape, and allows to maintain typical customs and traditions of many territories. Nevertheless diversification of fishing activities is not a real solution to the fisheries crisis but represents a way to react in front of the current degrading economic and environmental context.

The elements through which small-scale fisheries currently response to economics constraints are a multi-tasking activity made by fishers that fish, sell and make maintenance, minimising the costs; the increasing of new forms of fishing activities such as aquaculture or novel target species; the emergent of fish processing and added-value niche products; the awareness of own historical and cultural value.

After all, the resort to sustainable activities, that maintain the social and cultural integrity of the whole fishing community and at the same time defend marine resources, is a valid reaction against the destructive modernization which instead can be understood as a rediscovery of traditional activities, promoting the recovery of coastal areas and addressing new integrated maritime policies.

Bibliography / More information

- Carrà G., Peri I., Vindigni G. (2014). *Diversification strategies for sustaining small-scale fisheries activity: a multidimensional integrated approach*. Rivista di Studi sulla Sostenibilità, n. 1, p. 79-99.

- Henichart L., Lesuer M., Fontenelle G., Boude J.P., Ropars C. (2010*). Diversification of fisheries activities and construction of sustainability*. IIFET 2010, Montpellier Proceedings.

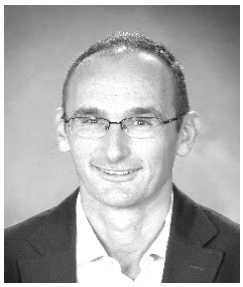
- Horemans B. (2005). *Fisheries and Aquaculture topics. The sustainable livelihoods approach. Topics Fact Sheets. In: FAO Fisheries and Aquaculture Department* [online]. Rome. Updated 27 May 2005. [Cited 13 October 2014].

- Van der Ploeg J.D., Roep D. (2003). *Multifunctionality and rural development: the actual situation in Europe*. In: Van Huylenbroeck G., Durand G. (eds.), *Multifunctional Agriculture: a new paradigm for European agriculture and Rural Development*. Ashgate, Burlington, VT (USA) and Aldershot (UK).

- Vindigni G., Peri I., Carrà G., Monaco C. (2013). *Diversification of fishery activity: a cognitive approach*. In: *Laboratorio di studi rurali SISMONDI* (Pise, Italie), *Rural resilience and vulnerability: the rural as locus of solidarity and conflict in times of crisis*. p. 189-191. XXV European Society of Rural Sociology (ESRS), 2013/07/29-08/01, Florence (Italie).

Family Fishing and Environment: the Case of Xàbia in Spain

Lluís Miret-Pastor
Associate Professor
Universitat Politècnica de València
Instituto de Investigación
para la Gestión Integrada de Zonas Costeras (IGIC)



Paloma Herrera-Racionero
Associate Professor
Universitat Politècnica de València
Instituto de Investigación
para la Gestión Integrada de Zonas Costeras (IGIC)

Cristina Buigues-Ortolá
Universitat Politècnica de València

Traditional fishing on the Spanish Mediterranean coast is at a critical juncture. The sector is facing an environmental, economic and social crisis that is threatening its survival. Overexploitation of fish stocks, the fishing industry and increased costs are among the causes leading to the current situation (FAO, 2010).The different fishing policies have led to the imposition of an ever more restrictive and conservationist legislation, resulting from the desire to protect marine environment and ensure the sustainability of the fishing industry. However, in a sector which is very hostile to legislation, many of the measures are failing because they are difficult to implement and to monitor.

Given these circumstances there is an increasing call for the replacement of the current centralist, generalist, and top-down models with co-management fishing models, which are decentralised, local and able to involve the fishermen themselves in the management of their own resources. This call to action is even more pressing when considering the traditional fishing sector, where local features and the specific wishes of the fishermen, is very distant from large-scale industrial fishing, at which European fishing policy seems to be aimed.

The European Union itself recognized the failure of its Common Fisheries Policies (European Commission, 2009, 2011) and proposed to give greater prominence to the sector itself in the latest fisheries reform. Among other measures, the new Common Fisheries Policy which came into effect on January 1, 2014, aims to incorporate the biological, economic and social dimensions of fisheries to give a greater role to regional institutions and to strengthen the fishermen organizations. Moreover, the new Policy requires the reinforcement of research-oriented fisheries policy through national programs to promote the collection of scientific data (including biological, technical, environmental and socio-economic information). In the same way, the European Maritime and Fisheries Fund (EMFF) is structured around four pillars: "Smart, Green Fisheries" (i), "Smart, Green Aquaculture" (ii), "Sustainable and Inclusive Territorial Development" (iii) and "Integrated Maritime Policy" (iv). One of the Fund's main objectives is "promoting competitive innovative fisheries and aquaculture", based on knowledge.

Nevertheless, when we talk about innovation in fishing, and especially in traditional fishing, some special features should be considered. Most innovation studies emphasize the importance of external knowledge and the collaboration of companies with customers, universities, suppliers and the government by creating an institutionalized system of innovation. However, studies that focused on primary industries find that innovation responds primarily to internal stimuli, because they are sectors with a strong knowledge base (Christensen et al, 2011).

In these sectors, innovation models exclusively based on external knowledge can lead to the rejection of the policies adopted. This is especially important in the management of fisheries where the FAO recommends the involvement of stakeholders in the design of both policy innovation and management policies (McGoodwin, 2002). However, there is a great ignorance of the socio-economic realities of fishing. If a new approach to fisheries policy, based on the strengthening of the role of the fishermen and their institutions is necessary, a better understanding of their realities and their vision of the problems that affect them is crucial. In the case of traditional fisheries, a key aspect that is little studied is their view on innovation, the environment and the fact that many fisheries are family-owned.

The family plays a key role in the fields of learning, innovation or management of traditional fisheries. Any model of co-management or any attempt to drive innovation and environmental sustainability in this sector should take this family dimension into account.This paper will therefore focus on a small Spanish Mediterranean port, in an attempt to analyze the process of innovation and the vision of fishermen on environmental sustainability, with a particular attention given to the role played by the family in management, innovation or learning.

Xàbia

Xàbia is a town of about 30,000 inhabitants located in the Valencian Community in one of the major touristic areas in Spain (Costa Blanca), as evidenced by the fact that more than 53% of the population are foreign residents (especially English and German).

The coexistence between tourism and fishing has not always been peaceful. Thus, over the years, although the port was designed as a fishing port, the marina has cornered the fishing boats and created a great tension between traditional fishing and sport fishing.

There are currently 6 trawlers, 4 purse seiners and 7 dedicated to other minor gears as trammel in Xàbia. There are 83 active fishermen and the annual catch volume is of about 2,000 tons. It is important to note that there has been a sharp decline in the number of boats, fish catches and active fishermen over the past 10 years.

Methodology

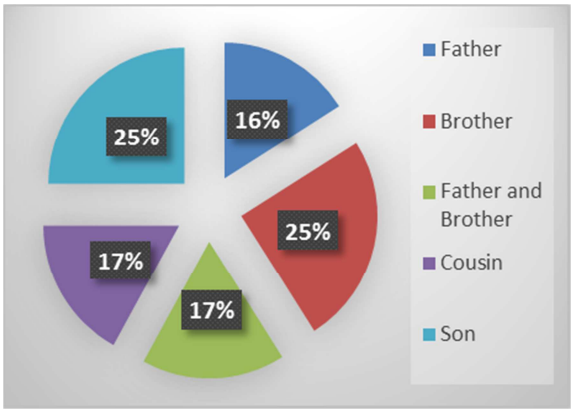
This study combines quantitative and qualitative approaches. The quantitative work has been based on simple random sampling. During the months of March, April and May 2014, we have personally interviewed 20 fishermen of the 83 (N) active ones in the port of Xàbia. They were chosen randomly by a principle of opportunity, with a 19% error and a confidence level of 95%. The survey included 20 questions covering different aspects such as the importance of family, innovation, traditional ecological knowledge, environment, etc. The questionnaire consisted of closed questions (Likert scale, dichotomous, filter...) and is part of a larger study dealing with various aspects of traditional fisheries around the Spanish Mediterranean, but 13 questions were used to discuss the issues raised here.

To examine specific aspects of our research and give more validity to the data obtained in the survey, we proceeded to a triangulation from semi-structured interviews to seven people directly involved in the fisheries sector in Xàbia, including two ship's masters, the secretary of the guild ("cofradia"), a retired sailor and three active sailors. The ages range from 21 to 83, as we have tried to diversify points of view and analyze different experiences.

Results

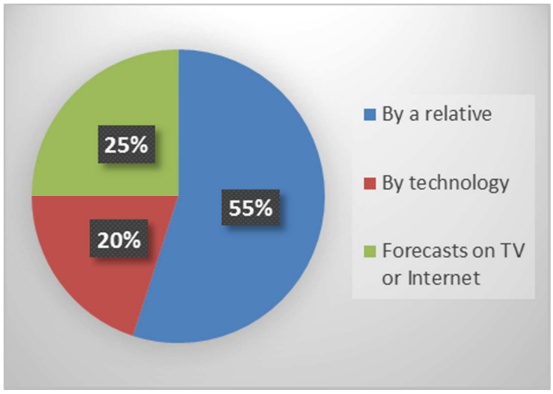
The first question asked them how they learned to fish. 17 of the 20 respondents said that they have learnt thanks to a family member; 3 independently and none of them through training courses. This first question reveals the importance of the family in the training of fishermen. In the second question they were asked if they were currently working with a family member: the results gave us 12 positive answers and 8 negative ones. Among those who answered yes, the relationship is as follows:

Figure 1
Kinship



Fishing therefore remains a family affair in Xàbia. This is also revealed by the answers to another question related to the weather (Figure 2), where most of them stated they had learnt thanks to a relative. However, there seems to be a generational gap since in this matter, young people are more likely to use technological devices or internet.

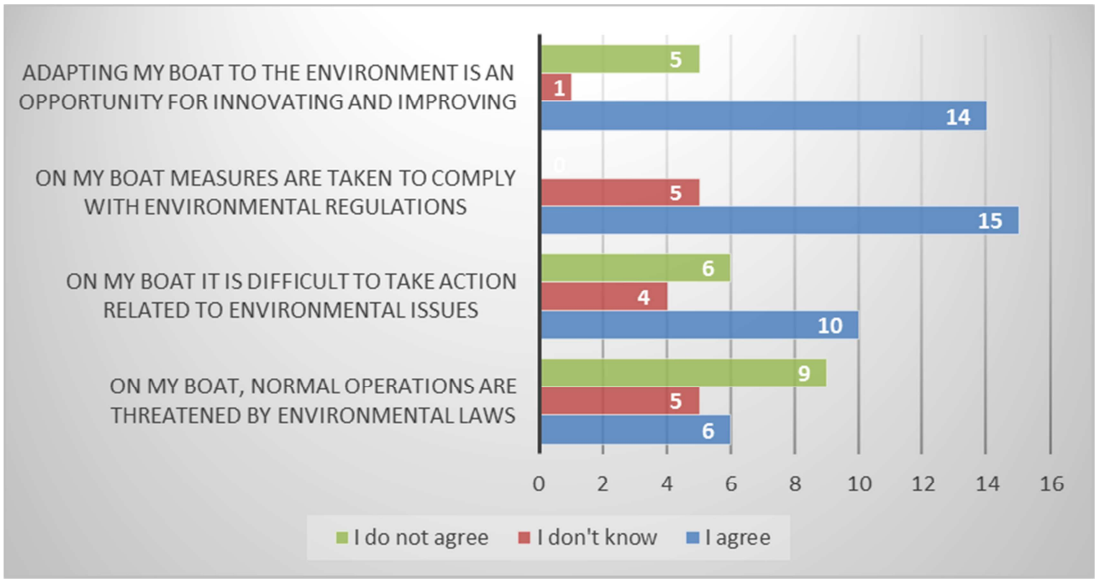
Figure 2
How did you learn to forecast the weather?



This idea is brought up again in the qualitative analysis where many respondents recognized the role played by their fathers, uncles, etc. in their training. In the survey, another set of questions dealt with questions related to innovation. Regarding the gadgets used for fishing, 70% of respondents said that they use the same devices as some years ago, only the remaining 30% said they have changed the gadgets used for fishing. They admit that the new ones are more efficient than the old ones but they are not more respectful towards the environment. These results show two interesting aspects. First of all, they reveal how difficult it is to introduce innovations in traditional fishing and secondly that these innovations are aimed at getting a more effective but not a more sustainable fishing.

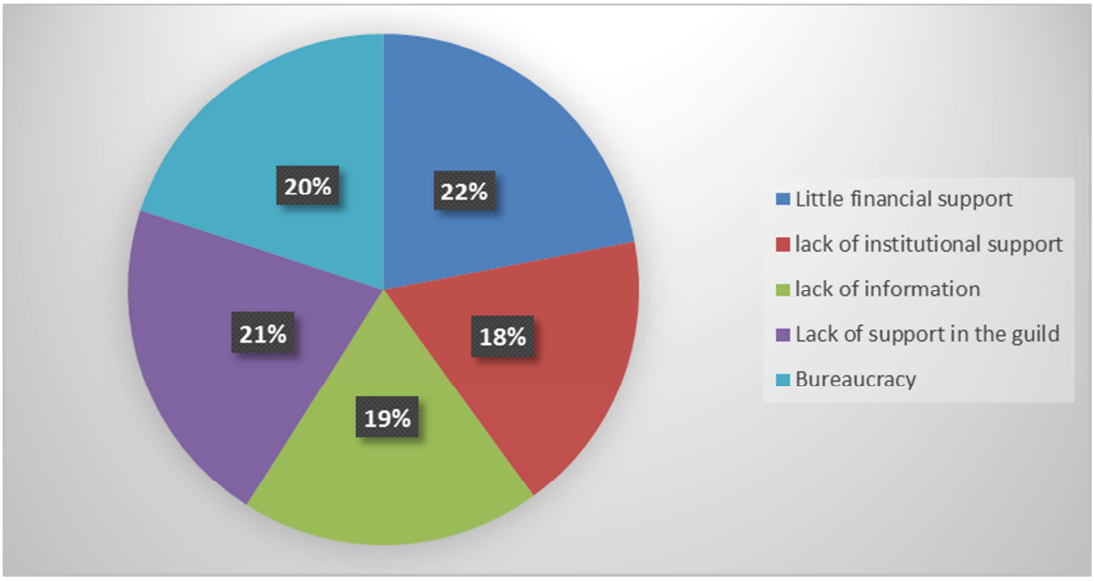
However, when answering another question, more than half of the respondents admitted having made changes to try to reduce their negative impact on the environment. Fishermen have been using methods that have allowed them to save fuel, manage their own waste on the boat, reduce pollution, etc. Most fishermen do not see environmental regulations as a threat and 70% of them agree that changing and adapting to environmental needs are an opportunity to innovate.

Figure 3
Results of the questions related to measures taken by the vessels in order to adapt themselves to the environmental legislation



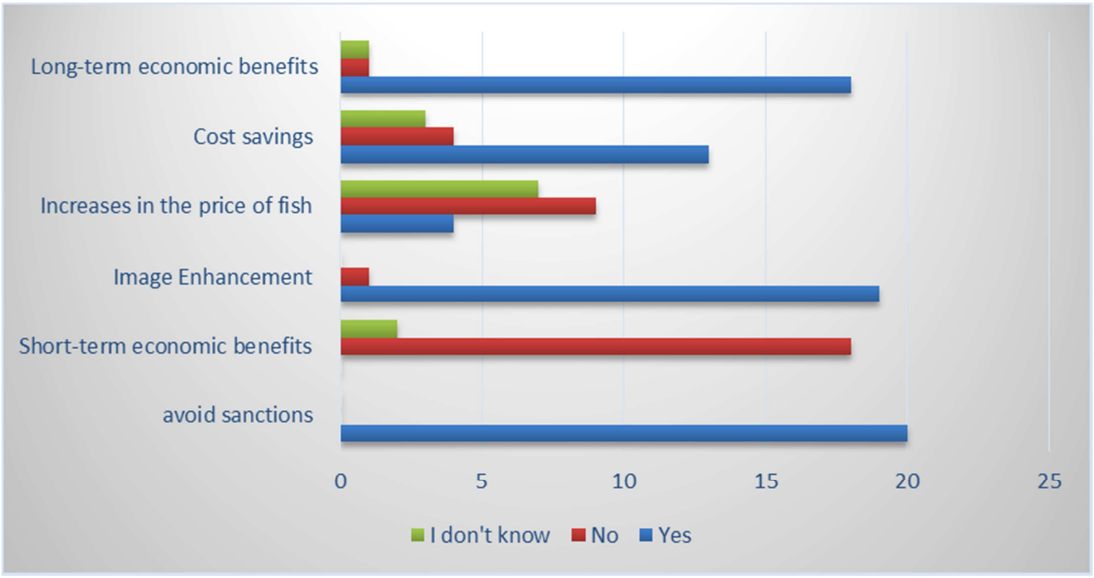
Regarding the disadvantages and difficulties encountered when taking actions favoring the environment, 22% of respondents agree that financial support is scarce, 18% claim that there is a lack of institutional support, 19% expect more information, 20% complain about bureaucracy and 21% point out a lack of support from the guild.

Figure 4
Major issues hindering actions in favor of the environment



Fishermen believe that changes related to the environment are important to the administration, the guild and the ship's masters and they are not so important for employees, customers or suppliers of material. Most of them supported the idea that their own boat, the guild and the administration have a strong commitment to the environment; however they do not believe that consumers are conscious (which goes in line with the fact that only one respondent knows the concept of eco-labeling) of the importance of the environmental impact. They were also asked about the type of benefits that the actions of environmental protection could provide them, and the response of fishermen can be seen in the figure below. With regards to sustainable development, 40% admitted not knowing what it is and only one of the twenty respondents said he knew of any eco-label related to fishing, the rest had never heard of it.

Figure 5
Benefits provided by the environmental actions carried out on the boat



Conclusion

This work has allowed us to analyze the importance of the family in traditional fishing; furthermore it has also enabled us to analyze the perception fishermen have of innovation and, in particular, innovation related to the environment.
As for the family, the data analysis allows us to confirm the idea that it plays an important role in traditional fishing. Many of the vessels are formed by members of the same family, and this obviously influences other aspects such as training or management. In fact, the fishermen's training seems to be family matter and this is reflected in the way they learn and understand technology. However, this aspect may be changing with the new generations.

Regarding innovation, the results may seem contradictory as there is no distinction between product innovation and process innovation. Product innovations are scarce in traditional fishing. Fishermen are reluctant to introduce new technology, especially because it is costly and, in any case, when they do it is not for environmental reasons but in order to increase their productivity. However, fishermen are continuously introducing new methods (process innovation) to try to minimize environmental damage. Fishermen point out the lack of support by the administration as one of the main obstacles to innovation. They also complain about the high bureaucracy associated with environmental issues. With regards to the motivations for eco-innovation, they highlight the importance of avoiding sanctions, reducing costs, improving the image as well as other long-term benefits. However they are not able to see advantages in the short term or to identify how they can influence market prices or customers.

This exploratory work in a small Spanish port can serve as a basis for more ambitious works. When designing or analyzing issues related to fisheries, fishermen are very often not consulted in the policy-making process. This work reveals that their interest in environmental issues is high and they often take measures independently .Attempts of forced environmental innovation fail due to lack of information and involvement of fishermen. It is also important to take into account the important role that the family plays in traditional fishing even today. There are still many issues to be analyzed and explored which are of vital importance in order to ensure a sustainable traditional fishing in the Mediterranean countries.

Acknowledgments
The authors would like to thank the Spanish Economy and Competitiveness Ministry for its support throughout the Research Project (CSO2013-41972-P)

Bibliography / More information

- Christensen, J.L., Dahl, M.S., Nielsen, R.N., Ostergaard, C. R. & Eliasen, S.Q. (2011). *Patterns and Collaborators of Innovation in the Primary Sector: A Study of the Danish Agriculture, Forestry and Fishery Industry*. Industry & Innovation, 18 (2), 203-222.

- European Commission (2011) *Reform of the Common FisheriesPolicy*. Brussels. *http://ec.europa.eu/fisheries/reform/index_en.htm*

- European Commission (2009) *Green Paper. Reform of the Common Fisheries Policy*. Brussels. *http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0163:FIN:EN:PDF*

- FAO (2010), *The State of World Fisheries and Aquaculture (SOFIA)*. FAO Corporate Document Repository.Roma.

- McGoodwin, J. R. (2001). *Understanding the cultures of fishing communities: A key to fisheries management and food security* (No. 401).Food & Agriculture Org.

Improving the Design and Implementation of the Mediterranean Marine Protected Areas Network

Souha El Asmi
Programme Officer,
Regional Activity Centre for Specially Protected Areas
(RAC/SPA – UNEP/MAP), Tunis

Dan Laffoley
Principal Advisor on Marine Science and Conservation,
IUCN Global Marine and Polar Programme
Marine Vice-Chair for the World Commission on
Protected Areas (WCPA)

Atef Limam
Programme Officer,
Regional Activity Centre for Specially Protected Areas
(RAC/SPA – UNEP/MAP), Tunis

The conservation of the sea remains a pressing issue of concern for many countries. Conscious of the pressures on the sea's finite resources, international commitments direct nations to provide the sea with greater protection, primarily by establishing networks of Marine Protected Areas (MPAs), but also through implementing a range of broader spatial and sustainable management practices.

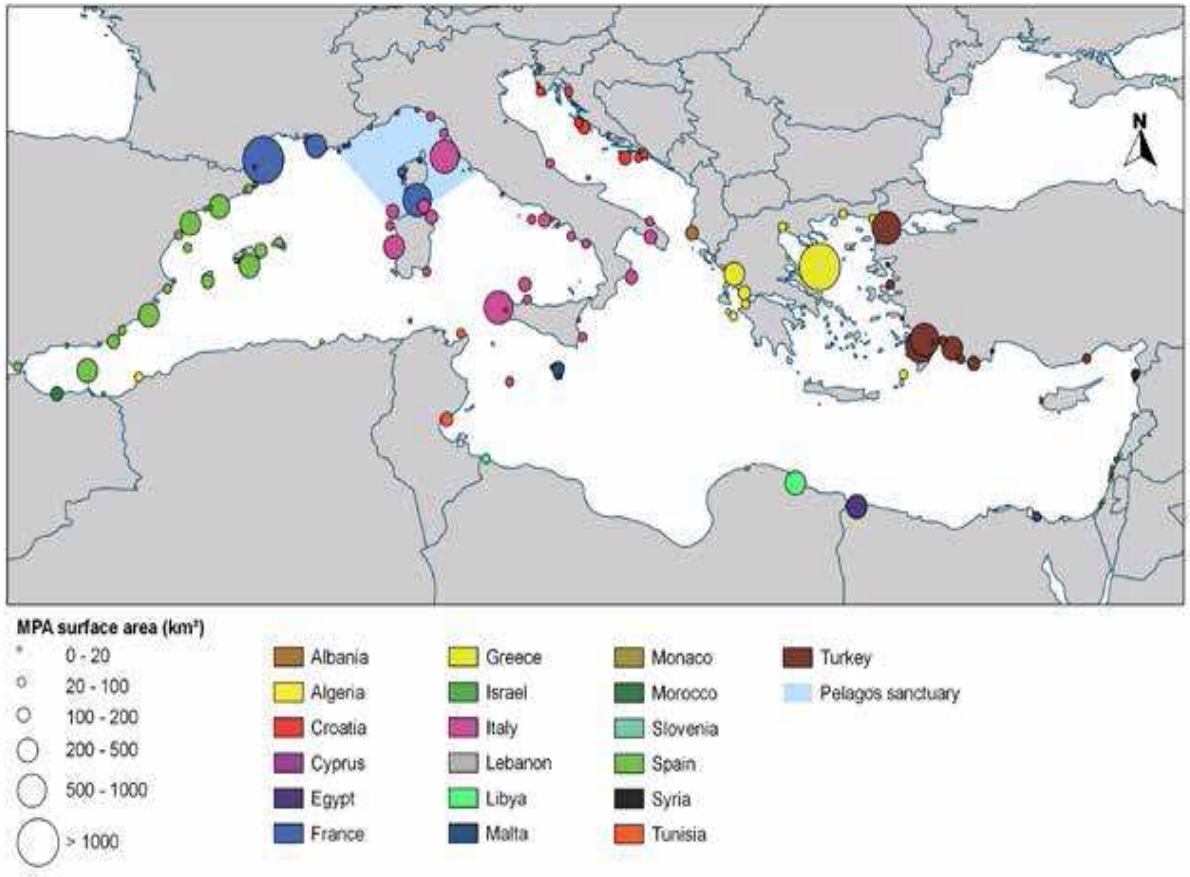
Countries throughout the world have committed to improving the protection of the sea using MPAs. Many countries are taking active measures to implement this protection, moving from individual MPAs and groups of MPAs towards full scale MPA networks (Figure 1).

In order to support Mediterranean countries to meet the Convention on Biological Diversity (CBD) MPA target, as well as the objectives of the 'Regional Working Programme for the Coastal and Marine Protected Areas in the Mediterranean Sea including the High Sea', adopted under the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention), the Regional Activity Centre for Specially Protected Areas (RAC/SPA) has developed a set of 'Guidelines to improve the implementation of the Mediterranean Specially Protected Areas network and connectivity between Specially Protected Areas' (RAC/SPA, 2014).

Figure 1
Magnificent underwater life view of the Gulf of Bumba (Libya) declared as MPA in February 2011
© RAC/SPA / Mathieu Foulquié

These guidelines' purpose is to provide clear, strategic-level guidelines to improve the implementation of the Mediterranean Specially Protected Area (SPAs) network and connectivity between SPAs (Figure 2). Specially Protected Areas are a terminology used by the Barcelona Convention's 'Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean' (1995) to designate the areas established by each Party in the marine and coastal zones subject to its sovereignty or jurisdiction, which objective is to safeguard representative types of marine and coastal ecosystems, habitats which are in danger of disappearing, habitats critical to the survival of endangered, or, threatened or endemic species of flora or fauna.

Figure 2
Surface distribution of MPAs by country (Gabrié *et al.*, 2012)



Network design principles and key steps towards delivering the MPA network

In taking forward the CBD target, in meeting the aims of an overall MPA network and in improving single MPA sites, seven network design principles need to be considered:

- Representativity: the MPA network should represent the range of marine habitats and species by protecting all major habitat types and associated biological communities present in the Mediterranean Sea, including unique habitat types;

- Replication: all major habitats should be replicated and distributed throughout the network. The amount of replication will depend on the extent and distribution of features within the Mediterranean Sea;

- Viability: the MPA network should incorporate self-sustaining, geographically dispersed component sites of sufficient size to ensure species and habitats persistence through natural cycles of variation;

- Adequacy: the MPA network should be of adequate size to deliver its ecological objectives and ensure the ecological viability and integrity of populations, species and communities (the proportion of each feature included within the MPA network should be sufficient to enable its long-term protection and/or recovery);

- Connectivity: the MPA network should seek to maximize and enhance linkages amongst individual MPAs using best current science. For certain species this will mean that sites should be distributed in a manner to ensure protection at different stages in their life cycle;

- Protection: the MPA network is likely to include a range of protection levels. Ranging from highly protected sites or parts of sites where no extractive, depositional or other damaging activities are allowed, to areas with only minimal restrictions on activities that are needed to protect the features; and

- Best available evidence: network design should be based on the best information currently available. Lack of full scientific certainty should not be a reason for postponing proportionate decisions on site selection.

A key outcome sought from properly applying these seven criteria is the concept of resilience. Given the rapidly changing climatic conditions in the Mediterranean Sea, coupled with significant impacts that vary across the area in terms of intensity, cause and extent, using the MPA network to stimulate increased resilience is a very valuable goal to pursue with widespread associated benefits.

Resilience is also related to the degree of replication of representative habitats in the network, the connectivity achieved between MPAs, ensuring that sites are of a viable size and delivering sufficient protection for habitats and species within the network, with full protection of some areas, to restore and/or maintain ecological functioning and associated ecosystem complexity.

Alongside, network principles and the concept of resilience are two other important sets of considerations that help assist the identification of MPA sites for the network. These two areas relate to ecological and practical considerations.

Key ecological considerations that guide choice of future MPA sites to build the network relate to:

- Presence of rare, declining, endemic or threatened species;
- Presence of habitats and species of conservation importance;
- Ecological significance of features (species, habitats, ecosystems and associated processes) being proposed;
- High natural biological diversity;
- Sensitivity of features;
- Naturalness of features; and
- Size and positioning of the MPA.

The practical considerations that often also come into play, especially where there is a choice on location to contribute to the MPA network, are:

- Synergies with other sectors;
- Size;
- Potential for recovery;
- Degree of consensus;
- Potential for success of management measures;
- Scientific value;
- Degree of threat.

It should be evident from the above that to be able to assess existing SPAs within the context of network thinking, particularly concerning representativity, replication and connectivity, a number of fundamental elements to be in place:

- Defined eco-regions (Figure 3). Whilst the overall unit is the Mediterranean Sea, a common and agreed understanding of ecological regionalization is needed, identifying the regional sea scale units that can be used as a practical scale to bring together agencies and stakeholders to build the MPA network. The use of eco-regions becomes particularly significant and important when applying the network design principles.

- Agreed MPA network objectives. A shared understanding of the marine biodiversity priorities for Mediterranean Sea is needed, and how these divide down at the regional sea scale. This would be by bringing together listings from the different Directives, Conventions and Agreements into one list, assessing whether what is listed matches with actual conservation needs, and then setting the outcome in terms of objectives to be delivered by the MPA network.

- Basic ecological knowledge of marine ecosystem distribution. A knowledge on the broad distribution of all habitats and relevant species, to act as a commonly held backdrop to discussions on the contribution existing SPAs and other MPA types already provide, and as essential context to identify where gaps in protection of which habitats occur.

- Developing and providing 'ecological MPA network guidance' as a central source of advice to drive the network development process. This guidance should provide essential information about how to meet each of the network design criteria. It is also important as it can describe the roadmap, provide transparency for the various stages, and by its publication ensure the community has access to such core advice.

- Establishing and appointing an independent science advisory group to support their MPA process. Such experts assist by being seen to be independent to the responsible agency, providing technical advice, as well as evaluating proposal for the MPA network against the guidelines.

Levels of protection needed to secure the MPA network

The level of protection afforded to individual sites within the MPA network is a key design consideration. Widespread consultation associated with establishing a network inevitably raises significant questions on what activities will be allowed, and importantly for stakeholder which activities are there proposals to prevent.

A basic premise is that if the network design principles have been applied well, the level of management should be commensurate with sustaining the key conservation values for the long term. Thus this requires an understanding of the sensitivities and resilience of broad-scale habitat types and features of particular conservation interest in applying the design principles. This can be best supported by a desk study bringing together such information against which means it is then possible to come to views on the general compatibility or otherwise of activities.

Representativity and replication of ecological features at the appropriate scale

Representativity is another key design principle in building the MPA network through protecting examples of the full range of marine biodiversity found in the region. This is usually achieved by grouping habitats and species together into broad-scale habitat types and ensuring that examples of all such types are included across the MPA network. Representativity also includes ensuring that in protecting the full range of biodiversity attention is given to rare, threatened, declining and endemic species with limited distributions.

Replication is the protection of the same feature across multiple sites within the network, taking biogeographical variation into account. To fulfill this principle, all features should be replicated across the network with individual examples being spatially separate. Replication is very important for the MPA network as it spreads the risk of damaging events and long-term change negatively affecting the features of the MPA.

Again successful application of this principle requires up-front knowledge of the broad-scale distribution of habitats and features of conservation interest across the whole region. The number of replicates recommended in the literature varies, with three to five often recommended within a selection area (Laffoley *et al.*, 2008).

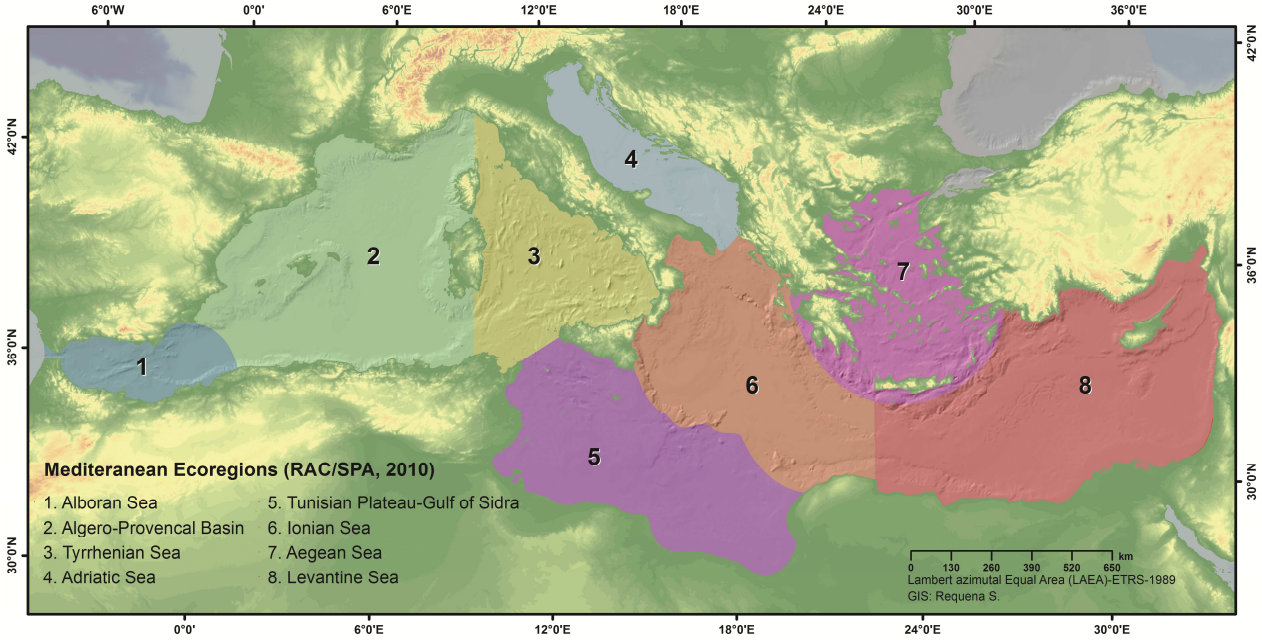
Connectivity and ecological coherence: determining the spacing of MPAs in the network

Connectivity is the extent to which populations in different parts of a species' range are linked by the movement of eggs, larvae or other propagules. Connectivity between habitats is one of the key principles of ecological coherence and seeking to maximize connectivity between MPAs may be critical for effective conservation. In addition to linkages through reproduction, connectivity may also occur as a result of movement of adults or young between MPAs, the regular settlement of larvae from one MPA to another, or through underlying physiochemical processes such as the transfer of nutrients.

Delivering connectivity in an MPA network is not an exact science as adults and larvae will pass in and out of MPA boundaries and may be subject to periodic changes in current regimes. However some predictability in linkages can be achieved through the persistence of current systems and also from knowledge of the dispersal distances of species of conservation interest.

Natural England and the Joint Nature Conservation Committee (2010) advise that in the absence of species specific information on connectivity, MPAs of a similar broad-scale habitat types should be separate, where possible, by no more than 40 – 80 km (between individual MPA boundaries.

Figure 3
Mediterranean ecoregions (RAC/SPA, 2010)



Assessing progress in delivering the MPA network

A key question is how do you know when the MPA network as set out in the CBD target has been achieved? Systematic conservation planning shows the role that the delivery of end-point conservation should play in the process. Thus simply applying the network guidance principles will not in themselves result in the CBD MPA target being achieved. Political leadership, effective management, surveillance and monitoring and many other aspects all form important parts of delivering success. In view of this question and these issues a self-assessment checklist has been developed to help track progress towards delivering MPA networks (Day and Laffoley, 2006).

Levels of evidence needed to support the development of the MPA network

The evidence requirements to support the development of the MPA network will vary depending on the stage of the process. In identifying and recommending sites all sources of information should be used but usually sufficient data is available to define meaningful ecological regions as well as to provide a basic map of broad habitat types, physiographic features and patterns of currents and fronts. Coupled with data on the distribution of selected habitats and species, this usually proves an adequate basis to make qualified decisions on the placement of MPAs in the network.

How to build the MPA network at national and sub-regional levels: stakeholder engagement and cooperation

The involvement of stakeholders is essential to the success of the MPA network. Not only do stakeholders play a critical role in delivering the day to day management needed to secure conservation features through their behaviors on sites, but they also possess valuable knowledge to inform the identification, management, surveillance and monitoring of MPAs. Engaging local stakeholders at the local planning level will be key to the success of the network and its component MPAs. Fostering cooperation between neighboring countries also needs a clear commonly-held framework within which to have meaningful discussions.

Bibliography / More information

- Day, J., and D. d'A. Laffoley (2006). *Self-assessment checklist for building networks of MPAs*. WCPA IUCN.
- Gabrié C., Lagabrielle E., Bissery C., Crochelet E., Meola B., Webster C., Claudet J., Chassanite A., Marinesque S., Robert P., Goutx M., Quod C. (2012). *The Status of Marine Protected*
- *Areas in the Mediterranean Sea*. MedPAN & RAC/SPA. Ed: MedPAN Collection. 256 pp.
- Laffoley D. d'A., White, A. T., Kilarski, S., Gleason, M., Smith, S., Llewellyn, G., Day, J., Hillary, A., Wedell, V., and D. Pee (2008). *Establishing Resilient Marine Protected Area Networks: Making it Happen*. IUCN, Washington.
- Natural England and the Joint Nature Conservation Committee (2010). *The Marine Conservation Zone Project: Ecological Network Guidance*. Sheffield and Peterborough, UK.
- RAC/SPA (2009). *Regional Working Programme for the Coastal and Marine Protected Areas in the Mediterranean Sea including the High Sea*. By Giuseppe NOTARBARTOLO DI SCIARA and Chedly RAIS. Ed. RAC/SPA, Tunis, 30 pp.
- RAC/SPA (2010). *Report presenting a georeferenced compilation on bird important areas in the Mediterranean open seas*. By S. Requena and C. Carboneras, Ed. RAC/SPA, Tunis, 39 pp.
- RAC/SPA (2014). *Guidelines to improve the implementation of the Mediterranean Specially Protected Areas network and connectivity between Specially Protected Areas*. By Dan LAFFOLEY. Ed. RAC/SPA, Tunis. 32 pp.

Webography

- Database of Marine Protected Areas in the Mediterranean *www.mapamed.org*
- Regional Activity Centre for Specially Protected Areas *www.rac-spa.org*
- The 2012 Forum of Marine Protected Areas in the Mediterranean *www.medmpaforum2012.org*
- United Nations Environment Programme Mediterranean Action Plan for the Barcelona Convention *www.unepmap.org*

UfM Secretariat and CIHEAM join forces to advance cooperation in Higher Education and Food Security in the Euro-Mediterranean region

The Secretary General of the Union for the Mediterranean (UfM), Fathallah Sijilmassi, and the Secretary General of CIHEAM, Cosimo Lacirignola, signed in Barcelona (Spain), on October 2, 2014, a cooperation agreement to undertake joint initiatives to effectively contribute towards higher education and food security in the Euro-Mediterranean region. The UfM-CIHEAM project "Higher Education on Food Security & Rural Development" was officially launched. Within the frame of this project, 20 scholarships have been allocated to Southern Mediterranean female students that are in the four Institutes of CIHEAM for the academic year 2014-2015.

The Memorandum of Understanding (MoU), signed provides a solid basis for strengthened collaboration and coordination of mutual efforts in the promotion of the UfM-CIHEAM project "Higher Education on Food Security & Rural Development". The project seeks to enhance the current CIHEAM Master Programmes and advanced training courses for professionals by:

- Increasing the participation of Southern and Eastern Mediterranean students and granting scholarships;
- Developing e-learning initiatives;
- Establishing international mobility initiatives and joint degrees;
- Implementing a Mediterranean Doctoral Platform that provides training and financial support to PhD students;
- Establishing an observatory to promote graduates' entrepreneurship and employability skills;
- Increasing women's participation in all programmes.

This joint commitment will also help to accelerate efforts towards implementing common activities and initiatives aimed to advance regional cooperation in the fields of environment, water and research. "*I believe that Food Security, together with Higher Education and mobility related to this sector, are really at the heart of the development of the Euro-Mediterranean region and are crucial for the employability of the youth"*, said UfM Secretary General Sijilmassi. "*Our mission is complementary and our action will be stronger if we are able to set up joint concrete projects for Mediterranean people, especially in the field of education, young mobility and scientific diplomacy. Food security issues are strategic in the region and totally linked to green growth and inclusive growth strategies*" added CIHEAM Secretary General Lacirignola.

Aménagement multi-acteurs et multi-usages dans la baie d'Izmir en Turquie

Güzel Yücel-Gier
Chercheur, Université de Dokuz Eylul, Institut des Sciences et des Technologies Marines, Izmir, Turquie

L'ensemble du pourtour méditerranéen connaît depuis une trentaine d'années un accroissement du flux de population, qu'elle soit résidentielle ou touristique. Cette situation a généré un stress sévère sur l'environnement marin, remettant en cause la pérennité de nombreuses ressources en zone côtière (MERMED, 2014). A ce titre, la baie d'Izmir est tout à fait représentative de ce type de problématique. Il s'agit d'une des plus grandes et des plus profondes baies (60 km) de la mer Égée. Peuplée depuis plus de 8000 ans, cette baie est la patrie d'Homère et des Ioniens fondateurs de la ville de Marseille (Maeso et Lasvigne, 2013).

A partir du 17e siècle, les échanges avec l'Europe s'intensifient au plan politique comme au plan commercial. De fait, la topographie du site en fait un port naturel de première importance pour les échanges avec le Levant et avec les grands ports de la Méditerranée occidentale comme Gênes, Venise, ou Barcelone. Bien protégée des attaques potentielles par la mer et au débouché d'un vaste arrière-pays, la ville acquière une importance stratégique, ce qui explique son développement continu jusqu'à aujourd'hui. Le mouvement des populations vers le littoral a été très marqué dans cette région depuis une trentaine d'années : si, en 1987, la ville comptait 1,4 millions d'habitants, elle est aujourd'hui la troisième ville de Turquie avec une population de plus de 4 millions d'habitants.

Cette croissance rapide a engendré naturellement des conflits d'intérêt entre les différents utilisateurs de la baie. Il a donc fallu trouver progressivement des solutions de cohabitation entre tous les usagers afin d'éviter des blocages récurrents. On peut résumer les grandes étapes de cette conciliation réussie en quelques actions-clefs : borner et caractériser les différentes zones d'activité de la baie, réunir les acteurs, mettre en place les outils du dialogue. Ces étapes successives ont rendu possible le succès ultérieur de nombreux projets d'aménagement ou de développement. Cette démarche a aussi permis de mieux cerner les enjeux sur l'avenir des problèmes en cours.

La définition des zones d'activité

Face à une situation de conflits chroniques entre les utilisateurs de la baie (pêcheurs, aquaculteurs, armateurs, militaires, hôteliers, écologistes, économistes, promoteurs…) les autorités locales ont décidé de commencer par définir précisément les grandes zones d'activité. On en compte neuf :

1) Au nord, l'aire marine protégée de Foça, créée en 1990 pour préserver l'habitat et la zone de reproduction du phoque de Méditerranée. Cette réserve fait suite à la signature par la Turquie de la convention de Barcelone pour la protection des espèces en voie de disparition. L'espèce ne compte plus que 400 individus et cette zone représente environ 1% de cette population.

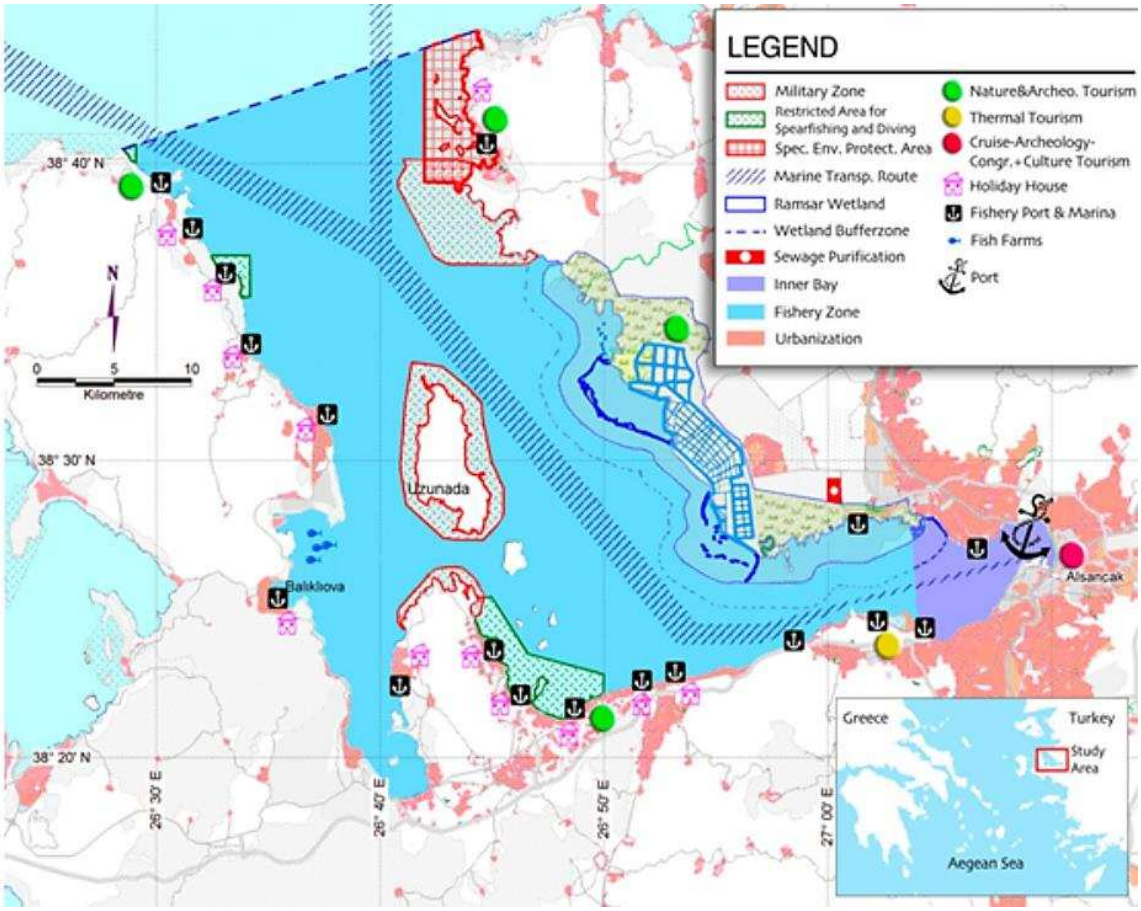
2) Réparties sur l'ensemble des points stratégiques se trouvent des zones militaires dont certaines datent de l'époque ottomane. A l'époque, elles servaient de quarantaine. L'augmentation du trafic maritime, de la pêche et du nautisme en petites embarcations complique la sécurisation des sites. Une démilitarisation de certaines zones est à l'étude.

3) Au centre, le delta du Gediz qui recouvre une zone de 20 000 hectares classée en site RAMSAR depuis 1998. C'est une nurserie naturelle, vitale pour la reproduction de plusieurs espèces de poisson, et donc importante pour l'activité de pêche de la baie. On y dénombre plus de 260 espèces d'oiseaux, des plantes endémiques. De plus, 20 % de la population mondiale de flamands roses passe par ce delta (Rapport sur le delta du Gediz, 1999).

4) Accolée à la zone humide, se trouve les Salines d'Izmir. Elles datent de 220 avant J-C et font partie intégrante de la zone RAMSAR. Elles produisent chaque année 500 000 tonnes de sel et couvrent 40% des besoins de la Turquie.

5) La zone urbaine, concentrée surtout autour en fond de baie a vu sa population augmenter de plus d'un million d'habitants au cours des 10 dernières années.

Figure 1
Les zones majeures d'activité maritime de la baie d'Izmir



6) Les industries trop polluantes du cuir et de la chimie ont été déplacées hors de la baie il y a vingt ans. Mais les problèmes liés à l'urbanisation s'avèrent nombreux: insuffisance du système d'assainissement des eaux usées, pollution chronique issue du bassin versant de la rivière Gediz avec les effluents de trois agglomérations en amont, sédimentation importante freinant la circulation et le renouvellement des eaux marines dans la partie est de la baie, des infrastructures qui ne sont pas aux normes de l'importante activité sismique de la région.

7) confiné au fond de la baie se trouve le port commercial d'Izmir. La sédimentation limite les espaces de manœuvre pour les navires et le chenal d'accès est très étroit. Un dragage est en projet pour améliorer la circulation maritime. Un autre projet à long terme prévoie de relocaliser le port à 100 km plus au nord afin de laisser la place aux marinas et aux bateaux de croisière et de donner ainsi une vocation résolument touristique à la ville.

8) Les nombreux petits ports de pêche et la zone réservée à l'aquaculture marine occupent plusieurs sites de la baie. L'aquaculture a dû réduire son périmètre car les nouvelles règles d'implantation de fermes aquacoles du ministère de l'environnement ont obligé celles-ci à se déplacer. La pêche est active et concerne 90% de l'espace total de la baie.

9) Les infrastructures touristiques et des résidences secondaires se développent sur le pourtour de la baie. Toute la façade ouest est encore préservée mais la beauté des paysages, l'amélioration de la qualité des eaux de la baie et l'ouverture d'une voie rapide vers la presqu'île de Karaburun suscitent l'intérêt croissant des investisseurs.

Les acteurs

En 1990, le constat d'une pollution chronique sévère des eaux de la baie oblige la municipalité à intervenir et une première démarche de planification et de gouvernance est mise en place grâce à un projet du Programme des Nations Unies pour l'Environnement ou PNUE (UNEP, 2005). La notion de "parties prenantes" (*Stakeholder*s) apparaît mais la participation des différents acteurs ne s'est faite que progressivement et au fur à mesure de la mise en place des projets.

Ces acteurs se répartissent en trois catégories :

- Le groupe des décideurs, représentés d'abord par les ministères de l'environnement, de l'urbanisme, du transport, de l'agriculture, de la défense, du tourisme. Y figurent également les responsables de la municipalité dans la mesure où, n'étant pas du même bord politique que le gouvernement, leur pouvoir de blocage est important.

- Les conseillers et experts, dont les chercheurs des universités et les ingénieurs et spécialistes des bureaux d'études.

- Les utilisateurs, avec les représentants des chambres de commerce et d'industrie, la chambre de commerce maritime, les associations professionnelles de la pêche, de l'aquaculture, du tourisme et les ONG.

Si, au départ, le consensus pour une dépollution rapide de la baie était évident, les choix à opérer par la suite se sont révélés plus délicats d'où l'intérêt de développer des stratégies et des instruments qui facilitent le dialogue.

Les outils du dialogue

Dès le début, les voies pour accéder à l'objectif de la dépollution de la baie et de l'harmonisation des activités sont apparues multiples. C'est cette variété de solutions potentielles, avec des avantages et des inconvénients pour chaque option, qui a justifié la mise en place et l'animation d'un dialogue soutenu pendant plusieurs années. Les outils de ce dialogue peuvent être résumés comme suit.

Les rapports scientifiques

La première étude globale de gestion de la baie fut lancée en 1990 suite à un accord entre la municipalité et le PNUE. Cette étude (Yucel et al. 2010) a conduit à la réalisation du grand canal d'assainissement terminé en 2000. Une étude d'impact et de suivi constant a permis de mettre en évidence la diminution des problèmes d'eutrophication, une montée du taux d'oxygène et la diversification et l'augmentation des organismes benthiques après la mise en service du système d'assainissement (IMST-199, 2012).

Une autre étude, lancée en 2010, a concerné les problèmes de sédimentation (IMST-200, 2010-2014)**.** Cette étude de bathymétrie et des courants marins a contribué au démantèlement d'un site de valliculture (l'une des plus anciennes techniques d'aquaculture en Méditerranée) sur le bord de la zone RAMSAR et permettra le creusement ultérieur de chenaux dans la baie intérieure.

Les procédures réglementaires

Les procédures de consultation, dites EIA pour "*Environment impact assesment*", sont des réglementations mises en place depuis 1995 par l'Etat pour estimer les impacts de toute nouvelle activité maritime d'une certaine envergure. Ainsi, en matière d'aquaculture, dès que la production prévue dépasse 1000 tonnes par an, la procédure est obligatoire (Yucel-Gier et al, 2009).

Les conventions internationales

Les engagements de l'Etat dans le cadre des conventions internationales et les directives européennes définissent un ensemble de règles obligatoires. Plus qu'un outil, les contraintes des conventions internationales obligent tous les acteurs à respecter un cadre prédéfini qui va servir de base légale lors des négociations. Pour ce qui concerne la zone humide, toute la négociation, difficile, a été menée dans le cadre international de la convention RAMSAR. Cette référence internationale a permis de mener les travaux à bien jusqu'à la préservation complète de la zone.

Les ateliers et la communication

Les réunions régulières des acteurs en ateliers de travail avec des objectifs concrets et précis à chaque étape constituent une excellente méthode pour le dialogue inter-acteurs. Cette technique a été utilisée à maintes reprises. La FAO a organisé des ateliers techniques de type TCP (*Technical Cooperation programme*) sur le sujet de l'aménagement de la baie: «*Thematic development of a roadmap for Turkish marine aquaculture site selection* » (MARA-FAO, 2009). Ces ateliers réunissaient les représentants des ministères, des aquaculteurs, des universités, des industriels et le WWF. Ils ont facilité les contacts entre les acteurs grâce à la présence du modérateur, le respect d'une règle internationale commune, et une ambiance plus conviviale. Un autre atelier a été organisé avec l'Union internationale pour la conservation de la nature (UICN), avec une attention particulière aux aspects de durabilité de l'aquaculture. Le rapport final a été traduit en turc et a été largement diffusé dans le but d'accroître la communication avec le grand public. Peu à peu, tout un travail de sensibilisation s'est mis en place par le moyen de brochures, d'articles de presse, de visites du delta du Gediz...La communication à tous les acteurs dont le grand public est un des outils majeurs de réduction des incompréhensions entre acteurs et de facilitation du dialogue sans préjugé à toutes les étapes de l'aménagement.

Les étapes de l'aménagement

L'aménagement, ou le réaménagement, des sites sensibles de la baie reste un processus laborieux. Sur trois zones, des avancées marquantes ont pu être obtenues. L'aire protégée de Foça était en déclin dans les années 90 en raison d'une surpêche à sa périphérie. La conséquence a été la raréfaction des poissons de la zone. Privés de leur alimentation naturelle, les phoques de la colonie ont alors attaqué les filets maillants des pêcheurs et les cages flottantes des fermes aquacoles. D'autre part, le développement du tourisme, de la plongée, de la pêche en apnée dérange le phoque dans sa zone de reproduction. Or, le personnel manque pour faire appliquer la réglementation et faire respecter les interdictions sur la zone. En 2005, après dix ans d'études et de suivi sur la zone, l'Etat décide de son extension car la protection n'est pas efficace sur une aussi petite surface. Après une période de latence, les pêcheurs artisanaux travaillant à la périphérie de la nouvelle zone protégée réalisent qu'ils bénéficient à nouveau de pêches importantes. Ils participent aujourd'hui activement à la surveillance et à la protection du site.

Un autre exemple d'aménagement réussi concerne l'ensablement de la baie. En 2010 le ministère des transports maritimes dépose le plan d'un chenal en baie intérieur pour faciliter la navigation des porte-conteneurs. Parallèlement, la municipalité d'Izmir décide d'un projet pour améliorer le renouvellement des eaux de fond de baie. Les chenaux prévus sont sensiblement différents et une première négociation permet aux deux parties de se mettre d'accord sur un tracé de chenal compatible avec les deux projets. Une étude complémentaire recommande que les boues de dragage soient rejetées sur les terrains de la zone protégée par la convention RAMSAR. Cette proposition choque de nombreux scientifiques locaux et un nouveau conflit apparaît. Une seconde phase de négociations s'engage alors et finalement, un compromis est trouvé: les boues serviront à l'édification des digues de la lagune limitrophe afin de la préserver d'une érosion qui risquera d'entraîner la disparition de cette nurserie naturelle. Tous les protagonistes estiment qu'ils ont eu chacun gain de cause!

Le dernier exemple, qui concerne l'aquaculture marine, montre aussi les limites de la négociation. Avant 2007, la baie comptait une dizaine de fermes aquacoles, élevant principalement en cages flottantes du bar (*Dicentrarchus labrax*) et de la daurade (*Sparus aurata)*. Mais les conflits avec le secteur du tourisme et des résidents sont fréquents et sans solution. Il est reproché aux aquaculteurs de monopoliser un espace à haute valeur touristique et de polluer les plages proches. Suite à une campagne de presse, le ministère de l'agriculture lance en 2008 une étude globale sur le potentiel de l'aquaculture en lien avec la FAO (MARA-FAO, 2009). Le rapport préconise une réforme graduelle des règles d'implantation des fermes aquacoles. Mais, un an plus tard, le ministère choisit d'adopter une réglementation pour l'aquaculture marine. Six ans plus tard, il ne subsiste que quatre fermes capable de respecter les nouveaux critères (Yucel-Gier *et al,* 2010).

Ces trois exemples révèlent une évolution vers une approche moins corporatiste et moins conflictuelle. Cette évolution est liée à de multiples facteurs, dont la disponibilité de vraies méthode de négociation (FAO / TCP, PNUE / Plan Bleu), l'expérience acquise dans d'autres pays comme en Grèce ou en Croatie et enfin une meilleure compréhension des enjeux de moyen et long terme.

Alors quel avenir pour les problèmes en cours ?

L'urbanisation croissante d'Izmir sera géographiquement limitée en raison des nouvelles normes sismiques décidées en 2013. Ainsi, plus de 70% de la ville devra être détruite et remplacée par des infrastructures plus élevées afin de financer en partie la reconstruction. Une partie du développement urbain se fera donc sur une zone déjà construite. Par ailleurs, d'importants terrains militaires au sud de la baie pourraient être cédés au secteur civil. La zone humide est déjà sous la pression des promoteurs d'opérations immobilières mais les alternatives sont encore nombreuses pour le moment. Si un certain nombre d'opérateurs ne voient cette zone que comme un "terrain vague" à investir (annexe pour le port Conteneur, marina, urbanisation traditionnelle...), la municipalité d'Izmir rêve d'une ville touristique valorisant pêle-mêle ses sites archéologiques, les plages, la nature sauvage proche de la ville, des centres de thalassothérapie, la géothermie... Le symbole de cette vision est sa candidature à une prochaine exposition universelle sur le thème de la santé. Cependant, nombre d'élus préfèrent assurer le développement économique par l'extension des activités du port d'Izmir. La question est très sensible pour les responsables politiques.

Mais la croissance démographique reste une menace forte sur la qualité des eaux de toute la baie. En effet, la capacité des stations d'épuration est à peine suffisante, même quand elles fonctionnent au maximum de leur capacité. Par ailleurs, les rivières qui se jettent dans la baie sont polluées car il n'y a pas de traitement des eaux en amont. Enfin, avec l'extension de la ville, une partie du réseau n'est pas reliée au grand canal d'assainissement. La pollution est devenue un problème de santé publique. De fait, actuellement, les mollusques pêchés dans la baie intérieure sont impropres à la consommation. On est loin de la vision de la municipalité évoquée précédemment...

L'érosion de la biodiversité, maintenant observée de manière précise, constitue un des risques majeurs pour l'avenir car elle impacte toute la chaîne alimentaire jusqu'à la pêche artisanale. L'exemple emblématique de la nécessaire protection du phoque moine (*Monachus monachus)* montre bien la vulnérabilité et la fragilité de l'écosystème (Kaboglu et al, 2005). Si le phoque disparaissait de la baie, la conséquence serait probablement la perte du statut d'aire marine protégée pour toute la zone de Foça. Les responsables de la zone souhaitent même que d'autres espèces soient classées en danger, comme le cormoran huppé (*Phalacrocorax aristotelis*), afin de conserver la justification de la zone.

Un autre type de menace apparaît: le changement climatique avec des risques de dégradation des herbiers de Posidonies si la température des eaux de fond de baie devient supérieure à 29°C. Or, comme ailleurs, ces herbiers constituent un habitat remarquable pour de nombreuses espèces. Une montée du niveau de la mer mettrait en danger la zone humides et sa fonction de nurserie.

Conclusion

Avec la croissance rapide de la ville, le développement économique est devenu prioritaire. Plus que jamais, les décideurs ont besoin d'outils efficaces pour éclairer les bons choix. L'expérience acquise au fil des années dans diverses formes d'aménagement permet de mettre en avant les points suivants:

- La nécessité de développer des bases scientifiques fiables sur trois critères: le choix d'indicateurs représentatifs, un suivi régulier et à long terme de ces indicateurs et, sur la base des données accumulées, la capacité de modélisation des évolutions possibles et donc de formalisation de scénarios pour l'aide à la décision ;

- La nécessité de disposer d'une vue d'ensemble. Il faut donc former des ingénieurs à vocation interdisciplinaire pour renforcer le dialogue entre science et pouvoir, et faciliter la mobilisation d'expertises interdisciplinaires. Tout aussi utile est la sensibilisation des décideurs à l'analyse pluridisciplinaire afin d'ouvrir leur champ de critères de choix politiques ;

- Etendre et renforcer les conventions internationales afin de se protéger des décisions arbitraires locales voire nationales.

La dernière recommandation en matière de qualité de dialogue entre tous les acteurs est celle la qualité de la communication notamment celle qui concerne le grand public, afin qu'une information claire, transparente et vérifiable soit disponible sur les tous les enjeux en cours.

Bibliographie / Plus d'information

- IMST-200, 2010-2014. *Gulf of Izmir Real-time monitoring and circulation and sediment transport modelling.*

- IMST-199, 2012. *Monitoring of physical, chemical and microbiological effects of Büyük Kanal Wastewaters in Izmir Bay marine environment.*

- Kaboglu,G., Guclusoy,H and Bizsel, C.K., 2005. *"Marine protected areas in Turkey: History, current state and future prospects".* International Workshop Proceedings. Marine and Coastal Protected Areas. Edited by A.Chouikhi & M.Menioui. Inter-Islamic Science and Technology Network on Oceanography, ISBN: 975-7895-02-4. 550-556.

- Maeso, J. L. et M. L. Lasvigne, (Ed.), *2013 : Smyrne aux 18e et 19e siècles.* Regards Occidentaux. ISBN978-605-5974-27-5. Mas Matbaacılık San. Ve Tic. A.Ş. Izmir.

- MARA-FAO, 2009. *Report developing a roadmap for Turkish Marine Aquaculture Site Selection and Zoning Using an Ecosystem Approach to Management Project TCP-TUR-3101*.

- MERMED, *2014 : Rapport Final. Atelier de réflexion prospective MERMED, Adaptation aux changements globaux en mer Méditerranée*.

- Rapport sur le delta du Gediz, *1999: Sulak Alanların Yönetimi Projesi Gediz Deltası Sulak Alan Yönetim Planı Alt Projesi,* T .C Çevre Bakanlığı, Çevre Koruma Genel Müdürlüğü, T.C Ege Üniversitesi Su Ürünleri Fakultesi.

- UNEP, *2005: Coastal area management in Turkey. Unep Split: Priority Actions Programme*.

- Yucel-Gier, G. Uslu, O., Kucuksezgin, F., *2009: Technical contribution regulating and monitoring marine finfish aquaculture in Turkey.* Journal of Applied Ichthyology, 689-694.

- Yucel-Gier, G., Arisoy Y. and Pazi, I., *2010: A spatial analysis of fish farming in the context of ICZM in the Bay of Izmir-Turkey.* Coastal Management, 38, 399–411.

Tara Méditerranée: an innovative approach combining science, education and cooperation for ocean protection

Agathe Laure
Independent Consultant at the United Nations Environment Programme

Disclaimer

This article was written on the personal capacity of the author and does not necessarily reflect the views or policies of UNEP or contributory organisations.

Tara Méditerranée: an innovative approach combining science, education and cooperation for ocean protection

After seven months sailing across the Mediterranean Sea, Tara made it back to its homeport of Lorient, in the western coast of France. Between May and November 2014, the schooner travelled for almost 13,000 kms across the Mediterranean, stopping by 13 countries, and collecting on the way hundreds of plastic fragments and planktons from 350 different locations across the basin. The scientific objective of this voyage, proposed by the French National Centre for Scientific Research (CNRS) and the Université Pierre et Marie Curie (UPMC), and operated by the non-profit organization Tara Expeditions, was to better understand the importance of plastic pollution in the Mediterranean Sea.

The Mediterranean, as a nearly closed sea, surrounded by high density of population and industrial activities, and various cultural sensibilities, constitutes an interesting laboratory to understand and model the sources and sinks of plastic pollution.

The mission of *Tara Méditerranée,* combined with two other projects[1], aimed to contribute to bridge the scientific gap, on the scope of plastic pollution in the region, and to shade light on its impacts on Mediterranean ecosystems. Besides this research purpose, *Tara Méditerranée* aimed to connect the public with the latest science to strengthen the engagement of civil society and to increase cooperation between local, regional and international stakeholders. This multi-faceted approach proposes an original and invigorating way of increasing the protection of our world's oceans and promoting sustainable management of resources.

An itinerant platform for scientific expeditions, education and awareness-raising

Tara Méditerranée is the tenth expedition of the 36-metre schooner, which became a floating platform for scientific research missions and environmental education. Active since 2003, Tara Expeditions was created by Agnes b and Etienne Bourgois, and focuses on three main themes: Ocean & Mankind**,** Ocean & Biodiversity, and Ocean & Climate. More focused on education and public outreach in its early days, Tara Expeditions has progressively increased its scientific work conducting high-level research across the oceans of the globe.

Photo credit: Tara Expeditions

[1] *Including the Expédition M.E.D.*

The *Tara Arctic* expedition, launched in 2006, reproduced the ground-breaking mission of the exploratory and scientist Fridtjof Nansen's, who had drifted with the Fram for more than two years across the Artic in 1893–1896 and provided significant knowledge on the Artic. Tara, especially built to resist to ice and very low temperatures, followed the same trajectory and completed the 5,200 kilometers drift in about 15 months, three times faster than predicted, and thus highlighted the shrinking of ice cover in the Arctic Ocean (Gascard, J.-C. et al., 2008). For the mission that followed, in 2009, Tara embarked 140 scientists from 21 laboratories for a 30-months expedition to study the world's plankton ecosystems and climate change. While a lot of the data collected is still being analysed, the findings of the *Tara Oceans* mission significantly increased knowledge on the relationship between climate change and planktons, and contributed to set the recognition of Tara's work in the scientific sphere. This work was completed by the mission *Tara Oceans Polar Circle* expedition that took place in 2013.

But the growing importance of this research work has not undermined the willingness of the non-profit to reach out to a wider audience, with a special emphasis on children. Rather, Tara's scientific work has greatly reinforced its capacity to introduce up-to date scientific evidence and to educate the public on conservation challenges. This hybridity provides Tara Expeditions with the potential to trigger important social and societal changes (Thümler et al, 2014) toward stronger ocean and biodiversity protection.

Assessing impacts of micro-plastics on Mediterranean ecosystems

The expedition *Tara Méditerranée* aimed to advance research on presence and impacts of micro-plastic in the basin. Although the existence of plastic pollution in the Mediterranean is known, its importance and its threats for the rich biodiversity of the region is still unapprehended and poorly understood, partly due to the irregularity of sampling collected, differing protocol and observers (Barnes & Milner, 2005).

For seven months aboard Tara, the team of scientists collected samples to identify the types of plastic found in the basin and to analyse how this plastic is interplaying with the living organisms inhabiting the basin (planktons such as bacteria, protozans, micro-elgae, molluscs, crustaceans, etc.). This pollution is mainly due to the antrophic pressure on the region, cause by increased population, significant maritime traffic (around 30% of the global traffic) and important activities on the coast such as tourism. And because it is an enclosed sea, the Mediterranean has recorded higher density of plastic debris than other regions. Among them, micro-plastics (inferior to 5 mm) seem to be found in rising abundance over the recent decades (Barnes et al, 2009).

These micro-fragments come from various sources: the deterioration of larger plastic debris (polystyrène, polyéthylène, nylon, polyuréthane, polypropylene, etc.), and direct release of plastic pieces from industrial and domestic usage (abrasive products, cometics such as scrubbers, etc.) (Thompson et al. 2009). These debris also seem to be colonized by marine organisms such as bacteria, algae, protozoan, etc. (Thompson et al. 2009). In addition, micro-pastics act like sponges with ambient organic polutants (POPs) (Teuten et al, 2007; Hirai, et al, 2011) that are particularly toxic, and contribute to endocrine mutation and cancer (Tara Expeditions 2014).

A global and cross-sectoral approach to scientific researches

The objective of Tara's mission in the Mediterranean was to be "*the first large-scale expedition and cross-disciplinary approach to better understand the ecosystem-level impacts of surface plastics in the Mediterranean Sea*" (Tara Expeditions, 2014). *Tara Méditerranée* therefore followed an ecosystem-wide method, similarly to the work of its recent expeditions, to understand how interactions between populations of molecules, cells and organisms give rise to complex biological processes such as cell division, developmental, behavioral and ecological patterns (Karsenti, 2012). For seven months, scientists collected plastic fragments days and nights, using the same protocol all over the basin. According to Dr Gaby Gorsky, the Scientific Director of Tara Méditerannée (CNRS-UMPC), this is the first time that a homogenized and systematic collection was done at this scale in the basin, especially in the Eastern part that has been less studied so far. Tara is also particularly adapted to this global approach, as the ship is small, not constrained by a heavy schedule with a fast succession of expeditions, and can undertake very long missions, close and away from the coast. Tara hence offers an interesting complement to existing large-scale scientific expeditions.

This mission in the Mediterranean engaged scientists from various fields, such as biological and physical oceanography, ecology, microbiology, molecular, cellular and systems biology, bioinformatics, data management, modeling, etc. The effort to bring on board such diverse expertise, often rather segmented, enables Tara to study marine ecosystems on a global scale and at multiple depths (Karsenti, 2011) and to embed a new perspective to scientific research on climate change and global conservation efforts. In addition, the small number of people authorized on the ship (a maximum of 14 people, including the sailing crew, scientists, a cook, artists, journalists, etc.) creates inevitable exchanges between disciplines, since everybody contributes to the research work, and even to the sailing work (night shifts are always covered by a mixed team of sailors and others team members). But this fierce determination of bringing numerous fields of science together can be extremely challenging for the team. Dr Gorsky is a fervent advocate of this concept, but recognizes that for *Tara Oceans*, it took almost a year and a half for the researchers involved to understand each other and to align their work.

A growing emphasis on international and regional cooperation

The mission *Tara Méditerranée* was coordinated by the Laboratory of Oceanography of Villefranche-sur-Mer (Pierre et Marie Curie University and CNRS) and the University of Michigan, and included 15 scientists representing 14 universities from France, Italy, Germany and the United States. If countries represented were mainly from higher income countries, due to their enhanced access of technologies and capacities, the mission also put a strong emphasis on engaging scientists from countries of the other parts of the basin.

A number of activities have been organized along the way to meet and exchange with scientists, academia and universities at each port of call, through meetings, conferences, and workshops. In Beirut for example, the team of researchers met with the Lebanese CNRS to share knowledge and explore cooperation opportunities to fight plastic pollution off the coast of Lebanon. In Tunisia, a full-day conference was organized by the Faculté des Sciences of Bizerta, to present the findings of Tara Oceans, as well as Lebanese scientists' work on pollution of the bay and biodiversity management. Interviewed during its stop in Marseille in France, Tara's team was very enthusiastic about these exchanges, which underpin the willingness of Tara Expeditions to increase such cooperation. The organization would like the next mission to be even more international, and composed of crewmembers, scientists and artists from numerous countries around the globe. Tara is also exploring opportunities for strengthening capacities of students and researchers from developing countries through an exchange program with Tara Expeditions.

Beyond scientific collaboration, every stop of Tara on the coast was an opportunity to create linkages with the national and local authorities but also with civil society. And as such, the frequency of halts in coastal countries has been higher that in previous scientific expeditions, even more than during *Tara Oceans*, where the ship stopped in 35 countries over the course of three years. Apart from the hundreds of visitors and children coming on the boat every day to learn about Tara's work, a number of events were organized to promote the work of a wide array of local organizations and to raise awareness on conservation issues such as protected areas, coastal and waste pollution management, etc. In Bizerta, in collaboration with local organizations, a beach clean-up was conducted, engaging around 200 people.

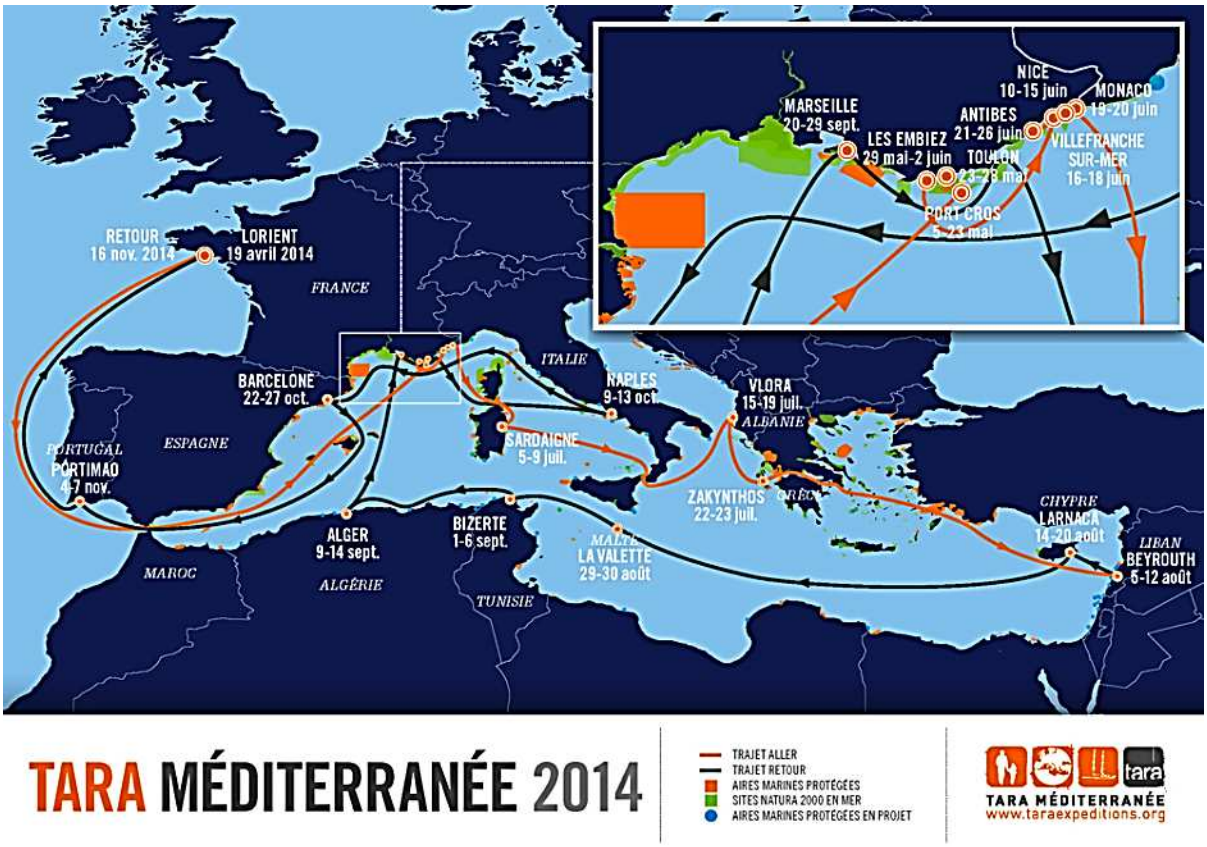
Awaking positive emotions to inspire actions on conservation

Among the multiple fronts that Tara is engaged on, one aspect of its work appears as particularly innovative in the wide spectrum of current environmental efforts: Tara gets us dreaming. From the kids to the boat lovers, this project seems able to reach out to a very wide audience, made of non-experts and non-militants that many conservation organizations still struggle to reach.

Recent researches of cognitive science, that have been assessing the impacts of environmental campaigns, highlight that usual environmental messaging has been focusing too much on scaring people, based on impressive data and apocalyptic scenarios. According to these studies, such messaging create guilt, fear, demotivation and anger about the state of the environment, and lead to a repertoire of defensive strategies, including blame shifting and fatalism (Kelsey, E. and Armstrong, C. 2012; Blackmore, E. et al, 2013). Experimental work suggests that facing fear, individuals trigger instinctive survival responses, focusing on their own interest, leading to a lack of interest on the planet, and to the opposite result of what the organisation advocates for (Monbiot, 2014).

In this context, a growing number of research in sociology are revealing that touching people's positive emotions would be in fact far more powerful than touching negative ones. Common Cause, a think tank funded by Oxfam, Public Interest Research Centre and WWF advocates for a messaging focusing on people's "intrinsic" values and emotions, such as love, wonder, exploration, enjoyment and respect for nature, rather than "bigger-than-self" problems (climate change, biodiversity loss, ocean pollution, etc.) and have more potential to inspire sustainable actions. The authors explain that these positive emotions have the potential to broaden people's ideas about possible actions, open our hearts and our minds, making us more receptive and more creative (Carter D., 2009, Fredrickson, 2009; Fredrickson, B. L. and C. Branigan 2005). They argue that communicating environmental facts should be completed by successful stories that trigger action, through connecting people with authentic, peer-reviewed, scientific examples of successful conservation outcomes (Kelsey, E. and Armstrong, C. 2012, Monbiot G., 2014, Blackmore, E. et al 2013).

Tara Expeditions constitutes an interesting case of communicating positive emotions through providing scientific evidence to the public, while feeding people's fascination for the ocean. During the *Tara Méditerranée* expedition, 11 artists were in residence on the boat, to contribute to increase outreach on ocean protection in a creative way. In this context, Tara's hybridity is a virtue and also its major asset, as it enables it to make science accessible, attractive and understandable for all (Thümler E., 2014). Indeed the combination of intrepid exploration, the thrilling history of the boat and the contagious enthusiasm and passion of the team proposes an innovative way of promoting conservation action. This approach has proven to be particularly effective even on the Secretary General of the United Nations, Ban Ki-moon. After meeting the leaders of Tara Expeditions in 2012 in New York and spending a few hours of his week-end on the boat discussing with the team, Ban Ki-moon has been openly supporting their work and have mentioned them on numerous official occasions, such as the Rio+20 conference, the Yeosu Expo or the launch of the Paris Appeal for the High Seas.



Source http://oceans.taraexpeditions.org/
(Photo credit : Tara Expeditions)

What's next?

The samples and data collected by *Tara Méditerranée* are now being analysed by the partners' laboratories. This work should be completed within the next years, but some trends are already emerging from the mission. Gaby Gorsky pointed out that fragments of micro-plastic were found everywhere the boat collected samples, from the north to the south, near and further from the coast.

Tara Expeditions is preparing a "blue book" to present the work conducted during the stops along the coast and the perspectives of the various actors that were engaged in the countries, as well as to propose solutions and recommendations to guaranty a healthier Mediterranean Sea. It will be presented at the conference on plastic in the Mediterranean in Monaco, on 10 and 11 March 2015.

For its next expedition, Tara will head to the Pacific Ocean and South East Asia, to study surface and deep-sea corals. Tara Expeditions will also pursue its activities at the political level, as it is already very engaged in global climate and environmental processes, such as negotiations under the United Nations Convention Framework on Climate Change (UNFCCC), or the Barcelona Convention for the Mediterranean. In this context, Tara Expeditions co-founded a multi-stakeholder platform "Ocean and Climate 2015", together with UNESCO the Intergovernmental Oceanographic Commission (IOC) and a number of other organizations. Launched in 2014, the platform aims to contribute to the international negotiations on climate change that will be held in Paris in December 2015, and to place healthy oceans on the global agenda post-2015.

Bibliography / More information

- Ben Barnes D.K.A. and Milner P. (2005). *Drifting plastic and its consequences for sessile organism dispersal in the Atlantic Ocean.* Marine Biology 146: 815-825.
- Barnes D. K. A., Galgani F., Thompson R. C., Barlaz M. (2009), *Accumulation and fragmentation of plastic debris in global environments*. Phil. Trans. R. Soc. B 364, 1985–1998.
- Blackmore, E., Underhill, R., McQuilkin, J., Leach, R., and Holmes, T. (2013) *Common Cause for Nature: A Practical Guide for Values and Frames in Conservation.* Machynlleth: Public Interest Research Centre
- Carter D., (2009) *Cultivated Positive Emotions Inspire Environmentally Responsible Behaviors*
- Fredrickson, B. L. and C. Branigan (2005). *Positive emotions broaden the scope of attention and thoughtaction repertoires. Cognition and Emotion,* 19(3): 313-332.
- Gascard, J.-C. ane al., (2008) *Exploring Arctic Transpolar Drift During Dramatic Sea Ice Retreat*. EOS, Vol. 89, No. 3, pp. 21-23, 15 January 2008
- Hirai, H., Takada, H., Ogata, Y., Yamashita, R., Mizukawa, K., Saha, M., Kwan, C., Moore, C., Gray, H., Laursen, D., Zettler, E.R., Farrington, J.W., Reddy, C.M., Peacock, E.E., Ward, M.W., 2011. *Organic micropollutants in marine plastics debris from the open ocean and remote and urban beaches*. Mar. Pollut. Bull. 62,1683–1692.
- Karsenti E (2012) *Towards an 'Oceans Systems Biology'*. Mol Syst Biol 8:575
- Karsenti E, Acinas SG, Bork P, Bowler C, De Vargas C, Raes J, Sullivan M, Arendt D, Benzoni F, Claverie JM, Follows M, Gorsky G, Hingamp P, Iudicone D, Jaillon O, Kandels-Lewis S, Krzic U, Not F, Ogata H, Pesant S, Reynaud EG, Sardet C, Sieracki ME, Speich S, Velayoudon D, Weissenbach J, Wincker P, Tara Oceans Consortium. (2011), *A holistic approach to marine eco-systems biology*, PLoS Biol. 9(10):e1001177.
- Kelsey, E. and Armstrong, C. 2012. *'Finding hope in a world of environmental catastrophe'*, Chapter 11 in: *Learning for sustainability in times of accelerating change*, edited by: Arjen E.J. Wals and Peter Blaze Corcoran
- Monbiot G., (2014), *An Ounce of Hope is Worth a Ton of Despair,* June 16, 2014
- Tara Expeditions (2014), *Toward Assessing the Impact of Platic Debris on the Mediterranean Sea Ecosystem*, http://oceans.taraexpeditions.org
- Teuten, E. L., Rowland, S. J., Galloway, T. S. & Thompson, R. C. 2007 *Potential for plastics to transport hydrophobic contaminants. Environmental Science and Technology* 41, 7759-7764.
- Thompson R. C., Moore C. J., Vom Saal F. S., Swan S. H. (2009), *Plastics, the environment and human health: current consensus and future trends*. Phil. Trans. R. Soc. B 364, 2153–2166.
- Thümler E., Beller A., Troublé R. (2014), *Journeys into Hybrid Terrain: The Case of Tara Exeditions*, SSRN Working Paper Series, March 2014

Webography

- http://oceans.taraexpeditions.org/
- http://www.expeditionmed.eu/

Signature d'un arrangement bilatéral (MoU) entre le ministère tunisien de l'agriculture et le CIHEAM

A l'occasion d'une visite officielle à Tunis, M. Cosimo Lacirignola, Secrétaire général du CIHEAM, a été reçu par le ministre tunisien de l'agriculture, M. Lassaad Lachaal, le 24 septembre 2014, afin de lui présenter les différentes activités du CIHEAM et de discuter de futurs projets de coopération avec la Tunisie. Cette rencontre s'est tenue en présence notamment de M. Mohammed Aziz Darghouth, qui préside l'Institution de la recherche et l'enseignement supérieur agricoles (IRESA) et qui est également délégué de la Tunisie auprès du CIHEAM, et de M. Pascal Bergeret, directeur du CIHEAM-Montpellier.

Cette visite à Tunis a été marquée par la signature d'un arrangement bilatéral (*Memorandum of Understanding*) entre le ministère tunisien de l'agriculture et le CIHEAM. Cette initiative vise à renforcer des liens historiques anciens (voir encadré ci-dessous) par le développement de nouvelles actions conjointes dans le domaine de l'enseignement supérieur, de la recherche en réseaux et de l'assistance technique sur les questions agricoles, alimentaires et rurales.

Cet arrangement bilatéral prévoit que les activités de coopération, en matière de formation et de recherche d'une part, et que les initiatives dans le cadre de projets de développement bilatéraux et régionaux d'autre part, puissent être en adéquation avec les besoins nationaux et locaux de la Tunisie dans le domaine de l'agriculture, de l'enseignement supérieur agricole, de la recherche agronomique, de la sécurité alimentaire, de l'environnement et du développement humain et territorial. Ces principes sont au cœur de la mission du CIHEAM qui vise à fournir des solutions répondant aux besoins de ses Etats membres.

Le ministère tunisien de l'agriculture et le CIHEAM se sont accordés sur une liste de quatre domaines prioritaires de coopération pour cibler leur arrangement bilatéral autour de mesures :

- d'accompagnement institutionnel, notamment un appui au processus de réforme de l'IRESA
- de gestion des ressources naturelles (eau, sols, etc.) et de développement durable
- de gestion intégrée et inclusive des territoires avec une attention particulière sur l'emploi des jeunes en milieu rural et en agriculture ;
- de développement économique pour le renforcement de la compétitivité agricole et halieutique.

New approaches in a context of global change: the future of the Mediterranean ichtyofauna finally predicted

Frida Ben Rais Lasram
Researcher, National Agronomic Institute of Tunisia

The Mediterranean Sea, despite its small dimensions, is a hot spot of endemism (Quignard and Tomasini, 2000). This sea is connected to the Atlantic Ocean and to the Red Sea through respectively the Strait of Gibraltar and the Suez Canal. The Suez Canal and the Gibraltar Strait are two exotic species spillways. These invasions together with other ways of introduction (fooling, aquaculture, ballast waters etc…) make the Mediterranean Sea as the biggest receptacle of exotic species in the world (Streftaris et al., 2005).

The combined effect of invasions and global warming

On a global scale, species invasion has been recognized as a major threat to biodiversity. Indeed, there is sufficient evidence to warrant the claim that exotic invasions can, at the very least, reduce the abundance of native species, alter disturbance regimes and basic ecosystem processes, impose large economic costs, introduce new pathogens to indigenous populations and modify food webs structure and energy flows. Further, native species can be driven to extinction by competitive interactions, by predation, or simply by demographic stochasticity when many new individuals enter the community and occupy part of the carrying capacity of native species.

Endemic species, that are native species restricted to an enclosed area, are more endangered by exotic invasions because they cannot escape and establish elsewhere. Thus, the intensity of interaction between exotic and endemic species is of major concern for the conservation of biodiversity.

Besides, a large quantity of evidence has been accumulated towards an ecological impact of recent climate change on ecosystems. It appears that many species have recently shifted their area of distribution by extending towards Polar Regions as a response to climate warming (e.g. Hickling et al., 2005). The effect of such species movements on the Earth's biota is still under scrutiny, but we can already distinguish "winner" species, which expand their geographical ranges, from "loser" species, which are in decline. Consequently, there is emerging evidence of biotic homogenization at different scales through the gradual replacement of endemic species by exotic species (Mac Kinney and Lockwood, 1999). This process of homogenization is even more critical in semi-enclosed areas because of the high relative percentage of endemic species in such places. It contributes to the breakdown of the regional distinctiveness of the Earth's biota (Vitousek et al., 1997). In this respect, the Mediterranean Sea provides exceptional material for a case study by virtue of its biodiversity and its percentage of endemic species.

Consequently, fundamental questions arise: is climate a key determinant in the dispersal success of exotic species? Is there an increasing spatial overlap between exotic and endemic Mediterranean fish fauna? What would be the geographical distribution of the Mediterranean endemic ichtyofauna in response to global change?

Dispersal success determinants of the exotic ichtyofauna and congruence with the endemic ichtyofauna

In a context of global change, and particularly of climate change, one can ask if climate plays a key role in the dispersal success of exotic species. More generally, we can inquire if there are some life-history or functional traits that predispose some species to establish and become invasive outside their native environment. To deal with such hypothesis, exotic fish species have been classified into three categories according to their abilities to disperse (absence of dispersal, weak dispersal, strong dispersal) and the effect of 7 variables likely to be related to the dispersal success has been explored (Ben Rais Lasram et al., 2008): the climate match, the position in the water column, the maximal length, the type of propagules, the number of species belonging to the same genus already present in the Mediterranean sea, the bathymetry and the year of first record in the Mediterranean.

In order to prioritize the variables related to dispersal and to investigate potential subsequent interactions between variables, a multiple logistic regression approach (Generalized Linear Model, GLM) with a binomial error and a logit link has been performed. Results revealed a strong significant effect of climate match on the dispersal success of Lessepsian species, i.e. species migrating from the Red Sea (Ben Rais Lasram et al., 2008).

One can also inquire if there is an increasing spatial overlap between exotic and endemic Mediterranean fish fauna. Spatial overlap is an indicator of the intensity of the interaction between species leading to the assessment of the potential hazard coming from exotic species. Using a Geographical Information System, endemic and exotic species maps have been compared choosing the eighties as a reference date of sea water warming (Ben Rais Lasram and Mouillot, 2009). Regarding spatial congruence between exotic and endemic species (Figure 1),

it appeared that between the 1980s and 2006, major exotic species have moved northwards in the Mediterranean Sea by an average of 3.5° (approximately 300km). In 2006, 125 species were identified in the Mediterranean Sea, and the updated spatial distribution of exotic fish richness in 2006 showed that almost all Mediterranean coastal waters have been colonized, with the exception of the eastern and western coasts of the Italian peninsula. The highest richness of exotic species increased by more than 66% over that observed during the 1980s. Some areas that were not colonized at all during the 1980s, such as the Ionian coast and the eastern Adriatic Sea, were colonized by an average of 3.5 exotic fish species par year. Overall, spatial overlap between endemic and exotic species increased by 23% between the 1980s and 2006.

Overall, climate plays a key role in the dispersal success of Lessepsian species. This is corroborated by the invasion of the western basin of the Mediterranean, colder than the other areas, by Lessepsian species. The comparison of the exotic richness maps generated more than 20 years apart (before and after the significant climatic warming period), revealed a clear modification in the species distribution pattern. After the 1980s, some exotic fishes reached the coldest areas of the Mediterranean Sea, for example the Adriatic Sea, which is a major hotspot of endemism. The number of exotic species in the Mediterranean is now 98.4% higher than it was 20 years ago.

Projections of the endemic species distribution areas in a global warming context

Conducting broad investigations *in situ* across the Mediterranean Sea to prove the modification of the distribution area of a species is almost impossible given the time, the necessary material and especially the difficulty of demonstrating the absence of a species at a given point. Modeling is therefore an appropriate and effective alternative for this kind of issues. This is the approach that has been chosen to study the potential influence of increased water temperature on the distribution of endemic species (Ben Rais Lasram et al., 2010). The considered models are implemented in the BIOMOD package of Thuiller (2003) running under the R environment.

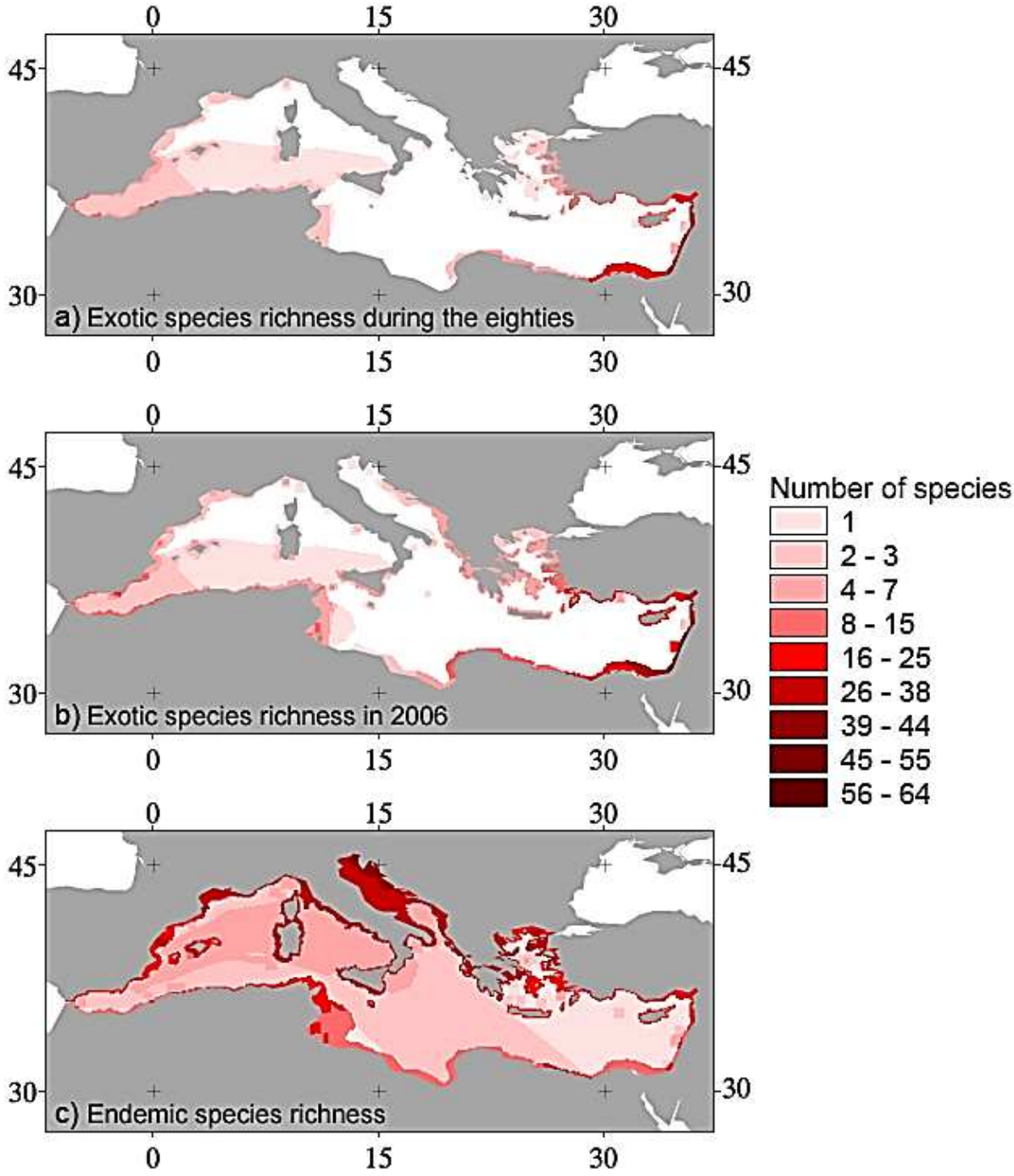
By 2041–2060, ¾ of the looser species are expected to qualify for the IUCN Red List. 20% of them are expected to become extinct and 20% are expected to become highly threatened i.e. to undergo 80% of reduction of their initial range. By 2070–2099, 90% of the looser species are expected to qualify for the IUCN Red List. 33% of them are expected to become extinct and 23% are expected to become highly threatened.

There are four scenarios for species predicted to lose part of their geographic range size and hence, qualify for the IUCN Red List: (i) a high probability of immediate extinction (e.g. *Corcyrogobius liechtensteini* and *Didogobius schlieweni*), (ii) a high probability of extinction by the end of the 21st century, after severe climatic niche reduction (e.g. *Gobius geniporus* (Figure 2)), (iii) severe habitat fragmentation (e.g. *Arnoglossus kessleri* (Figure 2)) and (iv) migration to the coldest areas, associated with habitat reduction (e.g. *Cyclothone pygmaea*).

Among the winner species, 77% are predicted to experience high range extensions, reaching 80% or even 100% increase. This is for example the case of *Solea aegyptiaca* (Figure 2) that is currently distributed along the southern and the eastern sides of the Mediterranean (from Tunisia to Turkey) as well as the Adriatic Sea and the Gulf of Lion. By the middle of the century, it could reach the Aegean Sea, the Tyrrhenian Sea and the Catalan coasts. Its distribution area projected using its climatic niche is expected to extend by 88%. By the end of the century, this specie would be distributed in the whole Mediterranean except the extreme west of the Alboran Sea and an enclave in the northern part of the Aegean Sea. This means a range extension by 123%.

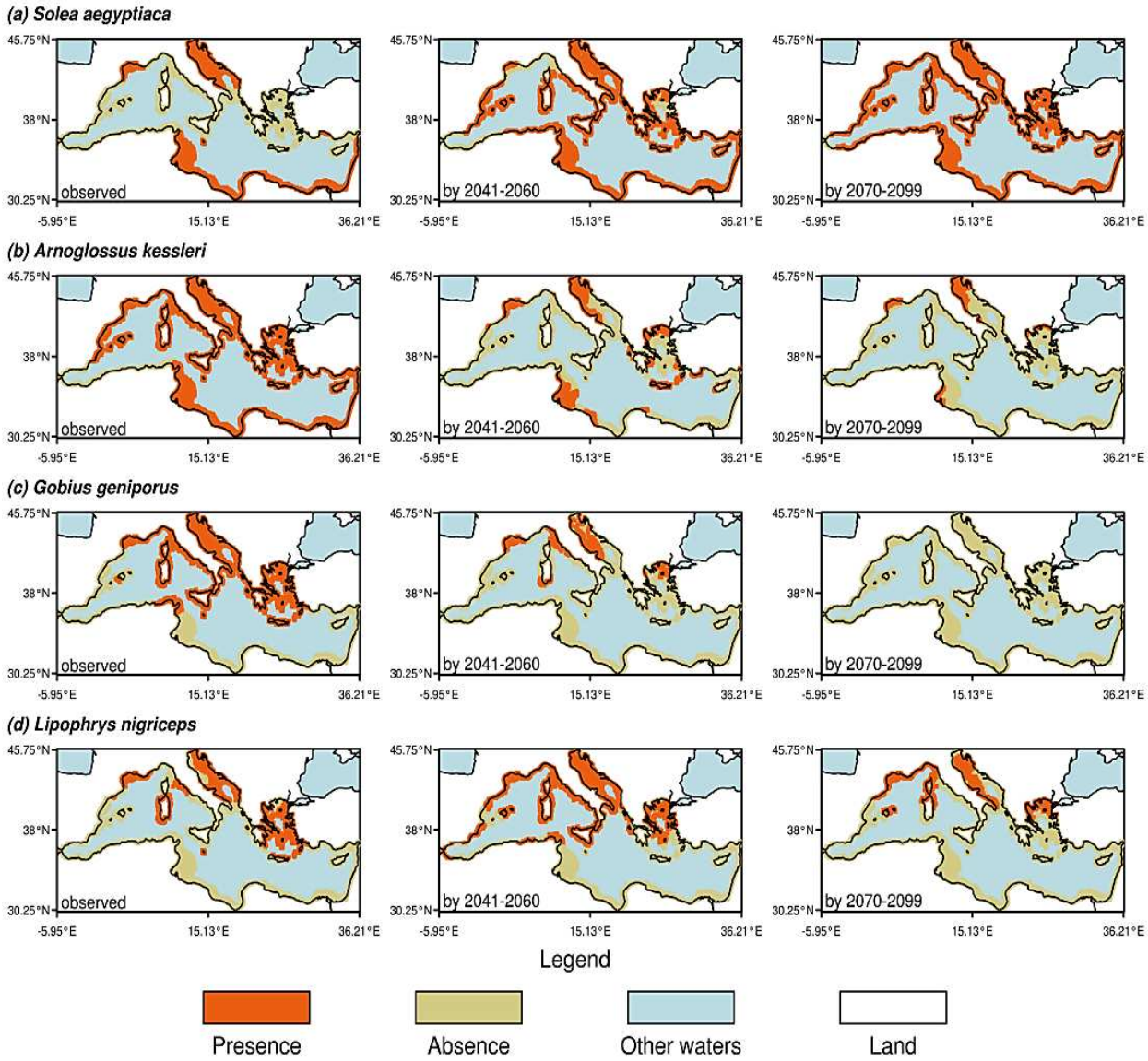
It also appeared that by the middle of the 21st century, the coldest areas of the Mediterranean Sea (Adriatic Sea and Gulf of Lion) would act as a refuge for cold-water species, but by the end of the century, those areas are projected to become a trap that would drive those species towards extinction.

Figure 1
Spatial congruence between exotic and endemic species between the 1980s and 2006



Source : Ben Rais Lasram et Mouillot., 2009

Figure 2
Observed (1980s) and predicted (by 2041-2060; by 2070-2099) distribution areas of endemic Mediterranean Sea fish species, and potential future thermal habitats projected with climate envelope models



The axes indicate degrees of latitude (X-axis) and longitude (Yaxis)

Source : Ben Rais Lasram et al., 2010

The estimation of the turnover rate revealed that by the middle of the 21st century, the Levantine Basin and the southern side of the eastern basin as well as the Gulf of Gabes (southern Tunisia) are expected to experience a turnover rate of 100% in species composition. That is, all endemic species in those areas would disappear (by extinction or migration) and would be replaced by others. A 80% turnover rate would also occur in the Aegean Sea, the Adriatic Sea and northern Tunisia.

Conclusion

Overall, we observed that in 20 years the balance between exotic and endemic species richness will be reversed following a period of global warming: exotic species have extended their ranges towards the hotspots of endemism, have colonized new areas and become more numerous than endemic species in some areas. Even though a causal link between the introduction of exotic species and the risk of local extinction has not yet been demonstrated, we can predict the gradual replacement of some species by others in a near future.

Projections based on climate envelope models (Ben Rais Lasram et al., 2010) confirmed the hypothesis that the coldest areas of the Mediterranean Sea (Adriatic Sea and Gulf of Lion) would act as a refuge for cold-water species, but by the end of the century, those areas were projected to become a trap that would drive those species towards extinction. Sea water warming would also lead to a total modification of endemic species assemblages: as a whole, 25% of the Mediterranean Sea is predicted to experience a total modification of endemic species assemblages by the end of the 21st century.

At that point, global warming would be so marked that none of the endemic fish assemblages of the Mediterranean would be identical to those of the 1980s. Endemic Mediterranean Sea species are thus likely to undergo a biotic stress materialized by exotic species and an abiotic stress materialized by global warming. The former being favored by the latter, it is likely that both pressures add up and act in synergy leading to the increase of vulnerability of endemic species. Moreover, these pressures could have consequences on habitat fragmentation.

In conclusion, the effects of global change, including exotic invasions and global warming, must be looked at a global scale and not only at a local scale. Thus, biogeographical approaches such as addressed in this paper, are necessary to anticipate the consequences on the biodiversity as well as on fisheries. This requires the combined efforts of all the bordering Mediterranean countries in order to compile and improve the existing data and to run predictive models. This would lead to reliable predictions that could be helpful for decision support.

Bibliography / More information

- Ben Rais Lasram F., Tomasini J.A., Guilhaumon F., Romdhane M.S., Do Chi T., Mouillot D. (2008) *Ecological correlates of dispersal success in Lessepsian fishes*. Marine Ecology Progress Series, 363, 273-286.
- Ben Rais Lasram F., Mouillot D. (2009) *Increasing southern invasion enhances congruence between endemic and exotic Mediterranean fish fauna*. Biological Invasions, 11, 697-711.
- Ben Rais Lasram, F., Guilhaumon, F., Albouy, C., Somot, S., Thuiller, W., Mouillot, D. (2010), *The Mediterranean Sea as a "cul de sac" for endemic fishes facing climate change*, Global Change Biology, 16(12), 3233 - 3245.
- Hickling, R., Roy, D.B., Hill, J.K., Thomas, C.D. (2005), *A northward shift of range margins in British Odonata*, Global Change Biology, 11, 502-506.
- Mac Kinney, M.L., Lockwood, J.L. (1999), *Biotic homogenization: a few winners replacing many losers in the next mass extinction*, Trends in Ecology & Evolution, 14,450-453.
- Quignard, J.P, Tomasini, J.A. (2000), *Mediterranean fish biodiversity*, Biologia Marina Mediterranea, 7, 1-66.
- Streftaris, N., Zenetos, A., Papathanassiou, E. (2005), *Globalisation in marine ecosystems: the story of non-indigenous marine species across European seas*, In: Oceanography and Marine Biology - an Annual Review, 43, 419-453.
- Thuiller, W. (2003), *BIOMOD – optimizing predictions of species distributions and projecting potential future shifts under global change*, Global Change Biology, 9, 1353–1362.
- Vitousek, P.M., Mooney, H.A., Lubchenco, J., Melillo, J.M. (1997), *Human domination of Earth's ecosystems*, Science, 277, 494–499.

Greening the Mediterranean Fisheries

Didier Sauzade
PNUE, PAM, Plan Bleu

Nathalie Rousset
PNUE, PAM, Plan Bleu

Mediterranean fisheries are far from their full potential economic and social value

Evidence of sustained fisheries in the Mediterranean has been documented over millennia. Taking advantage of the great ecological diversity of this enclosed sea, multi-specific and multi-gears fisheries were developed over time, and today have come to represent particularly important socio-economic sectors in most of the coastal countries. They are an important source of nutrition, employment and income, and they meet a growing demand for fish products in ever-greater demand emblematic of the Mediterranean art of living so prized by tourists. Most, if not all Mediterranean fisheries, however, now face serious challenges resulting from a series of impacts: environmental degradation, poorly known fish wastes, overexploitation of the stocks targeted and poor managements of these shared resources. In addition, the impacts of climate change are now starting to be felt, exacerbating the impacts on both ecosystems and species.

Setting the conditions that will put marine fisheries on a more sustainable path is critical from an economic and social standpoint. In its role of observatory of the sustainable development in the Mediterranean region, Plan Pleu, one of the Mediterranean Action Plan Regional Activity Centers, has carried out a scoping study to assess the current economic and social value of marine fisheries to the Mediterranean region and to estimate the sector's full potential economic and social value if it were managed optimally.

Methods and data

For this study (Sauzade D., Rousset N., 2013), data have been collected from various statistical sources (Eurostat, UNData, FishStat, FAO Country Profiles or FCP...), which provide data on landings and fishing fleets. Data on employment were more difficult to gather, countries statistical data on employment related to fisheries are generally aggregating all types of fisheries (in land, aquaculture) and if appropriate, are not limited to the Mediterranean country's coasts. Drawing on his analysis of the Mediterranean fishing fleets, Sacchi (2011) has estimated direct employment by allocating a typical crew for each category of vessel, taking into account the current practices in each country from his personal expertise. Indirect employment has been estimated by Sacchi (2011) mainly from the FCP at the national level. In the absence of better information, these national data have been adjusted assuming that the ratio of indirect employment on total sector employment was similar for capture and aquaculture activities, and spatially constant for all the coasts of the considered country. Regarding ex-vessel fish prices, the Sea around Us project (SAUP) database has been used largely to overcome the fact that FAO publishes only processed and product fish prices.

To assess the total economic impact of the fisheries, the output multipliers estimated by Dick and Sumaila (2010) for the Mediterranean coastal countries were applied to the landed values of their marine fisheries. Sumaila (2010) has also developed a database of fisheries subsidies in the frame of the SAUP, to compensate missing data from official sources. The total cost of fishing has been estimated considering the one by gear and by country calculated by Lam et al. (2010) and data of catch by gear and by country from SAUP database.

Based on the value of landings by country contained in the SAUP database and estimations of costs of fishing, it was possible to calculate the current economic fishery rent, the profits and the total added value at the country and Mediterranean levels. Wages and payment to capital were estimated on the basis on the comprehensive costs and earning data set available for European fishing fleet (EC, 2006). Labor costs and payments to capital were conservatively calculated at respectively 39% and 9% of the total cost of fishing.

An aggregate economical model

Based on Arnason (2007), an aggregate model of the global fisheries has been applied to estimate the total rent lost by Mediterranean marine fisheries. In particular, the model assumes that Mediterranean fisheries can be modeled as a single fish stock with an aggregate biomass growth function. The whole harvesting sector is represented by an aggregate fisheries profit function, composed of an aggregate harvesting function, relating the harvest to fishing effort and biomass, and an aggregate cost function relating fishing effort to fisheries costs.

The population dynamics of the exploitable aggregate biomass were modeled through a Fox model, consistent with the experience from the Mediterranean fisheries that proved to be relatively resilient. When needed, assumptions used by Willmann and al. (2009) in the flagship publication of the World Bank and FAO on the world fishery rent "The Sunken Billions, the Economic Justification for Fisheries Reform" where used. Regarding policy recommendations, those drawn at the regional (Mediterranean) scale by the General Fisheries Commission for the Mediterranean (GFCM), European level in the wake of the preparation of the next Common Fishery Policy and the International Convention for the Conservation of Atlantic Tuna (ICCAT) have also been considered to present a new set of propositions focusing on the marine fisheries component.

A socially important activity in a worrisome situation

From all these data, asumptions and model results, the study stressed that the total catch from the Mediterranean marine capture fisheries rose from 420,000 tonnes in 1950 to close to 1,000,000 tonnes in the 1980s, with a peak of 1,093,000 tonnes reached in 1995.

Ever since, the level of catches has been slowly decreasing, with the exception of a short-burst increase in 2006, which was essentially due to an exceptional level of landings for small pelagics, species that are very sensible to environmental variations. The total landed value presents a different pattern, with a clear peak in 1985 at US$ 3 billion, followed by a quasi-constant decrease to US$ 1.5 billion, which is a similar value to that reached in 1975 in real 2000 US$ value.

While employment in capture fisheries has declined since the 1990's in countries on the northern shore of the Mediterranean, figures are much higher on the southern shore, where 319,000 individuals are still employed in the sector. Over 55% of this workforce is employed in small-scale fisheries, which play an important role in the social fabric and cultural identity of many Mediterranean coastal regions, and where capture fisheries-related employment in southern rim countries can reach almost 1.3% of the total active population, without even counting aquaculture employment or upstream activities (boat construction, engine maintenance, gear manufacture, etc.).

In spite of the importance of this sector for so many coastal populations, most of these fisheries are exploited at an unsustainable level, which directly threatens stocks with overexploitation and the attendant long-term depletion of the whole sector, increasing economic costs and employment losses. In the span of 15 years, from 1991 to 2006, the percentage of fisheries resources in overexploitation has increased from 15% to nearly 60%, affecting especially the most valuable species (bottom fishes, lobsters) and top predators (tuna, sharks and rays), which are known to play key roles in the control of the whole trophic chain. The situation is slightly less worrisome in the home fishing areas of southern rim countries, where the number of their resources in overexploitation has only increased by a third, while it has more than doubled in those of other Mediterranean countries during the same period.

Challenges and opportunities for Mediterranean fisheries

Regarding their economic and social impact, marine fisheries are crucial to the Mediterranean region, providing animal protein and supporting food security for over 452,000,000 people. An estimated 32% of this population lives in close proximity to coastal areas, relying on fish resources not just for food but also for their livelihoods – from fishing and induced activities, but also increasingly from fishing tourism. Currently, Mediterranean fisheries deliver annual revenues that amount to around US$ 1.3 billion and support directly and indirectly 458,000 jobs. When the total direct and indirect economic effects arising from fish populations in the regional economy are accounted for, the total contribution of the sector to national economic outputs is estimated at some US$ 3.1 billion a year.

However, Mediterranean marine fisheries, and more particularly the northern ones, are not only overexploited, they also have been underperforming in both economic and social terms for decades. Mediterranean countries currently generate a negative rent of US$ 1 billion a year from fishing, when the total cost of fishing (US$ 1.6 billion) and subsidies (US$ 727 million) are deducted from the total value of US$ 1.3 billion that fishing generates. This appalling result, however, does not extend to all fisheries, as some artisanal fisheries still succeed in generating positive rents.

A reduction by half of the fishing effort

Investments that will help achieve sustainable levels of fishing can secure a vital revenue stream in the long run. If the current path is followed, overexploitation will increase and the operating deficits can be expected to increase, requiring still higher subsidies. Any effort to increase the sustainability of fisheries will require a reallocation of public expenditures, particularly as they relate to a reduction in harmful subsidies. It is imperative that fisheries management be strengthened to allow overfished and depleted stocks to recover, including via a significant reduction of excess capacity through de-commissioning vessels and equitably relocating employment in the short term. It is estimated that an investment of US$ 3 billion would reduce excessive capacity, allow depleted stocks to recover, and could result in the long term in an 66% increase of catch per unit effort, in spite of an expected 17% drop in total Mediterranean catches.

Improve dramatically the resource rent

Transitioning to sustainability in the fisheries sector would result in a dramatic increase in resource rent from Mediterranean fisheries. Projections indicate that reforming Mediterranean fisheries could transform resource rent from a negative US$ 1 billion to a positive US$ 315 million a year. The total value-added to the economy of the region from fishing in such a scenario is estimated at US$ 668 million a year, compared to the negative feature of US$ 222 million in the current situation (see Table 1).

Even without accounting for the potential boost to recreational fisheries, multiplier and non-market values that are likely to be realized, the potential present value of benefits of reforming fisheries is at least six times the cost of the required investment.

Providing leeway for changes toward better economic and social impacts

Bringing and keeping the capacity of the fishing fleets in line with the sustainable fishing scenario will improve the wealth of the nation and the individual revenues of remaining fishermen but inevitably lead to less overall employment in the catching sector. However, it should be considered that the employment losses could be more important in case of continuation of the business as usual scenario. History of fisheries shows that overexploitation can lead to disasters, as in the case of the cod exploitation in Newfoundland, the largest cod fishery in the world, where the industry and associated employments collapsed entirely in the early 1990s, without recovery to date in spite of moratorium on fishing, due to provoked irreversible changes in ecosystems. Management of reforms towards sustainable fisheries and cushioning of the effect on impacted populations are political issues.

A number of other management tools and funding sources are available that can also be used to move the regional fisheries sector from its current underperforming state to a sector that delivers higher, but socially acceptable benefits, while achieving sustainable levels of fishing in the long run for the benefits of current and future generations. The necessary downsizing of the fleet should be carried out with a view to trying to protect small-scale fisheries and associated and dependent coastal communities, while allowing larger fleets to undergo the necessary adaptations. To that end, two differentiated management regimes could be envisaged, with one designed for large-scale fleets and where capacity adjustment and economic efficiency are at the core, and the other targeted at small-scale fleets in coastal communities, with a focus on social objectives. The approach to public financial support could be different for the two segments: the large-scale fleet would be expected to be economically self-reliant, while public funding may help the small-scale segment adapt to changing conditions towards more sustainable fisheries, thereby strengthening its economic viability, and maintain its contribution to the livelihood of coastal communities.

Table 1

Sustainable fisheries, key economic figures, comparison between two scenarios, current situation illustrated by the year 2004 and sustainable fisheries as an average of two modeled situations: Fox and Logistic

	Units	Current situation	Sustainable fisheries (Fox)	Sustainable fisheries (Logistic)	Sustainable fisheries (average)
Harvest	1,000 tonnes	1,053	860	891	**876**
Fishing effort	index	1	0.53	0.38	**0.46**
Price of landings	1,000US$/t	1.3	1.5	1.7	**1.6**
Value of landing	US$ million	1,345	1,294	1,535	**1,415**
Cost of fishing	US$ million	1,618	857	617	**736**
Subsidies	US$ million	727	363	363	**363**
Rent	US$ million	-999	74	556	**315**
Wages	US$ million	631	334	240	**287**
Payment to capital	US$ million	146	77	55	**66**
Total added-value	US$ million	-222	485	851	**668**

Methods: Sumaila (2011); Willmann et *al.* (2009); Arnason (2007); Srinivasan et *al*. (2010); and Lam et *al.* (2010).
Data: Sea Around Us project and FishStatJ

Bibliography / More information

- Sauzade D., Rousset N. (2013). *Greening the Mediterranean fisheries: tentative assessment of the economic leeway*. Plan Bleu, Valbonne.
- Sacchi, J., (2011) *Analysis of Economic Activities in the Mediterranean: Fisheries and aquaculture sectors*, Technical Report, Plan Bleu, Sophia-Antipolis.
- Sea Around Us Project, *Large Marine Ecosystems, Global Database: Catches, Values and Subsidiaries* http://www.seaaroundus.org/
- Sumaila, U.R. (2010) *A bottom-up re-estimation of global fisheries subsidies*, J. Bioeconomics,12, pp. 201-225
- Lam, W.Y.V., Sumaila, U.R., Dyck, J. A., Pauly, D.,Watson R. (2010) *Construction and Potential Applications of a Global Cost of Fishing Database*, Working paper # 2010-13,Fisheries Centre, University of British Columbia, Vancouver, Canada.
- EC (2008) *Economic Performance of Selected European Fishing Fleets in 2008*, *The Potential Economic Impact on Selected Fleet Segments of TACs proposed by ACFM and reviewed by SGRST for 2008* (EIAA-model calculations), Nov. 2007.
- Arnason, R. (2007) *An Excel Program to Estimate Parameters and Calculate Fisheries Rents*, FAO
- Willmann, R., Kelleher, K., Arnason, R. (2009) *The Sunken Billions, The Economic justification for Fisheries Reform*, The World Bank & FAO publication, Washington, DC.

La prospective: un outil au service de la gouvernance des ressources marines vivantes en Méditerranée

Denis Lacroix
Animateur de la veille et de la prospective
Direction scientifique, IFREMER, France

La mer Méditerranée concentre une intense activité industrielle, urbaine, commerciale et touristique, ce qui représente aujourd'hui plus de menaces que d'opportunités, notamment en termes de valorisation durable des ressources marines et côtières (Benoit et Comeau, 2006, UNWTO, 2011). Mais le progrès des connaissances et la diffusion massive de l'information suscite une attention grandissante aux océans et aux mers régionales, à leur interface avec les continents et à leurs évolutions possibles en fonction des scénarios de changement global (Sénat, 2012. Marine Board, 2013).

De plus, ces espaces apparaissent de plus en plus comme des opportunités de croissance dite "bleue" mais sous réserve d'une approche plus patrimoniale que minière de valorisation des ressources (Plan Bleu, 2008). Enfin, les dimensions sociétales émergent de manière multiforme via des demandes nouvelles d'un public de mieux en mieux informé et soucieux de sécurité alimentaire, de santé, de sûreté et d'éthique (Rossetti, 2011). Dans ce contexte très large apparait le besoin récurent d'une concertation de tous les acteurs avec notamment la capacité d'éclairer les choix de long terme dans un contexte d'incertitudes et de risques accrus.

Un concentré des problématiques maritimes mondiales

La mer Méditerranée concentre sur moins de 1% de la surface des océans un nombre élevé de problématiques maritimes et côtières. Au plan environnemental et biologique, elle constitue l'un des points remarquables de la biodiversité marine, avec de nombreuses espèces, dont une importante proportion est endémique. La diversité des habitats et des micro-climats expliquent en grande partie cette richesse: lagunes, deltas, côtes rocheuses, plaines sableuses, herbiers, canyons, plateaux continentaux, monts sous-marins...

Au plan de l'habitat humain, les pays riverains totalisent une population de 480 millions d'habitants, dont un tiers sur le littoral. Les grandes villes côtières sont toutes en expansion (Le Caire, Istanbul, Barcelone, Alger…). La densité urbaine est accentuée par environ 350 millions de touristes, soit le tiers du tourisme mondial, qui viennent tout au long de l'année séjourner sur le littoral. Cet accroissement continu de population, qui se traduit notamment par une artificialisation croissante du littoral entraîne aussi des pressions sur les ressources, qu'elles soient minérales (granulats par exemple), énergétiques (pétrole et gaz), et vivantes (pêche).

Elle fournit une grande diversité de services écosystémiques non marchands (nurseries de nombreuses espèces marines, puits de carbone atmosphérique, filtration ou absorption de composés toxiques, recyclage d'éléments nutritifs...), ce qui contribue à la durabilité des écosystèmes productifs et la qualité générale de l'environnement. Ces services sont vitaux pour nombre d'activités comme le tourisme, l'aquaculture ou la pêche. Mais les modifications de l'environnement liées au changement climatique, comme par exemple l'élévation du niveau de la mer, et à l'évolution des sociétés (pollutions physiques, organiques, chimiques...) s'accroissent. Les services écosystémiques aquatiques et surtout marins, sont donc de plus en plus affectés et risquent de l'être encore plus à l'avenir.

Au plan géopolitique, la mer Méditerranée joue un rôle central dans les échanges commerciaux et culturels. Un chiffre illustre bien cette importance: un tiers du pétrole mondial transite par cette mer avec tous les risques et les impacts qu'implique ce trafic. Elle constitue un espace partagé par 23 pays riverains, traversé et exploité par ces pays et par d'autres. Cette situation, unique au monde, est source de tensions entre de nombreux acteurs, étatiques ou privés, sur fond de compétition dans l'accès aux ressources.

Atouts et contraintes de la pêche et de l'aquaculture en Méditerranée

La pêche méditerranéenne présente deux formes majeures d'activité: une pêche semi-industrielle de flottilles spécialisées fournissant marchés locaux et régionaux. Ces flottilles mobilisent des moyens importants et se déploient sur tout le plateau continental et jusqu'au domaine profond.

La seconde forme est la petite pêche artisanale qui compte un grand nombre d'embarcations. Elle fréquente les zones côtières et les fonds non chalutables. Mais de nombreux facteurs comme la surpêche, le chalutage illégal ou la pollution ont conduit à une stagnation globale des apports de capture, pour la plupart des espèces et dans la majorité des zones (FAO, 2012).

Le secteur doit faire face à de nombreux défis : concurrence sur les marchés (avec des importations croissantes d'Asie), compétition dans l'accès à l'espace, y compris dans les zones de pêche traditionnelles, détérioration de certains écosystèmes côtiers sous diverses formes de pression, expansion d'espèces invasives… Le développement durable de ce secteur en Méditerranée requiert de mieux prendre en compte toutes les caractéristiques de l'exploitation de ces écosystèmes afin d'intégrer ce secteur dans l'ensemble des activités côtières et d'être capable d'en anticiper les évolutions. Le chantier est vaste : harmonisation des réglementations, contrôle des recommandations internationales, mesure, suivi, formation, gestion des marchés, recherche, valorisation des savoir-faire et prospective.

Des évolutions encourageantes sont observées comme pour le thon rouge, espèce emblématique. Le thon était considéré en danger d'effondrement des stocks dans les années 1990. Une vigoureuse politique de maîtrise des technologies, des périodes de campagne, des quotas de capture par pays, a permis d'enrayer cette évolution puis d'inverser le déclin à partir des années 2000. Cette évolution n'a été rendue possible que par une coopération active entre les chercheurs de plusieurs pays, la Commission internationale compétente (CICTA), les administrations de pays concernés et les syndicats d'armateurs. La baisse des quotas, et celle du nombre des bateaux, les contrôles avec des observateurs à bord ont contribué au changement. Les survols aériens repèrent aujourd'hui trois fois plus de bancs de thons qu'il y a dix ans. Mais les scientifiques reconnaissent aussi que c'est parce que la société civile et les ONG ont porté leur message de « catastrophisme éclairé » auprès du grand public que les choses ont bougé.

Marginale dans les années 1970, en dehors de la conchyliculture traditionnelle, l'aquaculture méditerranéenne est devenue une activité économique majeure, surtout en raison de l'essor rapide de la pisciculture marine (Bar et daurade). Depuis 2012, la production aquacole des pays riverains dépasse les captures liées à la pêche, en valeur comme en tonnage, et la FAO prévoit une croissance soutenue dans les décennies à venir. Mais après le foisonnement des fermes aquacoles, comme en Grèce dans les années 1990, on observe une double tendance en pisciculture marine.

Premièrement, le nombre d'entreprises diminue et leur taille grandit ; elles font des investissements lourds au large et sécurisent leur intégration verticale dans les intrants comme sur les marchés; deuxièmement, les aquaculteurs, comme l'Etat ou les élus locaux ont compris qu'il était plus efficace de se concerter pour l'aménagement de l'espace côtier que de risquer des conflits chroniques (ex. de la baie d'Izmir développé ailleurs). De fait, le développement d'une aquaculture durable exige une approche écosystémique, visant à optimiser la fourniture de services marchands (production d'aliments ou de substances de valeur, patrimoine culturel pour le tourisme…) tout en assurant la pérennité des services mobilisés pour la production aquacole : qualité de l'eau, production de juvéniles/naissains….

Cette évolution exige de prendre en compte au moins le moyen terme pour que les investissements soient rentabilisés et que les conflits d'usage soient traités durablement. Mais la traduction de la planification en systèmes normatifs peut aussi avoir des effets pervers. Ainsi, les systèmes réglementaires se sont généralisés au point parfois de paralyser tout développement, comme en France, où pas une seule ferme n'a vu le jour depuis 10 ans malgré de nombreux sites favorables et un marché demandeur. En effet, en France, tout porteur de projet d'aquaculture d'une certaine envergure (plus de 20 tonnes de production annuelle) doit suivre une longue procédure administrative avec la consultation en 6 étapes successives de 7 services de l'Etat, en plus de la ou des mairies concernées. Même si ces précautions sont fondées sur des principes légitimes, la complexité de l'instruction du dossier et la vulnérabilité de celui-ci lors de l'enquête locale finissent par bloquer les projets.

Un autre axe de développement de l'aquaculture est celui de la valorisation des terres agricoles dont l'exploitation a été abandonnée pour raison de salinisation, notamment dans les zones de delta. Ainsi, la pisciculture en eau saumâtre du delta du Nil a connu une progression fulgurante depuis 15 ans (de 150000 tonnes à plus d'un million de tonnes) avec le remplacement, parfois anarchique, de la riziculture traditionnelle par la pisciculture semi-intensive de bar, de mulet, de daurade… Il apparaît là un immense besoin de concertation, de planification, d'organisation et de formation car ce grand delta, comme d'autres en Méditerranée, concentre toutes les contraintes à moyen terme : urbanisation rapide et mal contrôlée, nouvelles infrastructures, industries polluantes, pénuries d'eau, manque de compétences locales, stress hydrique croissant, tensions sociales…

S'il est un espace qui a besoin de prospective en priorité, c'est bien cette bande côtière en voie de « marinisation ». Pourtant l'aquaculture *sensu lato*, si elle est bien gérée par les acteurs, offre de nombreuses perspectives de développement notamment dans les biotechnologies dites « bleues », dont l'intérêt économique est avéré ou potentiel (production d'énergie ou de molécules d'intérêt pharmaceutique ou industriel ; absorption de CO^2…). En effet, certains organismes, comme des algues unicellulaires présentent des rendements photosynthétiques élevés et des applications industrielles multiples. Pour cette filière encore, la gestion concertée des espaces et des flux sur le long terme est une nécessité dès lors que l'on recherche ou que l'on affiche la durabilité.

La prospective : luxe ou nécessité ?

Si l'on définit la prospective comme la capacité d'éclairer l'avenir à moyen et long terme (sinon, il s'agit de stratégie), cette démarche humaine est ancienne et repose sur le désir d'optimiser le résultat de ses actions ou de ses décisions par une capacité d'anticipation (Gaudin, 2005). Elle a été développée sur des bases rationnelles après 1945 et a pris de multiples formes avec l'accroissement des demandes d'analyse par les entreprises, les Etats, les organisations internationales, les instituts de recherche… Longtemps, elle a été utilisée pour aider à la planification, dite « stratégique », pour les Etats et les grandes entreprises. Mais deux facteurs ont réactivité son utilité sur les 15 dernières années. D'abord, la prise de conscience que le changement climatique n'était plus une hypothèse mais une réalité scientifique et que son origine était si liée à l'activité humaine que l'on serait en droit de renommer notre ère « l'anthropocène » (Bonneil et Fressoz, 2013). Ensuite, la recherche permanente de la durabilité dans les problématiques posées dans le développement des sociétés exige une capacité de projection de moyen et long terme.

Ces deux raisons sont particulièrement déterminantes dans le domaine côtier parce qu'il est soumis à des changements globaux déjà perceptibles et parce qu'il concentre presque toutes les activités humaines. La gestion de la mer Méditerranée, et plus encore, des flux vivants qui la traversent, requiert une vision intégrée dans l'espace et dans le temps. En effet, comment conserver l'exceptionnelle attractivité touristique de cette mer sans une analyse réaliste de ses grands enjeux et des risques associés ?

Si de nombreuses méthodes ont été développées depuis les années 1980 (Schwartz, 1991, Callon *et al*, 2001 ; Godet et Durance, 2008), notamment celles concernant les évolutions possibles des écosystèmes (Passet, 1979 ; Mermet, 2005), la clef de l'utilité de l'exercice de la prospective reste l'appropriation des scénarios ou recommandations par les décideurs, sinon l'étude, aussi brillante et exhaustive soit-elle, n'est pas féconde. En partant de ce constat une méthode de prospective a été élaborée dans le cadre du programme européen Pegaso (*People for Ecosystem Based Governance in Assessing Sustainable Development of Ocean and Coast*) visant à mettre à disposition des décideurs et des scientifiques du pourtour méditerranéen des outils pratiques de réflexion et de décision au service d'une meilleure gestion intégrée de la mer et des côtes. La base de la méthode emprunte le concept américain des 6 paramètres majeurs qui expliquent 95% de la variabilité d'un système socio-économique (Cornish, 2004). La méthode, mise au point dans des études de cas à l'université pendant 10 ans puis sur le terrain (Grèce, Egypte, Algérie, Maroc) permet deux actions essentielles :

- Faire travailler ensemble les experts du pays, fonctionnaires, chercheurs, entrepreneurs, consultants… dans de nombreuses disciplines différentes et sur des questions urgentes et majeures intéressant leur pays ; il s'agit là d'un processus pluridisciplinaire d'intelligence collective dont la qualité et l'intérêt des résultats surprennent souvent les participants ;

- Montrer qu'une analyse de long terme bien conduite facilite le choix des priorités, la structuration des moyens et la planification des actions.

Dans le domaine des ressources aquatiques vivantes dont le continuum est l'eau, de leur exploitation comme de la préservation de leur biodiversité, la prospective est particulièrement éclairante car elle doit intégrer toutes les activités qui utilisent cette ressource (agriculture par ex.) ou ce support (navigation par ex.) et tous les impacts directs ou indirects (pollution, espèces invasives…). Dès qu'elle est pratiquée, la prospective n'apparaît plus comme une analyse « de luxe », ou une étude de plus, mais comme un outil stimulant, fédérateur et utile.

Pas de durabilité sans réflexion de long terme

La prospective irrigue déjà de nombreuses activités dans le domaine marin. Ainsi, l'approche écosystémique des pêches (AEP) a fait évoluer ce métier dans sa façon d'envisager la gestion des ressources, même si elle reste encore plus conceptuelle qu'opérationnelle.

La surveillance et la gestion des services rendus par la mer pourraient ainsi s'inspirer des méthodologies et approches développées pour la gestion des stocks halieutiques, tandis que l'observation, la prévision et la gouvernance d'autres services pourraient en retour alimenter l'AEP. Les outils d'une gestion durable ne pourront émerger sans démarche collaborative et pluridisciplinaire alliant sociologie, économie et gouvernance, Cette démarche exige une connaissance approfondie de la dynamique des écosystèmes et de leurs usages et passe par la construction de scénarios normatifs à moyenne échelle temporelle. Ces scénarios, produit de la méthode reine en prospective, permettent alors d'explorer les futurs des écosystèmes marins, ainsi que les trajectoires possibles menant à des objectifs souhaitables, selon différentes projections environnementales, économiques et sociales. Tout ce travail d'analyse collective permet alors d'aboutir à des recommandations pour les décideurs et les gestionnaires.

Dans cet esprit, il faut citer le développement récent de l'ingénierie écologique et de l'éco-conception en milieu côtier. L'ingénierie écologique se base sur l'utilisation de populations ou d'écosystèmes dans le but d'orienter les dynamiques de l'environnement dans un sens favorable à la société et compatible avec le maintien des équilibres écologiques. L'éco-conception vise à réduire les impacts environnementaux et à améliorer la performance environnementale des produits dans leur cycle de vie. En exemples d'application, on peut citer la mise en place d'habitats artificiels pour protéger des zones sensibles, ou la conception de digues favorisant la vie aquatique. Un autre aspect important est de mobiliser la prospective pour réfléchir sur les capacités des sociétés littorales à faire face aux risques liés aux impacts du changement global. De telles analyses doivent intégrer les évolutions des territoires autant du point de vue géographique (évolution du trait de côte, artificialisation des espaces…) que du point de vue socio-économique (plans d'occupation des sols, structures démographiques, thalassotropisme….). Ces enjeux s'inscrivent d'ailleurs naturellement dans les agendas de développement durables de toutes les organisations internationales compétentes sur le sujet.

Conclusion

L'analyse prospective apparaît depuis une quinzaine d'année comme un nouvel outil au service de la gouvernance, avec l'intérêt d'une sorte de « modélisation » des choix stratégiques et d'estimation de leurs conséquences.

Par l'usage de méthodes éprouvées et transparentes, ce processus contribue à faciliter les débats entre porteurs d'enjeux, à la sélection collective de mesures sans regret et enfin à l'appropriation par toutes les parties des actions nécessaires à mener à l'échelle de cette mer régionale.

Cette approche a montré particulièrement son utilité en matière de ressources aquatiques vivantes tant les écosystèmes qui les génèrent sont fragiles et menacés. La prospective n'est pas une baguette magique mais elle apporte un éclairage le plus souvent négligé : celui du long terme, incertain, multiple mais souvent révélateur. Elle contribue ainsi à mettre chacun des acteurs devant ses responsabilités, amène l'Etat à jouer pleinement son rôle au cœur de la prise de décision et ouvre des perspectives de réflexion et d'actions communes à tous les acteurs locaux et internationaux.

Bibliographie / Plus d'informations

- Benoit G., A. Comeau (2006), *Méditerranée : les perspectives du Plan Bleu sur l'environnement et le développement*.
- Bonneuil C., J. B. Fressoz (2013), *L'évènement Anthropocène : la terre, l'histoire et nous*. Le Seuil.
- Callon M., Lascoume P. et Barthe Y. (2001), *Agir dans un monde incertain*, Le Seuil.
- Cornish E. (2004), *Futuring: the exploration of the future*. Bethesda; World Future Society.
- FAO (2012), *La situation mondiale des pêches et de l'aquaculture*.
- Gaudin T. (2005), *La prospective*. PUF.
- Godet M., P. Durance P. (2008), *La prospective stratégique : pour les entreprises et les territoires*. Dunod.
- Marine Board, 2013: Navigating the future IV; EU / DG RTD. 170 p.
- Mermet L. (sous la dir.) (2005), *Etudier les écologies futures*, PIE Peter Lang Edit.
- Passet R. (1979), *L'Economique et le Vivant*. Payot.
- Plan Bleu (2008), *Changement climatique et énergie en Méditerranée*. BEI/EuroMed.
- Rossetti di Valdalbero D. (Coord.), 2011: Global Europe 2050. Etude prospective DG Recherche / SSH / Prospective.
- Schwartz P. (2007), *The art of long view: planning for the future in an uncertain world*. Ed. John Wiley & sons. Chichester.
- Sénat (2012), *Rapport d'information sur la Maritimisation*. N° 674. Groupe de travail et commission ad hoc. Animation: Lorgeoux J. et A. Trillard A.
- UNWTO (2011), *Tourism towards 2030*, Global overview.

Training Programme on Fisheries and Aquaculture at the Mediterranean Agronomic Institute of Zaragoza (CIHEAM Zaragoza) in the last decades

Bernardo Basurco
Administrator, Fisheries and Aquaculture Issues
CIHEAM-Zaragoza

Ignacio Romagosa
Director
CIHEAM-Zaragoza

Introduction

This article presents a review of the training programme developed by CIHEAM-Zaragoza in the field of Fisheries and Aquaculture, which dates back almost three decades, when in September 1985 the Institute organized a three week course on Pisciculture. Since then, the Institute has organized 75 short advanced courses for professionals and has successfully implemented two Master programmes on this area of work.

In agreement with the CIHEAM mission pursuing to provide supplementary education through international cooperation, most activities have been developed in close collaboration with internationally recognized experts and institutions specialized in the field of fisheries and aquaculture. Worthy of mention is the agreement reached between the FAO and the CIHEAM at the end of the FAO/UNDP Medrap II (Mediterranean Regional Aquaculture) Project conferring CIHEAM-Zaragoza the coordination of the TECAM (Technology of Aquaculture in the Mediterranean) and SELAM (Socio-economic and Legal Aspects of Aquaculture in the Mediterranean) networks from 1995 onwards. In this framework a significant number of courses, workshops and other technical meetings were organized on both technical and socioeconomic aquaculture issues.

Both networks identified advanced training as a critical action to be undertaken more intensely by the CIHEAM-Zaragoza, and therefore in 1997, the Master programme on Aquaculture started. At the same time and in collaboration with different institutions, such us the FAO CopeMed I and II Projects and Spanish Ministry of Agriculture, Food and Environment, the Institute also focused on fisheries management aspects. Finally, in 2003 the area of fisheries and aquaculture was consolidated, the only area devoted to this discipline within CIHEAM.

In this short article it is not possible to describe in detail all the different topics that have been addressed over these last decades; therefore we are providing a short review of the training activities implemented and their impact.

Advanced courses for professionals

These courses last one or two weeks and are aimed at graduates with professional experience in the specific subject matter of the course. The course contents are fundamentally applied and address socioeconomic or management issues, scientific and technical aspects or particular methodologies in detail. They provide a high-level updating of knowledge, which is complemented by the opportunity to exchange experiences, within an international framework, with the lecturing guest experts and with the other professionals participating in the course. The topics are selected according to their current relevance and interest and, if considered appropriate, successive editions of the same course are organized in different years.

The 75 courses organized on Fisheries and Aquaculture are grouped in the following four thematic areas:

- Sustainable management of Mediterranean fishery resources (25 courses)
- Marketing and increasing the value of Mediterranean fishery and aquaculture products (18 courses)
- Improvement of the efficiency of aquaculture production systems (26 courses)
- Fish health management in aquaculture (6 courses)

Frequently, the courses are organized in collaboration with international and national institutions of Mediterranean scope and with scientific and professional organizations. Of all the collaborations, the most outstanding is the one developed with FAO. Nearly 50% of the advanced courses have counted on the collaboration of different divisions and units of the FAO Fisheries and Aquaculture Department, through the General Fisheries Commission for the Mediterranean (GFCM), or the Medrap II and CopeMed projects. Many other courses have been organized with the support of different international and national institutions, such us the European Commission, Spanish Ministry of Agriculture, Food and Environment, the Spanish Institute of Oceanography (IEO), the French Research Institute for Exploitation of the Sea (IFREMER), the Spanish National Research Council (CSIC), etc.

An average of four courses per academic year have been organized in the last decade. Over 1000 participants from more than 60 different countries have benefited from this training programme. The programme was not designed as a life-long-learning activity, however this is achieved to a certain extent, as more than 10% of trainees have participated in up to four different courses. In the near future there may be a need to assess this demand. As for the guest lecturers 425 (26 countries) from international institutions and research centres, universities, government departments, private companies, NGOs and professional associations in different countries have contributed to this programme at an average of 12 guest lecturers per course.

Distribution of participants in CIHEAM Zaragoza advanced short courses in the last 10 years

Origin	Countries	Participants	
CIHEAM Countries	13	873	*83.5%*
Other Mediterranean Countries	6	28	*2.7%*
Other EU Member Countries	9	30	*2.9%*
Other Countries	38	114	*10.9%*
Total	**66**	**1045**	

Master of Science Programmes

CIHEAM Master Programmes, have a duration of two academic years (120 ECTS), aimed at young graduates and professionals who wish to specialize and update their knowledge. The two Master programmes on Fisheries and Aquaculture, as any other Master organized by CIHEAM Zaragoza are recognized as fully equivalent to the official Master degree of the Spanish university system by the State of Spain. The Masters are structured in two parts. The first part (60 ECTS) consists of lectures, practical work, individual and group work and technical visits. In the second part (60 ECTS), individual work is carried out as an initiation to research or to professional activity for 10 months on a given topic within the speciality.

Sustainable Fisheries Management Master Programme

The objective of the Master is to provide high level specialization in issues related to the economics and management of the fishing activity through an analysis of the fishing system, exploitation mechanisms, marketing and management, with special emphasis on the perspective of evaluation of resources and on the economic interpretation of fishing issues in the Mediterranean, an area which, due to its diversity of species and fleets and fragmented vessel ownership, requires management based on control of the fishing effort. It offers a multi-disciplinary vision of sustainable fisheries management from the perspective of different sciences such as biology, economics, law and sociology. The Master is jointly organized by the University of Alicante (UA), the Spanish Ministry of Agriculture, Food and Environment (MAGRAMA), through the General Secretariat of Fisheries (SGP), and the CIHEAM through the Mediterranean Agronomic Institute of Zaragoza. It is highlighted that the Master was initially coorganized with the University of Barcelona, and also counted on the collaboration with the former FAO Project CopMed II. Since 2004 when the programme started, five editions have been organized, with an average of 16 participants per edition; that is a total of 78 participants (72% from CIHEAM member countries) from 21 countries.

Marine Aquaculture Master Programme

Aquaculture is the food production sector that has most grown over the past decades and is currently a consolidated activity able to supply the growing demand for fish products, unlike the fishing sector, whose catches have stagnated since 80s. This development has led to a constant demand for specialized professionals in the various fields of this activity, which the International Master in Aquaculture has been providing since 1997. The Master is an intense specialization course that addresses the principles of Aquaculture, the cultivation techniques of the most representative species and the different areas of study that support this activity: Nutrition, Pathology, Genetics, Reproduction, Engineering, Economics and the Environment.

The Master programme is jointly organized by the University of Las Palmas de Gran Canaria (ULPGC), the Canary Institute of Marine Science (ICCM) of the Government of the Canary Islands, and the CIHEAM through the Mediterranean Agronomic Institute of Zaragoza. Since the beginning of the programme in 1997, eight editions have been organized, with an average of 19 participants in each edition and a total of 151 participants coming from 21 countries.

Distribution of participants in CIHEAM Zaragoza Master Programmes

ORIGIN	Aquaculture (8 editions)		Fisheries (5 editions)		Total		
	Countries	Students	Countries	Students	Countries	Students	
CIHEAM	10	131	7	56	10	187	*81.7%*
Other Med.	1	1	0	0	1	1	*0.4%*
Other EU	2	2	1	1	2	3	*1.3%*
Other Countries	8	17	13	21	16	38	*16.6%*
Total	**21**	**151**	**21**	**78**	**29**	**229**	

News from CIHEAM Bari

High-Level Events in the Institute

On the 17 and 18 of October 2014, two prominent events took place at CIHEAM-Bari in the framework of the semester of the Italian Presidency of the Council of the European Union 2014.

The first one with the representatives of 27 EU countries in the European fund for Development, who discussed their future actions and perspectives. This meeting was concluded by a plenary session with the Italian private sector to explore new opportunities for actions.

The second as the World Food Day 2014 and entitled "*From Seed to Food: Cooperation, Sustainable agriculture and Food security*". This international conference, organized in partnership with the Directorate General for Development Cooperation (DGDC) of the Italian Ministry for Foreign Affairs and International Cooperation, Alleanza delle Cooperative Italiane and CIHEAM-Bari, is one of the five events planned in the framework of the semester of the Italian Presidency of the Council of the European Union to celebrate the World Food Day. The purpose is to improve collaboration initiatives among those stakeholders willing to take the challenge of achieving food security: research centres, NGOs, companies, donors, cooperatives, civil society, and governments of partner Countries. The Secretary General of CIHEAM, Cosimo Lacirignola, chaired the conference with institutional addresses by representatives of the Italian Ministry of Agriculture, Food and Forestry Policies and of the Apulia Regional Government. Moreover, a skype call made with Maurizio Martina, Minister of Agricultural, Food and Forestry Policies, Paolo De Castro, member of the Committee on Agriculture and Rural Development of the EU Parliament, and Lapo Pistelli, Deputy Minister of Foreign Affairs and International Cooperation. A plenary discussion took place with interventions by Marco Pagano, President of Alleanza Cooperative Italiane Puglia, Ren Wang, Deputy General Director of the FAO Department for Agriculture and Consumers' Protection, Roberto Ridolfi, Director, Sustainable Growth and Development, DG-DevCo-EuropeAid, and Giampaolo Cantini, Director General DGDC of the Italian Ministry for Foreign Affairs and International Cooperation.

Greenhouse Gas (GHS) Modelling Seminar

Over 2014, many partner countries expressed an interest in learning more about GHG modelling, tools and methods. Therefore, a 5 days seminar was organized by ClimaSouth (Agriconsulting Consortium) and ClimaEast (HTSPE Consortium) at CIHEAM-Bari from 10 to 14 November 2014 .

The objectives of the training seminar were:

- Introducing to use the GHG modelling Long-range Energy Alternatives Planning System (LEAP) software for GHG mitigation assessment;
- Facilitating exchange & learning among ClimaSouth and ClimaEast countries
- Identifying and organising follow-up action to assist countries with GHG modelling

The first step towards progress on this topic is a learning phase on how to assess current and likely future GHG emissions including the emissions reductions and costs resulting from proposed mitigation policies and measures. Creating assessments that are sufficiently credible to be accepted by both national decision makers and the international community is no easy task.

Countries need to build/enhance their capacities the use of the types of standard modeling tools required to make these assessments. The most commonly used tool in the energy sector is the Long-range Energy Alternatives Planning (LEAP) system, developed by SEI, which has been widely adopted by many countries as a standard framework GHG mitigation assessments under the UNFCCC's National Communications process. LEAP is particularly notable for its ease-of-use, its low initial data requirements and its flexibility, making it well suited to countries where data is relatively scarce. Based on the conclusions and recommendations, ClimaSouth and ClimaEast in partnership with SEI are organizing a five-day event for national representatives from climate change units and energy ministry/ agency staff, to familarise with and better understand modeling tools. In this regional seminar, participants will become accustomed with the use of the LEAP tool for GHG mitigation assessment and scenario analysis.

Country beneficiaries and methodology

- Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, and Tunisia, but also Armenia, Belarus, Moldova, Ukraine, Georgia, and Azerbaijan.
- 1 day policy briefing/dialogue with European speakers and partners (EU Presidency representative, DG CLIMA and the presentation of 2 examples of national GHG modelling, Belgium and Tunisia);
- 4 day hands on training on GHG modelling (LEAP software) for 2 representatives from those 15 countries, with the technical support of the Stockholm Environment Institute (SEI).

News from CIHEAM Chania

Exchange of experience and transfer of know-how: Conservation of coastal dunes with *Juniperus* spp. in Europe.

The coordination team of the LIFE+ JUNICOAST project "Actions for the conservation of coastal dunes with *Juniperus* spp. in Crete and the South Aegean" from CIHEAM-Chania participated in the final event of the PROVIDUNE project, a similar LIFE+ project for the conservation of coastal *Juniperus* dunes in Italy, held in Cagliari-Sardinia on 23-24 October 2014, to discuss actions and activities implemented by PROVIDUNE, exchange know-how and experiences and raise public awareness of the values and functions of this priority habitat.

The JUNICOAST project was implemented by CIHEAM-Chania (coordinating beneficiary), the National and Kapodistrian University of Athens, and the Regional Development Fund of Crete - Forest Directorates of Chania and Lasithi (associated beneficiaries), with the primary aim to promote long-term conservation of coastal *Juniperus* dunes, targeting Natura 2000 sites in Crete (Gavdos, Kedrodasos, Falassarna, Chrysi Island) and the South Aegean (Milos, Polyaigos-Kimolos, Naxos, Rhodes islands). The PROVIDUNE project is implemented by the Province of Cagliari (coordinating Beneficiary), Province of Caserta and Matera, University of Cagliari (Earth Sciences and Botany Departments) and the TECLA Association (associated beneficiaries), targeting 5 Sites of Community Importance.

The projects started simultaneously in January 2009, funded by LIFE+, the EU financial instrument for the environment. Meetings were held to share methodologies, know-how, best practices and experiences. Coastal *Juniperus* dunes in Greece and Italy face similar natural anthropogenic pressures and are threatened mainly by urban development, unsustainable recreational activities, restricted natural regeneration, erosion, grazing, habitat fragmentation, and lack of public awareness. Rapid and uncontrolled tourism growth, combined with lack of environmental education and public awareness, is considered the most serious threat to this priority habitat.

The final PROVIDUNE event included presentations of project activities, conservation/management and communication activities to be implemented after the end of the project and examples from similar European projects. A field visit in southern Sardinia was conducted in order to examine on-site conservation and management measures in an area with very strong tourism activity. Despite the conservation and management measures implemented at national and European levels, the conservation status of this habitat is unsatisfactory. Participants highlighted the vital need for better coordination and more efforts to mitigate the adverse natural anthropogenic pressures.

Effective protection of touristic coastal dune areas is achieved only when proper management is adopted and largely depends on visitors' behavior. Therefore, impact control measures such as public awareness and environmental education are of prime importance to help minimize on-site effects.

Samaria National Park

The CIHEAM-Chania study "Tourism at Samaria National Park, effects on the local economy" was conducted in collaboration with the Management Body of Samaria National Park (SNP) and the Chania Forestry Service, and presented by MSc student George Fakotakis at the 2nd meeting for innovative action "A snorkel on the mountain", organized on Saturday 18 October 2014 at Hora Sfakion. During 2013, SNP had 136,645 visitors, mainly of a young age and high education level. The main aspects that influenced visitors to come to Chania were climate and nature. Visitors were well informed about SNP mainly from the internet, friends and relatives that had visited the area previously.

SNP benefits the economy of the whole Chania region because SNP is seen as a main attraction of the area. 40.5% of the visitors stated that they were influenced very much or critically by SNP so they would probably have gone elsewhere if SNP didn't exist. Taking into account the duration of their stay, the month they came, their average daily accommodation costs, and average daily spending, direct economic benefits for Chania hotels are estimated at 20,753,714.65€ with an additional 29,265,000€ for other businesses.

For the Hotels of the Agia Roumeli region (south entrance of the park) the results are not positive since most visitors depart on the same day. Local taverns and restaurants however do better since 81.1% of visitors stated their intention or probability that they would dine in the area. Therefore, direct economic benefits for Agia Roumeli hotels are estimated at 539,910€, while for taverns and restaurants, visitor spending reaches 1,329,829€. The most popular transport means to reach the park entrance is by bus with a local tourist agency, followed by the local inter-urban bus company (KTEL). Direct economic benefits for the local transport sector can be estimated at 1.576.833€ for the tourist agencies, 607,707€ for KTEL and 1.503.095€ for boat tickets from Agia Roumeli. Spending on water and snacks is estimated at 336.146€, with 1.298.127€ for trekking equipment from local Chania enterprises.

The vast majority of visitors stated that they were very satisfied from their visit to SNP and intended to suggest it to friends. Suggested actions to improve SNP include placement of a doctor in SNP, improving trekking paths, toilets and transportation. The most frequent suggestion was for the area to remain as it is, natural with minimal human intervention, which shows visitors' satisfaction regarding their experience in Samaria National Park.

News from CIHEAM Montpellier

MED-Amin

Lancé début 2014 à la demande des Ministres de l'agriculture des 13 Etats membres du CIHEAM, le réseau méditerranéen d'information sur les marchés agricoles (MED-Amin) s'est réuni à Izmir, à l'invitation de la Turquie, les 6 et 7 novembre 2014. MED-Amin vise à favoriser la coopération et le partage d'expériences entre les systèmes nationaux de suivi des marchés agricoles, en se concentrant dans un premier temps sur les céréales. Coordonné par le CIHEAM, MED-Amin travaille en relation avec le secrétariat d'AMIS (*Agricultural Market Information System*) basé à Rome, la FAO et la Commission européenne.

Lors de la seconde rencontre du réseau, les membres ont discuté des questionnaires méthodologiques et des tableaux statistiques ciblés sur le blé tendre et le blé dur qu'ils avaient remplis précédemment. Les discussions ont permis d'identifier des points de convergence entre processus nationaux de construction des données relatives aux blés, tant du point de vue de la production que des utilisations, des stocks et des échanges commerciaux. Il est évident que des différences méthodologiques existent entre les 13 Etats, dont les réalités céréalières sont contrastées et les moyens d'analyse statistique varient fortement. C'est précisément le but de MED-Amin que de faire progresser le dialogue multilatéral afin de pouvoir partager des outils et des connaissances adaptées aux besoins de chaque pays.

Il a été décidé pour 2015 de lancer un travail sur les bilans céréaliers en rassemblant des données historiques sur la base des années commerciales nationales, à travers de nouveaux questionnaires standardisés pour les blés, le maïs, l'orge et le riz. Des discussions seront également lancées en ligne, via un forum électronique, sur le commerce international des céréales. Des analyses seront produites, en vue de publier un document de synthèse fin 2015 afin d'assurer une première communication du réseau à destination des décideurs de ses Etats membres et des organisations partenaires du CIHEAM.

Le réseau, dont la Turquie assure désormais la présidence, tiendra sa troisième rencontre en 2015 à Milan, sous la présidence et à l'invitation de l'Italie, à l'occasion de l'Exposition universelle de Milan « Nourrir la planète. Une énergie pour la vie ».

Plus d'informations: tonnu@iamm.fr

A2DTRM – Territoires ruraux en Méditerranée

Du 9 au 11 décembre l'Institut de Montpellier accueille un séminaire international consacré aux territoires ruraux en Méditerranée sur le thème : « Quelles politiques publiques pour accompagner les politiques de développement ? ».

Ce séminaire s'inscrit dans le cadre du projet A2TRM (appui aux dynamiques de développement des territoires ruraux en Méditerranée), qui aborde les territoires ruraux sous l'angle premier de l'innovation, dans un contexte de grands changements (mondialisation, changements climatiques, urbanisation, migrations, etc.). Ce projet est financé par l'Agence Française de Développement (AFD) et mis en œuvre par le CIHEAM-Montpellier. Le séminaire concerne principalement les pays cibles de ce projet (Tunisie, Maroc, Egypte) et donc la rive Sud de la Méditerranée. Ce séminaire est organisé en collaboration avec l'IRAM (Institut de Recherches et d'Applications des Méthodes de développement), un bureau d'étude international travaillant dans le domaine de la coopération depuis 1957).

Une trentaine de spécialistes provenant de la recherche, des instituts techniques, des collectivités territoriales, des associations professionnelles ou encore des agences de coopération bilatérales échangeront sur les quatre thèmes organisant ces journées de rencontre :

- La conception et la mise en œuvre et évaluation des politiques publiques pour le développement des territoires ruraux méditerranéens ;
- Les leviers de développement des territoires ruraux méditerranéens : filières de production, marché et emploi ;
- La sécurisation de l'accès aux ressources naturelles et la responsabilisation des ruraux dans la gestion durable des territoires ;
- L'appui aux agriculteurs et l'animation des territoires : quels nouveaux besoins de compétences et de services ?

La dernière journée de ce séminaire international comprendra, d'une part la restitution de ces quatre sessions de travail et, d'autre part, une table ronde consacrée au thème : « Développement rural et formes de gouvernance territoriale : quels conflits et quelles articulations ? ».

Plus d'informations: pellissier@iamm.fr

News from CIHEAM Zaragoza

Master of Science on animal nutrition evaluation

The Master of Science on Animal Nutrition of the CIHEAM Zaragoza and the University of Zaragoza has recently passed the evaluation for renovating its accreditation as official Master of the Spanish Higher Education System.

The accreditation has to be assessed every 5 years and the procedure is carried out by the competent authorities for Quality Assessment and Accreditation of Spain. The evaluation, which also involved external experts, has been based on 7 quality criteria and analysed the strengths and weaknesses of the programme and proposed some recommendations.

The CIHEAM Zaragoza Master of Science on Animal Nutrition has passed with the mention "exceptional" each one of the evaluation criteria, and has stood out for its international character (students and lecturers), for the wide list of prestigious lecturers, and for the appropriate adaptation of the learning outcomes to the needs of the professional environment to which students are targeted.

Detailed information at:
http://masters.iamz.ciheam.org/en/animalnutrition

Next events – Courses

The CIHEAM Zaragoza offers a wide range of training activities related to fisheries and aquaculture. The Institute started to work in these areas in the nineties, and nowadays its training programme includes two Master of Science programmes ("Sustainable Fisheries Management" and "Aquaculture") as well as several advanced short courses organised every year on diverse topics of current relevance and interest.

The first year of the MSc Science on Aquaculture is now taking place in Las Palmas de Gran Canaria (Spain), while the students of Sustainable Fisheries Management are on their second year developing the MSc thesis at different research centres and universities. As for the short advanced courses on fisheries and aquaculture, the current offer of CIHEAM Zaragoza is the following:

- Application of Epidemiology in Aquatic Animal Health. (Zaragoza, Spain, 15-19 Dec. 14)
- Applied Seafood Marketing Data: Understanding Statistics and Forecasting Market Trends. (Zaragoza, Spain, 23-27 Feb. 15. Co-organised with FAO).
- Advances in Flatfish Production. (Zaragoza, Spain, 11-15 May 15)

Detailed information on the MSc programmes and advanced short courses of the CIHEAM Zaragoza can be found in the Training section of the Institute website (iamz.ciheam.org)

Next events – Networking

CIHEAM Zaragoza promotes and supports several networks with the objective of exchanging research methodologies and results in areas of interest for Mediterranean agriculture and rural environments. During the spring of 2015, two of these networks will organise international meetings that will gather together scientists and specialists from the Mediterranean countries and other parts of the world for scientific debate and exchange.

The XVI GREMPA Meeting will be held in Meknès (Morocco) from 12 to 14 May 2015, organised by the École Nationale d'Agriculture de Meknès (ENA) and the CIHEAM Zaragoza. GREMPA (Mediterranean Research Group for Almond and Pistachio) has been carrying out activities for the last 40 years and lead to the creation of the FAO-CIHEAM Network on Nuts. The objective of the XVI GREMPA Meeting is to debate the challenges and the latest advances in research on almond and pistachio, two species of importance in the Mediterranean agricultural systems. The Meeting is open to researchers, technical experts and industry, and will take the format of a colloquium to favour the active intervention of participants in the discussions.

Registration is open at:
http://www.iamz.ciheam.org/grempa2015

The FAO-CIHEAM Network on Sheep and Goats will hold a Seminar in Montpellier (France) on 16-18 June 2015 around the topic "*The value chain in Mediterranean sheep and goats. Industry organisation, marketing strategies, feeding and production systems*". The FAO-CIHEAM Network for Research and Development in Sheep and Goats was created in the nineties after an agreement by FAO and CIHEAM to study and improve the sheep and goat production systems in the Mediterranean region; the network has two subnetworks, the Nutrition Subnetwork and the Production Systems Subnetwork, which generally carry out their activities independently, but this time will meet together to exchange experiences and make proposals from science on the transversal topic of the value chain. The Seminar is co-organised by INRA France, FAO and the CIHEAM Zaragoza and the CIHEAM Montpellier.

Registration is open at:
http://www.iamz.ciheam.org/montpellier2015

CIHEAM
International Centre for Advanced Mediterranean Agronomic Studies

Watch Letters published

2007

1. Water Resources and Agriculture
2. Identity and Quality of Mediterranean Products
3. Zoonoses and Emerging Diseases

2008

4. Aquaculture Sector
5. Sociopolitical Impacts of the Rising Food Prices
6. Forest Fires
7. Organic Farming

2009

8. Agro-Business
9. Drought Management and Desertification
10. Agricultural Policies Outlook
11. Agriculture and Fisheries in the Islands

2010

12. Climate Change and Agriculture
13. Food, Nutrition and Health
14. Women in Agriculture
15. Agricultural Trade and Liberalization

2011

16. Olive Growing
17. Financing Agricultural and Rural Development
18. Urban Agriculture
19. Labelling Mediterranean Products

2012

20. Agri-Food Chain and Logistics
21. Enhancing Research
22. Education and Training
23. Cereals Trade and Markets

2013

24. Rural Development
25. Mediterranean Forests
26. Farmer's Trade Union
27. EU CAP Reform and the Mediterranean

2014

28. Land Issues in the Mediterranean
29. Corporate Social Responsibility
30. Food Waste and losses
31. Fisheries and Sea products

Next Issues

2015

32. Innovative Initiatives and Indicators for Food Security
33. Emerging Diseases and New Invasive species
34. The Mediterranean and the Agenda post-2015

Access to the Watch Letter

All the issues are available on **www.ciheam.org**

- English and French Version from n°01 to n°20
- Arabic Version since n°12
- Bilingual Version (English/French) since n°21

Communication Policy

The Watch Letter is dispatched electronically to more than **20,000 recipients** in the Euro-Mediterranean World (decision makers, ministers, journalists, researchers, students, documentation and research centres, universities, etc.).

Constant efforts are made to ensure a wide variety of contributor profiles in both geographic and professional terms. In the 31 issues published so far, we have published **216 articles** involving **346 authors.**

Contributing to the Watch Letter

We invite persons who have relevant expertise in Agriculture, Food and Rural Development Areas (teachers, researchers, students, decision makers, etc.) and wish to contribute to the Watch Letter to contact us at the following email: abis@ciheam.org

ciheam.org