



FORCE

Fisheries and aquaculture-Oriented Research Capacity in Egypt

*Seventh Framework Programme
Coordination and support action*

FORCE Final Publishable Summary

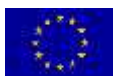
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Table of Contents

4.1. Final publishable summary report	2
4.1.1 Executive summary	2
4.1.2 A summary description of project context and objectives.....	4
4.1.3 A description of the main S&T results/foreground.....	9
4.1.4 The potential impact and the main dissemination activities and exploitation of result...29	



List of acronyms

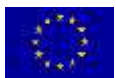
- **AB:** Advisory Board
- **AQUAMED:** The future of research on aquaculture in the Mediterranean region
- **CNR-ISMAR:** Consiglio Nazionale Delle Ricerche
- **EEAA:** Egyptian Environmental Affairs Agency
- **EIA:** Environmental Impact Assessment
- **ENSTINET:** Egyptian National Science & Technology Information Network, Academy
Of Scientific Research and Technology, Egypt
- **GAFRD:** General Authority for Fish Resources Development
- **GITTC:** Grants, Innovation & Technology, Transfer Center, Alexandria University, Egypt
- **PEGASO:** People for Ecosystem based Governance in Assessing Sustainable development of Ocean and coast
- **ShERACA :** FP7 project "Shaping Egypt's association to the European Research Area and Cooperation Action"
- **MEDINA:** Marine Ecosystem Dynamics and Indicators for North Africa
- **MEDSPRING:** Mediterranean Science, Policy, Research and Innovation Gateway
- **MIRA:** Mediterranean Innovation and Research Coordination Action
- **MOU:** Memorandum of Understanding
- **M:** Month
- **NIOF:** National Institute of Oceanography and Fisheries
- **UNIVE:** Università Ca' Foscari Venezia
- **TOR:** Terms of Reference
- **TOT:** Training of Trainers

List of figures

- **Figure 1:** Methodology deployed in achieving the objectives
- **Figure 2:** the overall structure and interdependencies of the FORCE project,
- **Figure 3:** FORCE logical framework
- **Figure 4:** Methodology of R&D Layer
- **Figure 5:** BREAMOD validation in Porto Ercole. Black dots indicate the measured data;
- **Figure 6:** field visit to real “sea bass and sea bream” fish Farm
- **Figure 7:** Escape of fish from the trawl net (in green). Fish caught (in red)
- **Figure 8:** SELNET software interface.- trainer and trainees
- **Figure 9:** New engine room layout.
- **Figure 10:** Spatial distribution of the ammonia background concentration due to the presence of the farm, at the end of the simulation (July 1st, 2013).
- **Figure 11:** Spatial distribution of the Organic Carbon in surface sediment due to the presence of the farm
- **Figure 12 :** Contour plot of the Mean Daily Carbon Flux computed by the deposition model for the three-cage virtual farm
- **Figure 13:** Schematic of a square mesh window mounted on the extension piece
- **Figure 14:** On Board “FORCE participants during the measurement of the codend mesh opening with the electronic gauge and sorting of fish”.
- **Figure 15:** Photos for Master students in the TOT event
- **Figure 16:** workshop on Increasing the linkage with economic and social environment (Form B amendment)
- **Figure 17:** Summary of the WP4, Task 4.2 and Task 4.3
- **Figure 18:** Aquaponic Basic Diagram – part of Learning by doing for NIOF researchers
- **Figure 19:** Simple home Model of Aquaponics assembled for learning u doing for school students
- **Figure 20 :** Part of training seminar “Enhance the capacity and research valorization to support R&D institutions in EGYPT”
- **Figure 21:** Part of training seminar “How to internationalize your research”
- **Figure 22:** Drawing showing the relative percent of each category of FORCE trainees
- **Figure 23:** Part of discussion between, FORCE coordinator, EEAA, GAFRD And Aquaculture Investors



- **Figure 24:** Learning-by-doing. Participants were split in working groups in order
- To directly apply what they were learning
- **Figure 25:** Article on FORCE in IL PESCE Italian magazine
- **Figure 26:** Aquaculture and Fisheries cover books
- **Figure 27:** Summary of dissemination activities
- **Figure 28:** FORCE final conference selected photos
- **Figure 29:** PEGASO project event by collaboration with FORCE and MEDINA project



4.1. Final publishable summary report

4.1.1. Executive summary

Egypt faces the same internationalization challenges that influence the international level. In order to be able to give a successful response to these, Egyptian researchers need to enhance their own capabilities for development. Research institutions and Universities have a particular responsibility in contributing to the international knowledge capital and to put it at the disposal of users. Relating to this, the transfer of innovation technology and expertise from EU to Egyptian researchers and post graduate students must be urgently developed. FORCE is focused on the driving objective of FP7-ERA-WIDE, and thus works towards a road map for strengthening the research capacity and improving the competitiveness of Egyptian institutions. This was carried out through initiating collaborations with EU institutions and Egyptian institutions so as to transfer new knowledge to the research community and to the wider society. The essential goals of FORCE include reinforce the management skills of researchers and young scientists at Egyptian Institutions in order to increase their competitiveness to make them able to support the work of the researchers, valorize their results and hence reinforce the research Centre's competitiveness in a sustainable way. This goal has been achieved through training and transfer of innovation technology and expertise based on the requirements of an ecosystem-approach to fisheries and aquaculture management, which need to outsource research, increase the researchers' efforts, extend their networks, better exploit research results and acquire technological know how, in order to describe new strategies that enhance fish production, reduce overfishing and mitigate adverse environmental impacts.

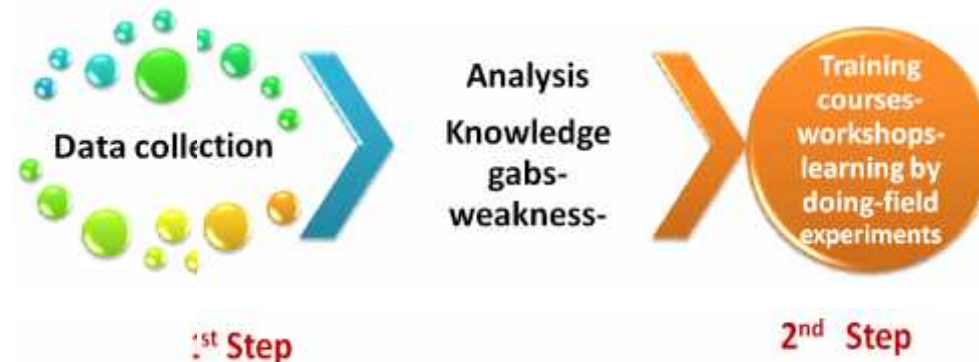


Figure-1: Methodology deployed in achieving the objectives



The first step of the project was to draw a complete picture of the current status of fisheries and aquaculture in Egypt in order to identify suitable areas for the design and implementation of the capacity building activities. To do that, a review was carried out to provide a set of “real world” input data focusing on the definitions of the technical measures affecting sustainable development of aquaculture and fisheries, in order to evidence eventual problems and to suggest innovative technology and tools to be inserted in the regulation and/or Legislation and to identify suitable areas for capacity building activities. This part is followed by description of related national and international governance structures and an assessment of science based knowledge of local stakeholder and their uncertainties and needs for communication with scientists. **Second step** was to put into practice the plans for transfer of state-of-the-art of science and technology from EU expertise to Egyptian researchers.

FORCE has progressed significantly in the transfer of state-of-the-art in science and technology in Egypt in a number of ways, namely by:- Applying modelling tools for site selection and Environmental Impact Assessment (EIA) of fish farms; - Improving methods for measuring and improving gear selectivity, - Improving methods for measuring and reducing vessel fuel consumption, - Assessing trawl gear performance, fishing effort and gear parameters, - improving women's capacities to contribute effectively to a real development in the socio-economic conditions of the community, - Increasing the capacity of Egyptian research institutes by providing training in policy drivers and EU funding programmes, competitive applications, good practice in dissemination, communication and knowledge transfer as well as development of sustainable funding procurement strategies. Moreover, 5 years research valorisation strategy plan for NIOF that supports its mission beyond FORCE has been formulated.

Stakeholders and fish producers are contributed effectively in all capacity building activities even in the learning by doing activities to improve the relationships and understanding between RTD providers and the commercial sector in order to achieve buy-in to the stakeholders. The involvement of stakeholders and policy makers in the whole project period secured reaching a real common understanding among researchers and stakeholders and provides an efficient feedback from the external community including those that are not in the first circle of awareness.

One of the main lessons to be learned from the FORCE training events is that success in creating innovations is a key factor for the success of both researchers and societies. One precondition for this is high-level R&D know-how transfer .



4.1.2 A summary description of project context and objectives

The sustainable development of Mediterranean aquatic resources sector is an important issue for all the bordering countries. This sector is confronted to recurrent crisis due to inadequate production systems and competitiveness, interaction and space competition with other users and the need for a proper integration in the coastal zones, possible negative impact on the environment and negative image of the product quality, in spite of initiatives from national and international bodies, such as FAO, GFCM, EC, GAFRD, etc..In Egypt the farm and wild fish play an important role in the food security and provide fulltime employment to over 200,000 people. Egypt and the whole Mediterranean domain face a huge challenge in aquatic resources development in the coming decades. Effective management of fisheries and aquaculture has proven instrumental in enabling countries to jump to higher stages of development and fostering economic and social transformation. The challenge now is to sustain this sector not only for food security but also for environmental stewardship and to access the international market and create jobs, so that can help in economic crisis.

The FP7 FORCE "Fishing and aquaculture-Oriented Research Capacity in Egypt" set out to address particular issues supporting the implementation of sound and science -based policies for the sustainable development of fishery and aquaculture in Egypt and the whole Mediterranean countries. It is a 30 month EU FP7- International Cooperation (INCO) funded project running from 2011 to 2014 and brings together 4 partners comprising of research and development centres and a small and medium enterprise. The aim of FORCE is to enhance the capacity of the Egyptian National Institute of Oceanography and Fisheries, NIOF, to carry out research activities aimed at supporting the implementation of sound and science -based policies for the sustainable development of fishery and aquaculture in Egypt, as well as in the whole Mediterranean North African region.

1.1 The overall FORCE scientific objectives are;

- To identify potential for more efficient cooperation between Egypt and EU research through training and exchange of expertise, such as in an ecosystem-approach to fisheries and aquaculture management, in order to strengthen capacity for more sustainable development of fisheries and aquaculture.
- To support NIOF in developing a "tool-box" for environmental impact assessment of aquaculture activities
- To disseminate the best practices and to raise awareness among scientists, fishery inspectors and policy makers in support of reaching competent sustainable management of fisheries
- To promote the principles and objectives outlined in Horizon 2020 frameworks and EU Marine Strategies



- To enhance the participation of Egypt in EU funded research programmes by providing NIOF the opportunity to coordinate an FP7 project

The FORCE objectives accomplished through the synergetic work plan of capacity building and dissemination activities. The work plan is divided into 5 work packages following the logical phases of the implementation of the project objectives. As presented in the Figure-2, **there are two work packages dedicated to increase the research capacity of NIOF in the field of fisheries and aquaculture;**

–**Work Package 2** “*Developing tools for sustainable aquaculture in Egypt*”- The central goals of WP2 are to support NIOF in testing indicators of impact of finfish cage culture in coastal areas, in order to identify the most cost-effective monitoring practices and to enhance the NIOF research capacities on sustainable aquaculture by the training of NIOF researchers in using and developing simulation models. This knowledge transfer from EU experts to NIOF will reinforce the research capacities of this institution in the field of aquaculture, facilitating its participation as partner in EU research projects.

–**Work Package 3** “*Sustainable fishing technologies transfer*”- The primary objectives of this Work Package are to promote the coordination and stimulate synergies between Egypt and EU countries aiming at strengthen capacity for developing the sustainable management of fisheries through training and exchange of expertise and to transfer the expertise on the fishing technology based on the requirements of an ecosystem-approach to fisheries management, in order to describe new fishing methods and strategies that mitigate adverse environmental impacts.

There is one work package (WP4) specifically dedicated to for research internationalization and valorization in relevant sectors (e.g. Fisheries, aquaculture, marine environment,..) accounting for the social, economic, environmental and institutional sustainability. Furthermore, the enhancement of women capacities in the decision-making process in aquaculture and fisheries communities and promote their participation in European research projects;

WP4 “*Enhance the capacity building for a comprehensive strategy*” specifically dedicated for research internationalization and valorization in relevant sectors (e.g. Fisheries, aquaculture, marine environment,..) accounting for the social, economic, environmental and institutional sustainability. Furthermore, the enhancement of women capacities in the decision-making process in aquaculture and fisheries communities and promote their participation in European research projects will be educated. The objectives of WP4 are:-to build principles for institutional capacity and research valorization to support R&D institutions in Egypt; - to reinforce the research, development and innovation management capacities of NIOF and other Egyptian research at a national level in order to increase their competitiveness;- to make the research institutions focus on the formulation of a medium-term strategy for research internationalization and valorization in relevant sectors (e.g. fisheries, aquaculture, marine environment, water management...) accounting for the social, economic, environmental and institutional sustainability;- to





encourage scientific females and post graduate students to participate in the EU funding programmes and to improve their capability for writing competitive research proposals.

Two work packages which are cross cutting:

Work Package 1” Project Management” - The main objective of this Work Package is to ensure an efficient and integrated management of the consortium. This Work Package will be lead by NIOF, allowing this institution to learn by doing how the administrative part of a European project has to be carried out (i.e. documentation to provide to the EC, financial management, deliverables, etc) and how a coordinator has to interact with the consortium to achieve a successful project.

Work Package 5“Dissemination, communication, outreach and networking” - The main objective of this Work Package is to ensure effective external dissemination, communication and optimal outreach of the project and its results and to strengthen the NIOF network in the aquaculture and fisheries sectors with relevant European research centres in the area.

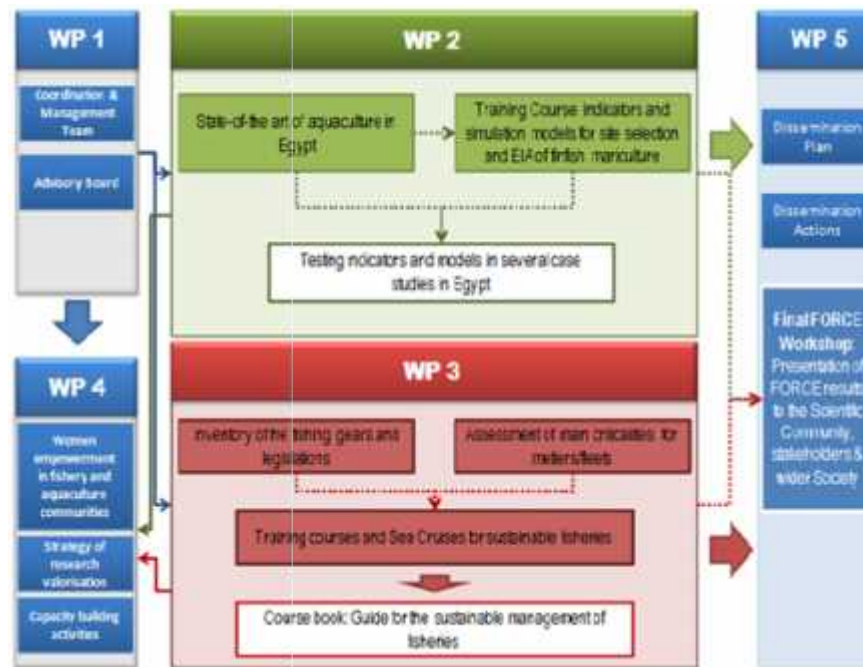


Figure 2: the overall structure and interdependencies of the FORCE project,



To achieve these objectives, FORCE operates across three interactive layers **(Figure 3):**

- I. **Research technologies transfer layer**, which includes WP2 and WP3 and aimed to increase research capacity of NIOF in the field of fisheries and aquaculture. To achieve this, an analysis of the current situation, in particular gaps and needs, and collection of data, are planned to identify the most cost - effective capacity building methods for the improvement of NIOF's research capacities on sustainable fisheries and aquaculture such training seminars, workshops and learning by doing.
- II. **Research valorisation and internationalisation layer**, which is represented by WP4 and focuses on research internationalisation and valorisation in relevant sectors and enhancement of young researchers and women's capacities. In this context, training chain has been provided to Egyptian researchers to improve their potential with the aims of:
 - Understanding policy drivers and EU funding programmes,
 - Improving networking skills and understanding the basic outline of competitive applications,
 - Developing a funding procurement strategy for their business and understanding of good practice in dissemination, communication and knowledge transfer,
 - Improving the socio-economic conditions of the community, increasing job opportunities, well - being and promoting gender equality.
- III. **Spreading excellence and disseminating knowledge layer**, which includes WP1 and WP5 and aiming to ensure efficient and integrated management of the consortium, to strengthen the NIOF network in the aquaculture and fisheries sectors with European research centres and to guarantee effective external dissemination, communication and optimal outreach of the project and its results.



Figure 3: FORCE logical framework

FORCE support Egypt in acquiring key expertise and initiating network activities involving EU research institutes, which are actively involved in the above fields. This aim has been accomplished by integrating:

- 1) Training courses, involving NIOF personnel as well as scientists from Faculty of science, Alexandria University, technical staff working in fish farms from GAFRD and National fishers community and environment protection in charge from Egyptian Environment Affairs Agency (EEAA).
- 2) Workshops, in which NIOF personnel get in touch with experts from the EU on the topics listed above as well as on complementary issues, such as, for example, fish fry production.
- 3) Field experiments and Learning by doing, which are designed and conducted by NIOF in close collaboration with the EU partners; Stakeholders and fish producers are contributed effectively in all capacity building activates even in the learning by doing activates to improve the relationships and understanding between RTD providers and the commercial sector in order to achieve buy-in to the stakeholders. The



involvement of stakeholders and policy makers in the whole project period secured reaching a real common understanding among researchers and stakeholders and provides an efficient feedback from the external community including those that are not in the first circle of awareness.

FORCE has progressed significantly in the transfer of state-of-the-art in science and technology in Egypt in a number of ways, namely by:- Applying modeling tools for site selection and Environmental Impact Assessment (EIA) of finish farms; - Improving methods for measuring and improving gear selectivity, - Improving methods for measuring and reducing vessel fuel consumption, - Assessing trawl gear performance, fishing effort and gear parameters, - improving women's capacities to contribute effectively to a real development in the socio-economic conditions of the community, - Increasing the capacity of Egyptian research institutes by providing training in policy drivers and EU funding programmes, competitive applications, good practice in dissemination, communication and knowledge transfer as well as development of sustainable funding procurement strategies. Moreover, a 5 years research valorisation strategy plan for NIOF that supports its mission beyond FORCE has been formulated.

The FORCE outputs (as detailed in the next section) defined and recommend solutions to solve the problems related to the decrease of marine fish production in Egypt and over fishing in the Mediterranean. A set of measures should be taken by scientists, policy makers, fishermen, public and private sectors related to the fisheries sector in order to reach a better and more sustainable growth in fish production. These measures must be designed to reduce over fishing, and to decrease the fish imports, as well as to increase the export to the EU market.

The objectives of FORCE project were completed successfully within budget and on time through well designed capacity building programmes which have been revised and approved by FORCE advisory board and local stakeholders. Valuable experience was gained from the training courses, workshops and learning by doing. The research and deliverables from the FORCE project have been disseminated widely both locally, in the countries of respective FORCE partners and internationally through workshops, FP7 project meetings, conference and published papers and a showcase event. All feedback from the project has been made available to academia, stakeholders and policy makers via web portal and two text books

A specific and well designed communication and dissemination Plan for general and targeted groups developed from an early stage of the project, and reviewed at each partner meeting. A broad spectrum of dissemination tools have been used for general dissemination, and specific customised dissemination.



4.1.3 Description of the main S&T results

The international competitiveness of modern economies is linked increasingly to their ability to generate, adapt and use new knowledge. Science and technology (S&T) are considered to be key factors contributing to achieving sustainable development, prosperity and economic growth. One of the main factors which hinder the sustainable development of aquaculture and fishery in Egypt as well as the whole Mediterranean North African region is the lack of transfer of state-of-the-art S&T. It is of paramount importance to reinforce cooperation with the EU and its neighbours and to enhance the production of knowledge and scientific excellence, on the basis of mutual interest and mutual benefit.

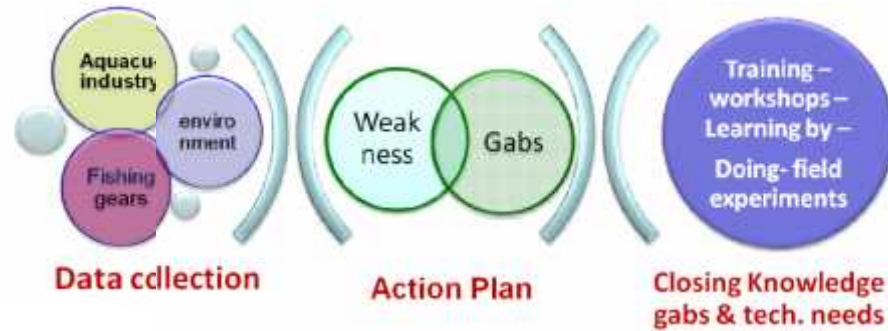
To solve this issue several countries considered the training as the key-factor for building up local knowledge and experience. In particular the Code of Conduct suggests that the States should recognise the importance of fishermen and fish farmers to understand the conservation and management of the fishery resources on which they depend, so they may promote awareness on the responsible utilisation of fisheries through education and training.

Therefore the improvement of scientific capacity of NIOF researchers will represent a crucial point for the management of marine resources in the entire Mediterranean Sea. The trainings and the exchange of expertise will enable NIOF scientists to be actively involved in future research projects together with European countries. Moreover the participants will be able to attend international working groups or meetings in order to give their contribution for the Egyptian fishery; in fact especially in the framework of Mediterranean bodies, such as the GFCM (General Fishery Commission for the Mediterranean), the contribution of each country is essential in order to establish common rules in the fisheries sector.

As stated in the previous section and in figure 2 the work plan is divided into 5 work packages generated 23 deliverables and 7 milestones. FORCE operates across three interactive layers (Figure 3), the results from these layers will be explained through two main parts;

I. First Part: Research technologies transfer results (WP2&WP3)

This part explains the results of capacity building activities dedicated to research technology transfer of NIOF in the field of fisheries and aquaculture. It has been carried out in **Three stages** (as shown in Figure 4).



Stage-1, initially dedicated to conduct a detailed survey concerning the present state of fishery and aquaculture, bringing up to date technical reports issued in the last decades. The results have been summarized in two reports (D2.1, D3.1) which provide the basis for focusing the most capacity building subsequent activities.

Figure 4: Methodology of R&D Layer

The main objective of the **first 6 months** of the project was to make an assessment of the current situation of Egyptian aquaculture and fisheries through applying a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of Egyptian aquaculture and fisheries, such approach focused on two of the main bottle-necks to further sustainable development of fishery and aquaculture in Egypt, namely:

- 1) The lack of tools for site-selection, Environmental Impact Assessment, optimization of husbandry practices and cost-effective monitoring of finfish aquaculture;
- 2) The lack of a complete body of knowledge about the fishing capacity and the applied fishing techniques for the different métiers in the different areas (coastal zone, lagoons, open sea, internal waters, etc)

The characteristics of the data necessary to implement the project were first discussed during the kick off meeting in Alexandria (November 2011). During this meeting, the measures of the necessary data were precisely described and approved by project Advisory Board. For this mission, two templates and questionnaires were prepared to be filled in by NIOF scientists, stakeholders and policy makers;

o **Concerning aquaculture** activities (*WP2; T2.1"the State-of-the art of aquaculture in Egypt"-D2.1*),

the survey aimed at collecting quantitative data concerning: farmed species and farming practices, spatial location of farms, rearing densities, husbandry practices, water quality data and data concerning the state of benthic and pelagic ecosystems in the surrounding of the farm. Such preliminary work serve two purposes: 1) identify suitable areas for the design and implementation of field experiments; 2) provide a set of "real world" input data, to be used in the training course.

Data concerning aquaculture in Egypt were collected by the NIOF team, who prepared the first draft of D2.1. The draft was revised by UNIVE, in close collaboration with NIOF. However, the final draft was revised and amended by an Aquaculture expert from the Faculty of Science, Alexandria University. This deliverable presents a comprehensive overview of the aquaculture sector in Egypt, as well as an analysis of the main factors which hinders its further development. In particular, it emerged that marine aquaculture is still in its infancy in Egypt and has the potential to be expanded in the next years. To this regard, the innovative tools, i.e. indicators and mathematical models for Environmental Impact Assessment and site selection of fish farms, which were presented in the training course (T2.2), could enable NIOF to play a key role in fostering the sustainable development of aquaculture in marine and coastal areas.

o **As regards to fisheries** (*WP3, T3.1"Inventory of the fishing gears and legislations"*),



The first 6 months of the FORCE project dedicated to the data and information collection (as described later) which give a complete picture of the current of Egyptian fisheries situation so that we can compare this situation with that of other Mediterranean countries. As well as to provide an overview of the state-of-the art concerning indicators of the fishing capacity and the more recent guidelines from the EU (PCP) in relation to the implementation of a real ecosystem approach management. Data collection has been undertaken both through a critical review of the scientific and technical papers where the net drawings are available as well as through direct interviews of Egyptian net makers, fishermen and gear technologists. This data has been used for preparing the materials for second stage that will be focused on closing of knowledge gaps and technology needs.

The fishery survey included an inventory of data e.g.; vessel size and power, fishing gears used, fishing gear design, properties and dimensions, fishing strategy, target species, non-target species. To this aim CNR-ISMAR prepared ad hoc detailed forms for the data collection of the technical gears properties according to several boxes, taking into account the complexity of Mediterranean situation. Only the parameters which were straightforward to directly measure and/or collect (net drop, net length, mesh opening, horizontal and vertical hanging ratio, etc.) were selected. These forms were designed to assist the scientific personnel in the data collection and recording. The data collection on the technical properties of the main fishing gears used in Egypt was performed by the NIOF staff under the supervision of CNR-ISMAR. The review of the main fishing techniques and gears in Egypt, as well as of the technical properties, was carried out through direct measurements on deck at harbours and interviews with fishermen, stakeholders and net-makers in order to give a complete picture of the situation and to compare this with the current situation of other Mediterranean countries.

Such survey served to; **1)** identify main criticisms, both in terms of overcapacity/overexploitation and application of low resolution power indicators; **2)** identify low efficiency situations in terms of fishing gear/techniques; **3)** prepare a sort of criticisms map taking into the account not only weakness elements, such as lacks of data and gaps in knowledge, possible implementation of new tools (i.e. indicators, models, etc.), strength elements, such as those usually present within the artisanal fishing activities (the fishermen ecological knowledge, the use of low impact gear); **4)** as for the previous point, provide a set of “real world” input data, to be used in the training course (T3.2) and for the course book (D3.5). The report of D.3.1 includes the following information which has been collected while taking into account that each fishery is different:

- an overview of the main fishing gears used in Egypt
- the main technical properties of the different fishing gears
- the characteristics of the fishing fleets in different harbours
- the characteristics of different fisheries





- the collection of information on the Egyptian legislation
- to identify the lack of information and weak points

The review made it possible to initialise a technical database for Egypt, by means of which it will be possible to propose new legislation with respect to gears, to propose ways how to re-structure the fleet in order to have more sustainable fishing gears and to achieve a balance between different gear types. This review should be considered as a first attempt in Egypt given that no other technical information is available for Egyptian fishing gears and could be used as a basis for further reviews. Accordingly, this review is accepted for publication in peer review scientific ranked journal

The review showed that most of the fishing gears used in Egypt imply the use of small sized meshes and hooks with the consequence that small sized fish and juveniles are present in the landings. In particular, bottom trawl mesh sizes appear to be small enough to catch juveniles. In the meantime, the weak selectivity implies a large portion of discard, especially in bottom trawling. Therefore the selection properties of codends used in Egypt trawl fisheries are a matter of concern. Moreover, the impact of towed gears on the bottom should also be taken in consideration. Therefore, a reduction in fishing effort has an impact as well as the improvement of selectivity of the traditional fishing gears and additional management advices, such as technical restrictions to the fishing gears, are recognized as needful measures to ensure the sustainability of fishing activity in Egypt.

Taking these assumptions into account the course (T3.2) aimed at providing information on fishing technology relating to the following main issues: selectivity, impact, innovation and energy efficiency in fishing activities.

STAGE-2 of the first part, transferring the results of data analysis of research and technology (reports D2.1 and D3.1) to the capacity building events.

o As regards to Aquaculture (WP2),

Three days training course designed at M12 The training course on “*indicators and simulation models for site selection and EIA of finfish mariculture*“(D2.2)“ provided an overview of the state-of-the art concerning indicators of impact on both pelagic and benthic ecosystems to introduce NIOF researchers and other Egyptian scientists to the use the integrated models which simulate such impact by means of hands-on session, during which data gathered in the first phase will be used as model input. The course contents include the development of a "tool-box"



for site selection and Environmental Impact Assessment (EIA) of finfish aquaculture activities and review the monitoring guidelines for sustainable management of aquaculture activities, based on the Ecosystem Approach Principles (UNEP/CBD/COP/5/23/ DecisionV/6); in the context of EU guidelines and in the taking into account the European initiative Horizon 2020.

This training course was organised by NIOF and held at Alexandria, Egypt from October 8th to October 11th, 2012, with the last day dedicated to a visit of two sites of seabass and seabream fish farms in Maryout Valley. Egyptian Aquaculture experts started the training course with the presentation of the State of the Art of Aquaculture in Egypt, and then the legislations regarding Egyptian aquaculture and Environment Impact Assessment were also presented by invited policy makers from the General authority for fish resources development (GAFRD) and the Egyptian Environmental Affairs Agency (EEAA). Some Aquaculture investors and Italian Aquaculture expert were also invited to participate and to assess the training course.

Throughout the training course, the topics included in D2.2 were illustrated using slide shows, which were subsequently uploaded on the FORCE website. The course slides provide a step-by-step guide to the use of the model FiCIM, which has been available at the web address <http://acqua.dais.unive.it/> from January 1st 2013: UNIVE offers full support to the trainees who wish to test the model. A step-by-step guide to use the FiCIM, presented in the course slides is also currently available at the web site.

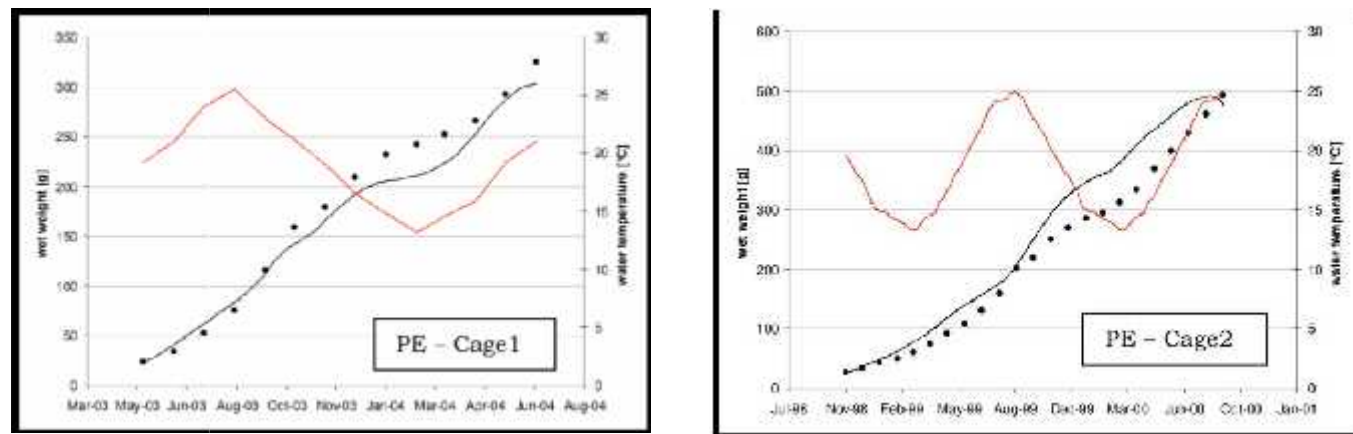


Figure 5: BREAMOD validation in Porto Ercole. Black dots indicate the measured data; continuous black line represents the predicted values; continuous red line represents the water temperature.

The D2.2 “*Lecturer notes used for aquaculture training activities*“ presents the following topics, concerning the use of mathematical models for Environmental Impact Assessment, site selection, optimization of husbandry practices and monitoring activities in relation to marine finfish aquaculture:

- Bioenergetic models
- Effect of water temperature and feed composition on biomass growth of gilthead seabream (*Sparus aurata* L.) and European seabass (*Dicentrarchus labrax* L.)
- Simulation of dispersion processes in inland waters, transitional and coastal ecosystem using particle-tracking deposition models
- Indicators of the impact of cage aquaculture on pelagic and benthic marine ecosystems
- Monitoring protocols
- Simulation of the impact of cage aquaculture on sediment geochemistry using FiCIM (Fish Cage Integrated Model)

The third day of this training was dedicated to field visit of site selection of fish farms, so that to give the trainers the opportunity to visit real fish farms and to communicate with fish farmers.

Figure 6: field visit to real “sea bass and sea bream” fish Farm



○ Regarding the fisheries (WP3).

The three days training course on **“Closing Knowledge Gaps and Technology Needs”** at M16 has been carried out to give an overview of the EU fisheries legislation in comparison with the Egyptian legislation and the method for the control of fishing gears and mesh opening measurement that are applied in EU countries in order to present to the Egyptian scientists the EU standard procedures. Additionally, this training course provided information on the main problems affecting the fishing activities in Egypt based on the analysis of the data collection for D3.1 and for T3.2 **“Assessment of the main problems related to overcapacity and gaps in knowledge or technology in the fisheries sector”**. In T3.2 the information on fishing technology in Egypt gathered in the field, by means of interviews and direct measurements, provided a general overview of the situation in Egypt and identified the weaknesses and problems. The main concerns relating to Egyptian fisheries can be briefly resumed as follows:

- the selectivity of the different fishing gears, especially bottom trawl, is generally poor, meaning that the catch of undersized specimens is quite common
- Problems with Bycatch and discard should be carefully addressed
- Coastal environment is highly impacted
- Physical impact of towed gears
- Coastal areas are overexploited due to the technical constraint of fishing boats
- Presence of a large number of small and relatively old vessels
- Low Energy efficiency of fishing vessels
- Technological advances of on board fish processing: this can greatly affect the quality of fish products and their shelf-life
- Scattering of legislation: there is a need for a simplification of the rules and for a standardisation of the management measures in the Mediterranean sea among the different countries, as stressed by the GFCM (General Fisheries Commission for the Mediterranean)
- Fragmentation of landing sites and sales
- Lack of selectivity studies
- Lack of fishing technology scientific production

The status of fishing gear technology in Egypt was then compared with the current status of other Mediterranean countries. All this information helped the CNR-ISMAR partner to formulate the contents of the training course at M16.

The training course was organised by NIOF in close collaboration with the WP3 leader, CNR-ISMAR and was held in Alexandria from 9th to 11th April 2013. This training was mainly aimed at transferring expertise on the sustainable fishing technology to NIOF scientists, in terms of selectivity, impact, innovation and energy efficiency in fishing activities.

- **The first day** of the training provided an overview of fishing technology and related management measures in the Mediterranean Sea. Additionally the technical parameters of the different fishing gears, regarding mainly the selectivity and catch efficiency (mesh opening, hanging ratio, net length, etc.), were reviewed in order to identify eventual problems and to suggest new technical details which could be investigated and also inserted in fisheries legislation. The first phase also covered the impact of the different fishing gears as well as describing alternative solutions, methods and strategies that mitigate adverse environmental impacts; in this section the problem of bycatch and the available solutions (Bycatch Reducer Devices) have been also addressed. In addition to the previous topics the course also involved some basic concepts on the trawl net design: how to understand and how to produce a trawl net drawing.

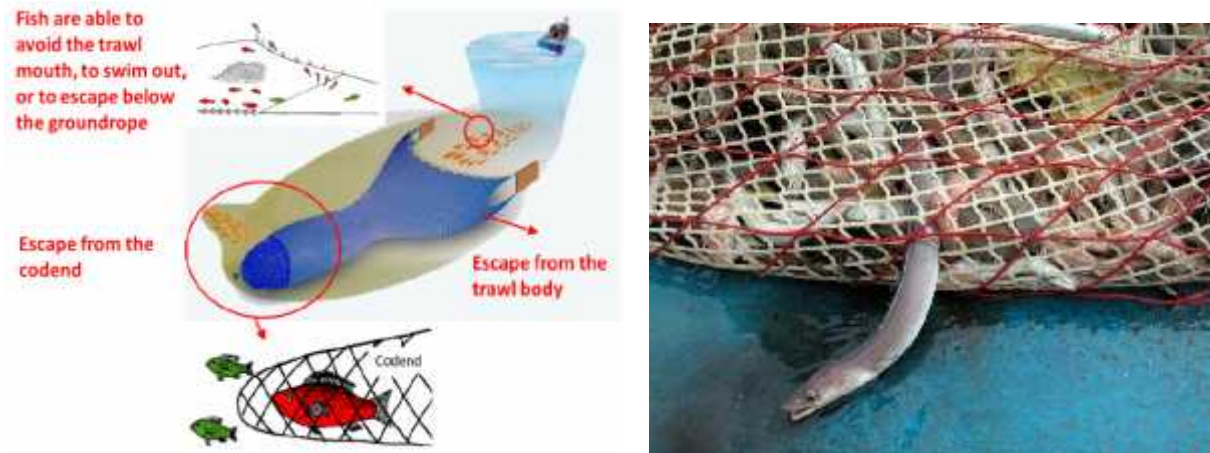


Figure 7 :Escape of fish from the trawl net (in green). Fish caught (in red)

- **The second day** of the training was dedicated to the selectivity theory, the methods for the study of trawl selectivity and the set-up of a selectivity study. Finally the SELNET software for the study of selectivity was presented and its use was described in depth through simulations with data obtained in selectivity studies.

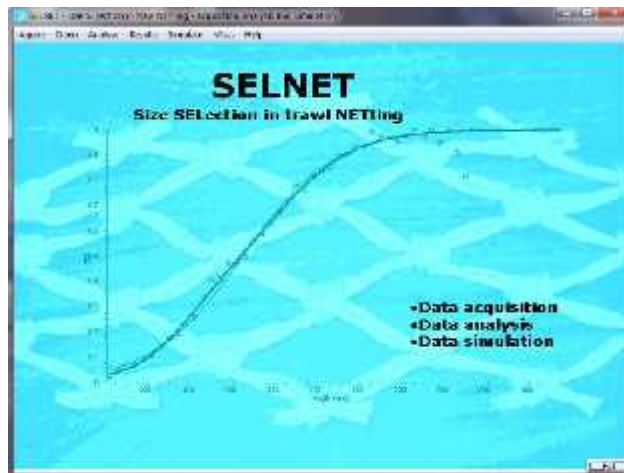


Figure 8: SELNET software interface.- trainer and trainees

- **The third day** of the course was mainly focused on the fishing vessel technology. This section aimed at describing the basic concepts of naval architecture and ship design relevant to non-naval architects. The fishing vessels technology section mainly addressed the problem of energy consumption and associated running costs. In this regards the technical factors affecting the fuel consumption were described and the following topics were tackled: introduction to naval architecture; definitions and principal dimensions; types of vessels; hydrostatics; resistance and powering; layout of fishing vessels.



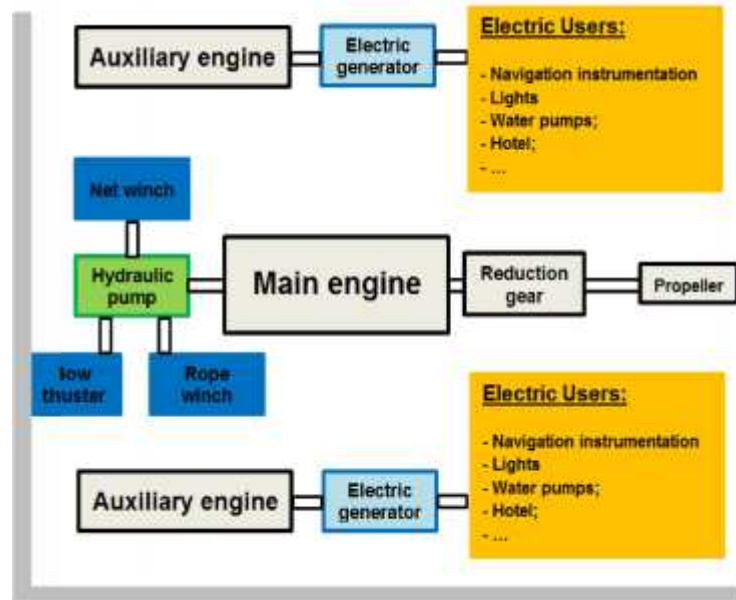


Figure 9: New engine room layout. New vessels usually are designed with the main engine providing power for propulsion and for hydraulics such as rope winch or net winch

STAGE-3 “Learning by doing” and field experiments

FORCE aims at improving also NIOF capacity of transferring the results of research and technology activities into the practical field, following a "learning by doing" approach. Such approach could be the most suitable solution for effective transfer of knowledge. The practical approach here focused on the main bottle-necks to further sustainable development of fishery and aquaculture in Egypt that concluded from analysis of State of the Art.

o For Aquaculture (WP2, T2.3: Testing indicators and models (field experiments))

Knowledge acquired through the training course put into use in the practical implementation of two EIA studies, concerning the two most important farmed marine fish sea-bass and sea-bream. Field experiments have been designed and conducted by NIOF scientists, in close collaboration with UNIVE. The aim of this activity is to test a set of preselected indicators, to be subsequently used by Egyptian authorities, for



monitoring the impact of fish farms. Mathematical models have been used for both designing a cost-effective monitoring strategy and interpreting the results.

As a follow-up of the training course, UNIVE and NIOF teams identified a suitable area for testing the models and indicators presented in the course. In accordance with the DoW, the sampling strategy was designed and implemented by NIOF, in close collaboration with UNIVE. Field surveys started in March 2013, when a current meter was deployed in the vicinity of the farm. Indicators have been sampled and analysed by NIOF scientists at the end of May 2013, when the water quality conditions are more critical, and the fish biomass is larger. The results enabled UNIVE to test the model. In fact, the fish biomass is indeed a key forcing necessary to identify the impact and test the model. Data concerning: geographic location of farms, current velocities and directions, water depth, farm shape and dimension, rearing density, feeding regime (including quality and quantity), fresh water discharges in the area, were also collected by NIOF.

UNIVE carried out a preliminary analysis of the data collected by NIOF, concerning both the water column and the surface sediment. The variability of dissolved forms of inorganic nitrogen and phosphorus was explored by plotting the data as a function of the distance for the fish farm. Indicators of impact on the benthic community, such as Shannon index, AMBI e m-AMBI were computed. The field work was carried out by NIOF in accordance with international quality standards and the results could be used for further elaboration.

During the end of October 2013, UNIVE completed the analysis of the data collected by NIOF at the Maryout Valley fish farms, concerning both the water column and the surface sediment.

The model FiCIM was applied to Maryout Valley, using as input the data set collected by NIOF. The results of the statistical analysis and of the model application are presented in Deliverable D2.3, in M26, as scheduled. In summary, the results obtained at Maryout are in accordance with the general literature. The high back-ground variability of water quality parameters makes it very difficult to univocally identify the impact of fish farm activities in water quality parameters. As regards the impact on sediment, some organic enrichment in surface sediment can be detected in proximity of the farm but this does not significant changes in the benthic biocenosis, given the high background level of organic matter. The results of the simulation are consistent with these findings and also highlight the importance of the standing stock biomass, which at the time of sampling was rather low. All results of site selections are gathered in D2.3)



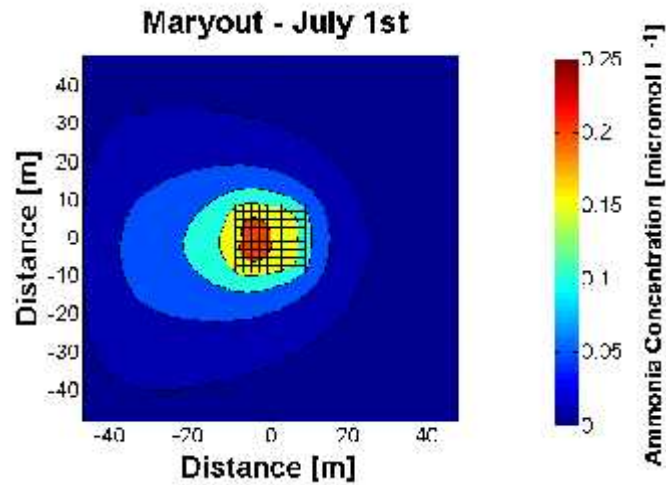


Figure 10: Spatial distribution of the ammonia background concentration due to the presence of the farm, at the end of the simulation (July 1st, 2013).

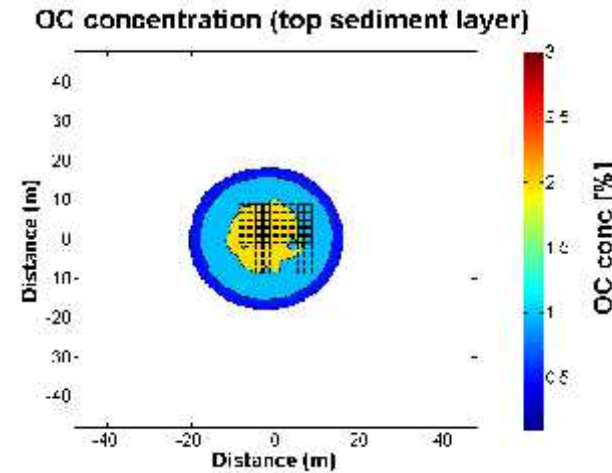


Figure 11: Spatial distribution of the Organic Carbon in surface sediment due to the presence of the farm

The model FiCIM was also applied to a “virtual” farm located in proximity of Alexandria, at a site where time series of hydrodynamic data collected in previous studies were available. The results allowed the estimation of the potential impact of a farm on the benthic community and also the assessment of the potential productivity of the site (D2.3)

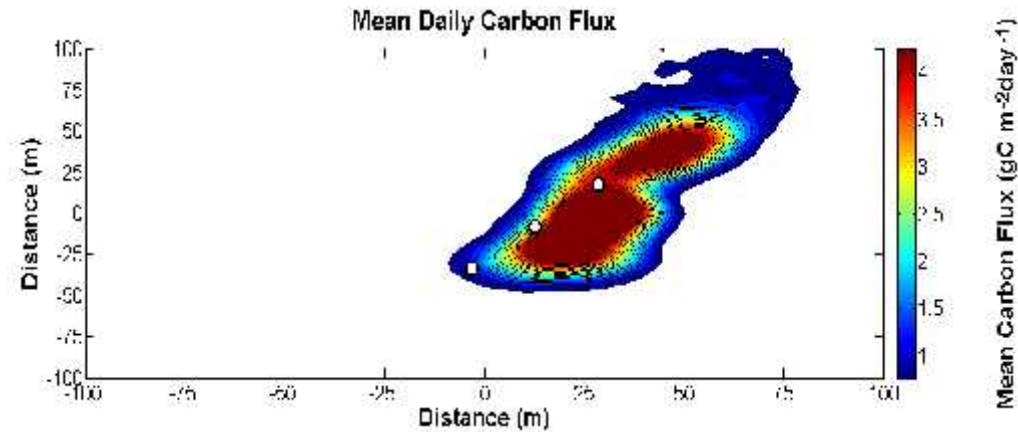


Figure 12 : Contour plot of the Mean Daily Carbon Flux computed by the deposition model for the three-cage virtual farm

The findings of these case studies have been presented to Egyptian aquaculture investors and policy makers in the one day workshop in the frame of WP4 (**see more detailed in Second Part**), also presented at final conference and stakeholders meeting at (M24), together with other case studies concerning EIA in Southern Mediterranean countries. This gave NIOF the opportunity to discuss their results in a well qualified arena and to appreciate their advances in this research field.

Additionally, The results obtained through this work package were summarized in the Aquaculture Course book (D2.5), which also includes a general introduction concerning the state of Mediterranean aquaculture.

o **For Fisheries (WP3). As part of T3.3 (D3.4)**

The transfer new fishing technology strategies, available in other countries has been done through sea cruises "learning by doing" where the monitoring of gear performance, assessment of trawl impact on the seabed etc, described. CNR ISMAR has organized a training course Sea cruise learning by doing for selected participants from NIOF and GAFRD who travelled to ANCONA to attend this training course from 26th to 30th August 2013. The main goal of the sea samplings was to compare the selective performance of a traditional codend having 50 mm diamond mesh opening, and an experimental codend rigged with a 40 mm square mesh window (Figure13 &Figure 14). The use of square mesh panels as

a tool (Bycatch Reducer Devices (BRD)) to improve the selectivity of a bottom trawl has been widely described during the training course that was held in Alexandria (see D3.3 for more details).

The trawl net used to explain the study of selectivity was prepared by fitting a square mesh panel to the net. Moreover a cover was prepared and rigged to the codend of net in order to collect the fish escaped from the codend during the experiment. Furthermore the pots used to demonstrate the use of alternative gears were set on a single rope, with weight, floats, flags etc. (this operation took at least three days of work for three CNR technicians. Thus the administrative issues for the sea samplings have been accomplished. All instrumentation was then loaded on the vessel.



Figure 13: Schematic of a square mesh window mounted on the extension piece



Figure 14: On Board “FORCE participants during the measurement of the codend mesh opening with the electronic gauge and sorting of fish”.

- After the return of Egyptian scientists from Ancona - Italy, NIOF organised a Training of trainers (TOT) under the title "*The latest technique in fisheries especially trawling*". The main target of this event is two folds: the first one is to enhance the capacity of young scientists (Master students) to be able as trainers to transfer the knowledge to others, second is to transfer the latest technology and techniques in fisheries that learned by the Italian experts at the sea cruise to other researchers and stakeholders whom not join the cruise.



This training was held in NIOF in 26th September 2013 by the participation of 60 trainees (young scientists, fisheries expert, policy makers and fishermen).

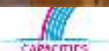
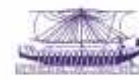
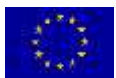




Figure 15: Photos for Master students in the TOT event





Finally, A Course book: guide for the sustainable management of aquaculture and fisheries was prepared by CNR- ISMAR .The first section implies an overview of the fishing technology and related management measures in the Mediterranean Sea. The second section of the book deals with the technical measures of fishing gears affecting the size and species selectivity, in order to evidence eventual problems and to suggest new technical details which can be inserted in the Regulation and/or Legislation and The final part of the book is mainly focused on the Fishing vessel technology for non-specialists. Was prepared by CNR-ISMAR

This course book considers as a guide for fisheries and aquaculture sector and can support local trainers to develop appropriate short-courses in fisheries and aquaculture sustainable management aiming at the implementation of the Ecosystem Approach to fisheries. The purpose of this course book is to introduce the participants to the principles of Horizon 2020, GFCM regulations and best practice of EBFM and EAA, with particular emphasis to the issues of the fishing capacity, over fishing and available indicators/metrics and application of tools for the assessment of aquaculture impacts (in coordination with WP2). It aims to provide participants with the knowledge and skills to successfully develop programs to efficiently monitor main indicators of the fishing capacity and sustainable aquaculture in their own region.

Second Part: Research valorization and internationalization activities results (WP4) “Enhance the capacity building for a comprehensive strategy”.

Egypt faces the same internationalization challenges that influence the international level. In order to be able to give a successful response to these, Egyptian researchers need to enhance their own capabilities for development. The networking between Egypt and EU countries is certainly a good way of achieving these objectives and improving the innovation services needed by community. FORCE project which is funded by EC offers different training programmes for Egyptian researchers and youth in order to increase their competitiveness and encourage them to participate in EU funding programmes.

Research valorization is defined as, “The process of transferring skills, knowledge, technologies, methods of manufacturing, samples of manufacturing and facilities among governments or universities and other institutions to ensure that scientific and technological developments are accessible to a wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials, legislations and/or services”.



- **Through Task 4.1 "Building up of a strategy of research valorisation"**, which aims to progressively build the impact of the projects and to identify the possible common collaboration with other EC funding projects in particular INCO projects, MIRA and other Mediterranean ERA-WIDE projects with respect to the strategic orientations of the bilateral and regional cooperation have been proposed around the sectorial Horizon 2020 Initiative.
- The project coordinator has actively involved in WP7 (de-pollution of the Mediterranean Sea) expert group of MIRA project. She has coordinated the Med Monitoring Expert group which was responsible for the preparing the report on "**Mediterranean Monitoring**" and delivered to MIRA coordinator. Furthermore, she presented a talk under the same title in MIRA meeting which has been held in March 2012, Egypt. A link of FORCE project website has been added to MIRA web portal and vice versa. After the end of MIRA project, FORCE has continue collaborated with the second MIRA (MEDSPRING) and organized a joint meeting in 13th June 2013 in Cairo with Med Spring and four ERAWID projects. A link of MEDSPRING website has been added to FORCE project website and the FORCE video has been uploaded in MedSpring web site. Also, FORCE has actively collaborated with other INCO projects, like, ShERACA project; where a joint training course has been organize (see report D4.1).

- FORCE has actively collaborated with AQUAMED project. The coordinator of AQUAMED is one of FORCE advisory Board. FORCE and AQUAMED has signed MOU for scientific cooperation with Aquaculture part. In this sense, a session of FORCE has been organized in the AQUAMED final General Assembly and Platform stakeholders meetings which held in Istanbul-Turkey in the 22nd-25th of May 2013 to present the joint cooperation of both projects.

As regards to collaboration between FORCE and other ERAWID projects, FORCE collaborates with INCAM which its aim is almost related to objectives of FORCE. The coordinator presented "*Environmental protection and ICZM in Egypt*" in the Final conference of INCAM which held in Izmir, Turkey on 15th -17th May 2013.

- **Increasing the linkage with economic and social environment.**

FORCE increased the visibility and scope of NIOF and played an important role to promote the links with the different stakeholders and policy makers related to the fisheries and aquaculture sector. In this sense, FORCE helped EEAA with the preparation and development of Environmental Impact Assessment Terms of Reference (TOR) as guide lines for fish farming, which can assist potential investors in choosing appropriate sites and preparing an environmental management plan for the management of their farm for the first time in Egypt, thus helping GAFRD and EEAA in the applying innovative systems for follow-up of fish farms impact on surrounding

environment. For this, three meetings have been conducted from January to April 2013, at NIOF with EEAA and GAFRD, to develop TOR for Aquaculture industry (FORM-B). Then, stakeholders and investors workshop held in 29th April 2013, to discuss and approve the proposed TOR



Figure 16: workshop on Increasing the linkage with economic and social environment (Form B amendment)

- To accomplish the objectives of this task which aims to develop a kind of future business plan for building up of a strategy of research valorisation in NIOF, The project coordinator communicated with INNOVETY Company (www.innovety.com) to develop this strategy. INNOVETY suggested the proposal, then approved by project coordinator. Within this mission a series of interviews with NIOF staff, administrators, financial and authorities have been conducted. Data analysis was done to come to a broader understanding of the current status of NIOF, a gap analysis highlighting what activities and tools are missing was developed , then a strategy was formulated to leverage positive experiences and as a conclusion some action points are recommended to start with suggestions for local and EU funds that NIOF can apply for. This strategy was presented and discussed at FORCE final conference. Also, it is presented to Egyptian Minister of Scientific Research, so that can be applied in other research institutions. (for all detailed and strategy see D4.4)
- Within the overall framework of FORCE project and in order to achieve WP4 objectives (*Enhancing the capacity building for a comprehensive strategy*), **5 events** have been organized under **Task 4.2** and **Task 4.3**, to improve the capability of young researchers and scientists from NIOF and different institutes in Egypt, two events of them have been dedicated for women to help them to actively participate in the fisheries and aquaculture development and train them to contribute socially and economically to their community. These capacity building initiatives were designed to enhance the participation of Egyptian institutions in European research funding programmes and followed a logical

and structured design to build capabilities and in the case of T4.2 follow the European Commission’s strategy to promote gender equality in science and research.

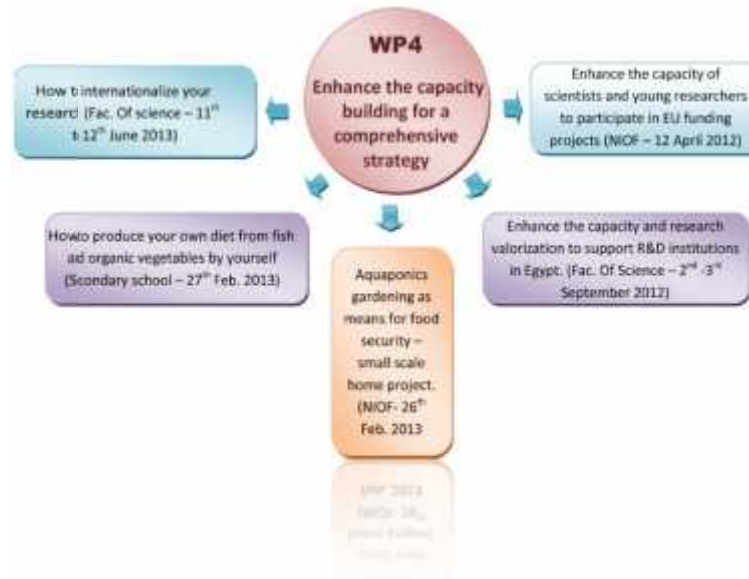


Figure 17: Summary of the WP4, Task 4.2 and Task 4.3

- Around 280 participants benefited from WP4 activities. **One event** dedicated to provide them the necessary skills, guidelines and information that helped them to participate in EU funding programs, and educate them on how to write a competitive proposal for EU funding programmes.
- **One event** was dedicated to explain the main structure of H2020 programme and the difference between FP7 and H2020. **Another event** was organized to teach the scientists “How to internationalize their research results”.
- **Two event** oriented to teach researchers, high school students and fishermen wives how to establish a small scale home project that can help them to secure their own food from fish and vegetable.



Under the **Task 4.2 “Women empowerment”**, which is drafted to enhance women’s participation in fisheries and aquaculture development and educate them to contribute socially and economically to their communities. The activities of T4.2 follow the European Commission’s strategy to promote gender equality in science and research.

- On 26th February 2013, the first of these activities held in NIOF under title “*Aquaponics gardening as means for food security - small scale home project*” was held at NIOF, Alexandria Branch. It aims to increase the knowledge of different Egyptian community’s members through managing and developing aquaculture activities. The event was dedicated to NIOF researchers and young scientist’s especially female to learn them theoretically and practically “*what is Aquaponics system and how they can benefit from it in their own life*”. Around 70 researchers and young scientists from all NIOF branches have been participated. The following topics have been addressed by four lecturers in this workshop:
 - Could Egypt run out of water by 2025?
 - Clean water recirculation system
 - Fish production capacity depends on the design and processing system and water quality
 - The five major process in recirculation system
 - What is Aquaponics?
 - How can it works?
 - Parts of an Aquaponics system
 - Difference between hydroponics and aquaponics
 - Hydroponics VS Aquaponics which is better for you?
 - Water quality
 - Type of fish
 - How to build a small and cheaper design of aquapoincs in your home and how it works

After finishing the theoretical presentations on Aquaponics system, the trainers train the participants on real Aquaponic Modules “learning by doing” and showed them on the reality how it works (Figure 17).



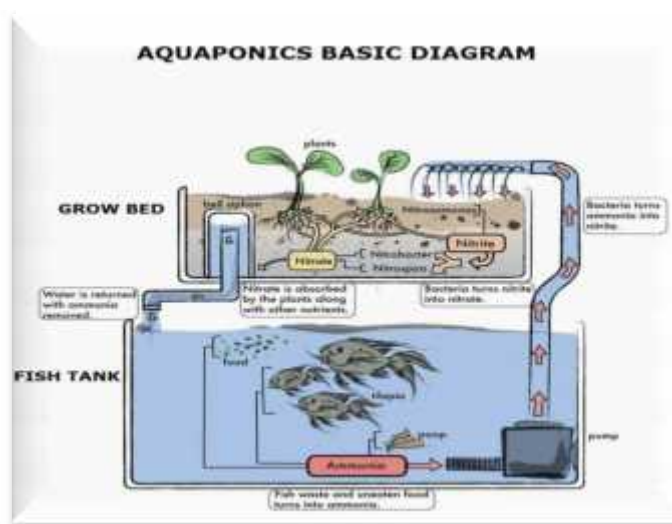


Figure 18: Aquaponic Basic Diagram – part of Learning by doing for NIOF researchers

- On 27th, February 2013, training course was organized exclusively for young girls (High school students) and selected fishermen’ wives, with the specific objective of enhancing women’s participation in fisheries and aquaculture development and to train them to contribute socially and economically to

their own communities. The event entitled *“Aquaponics gardening as means for food security – Small scale home project”* took place in the Agriculture secondary girls’ school at El Maadia, Abu Qeer region, Egypt. More than **50 women** (students, housewives, and fishermen’ wives) and **10 Young** boys from Boys High School (All detailed gathered in D4.1). A primary aim of the training seminar was the provision of technical support to increase women’s participation in the labour market and in the establishment of their own enterprise. In this regard the workshop and training seminar for women and design of WP4 followed the work of the European Commission through its systematic and visible strategy to promote gender equality particularly with regard to women’s participation in science and research and the needs to promote and encourage this on a pro-active basis.

After practical session, the project coordinator held a competition between students in order to, first, for entertainment and second, to know how much knowledge they gained through this training (Figure 19), nice presents from FORCE delivered to the best students and two Aquaponic modelling delivered to two fishermen wives, as well as one model to Boys school, so that can transfer this training to other students who not participated in this training



Figure 19: Simple home Model of Aquaponics assembled for learning u doing for school students and selected photos for the event

Task 4.3, which aims to provide participants with an introduction to the skills that are required to write a competitive application introducing the necessary details, guidelines and evaluation criteria required to help them understand and navigate the EC funding landscape.

Three training Seminars were held with main objectives;

- To strengthen the research, development and innovation capacities of researchers and young scientists at Egyptian Institutions so as to increase their competitiveness
- To encourage research institutions to focus on the formulation of a medium-term strategy for research internationalisation and valorisation in Egypt, accounting for the social, economic, environmental and institutional sustainability
- To encourage scientists and post graduate students to participate in EC funding programmes
- To improve the capability of researchers in writing competitive research proposals
- To provide an overview of the European funding system, in particular the upcoming Horizon 2020 programme (2014-20)
- To help understand the underpinning policy driving the European strategy
- To help develop skills in networking
- To understand the key characteristics of competitive consortia and their funding applications
- To help individuals and institutions develop a funding procurement strategy in line with their institutional strategies
- How to ensure innovations from your project are transferred effectively

- **First training** seminar entitled *“Enhance the knowledge of researchers for participation in EU”* was organized for NIOF scientists and young researchers from different branches on 12th April 2012 at the National Institute of Oceanography and Fisheries – Alexandria, Egypt to help them to catch some open calls of FP7. About 40 scientists and young researchers from NIOF and different institutes were participated.
- **Second training** seminar on *“Enhance the capacity and research valorization to support R&D institutions in EGYPT”*, it was held at Faculty of Science (Alexandria University) in the 2nd-3rd September 2012,.All the necessary information, guidelines, evaluation criteria, and other measures related to EC funding programmes were offered, in order to support professional and competitive proposals for EU funding programs. **55 participants** from NIOF and different institutions and universities in Egypt were participating; most of them are young researchers, as well as other scientists who are planning to join the current FP7 call. On the other hand, the universities’ members who already have FP7 project were also interested to join this event to learn more about financial and administration issues. This training seminar was organized in collaboration between **FORCE** project and **ShERACA** project; Ministry of scientific research (**ENSITNET**); Faculty of Science Alexandria University, and Alexandria University outreach *“Grant Innovation and Outreach Center (GITTC)”*.



Figure 20: Part of training seminar “Enhance the capacity and research valorization to support R&D institutions in Egypt”



- **Third training** course under the title *“How to internationalize your research”* was held from 11th to 12th June 2013 has been organized in collaboration with AQUATT. Only 35 trainees who have some experience on EC project framework participants have been selected for this event. The aim of the training was to provide the participants with an introduction to the EC funding procurement landscape and to improve their networking opportunities. This would form part of their overall strategic goal of formulating a medium-term strategy for research internationalisation including encouraging potential participation in future EU funding programmes.

The purpose of the seminar was twofold, **firstly**, it was intended that participants would leave with some practical tips and ideas that they could apply in their own institute and country; **secondly**, through the interactive exercises and discussions they would also have made new contacts or built on existing ones with other participants from Egypt, thereby extending their national network and support structure.

Equally important however was the introduction to the research funding procurement landscape and the policy drivers that influence its financial instruments (FP7, H2020). This strategic overview was a recurring theme in all of these sessions and was introduced with the overall goal of assisting research institutions to focus on the formulation of a medium term strategy for research internationalisation.

The delivery of the training in this manner focused on the complete life cycle of grant acquisition and management. While it emphasised the more specific and practical skills of proposal writing and budgeting it also drew attention to the efforts that must be invested in building networks and developing international partnerships based on excellent research and value creation. Furthermore, an examination of international best practice in grant acquisition and contract management highlighted the other factors involved in formulating a research funding strategy including:

- Alignment of the individual researcher with the faculty/institution/national agenda;
- Funding knowledge capture and administrative support;
- Networking;
- Knowledge management;
- Internal capacity building and support;
- Communications and marketing;
- Innovation.

Overall these events would help participants in action planning and reaching out to perspective partners, enabling them to participate in internationally funded programmes and training them in how to write competitive proposals having already provided them with an overview of FP7/Horizon 2020 instruments and policy drivers.



Figure 21: Part of training seminar “How to internationalize your research”

Informal evaluation carried out immediately after each event through discussions with participants pointed to a marked appreciation of the various capacity building initiatives. Feedback pointed towards a new understanding of the operational and strategic funding perspectives that stemmed from the suite of training workshops. The inclusion of practical learning techniques (guidelines, evaluation criteria, legal and financial, proposal writing) in addition to understanding the strategic priorities (policy drivers, funding opportunities, action planning) was especially welcomed as a valuable learning experience.

Participants made particular reference to the fresh insights gained in relation to the EC funding landscape as being particularly welcome, even more so after a detailed discussion involving EC policy and financing realities. Others mentioned the discussions around teamwork and collaboration as being particularly beneficial especially in the context of internal and external (international) collaboration.

The delivery and approach to training was commented on with many participants appreciating the innovative, participative and interactive learning techniques used by the trainers in order to address the various challenges associated with internationalizing research.

4.1.4 A Potential Impact and main dissemination activities exploitation results

A. Potential impact including wider societal implications

FORCE is focused and planned around the driving objective of FP7-ERA-WIDE, and thus works towards a road map for strengthening the research capacity and improving the competitiveness of Egyptian institutions. This focus is applied right across the project, from the integrated output of all work-packages.

This focus is to:

1. Contribution to RTD capacity building and management in Egypt.
2. Increased visibility and scope of the centre with increased linkage with economic and social environment.
3. Reinforcing the research, development and innovation capacities of NIOF and other research institutions in order to increase their competitiveness.
4. Increased job opportunities that encourage gender equality in Egypt, in particular for young scientists.
5. Networking with other research centres in Member States or Associated countries.
6. Collaboration between FORCE and other Mediterranean Research and Innovation Networks projects (AQUAMED, ERA-WID, MIRA, shERAKA, Med Spring, ..)"
7. Formulate five years strategy for NIOF for research valorisation based on lessons learnt in the FORCE project

This has been done through a process of mapping, assessment, data collection, modelling, testing and validation indicators, trainings, workshops, learning by doing. The outcome has been directly relevant due to developer involvement.

The expertise required to achieve such relevant impacts is found in:

- **Project consortium.** The consortium was chosen for its diverse range of complementary expertise and past experience in relevant sectors. Each partner in the consortium was chosen for their track record and expertise in their respective disciplines. This project leveraged extra value from these partners as their expertise has been built through their own national research programs and international collaborations. Each partner was also current and up to date in their discipline (mainly because they are leading the field) so that the impact of the project is relevant.
- **An external Scientific Advisory Board (AB)** which established to advise, consult and recommend on different aspects of the project. The Board has members who are internationally recognized scientists and authorized national members from Ministry of environment, EEAA and Ministry of Agriculture, GAFRD. In point of fact, the AB plays a crucial role in FORCE rather than the consultation role, as the EU member helped coordinator to solve the problems of coordination that can cause termination of the project during the unstable situation of Egypt. Regarding the National authorized members, they provided coordinator with data and information required for achievements of the goal of the project, also they facilitate the communication of all stakeholders and other policy makers, they even help with organization of most of the project events. That is because they are

interested in the project's aims and objectives, since it is the first real and innovative capacity building trial in Egypt. They promised to work on the findings of FORCE beyond FPRCE and will try to help to find another way for second stage of FORCE.

- **A permanent exchange of ideas and recommendation** between the project coordinator and some key EU institutions in the field in the Mediterranean region: IFREMER, IUCN (NGO), GFCM (Mediterranean information and governance European federation), EAS (European Aquaculture Society- NGO), ACO (, Egyptian Aquaculture Consultant-NGO) and UFC, (Egyptian Union of Fishermen Consultant- NGO).
- **A strong participation of non scientific partners, stakeholders and public** in the project events, during the project meetings, during the consultation processes (data collection and capacity building programme set-up). The main types of stakeholders were represented ; industry, NGO, governance and fish producers.

Event	Total no. participants	Stakeholders “selected fish farmers-authorities-NGOs member)	Post graduate students	PhD
WP2” “indicators and simulation models for site selection and EIA	36	10	12	14
WP3” “closing knowledge gaps and technology needs”	27	8	11	8
WP3 TOT “latest technique in fisheries especially trawling”	61	15	26	19
WP3” Sea-Cruise” learning by doing-ANCONA, Italy (number without Italian)	6	2	2	2
FORCE final conference and Stakeholders meeting	61	18	16	26

Table 1: The number of each category of participants in the technical capacity building events; (Note that, those events excluding the three WP4 events which dedicated for research valorisation)

1. Contribution to RTD capacity building and management in Egypt.

Impact of RTD capacity building activities (WP2&WP3).

The following specific tasks have been specifically designed to improve NIOF capacities in the field of fisheries and aquaculture:

- Task 2.1 Analysis of the State-of-the art of aquaculture in Egypt
- Task 2.2 Training course on indicators and simulation models for site selection and EIA of finfish mariculture
- Task 2.3 Testing indicators and models
- Task 2.4 Role of NIOF in the development of sustainable aquaculture in Egypt
- Task 3.1 Inventory of the fishing gears and legislations
- Task 3.2 Assessment of main problems related to metiers/fleets
- Task 3.3 Closing Knowledge Gaps and Technology Needs
- Task 3.4: Preparation of a course book as a guide for fisheries sector

The first four tasks have significantly advanced to transfer the state-of-the-art in science and technology in Egypt in a number of areas (as described in detail in the Part1), namely:

- The state-of-the-art of Egyptian aquaculture, Task 2.1, confirmed that tools for Environmental Impact Assessment, site selection of fish farms as well as tools for monitoring optimization are needed in order to foster the sustainable development of aquaculture in Egypt.
- The training course, Task 2.2, was welcome by NIOF researchers and invited policy makers and provided to trainees and stakeholders a comprehensive overview concerning the role of indicators and models in supporting the sustainable development of aquaculture in Egyptian coastal areas.
- An integrated model of EIA of European seabass and gilthead seabream farms was made available to end-users (<http://acqua.dais.unive.it/>).

The modelling and “tool-box” of EIA considered the innovation tools for measuring the impact of Aquaculture on water quality and for choosing the best site selection of new establishment of Aquaculture.

The impact of fisheries, WP3 Tasks (the remixing tasks in the above list):

Management of fisheries for the protection of marine resources is worldwide recognized as a matter of major concern. In this context the technological features of fishing gears are considered as one of the main issues that fishery managers should carefully take into account. *Code of Conduct for Responsible Fisheries of FAO (1995) stressed that “Selective and environmentally safe fishing gear and practices should be further developed and applied, to the extent practicable, in order to maintain biodiversity and to conserve the population structure and aquatic ecosystems and protect fish quality.*

The main target of FORCE project focuses on improving scientific knowledge through the exchanging of know-how and experience in the field of management of fishing, as well as on providing advices to policy makers for technical and innovative solutions.

By taking these statements into account the knowledge of the actual situation in the Egyptian fisheries has been considered as a crucial point, as indicated in the State of the art of fishing gear technology which developed after completion of collection set of data of fishing gears in Egypt in the frame of Task3.1, as a first attempt in Egypt. The following information has been collected in detail through on field investigations and interviews:

- Overview of fishing gear legislation and management in Egypt

- Review of bottom trawl technical properties
- Review of passive nets technical properties
- Review of longline technical properties
- Review of selectivity studies in Egypt
- Review of available information on vessel types and characteristics
- Legislation requirements

The review allowed the researchers and policy makers to know the weakness and gaps and the current situation of Egyptian fisheries. This review highlighting that, Mediterranean coastal areas of Egypt are subjected to a high level of anthropogenic pressure due to fishing activities. Activity of the Egyptian fleet is mainly concentrated in inshore fishing grounds, due to technical constraint of the fishing vessels used (fishing boats are generally old, have low engine power and are poor equipped) and only the larger fishing boats (mainly trawlers) are capable to exploit deep sea fishing grounds. The coastal environment, where the highest biodiversity occurs, is highly impacted and the risk of overexploitation of the resources is a matter of concern.

Therefore, a reduction in fishing effort has an impact as well as the improvement of selectivity of the traditional fishing gears and additional management advices, such as technical restrictions to the fishing gears, are recognized as needful measures to ensure the sustainability of fishing activity in Egypt. These goals might be achieved through the modification of the actual fishing gears and through the introduction of new gears. In addition, the technical parameters of the different fishing gears mainly affecting both selectivity and catch efficiency (mesh opening, hanging ratio, net length etc.) were reviewed and gathered in course book in order to evidence eventual problems and to suggest new technical details which could be investigated and likely inserted in the fisheries

Legislation.

The training course was planned in order to make learning environments interactive, to integrate technology into the learning experience and to use collaborative learning strategies. The events provided information on fishing technology relating to, selectivity, impact, innovation and energy efficiency in fishing activities.

In addition to the previous topics the training course on fisheries, it was also involved some basic notions on the trawl net design: how to understand and how to produce a trawl net drawing. In this framework the scientists and trainers had the opportunity to share investigations about the existing trawl net designs and riggings in Egypt. This could be the basis for a future collaboration in this important issue. Finally an overview of the fishing technology in Egypt was done by describing the data collected in the first phase of FORCE project, where a detailed on field activity allowed to obtain useful information on the most important fishing gears.

- The fishing vessels technology section in the training course mainly addressed the problem of energy consumption and associated running costs. In this regards, the technical factor affecting the fuel consumption were described and the following topics were tackled: introduction to naval architecture; definitions and principal dimensions; types of vessels; hydrostatics; resistance and Powering; layout of fishing vessels. This knowledge can be helpful for Egyptian authorities for near future strategy for fishing management.

2. Increased visibility and scope of the centre with increased linkage with economic and social environment.

Based on the knowledge acquired from WP2 tasks, FORCE coordinator has submitted a special request to both authorized member of FORCE Advisory Board [Egyptian Environmental Affairs Agency (EEAA) and General Authority for Fish Resources (GAFRD)], to put in use the acquired expertise and offering help and cooperation with amendment of **FORM B** in the Law 4/94 and its amended by law 9/ 2009 (for all type of new establishments of projects) to be specific FORM for EIA study requirements before establishment of Aquaculture projects. It is noteworthy to mention that, the EIA of site selection of Aquaculture projects not including in the main description of the above Law. In this context, FORCE offered the experience gained from WP2 to improve the EIA system in Egypt through:

- Helping the developers how to choose the best location (site selection) and operate the facilities
- Helping the EEAA in reviewing process
- Helping the license authority in following up the project
- Improving the quality of fish specially sea bass and sea bream which can be exported to EU market

This initiative is still under discussion, it is a little bit delayed because the changing of Ministers in the Last period of Egypt. The project coordinator will keep working in this issue beyond project until to put it into force.

➔ Involvement of Stakeholders in knowledge transfer

It is significant to highlight that, before introducing a new gear or practice there is a need to involve the stakeholders (fishermen, net makers, suppliers, scientists, enforcement officers as well as managers and the environmental bodies) in order to know what they think about the new solution and what they suggest. Stakeholders need to be clearly informed on the capital costs (maintenance and running costs) on the effects on fishing operations. Meetings and publicity are considered as an essential step acceptable.

Therefore, Stakeholders, fish producers effectively in all capacity building activates improve the relationships and

Figure 22: Drawing showing the relative participants in the R&T transfer events

RTD providers and the commercial sector stakeholders. The involvement of project period secured reaching a real and stakeholders and provides an efficient



and in order to make the new technology more

and selected policy makers were contributed even in the learning by doing activates to understanding between

percent of each category participants total

in order to achieve buy-in to the stakeholders and policy makers in the whole common understanding among researchers feedback from the external community

including those that are not in the first circle of awareness.



Figure 23: Part of discussion between, FORCE coordinator, EEAA, GAFRD And Aquaculture Investors

3. Reinforcing the research, development and innovation capacities of NIOF and other research institutions in order to increase their competitiveness.

- Over the duration of the FORCE project more than 280 people benefited as a result of the five separate WP4 capacity building activities. The different events organised during this Work Package provided participants with an introduction to the skills that are required to write a competitive application introducing the necessary details, guidelines and evaluation criteria required to help them understand and navigate the EC funding landscape. As well as the research funding procurement landscape and the policy drivers that influence its financial instruments (FP7, H2020) **(as described in section 4.1.1)**. This strategic overview was a recurring theme in all of these sessions and was introduced with the overall goal of assisting research institutions to focus on the formulation of a medium term strategy for research internationalisation.
- Overall these events would help participants in action planning and reaching out to perspective partners, enabling them to participate in internationally funded programmes and training them in how to write competitive proposals having already provided them with an overview of FP7/Horizon 2020 instruments and policy drivers.



NIOF has managed to bring together both internal and external actors in Egypt, allowing them to build capacity in line with the objectives of the FORCE project. Furthermore, NIOF now has an extended capacity to facilitate future training and capacity building, using the experiences and materials developed in the FORCE project.

- **The result of the informal evaluation** which carried out immediately after each event through discussions with participants pointed to a marked appreciation of the various capacity building initiatives. Feedback pointed towards a new understanding of the operational and strategic funding perspectives that stemmed from the suite of training workshops. The inclusion of practical learning techniques (guidelines, evaluation criteria, legal and financial, proposal writing) in addition to understanding the strategic priorities (policy drivers, funding opportunities, action planning) was especially welcomed as a valuable learning experience.

4. “Increased job opportunities that encourage gender equality in Egypt, in particular for young scientists

- FORCE favoured the creation of new positions for young scientist at NIOF through increase their capabilities to carry out the excellence of research and encouraging the gender equality. The relationships that created between NIOF and FORCE’ EU partners will facilitate Egyptian young researchers to communicate with research centres in EU countries and associated countries for short term staying for training or lab/cruise/experiments. That will lead to improve their knowledge and consequently the quality of NIOF research. In addition, this interaction will reinforce the NIOF networks and will facilitate the participation of this institution in new H2020 projects; consequently the number of research positions that will be available for young scientists will be increased.
- Two capacity building events were organized under for Women Empowerment, included fifty women including, school students, housewives, fishermen’s wives, with the specific objective of enhancing women’s participation in fisheries and aquaculture development and to train them to contribute socially and economically to their own communities.

A primary aim of the training seminar was the provision of technical support to increase women’s participation in the labour market and in the establishment of their own enterprise. In this regard the workshop and training seminar for women and design of WP4 followed the work of the European Commission through its systematic and visible strategy to promote gender equality particularly with regard to women’s participation in science and research and the need to promote and encourage this on a pro-active basis.

It is noteworthy to mention that, FORCE coordinator has established a follow-up plan for Girls and boys’ schools that gave Aquaponic models form FORCE as a gift during the WP4 training, so that they can provide any assistance.

5. Networking with other research centres in Member States or Associated countries.”





FORCE support NIOF in acquiring key expertise and initiating network activities in the field of sustainable fisheries and aquaculture, by the involvement of the EU research centres (UNIVE, CNR-ISMAR, and AQUATT) as partners in the project. These institutions are actively participating in many EU projects and have long and sound experience in the field of fisheries and aquaculture. Also, the project partners facilitated NIOF access to the networks in the fisheries and aquaculture sector to which they currently belong. For example, AquaTT is positioned as a facilitator of knowledge management in the European Aquaculture and Innovation Platform (EATiP) and also is part of the secretariat team of Aqua-tnet, the European Thematic Network in the field of aquaculture, fisheries and aquatic resources management (funded under the European Commission Lifelong Learning Programme). AquaTT helped NIOF to network with the main European experts on aquaculture and fisheries belonging to these networks by the presentation of FORCE project and its results through their communication channels or in their meetings (see dissemination part).

Furthermore, FORCE coordinator already participated in other FP7 Mediterranean projects such AQUAMED, MEDINA, and PEGASO. This participation added another means of collaboration with FORCE project which allowed NIOF to strengthen the networks with Mediterranean and European researchers in these sectors.

In addition, the training courses and knowledge transfer activities described in PART!&2 allowed NIOF personnel to get in touch with experts from the EU on the topics listed before as well as on complementary issues, such field experience and sea-cruise.

Also a final FORCE conference has been carried out to present the project results to the EU scientific experts, the relevant stakeholders and wider public. Experts from European research institutions involved in EU projects, such as AQUAMED, MEDINA & PEGASO and other relevant organisations such as, the General Fisheries Commission for the Mediterranean (GFCM-FAO) invited to participate in the conference and to review the field and modelling activities carried out during the project. The international EU participants in the conference presented their own experience to the NIOF scientists and stakeholders. This activity facilitated the interaction between the European and Egyptian experts increasing the NIOF networks with other research centres in Member States or Associated countries.

6. Collaboration between FORCE and other Mediterranean Research and Innovation Networks projects (ERA-WID, MIRA, shERAKA, Med Spring, ..)"

- Tangible collaboration with Mediterranean innovation and research coordination action (MIRA) project, especially WP7 dealing with Horizon 2020. In this context, FORCE coordinator coordinated the Med Monitoring Expert group which was responsible on the preparing and delivered the report on "**Mediterranean Monitoring**" to MIRA coordinator. Furthermore, she presented a talk under the same title in MIRA meeting which has been held in March 2012, Egypt. As well as, FORCE coordinator invited by MIRA coordinator to participate in MIR final conference. At the same time, a link to MIRA website has been added to FORCE website and vice versa.





Another way of collaboration was done through organizing a joint event with Med SPRING as well as other INCO project, like, ShERACA project, where a joint training course has been organized. Also a collaboration has been done between FORCE and other ERAWID project dealing with environment related topics in the Mediterranean, as INCAM, to share experience and transfer knowledge in the field which would eventually maximize the use of the available resources and ensure regional integration towards decontaminating the Mediterranean (as mentioned in PART 2).

- FORCE has actively collaborated with AQUAMED project, in terms of, a MOU for scientific cooperation between both projects has been signed. In this sense, a session of FORCE has been organized in the AQUAMED final General Assembly and Platform stakeholders meetings. In addition, the scientific cooperation between FORCE and MEDINA'FP7 projects in the where FORCE provide MEDINA a results of experiments of aquaculture site selection, so that to comparable with food web model developed for Burullus pilot case.

7. Formulate five years strategy for NIOF for research valorisation based on lessons learnt in the FORCE project

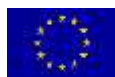
FORCE is part of the 27 projects that have been financed through the ERA-WIDE call launched in 2010 by the European Commission. The aim of this call was to reinforce the research, development and innovation capacities of the research centers from the European Neighboring Partnership (ENP) countries in order to increase their competitiveness and improve the RDI cooperation among the region. Hence, one of the main results expected from NIOF as Coordinator of FORCE project is to contribute to NIOF's strategy of research valorisation beyond FORCE project (Deliverable 4.4).

Based on the lessons learnt during the project implementation, and taking into account the ongoing and forthcoming internal efforts carried out by NIOF to formulate its future strategy and corresponding annual action plans, it is proposed to implement FORCE's (D4.4) NIOF's strategy of research valorization based on the organisation of a collective coaching process with NIOF's researchers and managers. This process has been done by INNOVETY Company in collaboration with project coordinator.

The full version of strategy submitted to EC as D4.4.

INNOVETY prioritized the full action plan (D4.4) and accordingly recommends the following:

1. Excellent work conducted under FORCE, NIOF has a solid opportunity to valorize research based on the learning.
2. Governing Pillars for Research Valorisation are; Research Management & Dissemination, Technology Transfer, Spin- offs and Infrastructure (IP Toolbox & Open Innovation Platform)
3. Review and fine-tune NIOF's research strategy and make sure the goals are aligned with the national priorities. Make the vision, objectives, and priorities clear for all researchers. Fund: This can be done without external fund. NIOF's staffs just need to obtain management buy-in and convince them about the importance of such action.



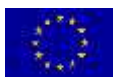


4. Establish a Technology Transfer Office (TTO) at NIOF. This TTO will develop the policies and guidelines for IP management, IP ownership, Technology Commercialization, and Confidential Information Management and will make sure that those policies and guidelines are aligned with NIOF's main strategy.
5. Partner with existing business incubators to support NIOF's researchers who want to spin-off a company to valorise their research output.
6. Develop an online innovation/collaboration platform to facilitate research collaboration between NIOF's researchers, other research institutions, and the industry and to expose NIOF's technologies to the outside world.

Overall impact

- Results of FORCE are aimed to have a positive impact on the socio-economic development of Egypt, as well as on that of other North African countries. The experience and results gathered from FORCE were collected and will be published in two course books as a guide for researchers, stakeholders and policy makers during the second period.
- FORCE played an important role in building institutional capacity among all partners, stakeholders and contributes to the preparation and development of Environmental Impact Assessment (EIA) and Terms of Reference (TOR) as guide lines for fish farming. This will assist potential investors in choosing appropriate sites and preparing an environmental management plan for the management of their farm, thus helping GAFRD and EEAA in the applying innovative systems for follow-up of fish farms impact on surrounding environment.
- The final project workshop focused on the perspective of fisheries and aquaculture in Southern Mediterranean countries. Experts from the EU and coordinators from FP7 projects invited to participate in this conference. In this way NIOF scientist had the possibility to meet important players in the European research arena, as a starting point for initiating active exchanges of staff and know-how.
- NIOF's strategy of research valorisation based on the lessons learnt during the FORCE project has been drafted in month 28 of the project and submitted to EC , NIOF president and Egyptian Minister of Scientific Research. In this context, the strategy could be applied in the near future in NIOF and other research institution in Egypt
- Increased the link with other FP7 projects, (Med Spring, ShERACA2,) and Established links with other FP7 projects, (Memorandum of Understanding (MOU) with AQUAMED and MEDINA Projects)
- Publishing two scientific papers in esteemed Journals (the first one has already published by CIESM , however the second "An overview of fishing technology in Egypt: weakness and opportunity" in the reviewing process.
- Two course boxes gathering all FORCE experience and results have been developed as a guide for the sustainable management of aquaculture and fisheries.

➔ Lessons Learned From FORCE Capacity building activities



- The trainers of FORCE' training events pointed out that, the case method is an effective instructional strategy that engages students in active discussion and it has proven to be an effective way of both disseminating and integrating knowledge. Instructional strategies that engage the participants in the learning process stimulate critical thinking and a greater awareness of other perspectives. Trainees seemed to be more reactive if they had the opportunity to apply what they learned in the classroom to real-life experiences. Therefore the method chosen for all FORCE knowledge transfer trainings was to teach the course contents through problem-solving exercises methodology, informal small groups, simulations, case studies and other activities, all of which require students to apply what they were learning. In this phase participants had the opportunity to analyze certain data with the software (as in SELNET), or with real case (site selection-field experiments) or real model (as in aquaponics) or true documents of open call for proposal (as in training how to write a competitive research proposals. This will enable the participants to perform studies in an autonomous way in future research activity.
- One of the main lessons to be learned from the FORCE training events is that success in creating innovations is a key factor for the success of both researchers and societies. One precondition for this is high-level R&D know-how transfer.



Figure 24: Participants were split in working groups in order to directly apply what they were learning

- Introducing a technology or practice needs to involvement of stakeholders, managers and the environmental bodies, to know what they think about the new solution and what they suggest.
- Meetings and publicity are considered as an essential step in order to make the new technology more acceptable to stakeholders.

Outreach and Dissemination of results and networking



To ensure the effective external dissemination and communication of the project and its results that is understandable to stakeholders, the scientific community & the wider public and to strengthen the NIOF network in the aquaculture and fisheries sectors with relevant European research centres, the WP5 closely worked with WP1 “Management. The Communication and Dissemination Strategy (D5.3) was developed by AQUATT from early stage and reviewed at each project meeting. It identified the target groups and key stakeholders of the project, the communication channels, and described the dissemination procedures of the project. The Communication and Dissemination Strategy was approved and outlined in kickoff meeting at Alexandria (November 2011). A broad spectrum of dissemination tools have been used for general dissemination and specific customised dissemination has been occurred where there is a need to communicate to sub-groups or end-users.

The promotional material developed for FORCE includes: the project website; the fact sheet; the logo; a Power Point Template; a general presentation on FORCE; a technical leaflet of the project; a video introducing the FORCE results obtained within the project; four posters, per reviewer scientific papers, two text books gathering all deliverables and recommendations, and web dissemination actions, article in National Journals. With collaboration between NIOF and AQUATT a final fact sheet gathered all the project activities was designed and printed to be disseminated at FORCE final conference. Besides, NIOF has developed special dissemination materials for each event and meeting (Roll up, posters, leaflets, banners,).

- **FORCE web portal:**

The website (www.forceproject.eu) was designed and developed in March 2012 following the standard design and content of FP7 project. A website User guide was developed by AquaTT and delivered to NIOF to assist in their management of the website. The website went live in mid September 2012. AquaTT have agreed to proof read any English content to be uploaded to the website and continue to provide guidance to NIOF with website management (part of D5.2 - Regularly updated project website), this included sitting down with a NIOF representative at the first General Assembly meeting and highlighting and recommending areas where the website can be improved. There is a link to the project intranet site, [Basecamp](#), on the website. The website is available in Arabic and English so as to disseminate project outputs to a wider audience. Project coordinator planned to keep FORCE web-portal active three years beyond project.

- AquaTT has released 8 press releases highlighting FORCE, The press releases were disseminated through AquaTT’s Training News newsletter which has approximately 6000 subscribers and through the Aqua-tnet newsletter. AquaTT is the secretariat for managing Aqua-tnet (www.aquatnet.com), the biggest educational network in the aquaculture, fisheries and related sectors in Europe with approximately 300 subscribers.

NIOF released the **first project newsletter** in mid-April 2013 which provides an overview of activities carried out in the first year of the project.

- **FORCE video:** 7 minutes video has been developed for FORCE, outlined aims, slogan of project, and synopsis of most activities. This video includes also, a short videos of learning by doing activates which have been done by FORCE. This video was presented in all national and international meetings



which project coordinator was participated. In addition, the video sent to EC to be uploaded in the portal and to Med-spring project to be added as a link in the project portal. [The video can be watched here http://www.forceproject.eu/media-centre/videos-5](http://www.forceproject.eu/media-centre/videos-5)

- **Article in PESCE - CNR National Journal:** CNR-ISMAR who arranged the Sea-cruise for learning by doing has published the detailed of this activities in the National Journal (IL PESCE)



Figure 25: Article on FORCE in IL PESCE Italian magazine

- Finally, **two course books** have been developed as a guide for the sustainable management of aquaculture and fisheries was prepared by CNR- ISMAR and UNIVE partners. This course books considers as a guide for fisheries and aquaculture sector and can support local trainers to develop appropriate short-courses in fisheries and aquaculture sustainable management aiming at the implementation of the Ecosystem Approach to fisheries and introduce the participants to the principles of Horizon 2020. Both books going to be published in the international esteemed publishers.

Figure 26: Aquaculture and Fisheries cover books

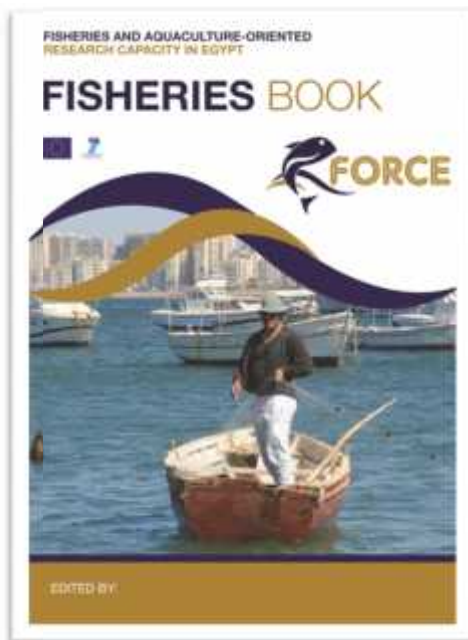
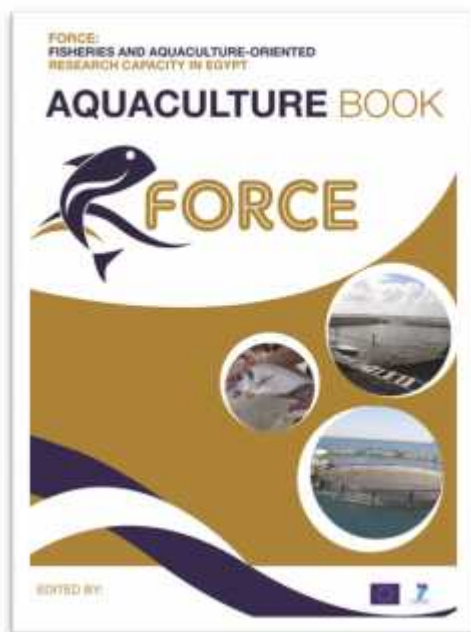




Figure 27: Summary of dissemination activities

In addition to the regular project meetings that included in DOW, two important events have been organized in collaboration between AQUATT and NIOF;

- **The first one is a session** in AQUAMED final conference and platform meeting. A representative from each of NIOF, UNIVE and AquaTT attended AQUAMED (<http://www.aquamedproject.net>) Partner meeting, which was held in 20th May 2013, Istanbul, Turkey. And provided opportunity for NIOF to network with EU research institutes and enhance their capabilities for participation in EU funded research programmes

- **Final project conference and stakeholders meeting**

The Final project conference (M 29) focused on the perspective of aquaculture and fisheries in Southern Mediterranean countries, in addition to research and innovation perspectives. Participants have been carefully selected, in order to cover all key aspects of fisheries, and aquaculture production, from hatcheries to the marketing stage. Their active participation in national societies and recent EU projects will be one of the criteria for selection: in this way, NIOF scientist will have the possibility to meet at one stage important players in the European research arena, as a starting point for initiating active exchanges of staff and know-how.

The Conference has been organised by NIOF and AQUATT in collaboration with project partners (University of Ca' Foscari; CNR_ISMAR and AquaTT) and advisory board to present the results of FORCE project to all the partnership and stakeholders. Four EU experts have been invited by project coordinator (GFCM, IFremer, PEGASO coordinator and IEAMED, Spain). **The Meeting objectives were:**

- Dissemination of FORCE results to scientific community, stakeholders and wider public
- Assessment of main FORCE results.
- Discussion on Governance initiatives and future orientation for Fisheries and Aquaculture
- Discussion on “What drivers could help overcome barriers to value creation and innovation from scientific Research”
- Prospection for future action plan beyond FORCE (road map for further development of aquatic resources in Egypt and other SE Mediterranean Sea countries.

The two days workshop was been divided as follows:

Day 1: Presentation of FORCE results to scientific advisory panel and discussions;

Day 2: Presentation to stakeholders and International experts to assess FORCE results and identify potential pathways to help sustain the project.

The event also focused on opportunities to help sustain FORCE activities and to further continue the second phase of FORCE2, so that can complete the measures which just started during project time.

All events detailed and recommendations can be find in D5.4





Figure 28: FORCE final conference selected photos



Figure 29: PEGASO project event by collaboration with FORCE and MEDINA project

The address of project public website and relevant contact details

Project website: www.forceproject.eu



Relevant contact details:

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Contact number: 002-01201607026

Coordinator: suzankholeif@gmail.com

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Project logo:



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