

FISHERIES/AQUACULTURE DEVELOPMENT PROJECT FOR THE MAGHREBIAN COUNTRIES IN COOPERATION WITH SENEGAL, EGYPT, LEBANON AND TURKEY

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**Prepared for: Mauritania, Morocco, Algeria, Tunisia, Turkey and
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REVERSE LINKAGE PROGRAM**

Preamble

The majority of member countries of the Organization of Islamic Cooperation (OIC) are maritime states bordering the Atlantic coast of North-West Africa, the east and east coasts of Mediterranean, South coast of Black Sea, the Red Sea, the North Arabian Sea including the Gulf and parts of South East Asia. Under the United Nations Convention on the Law of Sea (UNCLOS) of 1982, the marine jurisdiction of these nations has been extended to about 10 Million square kilometers Exclusive Economic Zone (EEZ) over which these countries have sovereign rights on its resources. Most of these oceanic areas represent some of the most productive regions of the world oceans, characterized by such oceanic phenomena favorable for producing rich fisheries, mineral, and oil and gas resources. These maritime areas are interconnected from Atlantic through Mediterranean via Red Sea, Arabian Sea, and Indian Ocean to Pacific Ocean, the geographic limits of most of the Islamic littoral states are inter-linked through the oceans and share in common, the waters and resources.

Economic exploitation of ocean space and its resources is beset with numerous scientific and technological problems in the majority of these countries. Therefore, these countries need “Advanced Marine Science and Technologies” for maximum utilization of marine affairs, protection of marine environment and balancing the multiple uses of ocean space. The solutions of these problems require a sound and scientific technological basis in marine science and technology. Reviewing the majority of member countries of the Organization of Islamic Cooperation (OIC) are maritime states bordering the Atlantic coast of North-West Africa, the west and east coasts of Southern Mediterranean, South coast of Black Sea, the Red Sea, the North Arabian Sea including the Gulf and parts of the fast development of marine sciences and technology in the world and assessing the rich benefits being accrued by the developed countries from living and non-living resources of the oceans, therefore these can be achieved by establishing a cooperative network on oceanography between Islamic countries so that full benefit can be obtained through pooling of resources, efforts and responsibilities beyond their national interests.

There is a saying in oceanography which is:

“Think Global Act Regional”

Within the framework “BLUE GROWTH” we should consider our regional marine environment in the context of below thoughts:

Setting a vision for seas and ocean science

- The ocean is a source of food, water, energy and raw materials, a medium for tourism, transport and commerce, and can provide solutions to many Countries and global policy challenges.

- But the ocean is neither inexhaustible nor immune to damage. In the context of rapid global change and human population growth, it is imperative to achieve human wellbeing by combining economic benefit with environmental protection.
- This presents a highly complex challenge. Collaborative and cross-disciplinary research is the key to providing the knowledge and tools that we need to achieve ecosystem-based management and protection of valuable marine resources and services.

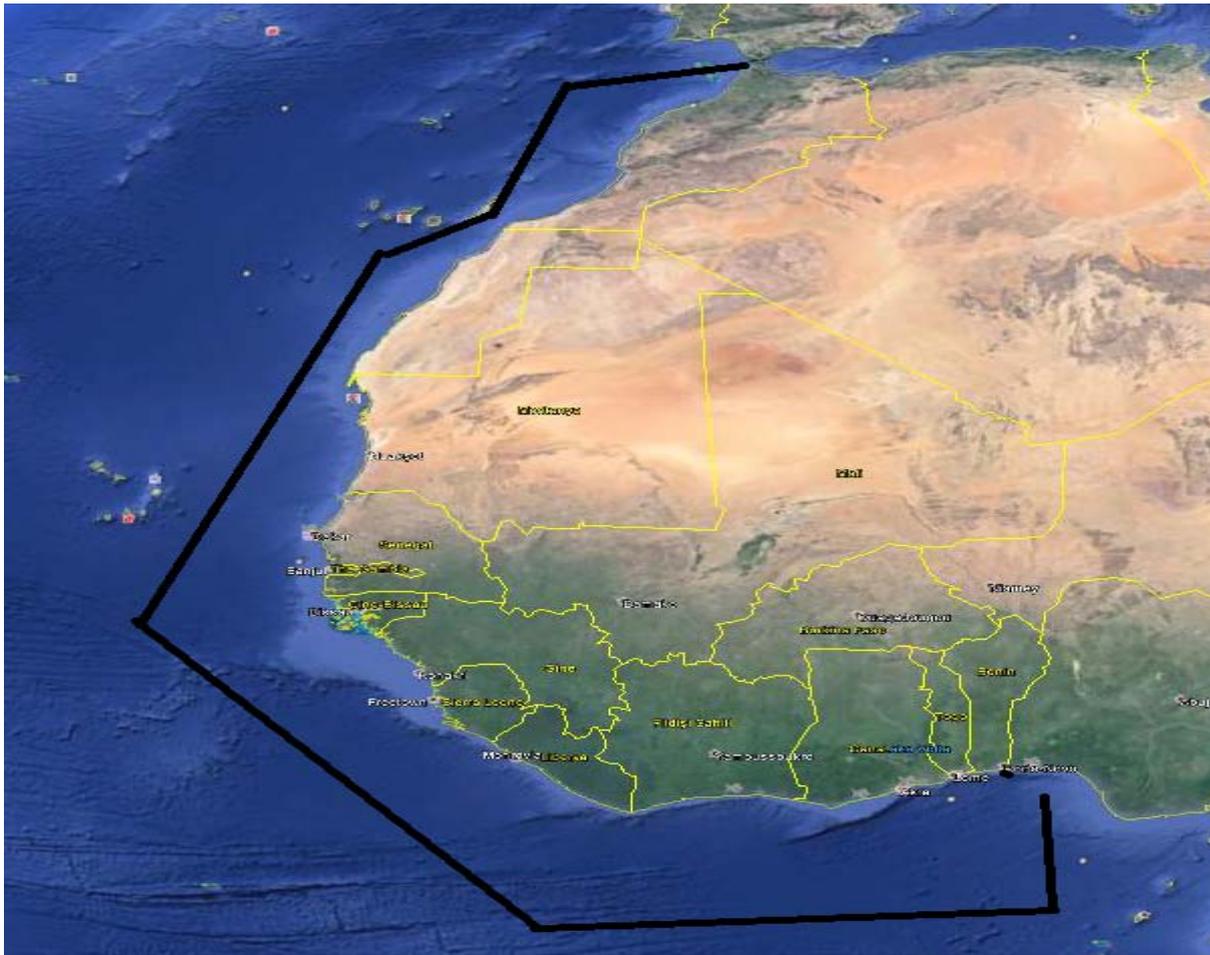
The Goals

- **Valuing the ocean:** Promoting a wider awareness and understanding of the importance of the seas and ocean in the everyday lives of citizens.
- **Capitalizing on the Islamic leadership:** Building on our strengths to reinforce position as a global leader in marine science and technology for the countries.
- **Advancing ocean knowledge:** Building a greater knowledge base through ocean observation and fundamental and applied research.
- **Breaking barriers:** Addressing the complex challenges of blue growth and ocean sustainability by combining expertise and drawing from a range of scientific disciplines and stakeholders.

The Islamic countries, therefore, must build a bigger and better base of science and technology for their future needs. They must not only strengthen their national science and technology systems but also endeavor to develop the institutional mechanism at the sub regional and regional levels, and achieve collective strength in science and technology in order to face the future with courage and confidence. A sustained effort of this magnitude is only possible if there is a clear appreciation of the historical perspective, the perception of the historical perspective, the perception of contemporary issues and a vision of the desired future.

The pooling of resources and the evolution of common strategy can be greatly facilitated if a mechanism for providing smooth and quick exchange of relevant information and data exists in the Islamic world. The Inter-Islamic Networks on Science and Technology will hopefully provide the necessary mechanism and means for exchange and sharing of information, data, ideas, experience and know-how enabling the formulation of a unified strategy by the partners working together in the joint projects through collaborative efforts through South-South understanding.

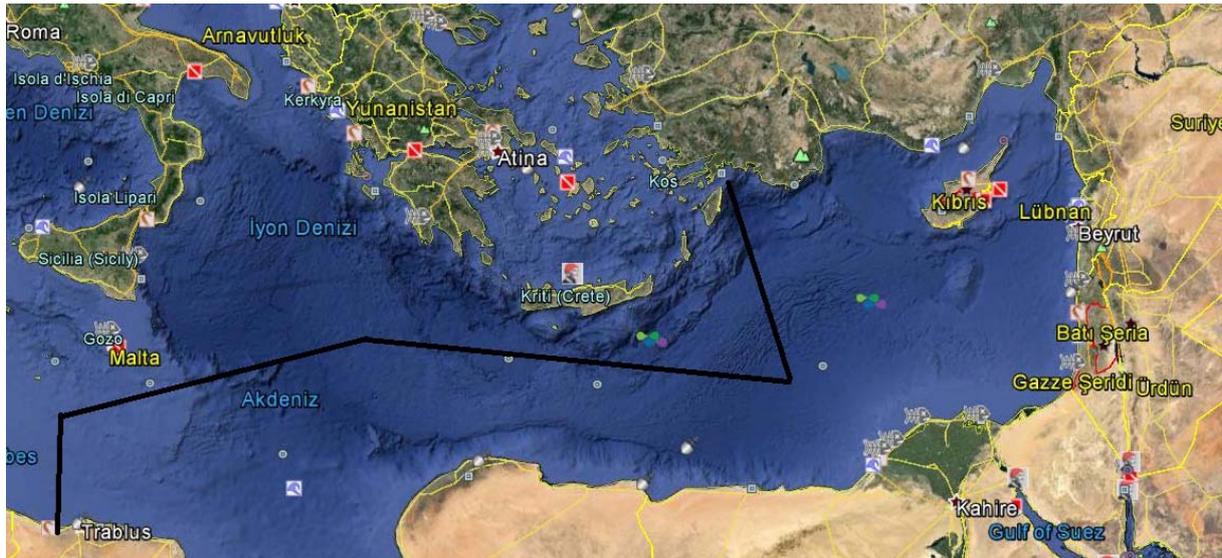
In this context we are going to get together the OIC countries of Senegal, Mauritania, Morocco, Algeria and Turkey riparian to the Atlantic coast of North-west Africa, the whole south and east of Mediterranean. These areas are:



ATLANTIC, NORTHWEST AFRICA



MEDITERRANEAN, WEST



MEDITERRANIAN, EAST

Challenges of Beneficiary Countries/ Institutions

As stated by FAO that fisheries and aquaculture have the capacity – if supported and developed in a regulated and environmentally sensitive manner – to contribute significantly to improving the well-being of poor and disadvantaged communities in developing countries and to achievement of several of the Millennium Development Goals, especially those related to poverty reduction and food and nutrition security, environmental protection and biodiversity.

Fisheries and aquaculture play an important role in the countries in terms of contribution to economic development, employment for coastal communities and as an important source of food. Harvests of wild aquatic species or matching demand through commercial fishing interests would eventually result in overfishing and the loss of those species entirely. Therefore, while aquaculture is required to meet the human demand, it also relieves the strain on wild species to allow them to continue to be a significant source. In the most of the member states, the production from capture fisheries stabilized in the early 1990s and many stocks are considered now fully or overexploited. In response, marine and brackish water aquaculture grew steadily during the last decades.

The need for increasing supplies of aquatic foods to meet the growing demands of an expanding population is recognized as an important problem of the world. Closely related is the concern over the increasing pollution of the coastal areas, with potentially serious effects upon the aquatic environment and its ability to produce acceptable foods. At last, the sustainability of the sector is increasingly challenged by old and emerging issues which require innovative techniques to be successfully managed.

Consequently, in order to achieve this goal, it is important to develop new modern environmentally friendly aquaculture techniques, to know the different disciplines of this industry and their management. FAO is the only intergovernmental organization formally mandated by its constitution to undertake the worldwide collection, compilation, analysis and diffusion of data and information in fisheries and aquaculture.

The compilation of accurate, relevant and timely data in a standard form facilitates monitoring, comparisons and analyses of status and trends that are essential to underpin the responsible development of the world's fisheries and aquaculture sectors and the sustainable utilization of the resources. It requires intensive international collaboration and cooperation, an area in which FAO plays a central role.

Since its inception, the FAO Fisheries and Aquaculture Department has built up statistical databases that are publicly accessible. The data is provided by FAO Members and verified from other sources wherever possible. The reliability of the analysis based on the data, and the quality of the advice to which it gives rise, depends on the reliability and quality of the data itself. To this end the FAO seeks to continue supporting and strengthening national capacity in the collecting, analysis and use of accurate, reliable and timely data. In this respect the FAO has a unique role in supporting the management and development of the aquaculture and fishery sectors.

The Aims and objectives of the Project:

As part of the Project, several objectives are targeted:

- **Reinforce the capacities of the member's institutions about the modern techniques of marine and inland fisheries/aquaculture;**

It's known that very many of the countries are the main (inland and marine) producing countries of fisheries. The average annual growth for the period from 2009–2014 for marine and brackish water fisheries/aquaculture is estimated at 9 per cent. The objective here is to help all the member states to reach a satisfying level of production.

- **Contributing to the development of fisheries/aquaculture production using sustainable practices that help stabilize aquatic resources, improve ecological conditions and maintain bio-diversity;**

In order to solve those environmental and social concerns, it is necessary to call for a swift inclusion of aquaculture within integrated coastal zones management and maritime policies. In this respect, space limiting factors, administrative and local conflicts are real and need a collaborative approach to be solved.

- **Ensure a better monitoring of fisheries/aquaculture industry in the Member Countries;**

In the World, it isn't easy to talk about a real existence of a common marketing strategy in the sector to better ensure price stability, product traceability, exploitation of emerging markets, the increase in domestic consumption, improving the sector's public image and increasing the competitiveness of the industry. Here, the course aims to help participants of the countries concerned to improve their data collection methods, evaluation and forecasting of production.

Fisheries/aquaculture and extractive fishing are complementary activities that must face the challenge of the increasing needs for marine products. and as you know the extractive fishing reached its highest levels at the end of 1980 and since that time has fluctuated around the same level, indicating that the oceans are exploited near to their maximum production. At this situation future increases of the products can only come

from the aquaculture, as has been happening in the last 20 years. In fact, aquaculture has grown and diversified, and has registered enormous technological improvements. In this context we are today here to share experiences between our countries.

Conscious of the importance of fisheries/aquaculture's role in ensuring the increased need for animal proteins at global, regional and, above all, national levels, with a view to reviving this sector which has experienced difficulties and of the results unconvincing in its beginnings. Among the recommendations mentioned in this strategy, in addition to administrative and financial incentives, the strengthening of fisheries/aquaculture training and research in order to remedy the shortcomings and to solve the difficulties encountered.

In response, marine and brackish water aquaculture grew steadily during the last decades. The need for increasing supplies of aquatic foods to meet the growing demands of an expanding population is recognized as an important problem of the world. Closely related is the concern over the increasing pollution of the coastal areas, with potentially serious effects upon the aquatic environment and its ability to produce acceptable foods. At last, the sustainability of the sector is increasingly challenged by old and emerging issues which require innovative techniques to be successfully managed.

In this context I would like to remember of the words of Henry Kissinger (1976):

***WITH OIL YOU CONTROL STATES
WITH FOOD YOU CONTROL PEOPLE***

Therefore;

“FOOD SECURITY CONCEPT”

is very important for the developing world. Consequently, in order to achieve this goal, it is important to develop new modern environmentally friendly aquaculture techniques, to know the different disciplines of this industry and their management.

Objectives of the Project

- Reinforce the capacities of the member's institutions about the modern techniques of marine and inland fisheries/aquaculture;
- Contributing to the development of fisheries/aquaculture production using sustainable practices that help stabilize aquatic resources, improve ecological conditions and maintain bio-diversity;
- Ensure a better monitoring of fisheries/aquaculture industry in the member countries.

Specific action plans and strategies should take place for preservation and health maintenance of the fisheries/aquaculture in the region. There is a saying in Oceanography:

“THINK GLOBAL ACT REGIONAL”

FAO is the only intergovernmental organization formally mandated by its constitution to undertake the worldwide collection, compilation, analysis and diffusion of data and information in fisheries and aquaculture. The compilation of accurate, relevant and timely data in a standard form facilitates monitoring, comparisons and analyses of status and trends that are essential to underpin the responsible development of the world's fisheries and aquaculture sectors and the sustainable utilization of the resources. It requires intensive international collaboration and cooperation, an area in which FAO plays a central role. This Project will help the international bodies to get good information for the region. Therefore, it will help the goals of FAO in this respect.

Project Connection with FAO

Since its inception, the FAO Fisheries and Aquaculture Department has built up statistical databases that are publicly accessible. The data is provided by FAO Members and verified from other sources wherever possible. The reliability of the analysis based on the data, and the quality of the advice to which it gives rise, depends on the reliability and quality of the data itself. To this end the FAO seeks to continue supporting and strengthening national capacity in the collecting, analysis and use of accurate, reliable and timely data. In this respect the FAO has a unique role in supporting the management and development of the aquaculture and fishery sectors.

The FAO Fisheries and Aquaculture Department recognizes the importance of internationally agreed methods and tools for data compilation. Thus, for the last five decades, it has cooperated in international efforts directed towards the development of standard concepts, definitions, classifications and methodologies for the collection and collation of fishery statistics, most notably through the Coordinating Working Party on Fisheries Statistics.

As part of a long-term strategy, activities of the **FAO Fisheries and Aquaculture Department** are defined through its vision and mission statements:

Vision: A world in which responsible and sustainable use of fisheries and aquaculture resources makes an appreciable contribution to human well-being, food security and poverty alleviation.

Mission: To strengthen global governance and the managerial and technical capacities of members and to lead consensus-building towards improved conservation and utilization of aquatic resources.

Aquatic ecosystems, inland, coastal and marine, provide humans with resources for recreation, food and livelihood. They also perform many other important environmental functions, e.g. in relation to meteorological events, pollution etc., contributing to general human well-being. They are used by both capture fisheries and aquaculture as well as other competing sectors. Achieving sustainable use of aquatic ecosystems has been the main and largely failed objective of fisheries management for decades.

The formally adopted **Ecosystem Approach to Fisheries (EAF)** imposes further efforts in that direction, implying better understanding and better governance.

Conceptually, ecosystems can be described at various sizes and with different degrees of resolution, from the Earth or a whole ocean with their large-scale relations and processes, to a microscopic grain of sand and its immediate surroundings. The choice is based on pragmatic considerations. Fisheries usually better relate to the intermediate ecosystem size range, corresponding to the size of the resources sought and of social structures in charge of their stewardship. In each case, adjustments will be needed to account for the possible mismatch between the limits of the human jurisdictions and those of the species distributions and ecological processes.

The exploited ecosystem is unavoidably affected by fishery activities. Wild or ranched stocks and other organisms affect each other e.g. through predator-prey relationships or transfer of diseases. The impact of capture or culture on the resource, the associated and dependent species, the habitat, the bottom and the benthic flora and fauna can be particularly severe and long lasting. It is also vulnerable to degradation and pollution imposed by other industries, with long-lasting or irreversible effects, including on the production of fisheries, seafood quality and fishers' livelihood.

Natural variability and climate change have significant implications for productivity and management. Catastrophic natural events (e.g. typhoons, tsunamis) have significant impact on resources, infrastructures and people. Understanding, predicting and accounting for them is a significant challenge of the next decade.

Capture fisheries and aquaculture depend on the use of natural renewable resources and other resources (e.g. aquatic species, land and water) as raw material. Other resources such as hatchery-produced seeds, feeds and fertilizers are artificially generated. Because fishery resources are finite, there is competition for them, within the sector and with other types of uses.

Capture fisheries resources have historically been considered, used and managed on a stock-by-stock basis. They are impacted by fisheries as well as other polluting and degrading economic activities. The state of wild marine resources raises concern as, since 1990, about a quarter are more or less seriously overfished. The state of wild inland resources is poorly known but is likely to deserve equal concern in most regions and reflect a much greater environmental impact.

Harvesting of aquatic resources and production is done either in the wild (capture fisheries) or in controlled environments (aquaculture). Both use a large variety of technologies - from artisanal to highly-industrial - encompassing vessels and equipment as well as fishing gears and methods.

For both capture fisheries and aquaculture, the technological development and widespread use of synthetic fibers, hydraulic equipment for gear and fish handling, electronics for fish finding, satellite-based technology for navigation and communications, onboard conservation and increase use of outboard engines have all contributed to the major expansion of fisheries and aquaculture in recent decades - particularly in small-scale fisheries. Technical advances have generally led to more

efficient and economical fishing operations, reduction of the physical labor required per unit of output and improved access to resources.

Where management has been ineffective, the greater efficiency of fishing methods and aquaculture production has sometimes led to overfishing and environmental degradation. This points to the need to develop more effective fisheries management frameworks, together with safer and more environmentally-friendly methods of production, for example, in developing selective fishing gear and in designing aquaculture systems that reduce their impact on external environments.

The most common use for fisheries resources is food. Over 75% of the global fish production is used for direct human consumption and the consumption of fresh fish is growing at the expense of other forms of fish products (e.g. canned fish). Fish landed not used for direct human consumption is reduced to fishmeal and oil (some 33 million tons per year) used as feed, mainly for pigs and chickens and, more recently, for raising carnivorous aquatic species (such as salmon, shrimp, sea bass, sea bream, etc.).

Of the fish destined for direct human consumption, the volume marketed as fresh fish nearly doubled during the 1990s. Fresh fish is now the most important fishery product (nearly half of the market), followed by frozen, canned and cured fish. With over one third of world fish production now being traded internationally, quality and safety assurance has become a major issue.

Fish represents a valuable source of proteins and nutrients in the diet of many countries and its contribution to food security is rising significantly. Post-harvest handling, processing and transportation of fish require particular care in order to ensure proper quality and safety. Retaining the nutritional value of the fish, preserving the benefits of its rich composition and avoiding costly and debilitating effects of fish-borne illnesses are vital.

The generally acknowledged limits of production from capture fisheries, coupled with the widening gap between the supply and demand of fish for human consumption, reaffirms that post-harvest losses are an unacceptable waste of scarce natural resources. Post-harvest losses of fish occur in various forms. The physical loss of material is caused by, for example, poor handling and preservation or the discarding of bycatch. Economic losses occur when spoilage of wet fish results in a value-decrease or when there is a need to reprocess cured fish, raising the cost of the finished product. In addition, inadequate handling and processing methods can reduce nutrients, leading to nutritional loss. Similarly, the lowering of large quantities of fish catches into animal feeds can be considered under certain conditions as a "loss" for human food security.

Considerable progress has been made in recent decades to establish international agreed standards and procedures that assure consumers a good quality fish product. Also, World Trade Organization (WTO) members have agreed sets of rules designed to prevent states using quality and safety issues as trade barriers. However, problems arise in the use of these standards, procedures and rules. The hazard analysis critical control point (HACCP) system, a systematic and preventive approach for the assurance of food safety and quality, is now accepted worldwide as the most cost-

effective system for quality and safety assurance and has been made mandatory in many countries. But differences arise in the way the system is implemented in practice.

The *Codex Alimentarius* of FAO and the World Health Organization (WHO), created in 1963, is a voluntary code establishing international standards for food safety and quality. The agreements on Technical Barriers to Trade and on Sanitary and Phytosanitary Measures recognize the *Codex Alimentarius* Commission as the international standard-setting body for food safety and encourage member countries to use *Codex* standards to facilitate international harmonization and fish trade – although much remains to be done to achieve international harmonization and to develop equivalence framework.

Governance at all levels

Fishery governance has international, national and local dimensions. It includes legally binding rules, such as national policies and legislation or international treaties as well as customary social arrangements. It is multiscale, covering long-term, strategic, planning as well as short-term operational management and local fisheries as well as whole ecosystems. It has public, private, and hybrid components that interact in ensuring administration and regulation of the sector.

More environmentally conscious, precautionary and participative forms of fishery governance are emerging from the UNCED process in which the keywords are: commitment, legitimacy, credibility, transparency, performance assessment, oversight, duty of care, equity, science and other knowledge, traditional values, ethics, systemic, multiscale, integration, coordination, adaptive etc.

Benefits

Stakeholders and policy makers will gain reliable estimates regarding fisheries/aquaculture resources and potential environmental challenges; fisheries/aquaculture exploitation technologies need to be developed beyond current prototype application; they will be assessed with a view to environmental impacts and integration into a future food production roadmap. This will strongly benefit from a network of collaboration and exchange, concentrating all disciplines required to evaluate marine fisheries/aquaculture resource with sustainability for the region.

Objectives, Deliverables and Expected Economic Impacts

Regional expertise in different scientific and technological disciplines relevant to the development of fisheries/aquaculture a future food resource is currently not used to its full potential; the objective of the Action is to merge and coordinate the various fields of expertise. The sub-ordinate targets to achieve this objective are:

- (i) to link the scientific and engineering communities to assess the development of economic and environmentally sound technologies,
- (ii) (to link up running/planned national-funded projects, iii) to establish a panel of experts that can advise on and work towards realizing future fisheries exploitation projects,
- (iii) to advise policy makers and stakeholders on fisheries exploitation issues.

Deliverables will comprise:

- (1) Action webpage -milestone: developing a webpage providing a public part for outreach and an internal part for project communication,
- (2) definition of fisheries/aquaculture key areas and development of a best environmental practice's guideline - milestone: annual meetings and short working group meetings,
- (3) ~5 short-term scientific training missions (STSM) per year for young scientists to enhance collaboration during expeditions and technical development processes,
- (4) publication of results in peer-reviewed open access journals.

The network will strengthen existing relationships to FAO and research groups to incorporate their experience in the Action.

Scientific Program and Innovation

This Project aims to:

- (i) explore the Maghrebian waters systematically for their potential gas hydrate resources using existing data,
- (ii) evaluate various production and monitoring technologies, iii) assess the environmental challenges associated with fishing and aquaculture activities, and
- (iii) combine knowledge of low-cost, safe, and environmentally sound technologies.

The scientific program will be carried out by four multidisciplinary working groups.

Working Group (WG) 1: Resource assessment

This WG will bring together experts from various scientific disciplines (e.g. biology, oceanography, ecology, environment, aquaculture, modelling) and industry to evaluate, reprocess and complement the multiplicity of data sets produced by fisheries/aquaculture industries. The aim is to quantify the volume and distribution of exploitable fish stocks and resources in the region. The main questions are:

- (i) Which are the key areas for fish and aquaculture productions in the region?
- (ii) What can be learned from re-processing of existing data and large-scale basin modelling?
- (iii) Can modelling approaches facilitate the identification of exploitable resources?
- (iv) Is fish production from marine resources economically feasible?

WG 2: Production and monitoring technologies

WG2 will pool professionals developing and employing production and monitoring technologies to progress the development of these technologies regarding their

economic feasibility and environmental soundness. Accordingly, appropriate site-specific production and monitoring strategies will be developed. The main questions are:

- (i) Are the region's SMEs ready to produce cost competitive, safe, and sustainable technologies for production and monitoring?
- (ii) At which circumstances could the production technology be the economic and environmentally preferred technique?

WG 3: Environmental challenges

The members of WG3 will review the environmental challenges associated with fisheries and production from aquaculture mainly. The aim is to define an environmentally sound monitoring strategy and a legal framework adapted to aquaculture productions. The main questions are:

- (i) Could fisheries activities and aquaculture sites affect marine environment?
- (ii) To what extent could these activities go on during production and what would be the impact?
- (iii) Are there effective monitoring technologies in place?

WG 4: Integration, public perception, dissemination

Interdependent scientific, technological, and economic questions have to be approached in order to adapt marine resources for the region. WG4 will coordinate and integrate the multidisciplinary work anticipated in the first 3 WPs. It will identify decision-support tools for policy makers, and develop communication strategies to responsibly inform the public, stakeholders and policy makers. Furthermore, it will support and foster training of young professionals.

ORGANISATION

The Project brings together renowned regional scientists, engineering experts and early stage researchers (ESR). Participants to the Action should be involved in/planning national projects dealing with one or more of the questions mentioned above. Due to the global relevance of the topic and the need to link it to key investigations in international partner countries researchers from all over the world. An utmost concern of the Action is the STSM exchange to enable ESR to develop lasting contacts supported by well-connected senior scientists

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