



## Soaring global food prices: will they affect aquaculture?

According to a recent FAO report, the cereal import bill of the world's poorest countries is foreseen to rise by 56 percent in 2007/2008. This comes after a significant increase of 37 percent in 2006/2007. The increase is due to the sharp rise in international cereal prices, freight rates and oil prices. Bad weather conditions (perhaps as a result of global climate change) and droughts which reduced the expected production of cereals in many countries, along with the use of certain grains in bio-fuel production have also contributed to soaring prices worldwide.

Cereal prices have risen precipitously over the past two months, reflecting steady demand and depleted world reserves. The price of rice increased the most following the imposition of export restrictions by major exporting countries. By the end of March 2008 the price of wheat and rice nearly doubled the levels of the previous year, whilst the price of maize has increased by a third.

Consequently, despite policy measures, over the past few months a number of developing countries have been hit by the soaring prices of bread, rice, maize products, milk, oil, soybeans and others basic food items and also the export restrictions, subsidies, tariff reductions and price controls by governments of both cereal importing and exporting countries to limit the impact of international prices on domestic food markets.

As a result, food riots have been reported in several places during the past month.

The major concern of the fish farming industry is whether the rising cereal prices will have a direct impact on fish production?

In aquaculture, almost 50 percent of the production cost goes towards feeds and feeding. Although considerable variation exists between species, cereal or grains are the usual sources of carbohydrate in most of the aquafeeds and hence the cost of feed will naturally rise along with the rising price of grains. Fishmeal is also an integral component of fish feed. It is used in different quantities depending on the species to be fed. Soaring petroleum prices, el-nino effects, and increased demand have caused a global increase in fishmeal prices. The price of global fishmeal and grain have already caused a serious impact on the fish feed prices. In fact, the average price of feed ingredients commonly used in aquafeed has risen by 30-130 percent over the past year.

There is evidence that co-products from bio-fuel generation can provide protein for fish feeds at a lower cost than the commonly used soybean-corn combination. Research also indicates that fishmeal could be supplemented by various other ingredients. However, the carbohydrate base of fish feed consisting of cereal and grain in formulated diets cannot be economically supplemented by any other source.

The repercussion of rising grain prices and fishmeal prices will undoubtedly have an effect on fish feed prices, which will in turn reflect the price of fish on the market. The major concern is, however, that the small-holders and rural farmers could be the victims of this scenario, which will further contribute to their poverty and vulnerability.

Guest Editor: Rohana Subasinghe

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# Aquaculture – the only way to fill the coming "fish gap"

## Outcomes of the High Level Special Event on Aquaculture

19 November 2007, FAO Headquarters, Rome, Italy

On 19 November 2007, top fisheries ministers of Algeria, Angola, Bahamas, Bahrain, Chad, Ecuador, Eritrea, Faroe Islands, Ghana, Guyana, Haiti, Honduras, Iceland, Indonesia, Mali, Mauritania, Mauritius, Mozambique, Myanmar, Nigeria, Norway, Papua New Guinea, Samoa, Senegal, South Africa, Sudan, Syria, Tanzania, Togo and Uganda and other high level delegates from many other countries, debated on the future of fish farming during the High Level Special Event on Aquaculture held at the FAO Headquarters in conjunction with the 34<sup>th</sup> Session of the FAO Conference (17-24 November 2007).



FAO Director-General, Jacques Diouf, delivered the opening statement where he expressed the importance of the aquaculture sector and future challenges in ensuring its sustainability. He informed the meeting that further development of the aquaculture sector should be a priority for the international development agenda. However, he cautioned that good policy decisions regarding the use of natural resources like water, land, seed and feed as well as sound environmental management will be necessary to sustain and enhance the further growth of the sector.



The Honorable President of the Democratic Socialist Republic of Sri Lanka, His Excellency Mr Mahinda Rajapaksa, in a video-taped message, underscored the important role that fish farming plays by supporting people's livelihoods in Asia and elsewhere. "For largely rural-based societies, aquaculture provides many opportunities for low income earners to diversify their livelihoods to obtain a larger income," he said. The Honorable President thanked FAO for bringing the subject of aquaculture to a high level of discussion and made several recommendations and remarks towards making aquaculture a high priority sector for global social and economic development within the mandate of FAO.



The Assistant Director-General, Ichiro Nomura, of the FAO Fisheries and Aquaculture Department, introduced the salient points of the conference working document

“The role of aquaculture in sustainable development”. The document highlighted that aquaculture helps reduce hunger and malnutrition by providing food rich in protein, fatty acids, vitamins and minerals and significantly improves food security by creating jobs and raising incomes. Twelve million people in Asia, for instance, are directly employed by the sector. The document also emphasized that while Africa is the only region where the per capita consumption of fish has dropped and whose share of the global aquaculture production is less than one percent, it has full resource potential for aquaculture growth and should be a “priority region” for support aimed at promoting aquaculture development.

The High Level Special Event, co-chaired by Ms Helga Pedersen, Minister of Fisheries and Coastal Affairs of Norway and Mr Amin Ahmed Mohamed Othman Abbaza, Minister of Agriculture and Land Reclamation of Egypt, concluded that:

- Although negative environmental impacts of aquaculture have been significantly reduced through continued stakeholder participation, the importance of continued sustainable aquaculture production, with minimal negative social and environmental impact as imperative.
- Small-scale aquaculture farmers are facing difficulties in producing for export due to stringent trading requirements. Thus, empowering small-scale farmers to become competitive in global trade is therefore important and urgent, and, perhaps, is a significant corporate social responsibility.
- With the limited contribution of capture fisheries, the importance of aquaculture as a strong food producing sector is duly recognised. Better management of the sector is essential to ensure maximising its contribution to social wellbeing, national economies and international trade.
- Creating a sound enabling policy, regulatory, institutional, and economic environment, including strong private sector investments, to ensure sustainability is important and necessary.
- Government commitment to provide appropriate support to aquaculture growth is essential. Such commitment should be expressed in the form of clear articulation of policies, plans, regulatory frameworks and strategies, availability of adequate funding for their implementation, and incentives for investment.



- There is a clear need for a concerted effort towards promoting aquaculture development in Africa, as part of the overall regional development programme. FAO’s Special Programme for Aquaculture Development in Africa (SPADA [see pages 5-8]) was highlighted as a platform for collaboration.
- Institutional and regional cooperation are important for technology transfer, sharing experiences, improving production and dealing with trans-boundary issues.
- Research, training, capacity building and extension are key areas for sustainable development of aquaculture.
- The issue of climate change and its potential effects on aquaculture should be further studied and researched, in order to enable necessary adaptations based on gained knowledge.
- A strong call for increased allocation of resources in aquaculture was emphasized. Strengthened assistance to Members by FAO, as well as (an intensification of) its normative work was recognised as necessary in order to realize the full potential of aquaculture.

The main message of the event was that because traditional capture fisheries have reached their maximum production levels, ***fish farming represents the only way to fill the gap.*** But it will only do so if it is promoted and managed in a responsible manner.

The full documentation of the High Level Special Event can be found at the link below:

<http://www.fao.org/fishery/topic/17000>



## SPADA: the Special Programme for Aquaculture Development in Africa

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The 27th Session of COFI, recognizing the growing importance of aquaculture in the Africa Region (see Box 1) as well as the region's under-utilized aquaculture resources, established SPADA: the Special Programme for Aquaculture Development in Africa. SPADA was further supported by participants in the 2007 High-Level Event on Aquaculture during the 34th FAO Conference. In conjunction with the NEPAD Action Plan for the Development of African Fisheries and Aquaculture, the programme's goal is to improve economic and rural development by enhancing fish supply and distribution as well as providing good human nutrition through increased aquacultural production; this goal achieved by promoting sustainable aqua-businesses at national level including the necessary public and private support services.

### SPADA's Aims

The Programme aims to:

1. increase aquacultural production in the Region by at least 200 percent over the next decade;
2. assist two-thirds of countries in the Africa region in elaborating and implementing national aquaculture development strategies with accompanying aquaculture plans, legislation and regulations;
3. implement the Code of Conduct for Responsible Fisheries (CCRF) and Best Management Practices (BMPs) as they relate to aquaculture as well as instituting monitoring and evaluation methods that ensure social and environmental soundness;
4. strengthen the African Aquaculture Network [ANAF] to facilitate information exchange, provide technical assistance, co-ordinate education and research and provide basic support to the sector while employing the latest information technology including communications technology to facilitate networking and information exchange; and
5. facilitate access to inputs (e.g., feed, seed, capital, land, water) by investors while promoting intra-regional trade and markets for aquatic products.

### PROGRAMME STRUCTURE

SPADA, as a new and innovative programme, is still in the formative stages. It is intended to cover all African countries and be directly linked to NEPAD through its Action Plan. SPADA activities would take place at national, sub-regional and regional levels. At national level, the programme would work with public and private institutions, service providers, NGOs/CSOs and the private sector to establish sustainable and responsible aqua-businesses which would, in turn, increase employment, fish supply and investment opportunities. At sub-regional level, SPADA would work with Regional Economic Communities (RECs) to develop protocols for managing shared resources, trans-boundary movement of aquatic products as well as intra-regional trade and markets. At regional level, the programme would assist NEPAD in implementing its Action Plan including assistance to the nascent ANAF as well as relevant aquaculture bodies including the Committee on Inland Fisheries and Aquaculture of Africa (CIFAA).



## PROGRAMME ARENAS

SPADA is planned to be active in seven different but interrelated programme arenas, namely:

### *(i) Strengthening regional, sub-regional and national institutions*

The programme will provide capacity building and advise as to how to efficiently structure aquaculture institutions at all levels as well as provide training on a broad spectrum of aquaculture issues including aqua-business management, production, facilities development, etc.

### *(ii) Networking and outreach*

The programme will strengthen ANAF and build effective links to extension and outreach activities at all levels. These activities will include publicising information concerning opportunities in aqua-business to encourage investment in the sub-sector.

### *(iii) Capital and input supply*

The programme will assist in ensuring access by investors to critical inputs including, among others, capital, feed and seed. This would include certification programmes for the suppliers of such inputs as feed and seed. As the aquaculture sub-sector expands, access to essential land and water issues will become increasingly competitive.

### *(iv) Processing and marketing*

The programme will provide guidance as to options for processing and marketing including establishing quality control procedures.

### *(v) Research and education*

The programme will co-ordinate and harmonise research and education in the region to identify comparative advantages of the different concerned institutions, support regional research and educational activities, match needs with providers and generally increase the overall efficacy of these operations.

### *(vi) Social, economic and environmental soundness*

The programme will establish base factors that are conducive for sustainable aqua-businesses as well as determine elements to be considered for pre-investment impact assessments and post-investment monitoring.

### *(vii) Monitoring and evaluation*

The programme will implement regional and national monitoring and evaluation activities including improved and more precise statistical reporting mechanisms.



J. MOEHL, FAO

## SPADA: INVESTING IN AQUACULTURE

The small investor can and should be the motor for development of sustainable and profitable national aquaculture programmes. Small and medium enterprise aqua-businesses will benefit from the region's comparative advantages of relatively inexpensive and available land, labour and water. These enterprises, concentrated in high potential zones with optimal bio-physical and socio-economic resources, will go a long way to fill the region's growing supply gap for aquatic products. However, this process requires a catalyst; this catalyst is SPADA. SPADA, as an integrated and multi-dimensional programme with a variety of national, regional and international partners including NEPAD and ANAF, will provide the needed support to thousands of small investors across the region, helping them develop profitable aqua-businesses, increasing aquaculture's contribution to local markets.

### Box 1

**Aquaculture: a new investment for Africa's future.** Africa has long been that region of the world with the lowest aquacultural production inspite of significant under-utilized resources. However, over the past several years there has been a major change in the status of the region's aquaculture sub-sector. This positive change has been catalyzed by increasing investor confidence in aquacultural enterprises. This growing confidence has been further strengthened by new approaches to the development of the sub-sector combined with the growing use of improved and appropriate technologies such as cage and tank culture as well as access to better inputs including feed and seed. Overarching these recent advances has been a shift in focus to farmer-led action and profitable aqua-businesses as the cornerstones of the sub-sector. SPADA is an umbrella programme that will amplify the growing momentum by developing effective economies of scale for regional and sub-regional action while ensuring efficient flow of information and technology exchange across the region.



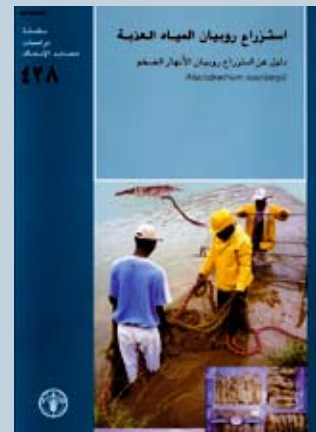
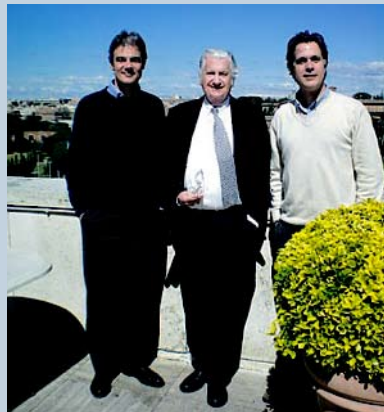
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### Visit of former FAO staff

Mr Michael New, OBE, a former staff with the FAO Fisheries and Aquaculture Department and founder of Aquaculture without Frontiers ([www.aquaculturewithoutfrontiers.org](http://www.aquaculturewithoutfrontiers.org)), an independent non-profit organisation that promotes and supports responsible and sustainable aquaculture in developing countries, recently paid a courtesy visit to FAO. Mr New, author of the FAO Fisheries Technical Paper No. 428 on "Farming freshwater prawns: a manual for the culture of the giant river prawn (*Macrobrachium rosenbergii*)", which has been just released also in Arabic, is seen in the FAO premises together with Mr Valerio Crespi (left) and Mr Alessandro Lovatelli (right), Aquaculture Management and Conservation Service (FIMA).





# COFI Sub-Committee on Aquaculture will meet in Chile

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The Fourth Session of the Committee on Fisheries (COFI) Sub-Committee on Aquaculture will be held from 6-10 October 2008 in Puerto Varas, Chile. All arrangements are underway for this important occasion, hosted by the Government of Chile.

Aquaculture is an important production sector, currently providing nearly 50 percent of the global aquatic food. At the 22nd Session of COFI held in March 1997, this importance was strongly emphasized and COFI underlined the valuable potential of aquaculture in meeting the expected increased demand for aquatic products. The report of the 22<sup>nd</sup> Session of COFI stated: "Given the increasing importance of aquaculture as a means of providing employment and contributing to food security, the Chinese delegation proposed that a Sub-Committee on Aquaculture be established under the Committee" auspices. After several years of discussions and deliberations, during the 24<sup>th</sup> Session of COFI, held in March 2001 in Rome, it was agreed that the COFI Sub-Committee on aquaculture should be established.

Since then we have gone a long way!

Three sessions of the Sub-Committee have been held. First in Beijing, P.R. China in 2002, second in Trondheim, Norway in 2003 and the third in New Delhi, India in 2006, all hosted by the respective governments. All three occasions

have been well participated by FAO membership and many others, and resulted in bringing many important recommendations towards development of sustainable aquaculture, globally. The Sub-Committee on Aquaculture is the only global inter-governmental forum dedicated to aquaculture, making its decisions and recommendations strong and important.

The Sub-Committee discusses timely global, regional or national issues of importance and relevance to aquaculture. The recommendations generally provide insights and opportunities for addressing those concerns or issues at national, regional and/or global basis.

Apart from the standing regular agenda items such as a) progress in the implementation of Sub-Committee recommendations, b) progress in implementing the provisions of the Code of Conduct for Responsible Fisheries (CCRF), the Puerto Varas Sub-Committee session will discuss issues concerning the following: a) improving governance in aquaculture, b) international technical guidelines for the certification of aquaculture, and c) challenges in meeting the rising global demand for food fish from aquaculture.

In an era where the cost of energy is sky-rocketing and large quantities of grains and several other food resources are being converted to bio fuel to compensate the rising cost of energy, aquaculture is facing

a major challenge to reduce cost of production. As the price of several internationally-traded commodities has already come down significantly, the farmers are finding it difficult to continue farming certain species with profit.

An additional 40 million tonnes of aquatic food will be required by 2030 to maintain the current per caput consumption. We believe that the sector can grow fast and sustainably enough to meet the perceived demand while preserving the natural resource base it needs to thrive. With this backdrop, we envision that the decisions and recommendations of the fourth session of the COFI Sub-Committee on Aquaculture will be substantial.

**Dates:** 06-10 October 2008

**Venue:** Hotel Sol-Meliá Patagonia, Klenner 349, Puerto Varas, Lakes Region, CHILE

**Information:** <http://www.fao.org/fi/body/cofi/cofiaq/cofiaq.asp>

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*Participants at the regional workshop in Beymelek*

## Kyrgyzstan

“Development of inland fisheries and aquaculture in the Kyrgyz Republic to reduce rural food insecurity” (FishDev–Kyrgyzstan), a short-term project under the EC/FAO Facility for consultancy services (GCP/GLO/162/EC), commenced in June 2007 and was completed in March 2008. The project of US\$124 000 prepared, as main outputs, a review study on capture fisheries and aquaculture in Kyrgyzstan, and the Strategy for Fisheries and Aquaculture Sector Development and Management in Kyrgyzstan (2008-2012). This strategy was approved by the new Minister of Agriculture, Water Management and Processing Industry of Kyrgyzstan, Mr A. Nogoev, in February 2008 and is now being implemented by the sector under the guidance of the Department of Fisheries of the Ministry. A trust fund project, preliminary entitled “Support to Fishery and Aquaculture Management in Kyrgyzstan” is under formulation following a request from the Minister. This trust fund project should support the implementation of the approved strategy. At present, FAO is continuing its assistance to the Ministry in its search for donor funds in support of the implementation of the strategy. Other activities undertaken under the European Commission funded project were 3 national planning and development workshops, a training workshop for fish inspectors and a fish consumption promotion campaign during World Food Day 2007. The main outcomes of the project will be published in the first semester of 2008 as an FAO Fishery Circular.

More information can be obtained from Raymon van Anrooy at [Raymon.vananrooy@fao.org](mailto:Raymon.vananrooy@fao.org) or Mr John Jorgensen of FIMF at [John.jorgensen@fao.org](mailto:John.jorgensen@fao.org)



*Under the initiation of FD the Uzgen fish farm organized fish selling in Uzgen at the World Food Day: the price of silver carp is 80 som/kg; the price of carp is 100 som/kg*



*The process of loading the tanker of water with the fish which they caught for sale at the World Food Day (Uzgen Fish Farm in the South)*

# Kyrgyzstan and Uzbekistan

## Uzbekistan

A TCP facility project “Development of strategic partnerships in support of responsible fisheries and aquaculture development in Uzbekistan” TCP/UZB/3103 (D) was implemented during the period from August 2007 to April 2008. This project of around US\$120 000 intended to develop strategic partnerships for and assist the Government of Uzbekistan in the rehabilitation of the national capture fisheries and aquaculture sectors in a structured and responsible manner, with specific emphasis on the achievement of food security and alleviation of poverty in rural areas in which the fisheries sector could play a more prominent role. The project produced a “Review of the current status of inland fisheries and aquaculture in Uzbekistan” and, through a participatory process, the “Aquaculture and Capture Fisheries Development Policy and Strategy of Uzbekistan (2008-2016)”. The Policy and Strategy was endorsed by the Council of the Ministry of Agriculture and Water Resources of Uzbekistan, and is likely to be officially endorsed by the government in the first semester of 2008. The project counterparts, particularly the Institute of Water Problems of the Academy of Science of Uzbekistan and the Department of Livestock, Poultry and Fisheries of the Ministry were instrumental in bringing this project to a successful end.

The project also organized a technical “training of trainer” capacity building sessions on pond aquaculture and stocking practices, and produced, based on existing FAO extension manuals, a number of extension and training manuals that are amended for the situation in Central Asia. A follow-up trust fund project proposal is under formulation. This project, at the request of the Ministry, should address fishery management and aquaculture development in the eco-hydrologically degraded



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*Carp hatchery in Uzbekistan*

region of the Aral Sea and in the Ferghana Valley of the Republic of Uzbekistan in order to support the rehabilitation of the sector. No donor has been found so far for this project, but efforts are being made in search of a donor.

More information can be obtained from Raymon van Anrooy at [Raymon.vananrooy@fao.org](mailto:Raymon.vananrooy@fao.org) or Mr Gerd Marmulla of FIMF at [Gerd.Marmulla@fao.org](mailto:Gerd.Marmulla@fao.org)



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*Ekos International ltd. trout cage culture at Issyk Kul lake, Kyrgyzstan, 2007*



# TCP/TUN/3001 (A): Technical support for the promotion of aquaculture development and management of the European eel (*Anguilla anguilla*) in Tunisia

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## INTRODUCTION

This article presents the activities undertaken by TCP/TUN/3001 (A): "Technical support for the promotion of aquaculture development and management of the European eel (*Anguilla anguilla*)" in Tunisia during the period from January 2004 to August 2006. The project was jointly implemented by FIMA, the FAO Representation in Tunisia and the Interprofessional association of fishing Products (GIPP) which provided staff to coordinate activities at the national level.

The European eel stock populating marine, brackish and freshwaters of Tunisia forms part of the Mediterranean population of this species whose area of reproduction is located in the Sargasso Sea, in the middle of the North Atlantic.

This species which is exploited in the Atlantic Sea from the north of Norway to Morocco and in all the Mediterranean countries is considered by the experts of the International Council for the Exploration of the Sea (ICES) and the European Inland Advisory Commission (EIFAC) Working Group on Eels, as an endangered species.

There are multiple factors threatening the status of this species. Fishing is often considered as one of the major factors. Studies carried out by various researcher teams of the main producer countries, however, showed that, in general, eels are mainly victims of shrinking natural habitats and pollution. When migrating both

upstream and downstream, migration through waterways is hindered by numerous man-made obstacles such as dykes and dams lacking "fish pass"; there is also particularly high mortality rate among the adult eels making their way to spawning grounds.

## EEL EXPLOITATION IN TUNISIA

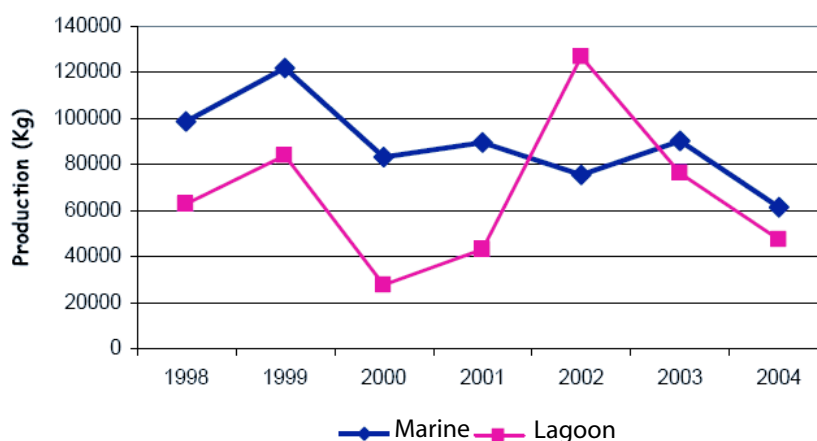
Tunisia, like other Maghreb countries, is a producer of eel and it has an important role to play in the restoration and conservation of the species. Eels are more abundant in the northern part of Tunisia where they frequent coastal waters, lagoons and river mouths.

The migratory season lasts from December until the beginning of June, although the elvers are present all-year round in some rivers (e.g. rivers of Mejerdah and Tinja). In the Tunisian legislation, it is not allowed to fish eel having a total length of less than 30 cm.

In Tunisia, eels are exploited in inland and coastal areas. Captured eels come mainly from lagoon and inland fisheries. The main fishing gears used in inland waters are gillnets and trammel nets. In the lagoons (Ichkeul, Ghar El Melh and lagoon of Tunis), fixed gears are usually employed; the most common are the fyke nets "capéchades" and the barriers "bordigues". They offer the advantage to keep fish caught alive that is particularly appreciated in the market of Northern European countries where captures are usually exported. Eel culture is not practiced in Tunisia and there is no eel aquaculture tradition in the country.

Total eel capture fisheries production in the country shows an average of 154 939 kg per year fluctuating between 108 384 and 205 606 kg during the period 1998-2004 (Figure 1).

**Figure 1.** Annual production of European eel in Tunisia (source: Direction Générale de la Pêche et de l'Aquaculture, 2007)



Captured eels coming from the northern part of Tunisia represent 51 percent of total captures, followed respectively by 31 percent from the east and only 18 percent from the south.

With regard to the seasonal production, landings of eel are distributed along all-year round with a peak during the winter season (November-February). Apart from this season, landings are rather irregular during the rest of the year.

## THE PROJECT

The overall objective of the project was to assist the Tunisian government in achieving sustainable development of European eel fisheries and aquaculture in fresh and brackish waters, by setting-up the base for a national programme which would evaluate the status of such resources within the framework of the international management of the species. The project was based on two key components, namely: (i) the aquaculture component, i.e. grow-out of the European eel from wild glass eel stage to elver; and (ii) the stock assessment component which estimates the status of European eel in the Tunisian waters.

These two components are interdependent due to the fact that the elvers, produced through the aquaculture component, have been

released into the inland lakes/reservoirs in order to enhance the local eel population.

Three training missions were organized for the benefit of six national researchers. The first mission was organized by EUROEEL in Denmark and the Netherlands on eel aquaculture techniques, e.g. management of an eel nursery. The other two missions held in France were organized by IFREMER on glass eel stock assessment methodologies and silver eel stock assessment and fishing methods.

The project provided the services of four international consultants with the following expertise, namely: (i) eel stock assessment; (ii) fishing technology (glass eel and silver eel); (iii) eel nursery technique (aquaculture); and (iv) eel stock assessment and experience in the Mediterranean Sea.

Through the support of FAO, an eel nursery was assembled by an Italian private company SCUBLA, in the area of Boumhel El Bassatine, just outside Tunis (Figure 2). National technicians have been trained by an international consultant/expert on eel aquaculture on the use of the nursery to produce eels from wild glass eel to elvers. The first production cycle was started at the end of the project.

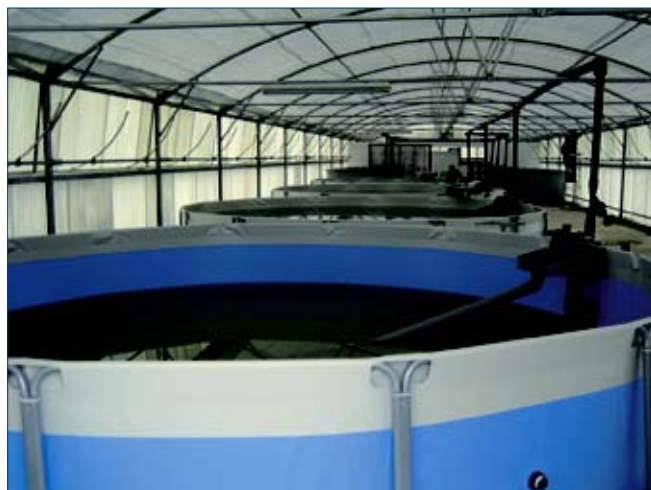
With regard to the stock assessment component, the required material was furnished by the project. Four fishing gears (“tezelles”, fixed trawls) have been manufactured by the “Institut Supérieur de Pêche et d’Aquaculture de Bizerte” (ISPAB) to be used in the selected rivers (Mejerdah and Tinja), to assess the quantity and size of silver eels moving towards the sea during their spawning migration (November-December).

A flat bottom boat in aluminum has been provided by the project along with a sieve device to assess the upstream migration of glass eels (June-July) in the two rivers.

## CONCLUSIONS AND RECOMMENDATIONS

Tunisia has approached FAO for advice on best practices for a sustainable development of European eel fisheries and aquaculture. Throughout the execution of this project, Tunisia has acquired enough experience to implement a national strategy for the sustainable development of eel fisheries and aquaculture. As a follow up, Tunisia should take the responsibility to address the following priorities: (1) a recovery plan for the eel stock should be compiled and implemented as a matter of utmost urgency; (2) fishing and other anthropogenic mortality

**Figure 2.** Eel nursery in Boumhel El Bassatine, Tunisia



V. CRESPI, FAO

should be reduced to the lowest possible level; (3) monitoring of recruitment, stocks, fisheries and escapees should be sustained; (4) Tunisia should report annually on status and trend of local eel population, fisheries and aquaculture to the ICES/EIFAC Working Group.

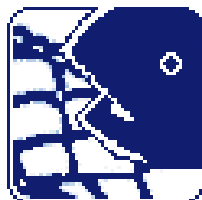


*Project staff. From left: A. Dorgham (National Consultant - Aquaculture), V. Crespi (FAO Fishery Resources Officer), M. Nadhif (Director of GIPP), and M. El Manouchi (National Consultant - Fisheries)*

## The FAO Aquaculture Fact Sheet

*The Fact Sheet collections produced by the FAO Fisheries and Aquaculture Department are continuously growing. Three collections have been produced and stored within the Aquaculture Gateway Page*

*<http://www.fao.org/fishery/aquaculture>*



**91** National Aquaculture Sector Overviews (NASO) have been published on the FAO website so far and are available at:

<http://www.fao.org/fishery/naso/search>

NASO collection provides a general overview of aquaculture aspects and related issues at the national level for FAO member countries. The NASOs contain detailed information on the history of aquaculture; human resources involved in the sector; main farming systems and cultured species contributing to national production; graphs showing reported production statistics; description of the main domestic markets and trade; and national development trends and issues.



In 2003, the FAO Fisheries and Aquaculture Department launched the Cultured Aquatic Species Information Programme (CASIP). The program consists of the preparation of a series of technical fact sheets on the most important commercially species produced by aquaculture. The cultured species fact sheets are written in simple technical language and focus on the practical aspects of aquaculture, from seed supply and the principal farming systems used worldwide to the raising, harvesting and marketing of farmed species. The main objective of this program is to improve the knowledge of marine and freshwater organisms of current and potential interest to aquaculture.

**50** Fact Sheets have been published on the internet so far and are available at:

<http://www.fao.org/fishery/culturedspecies/search>



The third Fact Sheets collection is composed of the National Aquaculture Legislation Overviews (NALO). The NALOs consist of a series of country reports on aquaculture laws and regulations, prepared by the Fisheries and Aquaculture Department in collaboration with the Development Law Service.

**42** NALOs have been published on the internet so far and are available at:

<http://www.fao.org/fishery/nalo/search>

The three above described fact sheet collections are being translated in five FAO official languages (Arabic, Chinese, English, French and Spanish) and many of them are already available in several languages.



# XI Session of the FAO Sub-Committee on Fish Trade

Bremen, Germany, June 2-6, 2008

**Audun Lem**

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FAO's "other" sub-committee within the Fisheries and Aquaculture Department, the Sub-Committee on Fish Trade, will meet this year in June 2-6 in Bremen, Germany. In this way, both sub-committees will meet in the same year before reporting to COFI next year in Rome.

The agenda of the upcoming COFI-FT meeting is not surprisingly focusing on trade issues but includes a wide range of topics, from an overview of the world supply and demand situation, to ongoing trends in consumption and markets, as well as FAO's trade-related activities in capacity building and normative work with relevance to the sector.

Other important issues are related to CITES, to harmonization of catch documentation schemes, to the use of port-state measures in combating IUU fishing, evolving market access requirements related to quality and safety as well as ecolabeling criteria in marine and inland capture fisheries.

The Trade Sub-committee will also be seeking to recommend that COFI adopt the new technical guidelines for responsible fish trade (Code of Conduct Article 11.2 and 11.3) which were partly finalised in Rome in November 2007 at a technical consultation. This Technical Consultation will be reopened in Bremen in two evening sessions in order to finalise the remaining few paragraphs before submitting the complete draft guidelines for debate in the Sub-Committee itself.

As is only natural, the relationship between the two FAO sub-committees is one of mutual recognition and co-operation, not the least in order to avoid any duplication in terms of agenda items and areas of work in the inter-sessional periods. However, on a number of issues related to trade, one has also started to focus on the



G. VALDIMARSSON, FAO

*Gerardo E. Nieto (Under Secretary for Fisheries, Argentina), Mrs Elisa Calvo (Head of Coordination Economic Policy Unit, Argentina) and Hector Lupin (former FAO Senior Fisheries Officer)*

particular role of aquaculture in marketing, distribution and trade as well as in utilization and consumption.

With rising output from the aquaculture sector, an increasing share of fish and fishery products in international trade also originates from aquaculture, although the exact percentage is not known due to data deficiencies in international statistics. However, it is a fact that the aquaculture sector not only has become a major player in international markets and for many products totally dominate supply, but aquaculture has become a principal driver in market development, product innovation and price formation. We can therefore expect references to aquaculture to be quite prominent in the debate in Bremen, not the least in relation to specific challenges in market access faced by aquaculture producers in many developing countries.



## FAO-SIDA-UNESCO/MIRCEN Workshop on “Safety of Shellfish from Harmful Algae and Biotoxins”

Mangalore, India, 21-25 January 2008

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Bivalve aquaculture has been growing at the rate of 5.6 per cent during the period from 1990 to 2005 and presently, 84 per cent of the world bivalve production comes from aquaculture. In 2005, 83.5 per cent of bivalve production came from Asia. Oysters constitute 39 per cent of the world bivalve production, and 97 per cent of oyster production originate from aquaculture. Clams, cockles and arkshells make up the second largest group (35 per cent of world production) and 86 per cent of these came from aquaculture. In the case of mussels (accounting for 15 per cent of world bivalve production), aquaculture contributed to 93 per cent of production. Harmful algal blooms and shellfish toxicities are a global problem affecting safety of shellfish and international trade. It is estimated that about 2 000 cases of shellfish toxicities occur annually with 15 per cent mortality (Hallegraff *et al.*, 2003). The economic impact

of this problem has been estimated to be US\$82 million in the United States of America alone (Sandifer *et al.*, 2007). Presence of biotoxins in shellfish has been affecting international trade in bivalve mollusks. During 2006, there were 25 notifications in the European Union Rapid Alert system related to biotoxins and in 2007, there were 15 notifications. In response to the request by the Codex Committee on Fish and Fishery Products, the FAO/WHO/IOC organized an *Ad hoc* Expert Consultation on Biotoxins in Bivalve molluscs in Oslo, Norway in September 2004. The Expert Consultation recommended the implementation of shellfish and micro-algal monitoring programme to enhance consumer protection. The need for capacity building in the area of biotoxin detection and algal monitoring was recognized in the Expert Consultation. This was reaffirmed by the FAO/WHO

member countries at the 28th session of the Codex Committee on Fish and Fishery Products, held in Beijing, China in 18-22 September 2006.

Considering the global importance of the problem and the need for capacity building in this area, an international workshop on “Safety of Shellfish from Harmful Algae and Biotoxins” was held at the UNESCO/Microbial Resources Center (MIRCEN), Department of Fishery Microbiology, College of Fisheries, Mangalore, India from 21-25 January 2008. Dr. (Mrs) Indrani Karunasagar was the Workshop Coordinator. The workshop was jointly sponsored by FAO, the Swedish International Development Agency (SIDA) and UNESCO/MIRCEN. The workshop included lectures and practical sessions on sampling techniques for the examination of water and

sediments, processing sediments for recovery of cysts, identification of harmful algae and their cysts; ecology of harmful algae, molecular (DNA-based) techniques for the detection of harmful algae and their cysts, biotoxins and their detection by bioassay, immunoassay, HPLC and liquid chromatography mass spectrometer (LC-MS) techniques and monitoring as a component of integrated shellfish safety management. The workshop included 23 participants from various countries such as Malaysia (3), Sweden (3), Viet Nam (4) and one each from China, India, Indonesia, Morocco, Thailand and Yemen. The resource experts for the workshop included: Dr. Y. Fukuyo from University of Tokyo (Japan), Dr. J. Larsen (IOC Center on Harmful Algae, Copenhagen, Denmark), Dr. Dave Clarke (Marine Institute, Galway, Ireland), Dr. Iddya Karunasagar (FAO, Rome), Dr. Ann-Sofi Rehnstam-Holm and Dr. Anna Godhe (Sweden), Dr. Indrani Karunasagar, Dr. B.B.Nayak, and Mr Anuj Tyagi (UNESCO/MIRCEN, India). The sessions were highly interactive and the workshop materials included manuals and CDs. A copy of the UNESCO Manual on Harmful Marine Microalgae was given to the participants for their reference in their laboratories. The participants had the opportunity to observe fixed samples of harmful algae belonging to various taxonomic groups, live plankton and sediment samples collected in Mangalore. Biotoxin assay by mouse bioassay, immunoassay, HPLC, LC-MS/MS techniques were demonstrated. In addition to lectures and practical sessions, the programme included presentation of the status of work on harmful algae and biotoxins in the countries represented in the workshop. The workshop materials, lectures and practical sessions were very much appreciated by the participants.



Reference:  
 Hallegraeff, G. M., Anderson, D.M. & Cembella, A.D. 2003. Manual on harmful marine microalgae. Vol 33, UNESCO, Paris.

Sandifer, P., Sotka, C., Garrison, D. & Fay, V. 2007. Interagency Oceans and Human Health Research Implementation Plan: A Prescription for the Future. Interagency Working Group on Harmful Algal Blooms, Hypoxia, and Human Health of the Joint Subcommittee on Ocean Science and Technology. Washington, DC. 104 pp.

### **Expert Consultation on Climate-related Transboundary Pests and Diseases including Relevant Aquatic Species, 25-27 February 2008, FAO, Rome, Italy**

The Aquaculture Management and Conservation Service (FIMA) participated in this expert consultation, which is part of a series of expert meetings/stakeholder consultations being held between February and April 2008 in preparation for a High-Level Conference on World Food Security: Challenges of Climate Change and Bioenergy that will take place from 3-5 June 2008 in Rome, Italy. Two FIMA officers, Dr Doris Soto and Dr Melba Reantaso, and two fish disease experts, Dr Mike Hine of New Zealand and Dr Franck Berthe of the European Food Safety Authority (EFSA) participated and handled the aquatic side of the consultation. The consultation identified a number of climate-related transboundary pest and diseases posing threats with respect to animals, plants, forests, and aquatic species as well as impacts on food security. The consultation drew up a number of recommendations addressing policy and implementation frameworks at national/regional/international levels, requirements for capacity building and priorities for national/regional/international action. The full outcome of the consultation will be made available at the FAO website soon.



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The Government of Uruguay and FAO signed a Unilateral Trust Fund (UTF) Agreement in July 2007 for a three-year Fisheries Management Project that aims to improve sustainable Fisheries and Aquaculture Development in Uruguay through the following:

1. restructuring and modernizing the institutional framework of DINARA (Dirección Nacional de Recursos Acuáticos);
2. providing capacity building to the production sector to secure high quality and hygienic standards of all fishery products, including modern labor safety provisions;
3. implementing a robust management system based on development policies and application of scientific findings on fisheries, e.g. effective exploitation schemes, minimizing capture losses and diversifying catches;
4. reorganizing the artisanal fisheries sector including implementation of a new institutional management structure; and
5. developing aquaculture as an alternative production.

This US\$5.81 million project is entirely funded by the Government of Uruguay and not supported by the World Bank as erroneously reported in FAN 36, Dec. 2006.

Pre-project situation is briefly described below:

#### **Industrial fisheries:**

The industrial fleet has some 120 boats employing 1 800 persons and catching 97 percent of the total, out of which 80 percent is exported. From Uruguay's 11.930 km<sup>2</sup> EEZ, the country catches some 120 000 tonnes/year and exports fishery products valued at US\$170 million (2006 data). Five most important fish species are: common hake *Merluccius hubbsi*, whitemouth croaker *Micropogonias furnieri*, stripped weakfish *Cynoscion guatucupa*, Argentine croaker *Umbrina canosai* and long-tailed hake *Macruronus magellanicus*. Global overfishing trend also affects Uruguay and above-mentioned species are fully exploited or overfished. Same situation exist for non-traditional catches, like red deep-sea crab *Chaceon (Geryon) quinquedens*. Demersal catches have gone down; the mean trophic level of landings decreased and fishing in balance index (FIB) decreased since 1997.

#### **Artisanal fisheries:**

Thus far, fisheries development policy have largely ignored artisanal sector catching only 3 percent of the total, i.e. some 3 000-4 000 tonnes/year. The artisanal sector employs almost equal number of fishers as the industrial sector and catch is an important source of fish for local consumers, although local fish consumption is very low (below 8 kg/capita). Unfortunately, previous efforts to improve artisanal fisheries for instance by supporting cooperatives has not worked as well as expected. Relatively easy free access and low capital investment requiring artisanal operations attracted too many unemployed people into fishing and it became difficult to manage and/or to regulate. Participatory fisheries management may serve as a potential solution to the current situation, using lessons learned in Asia and Africa.

#### **Commercialization:**

Two thirds of production is exported frozen and 20 percent as fresh/chilled. The rest is made as fish meal/fish oil, canned or smoked. Eighty percent of fish is frozen without filleting. The project's concern will be the quality of products. DINARA is not an internationally accredited reference laboratory. The Uruguay Technical Laboratory (LATU, Laboratorio Tecnológico del Uruguay) is the only

internationally accredited laboratory in the country.

### **Institutional framework:**

DINARA is responsible for evaluating fisheries resources and aquaculture. First and foremost, the project has to establish new law and long-term fisheries and aquaculture development policies based on relevant scientific and economic observations. Today, many management decisions are based on research data which are more than 20 years old. In addition, an economic programme is needed, but DINARA lacks sufficient capacity in statistical analysis and in processing socio-economic data. DINARA has very few postgraduates, so the capacity of scientific staff needs to be improved. While the sanitary inspection has enough personnel, they are not fully familiar with Hazard Analysis and Critical Control Point definitions. New focus will be needed for inspection, particularly on board operations. Fishing data collection quality must be improved and must be computerized. A lot of data from the last 30 years exists, but is not programmed for automatic use. DINARA needs to increase its visibility through new audiovisual information campaigns and these materials have to be produced with the help of the project.

### **Aquaculture:**

The first National Plan for Aquaculture Development was developed in 1975; a new plan has now been drafted under the FAO project: TCP/URU/3101 – Plan Nacional de Desarrollo de Acuicultura (See FAN 36, Dec. 2006). This UTF project will facilitate follow-up TCP activities to finalize scientific policy and long-term development plan for aquaculture in Uruguay. Very limited aquaculture activities have been developed in the country and production has been less than 100 tonnes/year in the



past years. Currently cultured species include black catfish *Rhamdia quelen*, pejerrey *Odontesthes bonariensis*, bullfrog *Rana catesbeiana*, Australian red claw or tropical blue crayfish *Cherax quadricarinatus*, common carp *Cyprinus carpio* and grass carp *Ctenopharyngodon idella*, Tilapia (*Oreochromis* sp.), etc. and various ornamental freshwater fish species. There is, however, one commercial size farm, which cultivates Siberian sturgeon *Acipenser baerii* in 4 000 m<sup>2</sup> raceways. In 2004, this farm exported 1.3 tonnes of caviar and 10 tonnes of sturgeon meat. In the very near future, the Black River Sturgeons (Esturiones del Rio Negro S.A.) expects to produce 20 tonnes of Black River Caviar and some 150 tonnes of sturgeon meat. The first management committee meeting of the project took place on 15<sup>th</sup> of August 2007; FAO was represented in this committee by Jordi Lleonart, FIRM and Heimo Mikkola, FAOR.

Further information about the project can be obtained by writing to the authors.

### **Recently held and upcoming meetings on aquaculture organized and co-organized by The Fisheries and Aquaculture Department**

- FAO Expert Consultation on Assessment of socio-economic impacts of aquaculture, 4-8 February 2008, Ankara, Turkey
- FAO Expert Meeting: Climate-related Transboundary Pests and Diseases including Relevant Aquatic Species, 25-27 February 2008, Rome, Italy
- FAO Expert Consultation on Improving Planning and Policy Development in Aquaculture, 26-29 February 2008, Rome, Italy
- FAO/NACA/SCA/DFID Expert Workshop on Guidelines for Aquaculture Certification, 28-29 February 2008, London, UK
- SBBSTA 13 Side Event on Aquaculture and Biodiversity, 21 February 2008, Rome, Italy
- TCP/BiH/3101 Training/Workshop 5: Surveillance and Diagnostics, 24-28 March 2008, Sarajevo, Bosnia and Herzegovina

# FIMA's Accomplishments

## Programme Entity 2IP02

Under Programme Entity (PE) 2IP02, FIMA completed biennial outputs related to providing advice and information to ensure the sustainable contribution of aquaculture to food supply, food security and general economic growth through implementing appropriate provisions of the Code of Conduct for Responsible Fisheries in close collaboration with a variety of national and international institutions. They are centred on the following areas: promoting sustainable use of fisheries resources for aquaculture development; reducing environmental and biodiversity impacts from aquaculture; analysing and reporting on the trends in aquaculture development on regional and global level; and assisting in decision making for sustainable development of aquaculture.

The Programme continued its efforts in building international consensus among all stakeholders responsible for aquaculture sustainability through providing platforms at regional and global levels for discussion by its regional fishery bodies. It convened the 3<sup>rd</sup> Session of the COFI Sub-Committee on Aquaculture and a number of FAO regional statutory body meetings related to aquaculture such as CIFAA, GFCM and RECOFI. Other major works included development of guidelines on aquaculture certification, risk analysis, assessment and management in aquaculture, aquatic animal health management and safe transboundary movement of live aquatic species, responsible use of feed and seed, responsible use of alien species in aquaculture, conservation and responsible use of aquatic biodiversity for aquaculture. It also continued its work on analysing and reporting on the state of world aquaculture which

in 2006 resulted in the publication of a major review entitled "State of World Aquaculture 2006" based on 7 regional studies and reviews. It further developed aquaculture specialised databases and information systems and produced 110 National Aquaculture Sector Overviews (NASO), 50 National Aquaculture Legislation Overviews (NALO) and 50 Aquaculture Species Fact Sheets. It continued to actively participate in the GESAMP and other UN inter-agency work. It promoted the use of Geographic Information Systems (GIS), remote sensing and mapping to improve the sustainability of aquaculture and produced a number of GIS products. With the extra-budgetary support by Japan and Norway, the PE carried out various studies on sustainable aquaculture with focus on issues such as use of wild resources as seed and feed for aquaculture, quality and safety of aquaculture products,





# for Biennium 2006-2007

environmental impact assessment and monitoring procedures in aquaculture, ecosystem approach to aquaculture, aquatic animal health and aquatic biosecurity.

The PE has, during the biennium, organized 36 technical workshops and statutory body meetings and/or sessions, and produced more than 50 technical publications of high quality. Many publications were referred to and cited by major international media and journals as authoritative statement for the aquaculture sector. One of the technical guidelines produced by this PE, i.e. International Principles for Shrimp Farming, has received the World Bank's "Green Award 2006", and many other technical guidelines have been adopted by the stakeholders including governmental institutions and private sectors and NGOs.

## Programme Entity 2IS02

Programme Entity 2IS02 provides technical information and advice to FAO members and technical service and support to aquaculture-related field programme and/or projects of the organization. Four training manuals on subject areas of pearl oyster health management, operation of bivalve hatchery, *Penaeus monodon* hatchery management, and GIS-based tool for inland aquatic resources management were produced. Six training courses were organized in partnership with national or regional institutions/organizations on a variety of subject areas, including fish disease investigation and diagnosis for 7 south African countries, GIS use in fishery resources management, genetic management of fish (tilapia) stock in Sub-Saharan Africa, mollusc health management in Asia-Pacific, and RAIS (RECOFI Regional Aquaculture Information System).

Technical information and FAO aquaculture publications were provided on requests by members and individuals and responses provided to numerous inquiries (some through ask FAO) and many technical advice were provided as requested.

The PE, provided in 2006-2007, technical inputs and backstopping to field projects on aquaculture or with a component on aquaculture in 23 Technical Cooperation Programmes (TCPs) in 2006 and 28 TCPs in 2007; 12 National Programme on Food Security in 2006-2007; seven regional and national programmes under the scheme of South-South Cooperation (SSC) with an aquaculture component; and 11 aquaculture-related trust fund projects (both GCP and UTF) operating in ten countries. In addition, FIMA supervised more than 20 telefood projects in the field of aquaculture during the biennium.





Participants to the workshop

## Aquaculture Project in the Kingdom of Saudi Arabia Takes Off

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The government of the kingdom of Saudi Arabia (KSA) and the Food and Agriculture Organization of the United Nations (FAO) have entered into a new Unilateral Trust Fund Agreement to continue the development and improvement of the agriculture sector in the Kingdom. This new Technical Cooperation Agreement (TCA) will run for a five-year period from 2007 until 2012 and covers a broad range of projects to be implemented across the whole country. It must be noted that this new TCA is already in the 6<sup>th</sup> phase; the Government of KSA and FAO having gone through five phases of TCAs during the last 25 years. The total budget for the new TCA amounts approximately to US\$57.5 million and this covers 13 different projects ranging from camel breeding, preservation of Arabian horses, production of tropical and subtropical fruits, establishment of

a date palm research center, olive production and processing, irrigation and waste water management, animal quarantine and integrated plant health management, among others. The fisheries and aquaculture component of the present TCA is the "Support to the Fish Farming Center in Jeddah with Project Symbol UTFN/SAU/017/SAU".

Just like in the previous TCAs between FAO and the Ministry of Agriculture (MOA), the long-term objective of the present project is to improve the capability of the Fish Farming Center (FFC) as an Aquaculture Research Institution to generate science-based sustainable aquaculture technologies appropriate for the Kingdom and the neighboring Arab countries. FFC is the only Aquaculture Research Center in the Kingdom established in 1982 by the MOA with assistance from FAO. Its mandate is to help

develop the aquaculture industry in the country. The establishment of the FFC then was the response of the Government to help aquaculture farmers, particularly in developing aquaculture technologies for the rapidly expanding aquaculture sector at the national level. In line with this, the specific objectives of the present project are to: (1) improve the technical capability of the research staff to undertake scientific research, (2) upgrade the physical (fish holding systems, hatchery, nursery, pond systems) and laboratory facilities, (3) develop and improve the technologies for marine fish broodstock management, hatchery, nursery and grow-out culture systems, (4) produce superior quality of white shrimp (*Ferropenaeus indicus*) breeders (the only shrimp species cultured in the Kingdom), (5) develop the capability for culture system in off-shore fish cages, and (7) improve the information dissemination system.





*A view of the Fish Farming Centre in Jeddah, KSA*

Some of the workshop outputs and recommendations are presented below. The participants recognized the: (1) importance of FFC to do scientific research on candidate aquaculture species; (2) importance of close collaboration between FFC and the universities to prevent possible duplication of work and to promote exchange of ideas and information, and sharing of resources; (3) need for more dialogue between FFC and the private sector so that the problems of the industry will be addressed; (4) lack of reference laboratory for molecular disease diagnosis in the Kingdom; (5) FFC library must be open to the private sector; (6) need to develop a National Aquaculture Development Strategy to include guidelines on zoning and licensing especially on the issue of cage culture development in the Red Sea; (7) need to establish an aquaculture society to forge closer ties between all players in the aquaculture industry of the country; (8) increasing cost of farm production brought about by increasing feed cost; and (9) importance of encouraging visits of prominent overseas scientists to FFC. A big challenge lies ahead for the Center and its staff especially so that the private sector demands more from them.

The Project had its Inception Workshop on 15 January 2008 at the Movenpick Resort, Al Nawras, Jeddah. The one-day workshop brought together all the stakeholders and partners in the development of the aquaculture industry in the country. These include people from MOA, other related government agencies (e.g. Presidency of Meteorology and Environment), academe (especially universities with degree and research programs in fisheries, aquaculture, marine science, biology), research funding institutions in the country, and private sector. From the FAO Headquarters in Rome, Mr Alessandro Lovatelli, the Lead Technical Officer for the project, attended the workshop. The purpose of the workshop was to inform all stakeholders and partners on the development of the aquaculture industry in the country and the various activities that the FFC will undertake in relation to the present project and to seek their cooperation and collaboration on these activities.



*From left to right: Mr Anwar Essa Al-Sunaiher (Acting Director, Aquaculture Development, Ministry of Agriculture, KSA), Mr Alessandro Lovatelli (FAO), Mr Hassan M. Ali Dinar (FAO Riyadh) and Mr Thamr I.M. Eissa (Director, Fish Farming Centre)*



# FAO/AAHRI/NACA/Botswana DWNP Emergency Disease Investigation Task Force on a Serious Fish Disease Outbreak in south Africa's Chobe-Zambezi River system

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## BACKGROUND

The FAO/AAHRI/NACA Botswana Department of Wildlife and Natural Parks Emergency Disease Investigation Task Force was organized by FAO in April 2007 at the request of the Government of Botswana for technical assistance in dealing with a serious outbreak of fish disease in the Chobe-Zambezi River system. The overall objective of the Emergency Task Force was to undertake an emergency assessment of the fish disease outbreak through: a) field observations (e.g. field visit to affected river system, interviews with local/district officials and local fishermen, collection of epidemiological data), (b) laboratory examination (i.e., parasitology, bacteriology, histopathology, mycology, virology) of available affected fish samples, and (c) examination of available reports and other laboratory findings to identify as far as possible the causative agent of the outbreak, to provide recommendations to prevent further spread of the disease, recommend control measures if applicable and develop an emergency response and contingency plan for future outbreaks to concerned governments.

The members of the Task Force were:

- RP Subasinghe, MB Reantaso: FAO Aquaculture Management and Conservation Service (FIMA, Rome, Italy)
- S Kanchanakhan, S Chinabut, S Tanjanavitj, Histology Team at AAHRI: Inland Aquatic Animal Health Research Institute (AAHRI), Department of Fisheries, Thailand
- MJ Phillips, CV Mohan: Network of Aquaculture Centres in Asia-Pacific (NACA, Bangkok, Thailand)
- S Nengu, KV Motshereganyi, RG Damage, K Kesego, B Mobiegi: Botswana Department of Wildlife and Natural Parks (DWNP, Botswana, Maun and Kasane)
- Bernard: Kasane Veterinary Office
- B Van der Waal: Namibia Ministry of Fisheries and Marine Resources (Caprivi, Namibia)

The information provided in this article is based on the preliminary report of findings that was submitted to the Government of Botswana in July 2007. The Task Force mission and the subsequent laboratory examination were supported by PCA Norway funds under the Aquatic

Animal Health and Biosecurity Project.

Three members of the Emergency Disease Investigation Task Force (MB Reantaso of FAO, S Kanchanakhan of AAHRI and CV Mohan of NACA) traveled to Botswana (see **Figure 1**) from 18-26 May 2007 to conduct an emergency investigation. AAHRI conducted the laboratory analysis of field samples collected by the Task Force.

## TASK FORCE FINDINGS

The preliminary findings of the Task Force investigation was based on observations on site, clinical observations of infected fish and histopathological examination of tissue samples from infected specimens. Infected fish exhibited large haemorrhagic dermatitis in the area immediately posterior to anus and towards the caudal peduncle. The lesion was covered with fungal-like mycelia (**Figure 2**).

Dashtail barb belongs to the Family Cyprinidae, Order Cypriniformes and has a current distribution in Africa, in the upper Zambezi system and Kafue river as well as the Cunene and Ojovango systems. It is common in riverine and floodplain habitats. The fish feeds on insects and small organisms and is used as bait for tigerfish.

Histopathology of muscle tissues from dashtail barb (*Barbus poechnii*) showed clear mycotic granulomas penetrating from the skin (epidermis and dermis) to the muscle layer, typical of fish infected with EUS<sup>1</sup>. Histological sections of the muscle tissues around the lesion at the peduncle area of infected fish showed typical mycotic granulomas surrounding the invasive fungal hyphae (arrows) which spread from skin (epidermis, dermis) (Figure 3A/B) to the muscle tissues (Figure 4A/B). These mycotic granulomas are indistinguishable from histopathology of fish infected with Epizootic ulcerative syndrome (EUS). Confirmation of mycotic granulomas in histological sections of affected tissues and organs, using special stains such as Grocott's silver stain for fungal hyphae, is one of three recommended EUS confirmatory methods (OIE, 2006)<sup>2</sup>. Above findings and observations confirms occurrence of EUS in fish in Chobe-Zambezi river system in Kasane, Botswana.

EUS is a seasonal epizootic condition of great importance in wild and farmed freshwater and estuarine fish; it has a complex infectious aetiology and is clinically characterised by the presence of invasive *Aphanomyces* infection (a fungal pathogen) and necrotising ulcerative lesions typically leading to a granulomatous response.

The presence of EUS in fish in the Chobe-Zambezi River system was confirmed as an outcome of the Task Force investigation based on internationally accepted diagnostic procedures for EUS. As far as is known, this is the first confirmed case of this serious disease in the African region which has grave implications for the fisheries of the Chobe-Zambezi river system and the livelihoods of many people dependant on these fisheries.

The Task Force recommended that immediate notification be made to the World Animal Health Organization (OIE) by the governments of Botswana, Namibia and AAHRI as the OIE Reference Laboratory for EUS. Official notification was submitted to OIE by the Chief Veterinary Officer (CVO) of Botswana in July 2007.

Early warning and sharing of information to neighboring countries such as Namibia, Zimbabwe, Angola,

<sup>1</sup> Chinabut, S. and Roberts, R.J. 1999. Pathology and histopathology of epizootic ulcerative syndrome (EUS). Aquatic Animal Health Research Institute, Department of Fisheries, Royal Thai Government, Bangkok, Thailand, ISBN 974-7604-55-8. 33 pp.

<sup>2</sup> The two other recommended confirmatory diagnosis for EUS are (i) isolation of *Aphanomyces invadans* and confirmatory identification, and (ii) PCR of pure isolate of *A. invadans*. OIE. 2006. Manual of Diagnostic Tests for Aquatic Animals.

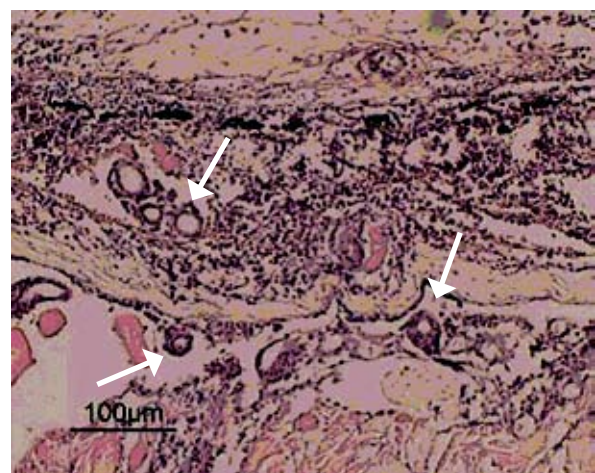
**Figure 1.** Map of Chobe-Zambezi River System (site of fish sampling in Chobe River near the Chobe National Park)



**Figure 2.** Dashtail barb (*Barbus poechnii*) exhibiting haemorrhagic dermatitis posterior to anus and towards the caudal peduncle.

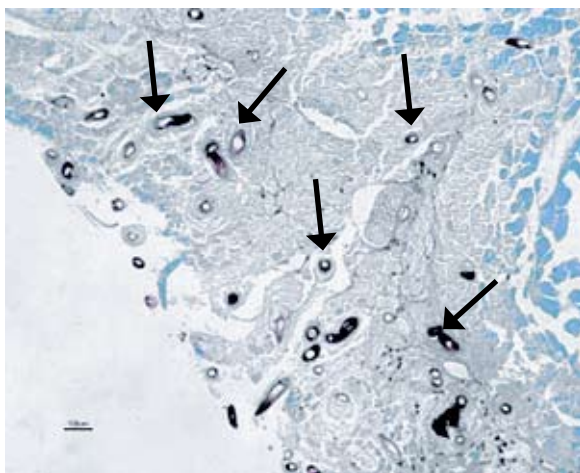


**Figure 3A.** Histopathology of EUS-suspected barb showing typical mycotic granulomas surrounding the invasive fungal hyphae (white arrows) in the skin layer (H&E).

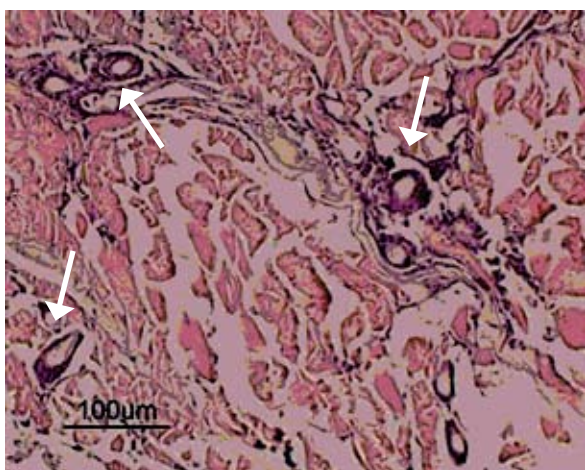




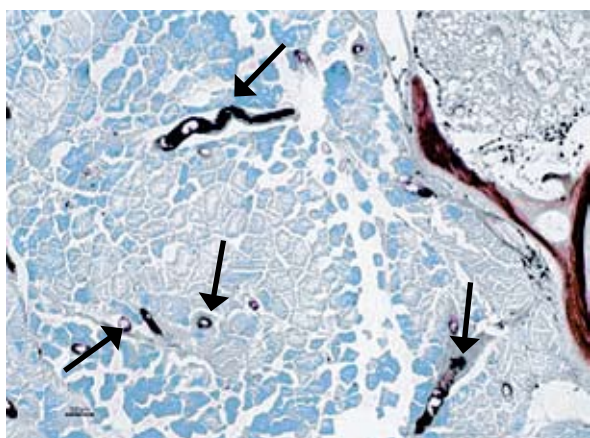
**Figure 3B.** Histopathology of EUS-suspected barb showing typical mycotic granulomas surrounding the invasive fungal hyphae (stained black, black arrows) in the skin layer (Grocott's silver stain).



**Figure 4A.** Histopathology of EUS-suspected barb showing typical mycotic granulomas surrounding the invasive fungal hyphae (white arrows) penetrating into the muscle layer (H&E).



**Figure 4B.** Histopathology of EUS-suspected barb showing typical mycotic granulomas surrounding the invasive fungal hyphae (stained black, black arrows) penetrating into the muscle layer (Grocott's silver stain).



Malawi, Zambia were also recommended as well as seeking information from neighboring countries of any similar occurrence or any on-going active outbreak of a similar disease. It was also strongly recommended to commence an active surveillance of further disease outbreaks, collection of samples for histopathology (taking special emphasis on other susceptible species), and submission of such fixed samples to AAHRI, and collection of other epidemiological data (temperature, species affected, mortality rates, data on spread to neighboring countries)

The Task Force also recommended the development of a medium- to long-term programme to strengthen capacity for fish disease diagnosis and control, quarantine, safe movement of aquatic animals, development of appropriate policy and regulatory frameworks, and implementation of better aquatic animal health management programmes in the region.

Because of insufficient capacity to control EUS within existing facilities and human resources in Botswana and neighboring countries, the Task Force recommended that an immediate programme of technical assistance be established: (1) to assist government authorities take immediate preventative and control measures, particularly through training of key staff and establishment of an effective surveillance, monitoring and public awareness campaign, *before the possible start of the next EUS season in 2007/2008*; and (2) to consider a longer-term program to identify the source of EUS and take measures to reduce the spread of the disease to other parts of the region.

An FAO Regional Technical Cooperation Programme (TCP/RAF/3111 [E]) Emergency assistance to combat EUS in the Chobe/Zambezi River has been approved for implementation from October 2007 to September 2008 involving 7 countries (Angola, Botswana, Malawi, Mozambique, Namibia, Zambia and Zimbabwe). The emergency assistance consists of training key staff in the 7 countries on basic aquatic animal health management, EUS diagnosis, targeted surveillance for EUS, preparation of an educational and extension manual, a regional strategy and a regional proposal aimed at establishing medium-to long-term aquatic biosecurity to include as a priority an emergency preparedness response to aquatic disease epizootics and over-all strengthening of human and institutional capacities for fish health management that will be submitted for donor funding.

Further updates on the implementation of this TCP will be provided in future issues of FAN.



# Support for the strengthening of aquaculture programs in Michoacan State, Mexico

## UTF/MEX/067/MEX

### Apoyo al fortalecimiento de programas acuícolas del Estado de Michoacán

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#### BACKGROUND

Fisheries include a variety of activities aimed at using aquatic resources. The sector specializes in capture and culture of these resources, and optimizes their utilisation to extract maximum value. In Mexico, fishing activities form part of the national economic development; fishing represents the cultural identity of native fisherfolks from different coastal zones and has a strategic importance for food production, employment generation and economic income for the population. To this end, it was considered important to support the initiatives and institutional efforts of the federal government in the State of Michoacan to boost, with solid scientific and technological knowledge, the integration and strengthening of the fisheries sector within an overall framework of technological independence, ecological compatibility and social equity to generate the benefits that the national society demands.

The project was requested by the head of the Commission for Fisheries in the State of Michoacan (COMPESCA), Ms. Catalina Rosas Monge, to promote the rational

and sustainable use of fisheries and aquaculture in Michoacan using appropriate technology and infrastructure for the capture, culture, industrialization and commercialization of fisheries products as well as to call upon the different production and social sectors related to the activity to build a new strategy of organization and action, in addition to promoting gender equity and food security.

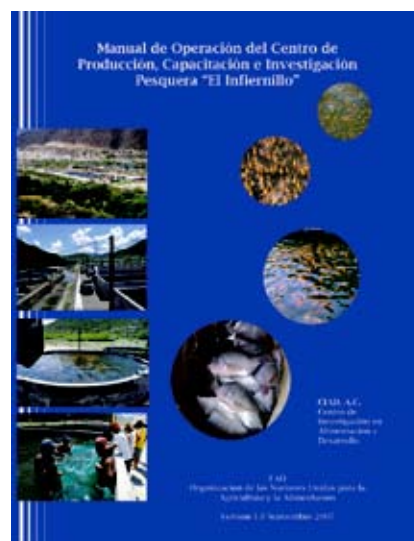
Counterpart implementing agencies include the Universidad Michoacana de San Nicolas de Hidalgo (INIRENA-UMSNH) in Morelia, Michoacan State and the Centro de Investigacion en Alimentación y Desarrollo (CIAD, A.C.) in Mazatlán, Sinaloa State.

The project commenced in October 2006 and was completed in February 2008. Dr Arturo Chacón Torres served as the National Project Coordinator as well as National Consultant on aquaculture. Backstopping was provided by FAO's Aquaculture Management and Conservation Service (FIMA) and Fish Utilization and Marketing Service (FIU).

#### OBJECTIVES

The main goal of the project was to improve the working conditions and livelihoods of aquaculturists and fisherfolks through sustainable management of resources from different regions in the state of Michoacan. The immediate objectives of the project were to:

- a. write an Operations Manual for the start up of a fish hatchery called Centro de Producción, Capacitación e Investigación Acuícola "El Infiernillo"



*Operations Manual for the Centro de Producción, Capacitación e Investigación Acuícola "El Infiernillo"*

and conduct training for the hatchery staff; formulate a management plan for inland fisheries and aquaculture for the Melchor Ocampo dam;

- b. prepare and conduct a practical training course on aquaculture business management for small farmers in the region, and develop a marketing study for tilapia, catfish and trout in selected municipalities.

The operations manual for the start up of a fish farm hatchery was written by staff at the CIAD, A.C. in Mazatlan. The INIRENA-UMSNH prepared the management plan for inland fisheries and aquaculture for Melchor Ocampo dam. The National Consultant on socio-economics, Mr. Antonio Martir Mendoza, prepared the socio-economics and marketing studies of the project.

### ASSISTANCE/RESULTS

The following assistance were provided:

Two studies on marketing and socio-economics:

- a. marketing study for tilapia, catfish and trout in the State of Michoacan, specifically in local markets in Morelia, Pátzcuaro, Uruapan, Apatzingán, Lázaro Cárdenas, Zamora, Azuayo and Zítacuaro;
- b. socio-economic study of inland fisheries communities adjacent to the Melchor Ocampo dam.

Two capacity building training courses on:

- a. operation of fish hatchery “Centro de Producción, Capacitación e Investigación Acuícola El Infernillo”; and
- b. managerial and marketing capacities for small-scale farmers in Michoacan State.

Technical manual and studies:

1. Operations Manual for the “Centro de Producción, Capacitación e Investigación Acuícola “El Infernillo”.
2. Management plan for inland fisheries and aquaculture for the Melchor Ocampo dam comprised of three documents:
  - a. Fisheries and limnological study for the Melchor Ocampo dam;



*Fisheries and limnological study for the Melchor Ocampo dam*



*Rural aquaculture farmers on a Training course on managerial and marketing capacities in Villa Madero, (Michoacan State, Mexico)*

- b. Management plan for fisheries and aquaculture in the Melchor Ocampo dam following the Code of Conduct for Responsible Fisheries (CCRF); and
- c. Management plan according to the Terms of Reference of the federal government of Michoacan.

### CONCLUSIONS

While the project had a very small budget (i.e. US\$65 000), without fund provision for follow-up activities and ambitious in scope, it was successful in achieving the major objectives.

The start of operations of the first fish hatchery will have a major impact to aquaculture development in Michoacan and the region. The operations manual will guarantee optimal results from the hatchery and can be used as a model for the region.

The management plan for inland fisheries and aquaculture for the Melchor Ocampo dam includes, for the first time in the region, applied the principles of the CCRF. The plan could be used as a model to follow for the other 260 dams in this state.

Results from the marketing study on tilapia, catfish and trout in Michoacan will enable the federal and state governments to develop a strategic plan to improve fisheries development.

The training course on managerial and marketing capacities for small-scale farmers has favoured a change of attitude towards improvements in fish utilization and marketing.

Based on the above, the project is expected to have a large impact on aquaculture and inland fisheries development in Michoacan State, Mexico. The technical assistance

provided by FIMA/FIIU will improve the management of aquaculture and inland fisheries and should improve fishermen and farmers livelihoods.

FAO's role in this project is very relevant and timely when the surge in aquaculture activities becomes more and more evident in this state and therefore the need to enhance its role for rural development.

The achievements of the Project should provide the state government with the momentum to continue the promotion and, most importantly, the implementation of action plans at the short-, medium- and long-term for the rational and sustainable use of fisheries and aquaculture in the state of Michoacan. This process is continuing and COMPESCA should try to make every effort to continue consultation with relevant stakeholders.

## FOLLOW-UP ACTIVITIES

Current follow activities to this project, funded by FAO Mexico, that are also relevant and applicable to other countries in Latin America and the Caribbean include:

- (i) a practical manual for rural aquaculture in Mexico (i.e. an advanced version of "FAO Training Series: Simple methods for aquaculture");
- (ii) consultation and discussion workshop to enhance the management plan for inland fisheries and aquaculture for the Melchor Ocampo dam; and
- (iii) a product of origin labelling system/scheme (e.g. for tilapia) to give local farmers a comparative advantage over imports for same products from other countries.

### **Convention on Biological Diversity's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA 13): Side Event on Protecting Biodiversity through an Ecosystem Approach to Aquaculture and Enhanced Biosecurity organized by the Fisheries and Aquaculture Department of FAO**

The Fisheries and Aquaculture Department participated in the CBD SBSTTA 13 through a side event on Protecting Biodiversity through an Ecosystem Approach to Aquaculture and Enhanced Biosecurity organized on 21 February 2008 at the Austria Room of FAO Headquarters, in Rome, Italy.

Dr Jorge Csirke, Director of FIM, and Dr Devin Bartley, chaired and facilitated the side event, respectively. Two speakers from FAO, Dr Doris Soto gave a brief introduction on the relevance of the ecosystem approach to aquaculture and Dr Melba Reantaso presented aquatic biosecurity approaches to protect biodiversity. Three invited speakers spoke as follows: (i) Mr Alexander Wainberg, an aquaculture practitioner from Brazil, spoke about the challenges and benefits of an ecosystem approach to aquaculture: implications for biodiversity conservation from a farmer's perspective; (2) Dr Michael deShield, a regulatory officer and practicing veterinarian shared the experience of Belize Agricultural Health Authority in protecting biodiversity through an integrated biosecurity regulatory framework; and (3) Dr Roger Pullin, an aquatic biology consultant from the United Kingdom and currently living in the Philippines, spoke about managing aquaculture genetic resources with an ecosystem perspective.



# Application of Risk Analysis in Aquaculture Production: Outcomes of the Desk Study and the FAO/NACA Expert Workshop on Understanding and Applying Risk Analysis in Aquaculture Production

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As a food-producing sector, while aquaculture surpassed both capture fisheries and the terrestrial farmed meat production systems in terms of average annual growth rate, it has a number of biosecurity concerns that pose risks and hazards to both its development and management, and to the aquatic environment and society. Aquaculture faces risks similar to those of the agriculture sector. However, as aquaculture is very diverse (in terms of species, environments, systems and practices), the range of hazards and the perceived risks are complex.

Multiple objectives are driving the application of risk analysis to aquaculture. Foremost is for resource protection (human, animal and plant health; aquaculture; wild fisheries and the general environment) as embodied in international agreements and responsibilities. Of equal importance, the other drivers of risk analysis are: (i) food security, (ii) trade, (iii) consumer preference for high quality and safe products, (iv) production profitability and (v) other investment and development objectives.

Recognizing these issues and responding to requests emanating from the second and third sessions of COFI's Sub-Committee on Aquaculture [SCA] (SCAII, Norway,

2002; SCA III, India, 2006) to undertake studies on risk assessment, a project "Application of risk analysis in aquaculture production" was undertaken to: (1) review the (a) current state of knowledge and understanding on the risks involved in aquaculture development and management, and (b) application of risk analysis (hazard identification, risk assessment, risk management and risk communication) in aquaculture; (2) to prepare and compile a technical document that will provide practical guidance for policy makers and interested individuals on the use of various types of risk analysis in aquaculture as a useful decision-making tool for the sustainable development of the sector; and (3) organize an expert workshop to contribute to the process of better understanding the various risks involved in aquaculture so that they can be communicated well, more accurately assessed, and risk management measures appropriately identified to reduce the vulnerability of people who depend on aquaculture for their livelihoods and so that improvement in sector sustainability, profitability and efficiency can be achieved.

The project, undertaken in 2007 through a desk study and an expert workshop held in Rayong, Thailand in June 7-12, 2007, was funded under the Regular Programme and



through FAO's New Cooperation Agreement with Norway administered by the FishCode Programme of the FAO Fisheries and Aquaculture Department.



Forty-one aquaculture experts (policy-makers, risk analysis practitioners and technical experts in various aspects, e.g. diseases, food safety, genetics, environment, socio-economics, aquaculture insurance) representing various international, regional and national organizations and institutions in Asia, the Pacific, Oceania, Europe and North America, participated in the expert workshop.



The experts were divided into 3 working groups and tackled the following themes:

**Working Group 1** - Development of the contents of the *Manual on Understanding and Applying Risk Analysis in Aquaculture*



**Working Group 2** - Identification and grouping of hazard categories pertaining to ecological, environmental, genetic, pathogen and food safety aspects

**Working Group 3** – Identification of hazards with emphasis on social, financial/economic and cultural aspects



The major outcomes of the desk study and expert workshop include a better understanding of the risk analysis process and its application to seven major risk categories (i.e. pathogen risk analysis, food safety and public health, genetics, application of risk analysis to genetic issues and environmental issues, ecological risk assessment, introduced marine species risk assessment, financial risk analysis, social risks in aquaculture) and two Fisheries Technical Papers (FTPs).



The desk study and the expert workshop recognized that the main purpose of risk analysis is to provide a structured means of assessing risks to or from a sector and communicating these risks in order to guarantee a uniform and transparent process of decision making or regulatory control. It was also recognized that risk analysis is undertaken in any circumstance where a decision must be made in the face of significant uncertainty and where potential harm exists. Risk analysis need not be an overly complicated process. It can be undertaken as a fully quantitative assessment of probabilities or alternately, can be based on qualitative assessment of perceptions. Risk analysis as a process should be considered as a highly flexible tool that can readily be adapted to various situations.

The first FTP contains two parts. Part 1 consists of 14 technical papers presented during the expert workshop, contributed by 23 specialists and peer-reviewed by nine experts. The contributed papers include general principles of risk analysis, application of risk analysis to the identified seven risk categories (see above) and three related papers on ecological risk assessment guidelines of marine fish aquaculture, aquaculture insurance industry risk analysis process and risk analysis in small-scale shrimp farmers in India. Part 2 contains the highlights of the FAO/NACA Expert Workshop on Understanding and Applying Risk Analysis in Aquaculture Production contributed by 41 experts.

The second FTP is a Manual for Understanding and Applying Risk Analysis in Aquaculture Production. The purpose of the manual is to provide an overview of the risk analysis process as applied to aquaculture production and to demonstrate the variety of ways in which risk can manifest in aquaculture operations



and management. The manual is intended to promote wider understanding and acceptance of the applications and benefits of risk analysis in aquaculture production and management that could lead to greater harmonisation between members in the use of risk analysis. It is intended for regulators and policy makers of FAO Member States to aid in an understanding of the

application of risk analysis in this fast growing sector of the economy. While examples are provided, it should be noted that the manual is not a recipe book to be followed for instant success. As risk analysis and resulting guidelines are typically developed in an explicit context, a good understanding of the risk fundamentals will be required in order to be adapted to a new situation. Risk analysis capacity and capability in relation to aquaculture operations should be developed in FAO Member States.

These two publications are expected to be in print by third quarter of 2008. Further information can be obtained by writing to [Melba.Reantaso@fao.org](mailto:Melba.Reantaso@fao.org).

## NEW STAFF PROFILE



The Government of the Kingdom of Saudi Arabia (KSA) and FAO has entered into a new Unilateral Trust Fund (UTF) Agreement for the next five years starting 2007 until 2012. This present UTF Agreement between KSA and FAO is composed of 13 different projects. One of these projects (UTFN/SAU/017/SAU) is on “Support to the Fish Farming Center in Jeddah”. The long-term objective of UTFN/SAU/017/SAU is to upgrade the technical capability of the Fish Farming Center as an institution to support the increasing aquaculture activities in the country. FAO’s role in the present project is to provide the technical assistance

to meet the project objectives. Dr. Felix G. Ayson joined FAO on 04 August 2007 as Chief Technical Adviser (CTA)/Aquaculture Expert for the Project.

Felix comes from the Philippines and holds a Doctor of Science degree in Zoology with specialization in Fish Physiology/Endocrinology. Before joining FAO, Felix was a Researcher at the Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC AQD) in the Philippines where he worked for the past 18 years. SEAFDEC AQD is an international research institution that does scientific research on aquaculture

and fisheries. While in SEAFDEC AQD, Felix held various positions, among them as Head of the Nursery Section, Program Leader of the Marine Fish Program, and Manager of the Multi-species Fish Hatchery and the Integrated Fish Broodstock and Hatchery Complex.

Felix is stationed in the Fish Farming Center in Jeddah, Saudi Arabia. He can be reached by email at [Felix.Ayson@fao.org](mailto:Felix.Ayson@fao.org)



# Thirtieth Anniversary of the Asia-Pacific Regional Research and Training Centre for Integrated Fish Farming<sup>1</sup>

Continuing international training efforts for the Last 28 Years

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*The Asia-Pacific Regional Research and Training Centre for Integrated Fish Farming is now known as the Freshwater Fisheries Research Centre (FFRC) of the Chinese Academy of Fishery Sciences and the Regional Lead Centre, China of inter-governmental NACA.*



*Group photo of participants and training staff of the 1981 Training Course on Integrated Fish Farming*

The Asia-Pacific Regional Research and Training Centre for Integrated Fish Farming was established 30 years ago by the Chinese government and with technical assistance from FAO/UNDP. The centre is located in Wuxi, near Lake Taihu, a historical site for aquaculture development where freshwater aquaculture practices started some 2 500-3 000 years ago. The establishment of the centre was a response of the Chinese government to the suggestion of FAO/UNDP to set up an institution in China for developing TCDC (technical cooperation among developing countries) activities in the area of aquaculture. The centre started operations in 1981 and was designated as the Regional

Lead Centre, China (RLCC) by the Network of Aquaculture Centres in Asia-Pacific (NACA) in the same year. In 1984, the centre merged with another Chinese national fisheries institute, the Scientific Experimental Base for Fisheries Enhancement in Lake Taihu and formed the Freshwater Fisheries Research Centre (FFRC) in 1984. With expanded resources and capacity, the FFRC is now one of the major national comprehensive fisheries research, development and educational institutions under the Chinese Academy of Fishery Sciences.

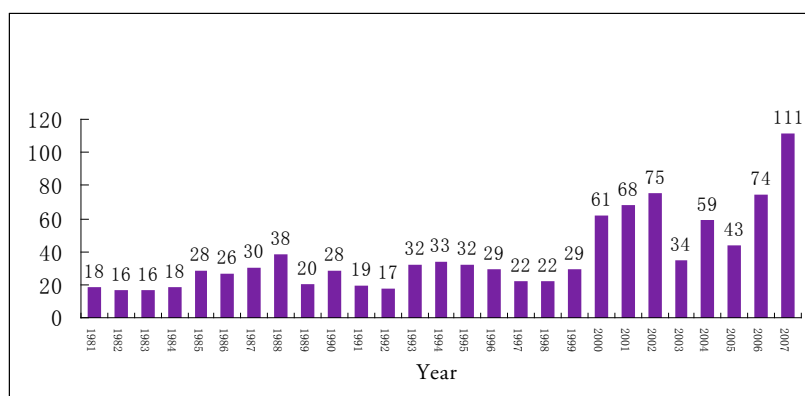
RLCC started its international training activities in 1981 when it organized the 1<sup>st</sup> four-month

TCDC technical training course on integrated fish farming for the Asia-Pacific region and other developing countries in other regions. The first training course was delivered with technical assistance from NACA and funding support from FAO, UNDP, the Asian Development Bank (ADB), the International Development Research Centre of Canada (IDRC) and the Chinese government. The training course was participated by 18 participants from 9 countries (Bangladesh, Belau, Fiji, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka and Thailand). The TCDC technical training course on integrated fish farming sponsored by multi-international donors lasted until 1991. During the period,

255 participants from 37 countries received comprehensive training on theories and practical techniques involved in integrated fish farming, a characteristic resource use for efficient and environment-friendly aquaculture system.

The regular international training course organized by RLCC became an integral component of the human resource development for developing countries sponsored by the foreign aid programme of the Chinese government since 1992 when most international donors discontinued their funding support for the training course. Since then, the international training activities have significantly expanded with increasing funding support from the Chinese government. In order to meet the growing demand from Africa for technical and managerial personnel in aquaculture, RLCC started to organize technical training courses especially for African countries since 2000 in addition to the training course for Asia-Pacific and South America. Since 1992, RLCC has organized 23 technical training courses on integrated fish farming, aquaculture and aquaculture health management for developing countries with core funding support from the Chinese government. Six hundred and twenty four participants from 71 countries received 2-3 month training at RLCC. In addition, RLCC organized 4 short-term training course/workshop on “Sustainable development and management of inland open water fisheries” and “Integrated paddy-fish culture” for the Asia-Pacific Economic Cooperation (APEC), the Association of Southeast Asian Nations (ASEAN) and other Asian countries with full funding support from the Chinese government. To-date, 118 participants from more than 20 countries participated. The international training activities at RLCC have continued without interruption for

**Figure 1.** Number of participants who attended the training course at RLCC during the period 1981-2007



**Table 1.** Countries which participated in international training courses and workshops at RLCC

Angola	Ethiopia	Marshall Is.	Senegal
Armenia	Fiji	Mauritius	Seychelles
Australia	Ghana	Mexico	Sierra Leone
Bangladesh	Guinea	Mongolia	South Africa
Belau	Guyana	Morocco	Sri Lanka
Bhutan	Haiti	Mozambique	Sudan
Botswana	Hong Kong SAR	Myanmar	Suriname
Brazil	Hungary	Namibia	Tanzania
Brunei	India	Nepal	Thailand
Cambodia	Indonesia	Netherland	Tunisia
Cameroon	Iran	Nigeria	Turkey
Chile	Iraq	Oman	Uganda
Colombia	Italy	Pakistan	Uruguay
Congo	Kenya	Panama	Uzbekistan
Cote d'Ivoire	Korea	Papua New Guine	Venezuela
Cuba	Lao PDR	Peru	Viet Nam
Czech	Liberia	Philippines	Western Samoa
Djibouti	Libya	Romania	Yemen
DPR Korea	Madagascar	Rwanda	Zambia
Ecuador	Malaysia	Saudi Arabic	Zimbabwe
Egypt			

the last 28 years. Altogether, 997 participants from 81 countries and different regions of the world received training at RLCC during the period 1981-2007 (see Figure 1). In 2008, a 2-month technical training course on aquaculture (April 25-June 23) and a 15-day (September 15-29) workshop on fisheries development and management for senior African fisheries officers are scheduled with full funding support from the Chinese government.

RLCC is one of the very few institutions which have offered long-term technical training course on aquaculture and fisheries for nearly three decades without interruption and with such broad coverage in the world. Such training activities have significantly promoted aquaculture development across the globe and are highly appreciated by participating governments and relevant international organizations. Many practical aquaculture techniques and systems were successfully transferred and applied in many countries through these courses. For instance, the Chinese induced fish



*Friendship tree planting by guests from international organizations (Mr F. Henderson, former FIRI Chief; Mr Chen Foo Yen, NACA Coordinator, Dr Pillay, FAO/UNDP ADCP Programme Chief)*



*Participants doing practical exercise on induced breeding of carps*

breeding technology has been extensively adopted by the RLCC trainees in many countries in Asia-Pacific and Africa, which has significantly improved seed supply for aquaculture, particularly, carps. A very good example is that of Mr. Mohammed Shahab Uddin who became the first person who succeeded in induced breeding of black carp in Bangladesh soon after attending the 4-month training course on integrated fish farming at RLCC in 1987. The traditional integrated fish farming system and techniques have been introduced and practiced in many developing countries. Many RLCC trainees are presently holding key positions in their national fisheries management agencies as well as research, human resource development and extension institutions.

While contributing to the world aquaculture development through continuing international training activities, RLCC dispatched its technical professionals to over a dozen countries in Asia, Africa and South America providing technical assistance to aquaculture projects, aquaculture facility establishment and aquaculture education and training.

With increasing support from the Chinese government, the physical capacity and professional team of RLCC for research, development and human resource development have been strengthened significantly in recent years. It is now the largest inland fisheries institution in China. As one of the NACA Regional Lead Centres, RLCC will continue its endeavor to contribute to world aquaculture development by carrying out more extensive international training activities and technical cooperation and exchange with different countries around the world.

### Recently held and upcoming meetings on aquaculture organized and co-organized by The Fisheries and Aquaculture Department (continued from page 19)

- RECOFI Regional Technical Workshop on Aquatic Animal Health, 6-10 April 2008, Jeddah, Kingdom of Saudi Arabia
- FAO Regional Workshop on Establishing an Aquatic Animal Biosecurity Framework for South Africa, 22-25 April 2008, Lilongwe, Malawi
- TCPF/MAS/3101 Workshop on Risk Assessment in Aquaculture Production, 7-9 May 2008, Majuro, Marshall Island
- West Balkan States Regional Workshop on Aquatic Animal Health and Project Terminal Workshop TCP/BiH/3101, 19-23 May 2008, Sarajevo, Bosnia and Herzegovina
- EIFAC Symposium on Interactions between Social, Economic and Ecological Objectives of Inland Commercial and Recreational Fisheries and Aquaculture, 20-23 May 2008, Antalya, Turkey
- COFI Sub-Committee on Fish Trade, 11th Session, Bremen, Germany, 2-6 June 2008
- COFI Sub-Committee on Aquaculture, 4th Session, Puerto Varas, Chile, 2-5 October 2008
- 5th Session of the Network of Aquaculture Centres in Central and Eastern Europe, 15-18 October, Lviv, Ukraine



# Convention on Biological Diversity

## Subsidiary Body on Scientific Technical and Technological Advice (SBSTTA) International Biodiversity Day 9<sup>th</sup> Meeting of the Conference of the Parties (COP9)

The ninth meeting of the Conference of the Parties (COP 9) will be held at the Maritim Hotel in Bonn, Germany, from 19 to 30 May 2008. COP 9 will coincide with the International Biodiversity Day, on 22 May 2008. This year's theme for the International Day for Biological Diversity (IBD), "Biodiversity and Agriculture," seeks to highlight the importance of sustainable agriculture not only to preserve biodiversity, but also to ensure that we will be able to feed the world, maintain agricultural livelihoods, and enhance human well being into the 21st century and beyond.

COP9 this year was preceded by the thirteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) held at the headquarters of the Food and Agriculture Organization of the United Nations (FAO) from 18 to 22 February 2008. During SBSTTA13, the FAO Fisheries and Aquaculture Department organized and contributed to a number of side events which were all very well received by the delegates. One side event focussed on *Protecting Biodiversity Through An Ecosystem Approach To Aquaculture (EAA) And Enhanced Aquatic Biosecurity*; approaches which involve physical, ecological, social and economic systems taking into consideration stakeholders in the wider social, economic and environmental context of aquaculture. Biosecurity is a strategic and integrated approach that encompasses both policy and regulatory frameworks aimed at analyzing and managing the risks of the sector. The event discussed the relevance of EAA and aquatic biosecurity approaches to protect biodiversity. A second side event focussed on the *Ecosystem Approach to Capture Fisheries (EAF)* which is an appropriate

and necessary framework for sustainable fisheries and biodiversity conservation. This side event presented an outline of the EAF framework as described in the FAO guidelines and presented a few case studies underlining the challenges and opportunities associated with it. The Fisheries and Aquaculture Department also joined hands with the Agriculture and Consumer Protection Department to organize a side event on *Human Nutrition Indicators For Biodiversity*. Here, the focus was on the common goals of the sectors of nutrition and biodiversity and nutrition indicators developed to monitor, mainstream and value underutilized and neglected species, including aquatic species.

At COP9, the Food and Agriculture Organization will again address the delegates on several occasions when the issues for in-depth consideration are being discussed including *inter alia* agricultural biodiversity, invasive alien species, incentive measures and the ecosystem approach. FAO will highlight that the organization is actively engaged in a wide range of normative and field activities relating to food and nutrition security, sustainable fisheries and aquaculture, monitoring and assessment of status and trends of inland water ecosystems, and global environmental change including climate change, specifically with regard to both positive and negative impacts of climate change on the spread of aquatic alien species and diseases and the considerable potential of the various forms of aquaculture in adaptation and mitigation. FAO will point out that the conservation and sustainable use of inland aquatic biodiversity needs to be promoted further by linking ecosystem considerations into integrated management practices and procedures, taking into account cross-sectoral consider-

ations. More than 80 percent of the world's finfish are farmed in inland waters, and to give due attention to the rapidly growing aquaculture sub-sector, including culture-based fisheries, the FAO Sub-Committee on Aquaculture has been established which will meet again this year for its 4<sup>th</sup> meeting in Puerto Varas, Chile, from 6 to 10 October 2008. In fact, the 27<sup>th</sup> Session of FAO's Committee on Fisheries (COFI) last year re-affirmed the great importance of aquaculture globally, and called for the establishment of a Special Programme for Aquaculture Development in Africa (SPADA). COFI will provide further guidance and propose concrete actions to achieve sustainable fisheries and aquaculture development, in line with the FAO Code of Conduct for Responsible Fisheries and in harmony with the articles of the CBD. In line with the above, FAO will invite delegates to bring issues of common concern forward to their country delegations who will be attending the meetings of the FAO Committee on Fisheries and its Sub-Committees on Aquaculture and Fish Trade.

FAO will organize three side events in Bonn: (i) Biodiversity for food and agriculture, 21 May at 13:15 in Salon Haydn, (ii) Monitoring and sustainably managing forest biodiversity, 21 May at 18:15 in Salon Haydn, and (iii) FAO and the Ecosystem Approach, 27 May at 13:15 in Salon G26.

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Valbo-Jorgensen, J.; Thompson, P.M. Cultured-based fisheries in Bangladesh: a socio-economic perspective. *FAO Fisheries Technical Paper*. No. 499. Rome, FAO. 2007. 41 pp.

Fisheries policy in Bangladesh is still trying to get to grips with the major dilemmas of maximizing benefits from natural resources while ensuring an acceptable degree of equity in the distribution of benefits and protecting the ecosystems that support the resources. During the twentieth century Bangladesh adopted one sided production oriented policies in the agricultural sector to feed its rapidly growing population. This strategy included increasing fish production, then in decline mainly as a result of environmental degradation brought about by the expansion of agriculture. The solution was to develop aquaculture and later to promote culture based fisheries and large scale stocking in the floodplains and beels (lakes) that previously sustained capture fisheries. Although fish production per se in many cases may have increased as a result of this type of intervention, benefits have not been socially and environmentally sustainable. This document reviews and discusses the development of culture based fisheries and community based fisheries management in Bangladesh with regard to socio economic impacts as well as environmental effects and biodiversity loss.



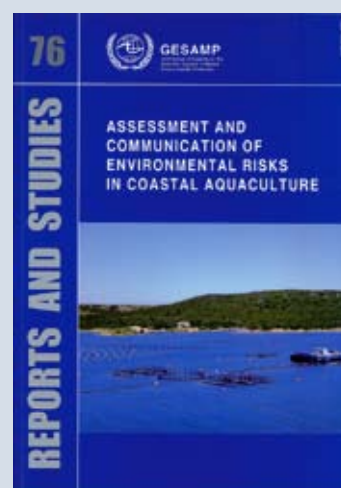
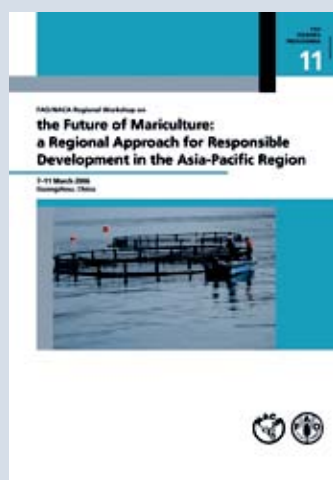
Secretan, P.A.D.; Bueno, P.B.; van Anrooy, R.; Siar, S.V.; Olofsson, Å.; Bondad-Reantaso, M.G.; Funge-Smith, S. Guidelines to meet insurance and other risk management needs in developing aquaculture in Asia. *FAO Fisheries Technical Paper*. No. 496. Rome, FAO. 2007. 148 pp.

This documents contains the Guidelines for action to meet insurance and other risk management needs in developing aquaculture in Asia. These guidelines are an outcome of a joint FAO, Network of Aquaculture Centres in Asia-pacific (NACA) and Asia-Pacific Rural and Agricultural Credit Association (APRACA) Regional Workshop on the Promotion of Aquaculture Insurance in Asia, held in Bali, Indonesia, from 30 April to 2 May 2007. the workshop was hosted by the Government of Indonesia, Directorate General for Aquaculture, and attended by policy-makers and international experts from the rural finance, insurance and aquaculture sectors from both the region and elsewhere, The document also contains the Report of the Regional Workshop and two background papers produced for the workshop.



Corsin, F.; Funge-Smith, S. & Clausen, J. A qualitative assessment of standards and certification schemes applicable to aquaculture in the Asia-pacific region. FAO. 2007. 98 pp.

Recent years have seen markets becoming increasingly stringent towards the quality of food products. Initially, quality criteria addressed mainly food safety issues. However, in response to the concerns expressed by many non-governmental organizations and other stakeholders, product quality increasingly began to include criteria related to environmental and socio-economic sustainability. This trend can also be observed in fisheries and aquaculture products. Sustainability and corporate social and environmental responsibility were key topics discussed at the 2007 Seafood Summit and are likely to play a greater role in the sector. There is a notable difference between agriculture and fisheries commodities, especially as fisheries products are often much more diverse than those of agriculture in terms of both commodities and production systems. Requirements for quality criteria and the need to cope with this diversity have led, over the past few years, to an overwhelming proliferation of certification schemes. Many countries in Asia have expressed concern about the potential impact that these certification schemes may have on the supply chain, especially those of small-scale producers. This document reviews the voluntary standards and certification programmes applicable to the aquaculture sector in the Asia-Pacific region.



Bartley, D.M.; Brugère, C.; Soto, D.; Gerber, P.; Harvey, B. (eds). FAO/WFT Expert Workshop. Comparative assessment of the environmental costs of aquaculture and other food production sectors: methods for meaningful comparisons. 24-28 April 2006, Vancouver, Canada. FAO Fisheries Proceedings. No. 10. Rome, FAO. 2007. 241 pp.

The global food production sector is growing. In many areas farming systems are intensifying. This rapid growth has in some cases caused environmental damage. In acknowledgement of the potential for adverse environmental impacts from food production, the first session of the FAO Committee on Fisheries' Sub-Committee on aquaculture recommended "undertaking comparative analyses on the environmental cost of aquatic food production in relation to other terrestrial food production sectors". These proceedings include review papers describing methods for such comparisons as well as the deliberations of their authors, a group of international experts on environmental economics, energy accounting, material and environmental flows analysis, aquaculture, agriculture and international development discussed during the FO/WFT Expert Workshop on Comparative Assessment of the Environmental Costs of Aquaculture and Other Food Production Sectors, held in Vancouver, Canada, from 24 to 28 April 2006.

Lovatelli, A.; Phillips, M.J.; Arthur, J.R.; Koji Yamamoto (eds). FAO/NACA Regional Workshop on the Future of Mariculture: a Regional Approach for Responsible Development in the Asia-Pacific Region. 7-11 March 2006, Guangzhou, China. FAO Fisheries Proceedings. No. 11. Rome, FAO. 2008. 325 pp.

Aquaculture in the Southeast Asian region has been growing steadily over the last few decades, requiring more space to accommodate it. The search for additional areas to expand the aquaculture industry as a whole and the identification of new farming species of commercial value to satisfy the growing local and export markets are pushing the sector in some countries to broaden activities in the sea, including further offshore where more space is available and where, to a lesser extent, competition is currently not so intense. The Fisheries and Aquaculture Department of the Food and Agriculture Organization of the United Nations (FAO) in collaboration with the Network of Aquaculture Centres in Asia-Pacific (NACA) organized the regional workshop entitled "The Future of Mariculture: A Regional Approach for Responsible Development in the Asia-Pacific Region" on 7-11 March 2006. The workshop was conducted in collaboration with the Ministry of Fisheries of the People's Republic of China and the Guangdong Ocean and Fisheries Administration. The workshop was convened in response to requests from FAO and NACA Member countries to identify key trends and issues affecting mariculture growth in the Asia-Pacific region and to strengthen regional collaboration for future responsible development of mariculture.

GESAMP (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP Joint Group of Experts on Scientific Aspects of Marine Environmental Protection) 2008. Assessment and communication of environmental risks in coastal aquaculture. Rome, FAO. Reports and Studies GESAMP No. 76: 198 pp.

This GESAMP study focuses on environmental risk assessment and communication in coastal aquaculture. To support effectively an open and transparent approach to sustainable resource use, risk assessment and communication must be able to fit within a broader social, economic and environmental decision-making framework. The communication aspects become paramount in enabling sustainable development in that type of decision-making environment. This publication presents a set of objectives, goals, methodologies and a checklist for assessment and communication of environmental risks which may be associated with coastal aquaculture. It is structured to improve risk communication and to ensure that risk assessment is a scientific exercise in predicting environmental change. A set of six case studies is also presented to illustrate the use of the environmental risk assessment methodologies in coastal aquaculture. These examples of environmental interactions span a range of cultured species from fin fish to molluscs and shrimp. The type of effects studied includes effects on carrying capacity, phytoplankton, kelp, benthic fauna, the genome of wild fishes and salinisation of soils.



Report of the fourth session of the Regional Commission for Fisheries. Jeddah, Kingdom of Saudi Arabia, 7–9 May 2007. [Bilingual version English/Arabic]. FAO Regional Office for the Near East. Report of the fourth session of the Regional Commission for Fisheries. Jeddah, Kingdom of Saudi Arabia, 7–9 May 2007. *FAO Fisheries Report*. No. 847. Rome, FAO. 2007. 48p. [Bilingual version English/Arabic]

The fourth session of the Regional Commission for Fisheries (RECOFI) was held in Jeddah, Kingdom of Saudi Arabia, during the period 7 to 9 May 2007. It was attended by delegates from seven Members of the Commission and by observers from international, regional and national fishery bodies and institutions. The meeting was organized to evaluate the progress of intersessional activities relating to recommendations of earlier sessions, address regional fisheries and aquaculture issues of concern and review plans for short- and medium-term activities. The Commission endorsed the work plan of its Working Group on Aquaculture (WGA), stressed the importance of developing and implementing national plans of action to prevent, deter and eliminate illegal, unreported and unregulated (IUU), fishing noted the increasing importance of fish food safety, and urged RECOFI Members and FAO to increase their efforts in improving fisheries information systems and methods of reporting of stock status in the region. In examining its role, responsibilities and future challenges, the Commission decided to expand its current Working Group on Statistics to a wider Working Group on Fisheries Management. Further, the Commission made recommendations concerning the organizational arrangements for its next session, agreed on its programme of work and adopted its budget for 2007–2008.

APFIC regional consultative workshop certification schemes for capture fisheries and aquaculture. Ho Chi Minh City, Viet Nam, 18–20 September 2007. RAP publication 2007/26. FAO. 2007. 38 pp.

This Workshop is contributing to the ongoing process of transforming the Asia–Pacific Fishery Commission (APFIC) into a consultative forum for APFIC members and organizations working in the region. The 29th Session of the APFIC recommended that, as one of its two major work themes in 2007–08, APFIC should focus on standards and trade in the fishery sector as one of the emerging issues in the region. In particular, the member countries specifically requested APFIC to review the costs and benefits associated with certification schemes for fisheries and aquaculture in the APFIC region. This regional consultative workshop was convened in response to this recommendation. The APFIC secretariat and the cohosting government Viet Nam convened the Regional Consultative Workshop in Ho Chi Minh City from 18 to 20 September 2007, with the objective of evaluating the potential for capture fisheries and aquaculture certification schemes and issues relating to their sustainability and implementation in the region.

It is recognized that fisheries and aquaculture certification could offer tangible benefits to APFIC member countries. However, this report concludes that a number of issues should be addressed for certification to contribute effectively to the sustainable development of fisheries and aquaculture in the region. It is crucial that there is considerable regional involvement in certification, especially on issues related to small-scale operations which are so important for the region. It is recommended that a higher degree of harmonization and equivalence of certification schemes should be explored. The number of certification schemes is increasing and this can potentially bring up the cost for both producers and consumers. The costs and benefits should be evenly distributed along the value chain. The report specifically notes that the producers should not bear the costs associated with certification alone. Governance and stakeholder involvement is crucial to ensure not only good certification schemes but a sustainable development of the sector. A final point is the need for capacity building at both regional and national levels.

For the future development of both fisheries and aquaculture, especially in the Asia–Pacific region, it is crucial to ensure the involvement of small-scale fisheries and farmers as they represent a significant factor.

In Asia alone 12 million people are directly employed in aquaculture.

Rana, K.J. Regional review on aquaculture development. 6. Western-European region – 2005. *FAO Fisheries Circular*. No. 1017/6. Rome, FAO. 2007. 56 pp. Contains a CD-ROM

FAO regularly conducts global and regional reviews of aquaculture status and trends, most recently during 2005 and 2006. The present regional synthesis for Western-Europe provides an overview of major issues and trends in the aquaculture sector. Stagnating capture fisheries and soaring demand for seafood products in Europe have spurred the expansion of aquaculture in this region. In 2003 farmed finfish accounted for 62 percent in volume and 79 percent of value while farmed molluscs accounted for 38 percent and 21 percent of volume and value, respectively. The expansion between 1994 and 2003 was dominated by marine finfish production particularly of Atlantic salmon in Norway (71 percent), United Kingdom (19 percent) and Faeroe Islands (10 percent). Seabass and seabream farming in Greece, Turkey, Spain, Italy and France in 2003 accounted for 95 percent of production. The increased production and supply of fish was accompanied by falling farmgate prices triggering restructuring of the industry, as well as substantial increases in volume of the key finfish species. The review confirms features of a maturing aquaculture industry including specialization, increasing skills and professionalism, diversification of technology and products, efficient production, vertical integration and market development. The growing environmental and social awareness and recognition of consumer and food safety preferences by the industry and the public sector are contributing to good farm management and governance measures which are enabling effective efforts towards sustainable development and responsible practices in aquaculture.





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# FAN

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