



### Global Conference on Aquaculture 2010 "Farming the Waters for Food and People"

9-12 June 2010  
The Imperial Queen's Park Hotel  
Bangkok, Thailand



## Role of Aquaculture to Food Security: Global Conference on Aquaculture 2010

Three important events served as paths to the World Food Summit, organized by FAO in Rome from 16-18 November 2009. A high-level expert forum “How to feed the world in 2050” held from 12-13 October 2009 examined policy options which governments should consider adopting to ensure that the world population can be fed when it nears its peak of nearly 9.2 billion people in the middle of this century. From October 14-17, 2009, the Committee on World Food Security, immediately following the high-level expert forum, considered reforms that will enable it to play a much more effective role in the global governance of food security. And the third major event was the World Food Day (celebrated annually every 16th of October) with the theme - how to ensure food security in times of crisis.

Now that the summit is over, declaration has been agreed, the greatest task, as in all other summits, is how to get down to implementation, how to get the words/narrative into actions. The Summit declaration vows governance, increased investment and proactive climate change strategy.

Aquaculture, although not specifically highlighted during the Summit can have a potentially strong role in contributing to food security even in times of crisis. With an average growth rate of 8.8 percent per annum since 1970, aquaculture is now recognized as a rapidly expanding sector of the global economy. During a period of slim prospects from capture fisheries and increasing demand for fish and fishery products, aquaculture will be expected to continue to increase its contribution to the world's production of aquatic food. Thus, its role in food security will be strengthened while also offering opportunities to contribute to poverty alleviation, community development and to reduce overexploitation of natural aquatic resources. The big diversity of species, farming systems, practices, environments and resource use patterns offer a wide range of opportunities for diversifying food production as well as income generation through aquaculture.

While aquaculture represents a viable solution to food security challenges confronting the global population, like other food producing sectors, it is also facing a number of important challenges and other emerging

issues in terms of sustainability, governance, public perception, conflicts with other users of aquatic habitat, environmental impacts, biosecurity and climate change, to mention a few.

Various public and private sector stakeholders are trying to do their best within their areas of responsibilities and capacities to contribute to the sustainable development of the aquaculture sector. On the part of FAO, apart from the many short- and long-term programmes being implemented including assistance to members, all aimed to contribute to the process, the Department of Fisheries and Aquaculture is organising the Global Conference on Aquaculture 2010 from June 9-12, 2010 in Bangkok, Thailand with the theme Farming the Waters for Food and People. The theme appears appropriate in current times as aquaculture now provides nearly 50 percent of food fish consumed globally and is recognized as a great source of jobs and income for millions of people directly involved in primary production and the support services.

The Conference will review the present status and trends in aquaculture development, evaluate the progress made in the implementation of the 2000 Bangkok Declaration and Strategy, address emerging issues, assess opportunities and challenges for future development and build consensus on advancing aquaculture as a global, sustainable and competitive food producing sector. While the task faced by the sector is not new, it is enormous. But the tools are available, developed and expanded since 2 300 years ago from the first publication “Fish husbandry” by Chinese scholar-statesman Fan Li who wrote the first how-to-do-it treatise. What is needed is to make these tools sharper and more versatile for a warming Earth.

Everyone is invited and welcome to participate in the conference and contribute to the ongoing multifaceted process of contributing to food security through responsible aquaculture.

**Melba B. Reantaso**  
Editor-in-Chief  
FAO Aquaculture Newsletter

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# Salient aquaculture issues discussed at the fifth session of the Regional Commission for Fisheries (RECOFI)

Dubai, United Arab Emirates, 12–14 May 2009

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The fifth session of the Regional Commission for Fisheries (RECOFI) was held in Dubai, United Arab Emirates from 12 to 14 May 2009. The Commission reviewed a range of regional issues and activities of importance to the conservation and management of fisheries and aquaculture. Members addressed intersessional activities and provided country reports. Administrative and financial reports were also considered. It was noted that as of 31 December 2008, eight Members had deposited their instruments of acceptance for the RECOFI Agreement.

The Commission discussed the report of the Working Group on Aquaculture (WGA) including the fourth meeting of the WGA (see FAN issue April 2009 No. 42), Regional Aquaculture Information System (RAIS), development of a regional strategy for aquatic animal health (see FAN issue December 2008 No. 41), sustainable marine cage aquaculture development (see FAN issue April 2009 No. 42) and a legal and policy framework for aquaculture.

Members also reviewed the structure and functioning of the Commission (see Box 1), its organization and *modus operandi* and terms of reference for RECOFI National Focal Points. In considering the programme of work and budget for the May 2009–May 2011 biennium the Commission approved seven activities for implementation.

**Harmful Algal Blooms** – Among the emerging issues discussed at the session, several Members recognized that the phenomenon of harmful algal blooms (HABs) was an urgent technical issue to be addressed. Although this phenomenon was not new in the region, recent outbreaks had caused serious damages to fish cage culture throughout the region, particularly in Oman and the United Arab Emirates where commercial companies had lost their entire production. It was noted that red tide also seriously affected capture fisheries and therefore it was agreed that the two RECOFI Working Groups on aquaculture and fishery management should plan for the current biennium (2009–2011) a joint activity covering this issue in close cooperation with other regional organizations, such as the Regional Organization for the Protection of the Marine Environment (ROPME).

**Regional Aquaculture Information System (RAIS)** – The Commission welcomed the official launching of RAIS (see FAN issue April 2009 No. 42) with the distribution of the RAIS User Manual and congratulated the Secretariat and all

## BOX 1

### Strengthening RECOFI

At the fifth session of the Regional Commission for Fisheries (RECOFI), the Commission agreed to hold an *ad hoc* intersessional meeting in the Islamic Republic of Iran to consider ways and means to enhance RECOFI's role. Members recognised the need to make the Commission more efficient and to accelerate its growth. It is expected that the *ad hoc* intersessional meeting will consider funding options in order to strengthen the Commission and achieve planned activities which the current funding does not allow. With respect of the funding RECOFI activities, some Members indicated the benefit of seeking funds from organizations and institutions that had not funded traditionally Commission activities. It is also expected that the *ad hoc* intersessional meeting will address issues such as the role of the Chair in facilitating sessions and promoting intersessional activities, the possibility to exercise fisheries management power as per the Commission's status and seeking cooperation and partnership with other organizations in the Region that are involved with aquaculture, fisheries and related issues.

the WGA Focal Points for the achievement. Furthermore, the Government of Kuwait's extrabudgetary support that permitted the establishment of this regional information system was acknowledged. In order to further develop and consolidate this web-based information system it was strongly recommended to fully launch the communication strategy developed by the RAIS National Coordinators/National Focal Points as well as to establish national networks of authorized data entry users. It was also noted that to ensure the system's utility and visibility all Members should continue to input validated national data and information.

**Regional Aquatic Animal Health Strategy** – The Commission Members recognized that the issue of aquatic animal health was very important in aquaculture. Health threats relevant to the sustainability of aquaculture and the protection of capture fisheries included, *inter alia*, exotic

pathogens, diseases, contaminants, transboundary movement of aquatic animals. The urgent need to harmonize national programmes on aquatic animal health was reiterated along with the development of national strategy on aquatic animal health. The Commission endorsed the “Proposal for a regional programme for improving aquatic animal health in RECOFI Member countries” along with its components, elements and activities developed by the WGA. Furthermore, it noted that the report of the regional aquatic animal health workshop provided an excellent roadmap for Members to follow. It included actions and activities that would be implemented incrementally, some at the national level while others as regionally coordinated activities.

**Marine Cage Aquaculture Development** – The Commission noted that although there was a growing interest in developing cage aquaculture in the region, there were technical, physical and policy constraints that were faced currently by Members. The major constraints identified in the establishment of fish cages had been the limited availability of suitable farming sites characterized by shallow waters, highly fluctuating salinity and temperature levels and inadequate sea currents. Other limitations identified included: (i) price competition from wild-caught fish; (ii) inadequate farming technologies for the region (i.e. introduction and poor adaptation of existing technologies used elsewhere); and (iii) the limited availability of endemic candidate species of commercial importance suitable for cage aquaculture (currently many existing operations farmed the Gilthead seabream, *Sparus aurata*, and the European seabass, *Dicentrarchus labrax*, voluntarily introduced from the Mediterranean). The Commission further endorsed the two guiding proposals formulated by the WGA for an Environmental Impact Assessment (EIA) framework and licensing procedure and encouraged strengthening regional collaboration to promote further sustainable marine cage aquaculture.



*Delegation of Oman. From left to right: Dr Ibrahim Al-Busaidi, Director General for Fisheries Development, Ministry of Fisheries Wealth; Mr Dawood S. Al-Yahyai, Director, Fishermen Training Institute and RECOFI-WGA Chairperson; Mr Fahad Saleh Ibrahim, Acting Director, Aquaculture Centre*



*Participants to the 5th RECOFI session*

The table below lists the aquaculture activities endorsed by the Commission for the current biennium May 2009 to May 2011.

Aquaculture	Risk analysis in aquaculture (training)	TBD*	Oman	3–4 days	Approved
Aquaculture	Environmental monitoring in aquaculture (training)	TBD	TBD	10–14 days	Approved
Aquaculture / Fisheries (joint activity)	Red tides: Impacts on capture fisheries and aquaculture and counter measures (technical workshop)	2010	Kuwait	3–4 days	Approved
Aquaculture / Fisheries (joint activity)	Geographical Information System (GIS) and spatial tools applications for capture fishery and aquaculture	2010	Qatar	3–4 days	Approved
Aquaculture	Regional Aquaculture Information System (development and consolidation)	--	--	5 days	Ongoing

\*TBD to be determined

# GCP/KYR/003/FIN

## “Support to fishery and aquaculture management in the Kyrgyz Republic”

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The Government of Kyrgyzstan recognizes the importance of the fisheries sector and the value of fish as a healthy product and an important component in the people's diet. Through aquaculture promotion and inland fisheries

development, the government sees opportunities for poverty reduction, livelihood improvement and diversification of rural employment both for men and women.

This new Trust Fund project aims to support the implementation of the Strategy for Fisheries and Aquaculture Sector Development and Management in Kyrgyzstan (2008-2012) which was approved by the Ministry of Agriculture, Water Resources and Processing Industry in February 2008.

The strategy has the following four overall goals of:

- using of the aquatic resources to contribute to the national economy, poverty alleviation and food security;
- augmenting the contribution of fisheries and aquaculture in generating socio-economic benefits and improving the wellbeing of the rural population;
- improving the economic viability of aquaculture farms through diversification of production in accordance with market demand; and
- increasing the availability of high quality fishery products for the domestic market, but also including increased production of low price fish for the popular consumption in the rural areas.

The present inland capture fisheries and aquaculture production in the Kyrgyz Republic is only about 10 percent of what it used to be in 1980s before the Soviet Union disintegration. Opportunities for the



*Rainbow trout*

sector lay in the fact that the consumer demand for fisheries and aquaculture products in the country is increasing with increasing incomes and growing health concerns of the modern population. The Kyrgyz Government is highly interested in implementing similar aquaculture based fish marketing systems as Finland created in the past.

The Government of Finland approved in May 2009 a USD2.2 million project; implementation started immediately with the First Steering Committee meeting.

A second major activity took place in September when the project organized a national workshop “Biodiversity Friendly Fisheries Management Regime (BDFMR) and Fisheries Co-Management” in close cooperation with the UNDP/GEF project Strengthening Policy and Regulatory Framework for Mainstreaming Biodiversity into Fishery Sector. The aim of this workshop was to discuss what new policies are necessary to make BDFMR and viable co-management options for Kyrgyzstan. The key problem addressed by the workshop was that of unsustainable management of fisheries and other natural resources at local level.

Some 40 people from various stakeholder groups attended this 3-day workshop held from 10 to 12 September 2009, in Cholpon-Ata Ecocentre at the Issyk-Kul Lake. FAO was represented by

Ms Cassandra de Young of the Development and Planning Service of FAO's Department of Fisheries and Aquaculture and Raymon Van Anrooy of the FAO Sub-Regional Office for Central Asia.

Issyk-Kul is the world's second largest mountain lake which has many problems, but most importantly the introductions of some new (alien) predatory species are blamed to have caused the disappearance of many endemic species, like naked osman (*Gymnodiptychus dybowskii*) and Issyk-Kul marinka (*Schizothorax pseudoaksaiensis issykkuli*). Lately, tension has been growing against rainbow trout cage culture. Eight companies are growing this species in 26 cages. Fishermen and environmentalists claim that a lot of fish have escaped from the cages and free rainbow trout are causing further damage to the endemics. The truth may not be that simple, as very intensive irrigation development took place in the country during the last 30 years and heavy water abstraction led to reduced water-levels and the drying of many of the incoming streams previously used by endemic fish species for spawning.

However, close cooperation is needed between UNDP/GEF and FAO projects in order to avoid misunderstandings as FAO project supports the fish farming and the UNDP/GEF sees this as a big danger to all endemic fish species at the Issyk-Kul Lake. Luckily, the FAO Project has already been able to assist the UNDP/GEF project in searching and capturing some of the most endangered species in order to reproduce these species in captivity for restocking purposes.

The proposal for a new biodiversity-friendly fisheries management regime for Issyk-Kul Lake was presented and was considered a good basis for the discussions on the integrated aquatic resources management of the lake, and particularly the management of fisheries. An Issyk-Kul Lake Fisheries Management Plan should be developed in a participatory manner with all stakeholders, which will include guidance (based on scientific evidence where possible) on management tools to be applied (including establishment and enforcement of closed areas and seasons, fishing gear regulations, restocking of endangered indigenous fish species, aquaculture production limits, etc.). The management plan should include all subtractive sectors (commercial, subsistence and recreational fisheries) and aquaculture. The development of such a management plan should be supervised by the Fishery Advisory Council.

It was strongly urged that the two projects (UNDP/GEF and FAO) should be implemented without further delay and that they coordinate their efforts to the fullest extent. Capacity building should be at the core of the project activities.



*Naked osman*

The proposal to establish sustainable integrated fish culture extension services in the Issyk-Kul oblast should be technically supported by both projects, and will include Best Management Practices (BMP) development.

Fisheries co-management, in terms of sharing management responsibility for aquatic biodiversity and fisheries resources of the Issyk-Kul Lake, is the most appropriate option to achieve the environmental, economic and social objectives of the stakeholders. In particular, the workshop participants agreed that the relevant authorities at national and local levels, research institutes and the communities around Issyk-Kul Lake would benefit from developing partnerships. It was recognized that co-management would only be successful if all stakeholders are committed to it and if the appropriate legal and policy frameworks are in place.

Fisheries co-management initiatives should be piloted with support from the above two projects in one or two areas in Issyk-Kul Lake, based on lessons learned in other parts of the world, while ensuring that these initiatives are appropriate to the local cultural and social contexts.

Further information can be obtained from Heimo Mikkola by e-mail at: [heimomikkola@hotmail.com](mailto:heimomikkola@hotmail.com)



GCP/KYR/003/FIN Logo  
designed by Sylviane Borghesi, FAO

# TCP/TUR/3101: Developing a roadmap for Turkish marine aquaculture site selection and zoning using an ecosystem approach to management

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## BACKGROUND

In 2006 the Turkish Environmental Law 2872 was amended as Law 5491. According to this law “Marine aquaculture facilities should not be constructed in sensitive areas such as enclosed bays and gulfs and in natural and archeologically protected areas. Fish farms existing in contradiction of this article will be closed after 1 year of the publication of this law”. The notification describing the criteria for aquaculture site selection in enclosed bays and gulfs was published in 2007. The law indicates that monitoring is necessary of fish farms, which already exist in enclosed bays and gulfs, if these sensitive areas have an eutrophication risk as calculated with the TRIX index. If these sensitive areas have high eutrophication risk, marine aquaculture facilities will not be constructed. Fish farms found to be in violation of this notice were under threat to be closed.

## OBJECTIVES OF THE ASSISTANCE

The specific objectives of TCP/TUR/3101 are: (i) to develop a road map for the moving of farms offshore, (ii) to determine the constraints and support needed for this to happen and (iii) to develop a plan of action within an ecosystem approach strategy for the growth of mariculture in Turkey.

## METHODOLOGY, ACTIVITIES AND PARTICIPATION

The project considered the following activities:

- elaboration of an initial map or estimate of conflicting farm distribution in the main marine cage culture areas of Turkey
- identification and analysis of information available about environmental and social issues of cage farming in Turkey through two stakeholder workshops
- initial training of farmers on site selection criteria and management aspects with an ecosystems perspective
- field work to develop a pilot zoning plan
- elaboration of a draft project for the development

of sound mariculture growth with an ecosystem approach in a multi-stakeholder environment

- development of aquaculture information brochures with selected data obtained and agreed in the workshops
- preparation of a road map for the recommended activities and presentation of the plan to government institutions.

All these activities were undertaken in close cooperation with the Ministry of Agriculture and Rural Affairs (MARA) and supported by the technical team consisting of the following: (i) two national consultants specialised in environmental issues, with a wide experience in coastal fish farming, large involvement with farmers and government offices and (ii) two international consultants, with wide expertise on issues of cage farming, site selection and modelling aquaculture impact, expertise in fish farming technologies and offshore aquaculture. Additionally, government counterparts participated actively in all technical activities. Overall coordination and backstopping was provided by FIMA in Rome and with the support of the FAO office in Turkey.

A very relevant element in this project was the participatory approach particularly through the two initial workshops with stakeholders and farmers and final workshop with government authorities.

The first workshop “Developing a Roadmap for Turkish Marine Aquaculture Site Selection and Zoning Using an Ecosystem Approach to Management” was held in Izmir, Turkey on 16 -17 July 2008. This facilitated workshop, attended by 37 participants belonging to 22 national institutions, farmer groups, companies and NGOs, identified issues of conflict between aquaculture and local communities and other sectors and potential solutions, as well as agencies who could implement the solutions and



develop a time-line for action. A road map was developed for the Turkish marine cage culture sector to prepare for the move from inshore sites to offshore sites (1 kilometre from the shore line).

The second workshop (same title), held in Muğla, Turkey from 10 to 11 August 2008 was attended by 62 participants belonging to 5 national institutions, 16 fish farmer companies/clusters, 6 aquaculture support industries, 3 farmer associations. At this workshop, the draft road map was presented and discussed and presentations were made on site selection criteria, offshore cage culture technology and management.

The pilot zoning plan started with field work involving the technical team and farmers in Gerenge Bay and Ildir Bay. Two meetings with authorities in Ankara elaborated further the process and discussed the main issues. The project team met weekly through internet conferences (Skype) to analyse progress in the development of the roadmap. Additionally, several informative flyers on Turkish cage fish production were prepared to inform other users of the coastal zones and to clarify many misconceptions.

The final roadmap and plan of actions was presented to government authorities in a workshop in Ankara at the MARA headquarters in January 2009. Seventy people attended the workshop, most of them belonging to different ministries involved (Environment and Forestry, Tourism, and Agriculture and Rural Affairs). Such meeting demonstrated the willingness from different sectors and institutions to understand this new sector and to make efforts to integrate it in to a well-planned coastal zone management.

### THE ROAD MAP

The roadmap addresses the actions to be taken from the immediate- to the long- term. It also proposes responsibilities, leadership and participation of various institutions.

The proposed roadmap covers 5 years including stages or periods of the first 6 months, the first year, 3 years and 5 years. Starting point could be considered the moment this roadmap is adopted by the Turkish government and adapted to current priorities.

Urgent issues to be addressed during first 6 months and actions include: i) assisting small farmers that are still inshore, ii) reviewing of the monitoring system for the farms, iii) implementation of a better planning system, iv) improving coordination between related ministries and institutions, and v) producing solutions for urgent issues such as logistic support (e.g., jetties and facilities for offshore farms). Some immediate action will be transitory until a more formal process is in place and the creation of the new institutions allow for more permanent measures. In this respect, a framework of at least 12 months is proposed for such needed transitory measures.



G. YUCEL, TURKEY

*Fish cages in tourist area, Gulluk Bay/Muğla*

During the first year period, the most relevant action suggested is the establishment of a inter-ministerial “Special Commission for Mariculture Development” to carry out the following tasks: coordination and planning process, education and training aspects, public relations activities, investment and credit issues, amending current legislation on site rental period and rental charges, identifying research priorities and ICZM among other duties.

Within 3-5 year period, there shall be a process of strengthening institutional organization. Other activities include education and training programs, data collection and monitoring, setting up of databases, assessment of carrying capacities of allocated mariculture zones, revision of implementation of current aquaculture regulations and preparation of a new/separate “aquaculture legislative act”.

This has been a model project with very close and coordinated work between FAO and MARA but also in close contact with other stakeholders such as the farmers themselves and other users of the coastal zones.

The roadmap for mariculture development as well as the pilot zoning plan could also be used as a model for other Mediterranean countries. The pilot zoning plan could be used by the CAQ (Committee of Aquaculture of the GFCM) and tested in other member countries. In fact, the project approach and results were presented as an example of an ecosystem approach to management of aquaculture sector during a side event of the 29th session of the Committee on Fisheries held in Rome.

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# TCP/RER/3205: Inception planning workshop “Advice to central Asian governments on the feasibility of commercial fish and livestock feed production” Tashkent, Uzbekistan, 24 -26th June 2009

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A sub-regional Technical Cooperation Programme (TCP) “Advice to central Asian Governments on the feasibility of commercial fish and livestock feed production” [TCP/RER/3205]” was approved in January 2009. The governments of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan are the recipients of this TCP. The project’s development objective is to strengthen the capacity of the ministries of agriculture of the participating countries in taking appropriate decisions and formulating adequate policies in support of increasing access to and availability of high quality commercial aquaculture and livestock feeds in the countries of Central Asia.

The project is implemented under the overall supervision by FAOSEC in Ankara, Turkey with FIMA, FAO HQ, as the lead technical unit. Duration of the project is from January 2009 to October 2010. The respective governmental national focal agencies implementing the national activities of the project are: Kyrgyzstan: Ministry of Agriculture – Department of Fisheries; Uzbekistan: Ministry of Agriculture – Uzbek Fisheries Development Center, Tajikistan Ministry of Agriculture – State Unitary Enterprise (Tajikriba); and Kazakhstan: Ministry of Agriculture – Scientific Research Institute of Fisheries. Stakeholders and beneficiaries include both the public and private sectors involved in aquaculture and livestock feed production.

The first activity of the TCP was an Inception Planning Workshop, convened at Hotel Shodlik Palace in Tashkent, Uzbekistan from 24 to 26 June 2009. The workshop, was hosted by the Uzbek Fisheries Development Center of the Uzbek Agricultural Scientific and Production Center, Ministry of Agriculture and Water Resources.

The workshop discussed follow-up project activities and finalized their modus operandi with primary focus on the following: a) project concept, rationale, envisaged outputs and broad outline of activities and the feasibilities of carrying out the different activities, b) share experiences and review information available on fish and livestock feeds, feed components, supply and demand issues, trade in feeds, custom tariffs for commercial feeds, and technological issues related to feed processing and marketing, c) review of the draft questionnaire outlines that were prepared for different surveys to be carried in all four countries, d) discuss a draft methodology for the (pre-) feasibility/assessment study, ensuring that both traditional and modern feed production technologies can be considered and that various feed alternatives are taken into consideration and agree on a common methodology to be used by the project in the four countries, e) in-country logistics for conducting different project components including training and survey plans for each country, f) overall work plan including the time-frame of implementation and responsibilities of all project holders, and g) other important issues/problems to be addressed before launching the field activities.

Six presentations by fish and animal feed experts from the four participating countries consisted of country overviews of the current state of aquaculture and aquafeed production and two overviews on the state of livestock and animal feed (Tajikistan and Uzbekistan). International experiences on the global state of aquaculture and livestock feeds were presented respectively by international experts for aquafeed and livestock feed. The aspects of financial feasibility were presented to sensitise the participants and further

introduce a methodology for conducting the feasibility study. During the plenary, extensive discussions were held on the design, scope and strategies for implementation of different project activities with country specific considerations including some related logistic and procedural issues. The structure of the feasibility study report was discussed in detail. In order to acquaint the participants with the situation in Uzbekistan, a half day field visit was organized to an aquafeed plant and a fish farm.

The main outputs of the workshop were:

- Better understanding of the aquaculture and livestock sub-sectors in the four participating countries and the importance of this TCP for sustainable development of these two sub-sectors;
- Increased understanding of the project concept, rationale, mechanism of project implementation and envisaged outputs and preparation of a work plan of the project for the next 12 months (July 2009 - June 2010);
- Outputs related to the implementation of different activities of the project with specific reference to participating countries include:

- ▶ nature and extent of the information to be collected for the different surveys to be carried out and suggestions for revision of draft questionnaires and guidelines to be used for these surveys. The type of surveys to be carried out are: a) general demographic information; b) overall assessment of aquaculture; c) overall assessment of the livestock and poultry sectors; d) assessment of fertilizers and feed resources of the country; e) aquaculture and feed management practices; and f) aqua- and animal feed plants in respective countries,
- ▶ a common methodology for carrying out fish and animal feed production feasibility studies in the region;
- ▶ an outline for preparation of database of the locally available feed ingredients to be used for production of aqua- and livestock feed; and
- ▶ agreement on venue and date of the next regional expert workshop to discuss the findings of the national level activities and preparation of feasibility analysis report.

The workshop recommended that the project should concentrate on aquafeeds, poultry feeds and supplements of cattle feed, assess requirements for introduction of appropriate technology, collection of input and output information for aquaculture and livestock, assessment of human resource capacities as well as provision of financial and extension services. The collection of data for the feasibility study and advice on better quality feed production on the basis of best international practices will be one of the core activities of the project, as well as the development of new approaches by feed



M. R. HASAN, FAO

*Preparation of grass carp fingerling transportation from Government Fish Farm, Tashkent, Uzbekistan*



R. VAN ANROOY, FAO TURKEY

*Soviet style control panel in animal feed plant near Tashkent, Uzbekistan. Old, but still functioning*

companies for distribution of the feed in the region. It was recognized that if all the participating countries gather all the necessary information, the project would be able to come up with high quality outputs that would help to address the problems confronted in both the aquaculture and livestock sectors.

The workshop was attended by 22 participants (16 from four project participating countries (two each from Kazakhstan, Kyrgyzstan, and Tajikistan and 10 from Uzbekistan), 3 international consultants, 3 from FAO and 2 observers from the feed industry. The workshop was facilitated by FAO officers (Raymon van Anrooy, Mohammad R Hasan and Abdul Baki Mehraban) and international consultants.

More information on the project can be obtained from Mohammad R. Hasan at [Mohammad.Hasan@fao.org](mailto:Mohammad.Hasan@fao.org) or Raymon van Anrooy at [Raymon.vanAnrooy@fao.org](mailto:Raymon.vanAnrooy@fao.org)

# TCP/CKI/3201(D)

## Aquaculture development project in Cook Islands

Masanami Izumi

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The project TCP/CKI/3201(D) “Aquaculture Development Project in Cook Islands” was approved in May 2008 to provide technical assistance in aquaculture to Cook Islands, with a total project budget of USD72,973. The project is designed to assist the Ministry of Marine Resources in Cook Islands in developing appropriate framework of project implementation in aquaculture, to enhance the capacity of the Ministry and potential farmers to sustainably develop, monitor and document aquaculture activities, and to practically implement the recommendations from various consultancies carried out in the past.

The first mission of the FAO project team, conducted in July 2009, was carried out to review past and current national fisheries policies, management, development and strategic plans, for sustainable aquaculture development, and to assess the impact of aquaculture in Cook Islands, including technical, economic, social, environmental and institutional aspects through collection of necessary information and data from concerned government agencies and the private sector involved in the culture of tilapia (*Oreochromis niloticus*), freshwater prawn (*Macrobrachium rosenbergii*) and milkfish (*Chanos chanos*), as well as other potential aquaculture commodities.

The mission recommended measures as to how aquaculture development, activities and projects should be designed to further improve its effectiveness, development impact and sustainability, and appropriate technology packages and preliminary outline designs for pilot-scale farming in Cook Islands as follows.

A structured R&D programme should be formulated for the species and farming systems. The outline of the structured R & D programmes for milkfish, tilapia and freshwater prawn was provided including economic, social and environmental justifications for projects and priority technical areas of each commodities.

A choice between focusing on specific stand-alone projects and going for a programmatic approach has to be made with the justifications for either option.

A framework for a R & D programme for aquaculture development was recommended, which includes the technology components of the aquaculture production system, such as production, marketing, production technology (comprising broodstock, larviculture, nursery, grow-out and post harvest technologies), marketing, socio-economics and livelihoods, fish health, environment, certification for food safety and quality, and training and extension.

The elements and basic information, including expertise required and indicative costs of some inputs, were provided to design pilot projects for specific production systems of milkfish, tilapia and freshwater prawn culture in identified sites. The potential objectives and outputs of the pilot projects were indicated.

Based on the above recommendations of the first mission, the project second mission was conducted in August 2009 to provide technical assistance in the field. Further, the project third mission has been planned early 2010 to provide practical or on-the-job training and mentoring to government counterparts and potential farmers.



# FAO Expert Workshop on Improving fish farm biosecurity through prudent and responsible use of veterinary medicine (antimicrobials) in aquatic food production

15-18 December 2009, Bangkok, Thailand

**I**ntensification and diversification of modern fish farming have created an ideal environment for disease-causing organisms to flourish in the environment. Irresponsible trading of aquatic animals paved the way for the transboundary spread of many pathogens together with host movement and thus have caused serious damage to aquatic food productivity.

One of the most effective management responses to emergencies associated with infectious disease problems is the use of appropriate antimicrobial therapy. However, such measure created problems related to the increase in the frequencies of bacterial resistance, occurrence of antimicrobial residues in aquaculture products, and the potential transfer of resistance genes in bacteria from the aquatic environment to other bacteria through horizontal gene transfer and eventually possibly reaching human pathogens. Using antimicrobials in aquaculture farming operations, or any agricultural farming systems, on a routine and regular basis, to control infectious diseases will be difficult to sustain. Since disease emergencies will occur even in well-managed fish farming operations, careful planning on the use antimicrobials is essential in order to maximize their efficacy and minimize the pressure for increased frequencies of resistant variants. Chemotherapy and vaccination are traditional ways of managing aquatic animals diseases. However, in isolation, they cannot prevent diseases losses. A holistic approach can be achieved through effective biosecurity where disease-causing organisms are excluded from the environment. In modern fish farming, this is done by blocking external (spread of disease onto and off a fish farm) and internal (spread of disease within the fish farm) barriers.

Correct and responsible use of veterinary medicine (antimicrobials and other chemotherapeutants) is very important. These measures will help ensure that the pathogen challenge is minimized, the fish natural defence against infection is maximized, incidences

of disease and mortalities are reduced, and money saved on what would have been spent on containing, treating and/or eradicating the disease. Biosecurity plays a very important role in every stage of the life cycle of a fish from hatching to harvesting and processing and has thus become a necessary tool for ensuring sustainable and healthy aquatic production. The irresponsible use of veterinary medicine poses a great biosecurity risks. In order to develop appropriate strategies or guidelines that will enable the rational and prudent use of antimicrobials and chemotherapeutants, particularly for use by small-scale aquaculturists, we need to assess the current status of usage of these agents and to have a good general understanding of how these agents are being used in aquaculture.

FAO is convening the above workshop in collaboration with the Aquatic Animal Health Research Institute, Thailand's Department of Fisheries from 15-18 December 2009 in Bangkok, Thailand as part of the project Improving Fish Farm Biosecurity through Prudent and Responsible Use of Veterinary Medicine (Antimicrobials and Chemotherapeutants) in Aquatic Food Production, undertaken under the supervision of the Aquaculture Management and Conservation Service (FIMA) as part of the Aquatic Biosecurity Project funded by FAO's Multi-Partnership Programme (FMPP).

This project is being carried out to (1) understand the current status of the use of veterinary medicine in this rapidly growing and expanding aquaculture through survey, thematic reviews and an expert workshop, (2) identify effective and meaningful alternatives to therapeutic treatments for aquatic animal diseases and (3) use the above as basis for preparing technical guidelines.

Further information can be obtained from Dr Melba B. Reantaso at [Melba.Reantaso@fao.org](mailto:Melba.Reantaso@fao.org)

# TCP/DRK/3204

## Supporting marine finfish aquaculture in DPR Korea

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The Democratic People's Republic of Korea is a predominately mountainous country with some 15 percent of its land area suitable for agriculture. The country has very long coastal line and with rich marine fisheries resources in proportion to its territory. An estimated half million coastal dwelling Korean have almost no access to arable land and derive their livelihood from fishing, foraging and aquafarming activities. In recent years, drastic decline of stocks of high valued marine fishes has been observed, resulting from various factors. On the other hand, catch of small fish of low quality has increased significantly. Such change has not only threatened the livelihood of the coastal fishing community, but has significant impacts on the domestic fish supply and export. To compensate the declining catch from marine fisheries, the Government of the Democratic People's Republic of Korea has shifted its policy from capture fisheries focus to promoting marine aquaculture development. Marine finfish have been identified by the government as the priority species for aquaculture development.

Due to the lack of appropriate mariculture technologies and technical know-how, the government requested FAO for technical assistance in developing its marine finfish culture in 2007. A complete TCP project document was developed and submitted following a TCP project formulation mission, conducted by two Chinese experts from the Yellow Sea Fisheries Research Institute (YSFRI) in Qingdao, at the end of 2008. The TCP project TCP/DRK/3204 "Capacity building in fingerling production and farming of selected marine finfish species" was approved July 2009. The approval of the TCP project was highly appreciated by the government. It is considered as

another major FAO support to the fisheries industry of the country after the successful implementation of an earlier FAO TCP project TCP/DRK/3001 "Strengthening marine aquaculture development", a project focused on farming scallop, sea cucumber and kelp.

Project implementation started in August 2009 with the identification and dispatch of Technical Cooperation among Developing Countries (TCDC) experts to assist the Yanghwa Fishing and Mariculture Cooperative, the main project beneficiary, in setting up a functional hatchery for the artificial propagation of turbot and black rockfish and establishment of pilot cage culture facilities through the purchase of necessary equipment and material.



M. WEIMIN, FAO

*FAO Officer (centre) with the National Project Coordinator (NPC) and Manager of Yanghwa Fishing and Mariculture Cooperative*

To date, the two FAO TCDC Chinese experts (marine fish hatchery design and operation; marine fish breeding and culture) have completed their first in-country field mission. The experts surveyed the sites for setting up the marine finfish hatchery and installation of the experimental, but commercial size marine cages. The experts further completed the detailed design of the hatchery and rearing facilities to be constructed inside an old fish storage building. The preparatory earthwork for the construction is almost completed. Furthermore, the site for the future installation of the marine cages has been identified in the Yanghwa Bay in close consultation with the national experts taking into account important environmental parameters and conditions to ensure proper selection of the site. The experts also helped in finalizing the technical specification of equipments and materials to be provided by the project and identification of potential suppliers.

Arrangements for another important project activity, i.e. the training of key technical staff from the government in China was also finalized. Four technical staffs from the Yanghwa Cooperative, Wonsan University and a fisheries institution in a neighboring province are scheduled for training on related technologies and technical know-how at YSFRI (Qingdao, China) starting at the end of October 2009.

The first technical backstopping mission of the Aquaculture Officer from the FAO Regional Office for Asia and the Pacific, carried out in September 2009, consisted of meetings with the TCDC experts, Assistant FAO Representative in Pyongyang, Project National Project Coordinator (NPC) and local project staff; visit to Yanghwa project sites and inspection of the progress in the construction of the hatchery and rearing facilities. Extensive discussions were also held with the TCDC experts on the project progress, constraints and solutions to overcome the difficulties. The FAO Officer noted the dedicated work of the experts and national project staff and the strong support given by the project NPC. The project progress has been generally satisfactory despite some delay in procurement and delivery of equipments and materials caused by communication and logistical constraints. A visit was made to the large Bay of Jinpu where marine cage aquaculture is likely to expand in the future due to the availability suitable and extensive sites. The project NPC informed that



M. Weimin, FAO

*FAO Officer and TCDC experts meeting with NPC and Assistant FAO Representative*



M. Weimin, FAO

*TCDC experts working on the project site*

the Ministry of Fisheries is planning to support a large-scale expansion of marine cage aquaculture in the area following the implementation of the TCP project.

During a wrap-up meeting with project NPC, TCDC experts and the Assistant FAO Representative, the FAO Officer briefed the mission findings and recommendations on project implementation, particularly with regard to the introduction of fish seed and fertilized eggs from China. The NPC reassured the full support to the project implementation from the government and looked forward to the successful implementation of the project, which is expected to further promote the development of marine finfish culture in the country.

# Updates on UTF/SAU/017: Support to the Fish Farming Center in Jeddah, Kingdom of Saudi Arabia

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The main thrust of the present unilateral trust fund (UTF) project in the Fish Farming Center (FFC) (or Center) in the Kingdom of Saudi Arabia (KSA) is technical capacity building for the national staff to carry out applied scientific research in the field of aquaculture and particularly in support of mariculture development. To accomplish this objective, the researchers of the Center are taught how to plan and conduct scientific research. New research proposals were written and the researchers were guided in the actual conduct of experiments. In addition, selected staff were sent for targeted technical training courses outside the country especially in areas where the Center needs advancement. Technical training courses attended by some of the staff include marine fish hatchery operations and management, fish health management, and culture of natural food organisms. For other activities, consultants were brought to the Center to train the staff and improve the Center's capabilities. In the latter scheme, a consultant on fish disease visited the Center for 3 weeks in January 2009 to train the staff of the Fish Health Laboratory on disease diagnosis and prevention. The consultant also evaluated the Center's readiness and capability to apply molecular-based tools, e.g. polymerase chain reaction (or PCR) for disease diagnosis. Furthermore, an English Language Course for research staff is a continuing activity considering that the majority of scientific literatures are largely in English.

The present UTF project in the FFC is entering into the third year of its five-year of implementation. To assess the progress and the achievements made by the project, a Joint Program Committee Meeting (JPCM) between FAO and the Ministry of Agriculture (MOA) of KSA was held in late March 2009. Aside from presenting the progress of the FFC and other projects under the same UTF, the meeting also highlighted the various difficulties so far experienced. Present during the JPCM were the technical officers of the various

projects from FAO headquarters and regional offices and the senior officers of the MOA of KSA. The chief technical advisers or national project directors of each project presented the achievements and problems for each project. The overall assessment indicated that the cooperation between FAO and MOA is progressing well, and that the achievements and delivery status of the various projects were satisfactory. Among the problems pointed out, the one that most applies to the project in the FFC is the limited number of national technical staff that can be trained. This is most relevant to the FFC since capacity building of the national staff is a major objective of the project.

The FFC was established as a research center to support the development of aquaculture. However, although the FFC has significantly contributed to the growth of the aquaculture industry in the country (particularly with regards to shrimp and tilapia aquaculture), the current shortage of technical manpower has severely lowered its support to the sector. To strengthen the role of the FFC, two senior officers of MOA in-charge of guiding the future course of the facility, namely, Dr Anwar Essa Al-Sunaiher (Director, Department of Aquaculture) and Mr Baheej Mohammad Rasem (Director, FFC), recently visited the Southeast Asian Fisheries Development Center - Aquaculture Department (SEAFDEC-AQD), a renowned aquaculture research center based in the Philippines. The main objectives of this study tour were to enable the MOA senior officers to visit the research facilities of SEAFDEC-AQD, observe its operations and appreciate the processes leading to the various research and training programmes. Furthermore, this visit was taken as an opportunity to discuss on future collaboration between the two institutions. SEAFDEC-AQD top management officials expressed willingness to extend technical assistance to FFC in specific areas identified by FFC.

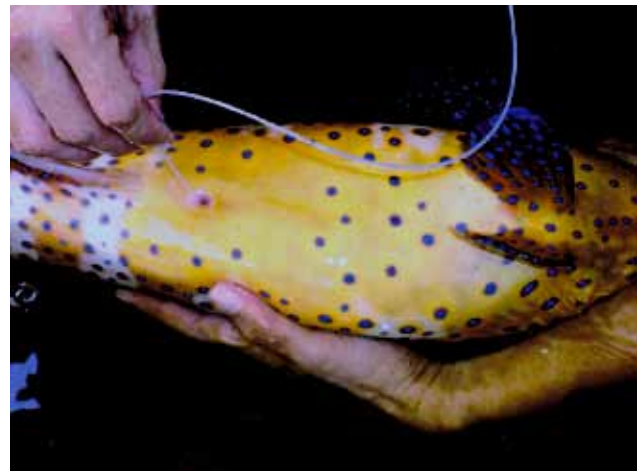


In the coming year, several important staff capacity building activities will be undertaken by the project. During the first six months of 2010, two international experts on marine cage culture and environmental monitoring of aquaculture operations will visit the Center for capacity building on marine cage culture technology and environmental monitoring. These activities are important especially now that there are plans by the private sector to initiate marine cage culture in the Red Sea (at present only one marine farm is operating). As tourism is an important and growing sector in the region, it is essential that future commercial marine farming is carried out responsibly and in a sustainable manner in order to minimize impacts to the surrounding environment. The FFC will therefore need to acquire the necessary technical expertise to better advise the authorities, guide the farmers and future entrepreneurs. To ensure that these project activities will be successfully implemented, preparations are currently underway which include the acquisition of hydrographic survey equipment and a research/work vessel. In addition, four technicians will undergo SCUBA training to assist in field activities and eventually to follow-up on the work initiated by the consultants.



F. AYSON, JEDDAH

*Grouper (Plectropomus areolatus) fry produced in FFC Fish Hatchery*



F. AYSON, JEDDAH

*Sexing grouper (Plectropomus areolatus) breeder for induced spawning*

#### Some facts about the Fish Farming Center

##### I. Staff Profile

###### A. Technical staff (all Saudi Nationals)

MS (Marine Science)	1
BS (Marine Science)	10

###### B. Support staff

Saudi Nationals	10
Non-Saudi nationals	12

###### C. Visiting staff 3 (all non-Saudi Nationals)

##### II. Facilities

- A. Fish broodstock tanks system
- B. Fish hatchery
- C. Shrimp hatchery
- D. Tilapia culture (Biobab) system
- E. Pond culture system (lined-ponds)

##### III. Laboratories

- A. Fish health lab
- B. Water analysis lab
- C. General fish biology lab
- D. Microalgae lab



F. AYSON, JEDDAH

*Senior officers of the Department of Aquaculture, Ministry of Agriculture of KSA (right) in discussion with the top officers of SEAFDEC-AQD during a recent study tour*

# The birth of the Network of Aquaculture in the Americas (Red de Acuicultura de las Americas, RAA)

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Aquaculture networks have been promoted and fostered by FAO in response to member countries requests to strengthen the sustainable development of the sector in all regions of the globe. Good examples are the Network of Aquaculture Centres in Asia and the Pacific (NACA) and other initiatives alike such as the Network of Aquaculture Centres of Eastern Europe (NACEE) and the recently-born Aquaculture Network for Africa (ANAF).

FAO has coordinated efforts towards the development of aquaculture in Latin America and the Caribbean since 1974, when the proposal to create a regional centre to support aquaculture in the region was made during a FAO/CARPAS symposium on aquaculture in Latin America held in Montevideo, Uruguay.

The activities carried out since then to foster regional cooperation in aquaculture have been recurrent with significant milestones at different times in the recent past. Good examples are the creation of the Commission for Inland Fisheries for Latin America (COPESCAL) in 1976; the establishment of the Latin American Regional Aquaculture Centre (CERLA) in Brazil in 1977; the AQUILA Project, implemented between 1986 and 1994. Moreover, during the past decade, joint and parallel actions between FAO and the Asia Pacific Economic Cooperation Mechanism (APEC), including feasibility studies and workshops, were also important steps towards this objective. Within these, the FAO workshop on the Feasibility of Establishing a Regional Cooperation Network for Aquaculture in Latin America and the Caribbean held in Panama in 2004, already laid out an initial potential structure and aim of a network<sup>1</sup>.

During the fourth session of the Sub-committee of Aquaculture of the COFI, held in Puerto Varas, Chile in October 2008, countries of the American continent requested FAO to take actions in order to reactivate this long-aspired aquaculture network. In response to such a demand, the FAO Sub-regional Office for South America (SLS), together with the Fisheries and Aquaculture Management Service (FIMA), organized a workshop to reactivate the initiative of the creation of an aquaculture cooperation network in the Americas. The meeting was held from the 10th to the 12th of June, 2009 in Guayaquil, Ecuador after a kind invitation of the government of this country. The workshop was partly funded by a trust fund with the government of Japan (GCP/INT/069/JPN).

Thirteen countries were represented in the meeting: Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, United States of America and Uruguay.



*Participants to the Meeting*

C. VELOSO, FUNDACIÓN CHILE

Representatives from NACA and from the Organization of the Fisheries and Aquaculture Sector for the Central American Isthmus (OSPESCA) were also present.

As a main result of the meeting discussions, the participants decided to sign a letter of intent to ratify officially their interest to create the RAA, the Spanish acronym for the Network of Aquaculture of the Americas (NAA). They agreed that the network should be an inter-governmental organization (IGO) and also agreed on the mission and vision statements, priority areas (see Box ) and the basic organic structure of the network. An ad interim directive council representing 5 sub-regions was also agreed and selected among adhering countries. The countries or organizations representing each subregion are the following: Mexico representing North America, OSPESCA representing Central America countries, a Caribbean country (to be identified) shall represent the Caribbean, Ecuador representing the Andean Sub-region and Chile representing the countries of the southern cone of South America.

The meeting also suggested that the network should have a Secretariat with an Executive Secretary in the host country for operating purposes. The Executive Secretary will be elected by the host country by a merit rating, with the approval of the Directive Council of the Network.

#### RAA MISSION

The network must contribute to the sustainable and equitable development of aquaculture, emphasizing social, economic, scientific, technological and environmental aspects through regional cooperation among the countries of the Americas.

#### RAA VISION

The network shall be an international benchmark in aquaculture cooperation and a catalyst for sustainable development of aquaculture in the countries of the Americas.

#### GOVERNING PRINCIPLES OF THE RAA

- The development of aquaculture shall be sustainable in the economic, social and environmental dimensions through adequate technology, research and development.
- The network shall operate with transparency, participation, commitment, cooperation, equity and social and environmental responsibility.
- The network shall be open to other relevant cooperation initiatives.
- The network shall promote gender equity.



*Participants to the Meeting*

The meeting delegates elected Brazil as the host country for two and a half years. During this period the network statutes are to be developed and agreed by the adhering countries and the initial actions shall begin.

Brazil has already committed to set up an office within the facilities of the newly formed Ministry of Fisheries and Aquaculture in Brasilia. The country also allocated relevant funding for 2009 and 2010 in order to support the initial activities of the network. Other countries also committed supporting funds.

The first meeting of the above-mentioned Directive Council took place on August 30th in Manaus, Brazil; FAO was invited as an observer. During this meeting, the Council reviewed and discussed the first draft of the statutes as well as the first actions of the interim secretariat.

The formalization of the creation of the RAA is expected to be signed by the Ministers responsible for the aquaculture sector from the adhering countries, by March 2010.

For more information, contact Alejandro Flores ([alejandro.flores@fao.org](mailto:alejandro.flores@fao.org)) or Doris Soto ([doris.soto@fao.org](mailto:doris.soto@fao.org))

<sup>1</sup><ftp://ftp.fao.org/docrep/fao/008/y6009b/y6009b00.pdf>.

# TCP/ALG/3103

## Soutien à l'aquaculture saharienne et valorisation des étangs salés en Algérie

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### ENGLISH SUMMARY

"Support to the development of desert aquaculture and management of the brackish water lakes in Algeria"

This article describes the activities undertaken by the project TCP/ALG/3103 "Support to the development of desert aquaculture and management of the brackish water lakes in Algeria". The project started in November 2008 and was completed in August 2009. The overall objective was to assist the Algerian government, represented by the Ministry of Fishery and Fisheries Resources, in promoting the development of rural aquaculture in two selected sites in the Wilaya (District) of Ouargla, 800 km south of Algiers and to evaluate the potential use of *Artemia* present in the Algerian brackish water bodies. A total of 25 small-scale farmers identified in two sites participated in the project. About 35 ponds have been rehabilitated for fish production ensuring the construction of correct water inlet and outlet for efficient circulation. The project carried out several fish stocking campaigns. A total of about 26 000 fingerlings were freely distributed in the selected ponds of the project for the first production cycle. The main cultured species are Nile tilapia (*Oreochromis niloticus*) and the red tilapia hybrid. Main problems encountered during the execution of the project were related to: (i) feed production and availability; (ii) lack of aquaculture experience by local farmers; (iii) production and distribution of fingerlings; (iv) high water temperature especially during summer months; (v) limited knowledge of *Artemia* species and exploitation in brackish water lakes. While project implementation generated great enthusiasm amongst the beneficiaries and support by national counterpart, limited results have been achieved so far and a second phase is strongly recommended in order to reinforce local capacities and launch desert aquaculture on a wider scale.



V. Crespi, FAO

*L'équipe nationale du projet*

### INTRODUCTION

Le Projet « Soutien à l'aquaculture saharienne et valorisation des étangs salés », TCP/ALG/3103 s'inscrit dans la démarche globale d'assistance fournie par la FAO aux pays membres de l'organisation. Sa période de mise en œuvre court sur une période de 9 mois, de novembre 2008 au mois d'août 2009. Les activités entreprises jusqu'à présent ont déjà permis d'obtenir des certains résultats: réhabilitation des bassins d'irrigation pour pratiquer la pisciculture, maîtrise et gestion de l'eau, ensemencement des 35 bassins, formulation d'aliment pour les poissons et acquisition des notions de base en matière d'aquaculture rurale. Ces activités ont été initiées dans la Wilaya (département) de Ouargla située à 800 km au sud de la capitale. Les activités couvrent deux sites : le « Périmètre des Jeunes N° 01 » et le « Périmètre des Palmeraies », 20 km à l'est de la ville de Ouargla.

L'objectif principal du projet consistait dans la promotion et développement de la pisciculture saharienne dans le but de contribuer au développement économique ainsi qu'à l'amélioration et à la diversification de l'alimentation des populations locales. Le projet a pu bénéficier de la

présence des trois experts, le Dr Sherif Sadek (expert en aquaculture en milieu désertique), le Dr Mohamed R. Hasan (expert de la FAO en aliments pour poissons) et le Dr Gibert Van Stappen (expert international en artémia).

## RÉSULTATS

Le projet a permis la construction/réhabilitation de 35 bassins qui appartiennent à 25 producteurs. Les bassins ont une superficie moyenne de 150 m<sup>2</sup> et une profondeur moyenne de 1 mètre. L'unité d'élevage piscicole est constituée par un bassin pour chaque producteur. Il est rare qu'un producteur ait plus d'un bassin sur une parcelle de terrain agricole de 1 à 2 hectares.

Afin de mettre à la disposition des 25 bénéficiaires les alevins nécessaires pour la mise en production des bassins, le projet a procédé à plusieurs campagnes d'empoissonnement. Afin de faciliter l'élevage et la performance zootechnique, l'espèce ayant fait l'objet de cet ensemencement est notamment le tilapia du Nil (*Oreochromis niloticus*), ainsi que l'un de ses hybrides, le tilapia rouge.

Le centre national de recherche et développement de la pêche et de l'aquaculture (CNRDPA) de Bou-Ismaïl (Tipaza) a été sélectionné en tant que principal fournisseur d'alevins en raison de sa production massive et son expérience. Les alevins de moins d'un gramme ou les juvéniles de 5 grammes sont été déversés dans les bassins à une densité de 10 alevins ou 6 juvéniles/m<sup>3</sup>.

La fabrication et installation des 12 enclos-hapas (dimensions : 2x2x1 m) dans 6 bassins parmi ceux sélectionnés, pour le stockage des géniteurs, a permis une première production d'alevins directement dans les bassins de bénéficiaires. Les alevins ont été en suite utilisés pour empoissonner d'autres bassins. Au total, pendant plusieurs campagnes d'ensemencement, environ 26 000 alevins ont été distribués parmi les producteurs. Mais dans certains cas, pendant la saison estivale, la température élevée de l'eau des bassins a causé une forte mortalité d'alevins due surtout à un manque de savoir faire des petits producteurs.

En général, à la fin de cette phase du projet, le contrôle et le suivi des bassins ensemencés après environ six mois d'élevage ont révélé des résultats assez satisfaisants. Les producteurs ont commencé à maîtriser de façon satisfaisante l'entretien quotidien de leur bassin et des poissons. Mais la croissance des poissons est très faible (moins d'un gramme par semaine), seulement un nombre limité des producteurs a obtenu des croissances acceptables de 2.9 à 10.4 g/semaine par individu, l'équivalente d'un coefficient instantané de croissance pondérale de 1.5 % à 4.4%. Les producteurs qui ont élaboré des aliments à partir des matières premières locales selon les instructions fournies par l'expert de la FAO, ont obtenu des meilleurs résultats.



V. Crespi, FAO

*Bassin d'irrigation utilisé pour la pisciculture avec des enclos-hapas pour la production d'alevins*



V. Crespi, FAO

*Tilapia du Nil (*Oreochromis niloticus*) récolté à la fin du cycle de production*

Une séance de travail final s'est tenue au siège de la commune de Hassi Ben Abdallah, réunissant les bénéficiaires-producteurs, le coordonnateur national du projet, les consultants nationaux, les ingénieurs et les personnels de la direction de la pêche et de l'aquaculture de Ouargla. L'objectif de l'atelier a été de dégager les résultats des activités menées dans les sites ainsi que d'aborder les problèmes qui se posent et d'envisager des solutions en concertation avec tous les acteurs impliqués dans le projet. Trois thèmes ont été débattus : 1) le nettoyage et l'entretien des bassins, 2) l'approvisionnement en alevins, et 3) la fabrication d'aliments pour les poissons.

Un calendrier détaillé des futures activités du projet a été discuté avec l'équipe nationale. Il a permis de proposer des actions à entreprendre pour la suite. Il s'agit surtout d'un suivi et une assistance technique aux producteurs de la part de l'équipe et la préparation d'un nouveau document de projet pour une seconde phase de consolidation.

La mission technique de l'expert international en artémia a permis la visite des lacs salés (chotts) de Melriir situés entre la Wilaya de Ouargla, El Oued et le Grand Sebkha d'Oran dans le nord-est du pays. Un plan de travail a été élaboré pour l'exécution d'une étude prolongée de 2 ou 3 ans consécutifs qui permettrait d'avoir une compréhension approfondie de la population d'artémia dans les chotts sélectionnés afin de l'utiliser dans les écloseries marines.

## CONCLUSION

Cette étape du projet représente une phase pilote qui a permis de collecter les données de base que serviront à élaborer un document de projet plus détaillé afin de lancer une nouvelle étape. La deuxième phase du projet devrait permettre de consolider les activités entreprises, de former des consultants nationaux sur des thèmes spécifiques liés au développement de l'aquaculture en milieu désertique et étendre la pisciculture aux autres Wilayas du sud algérien.

Parmi les produits du projet, il a été décidé de préparer un manuel technique sur le développement de l'aquaculture saharienne qui pourra être utilisé par toutes les personnes intéressées à entreprendre des activités d'élevage de poisson en milieu désertique.

Nos remerciements à monsieur Guy Delannoy (représentant de la FAO en Algérie), à M. Abdelkader Bounouni (directeur du développement de l'aquaculture du ministère de la pêche et des ressources halieutiques), M. Toufik Boutouchent (coordinateur national du projet), M. Mohamed Bengerina (directeur de la direction de la pêche et des ressources halieutiques - Wilaya de Ouargla) pour leur contribution et assistance tout au long du projet.

De plus amples informations peuvent être obtenues en écrivant à : [Valerio.Crespi@fao.org](mailto:Valerio.Crespi@fao.org)

## FAO exploring off-the-coast and offshore mariculture for the future production of food

In March 2010, the FAO Aquaculture Management and Conservation Service (FIMA) will be organizing a technical workshop on the developmental needs of off-the-coast and offshore marine aquaculture development. The main aim of this initial activity is to develop, through consultation with renowned experts and selected officers of the organization covering different disciplines, a short- and medium-term FAO mariculture programme that will guide its future activities and work plan in this specific sector of the aquaculture industry. In preparation of the workshop, FAO has commissioned a series of technical reviews covering environmental, technical, policy and governance, economic and marketing issues related to present and future development of mariculture. In addition, a parallel reconnaissance study using spatial planning tools (i.e. Geographic Information Systems, remote sensing and mapping) is also under preparation aimed at providing a measure on the potential for marine aquaculture development. The planned workshop, which will be held in Orbetello, Italy, from 22 to 25 March 2010, will bring together experts from different parts of the world including Dr Dror Angel (University of Haifa, Israel), Dr John Foster (Forster Consulting Inc., USA), Dr Marianne Holmer (University of Southern Denmark), Dr Andrew Jeffs (Two Fathom Ltd and University of Auckland, New Zealand), Prof David Percy (University of Alberta, USA) Dr Gunnar Knapp (University of Alaska Anchorage, USA) and Dr Neil Sims (Kuna Blue). The team of experts will also be joined by Dr Yngvar Olsen (Norwegian University of Science and Technology, Norway) who will prepare a global review and synthesis on mariculture development as well as identify preliminary critical issues and activities that may be included in the FAO global programme for the development and governance of off-the-coast and offshore mariculture. Several FAO experts will be attending and working on this initial effort along with the inputs from a few invited mariculture entrepreneurs. We will report the outcomes of the workshop and follow-up activities in future issues of the FAO Aquaculture Newsletter.

For additional information please contact the Project Lead Officer, Alessandro Lovatelli, Aquaculture Management and Conservation Service (FIMA) ([alessandro.lovatelli@fao.org](mailto:alessandro.lovatelli@fao.org)).

Other FAO technical officers involved in this activity: Doris Soto (Ms) (Environment Review): [doris.soto@fao.org](mailto:doris.soto@fao.org); José Aguilar-Manjarrez (Spatial Planning Study): [jose.aguilarmanjarrez@fao.org](mailto:jose.aguilarmanjarrez@fao.org); Nathanael Hishamunda (Policy Review): [nathanael.hishamunda@fao.org](mailto:nathanael.hishamunda@fao.org)

# Methods for aquaculture policy analysis, formulation and implementation in selected Southeast Asian countries

FAO/NACA Regional Workshop in Bangkok, Thailand, 9-11 December 2009

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The production of fish for food from aquaculture has been steadily growing; aquaculture now accounts for 50 percent of the total fish production. With production from capture fisheries reaching a plateau, this trend is expected to continue in the next decade to meet the increasing demand for aquatic products, fuelled by population growth and higher revenues. The sector will need proper planning through the formulation of appropriate and supportive policies that create an enabling environment for sustainable aquaculture development so that it fulfils its role as main supplier of quality food fish, and as vector of economic growth and poverty alleviation.

However, strategic planning and policy formulation remain a recognized “weak link” between what governments wish for aquaculture to achieve and what is happening at the ground level. Planning and policy development related to aquaculture are impeded by a number of factors relating to: i) limited human and institutional capacities; ii) confusion over terminology and requirements; iii) weak consultation and policy formulation processes; and iv) information gaps. This can lead to wrong economic choices and inappropriate policies. It can also result in the slow, uncoordinated and unsustainable development of aquaculture, as well as in conflicts within and outside the sector. To address these challenges, members of the Sub-Committee on Aquaculture called for the continuous support of FAO in providing and disseminating information and advice on aquaculture policy formulation and implementation. To answer this call, a regional workshop on “Methods for aquaculture policy analysis, formulation and implementation in selected Southeast Asian countries”, will be held in Bangkok, Thailand, 9-11 December 2009, co-organised by FAO and NACA.



The workshop focuses on selected Southeast Asian countries where aquaculture has developed, or is developing, fast, although often outside the frame of clear policies and well-defined strategies, at the risk of undermining the long-term sustainability and economic contribution of the sector.

The specific objective of the workshop is to build capacity related to aquaculture planning and policy development in the selected countries and to provide participants with some orientation and tools to strengthen policy formulation and implementation processes in their own countries.

Further information on the workshop can be obtained from Cécile Brugère, Fishery Planning Analyst, FIEP, at the email address indicated above.

# TCP/CMR/3103

## Formulation of a development plan for sustainable aquaculture in Cameroon

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### BACKGROUND

Fish farming in Cameroon started in 1948, since then, the country has had several projects and a variety of different programmes to encourage the adoption of fish farming. However, characterized by multiple ad hoc and uncoordinated interventions which promoted subsistence fish farming, the sector has remained modest in the country's economy. Some of the main factors affecting performance are: inappropriate policies; lack of strategies and plans for the sustainable development of the sector; investment difficulties; lack of fish processing industries; and insufficient and/or low seed quality. To capitalise on the country's natural assets and recognizing the strategic importance aquaculture could have in increasing incomes and food security, the government of Cameroon requested the assistance of FAO to prepare a strategic framework for the sustainable development of aquaculture. This strategy was formulated in May 2003 by a team of experts from MINEPIA (Ministère de l'élevage, des pêches et des industries animales), the Institute of Agricultural Research for Development (IRAD), World Fish Center (WFC) and FAO. The framework laid out a number of key orientations to promote the sustainable development of aquaculture in Cameroon and defined the roles of the public and private sectors in achieving the country's vision for aquaculture development. The operationalisation of the strategic framework, i.e. the formulation of a practical development plan for the sector, is now the next step, and one for which the government of Cameroon requested additional assistance to FAO under TCP/CMR/3103 Formulation of a development plan for sustainable aquaculture in Cameroon (Mise en place d'un plan de développement durable de l'aquaculture).

### OBJECTIVES AND EXPECTED RESULTS

The main objective of this TCP is to assist the MINEPIA to elaborate a plan for the sustainable development of aquaculture, supported by practical examples of profitable aquaculture to ensure that the plan is grounded in reality. Capacity building of selected farmers and government officials is also a major thrust of the project.

The expected project results are:

A plan for the development of aquaculture, prepared and validated by a national workshop and approved by competent authorities;

The piloting of production techniques, including fingerling production, on six sites selected in zones with high potential for aquaculture development, to demonstrate profitable and durable technologies to fish farmers.

Additional outputs from the project include: a detailed sectoral review, capacity building for at least 60 aquaculturists on business plans for aquaculture and basic hatchery techniques and the creation of a digital map for aquaculture in Cameroon to illustrate current aquaculture locations and identify areas with potential for development per province.





*Fish ponds for culture of Nile tilapia, African catfish and African bonytongue, Cameroon*



*Hatchery facilities are essential with simple and low-cost solutions preferred by the farmers*

### PROGRESS SO FAR

The project effectively started in July 2008 and is due to be completed in December 2009. Its innovative approach to the formulation of a development Plan for the sector was based on the iterative process undertaken, whereby draft documents have been successively reviewed and modified by multi-disciplinary committees and groups of resource persons. In addition, the concomitant running of pilot sites and collection of farm data (technical and economic) and farmers feedback, ensured the inclusion of all perspectives and the technical relevance of the activities listed in the Plan. In particular, the holding of many training workshops participated by farmers, extensionists and government officials have been found particularly useful, highlighting the thirst of knowledge and enthusiasm for the activity. It is indeed a premise in the Plan that capacity building will be a cornerstone in the successful development of the sector and that through it, many of the sector's current bottlenecks will be addressed.

Progress towards achieving the project outputs had been satisfactory. The sectoral review was finalised and its contents fed into the Plan drafting process. At the time of writing, the development Plan itself was still under elaboration and shall be reviewed once more by the project committee and the group of resource persons before being officially presented to the MINEPIA in a final workshop at the end of

2009. The identification of areas with potential for aquaculture is being finalised with the production of paper and digital maps and an analysis using data and tools developed by the WFC<sup>1</sup> and FIMAs African Water Resource Database<sup>2</sup>. New data collected at country level will also be used to complement Cameroon's National Aquaculture Sector Overview (NASO)<sup>3</sup> with a Google map showing the location of aquaculture sites and their characteristics at an individual farm level.

### CONCLUSION

Cameroon has recognized the importance of planning for the sustainable development of aquaculture and, since the inception of the project, other African countries have followed suite. It is hoped, and expected, that during its duration (5 years upon adoption), the implementation of the Plan, to which the country is committed, will lead to significant changes in the aquaculture sector, not only in terms of increased outputs, but also in terms of change in the perception of the respective roles of the public and private sectors, coupled with a move towards a more commercially-oriented management of aquaculture operations.

<sup>1</sup>WFC project on Recommendation Domains for Pond

<sup>2</sup>Aquaculture ([www.fao.org/fishery/gisfish/id/4815](http://www.fao.org/fishery/gisfish/id/4815))

<sup>3</sup>[www.fao.org/fishery/gisfish/id/2389](http://www.fao.org/fishery/gisfish/id/2389)

<sup>3</sup>NASO for Cameroon: [www.fao.org/fishery/countrysector/naso\\_cameroun/fr](http://www.fao.org/fishery/countrysector/naso_cameroun/fr)

## TCP/MAU/3103 (D)

# Formulation of a strategic and legal framework, and a development plan for sustainable inland fisheries and aquaculture\*

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### BACKGROUND

The Islamic Republic of Mauritania (surface area 1 030 400 km<sup>2</sup>) can be divided into three distinct zones: (a) a narrow southern belt along the Senegal River Valley which is relatively well vegetated; (b) an intermediate central belt of broad sandy plains and dunes fixed with scrub grasses; and (c) and a northern desertic belt of rocky plateaus and sand seas. The climate is extremely hot and dry with very little rainfall, confined to the south between July and August. The only permanent river in the country is the Senegal River, which forms the border with the Republic of Senegal for over 600 km. There are several lakes associated with the Senegal floodplain system. Environmental issues, which include overgrazing, deforestation, and soil erosion aggravated by drought are contributing to desertification. There are also limited natural freshwater resources away from the Senegal River, and locust infestation. Most of the population concentrated in the cities of Nouakchott and Nouadhibou and along the Senegal River in the southern part of the country. Half the population still depends on agriculture and livestock for livelihood. Mauritania's coastal waters are among the richest fishing areas in the world; however, overexploitation threatens this key source of revenue.

The fisheries sector has been primarily based on marine fisheries, therefore inland fisheries have been constantly overlooked despite its importance to food security and poverty alleviation to riverine fishing communities. Several other factors such as droughts, impacts of dams, displacement of rural communities to urban centres, consumer preference for marine fish, and the move of inland fisherfolk to agriculture have exacerbated the underdevelopment of this sector. Aquaculture continues

to be almost non-existent in Mauritania. There was an inland fish farming project initiative by UNICEF in the late 1990's. However, as in other African countries where subsistence farming was promoted, these efforts were unsustainable.

### OBJECTIVES

The Ministry of Fisheries and Maritime Economy (MPEM) wishes to re-launch efforts to improve and promote inland fisheries and aquaculture development. To this end, the government of Mauritania requested the assistance of FAO to support them in their efforts. TCP/MAU/3103 (D): "Formulation d'un cadre stratégique et réglementaire et d'un plan de développement durable de la pêche et de l'aquaculture continentales" (Formulation of a strategic and legal framework, and a development plan for sustainable inland fisheries and aquaculture) was proposed to resolve many of the issues listed above. It has been specifically formulated to promote the sustainable development of inland fisheries and aquaculture in Mauritania to increase food security and reduce poverty. The main objectives of this project are to support MPEM in the formulation of a legal framework for inland fisheries and aquaculture, a strategic framework for aquaculture development and a development plan for inland fisheries.

### EXPECTED OUTCOMES

Based on the above, the following main results were expected from this TCP:

- a legal framework for inland fisheries and aquaculture;
- a strategic framework for aquaculture development validated through a national workshop;
- a development plan for inland fisheries (including a digital map for inland waters illustrating fish landing sites) validated through a national workshop;

\* Original title of the project: Formulation d'un cadre stratégique et réglementaire et d'un plan de développement durable de la pêche et l'aquaculture continentales

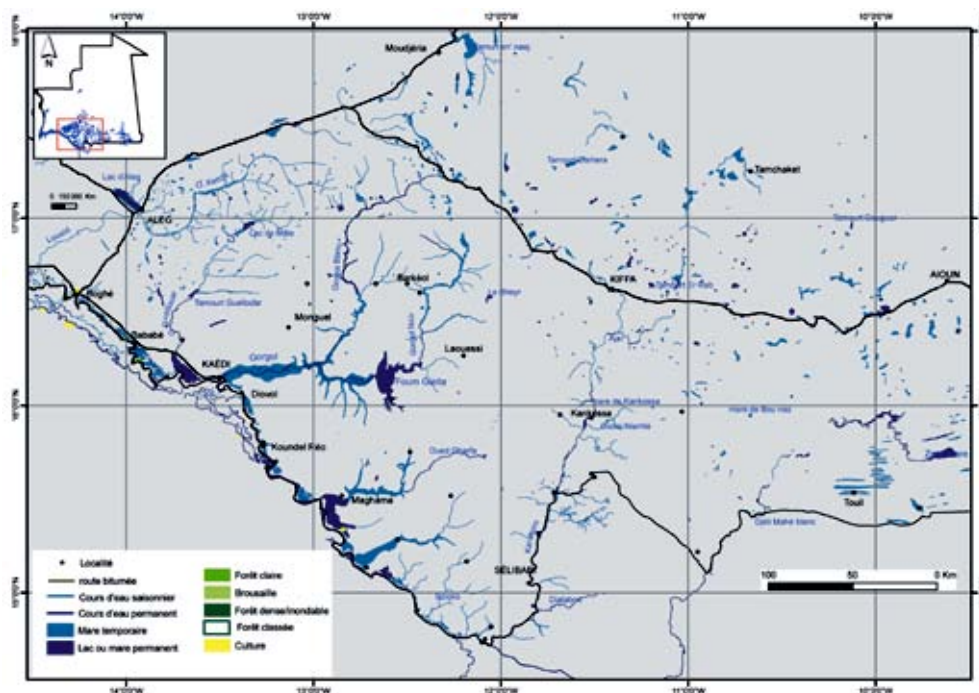


Figure 1. Surface waterbodies in the high valley (Senegal River) and the Tagant province, Mauritania

- capacity building on aquaculture production for 110 fish farmers and technicians; and
- at least two pilot sites to demonstrate profitable and durable culture technologies and practices for fish farmers.

The two last outputs were later removed from the list because of unsuitability of identified sites. The development of the two pilot sites was conditional to being already functional and having physical characteristics which are conducive to an economically and environmentally sustainable aquaculture. An expert's investigation of the sites revealed that neither of the two sites suggested met this condition. In fact, one of them was completely abandoned. Thus, without adequate sites, the capacity building of the 110 farmers (cooperative owners) and technicians was no longer possible because it was to consist in on-farm training on these sites.

### ASSISTANCE/RESULTS

Very little information for managing inland fisheries or aquaculture in Mauritania exists; therefore, one of the main outputs of this TCP is an inventory of inland waters (Figure 1).

Of relevance to inland fisheries, is that the inventory of inland waters can be used as a base to predict potential fish yield and conduct hydrological reporting. From an aquaculture viewpoint, inland waters represent the areas where aquaculture already is developed, or in which aquaculture has varying potential for development. Thus, the inventory provides a spatial framework for inland fisheries and aquaculture which could provide

the basis for assessing their potential for development at national scale. Further explorations and application of this inventory could deepen the understanding of inland aquatic resource management and be of immediate value in addressing a wide variety of issues such as improving status and trends reporting in inland fisheries and aquaculture, co-management of shared inland fisheries resources, transboundary movements of aquatic species, and increased participation of stakeholders.

### CONCLUSIONS

This project, which has resulted in a legal framework for aquaculture and inland fisheries, an operational strategic framework for sustainable aquaculture development, a plan for sustainable inland fisheries along with a digital map for inland waters, has been heralded as laying a solid foundation for aquaculture and inland fisheries development. The national workshop which validated these results especially acclaimed the digital mapping as a unique experience from which much could be learnt.

### FOLLOW-UP ACTIVITIES

What remains to be done is to take all necessary efforts to ensure the durability of these results, and in particular, to assist the government in taking full appropriation of them. The database for the digital map has been installed in the Ministry and 5 staff were trained on its maintenance and periodic update, but, a higher-level training is still needed. There is also a need for a development project to demonstrate the feasibility of the programmes defined in the plan and operational strategic framework.

# TCP/RAS/3101(A)3208(D)

## Sustainable aquaculture development in Pacific Micronesia

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The project TCP/RAS/3101(A) 28 Sustainable Aquaculture Development in Pacific Micronesia was approved in January 2006. The objective of the project is to provide technical assistance to Micronesian countries in the Pacific region (i.e., Federated States of Micronesia, Kiribati, Marshall Islands, Nauru and Palau) (FAO 20061). The project was intended to run for 18 months, from January 2006 to July 2007. The implementation of the project continued to advance according to the plan. However, local political changes (i.e., change of the local State Government administration) occurred which made continuation of project activities impossible or delayed. The project was therefore extended until February 2009/

Almost all planned activities were conducted with highly encouraging achievements in cooperation with the Bureau of Marine Resources and the Ngatpang State Government in Palau. These include:

- organization of a workshop on sustainable aquaculture development and a workshop on health management in July 2006;
- study and stakeholder consultations on national aquaculture development strategy;
- study on development of aquaculture farms in the Peleliu State, Palau;
- assistance in developing aquaculture farm in the Ngatpang State, Palau; and
- procurement of equipment and supplies for assisting field activities in the Ngatpang State aquaculture farm, Palau.

To facilitate completion of the final project activities and to ensure that the targeted outputs and outcomes of the project are achieved, formulation of a second phase of the project TCP/RAS/3101 was necessary and planned in early 2009. The project TCP/RAS/3208(D) (Phase II of the project TCP/RAS/3101) was approved in April 2009 with its budget of USD131,783. Under the Phase II, the following planned final activities were completed.

- design of an expert system on risk analysis
- organization of a national workshop on aquaculture strategy for Palau
- organization of a project terminal sub-regional workshop

For the development of expert systems, Google Maps API was integrated into the AAPQIS system (Aquaculture Animal Pathogen and Quarantine Information System E-Governance) to facilitate the plotting and display of GIS data, and AAPQIS guidelines were developed for the design, formatting, display, and archiving of relevant GIS data. A user-friendly form-based front-end for the flexible input and layout of the overlays were developed and region/country specific front-ends were created (visit [www.aapqis.org](http://www.aapqis.org)).

The National Workshop on Aquaculture Strategy (9-10 June 2009) was conducted in Koror, Palau, back-to-back with the Project Terminal Sub-regional Workshop (11-13 June 2009). A total of 44 participants attended the two workshops including representatives from relevant national government authorities (Bureau of Marine Resources, Division of



*Project Terminal Sub-Regional Workshop, Koror, Palau, 11-13 June 2009*

Environmental Health, Palau Community College), state governments, NGOs and the private sector in Palau, Representatives from Marshall Islands, Federated States of Micronesia (one participant each from the FSM National Government, Kosrae State Government, Pohnpei State Government and Yap State Government) and the FAO Project Team staff.

During the National Workshop, the important elements for formulating a national aquaculture strategy for Palau were discussed, including purpose, methods and processes, consistency with national and international principles and agreements, state priorities for aquaculture, a draft strategy document and action plans for implementation. During the Project Terminal Sub-regional Workshop, participants discussed the following: (i) status of aquaculture development in Micronesian countries, (ii) development of a national aquaculture strategy: experience from Palau; (iii) salient issues on aquaculture development in Micronesia; (iv) trans-boundary aquatic animal diseases (TAADs); (v) risk assessment and management in aquaculture, and (vi) the way forward.

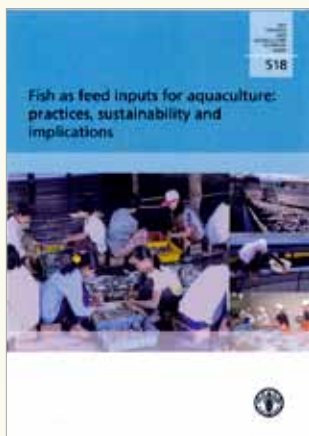
The above workshops recommended for FAO to continue its assistance in sustainable aquaculture development in the countries, particularly in small-scale aquaculture and aquatic biosecurity (FAO, 20082), and in reviewing aquaculture legislation/regulations. FAO technical assistance in strengthening coastal fisheries legislation was undertaken in the

Micronesian countries under the sub-regional TCP/RAS/2907-3104, 2003-2008. For further technical assistance in finalizing a draft fisheries legislation including aquaculture for Palau, the project TCP/PAL/3201 was approved on 30 September 2009.

Through joint efforts among the Ngatpang State Government, the Government of Palau (Bureau of Marine Resources) and the FAO over four years since the project planning, the project TCP/RAS/3101-3208 was completed in July 2009. Before and during the implementation of the project, many difficulties were faced. Despite these, the Ngatpang State Aquaculture Farm now produces and sells about 3,000 lbs of fresh milkfish and vacuum-packed boneless milkfish (at the average of 1 lb/pc) at the market in Koror on a bi-weekly basis (every Thursday), delivers 200 lbs of fresh milkfish directly to a local supermarket every Monday, and continues bait fish trials in cooperation with the local fishing industry.

<sup>1</sup>FAO. 2006. TCP/RAS/3101(A): Sustainable Aquaculture Development in Pacific Micronesia, FAO Aquaculture Newsletter No. 35, p. 45.

<sup>2</sup>FAO. 2008. FAO and Aquatic Animal Biosecurity in the Pacific Islands, FAO Aquaculture Newsletter No. 40, pp 18-19.



Hasan, M.R.; Halwart, M. (eds.). Fish as feed inputs for aquaculture: practices, sustainability and implications. *FAO Fisheries and Aquaculture Technical Paper*, No. 518. FAO, 2009. 407 pp.

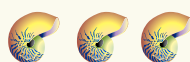
This technical paper provides a comprehensive review of the use of wild fish as feed input for aquaculture and discusses the existing practices, analyses the sustainability of feed/reduction fisheries and reviews the implication. It comprises of four regional reviews, three country-specific case studies from Latin America, a global synthesis and a review on the use of wild fish from the perspective of poverty alleviation and food security. The regional reviews specifically addressed the role of feed and reduction fisheries that may impinge on food security and poverty alleviation in these four regions and elsewhere, including sustainability of these finite resources and environmental implication of the direct use of fish as feed. On the basis of the four regional reviews and the five case studies (three from Latin America and two from Asia), an attempt was made to develop a global perspective on the status, trends, issues and challenges confronting reduction fisheries and use of fish as feeds. Based on the information presented in the global synthesis, regional reviews, and three case studies and through the fresh analysis of the information



presented elsewhere, a review was prepared on the use of wild fish as aquaculture feed from the perspective of poverty alleviation and food security.

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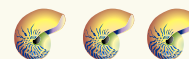
Hasan, M.R.; Chakrabarti, R. Use of algae and aquatic macrophytes as feed in small-scale aquaculture – a review. *FAO Fisheries and Aquaculture Technical Paper* No. 531. Rome, FAO. 2009. 123 pp.

This technical paper presents a global review on the use of aquatic macrophytes as feed for farmed fish, with particular reference to their current and potential use by small-scale farmers. The review is organized under four major divisions of aquatic macrophytes: algae, floating macrophytes, submerged macrophytes and emergent macrophytes. Under floating macrophytes, Azolla, duckweeds and water hyacinths are discussed separately; the remaining floating macrophytes are grouped together and are reviewed as 'other floating macrophytes'. The review covers aspects concerned

with the production and/or cultivation techniques and use of the macrophytes in their fresh and/or processed state as feed for farmed fish. Efficiency of feeding is evaluated by presenting data on growth, food conversion and digestibility of target fish species. Results of laboratory and field trials and on-farm utilization of macrophytes by farmed fish species are presented. The paper provides information on the different processing methods employed (including composting and fermentation) and results obtained to date with different species throughout the world with particular reference to Asia. Finally, it gives information on the proximate and chemical composition of most commonly occurring macrophytes, their classification and their geographical distribution and environmental requirements.

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FAO. Environmental impact assessment and monitoring in aquaculture. *FAO Fisheries and Aquaculture Technical Paper*. No. 527. Rome, FAO. 2009. 57 pp. Includes a CD-ROM containing the full document 648 pp.

This document contains the main outputs of Component 2 of the FAO project “Towards sustainable aquaculture: selected issues and guidelines”. Component 2 focused on environmental impact assessment and monitoring in aquaculture, in particular on the relevant regulatory requirements, the practice, the effectiveness and suggestions for improvements. The report includes four regional reviews on EIA and monitoring in aquaculture in Africa, Asia-Pacific, Europe, Latin America and North America, a special study on EIA as applied to salmon aquaculture, as well as a global review and synthesis report which draw on the findings of the review papers, covering relevant information from more than 35 countries. In addition, this document provides the Report of the Technical Workshop on Environmental Impact Assessment and Monitoring in Aquaculture, held at FAO headquarters in Rome from 15 to 17 September 2008. The global and regional reviews in this study and the associated technical workshop draw on experience from throughout the world in the application of EIA and monitoring to aquaculture development. In practice most aquaculture is

small-scale and is not subject to EIA or rigorous monitoring. More emphasis needs to be placed on environmental management frameworks which can address the environmental issues associated with large numbers of small-scale developments – including strategic environmental assessment, risk analysis, management plans for waterbodies and/or groups of farms, monitoring and response procedures. Where EIA is applied there is mixed experience. Several weaknesses were identified in the regional reviews and at the workshop, including lack of consistency in assessment; lack of appropriate standards; lack of integration between levels and divisions of government; inadequate or ineffective public consultation; lack of assessment skill and capacity; limited follow-up in terms of implementation and monitoring; and excessive bureaucracy and delays. There is very little hard evidence on cost effectiveness. Monitoring is of fundamental importance to effective environmental management of aquaculture, and without which EIA itself is largely pointless. The main weakness identified was limited implementation of monitoring requirements as developed in EIA environmental management plans, and limited analysis, reporting and feedback of farm level and wider environmental monitoring programmes into management of individual farms and the sector as a whole. The key to more effective use of both EIA and monitoring procedures will be to nest them within a higher level strategic planning and management framework, including clear environmental objectives and quality standards. More rigorous risk analysis should be used to inform the focus of both EIA and monitoring.

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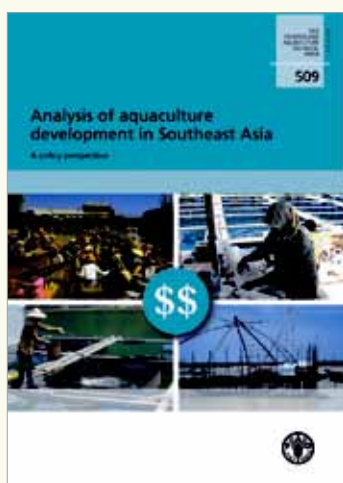
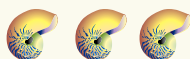


Bondad-Reantaso, M.G.; Arthur, J.R.; Subasinghe, R.P. (eds). Strengthening aquaculture health management in Bosnia and Herzegovina (TCP/BiH/3101). *FAO Fisheries Technical Paper*. No. 524, Rome, FAO. 2009. 81 pp. (in press)

The FAO Technical Cooperation Project, TCP/BIH/3101 Strengthening Capacity on Aquaculture Health Management, implemented between late 2006 until mid-2009, was aimed at increasing the effectiveness and efficiency of the State Veterinary Office of Bosnia and Herzegovina (BiH) on aquatic animal health management to support sustainable and healthy aquaculture production of the country. In this way, BiH will improve the value and efficiency of aquaculture production through the implementation of international aquatic animal health and food safety standards, especially those of its trading partners in Europe. The project developed national policies on aquatic animal health and strengthened the capacity of veterinary administration, inspectors, laboratories and producers in improving compliance with international health and food safety and quality requirements and practices. The project also assisted in disseminating the lessons learned to neighbouring trading partners in order to promote future regional cooperation in aquaculture and aquatic animal health management.

One of the major documentation outputs of the above TCP, this publication contains a series of seven contributed papers that were presented by national consultants and international experts to participants attending the series of workshops organized by the project. These papers contain information on (i) project overview and highlights of implementation, (ii) development of national policy and strategy for aquaculture, (iii) European Union animal health requirements for aquacultured animals and their products, (iv) status of national aquaculture development, (v) aquatic animal health surveillance and disease control system in BiH, (vi) national health status of aquatic animals and (vii) aquacultured fish and fishery product quality and safety in BiH.

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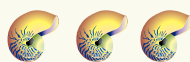


Hishamunda, N.; Bueno, P.B.; Ridler, N.; Yap, W.G. Analysis of aquaculture development in Southeast Asia: a policy perspective. *FAO Fisheries and Aquaculture Technical Paper*. No. 509. Rome, FAO. 2009. 69 pp.

This paper aims to understand the factors which have enabled aquaculture to reach a commercial level in many countries in Southeast Asia and constrained it in others. While aquaculture has had a long history in Southeast Asia, its rapid expansion began in response to market demand, both domestic and international. In most countries, aquaculture developed because entrepreneurs were able to benefit from these profit opportunities; government involvement was minimal. Aquaculture was endorsed by governments as a source of livelihood or of export earnings but not promoted with the generous incentives that other countries in the region now offer. The most recent expansion of aquaculture in the region has still been driven by the profit incentive but this time it has been accompanied by government involvement. In some cases, governments have been proactive, deliberately promoting the sector with incentives, motivated by the sector's contribution to economic development, food security and the balance of payments. In other instances, governments maintain an enabling role but, having learned from earlier mistakes in the region, they intervene with regulations to limit laissez-faire excesses. Although further development could be limited by the unavailability of land and fresh water, shortage and price of good quality feed, adequate energy supply and its rising cost, pollution and environmental degradation problems and limited expertise among government officials, aquaculture is likely to remain important in Southeast Asia for many more years ahead.

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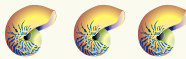
Cai, J.; Leung, P.; Hishamunda, N. Commercial aquaculture and economic growth, poverty alleviation and food security. Assessment framework. *FAO Fisheries and Aquaculture Technical Paper*. No. 512. Rome, FAO. 2009. 58 pp.

This paper proposes some methods for quantifying the contribution of aquaculture to national economies, poverty alleviation and food security so as to improve the much needed political and financial support to the sector for its adequate development. Aquaculture's contribution to a country's economy can be measured by "aquaculture value-added multiplier", an indicator that represents the "increase in gross domestic product corresponding to a one-unit increase in aquaculture value-added. As alleviating poverty occurs by creating well paying jobs, evaluation of the contribution of aquaculture to poverty alleviation can be done through "aquaculture employment multiplier", the increase in the total employment for the entire economy corresponding to one extra job created in aquaculture. The contribution to food availability, one of the three dimensions of food security, can be assessed through the "net sum of protein-equivalent" (direct contribution) and the "ratio between the aquaculture net foreign exchange earning and the total value of food



imports” (indirect contribution). “Aquaculture labour-income and employment multipliers” can be used to quantify aquaculture’s contribution to food access, the second dimension of food security. Aquaculture tax multiplier and the “aquaculture ratio between the net foreign exchange earning” and the “whole economy net foreign exchange earning” can be used to estimate the sector’s contribution to food utilization, the third dimension of food security.

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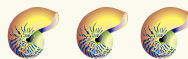
Hishamunda, N.; Poulain, F.; Ridler, N. Prospective analysis of aquaculture development: the Delphi method. *FAO Fisheries and Aquaculture Technical Paper*. No. 521. Rome, FAO. 2009. 93 pp.

In order to evaluate the major impediments to aquaculture development in different regions of the world and to indicate opportunities for expansion, a Delphi analysis was undertaken. The Delphi method is particularly useful for sectors such as aquaculture where discontinuities exist and where historic trends cannot be easily extrapolated

into the future. The recent global expansion of aquaculture is unlikely to continue at the same pace; however, certain regions have underexploited resources and offer considerable potential. The Delphi method allowed experts in different regions to indicate where the potential and constraints are; they were also encouraged to offer their policy solutions.

Experts from Latin America and the Caribbean were particularly optimistic about opportunities for future aquaculture expansion in their region. With a plentiful natural resource base and sufficient demand for fish products, their principal concern was lack of financing and of human capacity. Other regions such as Eastern Europe were less sanguine partly because of problems with species or with external factors such as negative public perceptions towards aquaculture. However, there was a consensus in all regions that aquaculture should be encouraged. Reasons given ranged from the contribution of aquaculture to food security and poverty alleviation to the role of aquaculture in reducing pressure on wild fisheries.

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FAO. Report of the FAO Workshop on the Development of an Aquatic Biosecurity Framework for Southern Africa. Lilongwe, Malawi, 22–24 April 2008. *FAO Fisheries and Aquaculture Report*. No. 906. Rome, FAO. 2009. 55 pp.

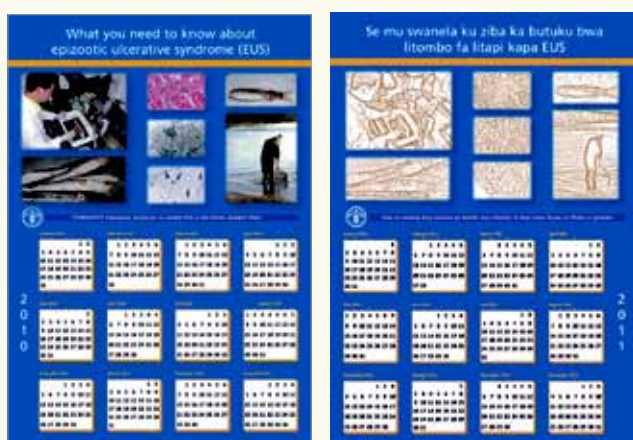
The Workshop on the Development of an Aquatic Biosecurity Framework for Southern Africa held in Lilongwe, Malawi, from 22 to 24 April 2008 was participated by a total eighteen officials representing nine countries (Angola, Botswana, Kenya, Malawi, Mozambique, United Republic of Tanzania, Uganda, Zambia and Zimbabwe) and including representatives from the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE).

The aims of this regional workshop were: (i) to present the outcomes of the survey on national aquatic animal biosecurity capacity; (ii) to provide a platform to discuss an aquatic biosecurity framework for southern Africa based on survey findings and ensuring workshop discussions; and (iii) to identify regional capacity-building needs to address aquatic biosecurity gaps or lapses in the region.

A number of key regional capacity building activities and actions to address aquatic biosecurity in the region were identified. Foremost is a request to FAO to develop a follow-up project, possibly to be funded under FAO’s Technical Cooperation Project modality, to assist in reviewing institutional and legal frameworks to enable countries to better address current aquatic biosecurity issues, especially addressing aquatic animal health management, transboundary movement of live aquatics and maintaining aquatic biodiversity. Additional

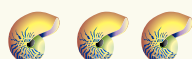
recommendations include the following: (i) for countries in the region to work closely in collaboration with FAO and OIE and regional partners to collectively address matters pertaining to aquatic animal health and biosecurity; (ii) to recognize the University of Zambia's School of Veterinary Medicine as a potential regional diagnostic centre and Uganda as a regional coordinating centre; (iii) to develop a regional model/template on import risk assessment for introductions and transfers of live aquatic animals; and (iv) to convene a ministerial level meeting for southern African countries to raise the issue of aquatic animal biosecurity.

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The EUS Calendar – What you need to know about EUS (published in English and Lozzi) is based on an extension material (FAO. 2009. What you need to know about epizootic ulcerative syndrome (EUS) – an extension brochure. Rome, FAO. 33 pp.). It provides simple facts or frequently asked questions by EUS. This extension material in the form of calendar is intended to a wide range of audience from fish farmers and fishermen to extension officers as a public information campaign raise awareness for better understanding about the disease. This product is an outcome of FAO's Technical Cooperation Project TCP/RAF/3111 Emergency Assistance to Combat Epizootic Ulcerative Syndrome in the Chobe-Zambezi River System, prepared under the technical supervision of Drs Melba B. Reantaso and Rohana P. Subasinghe of the Aquaculture Management and Conservation Service, Fisheries and Aquaculture Management Division of the Department of Fisheries and Aquaculture.

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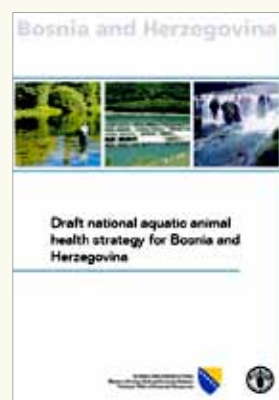
Government of Bosnia and Herzegovina. State Veterinary Office. Veterinary inspector's checklist for aquaculture farms and fish processing establishments in Bosnia and Herzegovina. Rome, FAO. 2009. 13 pp.

This document, Veterinary inspector's checklist for aquaculture farms and fish processing establishments in Bosnia and Herzegovina, developed as one of the outputs of FAO Technical Cooperation Project TCP/BIH/3101 "Strengthening Aquaculture Health Management in Bosnia and Herzegovina", presents a checklist of information that will provide guidance to veterinary inspectors of Bosnia and Herzegovina (BIH) in conducting veterinary inspection of aquaculture farms and fish processing establishments in the country.

The Veterinary inspector's checklist may be applied to several types of aquaculture farms and fish processing establishments, i.e. fish hatcheries, cage-culture facilities, concrete ponds, earthen ponds, fish transporting systems and fish processing facilities. The checklist includes information on aspects of inspections, parameters to be analysed/tested or activities to be performed, samples to be collected and frequency of inspection. The legal reference to which the inspection procedure needs to be carried out is also indicated. These legal decisions ensure that appropriate sanitary practices (for fish, water, feed, facilities, etc.) and monitoring of veterinary health of fish and safety and quality of fishery products are in place.

This veterinary checklist will assist in the implementation of the National Aquatic Animal Health Strategy (NAAHS) for BIH and help to protect and improve the country's national aquatic animal health status, enhance the nation's ability to meet international aquatic animal health and food safety standards and obligations, promote sustainable aquaculture and facilitate access to international markets for aquaculture and fishery products.

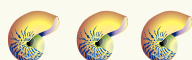
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Jažić, A., Zuko A., Omeragić, J., Fejzić, N. and Grbo, S. 2009. Government of Bosnia and Herzegovina. State Veterinary Office. Manual on health management of animals in aquaculture in Bosnia and Herzegovina. Rome, FAO. 2009. 54 pp. (Published in Bosnian)

This publication *Priručnik za upravljanje zdravljem životinja u akvakulturi*, an output of FAO Project TCP/BIH/310 "Strengthening of Capacities in Aquaculture Health Management in Bosnia and Herzegovina". The main aim of the manual is to provide guidance to government veterinary inspectors, aquaculture producers and other aquaculture and fisheries experts in Bosnia and Herzegovina (BiH) through a better understanding of the health problems caused by the most common and economically important diseases of fish and shellfish of national concern. The manual thus provides introductory guidance on the basic principles of health management in aquaculture, the diseases of national importance to BiH, general examination techniques, sampling methods and procedures for collecting and sending samples to specialist laboratories, and record keeping. Subsequent sections then provide brief information on 18 diseases of fish and shellfish of national importance, the majority of which are diseases listed by the World Organisation for Animal Health (OIE). For each disease, information is briefly presented for each of the following topics: causal agent, susceptible species, epizootiological factors in a disease outbreak, clinical picture, diagnostics, prevention, therapy and legal basis. Additional sections provide information on prophylaxis, administration of drugs, poisoning of fish, regulations and legal instruments in effect in BiH, contacts and other sources of information, and references.

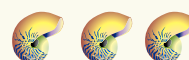
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Government of Bosnia and Herzegovina, State Veterinary Office. Draft National Aquatic Animal Health Strategy for Bosnia and Herzegovina. Rome, FAO. 2009. 24 pp.

As an output of FAO Project TCP/BIH/3101 "Strengthening aquaculture health management in Bosnia and Herzegovina", the National Aquatic Animal Health Strategy (NAAHS) was developed jointly by representatives of the government and private sectors to assist in formulating policy and planning towards improving national aquatic animal health status, achieving international recognition of the high quality of Bosnia and Herzegovina's aquaculture products and assisting their entrance onto international markets. The draft strategy expresses a Statement of purpose; Vision; Guiding principles; and implementation; and outlines nine major programmes of activity: (1) Policy, legislation and institutional framework; (2) Risk analysis and quarantine; (3) Diagnostics and health certification; (4) Surveillance, monitoring and reporting; (5) Emergency preparedness; (6) Capacity building; (7) Research and development; (8) Communication and international collaboration; and (9) Resources and funding. Within each major programme are presented its objectives, current status, and a number of projects that are to be accomplished during the initial phase of implementation. The NAAHS will be further developed by the State Veterinary Organization for funding and implementation.

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# FAN

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The FAO Aquaculture Newsletter (FAN) is issued three times a year by the Aquaculture Management and Conservation Service (FIMA) of the FAO Fisheries and Aquaculture Department, Rome, Italy. It presents articles and views from the FAO aquaculture programme and discusses various aspects of aquaculture as seen from the perspective of both headquarters and the field programme. Articles are contributed by FAO staff from within and outside the fisheries Department, from FAO regional offices and field projects, by FAO consultants and, occasionally, by invitation from other sources. FAN is distributed free of charge to various institutions, scientists, planners and managers in member countries and has a current circulation of about 1 500 copies.

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