



Committee on Fisheries 29

FAO Guidelines for Aquaculture Certification

Trailing the Long Journey: Development and Implementation of the FAO Guidelines for Aquaculture Certification

While recognizing the value of better management practices (BMP) and of certification for consumer confidence in responsible aquaculture practices and safety of aquaculture products, FAO Members reported on several occasions that the emergence of a wide range of standards, certification schemes and accreditation bodies caused some confusion amongst the various actors in the aquaculture supply chain.

In September 2006, Member countries requested that FAO play a lead role in facilitating the development of international aquaculture certification guidelines which could be considered when national and regional aquaculture standards are developed and which would serve as a basis for improved harmonization, or mutual recognition, of the various certification schemes.

It is hard to believe that more than 4 and half years of hard work were needed to meet that request. To tackle this task, 2 possibilities were considered. Firstly, the classical approach that calls for the organization of one or more expert consultations, followed by a technical consultation, before submitting the resulting draft Guidelines on aquaculture certification to the Members for consultation and endorsement. However, it was clear from the beginning that this approach, while well proven for many FAO undertakings of this nature, may not be the most conducive to accommodate the required broad participation from the many and diverse aquaculture stakeholders (government, NGOs, industry, retailers) interested in sustainable and responsible aquaculture development for food security, poverty alleviation and economic growth. It was also clear that there is a need to enable a transparent consultative process conducive to the building of a consensus. Instead, a more innovative second approach was requested to canvass synergies from a wide array of existing international instruments and initiatives, from national, regional and international organizations.

Using the second approach, with the highly appreciated support of several countries, 6 expert

workshops and/or consultative fora were held during 2007 – 2008, respectively, in Bangkok (Thailand, 27 – 30 March 2007), Fortaleza (Brazil, July 31 – August 3, 2007), Cochin (India, 23 November 2007), London (U.K, 28 – 29 February 2007), Beijing (China, 6 – 8 May 2008) and Silver Springs (Washington D.C, USA, 29 – 30 May 2008). The workshops held in Bangkok, Fortaleza, Cochin and Beijing focused on Asia and Latin America as major aquaculture producing regions of the world; whereas the two workshops held respectively in London and in Silver Springs focused on Europe and North America as major global seafood markets and included many diverse stakeholders from the aquaculture supply chain, in particular representatives of importers, retailers and processors who showed a keen interest in the development of guidelines for aquaculture certification. At the conclusion of each workshop, the draft guidelines were revised by the Secretariat taking into consideration the relevant views and concerns of the participants, as well as comments received from the public.

This transparent and exhaustive consultation process concluded with the finalization of the draft *Technical Guidelines on Aquaculture Certification*, which were presented to the 4th Session of the COFI Sub-Committee on Aquaculture (Puerto Varas, Chile, 6-10 October 2008). After a round of discussions, FAO Members requested further work from FAO to prepare a Technical Consultation which was held in February 2010 in Rome, Italy. Consensus was reached on most provisions, except for two sticking points. These were discussed further at the fifth session of the FAO Sub-Committee on Aquaculture (SCA V, Phuket, Thailand, 27 September- 1 October 2010) where the guidelines were finally approved by consensus. The approval was officially endorsed by 29th session of the FAO Committee on Fisheries (COFI 29) in February 2011.

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Cover photos:

*Culture of Red tilapia in cages in the
"lagon aux Bœufs - GCP/HAI/024/EC"*

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Editor's Note:

Koji Yamamoto is gratefully acknowledged for his assistance in completing FAN 47. Beginning 2011, FAN is presenting an improved front cover and back cover designs. There will also be only 2 issues for 2011 (FAN 47 and FAN 48).

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Aquaculture Highlights

29th Session of the FAO Committee on Fisheries (COFI 29)

31 January-4 February 2011
FAO Headquarters, Rome, Italy



Assistant Director-General of the Department of Fisheries and Aquaculture, Árni Mathiesen, delivering the findings of SOFIA 2010

The 29th session of the Committee on Fisheries (COFI) held in Rome from 31 January to 4 February 2011, was attended by 115 Members of the Committee, by observers from two other FAO Member Nations, one Associated Member, the Holy See, by representatives from five specialized agencies of the United Nations and by observers from 64 intergovernmental and international non-governmental organizations.

Mr Zbigniew Karnicki of Poland and outgoing Chair of COFI 28, opened the Session welcoming the record number of participants to COFI, congratulated the new Assistant Director-General of the Fisheries and Aquaculture Department, Mr Árni M. Mathiesen upon his appointment and thanked the former Assistant Director-General, Mr Ichiro Nomura, for his good leadership

of the Department during 2000–2010. On behalf of Mr Jacques Diouf, Director-General of FAO, Ms Ann Tutwiler, Deputy Director-General (Knowledge) delivered a statement. Mr Mohammad Pourkazemi of Iran was elected as Chair of COFI 29.

Mr Mathiesen presented the findings of the State of World Fisheries and Aquaculture 2010 (SOFIA 2010) which highlighted major changes during the last 15 years such as the rapid increase in aquaculture production, the rising demand for fish and fish products and a global call for responsible management.

Agenda Item No. 6 – Decisions and recommendations of the Fifth Session of the COFI Sub-Committee on Aquaculture (SCA V), Phuket, Thailand, 27 September – 1 October 2010 was chaired by South Africa (Mr Belemane Semoli). The Chief of the Aquaculture Service, Mr Jia Jiansan made an introduction of Agenda Item No. 6 which was supported by Information Document No. 9¹ and 10².

The following are the relevant decisions and recommendations by COFI 29 on matters pertaining to aquaculture as discussed during (SCA V).

- the growing importance of aquaculture for food and nutrition security, poverty alleviation, employment creation and its overall social and economic benefits to the people worldwide is recognized; the Committee emphasized the need for

better management of the sector to ensure its sustainable growth;

- more emphasis to FAO's work on aquaculture development in Africa, Latin America, small island developing States (SIDS), and Central Asia and the Caucasus and Near East was recommended; the Committee recognized the importance of the regional approach to aquaculture and emphasized that it should be targeted in FAO's future activities;
- in the future, greater priority should be given by the FAO Programme of Work and Budget (PWB) to the FI Department for its work on aquaculture, considering the growing demand by Members for technical assistance towards sustainable development and management of aquaculture;
- the importance of improving Members' responses to FAO reporting on progress in the implementation of the aquaculture provisions of the FAO Code of Conduct for Responsible Fisheries (CCRF) was emphasized;
- the FAO Technical Guidelines on Aquaculture Certification was approved; its gradual implementation was noted; and the existence of standards and guidelines set by international organizations and instruments such as the World Organisation for Animal Health (OIE) for aquatic animal health and



Aquaculture poster at the FAO Atrium during COFI 29



Aquaculture Service staff pose for a group photo during COFI 29

- welfare, CODEX Alimentarius Commission for food safety and ILO for socio-economic aspects, recognized;
- in the absence of a precise international reference framework for the implementation of some specific minimum criteria contained in the Guidelines, it will be necessary to develop, at a multilateral level and in coordination with the relevant intergovernmental organizations, appropriate standards, in order to ensure that the certification systems do not become unnecessary barriers to trade and remain consistent with the reference international standards, in particular with the Agreement on the Application of Sanitary and Phytosanitary Measures and the Agreement on Technical Barriers to Trade of the World Trade Organization;
 - the need for the provision of assistance for capacity development in developing countries was noted;
 - an evaluation framework to assess the conformity of public and private certification schemes with the FAO aquaculture certification guidelines was recommended to be developed by FAO;
 - the necessity for improving biosecurity in aquaculture was underscored; assistance to address the two fast spreading diseases of Epizootic Ulcerative Syndrome (EUS) in freshwater fish in Southern Africa and Infectious Myonecrosis Virus (IMNV) in shrimp in Southeast Asia was strongly recommended;
 - the importance of understanding the interactions between wild capture fisheries and aquaculture as well as cooperation with other international organizations involved in biosecurity issues were stressed;
 - the importance of promoting the use of indigenous aquatic species in aquaculture was stressed FAO's assistance for this purpose was requested;
 - the establishment of regional aquaculture networks in Latin America and Africa was appreciated and assistance to improve their contribution to aquaculture development in those regions was recommended;
 - the Government of Thailand for hosting the Fifth Session of the Sub-Committee on Aquaculture was gratefully acknowledged;
 - the offer by South Africa to host the Sixth Session of the COFI Sub-Committee on Aquaculture, in Capetown, 2–6 April 2012 was accepted; and
 - the report of the Fifth Session of the COFI Sub-Committee on Aquaculture was adopted.
- Under other matters, Sri Lanka's proposal, in relation to its national plan of development under its Presidential Vision, to convene an Asia Regional Ministerial Meeting entitled "Aquaculture Development for Food Security and Economic Development", to discuss, decide and develop a mutually-beneficial regional partnership to ensure responsible, sustainable, viable and profitable development of Asian aquaculture and a request for FAO to be a partner in this activity along with the Network of Aquaculture Centres in Asia and the Pacific (NACA) was approved.

¹FAO Committee on Fisheries/Comité des pêches/Comité de Pesca. 2010. Report of the fifth session of the Sub-Committee on Aquaculture. Phuket, Thailand, 27 September–1 October 2010. *FAO Fisheries and Aquaculture Report/FAO Rapport sur les pêches et l'aquaculture/FAO Informe de Pesca y Acuicultura*. No. 950. Rome/Roma, FAO. 2010. 158p.

²COFI: AQ/V/2010/Inf.7. Report of the Technical Consultation on the Technical Guidelines on Aquaculture Certification.

Asia-Pacific Region Aquaculture Highlights: 3 New Projects under FAO Technical Cooperation Programme

Miao Weimin

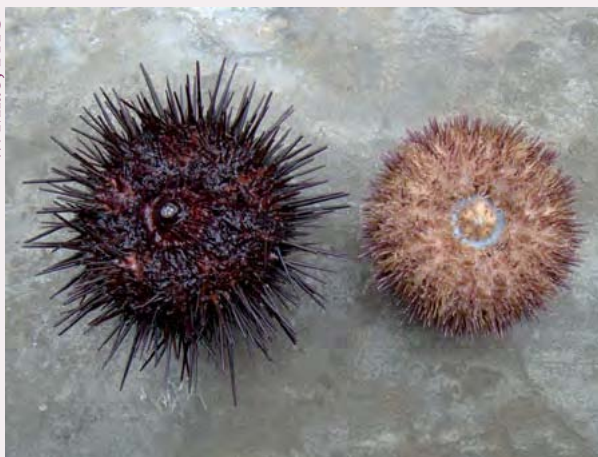
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Three newly-approved projects under the FAO Technical Cooperation Programme (TCP) are described in this regional update. All three projects are generally aimed at supporting sustainable aquaculture production to assist in securing food and nutritional security of concerned countries.

A. DPR Korea: TCP/DRK/3304 “Capacity building in seed production and juvenile rearing of ark shell and sea urchin species”

W. Miao, FAO



Sea urchin collected at Hongwon Fisheries and Mariculture Cooperative, DPR, Korea

The Democratic People’s Republic of Korea (DPR Korea), with limited production of livestock and poultry due to its predominantly mountainous terrain with harsh climate condition, is endowed with a very long coastal line and rich marine fisheries resources. Marine capture fisheries has traditionally served as a major source of animal food protein for the people. In recent years, drastic decline of stocks of high value marine fish has been observed as the result of various factors. Such decline in fisheries production has not only deteriorated food fish production in the country, but also threatened the livelihood of some estimated half million coastal dwelling Koreans, who are basically dependent on fishing and foraging activities as their means of livelihood. To offset the declining catch from marine fisheries, the Government of DPR Korea has been promoting aquaculture development in the coastal areas.

The current thrust was well demonstrated by frequent requests during recent years for technical assistance from FAO in developing the country’s marine aquaculture sector.

Ark shell and sea urchin were identified by the government as the species with great aquaculture potential due to high market demand and large water area along the coast suitable for their culture. Recent years have witnessed significant decline in natural stocks due to over-catching and insufficient natural recruitment. Successful development of capacity in artificial seed production will not only provide opportunity for aquaculture, but also support the enhancement of natural stocks. During the late stage of implementation of the project TCP/DRK/3204 “Capacity building in fingerling production and farming of selected marine finfish species”, a new TCP proposal “Capacity building in seed production and juvenile rearing of ark shell and sea urchin species” was approved by FAO in January 2011 as TCP/DRK/3304.

The expected outcomes of this TCP project are: (1) enhanced national capacity in production and supply of adequate quality seed for sustainable culture of ark shell and sea urchin; and (2) successful demonstration of grow-out commercial farming of the two species. A number of activities, to attain the objectives of the project, include: (i) upgrading national technical capacities, through training, in farming ark shell and sea urchin; (ii) building operational capacity for pilot ark shell and sea urchin hatcheries and other production-related capability; (iii) equipping a phycology laboratory at the Wonsan Fisheries University to support ark shell and sea urchin hatchery operation initially by the Hongwon Fishing and Mariculture Cooperative; and (iv) developing good practice technical manuals on seed production and grow-out techniques as well as a national strategy on marine shellfish aquaculture development.

The TCP project will provide the technical services of Technical Cooperation among Developing Countries (TCDC) consultants and FAO backstopping officers, has an implementation period of 23 months (until December 2012) and is being implemented by the Ministry of Fisheries.

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B. Nepal: TCP/NEP/3303 “Improving national carp seed production system in Nepal”

Aquaculture is considered a relatively new sub-sector of agriculture in Nepal. The earliest practice of aquaculture in the country started some 50 years ago. Over the past 25 years, aquaculture in Nepal has significantly developed. Production increased from 3 265 tonnes in 1985 to 27, 250 tonnes in 2008 (FAO, 2010). Presently, aquaculture plays a significant role in national food and nutritional security and as well as rural livelihood by supplying nearly 60 percent of total fish supplied to Nepalese people.

Aquaculture production is dominated by carp species (i.e. Chinese carps, Indian major carps and common carp). In recent years, pond culture and other systems experienced poor production performance (e.g. early maturation of common carp, retarded growth, low survival rates and disease problems). There is general recognition that genetic degradation of carp seed produced in the hatcheries from broodstock of poor genetic quality and with bad hatchery management practices are responsible for the poor production performance. A TCP/NEP/3303 “Improving national carp seed production system in Nepal” was jointly developed by FAORAP and FIRA officers in consultation with the government and the project was approved in November 2010. This is the second aquaculture TCP in Nepal, the first one was TCP/NEP/2355 “Strengthening fish disease diagnosis” which was completed in 1994.

The project will take multiple approaches to effectively address key issues associated with carp seed quality problem. The project will focus on the establishment of national legislative regulation, preparation of technical standards for good hatchery management practices, setting up of effective hatchery and nursery management systems (e.g. registration and certification) and developing national capacity on broodstock management and genetic improvement through relevant training and pilot genetic improvement programmes for selected carp at identified



W. Miao, FAO

Chinese carp hatchery at Pokhara Fisheries Research Center, Nepal

nuclear breeding centres. Original germplasm and improved strain of selected carp species will be reintroduced from the countries of origin to improve the genetic background of the carp broodstock in the country. The project is expected to significantly contribute to the establishment of a national production and distribution system that will enable a constant supply of high quality carp seeds as well as other aquaculture species for the sustainable aquaculture and enhancement activities.

The project was formally launched during an Inception Workshop conducted by FAO technical backstopping officers and project recipients and stakeholders in February 2011. Prior to the workshop, field visits to the national and private carp propagation centres, hatchery and nursery facilities provided first hand information on the current situation of carp seed production systems and broodstock used. The Inception Workshop, introduced the TCP project to relevant government agencies, public institutions and private sector, and became an opportunity to get comments and feedback on the project framework and implementation mechanism. Based on these, adjustments were made to better achieve the goals of the project. Project activities will be extensively carried by TCDC consultants and FAO backstopping officers during the coming breeding season of carp species in May 2011. The project, being implemented by Directorate of Fisheries Development of Nepal, is expected to run until November 2012.

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Capacity Building for Aquaculture Development in Central Asia

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A recent regional assessment of the Fisheries and Aquaculture Sector Education, Training and Research Needs in Central Asia¹ revealed inadequate institutional capacity for the promotion and development of research, education and training in the fields of inland fisheries and aquaculture.

The assessment showed, among others, that in all Central Asian countries, there exist university programmes that are providing higher education in fisheries and fisheries-related science (e.g. ichthyology, aquatic biology). However, these programmes often are not complete or universities are lacking expert teachers in certain relevant subjects. Training and upgrading of the capacities of staff of fisheries and aquaculture institutions, relevant

governmental bodies, fishers organizations and the private sector fishers and aquaculturists are not routine practice in Central Asia. National capacity to deliver practical training in most subjects is generally not available, but urgently needed.

Considering the above and the declining trend in aquaculture production in the region (see also FAN 45, pages 10-11) it is widely recognized that strengthening human and institutional capacities is a first priority for development of the sector in the region.

To remedy the current situation, FAO is collaborating with universities, training and research institutions and government agencies in Central Asia, the Caucasus and Turkey on the development of a regional

programme for education and training in fisheries and aquaculture. Bringing all relevant regional institutions and potential partners together in such a programme is important, but also takes time and effort. It is aimed to start the regional programme in 2012.

In the mean time, the various FAO projects active in the region are teaming-up with national, regional and international partners to deliver high quality training and education on a wide range of fisheries and aquaculture subjects.

During the period 2007 – 2010, numerous training courses and technical and policy workshops have been conducted in the region. In total these activities accounted the participation of some 1 300 individuals.

Types of training courses and workshops conducted from 2007-2010

Subject of training/ capacity building	Number of activities undertaken	Countries where activities were organized	Number of participants
Fisheries and aquaculture review, policy development and planning	12 national and regional level training workshops	Azerbaijan, Kyrgyzstan, Turkey, Tajikistan, and Uzbekistan	450+
Regional collaboration and partnership development in aquaculture and fisheries	7 regional workshops/meetings	Tajikistan and Turkey	300+
Fish reproduction and hatchery management training	3 regional training workshops	Kazakhstan and Turkey	140+
Aquaculture training	4 national and regional trainings and workshops	Turkey and Uzbekistan	120+
Aquaculture economics and feasibility training	3 national level training workshops	Kyrgyzstan, Tajikistan and Uzbekistan	100+
Fish feed production and management	3 regional (training) workshops	Tajikistan and Uzbekistan	80+
Inland fisheries (including recreational fisheries) training workshops	3 regional and national workshops	Kyrgyzstan, Turkey, and Uzbekistan	60+
International study tours (fish culture and inland fisheries)	3 study tours	Thailand and Turkey	50+

Until the regional programme for education and training in fisheries and aquaculture start its implementation, FAO is already implementing in 2011 a number of training activities under two major projects as described in the tables below.

In addition, various projects under the FAO Technical Cooperation Programme (TCP) active in Central Asia and the

Caucasus will deliver training in legal framework development for fisheries and aquaculture (in Azerbaijan and Tajikistan), sturgeon tagging and sturgeon habitat rehabilitation planning (in Turkey).

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Training activities under the Central Asia Regional Programme for Fisheries and Aquaculture Development (GCP/RER/031/TUR), which is financed by the FAO – Turkey Partnership Programme (FTPP)

Country	Training course	Period (2011)	FAO units involved
Azerbaijan	Preparation of a National policy for aquaculture development in the period	May-September	SEC, LEGN, FIRA
Kyrgyzstan	Regional training workshop on fisheries co-management	18-19 May	SEC, FIP and GCP/KYR/003/FIN
	Regional training on the principles of cage culture in reservoirs	23-24 June	SEC and GCP/KYR/003/FIN
Tajikistan	Regional training on small scale fish feed production in fish farms	27-28 September	SEC
Turkey	Regional Workshop on "fishery and aquaculture statistics, information, and trends: improving data collection, analysis and dissemination"	12-14 April	FIPS and SEC
Uzbekistan	National training on the importance of water quality monitoring for aquaculture	11-13 October	SEC
TBD	Regional workshop on the establishment and improvement of Monitoring, Control and Surveillance (MCS) in Central Asian fisheries	TBD	

Training activities under the project Support to Fisheries and Aquaculture Management in the Kyrgyz Republic (GCP/KYR/003/FIN)

Training course	Period	FAO units involved
National training on good pond management practices with special reference to carp aquaculture	24-25 February 2011	SEC
National workshop on promoting and strengthening fisheries and aquaculture organizations in the Kyrgyz Republic	16-18 March 2011	FIRO, SEC and GCP/RER/031/TUR
National training on small-scale cage farm construction and operation	27-28 April 2011	SEC
National training on fish breeding and brood stock management techniques	August-September 2011	
National training on environmental impact assessment of aquaculture practices in Issyk-Kul Lake	October 2011	

¹Yerli, S.; Siar, S.; Fersoy, H.; Karimov, B.; and Van Anrooy, R. (eds). Report of Workshop to Assess the Fisheries and Aquaculture Sector Education, Training and Research Needs in Central Asia. Tashkent, Uzbekistan, 12–14 January 2010. *FAO Fisheries and Aquaculture Report*. No. 945. Ankara, FAO. 2010. 32 p.

Strengthening Aquatic Animal Health and Biosecurity Capacity in the Western Balkan Region: a Success Story

Melba B. Reantaso

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TCP/BIH/301 Strengthening aquaculture health management in Bosnia and Herzegovina

FAO AN 37 (July 2007) provided information on a newly approved Technical Cooperation Programme (TCP) project “Strengthening capacity on aquaculture health management in Bosnia and Herzegovina”. The project activities carried out to meet the objectives of the TCP include a combination of a number of local training/workshops, overseas training/workshops, upgrading of laboratory facilities and a regional seminar/workshop. These activities were supported by national and international consultants, FAO backstopping officers, National Project Coordinator (NPC) and local stakeholders. The project focused on policy and national aquatic animal health (AAH) strategy, European Union (EU) trading and AAH, risk analysis in aquaculture, product safety and quality assurance, and diagnostics, surveillance and reporting of aquatic animal diseases. The national AAH reference laboratory was strengthened through overseas training and provision of equipment.

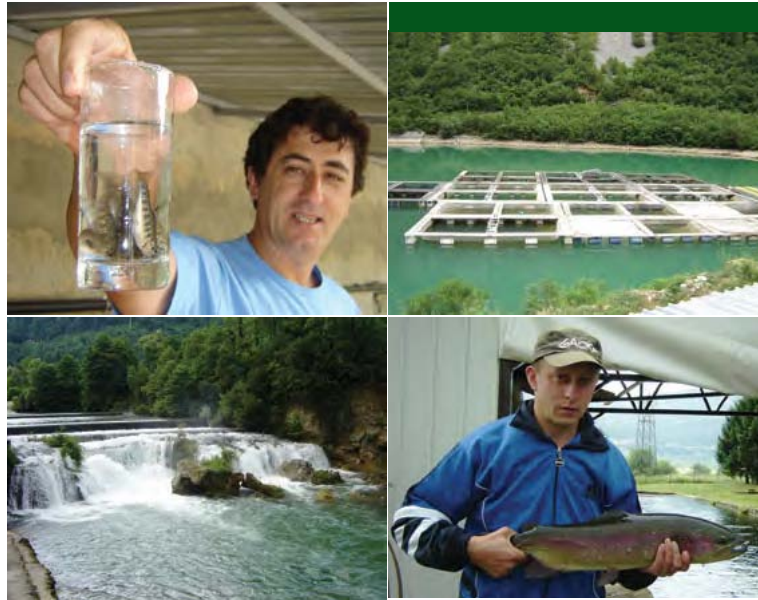
Project implementation commenced during the Inception Planning Workshop held in Mostar from 30-31 October 2006. There followed 5 more local training/workshops on various aspects of AAH management and food safety (undertaken between November 2006 and March 2008); participation in two overseas training/workshops (conducted in June 2007 in Rayong, Thailand and January-February 2008 in Aarhus, Denmark); purchase of laboratory equipments completed in early 2009 and a regional seminar/workshop done in May 2008. Final publication of all documentation outputs (a draft national AAH management strategy, a disease diagnostic manual for extension workers and a veterinary inspector’s checklist for aquaculture farms and fish processing plants, and FAO Fisheries and Aquaculture Technical Paper

No, 524) and dissemination were completed in 2009.

Bosnia and Herzegovina’s (BiH) State Veterinary Office (SVO) is one of the winners of FAO’s 2010-2011 Edouard Saouma Award ([see also page 23, this issue](#)) for its outstanding contribution to the implementation of the above TCP. Above-mentioned activities assisted the country in acquiring a license to export fish products to the EU market. In 2008, EU has approved four fish processing facilities from BiH for export. Aquaculture production increased by 12 per cent during the project (from July 2006 to May 2008) and export of fish products to the EU commenced. The veterinary administration, inspectorates, laboratories and producers have improved compliance to international animal health, food safety and quality requirements and practices. The SVO developed a risk-based approach important for drafting monitoring plans for aquaculture, aquatic animal health and food safety, and for decision making concerning domestic and international movements of live aquatic animals and their products.

TCP/RER/3206 Assistance to Western Balkan Countries for Improving Compliance with International Standards for Aquatic Animal Health

A follow-up TCP facility – TCP/RER/3206 “Assistance to Western Balkan Countries for Improving Compliance with International Standards for Aquatic Animal Health”, submitted in December 2008 and subsequently approved in February 2009 – was a major outcome of TCP BiH/3101. The overall objective was to prepare a future regional TCP proposal for submission to FAO. The processes involved in the development of a regional TCP included the following: (i) regional survey of aquatic animal health capacity and performance (May to August 2009);



M. Reantaso, FAO

The Western Balkan region has a long history of aquaculture, endowed with large areas of high-quality fresh waters, and supported by a strongly motivated and well-organized private sector with highly competent aquaculture work force and network of veterinary officers, inspectors and researchers. These and its proximity to large markets in the EU –make the subregion in an advantage position with regard to developing aquaculture as a sector that can provide healthy low-cost protein to their citizens and generating export earnings

(ii) regional field assessment (May to August 2009) by two teams (one team visited Serbia, Croatia and Bosnia and Herzegovina; second team visited The former Yugoslav Republic of Macedonia and Montenegro); (iii) regional proposal preparation (August 2009); and (iv) regional workshop to build consensus and finalize the regional TCP proposal (September 2009 in Croatia). The regional proposal development workshop was successfully implemented from 8 to 9 September 2009 and participated by 34 delegates from five countries (Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Serbia) and FAO. The regional workshop agreed that the regional TCP will have the overall objective of improving participating country compliance to international health standards for aquatic animals. The specific objectives include: (i) building capacity on specific themes (legislation, risk analysis, surveillance (aquatic epidemiology), diagnostics,

emergency preparedness/ contingency planning/ aquaculture development and promotion); (ii) review of national legislation to harmonize with respect to compliance with international standards of aquatic animal health (WTO-SPS, OIE, EU); (iii) design a regional disease surveillance programme for aquatic animal diseases (regional in scope, e.g. five Western Balkan countries, surveillance design based on international standards); and (iv) promote communication mechanisms and networking systems for aquaculture development.

Western Balkans regional aquatic animal health capacity and performance survey

The seven countries comprising the Western Balkans (Albania and the newly independent nations of the former Yugoslavia – Bosnia and Herzegovina, Croatia, The former Yugoslav Republic of Macedonia, Montenegro, Serbia and Slovenia) have a long history

of aquaculture and are in the process of developing modern aquaculture production systems as a means of providing healthy low-cost protein to their citizens and generating export earnings. Possessing large areas of high-quality fresh waters, skilled and relatively inexpensive labour, and proximity to large markets in the EU, the region has an advantage situation with regard to aquaculture development. To realize this potential, Western Balkan countries are attempting to develop the capacity to meet international standards for trade in live aquatic animals (fish, crustaceans and molluscs) and their products. Primary among these are the standards of the World Organisation for Animal Health (formerly the Office International des Epizooties, OIE) as expressed in the OIE *Aquatic Animal Health Code* and *the Manual for Diagnosis of Aquatic Animal Diseases*, the Sanitary and Phytosanitary Agreement (SPS Agreement) of the World Trade Organization

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Promotion and Development of Freshwater Aquaculture in Haiti

English Summary

This article presents the results of two FAO technical cooperation projects entitled “Promotion of small-scale aquaculture and poultry farming for food security” (GCP/HAI/022/OPF) and “Support to food security and livelihood of rural populations affected by food prices increase and technical assistance for environment rehabilitation and agriculture sustainable development” (GCP/HAI/024/EC) to promote and develop freshwater aquaculture in Haiti. Both projects were funded by the Organization of the Petroleum Exporting Countries (OPEC) development and the European Union.

The overall objective of project on “Promotion of small-scale aquaculture and poultry farming for food security” executed from January 2009 to February 2011, was to assist the Haitian government, represented by Ministry of Agriculture, Natural Resources and Rural Development, in promoting the development of rural aquaculture and poultry production in selected sites located in the Southern and Artibonite Districts. Some 100 small-scale farmers were identified according to their interest in project activities, motivation and previous experience. A total of 89 earthen ponds were constructed or rehabilitated during the project and several fish stocking campaigns were carried out. The main cultured species were Nile tilapia (*Oreochromis niloticus*), red tilapia (*Oreochromis mossambicus* x *Oreochromis niloticus*) and common carp

(*Cyprinus carpio*) which were reared in polyculture. About 30 000 fingerlings (average of 300 fingerlings per fish pond) have been freely distributed among the project sites to complete a first production cycle. One production cycle lasts from six to eight months using organic agriculture by-products as the main source of fertilizer for fish ponds. 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 and national resources; and (iii) production and distribution of fingerlings.

The project on “Support to food security and livelihood of rural populations affected by food prices increase and technical assistance for environment rehabilitation and agriculture sustainable development” was conducted in the North-East District of Haiti from April 2009 to June 2011, the project has an aquaculture component with two main objectives: (i) extensive fish production in small lakes; and (ii) grow-out red tilapia in floating cages. Several fish stocking campaigns (120 000 fingerlings) were carried out in six natural fresh and brackishwater lakes (size ranging from 10 to 45 ha), during August and December 2010, to ensure fish production for small-scale farmers living in the surrounding areas. The project also provided commercial feed which was distributed once a day in each lake for a period of three months. The project installed 32 floating cages (4 m³ in PVC) in

three different lakes for intensive red tilapia production. This activity is carried out through a contract signed with a private aquaculture farm (Caribbean Harvest) based in Port-au-Prince. This company provided the project with cages, red tilapia (*Oreochromis mossambicus* x *Oreochromis niloticus*) fingerlings and commercial feed imported from the United States of America, covering one production cycle (lasting 4–6 months). The main constraints are limited production of fingerlings and availability of feed. The only governmental hatchery (Pond Sondé) located in the Artibonite District currently does not have the production capacity to cover the national demand for fingerlings and in the whole country there are no feed processing plants.

Since lack of fingerlings and feed represent the major bottlenecks for aquaculture development in the Haiti, more attention should be focused on farm-made feed and fingerlings production in pond to allow farmers to cover their aquaculture production needs.

Even though the implementation of both projects has generated great enthusiasm among the beneficiaries and national counterparts scant results have been so far achieved. However both OPEC and European Union have already indicated interest in funding a new phase for both projects to improve local capacities and enhance freshwater aquaculture on a wider scale.



Etang piscicole construit dans le cadre du projet GCP/HAI/022/OPF

Projets de Promotion et Développement de l'Aquaculture en Eau Douce à Haïti (GCP/HAI/022/OPF - GCP/HAI/024/EC)

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Le projet **GCP/HAI/024/EC** « Appui à la sécurité alimentaire et aux moyens de vie des populations rurales affectées par la flambée des prix, à la réhabilitation de l'environnement et au soutien d'une gestion durable dans le département du Nord-est de Haïti » est financé par le fonds d'urgence de l'Union européenne avec un budget total de près de 10 millions d'euros. La période de mise en œuvre du projet se déroule sur une durée de 27 mois, d'avril 2009 à juin 2011. Le projet a deux objectifs: (1) la réhabilitation et l'aménagement des plans d'eaux (lagons, lacs collinaires, retenues d'eau), leur empoissonnement ultérieur et (2) l'installation de cages flottantes pour la production de poissons. Les sites d'intervention sont représentés par treize plans d'eau situés dans le département du Nord-est dans la commune de Fort Liberté. Ces plans d'eau ont une superficie variant de 1 à 400 hectares avec un taux de salinité variable. Les systèmes de production de poisson prévus sont la production piscicole intensive en cage et la production extensive dans les six lagons sélectionnés.

INTRODUCTION

Cet article décrit la composante aquaculture des deux projets d'assistance technique de la FAO à Haïti financé respectivement par l'Organisation des Pays Exportateurs de Pétrole (OPEP) et l'Union européenne (UE).

Le projet **GCP/HAI/022/OPF** « Promotion de petits élevages avicoles et piscicoles dans les exploitations paysannes en vue de l'amélioration de la sécurité alimentaire » est à sa troisième phase d'exécution. La phase pilote de ce projet (TCP/HAI/2903) a débuté en janvier 2003 pour prendre fin en octobre 2004 (voir article, FAN 33, juillet 2005). Les résultats encourageants de cette phase ont conduit à la formulation du premier projet d'extension GCP/HAI/017/OPF financé par l'OPEP démarré en juillet 2005 et a duré dix-huit mois (voir article, FAN 37, juillet 2007). L'objectif global était d'améliorer les conditions de vie des petits agriculteurs vivants en milieu rural à travers la promotion de l'aviculture et la pisciculture. Un deuxième projet d'extension GCP/HAI/022/OPF avait vu le jour, toujours avec le financement de l'OPEP et cette fois, l'objectif était de consolider les acquis du premier projet d'extension et d'étendre les activités dans de nouveaux sites. Le nouveau projet avait démarré en janvier 2009 pour prendre fin en février 2011. Les activités du projet ont été conduites au niveau des communes de Torbeck et des Cayes dans le département du Sud et les communes de Marchand, Petite Rivière, et Marmelade dans le département de l'Artibonite.



Récolte de tilapia rouge élevé en cage dans le lagon aux Bœufs - GCP/HAI/024/EC

RESULTATS

- les principaux résultats du Projet **GCP/HAI/022/OPF** sont :

Réhabilitation et identification des nouvelles unités aquacoles

Au début de cette phase une enquête d'évaluation des unités piscicoles a permis de mieux comprendre la situation existante des sites, de remarquer l'intérêt des pisciculteurs à poursuivre leurs activités et d'identifier les principales contraintes des bénéficiaires. Cependant des efforts considérables ont été consacrés pour la construction et la réhabilitation d'un certain nombre de bassins pour la production de poissons. Au total, environ 89 bassins ont été retenus pour être réhabilités et mis en production.

Système de production piscicole

Le système envisagé est une production piscicole en polyculture en bassins d'environ 150 m² avec la carpe commune (*Cyprinus carpio*), le tilapia du Nil (*Oreochromis niloticus*) et le tilapia rouge (*Oreochromis mossambicus* x *Oreochromis niloticus*). Ce système de culture a permis d'adopter un cycle de production de 6 à 8 mois avec l'adoption d'une fertilisation organique à partir d'une compostière. Quant à l'alimentation, les producteurs

ont utilisé des sous produits de l'exploitation agricole (sons de riz, maïs, petit mil, sang de bœuf, etc.) ce qui a permis d'éviter l'achat d'aliments commerciaux excessivement chers sur le marché.

Acquisition d'équipements et d'intrants piscicoles

Un certain nombre de matériel a été remis aux bénéficiaires pour assurer la gestion quotidienne des bassins (matériels de construction des bassins, des filets pour l'échantillonnage et la récolte des poissons, etc.). Pour la mise en production des bassins piscicoles, le projet a procédé à plusieurs campagnes d'empeuplement (tilapia et carpes) provenant de l'écloserie de Ponte Sondé ; 30 000 alevins ont été distribués aux bénéficiaires (environ 300 alevins par bassin). L'écloserie de Pont Sondé constitue l'élément central de promotion de l'activité piscicole à l'échelle nationale mais l'état actuel de l'écloserie ne permet pas de satisfaire la demande en alevins surtout en carpes, situation due surtout à la taille de l'écloserie dont la capacité de production est faible par rapport à la demande.

Renforcement des capacités locales

La formation a représenté un élément important du projet pour faciliter le maintien des acquis dans le futur grâce à l'augmentation des capacités locales des différents intervenants (bénéficiaires, techniciens et animateurs). Des sessions de formation ont été organisées pour les bénéficiaires couvrant les modules relatifs à la construction et la gestion quotidienne des bassins.

Analyse du rendement économique et des risques

Une analyse économique du secteur a permis de montrer que la pisciculture rurale intégrée dans les autres activités agricoles est une activité économiquement rentable pour les producteurs avec un investissement initial la première année. On estime que les besoins mensuels en liquidités s'élèvent entre 1200 et 2000 gourdes (1 gourde = 0,0247 USD) pour la pisciculture. L'investissement initial pour la construction d'un bassin piscicole est estimé entre 7500-10000 gourdes. Grâce à une bonne gestion des bassins, les producteurs peuvent obtenir une production assurant un bon rendement à travers la vente de poisson. Les risques majeurs sont représentés par le peu de disponibilité en alevins et d'aliment.

- les principaux résultats du Projet **GCP/HAI/024/EC** sont :

Système de production piscicole et gestion des activités

Les systèmes de production de tilapia rouge sont basés sur une production piscicole intensive en cage et une production extensive dans les six lagons sélectionnés. Le système de culture en cage a permis d'adopter un cycle de production de quatre mois. Celui-ci dépend cependant fortement de la disponibilité en aliments commerciaux excessivement chers sur le marché.

Pour la réalisation des cages, la production d'alevins et la distribution d'aliments, un contrat a été signé avec la société privée Caribbean Harvest, basée à Port-au-Prince. Jusqu'à présent Le projet a réalisé la construction de 32 cages (en pvc de 4 m³), leur installation en quatre plans d'eaux et leur mise en production. Afin de faciliter le transport des alevins et de réduire la mortalité, la société Caribbean Harvest a loué dix bassins dans le périmètre du Centre piscicole de Fort Liberté pour la production d'alevins sur place.

Des campagnes d'ensemencement de poissons (tilapia rouge) ont été menées dans plusieurs lagons en août et décembre 2010, afin de garantir une production extensive des poissons pour les bénéficiaires qui habitent dans les alentours. Le système de culture dans les lagons dépend quant à lui exclusivement de la bonne fertilisation organique de l'eau et d'une bonne gestion quotidienne.

Équipements fournis par le projet

Par le biais des associations qui assurent la gestion quotidienne des plans d'eaux, le projet a fournis un certain nombre d'équipement aux bénéficiaires notamment, cages, aliment pour les poissons (huit sacs par cage pour couvrir un cycle de production de quatre mois) et distribution d'alevins (tilapia rouge) nécessaires pour la mise en production des lagons et des cages.

De même, le projet a effectué les commandes pour l'acquisition de matériel supplémentaire : barques (une par association), filets pour l'échantillonnage et la récolte des poissons dans les lagons, igloos (thermos) pour la conservation du poisson, moulins et hachoirs manuels pour la production d'aliment pour les poissons produit localement.

CONCLUSION

L'aquaculture en eau douce à Haïti n'arrive pas à décoller pour une série de facteurs qui affectent le développement durable du secteur. Un facteur essentiel pour le succès des projets est d'avoir toujours à disposition des alevins de qualité. Il est indispensable de renforcer les capacités de production des écloséries nationales et de mener des expériences pratiques de production d'alevins directement dans les bassins aquacoles des producteurs.

L'alimentation est un autre élément fondamental pour la réussite et le développement de l'aquaculture dans le pays. Les prix élevés des aliments industriels importés ne permettent pas aux producteurs de soutenir ces coûts. La stratégie proposée est de constituer des unités de récolte, de production et de transformation des aliments, qui utiliseraient les produits agricoles disponibles localement

comme source de base pour la production d'aliment. Enfin, il est évident que le pays ne dispose actuellement que d'un nombre extrêmement limité de cadres et de techniciens expérimentés en matière d'aquaculture et que l'accompagnement des producteurs suppose la formation du personnel local qui interviendrait directement et indirectement dans les projets. Des programmes de formation devront toujours être pris en considération durant les projets pour permettre une formation exhaustive aux pratiques aquacoles utilisées. L'OPEC et l'UE ont déjà montré leur intérêt à financer une autre phase des deux projets afin de consolider le développement de l'aquaculture dans les zones d'intervention de projets.

Remerciements

L'auteur adresse ses sincères remerciements à tous les collègues de la FAO à Haïti pour leur aide et contribution au bon déroulement de la mission ; en particuliers MM AriToubo Ibrahim et M. Volny Paultre, de la Représentation de la FAO (Port-au-Prince), M. Pierpaolo Piras (FAO, Rome), M. Jean Baptiste Neudy (Consultant en aquaculture) et tous les techniciens du Ministère de l'Agriculture, affectés sur le terrain.



Tilapia rouge produit en cage pendant un cycle de production de quatre mois GCP/HAI/024/EC

H. Dumorme, FAO Consultant

Preliminary Notes on Forecasting Country's Future Demand for Fish

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According to UN estimation, world population is expected to reach 7.3 billion in 2015, 9.5 percent higher than the 2007 population. Assuming that people in every country consume the same amount of fish in 2015 as in 2007, then the world total fish consumption will reach 117 million tonnes in 2015, which is 6.5 percent higher than the consumption in 2007. This rough estimation may underestimate country's future fish demand because it does not account for the impact of income growth on fish consumption.

An econometric model has been developed to estimate the impact of income on fish consumption based on the FAO Food Balance Sheet data of 158 countries from 1980 to 2007. The preliminary results show that increases in country's per capita gross domestic product (GDP)¹ could raise the world fish consumption to 19 kg/capita/year in 2015, a level 13 percent higher than in 2007. When the impacts of both population growth and income growth are accounted for, the world total fish consumption in 2015 could reach 136 million tonnes, higher by 24 percent than the level in 2007. As highlighted in Figure 1, those with above-average growth in fish demand (i.e. higher than 24 percent) are mainly from developing countries in Africa and Asia. In Figure 1, the darker the color, the greater the fish demand growth rate for the country.

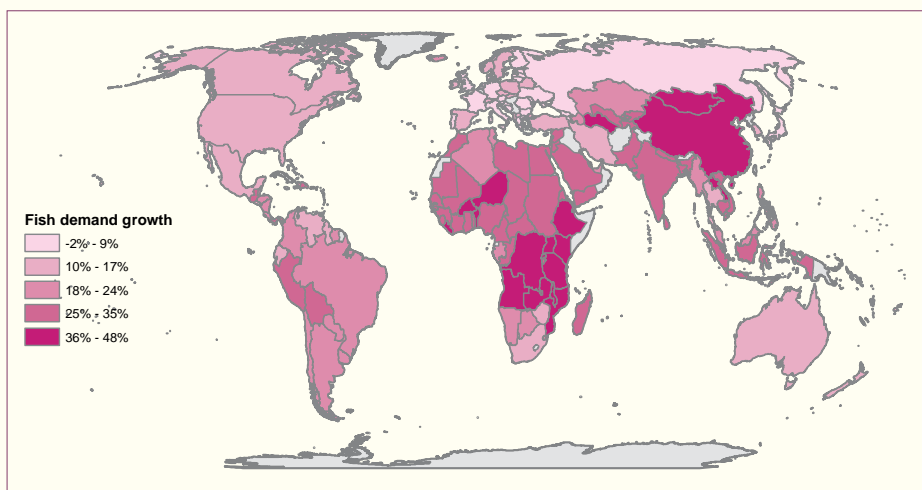


Figure 1. Expected fish demand growth rate in 8 years from 2007 to 2015

The Model

Instead of using the common method of extrapolating a country or country group's future fish demand based on its historical income and fish consumption patterns, the current model derives the above estimation results through a fixed-effect panel model that pools all country historical data together to conduct one single estimation. Extrapolations under this model would thus be based not only on comparing individual country's own fish consumption and income patterns over time, but also on comparing the patterns across countries.

As such, even countries with just a few data points can be included in the analysis as a distinctive country rather than being an unidentifiable part of a country group. Aggregating countries into groups, albeit a common practice in forecasting country's future fish demand, tends to result in a vast amount of information loss and hence should always be considered as the last resort. Another merit of this panel model is to improve the reliability of extrapolations because the pooled data provide a wide income range from countries at different income levels.

One limitation of this panel model is its inability to estimate the idiosyncratic "income elasticity" of fish demand (i.e. the parameter measuring the change in fish demand due to a change in income) for each individual country. Technically, this can be done under the panel model, but it would be equivalent to conducting a separate estimation for each individual country, which will lead to meaningful extrapolations *only* for countries with sufficient data as well as a wide range of historical incomes.

In deriving the estimation results presented above, we assumed a common income elasticity of fish demand for all the countries. Further study can relax this assumption by allowing different income elasticity for specific country groups. A challenge in doing so is how to determine which countries have similar income elasticity of fish demand.

For the model specification, we included countries' GDP (per capita), domestic fish production (per capita) and the price of imported fish as three independent variables that affect fish consumption (per capita). This model specification explains over 60 percent of the variations in fish consumption across countries and over time in the data used for the estimation. We also included a fixed-effect parameter to capture countries' idiosyncratic preference over fish consumption.

Due to data unavailability, we did not include the price of domestically supplied fish as an independent variable, but part of its impact should hopefully be captured by the included domestic fish production as well as the price of imported fish.

We have tried to include "the ratio of urban population in total population" as one of the independent variables, but the resulting coefficient of this demographic variable is negative and statistically insignificant, which contradicts the common notion that urbanization tends to increase fish consumption. This counter-intuitive result may be a "multicollinearity" problem caused by the high correlation between the ratio of urban population and GDP per capita. Since the results show that inclusion of this demographic variable or not virtually has no impact on the estimation results, we decided to exclude it to keep the model as succinct as possible.

Applications

Forecasting future fish demand allows us to assess potential gaps between fish supply and demand. For example, based on the estimation results mentioned above, we can further estimate that the world fish production would need to increase by about 20 percent in 8 years from 2007 to 2015 to satisfy the expected increase in fish demand. Since the world fish production grew only by about 15 percent in 8 years from 1999 to 2007, we can surmise that more effort is needed to boost fish production to satisfy the growing fish demand because of population and income growth.

Under certain assumptions on the supply side, we can also assess fish supply-demand gaps for individual countries. For example, we can estimate how fast a country's aquaculture production needs to grow if they rely on their own cultured fish production to satisfy their increased fish demand. In Figure 2, the darker the color is for a country; the faster its cultured fish production needs to grow in order to self-supply its extra fish demand in 2015.

As mentioned above, the model can be adjusted to account for differences in countries' income

elasticity of fish consumption. It can also be applied to more detailed analysis (e.g., estimating fish demand at the household level and/or for disaggregated fish species) should data availability allow.

As a side benefit, the estimated fixed-effect parameter in the model can be used to construct a "Fish Craving Index" to measure country preference over fish consumption. We will discuss this in detail in another future article.

Acknowledgement:

The forecasting model discussed in this article is part of FIRA's ongoing study on the contribution of aquaculture to food security. Dr PingSun Leung and Dr Nathanael Hishamunda are acknowledged for valuable comments and suggestions on the specification of the model.

¹Gross domestic product (GDP) refers to the market value of all final goods and services produced within a country in a given period. It is often considered an indicator of a country's standard of living.

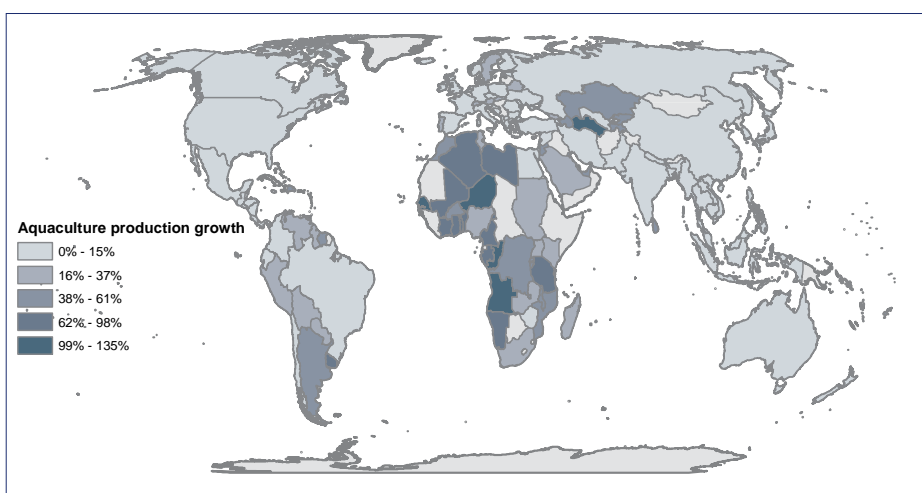


Figure 2. Annual growth rate of aquaculture production needed to satisfy expected fish demand growth from 2007 to 2015

A project financed by the Common Fund for Commodities¹

Organic Aquaculture in Myanmar, Thailand and Malaysia

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In the recently completed CFC/FAO Organic Aquaculture Project, INFOFISH helped fish farmers in the Asia-Pacific region adapt to the new market niche for organic aquaculture products.

Four shrimp farms in Thailand, another two in Myanmar, one shrimp farm and a freshwater fish farm in Malaysia all learned, with the assistance and new technologies introduced by the help of INFOFISH, to effectively produce, certify, and market safe, eco-friendly, high quality organic black tiger shrimp and tilapia.

The 3-year Project (2007-2010) began with **market studies** to determine which organic products might sell well in global and regional markets. Based on these promising findings, INFOFISH began to **transfer technology**: working with the farmers to adapt their operations and products to **organic standards**.

Trial marketing of the certified, processed, packaged and labeled products found receptive customers.

Practical lessons learned in the production, certification and marketing experiences of these pilot project farms have been gathered, published and disseminated in information workshops throughout nine countries in the Asia-Pacific and beyond, to enhance generally the sustainable development of small- and medium-scale aquaculture sectors in the region.

Market studies revealed some interesting trends and possibilities. Within the aquaculture sector, Asian markets are particularly hungry for organic fish products – and the Asia-Pacific region, with its established aquaculture, is particularly well-suited to accommodate this regional demand. Indeed, the growth rate of organic and demonstrably “green” or chemical (hormone and antibiotic)-free fish is higher on the Asian market in recent years than in the global market. Yet as recently as 2009, no certified organic shrimp or other indigenous fish were available on

the Asian market. Salmon and cod – imported – were the only organic fish options available.

At the outset of the project, the potential markets were thought to be Japan and Europe. It soon became evident however that national and regional markets in Asia were more interesting and also willing to pay higher prices.

Now many indigenous species are available and selling well – high quality black tiger shrimp (*Penaeus monodon*), freshwater prawn (*Macrobrachium rosenbergii*), tilapia, pangasius catfish and more. In China, which of course has a huge domestic aquaculture production and consumption, organic fish products are no longer a mere niche market. And the appetite grows in Thailand, Malaysia, Singapore and beyond.

Japan has long been a leading importer and consumer of fish products. And though Japanese consumers mostly prefer indigenous fish, imported organic shrimp are acceptable and in demand. In the United States of America, 70 percent of consumers are reported to regularly buy organic products. And in Europe, many consumers are increasingly seeking organic options.

Although the current size of the market for organic products is limited, the potential is significant. It will also grow as wild stocks stabilize and fish prices rise. In the Asia-Pacific in particular, where aquaculture is already an entrenched mode of food production, the shift to organic methods and products is possible and promising – indeed, as this project has initiated and demonstrated, is already taking off.

Technology transfer at fish farms involves practical, hands-on restructuring of the facilities and actual practices that go into raising, harvesting and processing shrimp and fish. To obtain **Organic Certification**, the farms had to create new flushing or filter systems for their pools, to achieve certain levels of water purity, and to maintain and verifiably

measure those levels. Feed – both dried fish and grain-based – must meet specific standards laid out by the different certifying entities. In fact, feed was one of the main constraints in the project as feed producers are reluctant to run low batches of organic feed at the time.

Trial marketing for organic products has proven effective, as has the promotion of organic shrimp. Beneficiary companies in the project participated in trade fairs in tandem with product and market promotion. Results were concrete: contracts and sales, which were further enhanced by continuous monitoring of exports, and of organic aquaculture products activities in the region.

As part of the project, organic products were successfully marketed in domestic markets (supermarkets, restaurants, retail chains, high-end hotels), as well as regional (Malaysia, Singapore, etc.) and international markets (EU, Japan).

Investment promotion is a vital aspect of the project as all of the beneficiary companies required upgrades to their facilities and operations. Cost-benefit analyses and feasibility studies demonstrated that the investments would be worthwhile; and experience since has already confirmed these projections. Appropriate future expansion and economies of scale – supported by further feasibility studies, based on real results, not just on projected hopes – will bear them out further, as the regional and international markets grow, and the farms and their production capacities expand with the markets.

Information dissemination was a key component of the project. Comprehensive compilation of documents and data afforded cost-benefit analyses and valuable techno-economic feasibility studies and manuals. Lessons learned have been gathered in two important publications, the Organic Aquaculture Handbook and the Organic Aquaculture Feasibility Study. These publications provide hard data and practical roadmaps for farmers who want to expand into this niche. This information has been supported at regional and national workshops/industry and investment seminars (2009-2011) by presentations tailored for each country, and by ensuing discussions and other interactions among stakeholders, marketers, government officials, financiers, experts and consumers in Bangladesh, Cambodia, India, Malaysia, Myanmar, Pakistan, the Philippines, Sri Lanka and Thailand.

As a result of this information dissemination campaign, organic aquaculture farming is gaining popularity in the region. Other member countries of INFOFISH are currently seeking guidance and technical know-how for establishment of organic



Tilapia harvesting in one of the project farms

farming in their countries, including the development of national organic standards.

The potential for organic aquaculture in the Asia-Pacific region and the world is promising. Though nearly half the world's food fish now comes from aquaculture, only between 0.1 percent and 0.2 percent of aquaculture is currently certified as being organic. But stagnant natural fish stocks, combined with rising demand for organic fish products, is changing the perception of consumers. In addition, quality and safety concerns for food products as well as for the environment, and the need for sustainable production cycles – all point to the need for the further development of organic aquaculture. This project, based on sustainable practices and stakeholder involvement, has made a promising start.

The article was written with the kind assistance of George Minot.

Project website: www.organicfishery.org

¹The Common Fund for Commodities is an intergovernmental financial institution established within the framework of the United Nations. The Fund operates under the approach of commodity focus instead of the traditional country focus. Member countries benefit from projects financed by the Fund, whose basic rationale is to enhance socio-economic development of commodity producers. The Fund finances projects for small-scale producers, as well as small- and medium-sized enterprises involved in production, processing and trade in developing and least developed countries.

FAO Regional Technical Cooperation Programme

“Reducing the dependence on the utilization of trash fish/low-value fish as feed for aquaculture of marine finfish in the Asian region”

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The Project and its objectives

A regional Technical Cooperation Programme (TCP) “Reducing the dependence on the utilization of trash fish/low-value fish as feed for aquaculture of marine finfish in the Asian region [TCP/RAS/3203 (D)]” was approved in July 2008. The governments of China, Indonesia, Thailand and Viet Nam participated in this TCP, aimed at reducing the perception of small-scale marine fish farmers that trash fish (TF)/low value fish (LVF) performs better than compound pelleted feeds. The TCP was expected to facilitate a transition away from dependence on TF/LVF to more sustainable alternatives. The primary project outcome was development of better farming practices through the use of formulated feed in marine finfish aquaculture in the Asian region that will increase the long-term viability of such operations, improve the livelihood of farmers and contribute to poverty alleviation.

Implementation/coordination

Coordinated by the Network of Aquaculture Centres in Asia and the Pacific (NACA), the project had the following national focal agencies responsible for implementation of national activities: a) China: Guangdong Provincial Aquatic Animal Epidemic Disease Prevention and Control Center, Guangzhou City; b) Indonesia: Main Center for Mariculture Development, Lampung; c) Thailand: Phuket Coastal Fisheries Research and Development Centre (CFRDC), Phuket; and d) Viet Nam: Research Institute for Aquaculture No 3, Nha Trang.

Project activities

The project comprised several studies/activities such as: a) farmers’ perceptions on the use of trash fish (TF)/low-value fish (LVF) vs. pelleted feed, b) on-farm trials participated by farmers to compare the efficacy of TF/LVF and pelleted feed for marine cage farming, c) livelihood analysis of fishers and suppliers of TF/LVF, and d) environmental impact assessment. The above were supported by a number

of workshops/trainings both at country and regional levels as listed and described below.

Inception and planning workshop: The first activity of the project., participated by representatives of the above four countries (with representation of farmers and the private sector) finalized and agreed on the project methodology, outputs, and overall work plan, time-frame of implementation and responsibilities of all project stakeholders.

1st national stakeholders’ workshop: Four in-country planning and awareness raising stakeholders’ workshops (one in each country) participated by representatives of cage fish farmers, fishers, TF/LVF suppliers, and feed manufacturers, prepared the implementation plan of the core project activities.

Livelihood analysis of fishers/trash fish suppliers/dealers: Assessment of the livelihood assets and opportunities of fishers and suppliers/dealers of TF/LVF and their perceptions, was carried out using a structured questionnaire administered through personal interviews in the four countries.

Farmers’ participatory trials comparing efficacy of TF/LVF and pelleted feed for marine cage farming: The species used for this comparative study were: China: red snapper (*Lutjanus erythropterus*) and orange-spotted grouper (*Epinephelus coioides*); Indonesia: tiger grouper (*Epinephelus fuscoguttatus*); Thailand: barramundi (*Lates calcarifer*) and tiger grouper (*Epinephelus fuscoguttatus*); and Viet Nam: snubnose pompano (*Trachinotus blochii*) and red snapper (*Lutjanus erythropterus*). Technical performance indicators were growth rate and feed conversion ratio, economic performance by feed cost for production or cost of feed per kilogram of fish produced. Comparison was made by feed used by species within country.



Cage culture in inshore water, Zhanjiang, China

Farmers' perception survey: Analysis of farmers' perceptions toward TF/LVF and pelleted feeds was done through a rapid rural appraisal (RRA) in selected villages and farming clusters. A second RRA was carried out after the farmers' participatory trials to find out changes in perceptions.

Environmental impact assessments (EIA): to compare the effect of TF/LVF and pelleted feeds on the culture site in particular the water column and the sediment, an EIA was undertaken. Indicators used to assess the impacts include concentrations of phosphorous, nitrogen (ammonia, ammonium, nitrates and nitrites), dissolved oxygen, pH, bacterial and nutrient loading in the water, and flora and fauna in the sediment. Two performance indicators were subsequently included in the EIA; these were FIFO (fish in fish out) and the cost of energy used to produce one kg of fish.

2nd national stakeholders' workshop: Second set of in-country stakeholders' workshops were organized in each country with participation of farmers and other stakeholders, to evaluate the results of the farmers' participatory trials and the environmental impact assessments and suggest improvements for increasing feed use efficacy and feed management efficiency and farmer practices that could be adopted. Ways to improve small scale cage culture farmer's access to commercial formulated feed with discounts and credit schemes were also discussed.

Project terminal workshop: After successful conclusion of most of the field activities, the project terminal workshop, in collaboration with the Fishery Division, Guangdong Provincial Ocean and Fishery Administration, Guangzhou, China, consolidated the results and conclusions of the various components of the project and formulated recommendations addressing the objectives of the project.

The workshop adopted the following major recommendations: a) there is need to develop species-specific diets for marine finfish species defining

the nutritional quality and type of ingredients and formulation, b) considering that there are still knowledge gap on quality and quantity of trash fish used for marine finfish culture, there is a need for further study on trash fish in terms of quantity used, quality of trash fish and its impact on the environment, c) BMPs need to be developed for marine cage finfish as a matter of urgency, and linked to appropriate cluster formation in order to obtain the maximum benefits from the activity, d) BMPs should emphasize the resource, economic and environmental impacts of different feed management practices in small-scale marine cage culture in selected countries as part of suitable strategies and best protocols for feed management, e) technical manuals/guidelines for better feed management practice should be developed and disseminated as part of overall BMPs for the entire culture cycle of important marine finfish species, and f) findings of the project should be disseminated as widely as possible.

The general conclusions from farmer trials were: a) technical feasibility of using pellet feed replacing direct use of low-value/trash-fish fish in marine finfish cage culture; thus, pelleted feed offers viable alternative for marine finfish cage culture in the long run; b) farmers' perception that pelleted feeds may lead to poor growth and fish flesh quality have changed; and c) some of the traditional perceptions, particularly in relation to weaning of wild caught seed to pelleted feed, were not true.

The final report of the project will be published as an FAO technical publication entitled "Transition of feeds and feeding practices from low-value fish to compound pellets in marine cage fish farming: experiences from four Asian countries". More information on the project and the forthcoming publication can be obtained from Mohammad R. Hasan (Mohammad.Hasan@fao.org) at FAO/HQ or Miao Weimin (Weimin.Miao@fao.org) at FAORAP.

FAO Margarita Lizárraga Medal awarded for the first time to an aquaculture institution

The Network of Aquaculture Centres in Asia and the Pacific (NACA) was selected as recipient of the FAO Margarita Lizarraga Medal Award in recognition of its significant contribution to sustainable aquaculture development in the Asia and Pacific Region. NACA serves as a cohesive intergovernmental forum for the formulation of regional policies as well as cooperation and coordination in aquaculture research, development and training. In particular NACA has noteworthy achievements in the areas of environment and aquatic animal health, support to small-scale fish farming, promotion of better management practices (BMPs) and aquaculture certification. The NACA model as an intergovernmental organization and a regional aquaculture network has been and is being emulated in other region as a catalytic effect of the achievement. The contribution of NACA to application of the Code is therefore outstanding, practical, tangible and sustainable as well as catalytic for other regions to follow.

G. Napolitano, FAO



Presentation of the Margarita Lizárraga Medal by the FAO Director-General Jacques Diouf to the Director-General of the Network of Aquaculture Centres in Asia and the Pacific, Prof. Sena De Silva, during the FAO Conference, 37th Session, 27 June 2011, FAO headquarters (Plenary Hall), Rome, Italy

The Margarita Lizárraga Medal, based on Resolution 18/97 approved during the 29th Session of the FAO Conference in November 1997, is awarded biennially by the FAO Conference to a person or organization that has served with distinction in the application of the FAO Code of Conduct for Responsible Fisheries (the Code). The Medal pays tribute to the late Dr Margarita Saucedo Lizárraga, Senior Fishery Liaison Officer for her decisive role in promoting the Code, for her productive work in the field of fisheries for almost forty years, for her great dedication to FAO and for her strong commitment towards fostering the promotion of the fisheries sector, especially in developing countries. Three nominations were received for the 2010-2011 biennium and the Selection Committee unanimously selected NACA based on the following criteria: outstanding, practical and a hands-on contribution to the application of the Code; tangible output; sustained effort and not a one off initiative and; potential for a snow-ball/catalytic effect.

Edouard Saouma¹ Award 2010-2011 State Veterinary Office of Bosnia and Herzegovina – for efficient implementation of TCP/BiH/3101

The Edouard Saouma Award 2010-2011 has been granted to the State Veterinary Office (SVO) of Bosnia and Herzegovina for the project TCP/BIH/3101 - “Strengthening capacity on aquaculture health management”. The project was launched to improve national capacities to support sustainable and healthy aquaculture production, for domestic consumption and trade. Working beyond its mandate, the SVO assisted the country in acquiring a license to export fish and fish products to the EU market. Four fish processing facilities were listed as EU

import approved establishments in 2008. Aquaculture production increased by 12 percent during the project and export of fish products to the EU commenced. Compliance efforts of veterinary administration, inspectors, laboratories and producers to international animal health, food safety and quality requirements and practices were enhanced. The SVO actively involved and coordinated various stakeholders of the country’s multistructured administration, mediated differing views and built consensus towards a harmonized approach. The risk-based approach developed by the project is now applied by SVO when drafting monitoring plans for aquaculture, aquatic animal health and food safety as well as for decision making concerning domestic and international movements of live aquatic animals and their products.



G. Napolitano, FAO

The Edouard Saouma Award pays tribute to Edouard Saouma, FAO Director-General from 1976 to 1993. The Award is presented biennially to a national or regional institution, which has implemented with particular efficiency a project funded by the Technical Cooperation Programme.

Upper photo: Presentation of the Edouard Saouma Award 2010-2011 by FAO Director-General Jacques Diouf to Sanin Tankovic, Secretary-General of the State Veterinary Office of Bosnia and Herzegovina. Right photo (l-r): J Jia, Chief (FIRA), A Mathiesen, Assistant Director-General, Department of Fisheries and Aquaculture, S Tankovic and K Cochrane, Director (FIR), 27 June 2011, FAO Headquarters, Rome, Italy



K Yamamoto, FAO

The Aquaculture Service (FIRA), of FAO’s Department of Fisheries and Aquaculture (FI), through its officers based at headquarters, was technically responsible for the project (TCP/BIH/3101), in collaboration with other technical officers from the Products, Trade and Marketing Service (FIPM) and the Policy, Economics and Institutions Service (FIPI) from FI as well as the Development Law Service (LEGN), and operational officers from the Subregional Office for Central and Eastern Europe.

Further information about the project may be obtained by writing to Melba.Reantaso@fao.org

¹There are two recipients for the Edouard Saouma Award 2010-2011. The other recipient of the award was the Forest Management Bureau (FMB), Philippines for the project (TCP/PHI/3101 - “Advancing the Application of Assisted Natural Regeneration for Effective Low-cost Forest Restoration”)

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FAO Expert Workshop

“Site selection and carrying capacity estimates for inland and coastal aquaculture”

Doris Soto and José Aguilar-Manjarrez

Aquaculture Service

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An FAO expert workshop on “Site selection and carrying capacity estimates for inland and coastal aquaculture” took place in Stirling, Scotland, from 6–8 December 2010, through a collaboration agreement between the FAO Department of Fisheries and Aquaculture and the Institute of Aquaculture of the University of Stirling.

The workshop was attended by 20 internationally renowned experts (see photo) from 12 countries (Brazil, Canada, Chile, China, Egypt, Ghana, Greece, Mexico, Norway, Portugal, South Africa, the United Kingdom of Great Britain and Northern Ireland and the United States of America) representing the private sector, industry professionals, academia and research organizations.

The main objectives of the workshop were to discuss and review the:

- i. process to site selection and carrying capacity estimates for inland and coastal aquaculture;
- ii. thematic papers and geographical reviews prepared by the participating experts; and
- iii. potential content of guidelines for aquaculture site selection and carrying capacity with an ecosystems perspective, based on the thematic papers and geographical reviews and the workshop discussions.

Aquaculture is a food production sub-sector receiving considerable attention for its ability to assist in filling the growing fish supply gap. However, aquaculture cannot be practiced everywhere; it requires a unique set of natural, social and economic resources. These resources must be wisely used if its development is to be sustained. The value of aquaculture must also be recognized by other users of land and water resources.

Around the globe, the availability of areas suitable for aquaculture is becoming a major problem for the development and expansion of the sector especially in inland waters in Asia. The following considerations are essential: (1) sites with appropriate environmental characteristics and good water quality; (2) social aspects, including conflict with



Workshop participants

J. Aguilar-Manjarrez, FAO

other users of resources, need to be considered in the management of existing aquaculture facilities and when setting up new facilities. Appropriate sites and staying within carrying capacity are among the most important elements to be considered for the success of aquaculture; these need to be carried out with full stakeholder participation and in accordance with the principles of sustainability, resilience and best practice guidelines.

The general guidelines for an Ecosystem Approach to Aquaculture (EAA)¹ and the FAO Code of Conduct for Responsible Fisheries (CCRF) are important reference documents. Basic concepts for site selection are provided by the EAA guidelines (FAO, 2010)² and a recently completed proceeding on “The potential of spatial planning tools to support the Ecosystem Approach to Aquaculture” (Aguilar-Manjarrez, Kapetsky and Soto, 2010)³. However, specific guidance to the process of aquaculture site selection and estimating carrying capacity are needed. These should address fundamental practical elements such as a common agreement on the concepts of carrying capacity, the inclusion of social aspects and the kind of prediction models that are suitable for different farming systems and socio-economic conditions.

Workshop participants⁴ contributed directly through short presentations that summarized their thematic paper or geographical review and to the structured

discussions. Many attendees agreed that one of the sector's biggest problem is the lack of space available to continue its growth at the current rate. For example, worldwide fish farming is in increasing conflict with other sectors, such as agriculture, tourism, energy production as well as conservation areas (e.g. Ramsar sites and Marine Protected Areas) as described by Aguilar-Manjarrez, Kapetsky and Soto (2010). Another major issue was the need to agree on the concept of carrying capacity, and how to limit, control and regulate maximum production at any site to ensure ecological and socio-economic sustainability. Workshop participants also noted that aquaculture zoning or site selection is a mechanism for better planning and regulation of aquaculture development. The workshop recognized two extreme and different challenges represented by: i) countries (e.g. in Africa [see Figure 1], Latin America and the Caribbean) where aquaculture is new, thus planning to identify potential areas is required; and ii) countries (e.g. China, see Figure 2) where the physical relocation-resiting of farms may be less likely or impossible, thus other means are needed to improve sustainability.

Understanding the concept of carrying capacities and appropriate selection of sites for inland and coastal aquaculture development, including supporting tools, and indicators to adequately monitor environmental and socio-economic impacts are fundamental to the implementation of EAA. The workshop proposed preliminary definitions concerning different types of carrying capacities, e.g. physical, production, ecological, and social. Such definitions and proposed methodologies to estimate them will advance planning and improve aquaculture production within an ecosystem perspective.

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Figure 2. Freshwater ponds covered with white plastic sheets for culture of *Litopenaeus vannamei* shrimp during winter in southern China

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J. Aguilar-Manjarrez, FAO

Figure 1. Freshwater ponds for culture of tilapia (*Oreochromis niloticus*) and catfish (*Clarias gariepinus*) in Uganda

The immediate outputs of the workshop are: (i) an *FAO Fisheries and Aquaculture Proceedings*; and (ii) a draft *FAO CCRF Technical Guidelines on "Carrying capacity estimates for siting of inland and coastal aquaculture"*. The Workshop Proceedings is expected to be released in 2011 and the draft guidelines will be distributed for further discussion at the end of 2011.

This technical workshop constitutes the first of a series of workshops and activities addressing different issues to help implement the EAA. The main outputs of this workshop will undoubtedly serve as a guide to support EAA implementation in many countries.

Further information can be obtained by email to the authors.

¹An ecosystem approach to aquaculture (EAA) is a strategy for the integration of the activity within the wider ecosystem such that it promotes sustainable development, equity, and resilience of interlinked social-ecological systems.

²FAO. 2010. Aquaculture development. 4. Ecosystem approach to aquaculture. FAO Technical Guidelines for Responsible Fisheries. No. 5, Suppl. 4. Rome, FAO. 2010. 53p. (www.fao.org/docrep/013/i1750e/i1750e.pdf).

³Aguilar-Manjarrez, J., Kapetsky, J.M. & Soto, D. 2010. The potential of spatial planning tools to support the ecosystem approach to aquaculture. FAO/Rome. Expert Workshop. 19–21 November 2008, Rome, Italy. FAO Fisheries and Aquaculture Proceedings. No.17. Rome, FAO. 176p. (www.fao.org/docrep/012/i1359e/i1359e00.htm).

⁴**Organizers:** Sustainable Aquaculture Group, Institute of Aquaculture: Lindsay G Ross; Trevor C Telfer; and Richard A Corner. FAO Fisheries and Aquaculture Department: Doris Soto and José Aguilar-Manjarrez. **Invited Experts:** Joao Ferreira (Portugal); Barry Costa-Pierce (USA); David C Little (UK); Jorge Bermudez (Chile); Jim Kapetsky (USA); Arnoldo Valle-Levinson (USA); Anne-Katrine Lundebye Haldorsen (Norway); Ioannis Karakassis (Greece); Changbo Zhu (China); Patrick White (France/Norway); Steve Cross (Canada); Philip Scott (Brazil); Alejandro Clément (Chile); Sherif Sadek (Egypt); Ruby Asmah (Ghana); and Martin De Witt (South Africa).

Supporting Aquaculture Development in the Caribbean

Will a Regional and Shared Aquaculture Facility Work?

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Background

Aquaculture production in the Caribbean Region accounts for less than 1 percent of the world aquaculture, and for 25 percent (or 42 500 tonnes) of the region's total seafood production. Total seafood production is on a downward trend (170 000 tonnes in 2008; FAO FishStat, 2009), as production from capture fisheries has declined dramatically in the past decade, ranging from 270 000 tonnes in 1990 to 130 000 tonnes in 2008 (FAO FishStat, 2009). Associated with slow aquaculture growth and declining capture fisheries, seafood demand exceeds supply in the Caribbean Region; it can be anticipated that this trend will increase due in great part to high seafood consumption from an increasing tourism sector, and to the observed decrease in natural population numbers for several native finfish and shellfish species. There is, thus, an increased reliance on imported fish products, currently amounting to approximately half of the fish supply to the region.

Issues

Continuing on such a trend is not sustainable, and would compound the existing overexploitation of some natural stocks, possibly leading to near extinction. In addition, commercial aquaculture efforts are directed mainly towards non-native species; in fact, introduced carp and tilapia aquaculture accounts for more than 25 800 tonnes (or more than half of aquaculture production in the Caribbean), according to the most recent FAO statistics (FAO FishStat, 2009). It is well recognized that introducing exotic species increases the probability of negative environmental impacts. This coupled with overfishing would lead to both cultural and economic losses – as the islands' aquatic biodiversity would become adversely affected.

Developing the aquaculture sector to supply the existing seafood demand has long-term benefits to the region if conducted in a sustainable manner – that is, culturing native species. Molluscs and bivalves, in particular, require less intensive grow-out method than that of finfish or crustaceans, thus less potential impacts on the environment. A set-back is that, aside from Queen (pink) conch, West Indian top shell, and the ark shell, many molluscan species are not a traditional component in the diet of the Caribbean people – especially for the island countries, more so in the bordering countries.

However, current seafood production is in a great part destined for the tourism sector, and many of these species are well-appreciated seafood product by tourists, potentially commanding a high price and substantial market.

A number of experts in the region recognize the opportunities for sustainable development of this sector in the Caribbean. Technology and scientific information are available for the culture of several native molluscan species. Past efforts at the national level have tapered at the implementation phase of a number of native species-oriented projects. The lack of national/action plans for aquaculture in several of these islands and the limited resources in terms of technical expertise, infrastructure, capital investment, and human resources, within any one country of the region, act as stumbling blocks to the development of the aquaculture sector. In addition, one of the greatest hindrance in the culture of native species is limited seed supply, explaining in part the preference for culture of exotic species as seed or juveniles are more readily available. For these reasons, the concept of pooling resources into a regional aquaculture facility was recently put forth to the governments of the Caribbean Region.

Caribbean Governments: Perspective on a Regional Aquaculture Facility

As an initial assessment of the potential interest and commitment of the governments of the region towards sustainable aquaculture development, FAO sent a questionnaire to 33 countries of the Caribbean Region in August 2009, requesting information on types of aquaculture operations, limiting factors, culture candidates of interest, etc. Political will for the development of aquaculture within the region was evident, as 21/33 countries responded to the questionnaire, with 67 percent of the countries being in favour of a regional and shared hatchery facility. The current unreliable supply of seed for several native culture candidate species calls for hatchery production of juveniles, to ensure a constant aquaculture production – a fact recognized by governments of the region. The concept of a regional aquaculture facility, that will pool resources and provide a reliable supply of seed and source of technical support are welcomed

by many. Nonetheless, the logistics of establishing a regional hatchery, potentially receiving broodstock from various populations, and sending live juveniles to client countries, and the associated risks need to be carefully addressed. Accidental transport of pathogens is a possibility and must be prevented through the development of and strict adherence to protocols. Similarly, preservation of genetic biodiversity among natural populations needs to be maintained through the assessment of genetic variation among populations and development of collection protocols. These warrant careful planning of the operating processes by the regional hatchery facility.

Regional Hatchery Workshop 18-21 October, 2010

Participants and Workshop Objectives

Senior fisheries and aquaculture officials representing 10 Caribbean governments (Aruba, Belize, Colombia, Haiti, Honduras, Jamaica, Panama, St. Kitts and Nevis, St. Vincent and the Grenadines, and Venezuela) and aquaculture experts with experience in the Caribbean, and representatives of international agencies (FAO, UNEP, CRFM and GCFI) met during a 4-day workshop in Kingston, Jamaica to address some of the concerns raised by the potential establishment of a regional facility.

Main Outcomes

A series of round table discussions led to four major recommendations addressing potential issues, defining goals of the proposed facility, and in brief providing a framework for the establishment of a regional facility.

Objectives of a Regional Molluscan Hatchery. It was agreed that the proposed facility would have multiple objectives, such as: commercial production of juveniles, training of the private sector on grow-out techniques, research into new species, and production for stock enhancement. From these discussions, it is evident that the interests of the Caribbean countries lie not only in limiting the reliance on imported seafood products, but also in using aquaculture for enhanced economic growth, by promoting the development of small-scale grow-out operations for the benefit of the communities, and contributing to the enhancement of local fisheries through the transfer of hatchery-reared juveniles.

Priority species. A major first step was made towards prioritizing target species as first culture candidates. Out of 37 native species of gastropods (conch, West Indian topshell), crustaceans (lobsters and crabs), bivalves (scallops, clams, oysters and mussels), echinoderms (sea urchins and sea cucumbers) and cephalopod (octopus), 22 are considered target species, and 6 were selected as top candidates.

Best practice protocols. Key points and criteria were identified for the establishment of best practice protocols. Criteria for the selection of suitable site were clearly defined. The framework of a 5-year business plan was laid out, based on a 3-months production cycle



FIDAES, Venezuela

Artisanal mussel culture in Chacopata, Araya Peninsula, Venezuela

(for juveniles), and on a multiple-objective facility. The sustainability of a regional hatchery facility depends on strategic location of the facility, production strategy, access to markets, balancing multiple objectives, adequate financing, and engagement of the partner countries.

What's next?

The response to the proposed concept was positive, demonstrating an increasing political will for sustainable aquaculture growth in the region. The step from political will to realization through the selection of a site, development of a full business plan, and seeking of funds is a huge one, which can only be crossed by Caribbean countries. FAO has drafted a ministerial brief which may assist in promoting the concept and maintaining the drive seen during the Jamaica 2010 workshop. It is up to the countries to rise to the opportunities presented, and seriously tackle aquaculture production in their Region.

The proceedings of the workshop, available from FAO (see New Publication section) provide a more detailed account of the workshop process and recommendation.

For more information contact Alessandro Lovatelli at: Alessandro.Lovatelli@fao.org



Group Picture of the Expert Workshop Participants (from left to right): Mr Pedro Bueno (Thailand), Mr Zsigmond Jeney (Hungary), Mr Vitaliy Bekh (Ukraine), Mr Niranjan Sarangi (India), Andras Woynarovich (Hungary), Mr M. Ali Canyurt (Turkey), Mr Raymon van Anrooy (FAOSEC), Ms Melba Reantaso (FIRA), Mr Yusuf Guner (Turkey), Mr Yuan Xinhua (China)

Better Management Practices of Carp in Central Asia and the Caucasus

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Land, water, brood fish, fish seed, feed and labour are very important inputs for aquaculture. Using these resources correctly and efficiently guarantees an optimum production. Pond polyculture of large cyprinids (silver carp, common carp, grass carp and Chinese major carps) is very common in Central Asia (CA). At present there are more than 50 000 ha of fish farms and small water reservoirs, but most of these huge resources are underutilized.

Effective use of available land and water resources is very important. Better management practices (BMPs) of different aquatic species were very successful all over the world and their application helped fish farmers to increase farm profits, improve the health of their stocks and increase growth rates. The abbreviation “BMPs” is used in several ways and in different contexts. The most obvious meaning of the term is the best-known way to undertake any activity at a given time. In this sense, it refers to the practice, or practices, of producers who are performing better than the average. Similar results are expected from BMPs of carp culture. If practiced in CA countries, they will help fish farmers to follow the necessary steps which would lead to predictable improvements and benefits.

The FishDev Central Asia programme (GCP/RER/031/TUR) started to develop BMPs for carp production in ponds in 2010. The motivations for the development of these BMPs were the following:

- A request for such a guidance document from the countries involved in the establishment of the Central Asian and Caucasus Regional Fisheries and Aquaculture Commission, and the frequent mention of the need for carp BMPs at various regional workshops.
- Carp is the main aquaculture species in CA and the Caucasus in terms of volume produced.
- The collapse of the sector in the 1990s, together with a slow recovery, calls for implementation of sustainable practices that have proven success elsewhere.

- The Aquaculture Service (FIRA) of FAO is currently collecting all aquaculture BMPs, Good aquaculture practices (GAPs), Codes of Practice, etc. and it was recognized that there are no carp BMPs available yet.

The FishDev Central Asia programme organized an Expert Workshop on Better Management Practices for Carp Production, held at the International Agricultural Research and Training Centre in Menemen- Izmir, Turkey on 17 -18 January 2011. It was attended by 11 highly competent carp culture, reproduction and health experts from main carp producing countries, such as China, India, and Hungary, supported by experts from Ukraine, Thailand, Turkey and FAO (SEC and FIRA) (see group photo).

The workshop reviewed the draft chapters of the carp BMP document that were prepared by the experts before the workshop,

narrowed down the scope of the BMP document and determined the deadlines and process for finalizing the document.

At present, the BMP document is being finalized by the experts and will have the following title “Better Management Practices for Carp Production in Central and Eastern Europe, Caucasus and Central Asia”. The draft BMP document will be presented for final review and endorsement to the Fourth Inter-Governmental Meeting on the Establishment of the Central Asian and Caucasus Regional Fisheries and Aquaculture Commission, which will be held in Issyk-Kul, Kyrgyzstan, 22-24 June 2011.

More information can also be obtained from Mr Raymon van Anrooy (formerly Fishery and Aquaculture Officer at FAO SEC, now with FAOSLC) at Raymon.vanAnrooy@fao.org; Mr Özgür ALTAN (FAOSEC Aquaculture Expert) at Ozgur.Altan@fao.org.

TABLE 1. Aquaculture Production in the Central Asia and the Caucasus (tonnes)

Country	Average of periods					
	1988-1989	1989-1990	1990-1991	1991-1992	1992-2000	2000-2008
	Tons					
Armenia	4 280	4 423	3 444	2 229	861	716
Azerbaijan	1 633	1 419	1 681	1 905	603	52
Georgia	780	564	1 625	1 821	250	52
Kazakhstan	7 878	9 134	11 304	8 255	1 693	614
Kyrgyzstan	1 062	1 038	928	749	195	55
Tajikistan	3 246	3 435	3 646	2 782	667	69
Turkmenistan	2 422	2 437	2 329	2 099	1 058	28
Uzbekistan	20 723	21 468	23 122	21 524	10 407	3 791
Total	42 024	43 918	48 079	41 364	15 734	5 377

Source: FAO, Department of Fishery and Aquaculture, online query of global aquaculture production, 2011



Group photo of Ministers and Heads of Delegations at the Ninth Meeting of FAO South West Pacific Ministers for Agriculture, Puataukanave Hotel, Vava'u, Tonga, 5-7 April 2011 (courtesy of FAO/SAP)

“Sustainable Agriculture and Food Security in the Pacific Islands: Emphasizing the linkages between the economic, social and environmental dimensions”

Ninth Meeting of the FAO South West Pacific Ministers for Agriculture

Masanami Izumi

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The Ninth Meeting of the FAO South West Pacific Ministers for Agriculture¹, with the above theme, was convened in Vava'u, Kingdom of Tonga, 5-7 April 2011. The opening ceremony took place at the Puataukanave Hotel Hall on 5 April; the meeting proper was held at the Puataukanave Hotel Conference Room from 6-7 April. The meeting was attended by agriculture ministers from Cook Islands, Nauru, Papua New Guinea, Niue, Samoa, Solomon Islands, Tonga and Vanuatu, and Heads of Delegation from Australia, Fiji, Kiribati, Federated States of Micronesia and New Zealand. Representatives from Hango College, Pacific Cooperation Foundation, Pacific Islands Trade and Invest, Secretariat of the Pacific Community and the Secretariat of the Pacific Regional Environment Programme attended as observers.

The Meeting was opened by the Acting Prime Minister of Tonga, Honourable Samiu Vaipulu and Director-General of FAO, Dr Jacques Diouf, delivered the keynote address. Lord Vaea, Minister for Agriculture and Food, Forests and Fisheries for Tonga, was elected as Chair of the Meeting.

Among the discussion topics included smallholder-based agricultural transformation, commercialization of agriculture, plant protection and biosecurity, sustainable diets, climate change adaptation, bioenergy, organic agriculture, sustainable forest management and high food prices. **AQUACULTURE** was highlighted in the meeting. A discussion paper titled “Pacific Aquaculture and its Prospects” was introduced before the Ministers and Heads of Delegations through a power-point presentation. The paper summarized the results of a study carried out in selected countries in 2010 under the TCP Project (TCP/RAS/3301: Regional overview of aquaculture development in the Pacific – lessons learned)² and the outcomes of the informal Pacific meeting³ held in the early evening of 23 September during the

Global Conference on Aquaculture (or GCA-2010) in Phuket, Thailand, 22-25 September 2010.

The Ninth Ministers Meeting was concluded with the following four recommendations in aquaculture. The Meeting

- noted the considerable potential for aquaculture to fill the gap in the increasing demand for domestic food production and some export trade in fishery products;
- agreed to strengthen capacity in aquaculture development and to implement policy and regulatory frameworks to support private sector investments in aquaculture;
- agreed to establish regional and sub-regional network systems to allow stakeholders to share their experiences and for FAO to acquire suitable fish species, including fresh water fish, for further developing aquaculture in the Pacific region;

- recognized the need for successful cases of aquaculture be analyzed and documented for the benefit of members.

The above recommendations will be implemented in the region as priority in 2011-2012. Further information are available from M. Izumi

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¹The Meeting of FAO South West Pacific Ministers for Agriculture is organized bi-ennially and is hosted by a member country in the Pacific region. The next (tenth) Meeting will be hosted by the Government of Samoa in 2013.

²Refer to FAN-45 (TCP/RAS/3301: Regional Overview of Aquaculture Development in the Pacific – Lessons learned, pages 16-17).

³Refer to FAN-46 (Building on Progress: an Evening on Pacific Aquaculture, pages 4-5).

FAO/SPC Regional Scoping Workshop: Development of a Pacific Aquaculture Regional Cooperative Programme

Nadi, Fiji, 11-14 October 2011

Purpose: The objective of this regional scoping workshop is to engage the governments of PICTs and development partners active in the Region in a dialogue to assess the needs and map out a coordinating strategy and actions for all major regional and international agencies and other relevant stakeholders working on aquaculture development in the Region. The specific objectives are to:

- understand past and recently completed activities, existing national and regional strategies/development plans and the current status of aquaculture in the Region, including an analysis of progress;
- identify emerging issues, opportunities and required support for its development;
- exchange lessons and good practices based on the work of development partners, inspire fresh thinking and innovative initiatives; and
- build and support a potential regional aquaculture development framework and programme or road map for aquaculture development for PICTs.

Process: This facilitated workshop will be organized along several thematic sessions, including keynote speeches; presentations on regional and global aquaculture status reports and SPC regional aquaculture strategy; invited lectures on hot topics and emerging issues important to the region; and statement of mandates and past/current activities from development partners. The workshop

will involve working group discussions to identify and prioritise current and emerging issues, undertake a matching exercise on PICT's aquaculture aspirations with potential development partners' support according to their mandates; and plenary report-back to present and adopt working group outcomes and recommended actions.

Participation: Key aquaculture PICT government representatives (one representative/country, i.e. 1 senior official or 1 aquaculture specialist), representatives from development partners, regional/international organizations and donors and other interested entities (academia and NGOs) who can potentially contribute to achieving the goals of the workshop have been invited.

Products: The expected outcome of the regional workshop is a report of the meeting and a regional strategy document (containing themes, priorities, partnerships; responsibilities; an agreed basis for detailed plans, projects and partnerships) that will serve as a package for seeking support from donors and development partners towards responsible and sustainable aquaculture for food security in the PICTs.

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Outcomes of the Seventh SPC Heads of Fisheries Meeting

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The Seventh Heads of Fisheries Meeting (HOF) of the Secretariat of the Pacific Community (SPC) was held at the SPC Headquarters in Noumea, New Caledonia, 1-4 March 2011, with the participation of 61 representatives from the fisheries authorities of SPC member countries and territories, regional/international organizations, academic/educational institutions, NGOs and private firms, and the SPC Aquaculture and Marine Ecosystems Division (FAME) staff (see group photo). The meeting was chaired by the representative of Papua New Guinea.



Participants to the Meeting

FAO (through the Sub-Regional Office for the Pacific Islands -FAO-SAP) presented two information papers on FAO/SPC collaborative work: (1) Regional Scoping Workshop¹ and (2) a Regional TCP Project². Both represent follow-up actions resulting from discussions and recommendations during the Informal Pacific Meeting (FAO, 2010)³ organized during the Global Conference on Aquaculture 2010 and the Fifth Session of the COFI Sub-Committee on Aquaculture (Phuket, Thailand, 22 September - 1 October 2010), the Tahiti Aquaculture Conference (Tahiti, French Polynesia, 6 - 11 December 2010), and the 29th session of FAO Committee on Fisheries (Rome, Italy, 31 January - 4 February 2011).

The objectives of the proposed Regional Scoping Workshop are to assess the needs and map out a coordinating strategy and actions for regional/international organizations and other stakeholders, and to engage the governments and development partners active in the region in the process. The proposed TCP project *“Improving food security and rural income through aquaculture development in selected PICTs”*, and its activities are planned to include human and institutional capacity development on; i) broodstock development, hatchery seed production of selected species, ii) aquaculture information and statistics, and iii) national biosecurity frameworks.

Aquatic biosecurity and introduced species were also tabled by the SPC as a discussion paper during the HOF meeting. The following were highlighted in the summary report of the meeting. The HOF meeting:

1. reaffirmed that the decision on whether or not to **introduce exotic species** or new strains of previously introduced species for aquaculture is a

national responsibility, and noted the importance of considering carefully the potential benefits and risks of any such introduction, including an appropriate **risk assessment**;

2. agreed that, for the time being and until more scientific knowledge is available, further **introduction and spread of tilapia** to countries and catchments where it is not yet established should be discouraged, and that a priority be placed firstly upon research to determine whether Nile tilapia introduced for aquaculture to areas where Mozambique tilapia is long-established will cause any significant new effects on **biodiversity**;
3. agreed that there be review of the potential for the use of **indigenous, rather than introduced, species for aquaculture**, but affirmed that a complete prohibition on any new introductions is not consistent with international practices of food production;
4. strongly supported the proposal to develop a **regional framework for management of aquatic animal health and biosecurity** in support of sustainable aquaculture development; and
5. noted that **fish feed** is a key constraint to aquaculture development in PICTs and supported further work in this area.

During the meeting, the proposed regional aquatic biosecurity framework as well as the two proposed FAO/SPC collaborative activities received strong support from the HOF in the Pacific region.

¹Information Paper no.5: Regional Scoping Workshop - Development of a Pacific Aquaculture Cooperative Programme.

²Information Paper no.6: Regional Technical Cooperative Programme (TCP) Project for Selected Pacific Island countries and Territories (PICTs).

³Building on Progress: An Evening on Pacific Aquaculture, FAO Aquaculture Newsletter No. 46, December 2010, pp.4-7.

Wetland Disease Manual: Guidelines for Assessment, Monitoring and Management of Animal Disease in Wetlands

The Aquaculture Service (FIRA) is contributing to the development of the above manual, whose production is being led by the Wildfowl & Wetlands Trust (WWT) in collaboration with relevant agencies. The development of the manual was a response to a request, in 2008, to Ramsar's¹ Scientific and Technical Review Panel, to consider how best to develop practical guidance on the prevention and control of diseases of either domestic or wild animals in wetlands, especially those diseases that have implications for human health, and how such guidance can be best incorporated into management plans at Ramsar sites and other wetlands. The manual is aimed to provide guidance and 'tools' for wetland managers and policy makers in a range of context.

The manual is divided into five chapters: (1) Introduction, (2) Principles of Disease Management in Wetlands, (3) General Management Practices, (4) Animal Diseases Currently Causing Concern in Wetlands, and (5) Where to Go for Further Advice). FIRA is contributing to Chapter 4 through 4-5 aquatic disease factsheets. The factsheets consist of a selection of diseases currently impacting wetlands providing a brief description of the disease and the methods used for prevention and control. The factsheets are divided into eight sections:

It is intended that the final manual will be made available at Ramsar's 11th Conference of Parties (19-26th June 2012, Romania).

Further information can be obtained by email to Melba.Reantaso@fao.org

¹The Convention on Wetlands (Ramsar, Iran, 1971) -- called the "Ramsar Convention" -- is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories. Unlike the other global environmental conventions, Ramsar is not affiliated with the United Nations system of Multilateral Environmental Agreements, but it works very closely with the other MEAs and is a full partner among the "biodiversity-related cluster" of treaties and agreements.

http://www.ramsar.org/cda/en/ramsar-about-about-ramsar/main/ramsar/1-36%5E7687_4000_0

Sections of WWT Aquatic disease factsheets

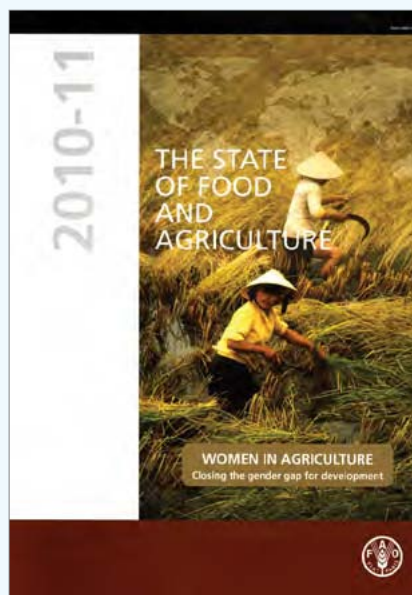
<i>Header</i>	At-a-glance summary of taxa affected, relevant wetland type and levels of impact.
<i>Synonyms</i>	Alternative names by which the disease may be known.
<i>Key facts</i>	Brief description of the disease, the causal agent, the species affected, the geographic distribution and the environment in which the disease usually occurs.
<i>Transmission and spread</i>	How the disease is transmitted and spread, including (when relevant) vectors, transmission between individuals, spread between geographic areas and how/if the disease is transmitted to humans.
<i>Identification and response</i>	Identifying and responding to a disease problem, including field signs, recommended action if the disease is suspected and information about how a diagnosis may be made.
<i>Prevention and control in wetlands</i>	Prevention and control measures in the environment, livestock, wildlife and humans.
<i>Importance</i>	Global importance in terms of effects on wildlife, livestock and humans, and economic importance.
<i>Further information</i>	Useful publications, websites and contacts.

FI and ESW Collaboration on Gender

FAO's Fisheries and Aquaculture Department (FI) and the Economic and Social Department (ESW) are currently collaborating on gender mainstreaming of the technical work in aquaculture and fisheries through a number of activities.

The first was on the implementation of the 3rd Global Symposium on Gender in Aquaculture and Fisheries (GAF-3) held from 21-23 April 2011 at the Shanghai Ocean University during the 9th Asian Fisheries and Aquaculture Forum; GAF3 was supported by FAO/FI together with ESW. Forty one oral papers and 5 posters were presented during GAF3, in addition to a an overview on approaches to gender mainstreaming in the aquaculture and fisheries section, and a discussion session in preparation for the FAO Special Workshop (see below) that followed GAF3. Presentations covered the following geographic areas: global – 6 presentations; countries - *Asia*: Bangladesh, Cambodia, India, Indonesia, Japan, Korea, Malaysia, Nepal, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam; *Africa*: Namibia, Tanzania; regions; Southeast Asia, Pacific, Europe. The papers and reports from GAF3 are currently being reviewed, edited and will be published in a special edition of the journal *Asian Fisheries Science* in March 2012.

The second activity was jointly conducting the FAO-sponsored Future Directions for Gender in Aquaculture and Fisheries Action, Research and Development: A Special Workshop, held from 23-24 April 2011 also at the Shanghai Ocean University. This special FAO Gender Workshop, funded through the Multidisciplinary Fund (MDF) and administered by ESW, was convened to generate strategic ideas and actions toward a 'road map' for future directions on gender in aquaculture and fisheries. The workshop prepared a vision statement for engendering aquaculture and fisheries as a starting point on the path to understanding the implications of roles, experiences and contributions of women in aquaculture and fisheries. The workshop emphasized the need for advocacy to focus attention on the critical roles that women assume in the fish sector, that keys actions are required to mainstream gender in the aquaculture and fisheries agenda,



FAO. The State of Food and Agriculture. 2010-11. Women in Agriculture. Closing the Gender Gap for Development. 147p.

and that policy changes are needed to engender the aquaculture and fisheries agenda. There was a strong consensus on the need for gender training for Member country institutions, programme and project staff, education and extension services made available to women across the fisheries value chain (to enhance their productivity), as well as the need to further develop important conceptual issues, sex/gender disaggregated data, research and information.

Detailed discussions are also ongoing for possible collaboration on future gender projects under the Technical Cooperation Programme (TCP) and other mechanisms.

Detailed outcomes of both events will be featured in future issues of FAN. More information can be obtained by email to:

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FI and AG Collaboration on Animal Health

The Fisheries and Aquaculture Department (FI) and the Agriculture and Consumer Protection Department (AG) of FAO has been collaborating on animal health a few years back but more actively during the last one or two years.

The Aquaculture Service (FIRA) and FI ADG represent FI in the Crisis Management Centre-Animal Health (CMC-AH)¹. The CMC-AH is FAO's rapid response mechanism for transboundary animal disease emergencies. The Centre provides technical and operational assistance to help governments develop and implement immediate solutions to prevent or stop disease spread. The CMC-AH has a direct link to FAO's Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES)², the Centre daily tracks the animal disease situation worldwide through information received from the Global Early Warning System (GLEWS). Daily risk analysis and decision-making allow the Centre to stay abreast of developments to respond rapidly and effectively.

Since the beginning of 2011, FIRA has made 3 presentations (5 min.) on epizootic ulcerative syndrome (EUS), infectious myonecrosis virus (IMNV) and Viet Nam unknown shrimp disease. FI has also teamed up with CMC-AH on a mission (July 2011) which investigated



Joint FI/AG CMC-AH Mission to investigate an unknown shrimp mortalities in Viet Nam. Meeting with affected shrimp farmers on Soc Trang Province, Mekong Delta, July 2011

recently an unknown shrimp disease mortalities in Viet Nam. FIRA also contributed to Chapter 3: FAO in Action: Past, Present and Future – Increasing risk of transboundary plant, animal and fish diseases as part of the forthcoming corporate publication – FAO in the 21st Century. FIRA is also actively involved in the One Health programme of FAO, having participated in a recent (May 2011) Workshop on Corporate One Health in line with the concept note “The FAO/OIE/WHO Collaboration -Sharing responsibilities and coordinating global activities to address health risks at the animal-human-ecosystems interfaces”. This concept note, recently agreed by the Directors-General of FAO, OIE and WHO and submitted, to the International Ministerial Conference on Animal and Pandemic Influenza meeting in Hanoi, Viet Nam in April 2010, serves as the conceptual basis for the preparation of corporate strategies in support of this inter-agency collaboration, mapping out each Organization's responsibilities, in compliance with their respective mandates.

Detailed information on cooperative activities will be reported in future issues of FAN.

Further information can be obtained by email to Melba.Reantaso@fao.org

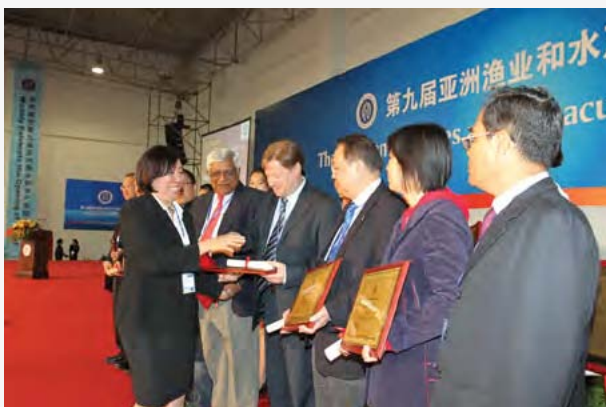
¹<http://www.fao.org/emergencies/home0/emergency-relief-and-rehabilitation/cmc/en/>

²<http://www.fao.org/foodchain/prevention-and-early-warning/en/>. EMPRES Animal Health is concerned with animal diseases including aquatic animal diseases.

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FAO Department of Fisheries and Aquaculture receives Gold Medal Award from the Asian Fisheries Society

In recognition of its role in the development of aquaculture and fisheries in the Asian-Pacific region and its active support to activities of the Asian Fisheries Society (AFS), the FAO Fisheries and Aquaculture Department received the Gold Medal Award from the society. The President of the AFS, Dr Ida Siason, presented FAO with the medal during the Opening Ceremony of the 9th Asian Fisheries and Aquaculture Forum of the AFS, which was hosted by the Shanghai Ocean University in Shanghai, China last April. Dr Matthias Halwart, FAO Senior Aquaculture Officer, accepted the award on behalf of the Department. “It is very rewarding to see the Fisheries and Aquaculture Department’s efforts for the Asia-Pacific Region and beyond recognized with this Gold Medal,” he said. “The triennial forum especially provides an excellent opportunity to liaise with leading aquaculture and fisheries scientists and key commercial stakeholders from all over the world to flag and discuss important issues pertaining to sustainable aquatic resource production and management.”



FAO’s important contributions to AFS include the organization of an FAO Special Session on Cage Aquaculture during the AFS Second International Symposium on Cage Aquaculture in Asia in Hangzhou, China, in July 2006; contribution to the Third Symposium on Gender in Aquaculture and Fisheries, an FAO Special Session on Aquatic Genetic Resources for Food and Agriculture and an FAO Special Workshop on Gender in Aquaculture and Fisheries research and development, all in conjunction with the 9th Asian Fisheries and Aquaculture Forum, held at the Shanghai Oceans University, in April 2011, which had the overall theme “Better Science, Better Fish, Better Life”. In

addition, officers of the Department often provided expertise as Organizing Committee members or Session Chairs for AFS symposia in subject areas like aquatic biodiversity and aquatic genetic resources, culture-based fisheries, and aquatic animal health.



Continued from page 7

C. Thailand: TCP/THA/3304 “Aquaculture information management system in Thailand”

After nearly three decades constant development, Thailand has become one of the leading aquaculture producers in the world, currently the 6th top producer, with a production volume of 1.4 M tonnes in 2009. Aquaculture development plays an important role in national food and nutritional security, and contributed to the global trade of seafood significantly. Export of aquatic products from Thailand ranked 4th in quantity and 3rd in value in 2007.

Such growth in the past decades mainly resulted from intensification and expansion of the sector. Sustainability issues related to impacts to the environment, animal health, and product quality and safety have attracted increasing concerns from the public. The Thai government has constantly endeavoured to improve sector management and practices at different levels to ensure long-term sustainability. With the decentralization of authority for planning to the provincial and district levels, a highly effective aquaculture information management system has become necessary in order to provide dual-direction flow of comprehensive information between the national and grass-root levels of management authorities and more effective guidance to local planners through informed management and decision-making. The Department of Fisheries (DoF) envisaged the urgency of establishing such information management system which eventually led to a request for FAO technical assistance. The TCP/THA/3304 “Aquaculture information management system in Thailand” was approved in December 2010 through the joint efforts of DoF and FAORAP and FIRA.

A formal signing ceremony for three TCP projects (including this TCP) was held at the Ministry of Agriculture and Cooperatives (MOAC) of the Royal Thai Government in February 2011. The Permanent Secretary of MOAC and FAO Assistant Director General/Regional Representative for Asia and the Pacific graced the signing ceremony and gave statements. The Director General of DoF introduced the expected outcome, outputs and major activities and implementation strategies of the project. The Director General also acknowledged FAO for its great technical support



Ministry of Agriculture & Cooperatives, Thailand

FAO representative to Thailand and Director General of Thai Department of Fisheries exchange TCP agreement witnessed by FAO ADG/Regional Representative for Asia and the Pacific and Permanent Secretary of Thai Ministry of Agriculture and Cooperatives

to Thailand in the development of its aquaculture sector.

The project is expected to improve operational decision-making on aquaculture management and development and expand aquaculture planning and policy capabilities through an issues-driven, timely, geographically comprehensive Aquaculture Management Information System (AMIS). Such system will be supported by the planning tools developed through the project and will be operated by different stakeholders at different levels along the production value chain. Major project activities include: (i) establishing a system for channelling management information and decision-making needs from stakeholders to the responsible DoF divisions and research centers and expediting solutions back to stakeholders, (ii) developing the AMIS with a basic geo-framework and attributes in two provinces in Thailand, (iii) siting and zoning tilapia culture in two provinces, also to be used for determining status and trends, (iv) carrying capacity modelling of bivalve and finfish culture in two provinces (research centers), and (v) improving decision-making capacities of DoF personnel at central and provincial levels through the use of AMIS decision-making tools.

The project, to be formally launched during the project inception and 1st national stakeholder workshop under planning, will be implemented by the Thai DoF for a period of 20 months.

Further information can be obtained by email to Weimin.Miao@fao.org and/or Jose.Aguilarmanjarrez@fao.org.

Continued from page 11

(WTO), and the standards for market access as required by the EU, as expressed in various EU Directives. Achieving these goals requires meeting high standards for aquaculture production, including a high level of capacity to address issues related to the control and prevention of aquatic animal diseases.

A survey to obtain information on national capacity and the agencies mandated to implement aquatic animal health programmes, was conducted for five Western Balkans regional countries (Bosnia and Herzegovina, Croatia, The former Yugoslav Republic of Macedonia, Montenegro and Serbia). The survey also collected relevant information essential to support the development of the aquaculture sector through healthy aquatic production and sought opinions on the components and activities that might be included in a regional aquatic animal health strategy.

Regional TCP “Assistance to Western Balkan countries for improving compliance to international standards on aquatic animal health”

The above regional TCP proposal was the result of a lengthy consultative and consensus-building process among countries of the Western Balkan Region which started in 2008 under two FAO projects (TCP/BiH 3101 and TCP/RER/3206). The above-mentioned regional survey of aquatic animal health capacity and performance conducted under TCP/RER/3206 provided valuable information in understanding the current situation and guidance in developing the regional TCP.

As agreed during the regional workshop in Croatia, the overall objective of the regional TCP is to improve participating country compliance to international health standards for aquatic animals by addressing key areas identified by the regional needs assessment process so that countries are better able to maintain and improve national aquatic animal health status, harmonize standards regionally, and better comply with the health standard requirements of regional and international trading partners. The specific objectives of the project proposal are to: build regional aquatic animal health capacity; conduct a regional review and assessment of national legislation; design and implement a regional surveillance programme for aquatic animal diseases; and promote national, regional and international communication mechanisms and networking systems for aquaculture development.

The Process and Lessons Learned

FAO’s support on AAH and biosecurity to the Western Balkan region started with TCP/BiH/3101 (which demonstrated clear impact and sustainability) and immediately followed by a TCP facility – TCP/RER/3206 (which paved the way for the development of a regional TCP). The AAH capacity and performance survey was an essential exercise and provided valuable guidance for regional and national strategic planning to improve AAH and biosecurity management and to assure adequate and rational support services for achieving sustainable aquaculture development. The core principles of regional cooperation, team effort, transparency and continuity were used throughout project development. Important lessons include the strong interest and commitment demonstrated by competent authorities of participating countries, the systematic, logical and transparent process followed in the development of the projects and the strong consensus demonstrated on the scope and elements of the regional proposal through regional cooperation. Thus, a regional TCP for the Western Balkan countries¹ is a big leap forward in forging cooperation on aquaculture through healthy aquatic production.

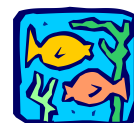
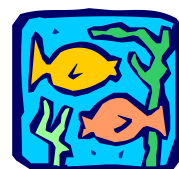
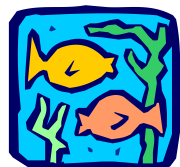
Further information can be obtained by email to Melba.Reantaso@fao.org

¹It is expected that the regional TCP will be approved this year

FAO/Regional Commission for Fisheries. 2011. Report of the Regional Technical Workshop on Spatial Planning for Marine Capture Fisheries and Aquaculture. Doha, the State of Qatar, 24–28 October 2010. *FAO Fisheries and Aquaculture Report*. No. 961. Rome, FAO. 118p.

Regional Technical Workshop on Spatial Planning for Marine Capture Fisheries and Aquaculture, held in Doha, the State of Qatar, from 24 to 28 October 2010, was attended by 21 delegates from seven Member countries of RECOFI (the Kingdom of Bahrain, the Islamic Republic of Iran, the State of Kuwait, the Sultanate of Oman, the State of Qatar, the Kingdom of Saudi Arabia and the United Arab Emirates) and representatives from FAO. The workshop achieved three objectives: (i) it created awareness and initiated capacity building through a technical seminar on basic concepts and emerging issues concerning spatial planning for marine capture fisheries and aquaculture; it received feedback from each RECOFI country presentation on the present status of the use of spatially-based planning tools, including case studies, present issues and challenges; (ii) it presented the results and analysis of the “RECOFI regional spatial planning for marine capture fisheries and aquaculture questionnaire survey”; and (iii) it prepared and finalized a “Proposal for a Regional programme for Implementing a Strategy on Spatial Planning for Marine Capture Fisheries and Aquaculture in RECOFI Member countries based on the survey outcomes and workshop deliberation and brainstorming. The long-term vision of the regional strategy for implementing spatial planning capacity in the RECOFI member countries is: “To illustrate how spatial planning tools are one essential element to achieving sustainable clean, healthy, safe, productive and biologically diverse marine seas in the RECOFI region, and how they allow for mariculture and marine fishery production activities to be maximized whilst at the same time taking into account the other users of the marine space.”

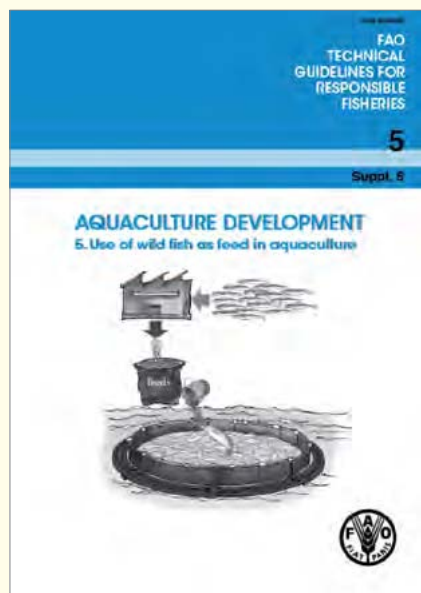
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FAO. 2010. Report of the FAO Expert Workshop on “On-farm feeding and feed management in aquaculture”. Manila, the Philippines, 13–15 September 2010. *FAO Fisheries and Aquaculture Report*. No. 949. Rome, FAO. 37p.

The FAO Expert Workshop on “On-farm feeding and feed management in aquaculture” was convened in Manila, Philippines, from 13–15 September 2010. The workshop was organized with three objectives: a) to review and analyze the existing knowledge on the application of feed management as a tool for reducing feed costs in aquaculture, b) to identify the major issues and constraints of feed management and those that need to be addressed and c) to prepare a list of recommendations to define/suggest the future course of action including the preparation of technical manuals/guidelines for dissemination to farmers. The workshop consisted of technical presentation and working group discussion. The technical presentations included invited reviews, case studies and synthesis of the case studies. Following several working group deliberations, and a general plenary discussion, the participants identified seven primary issues that currently constrain feed use and management in aquaculture, namely: 1) limited access to information on feed and feed ingredients (availability, prices and quality); 2) poor feed preparation, processing, handling and storage at the farm level; 3) inadequate monitoring of feed and farm performances; 4) low impact of current dissemination strategies on improved feeding and feed management; 5) gaps in the understanding of the economic aspects of feed management; 6) health aspects and their implications on feed management; and 7) feed quality – lack of regulatory mechanisms. A comprehensive set of recommendations was developed to overcome the constraints that were identified and it is anticipated that these recommendations will guide the FAO-FIRA’s future work in this arena.

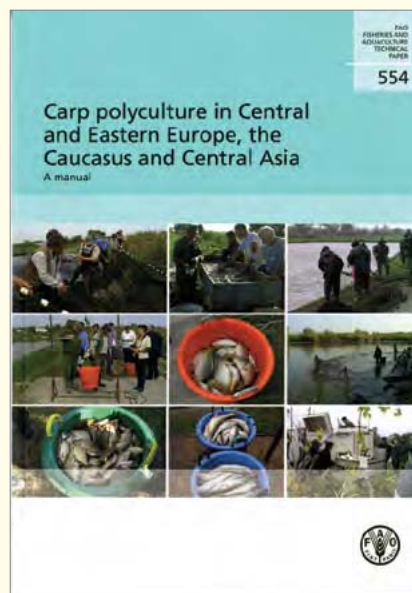
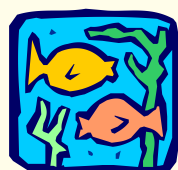
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FAO. 2011. Aquaculture development. 5. Use of wild fish as feed in aquaculture. *FAO Technical Guidelines for Responsible Fisheries*. No. 5, Suppl. 5. Rome, FAO. 79p.

These Technical Guidelines on the use of wild fish as feed in aquaculture have been developed in support of Article 7 (responsible fisheries management) and Article 9 (aquaculture development) of the FAO Code of Conduct for Responsible Fisheries and in particular in support of Articles 9.1.3, 9.1.4 and 9.4.3. The objectives of the guidelines are to contribute towards the development of aquaculture and the sustainable utilization of feed-fish stocks. The guidelines cover a number of issues relevant to the use of wild fish in feeds in aquaculture, including ecosystem and environmental impacts, ethical considerations on the responsible use of fish as feed, aquaculture technology and development, and statistics and information needs for managing the development of aquaculture. Specific matters relating to the management of fishery resources which may be used as feeds are briefly considered in these guidelines, as these have been dealt with in detail in separate FAO guidelines related to fisheries management and which, *inter alia*, would also apply to feed-fish fisheries.

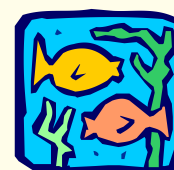
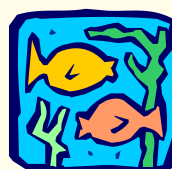
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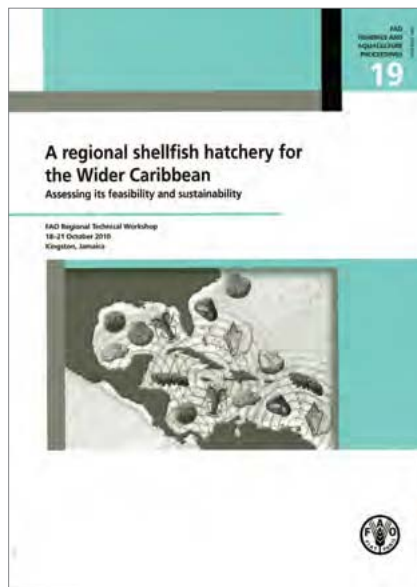


Woyнарovich, A.; Moth-Poulsen, T.; Péteri, A. 2011. Carp polyculture in Central and Eastern Europe, the Caucasus and Central Asia: A manual. *FAO Fisheries and Aquaculture Technical Paper*. No. 554. Rome, FAO. 73p.

This technical paper is a basic guide to carp pond polyculture practicable in the countries of Central and Eastern Europe, the Caucasus and Central Asia. It provides an overview on the guiding principles, aspects and tasks, and presents the most applicable production techniques and patterns of carp polyculture. For further reading and more in-depth information on the suggested techniques and technologies, it also includes a list of relevant FAO publications. The manual aims to help identify resources and contribute to the successful planning and realization of fish production by those fish pond owners and operators who need to strengthen and improve their knowledge on the subject.

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Lovatelli, A.; Sarkis, S. 2011. A regional shellfish hatchery for the Wider Caribbean: Assessing its feasibility and sustainability. FAO Regional Technical Workshop. 18–21 October 2010, Kingston, Jamaica. *FAO Fisheries and Aquaculture Proceedings*. No. 19. Rome, FAO. 246p.

Caribbean aquaculture production accounts for less than one percent of the world's aquaculture and culture efforts are directed mainly towards non-native species such as tilapia. This situation, where the application of foreign culture operations using exotic species predominates, may entrain potentially irreversible environmental impacts. It is recognized that the growth of the aquaculture sector in the Caribbean Region is due in part to the lack of technical expertise, infrastructure, capital investment and human resources. The pooling of resources among countries is proposed through the establishment of a regional facility. For this reason, the establishment of a "regional shellfish hatchery" focusing on native species is assessed based on the interest of Caribbean countries, the culture potential of native species and the available technical knowledge on identified target species.

The engagement of the governments of the Region in the development of a regional shellfish hatchery concept was first assessed through a brief questionnaire distributed by the Aquaculture Service (FIRA), Department of Fisheries and Aquaculture of the Food and Agriculture Organization of the United Nations (FAO) to 33 countries in 2009. Responses were received from 21 countries. Of these, 11 are islands of the Caribbean, while the other ten are continental countries bordering the Caribbean Sea. Of the total number of responses received, 14 expressed a definite interest in the concept. The



FAO. 2011. Developing a regional hatchery for native shellfish species. Pooling resources and expertise. 24p.

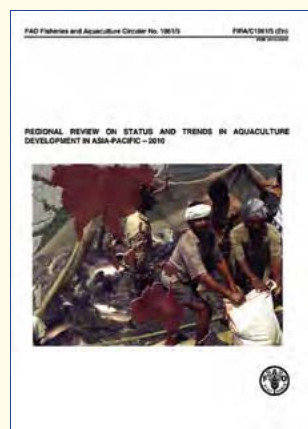
The bi-lingual Policy Brief (English and Spanish) was prepared in support of the FAO Regional Technical Workshop on assessing the feasibility and sustainability hatchery for the Wider Caribbean (left announcement) and for distribution to decision and policy makers.

The brochure can be downloaded from the following site: ftp://ftp.fao.org/FI/brochure/brochure_p19/brochure.pdf

responses confirmed the dominance of exotic species cultured and the overall interest in investigating the culture of native molluscan species. A list of 22 target species was drawn based on responses from the countries of the Region, including gastropods, crustaceans, bivalves (scallop, clams, oyster and mussels), echinoderms (three species of sea urchins) and one cephalopod (the common octopus). Sea cucumbers were added to this list at a later date due to the strong interest expressed by a number of participants.

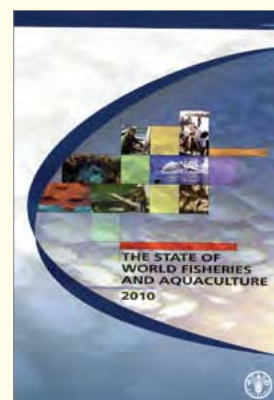
The publication can be found at the following url: <http://www.fao.org/docrep/014/i2179e/i2179e00.htm>

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FAO/Network of Aquaculture Centres in Asia-Pacific (NACA). 2011. Regional Review on Status and Trends in Aquaculture Development in Asia-Pacific – 2010. *FAO Fisheries and Aquaculture Circular*. No. 1061/5. Rome, FAO. 89p.

This review covers the vast Asia-Pacific region comprising Oceania, South, Southeast, East and Central Asia. In 2008, the region produced 92.5 percent of the world's total aquaculture production by volume but also consumed 70 percent of its own production. It should produce an additional 30–40 million tonnes more by 2050 to maintain the current consumption in the region at 29 kg a year per person. From past performance, it is seen to be capable of doing so, but will have to resolve a range of productivity, environmental, social and market access issues. The status of aquaculture production, its stage of development and the relative importance of each issue are unsurprisingly diverse across the many countries and territories. The outstanding regional characteristics are the dominance (except in Central Asia) of small-scale mostly commercially oriented farms, the dominance of cultured freshwater species in number and output and, as a recent FAO survey reveals, the low productivity of labour and the low employment multiplier of aquaculture in general, except in Oceania. These are circumscribed by the diminishing availability of land and freshwater, climate change and globalization of trade. To cope, farmers in the region will have to become more efficient, environmentally and socially responsible and competitive. The governance of the sector has set them towards the proper direction to acquire these capacities; its main features are the increasing use of market-based incentives and the adoption by farmers of voluntary governance mechanisms that include better management practices (BMPs) and codes of conduct (CoCs), bolstered by their association. Guided by progressive policies and regulations, these have shown that they can stimulate higher production, enable better returns, induce responsible farming practices, and produce higher quality and safer aquatic products. This, in capsule, is the major lesson from the region's recent history of aquaculture



FAO. 2010. The State of World Fisheries and Aquaculture 2010. Rome, FAO. 197p.

Against a backdrop of global economic uncertainty, this issue of The State of World Fisheries and Aquaculture highlights the major role and challenges facing fisheries and aquaculture worldwide. With a steadily rising demand for fish and fish products, the supply of fish as human food hit a record high in 2008, underlining its significance in contributing to food security and nutrition as a source of high-quality, affordable animal protein in particular. International trade in fish also topped previous values, pointing to the sector's continued important contribution to economic expansion and human well-being. Aquaculture, despite a falling growth rate in recent years, remains the fastest-growing animal-food-producing sector and is set to overtake capture fisheries as a source of food fish. Overall production of the sector continues to grow.

This publication analyses and reviews the latest available global statistics and trends in fisheries and aquaculture. It explores the important, yet often underestimated, role of inland fisheries, particularly in many small communities where they make a vital contribution to poverty alleviation and livelihood security. A broader look at the issues affecting fisheries and aquaculture emphasizes the growing need to focus on the many facets of policy and governance and examines the impacts of climate change, biodiversity loss, quality certification and product traceability on the sector.

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development. The challenge is to widely promote, adopt and sustain it in practice.

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FAO. 2011. Report of the FAO Regional Proposal Development Workshop “Assistance To Western Balkan Countries For Improving Compliance With International Standards For Aquatic Animal Health” Zagreb, Croatia, 7–9 September 2009. *FAO Fisheries and Aquaculture Report*. No. 969. Rome. 147p.

This document is the final report of the FAO Regional Proposal Development Workshop “Assistance to Western Balkan Countries for Improving Compliance with International Standards for Aquatic Animal Health,” held in Zagreb, Croatia from 7–9 September 2009.

This activity is one part of the FAO Technical Cooperation Programme TCP/RER/3206 Assistance to Western Balkan Countries for Improving Compliance with International Standards on Aquatic Animal Health.

This report was prepared by Dr Melba B. Reantaso (Aquaculture Officer and also Lead Technical Officer of the TCP) and Dr J. Richard Arthur (FAO Consultant) with contributions from Dr Sanin Tanković and Dr Nihad Fejzić [FAO Consultants from the Technical Cooperation among Countries in Transition (TCCT)].

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EDITORIAL

It is worthy of mention that the long road that led to the development of these guidelines resumed in Bangkok, Thailand where the first expert workshop was organized in March 2007 and technically resolved and endorsed in Phuket, Thailand in 2010 during SCA V. Four years of technical work, discussions and negotiations were possible due to the excellent support and dedication of many who facilitated this process that we all witnessed.

Above all, we feel it is worth revisiting this process to enlighten the users whether from industry, NGOs and government or academia, how difficult the road could be for building international consensus around international guidelines, which while enshrined in science should also at the same time address the specific requirements of various aquaculture systems, including small-scale aquaculture.

For FAO, this is only a first step in the long journey to build and implement robust international guidelines to improve aquaculture practices, to build transparent markets and ensure predictable and science-based

trade regimes. FAO has already initiated contacts and work to document implementation of these guidelines and the challenges thereof. No doubt that with the help of all involved, this will enable FAO members and observers to have a healthy and constructive debate at the 6th session of the COFI Sub-Committee on Aquaculture in Cape Town, South Africa (26-30 March 2012). This debate is needed to refine these guidelines and most importantly to identify ways and means to tackle the challenges for their implementation through technical assistance and capacity building, if responsible and sustainable aquaculture is to deliver increasing volumes of healthy and nutritious fish and seafood for future generations.

We take this opportunity to thank all those who contributed their time and expertise since we embarked in this process and we look forward to their continued support for the tasks ahead.

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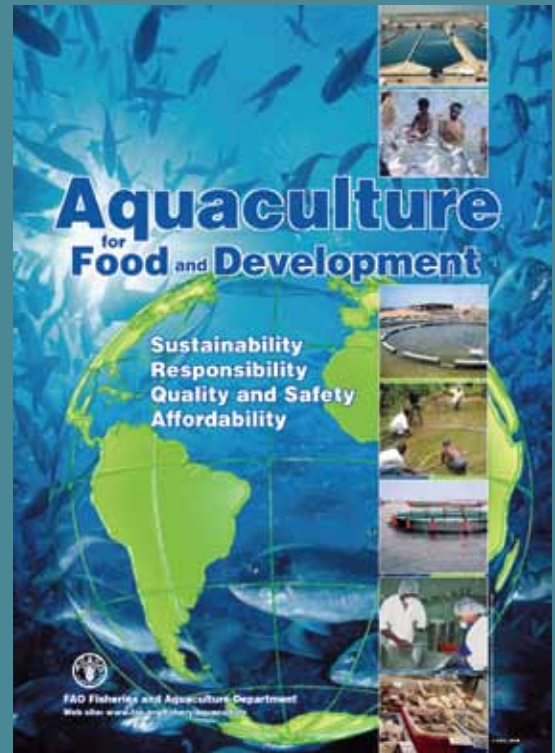
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