

FAN 46 Invited Editorial

Introduced Species in Fisheries and Aquaculture It's Complicated

We have noted previously in FAN and elsewhere¹ that in efforts to increase productivity and profitability from fisheries and aquaculture, aquatic species have been moved around the world. Many times the introduction was successful, but some times the introduction did not provide the expected benefits and endangered native biodiversity. The subject is complicated and there is, thus, a need to provide some recent perspectives.

The first complication is in the name: introduced species have been called alien, exotic, invasive and foreign species. It is clear that some standardization in definitions is needed, but FI (FAO Department of Fisheries and Aquaculture) prefers to use to the more neutral term “introduced species” to mean a species or sub-species that has been moved into an area outside its natural or historic range.

We also recommend the term **invasive** species as defined by the CBD² to be a species that can adversely impact ecosystems. And here comes the second complication: introduced species can be **invasive** in one environment, but not in another, e.g. Pacific oysters introduced into Australia have negatively impacted the local Sydney oyster, whereas Pacific oysters introduced to the California coast have had negligible impact after nearly a century of use in aquaculture. Additionally, a native species can become invasive when the local environment changes, e.g. when native predatory sea stars are removed, native mollusks can become invasive. Thus, since the term **invasive** is very much dependent on the environmental conditions, a particular species should not be labeled *a priori* **invasive**. Risk assessment and the precautionary approach must take into account the potential receiving environment and how a species may act in that environment.

A third complication is **non-native genotype**. Non-native genotypes can arise from genetic improvement programmes that create combinations or frequencies of genes that are not found in the native populations of the same species. Several species, *inter alia*, Atlantic salmon, Nile tilapia, and channel catfish have been selected for increased growth, survivability and fecundity among other characters; the collection of genes in farmed populations can be very different

from their wild relatives. If farmed fish escape they represent **non-native genotypes**. Non-native genotypes can also arise when genetically differentiated stocks are transferred from one part of their range to another. For example there are geographically and genetically distinct varieties of largemouth bass in North America that have been moved into each other's range to increase fishing opportunities. Due to the facts that **non-native genotypes** can breed with wild relatives in the local environment, have similar disease and parasite characteristics, and are difficult to distinguish from wild relatives, there is a growing body of evidence that the risks from **non-native genotypes** is substantial and may in some areas be greater than the risk of **introduced species**. The use of genetic technologies to make **non-native genotypes** sterile would reduce some of the risks to wild populations and good farming and fish health practices would further reduce the risk from diseases. In fisheries that use **non-native genotypes** in enhancement programmes, fishery managers must ensure that the wild relatives are not over-fished as a result of setting catch levels that are based on numbers of stocked **non-native genotypes**. Determining how to divide fishing effort between **non-native** and native genotypes is a complication that fishery and hatchery managers are increasingly needing to address.

Another complication is how to deal with those species that have been historically introduced into aquatic ecosystems and have become part of the local economy and culture; sometimes to the point that most common people would consider them “native”. Examples of these species are Pacific oysters in North America, common carp in western Europe and Nile perch in Lake Victoria.

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Cover photos:

Group photo of the Global Conference on Aquaculture, Phuket, Thailand

Meeting of the Sub-Committee on Aquaculture, Phuket

Photo of catfish, courtesy of James A. Steeby, Associate Professor Emeritus, Mississippi State University

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ERRATUM:

FAN 45, article on Veterinary Medicines, page 46, second column, paragraph 2, line 10 - florfenicals should be replaced with nitrofurans

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FAN Editorial Team acknowledges the kind assistance of Koji Yamamoto in the production of FAN 46

Building on Progress: An Evening on Pacific Aquaculture

Masanami Izumi¹, Timothy Pickering² and Pedro Bueno³

¹FAO Sub-Regional Office for the Pacific Islands (FAO SAP), Samoa, Masanami.Izumi@fao.org

²Secretariat of the Pacific Community (SPC), New Caledonia, timp@spc.int

³FAO Consultant, Thailand, pete.bueno@gmail.com

An informal meeting was held in the early evening of 23 September during the Global Conference on Aquaculture 2010 (GCA 2010) in Phuket, Thailand, 22-25 September 2010. The meeting title was business-like “Building on Progress” with a touch of the idyllic “An Evening on Pacific Aquaculture”.

But, it was all serious business for 25 GCA 2010 participants¹ who took part in the informal meeting, and the jargon-sprinkled descriptions and analysis of issues, problems and needs were hardly romantic. Its purpose was to generate ideas to guide future aquaculture development initiatives in the Pacific region and suggestions to move the ideas into actions.

Historical Notes and Status Overview

Goals for aquaculture in the Pacific:

1. Rural livelihoods: to reduce urban drift
2. Food security
3. Earnings: export more, import less, produce substitutes
4. Restoration of depleted resources
5. Resilience to climate change impacts

The first four were identified at the Second Regional Aquaculture Meeting organized by SPC in Noumea, New Caledonia, in November 2007. The fifth was suggested at the informal meeting in Phuket.

The discussions were adequately informed by three sources:

- a note on the history and status of aquaculture development in the Pacific prepared by FAO’s Subregional Office for the Pacific Islands (FAO SAP) and the Secretariat of the Pacific

Community (SPC), which overview was presented by FAO SAP’s Fishery Officer;

- a presentation by SPC’s Aquaculture Officer describing the persistent and emerging issues on aquaculture development in the region; and
- an overview statements on national aquaculture aspirations and constraints by five senior fisheries officers in charge of aquaculture development, research and management from five Pacific countries (see photo on page 5).

Progress and Perils

The meeting noted that the physical, natural, environmental, cultural and demographic endowments of the Pacific region have been a source of comparative advantage or a cause of limited success in aquaculture development projects and enterprises. The materials for the discussion illustrated this double-edged attribute. Many of the cases showed how some of these attributes could facilitate the progress of aquaculture or strew its development path with hazards. Considering such variety of biological, technical, economic and social issues, the meeting discussed and arrived at the following recommendations:

1. **Food security and biosecurity.** Fish for food security will be urgently needed to fill a growing fish gap driven by population growth, declining inshore fishery resources, and climate change. But the region is being stymied by the seeming contradiction between the goal of food security, which the region’s governments have unanimously embraced, and the international concern for biosecurity. The core of the issue is that “alien” species are seen as also “invasive” species. Milkfish, tilapia and freshwater prawn have shown in a number of countries much promise for meeting rural people’s food needs and income generation.

Tilapia is a bone of contention, as it is an introduced species and the sad experience in the Pacific is that the Mozambique tilapia (*Oreochromis mossambicus*) has arguably become a pest and a nuisance in every country to which it was brought in during the 1950s for food and mosquito control (Fijian farmers found an early use for it as a supplement for pig diets). On the other hand, it did become a sustained fishery resource in certain areas such as in the insular Pacific's largest natural lake, Lake Tegano in the Solomon Islands, in the Sepik River in Papua New Guinea (PNG), and in a small lake in Atiu in the Cook Islands. The improved Nile tilapia strains along with breeding and hatchery techniques were subsequently brought in, and these strains are now farmed by small farmers in Fiji, Samoa, Solomon Islands and PNG. In Vanuatu, a tilapia cage culture enterprise permitted to operate in a degraded freshwater environment is showing that tilapia can be a profitable fish for the local market and a well-accepted substitute for sea fish. The farm schedules harvests when wild fish is scarce. The broader implication of this astute marketing strategy is that freshwater fish such as tilapia and carps, both widely farmed in Fiji and PNG, can provide a means of adaptation when climate change-impelled events or over-exploitation deplete inshore fisheries. All these argue for a dispassionate look at introduced species, through provision of advice about benefits and risks that is science-based and through targeted research to fill knowledge gaps.

2. **Capacity in biosecurity** to safeguard aquaculture potentials is lacking in the region, a critical shortcoming in view of the high aquatic biodiversity and relative lack of serious aquaculture pathogens in the Pacific. This underscores the importance of a regional biosecurity programme.
3. **Capacity for aquaculture statistics and information** collection is weak. The lack or unreliability of statistics makes it difficult to track progress in the sector or craft well-targeted development plans and policies.
4. **Training for planning, management and production** is a continuing need. There are very capable but not enough personnel in the region. Graduates from universities who are taken into government service need in-service training as what Fiji is doing. Fiji also has a



P. N. Fale, Tonga

The Pacific delegates: left to right, Poasi Ngaluafale Fale of Tonga, Jacob Wani of Papua New Guinea, Gerald Billings of Fiji, Monte Depaune of Nauru and Korooa Raumea of Cook Islands. Their participation in the GCA 2010 and the Fifth Session of the FAO COFI Sub-Committee on Aquaculture was jointly supported by FAO FIRA and SPC

programme for students to conduct research and perform on farm practices in government research stations. Farmers need better farm management training to round out their technical skills; as well as right incentive to farm better and responsibly.

5. **Natural hazards** - cyclones, floods and drought - are noted to be increasing in frequency and intensity which have tended to set back progress; some trials were abandoned after a severe event. These represent a suite of risk management strategies ranging from risk reduction such as early warning systems and reliable forecasts, to risk impact mitigation such as diversification of livelihoods and insurance, and risk impact alleviation such as damage compensation by government, relief and rehabilitation. All these need resources and technical capacity to execute.
6. **Seawater acidification** from climate change could gravely affect the two leading species, pearl oyster and marine shrimp. Region-wise, their economic importance is such that in 2007, they combined for more than 95 percent of the total estimated value of aquaculture production in the Pacific region. However, most of the cultured South Sea pearls come from farms in French Polynesia and Cook Islands with a growing contribution from Fiji, while shrimp is mostly from New Caledonia. Entry is not easy but pearl farming is lucrative and with suitable government incentive could attract more investors. The fear, expressed by

S. Sagun, Philippines



Serious discussions at the “Evening on Pacific aquaculture”: Might the GCA 2010, during which this informal meeting was a quick event, be seen years from now as the fifth turning point in global aquaculture development?

one farmer, is that the commoditization of the South Sea pearl, a high fashion and luxury item, would debase its value.

- Subsidies** that had been effective in starting up aquaculture enterprises have tended to become permanent and more generous. This has eventually become counterproductive on three counts. They (1) strain the resources and capacities of government R and D services, (2) weaken the motivation of farmers to do more to take care of the crop, and (3) stunt the growth of the private service sector that could more efficiently use national resources or, in partnership with government and academia, enhance the provision of upstream and downstream services under a market regime.
- The problem of **feed for finfish and crustaceans** being promoted for wide adoption by both subsistence and commercial farmers is persistent and prevalent. Commercial feeds are mostly imported and thus expensive and producing them locally would still be costly as some ingredients have to be imported. But it is almost a chicken-and-egg conundrum to argue for privatization of services such as feed and seed supply when there is not much scope for economy of scale because local demand for the input is low because the sector is small because the local market is limited. Governments meanwhile are formulating feed and supplying it to farmers often for free, as in Fiji and Samoa.

- Species selection.** Since 1907, some 48 species have been tried for culture in the Pacific, many of these introduced from outside the region, some indigenous to some islands and moved around, others endemic. Several species for a country’s aquaculture can be a good thing; various species can be farmed for different economic purposes such as food, income and export, and raised in polyculture or in an integrated system. But, their technical and economic requirements for viability can overwhelm R and D capacities or diffuse attention. Pilot trials and initial farming on a commercial scale of many of the 48 species were technically feasible. But, apart from a handful, many failed to attain or sustain economic viability. Repeated impacts of cyclones, floods and drought have severely set back progress. But, the more important reason is the small local market and limited scope for its expansion and low competitiveness in the export market but also in the domestic with cheaper imports or substitutes.
- Intense focus and extended iterations of **research and technology development** at the research station level have resulted in the neglect of the other important phase in knowledge development and utilization, the up-scaling of research results to commercial application. The private sector has to be increasingly involved in the planning and development of research programmes. They have shown interest in diversifying into aquaculture and need the technology but also the proper incentives to invest and security of investment.
- Land and water tenure.** The traditional ownership of land and jurisdiction of water bodies by communities - except in open-access Tonga - have been good for community-based management projects particularly the protection of seeded stocks in reseedling programmes. But, this has also discouraged investments from outside or prevented investors from expanding or making durable improvements on physical assets owing to insecurity of tenure. Tonga’s open access removed the incentive of communities to protect their coastal resources, which had to be remedied by the establishment of Special Management Areas.

Recommendations

The meeting recommended three strategic actions, namely, (1) further assistance from FAO (through various services and units, e.g. FIRA, LEGN, SAP) in developing a biosecurity policy for the region in collaboration with SPC, JICA, ACIAR, NACA and WfC and other concerned agencies; (2) organization of a Regional Aquaculture Development Workshop in the Pacific to assess needs and develop cooperative programmes among international and regional organizations and government of the Pacific Island Countries (PIC); and (3) exploring the feasibility of a networking arrangement. The first recommendation – on biosecurity – drew justification from the food security-related issue related to alien species being equated with invasive species and the need to safeguard the aquatic biodiversity in the Pacific region, e.g. from exotic pathogens, which remains as one of its few sources of comparative advantage. The second – developing a cooperative programme – was a response to FIRA Chief Jia Jiansan's affirmation that FAO has increased its attention to the development of aquaculture in the Pacific region so that FIRA will try to allocate more resources for the region and is keen to establish partnerships with other organizations in developing a coherent regional strategy and assisting governments in its implementation. The third – networking – is inspired by the success of NACA and the early achievements of the newer regional intergovernmental networks.

Prospects

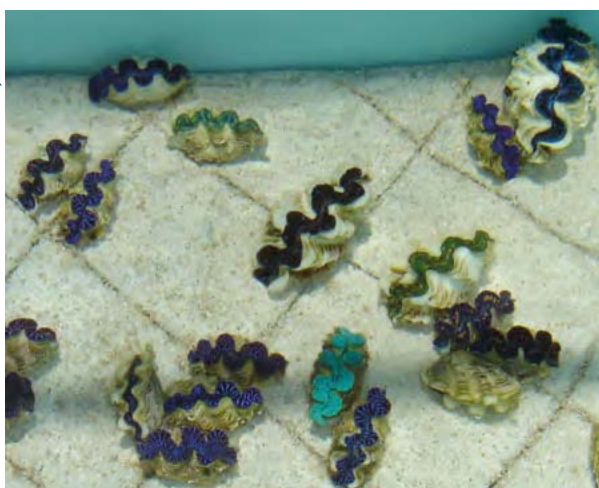
At the start of the meeting, the question was posed as to where and how the Pacific, arguably one of the least aquaculturally developed areas in world, would fit in the world aquaculture development agenda being fashioned at GCA 2010. Two of the action recommendations (contained in the Phuket Consensus adopted by the Conference) are relevant to this question and to the meeting's own recommendations: "to intensify development assistance to the Sub-Saharan region and other least aquaculturally developed areas" and "to increase collaboration and partnerships". Finally, alluding to the video production prepared by



P. Bueno, Thailand

Corals being nursed in one section of the Sopa hatchery in Tongatapu, Tonga: Core of the mariculture centre established in 1978 with JICA's technical assistance, the hatchery is one of the larger and well-planned in the region. It has been working on giant clam which seed it has shared with Samoa for rehabilitation from the 2009 tsunami

M.B. Reantaso, FAO



Several species of giant clams for the aquarium market are raised in Majuro Island, Republic of Marshall Islands (RMI). RMI is an ideal location for growing clams because of grow-out space and broodstock availability

FAO for the Conference, "Turning Points in Aquaculture Development", which highlighted four such turning points beginning with the 1976 Kyoto Conference on Aquaculture, the meeting looked ahead and asked whether this renewed surge of attention to and cooperation with the least aquaculturally developed areas of the world, the Pacific included, might make people decide, years from now, that GCA 2010 is the fifth turning point.

¹Participants were from the following institutions/affiliations: Australian Centre for International Agricultural Research (ACIAR), Aquaculture without Frontiers (AwF), ASEAN-EU Aquaculture Platform (ASEM), FAO (FIRA, FIPS Statistics and Information Service, LEGN Development Law Service, SEUD, RAP and SAP), Ghent University of Belgium, Japan International Cooperation Agency (JICA), Network of Aquaculture Centres in Asia and the Pacific (NACA), Secretariat of the Pacific Community (SPC) and the WorldFish Centre (WfC).

National Aquaculture Sector Overview (NASO) Map Collection Web Site

A new web-based information system for inventory and monitoring aquaculture

Valerio Crespi and José Aguilar-Manjarrez

Aquaculture Service

FAO Fisheries and Aquaculture Department, Rome, Italy

Valerio.Crespi@fao.org

Jose.AguilarManjarrez@fao.org

A new Web site showing the locations of aquaculture sites and their characteristics is now available. The online **National Aquaculture Sector Overview (NASO) map collection** uses “Google Maps and Google Earth” technology to assist FAO member countries to inventory and monitor aquaculture.

The main purpose of this map collection is to illustrate, in general, where aquaculture is taking place. Characteristics that accompany the administrative units or individual farms include: cultured species, technology used, culture systems, environments, farm characteristics, production, quantities and values, seed input quantity and characteristics, and main issues (e.g. diseases, environmental impact, etc.). Aquaculture data are collected by administrative units or by individual farms using an MS-Excel submission form. The completed MS-Excel form, once validated by FAO, are then used to create the NASO maps.

The MS-Excel form has already been tested in several developing countries and designed to be as user-friendly as possible. The form allows for rapid data entry from compilers and easy data retrieval by users. Maps are accessible online through a browse map page or through a Search by Country page; an Advanced Search is also available (Figure 1).

Focal points of the FAO Fisheries and Aquaculture Statistics and Information Service for country statistics are contacted to provide relevant information. However, when focal points are not readily available, then recognized national aquaculture experts and/or aquaculture statisticians from a broad range of institutions who have worked with FAO are consulted. Validation is conducted by comparing the total aquaculture production quantities reported in the NASO MS-Excel form by Organism Division (fish, molluscs, crustaceans, seaweeds, others) and environments (freshwater, brackishwater and marine) against FAO reported statistics using FAO FishStat Plus software. Any anomalies identified are corrected and updated in the MS-Excel form.

The collection is in its early stages but holds potential use in a number of ways such as monitoring the status and trends of aquaculture development and addressing site selection and zoning issues. The NASO map collection is coordinated by the Aquaculture Service (FIRA) of the FAO Fisheries and Aquaculture Department in close collaboration with FAO’s Fisheries and Aquaculture Statistics and Information Service.

A few selected aquaculture sites from the NASO map collection are illustrated on page 9. The sites have been selected at random but aim to illustrate a few examples of aquaculture structures in diverse environments and the power of remote sensing for operational management of aquaculture.

Contact us. To propose collaborative activities, FAO/FIRA continuously seeks opportunities to actively cooperate with other organizations in the realm of Geographic Information Systems (GIS), remote sensing and mapping, particularly for training and data dissemination to support sustainable aquaculture.

To explore cooperative activities or to obtain additional information, please contact:

Jose.AguilarManjarrez@fao.org

or Valerio.Crespi@fao.org

Figure 1 : www.fao.org/fishery/naso-maps



Italy

F. Cardia, Italy



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Species:
Sparus aurata, *Dicentrarchus labrax*
Technology: Floating cages
Systems of culture: Intensive
Environment: Marine
Production (Tonnes): 350/year

Mexico

Species:
Oreochromis (= *Tilapia*) spp.;
Cyprinus carpio
Technology: Pond
Systems of culture: Intensive
Environment: Freshwater
Farm(s) surface (ha): 1.4
Production (juveniles, No): 73,297



A. Cuevas Jiménez, Mexico

©2011 Google

Nicaragua

J. A. Fuertes Barahona, Nicaragua



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Species: *Penaeus vannamei*
Technology: Pond, earthen
Systems of culture: Semi-intensive
Environment: Brackishwater
Farm(s) surface (ha): 955.46
Production (Tonnes): 345.21

Notes from an Aquaculture Statistician's Desk: FAO Aquaculture Statistics Dataset 1950-2008

Xiaowei Zhou

Statistics and Information Service
FAO Fisheries and Aquaculture Department, FAO, Rome, Italy
Xiaowei.Zhou@fao.org

Dataset release, in-house uses and analysis

In March 2010, the FAO Fisheries and Aquaculture Department released the world Aquaculture Production and Value Statistics Dataset (1950–2008). With the addition of data for 2008 and adjustments to some historic data, this new dataset was used by FAO for the publication of 2008 FAO Fisheries and Aquaculture Statistics Yearbook (Yearbook 2008). The global level status and trends analysis on aquaculture based on the newly-released data were included in the 2010 State of World Fisheries and Aquaculture (SOFIA 2010) and also heavily used for regional level reviews (Sub-Saharan Africa, Asia and Pacific, Europe, Near East and North Africa, North America and Latin America and the Caribbean) and trends analysis on aquaculture development, presented during the Global Conference on Aquaculture 2010 in Phuket, Thailand in September 2010. The Yearbook 2008 contains summarized aquaculture production quantity and value data for the ten most recent years, along with data on capture, trade and food balance. The comprehensive analysis of the newly-released data at global and regional levels can be consulted from SOFIA 2010 and the proceedings of the Global Conference on Aquaculture 2010.

Fifty-million tonnes milestone production level

The level of world aquaculture production of food fish (fishes, crustaceans, mollusks and other aquatic animals) in 2007 was lowered to less than 50 million tonnes, as the combined result of (1) adjustments of some provisional data for 2007 made by national reporting authorities, and (2) adjustment of FAO estimates for some non-reporting countries using most recently available information. Instead of 2007, it was in the year 2008 that the world aquaculture of food fish surpassed the 50-million tonne milestone production level and reached 52.5 million tonnes. Aquaculture contributed 36.9 percent to the total capture and

aquaculture production and 45.7 percent to the world food fish supply for human consumption.

Aquaculture-producing countries

The new dataset has records of aquaculture production quantity and value for 166 countries and territories for 2008, including three additions for the first time, namely, Angola, Timor-Leste and Zanzibar. Twenty-four countries and territories with historic records of aquaculture production show no production in 2008, including those that ceased to exist (such as Yugoslavia).

Number of aquaculture species

To align with the standard aquaculture definition, two entire time series of data for the production of farmed aquatic macrophytes previously reported by Mali and South Africa as aquaculture production were excluded from the dataset.

Based on taxonomy, the concept of “species item” is used for fisheries and aquaculture statistics purposes to identify and classify the production. All the species items, actual or potentially to be reported, are included in the ASFIS¹ List of Species for Fishery Statistics Purposes. Being one of the basic standards used for statistics, the ASFIS List is dynamic, open access, and updated annually by the FAO Fisheries and Aquaculture Department.

Below are further notes:

1. The largest number of species items recorded in FAO aquaculture statistics database, such as Nile tilapia (*Oreochromis niloticus*) and silver carp (*Hypophthalmichthys molitrix*), refer to single taxonomic species.
2. Many species items refer to groups of species under various level of taxonomic division collectively, such as “Cyprinids nei” (any number of species in the family of Cyprinidae) and “Groupers nei” (*Epinephelus* spp.).

3. Few species items refer to certain hybrids, such as “striped bass, hybrid” (*Morone chrysops* x *M. saxatilis*) and “catfish, hybrid” (*Clarias gariepinus* x *C. macrocephalus*).
4. Some sub-species are used for aquaculture for certain desirable traits. However, the ASFIS List does not accommodate sub-species. Nationally-reported data on sub-species have to be merged or aggregated to the species level for storage in the FAO database.

The table below shows the number of species items ever recorded as cultured in the FAO aquaculture statistics database and the number that were cultured and harvested in 2008. The actual number of food fish species in taxonomic terms cultured in 2008 worldwide should be greater than 333 because some species items reported by certain countries included the production of more than one species, and the productions of such species have never been reported individually. For example, snubnose pompano (*Trachinotus blochii*) and tongue sole (*Cynoglossus semilaevis*) have been farmed in China, but their production have been invisible at national level statistics because they both have been reported in aggregation, along with many other species, as “marine fishes nei”, and no any other country has ever reported data for these two species.

	Food fish	Algae	Total
Number of “species items” ever recorded as cultured	451	29	480
Number of “species items” recorded as culture in 2008	333	25	358

Chinese data and impact on world analysis

In the newly-released dataset, revision for the time series was made to the identification of several species items reported by China. Data users of FAO aquaculture statistics should pay attention, at least to the re-identification of the following species (or species items) listed below, because they alter the overall picture of world aquaculture due to their dominating production quantity.

1. China’s reported aggregated production of a few species of oysters (3.4 million tonnes in 2008) was previously identified as a single

species, Pacific cupped oyster (*Crassostrea gigas*), in the FAO database. It is now re-identified as cupped oysters nei (*Crassostrea* spp.) in the new dataset. Pacific cupped oyster is no longer among the world top list of single species for aquaculture.

2. Similarly, the production of all species of scallops (at least three), reported in aggregation by China (1.1 million tonnes in 2008), was recorded as a single species Yesso scallop (*Patinopecten yessoensis*) in FAO database. In the new dataset, the timeline is reclassified as Scallops nei (Pectinidae). The most cultured scallop species in fact is an introduced exotic species, the Atlantic bay scallop (*Argopecten irradians*).
3. Largemouth black bass (*Micropterus salmoides*), an introduced exotic species cultured in China, has dominated in the production previously recorded as Japanese seabass (*Lateolabrax japonicus*). To better reflect the reality, the time series has been reclassified as largemouth black bass in the new dataset.

How to access the data

For regular or heavy data users, it is highly advisable to install the universal software *FishStat Plus* along with the dataset. The software and the dataset are freely downloadable from the FAO Fisheries and Aquaculture Department website at <http://www.fao.org/fishery/statistics/software/fishstat/en>. The website also contains manuals for installation of the software and the datasets. The *FishStat Plus* enable the user to query the databases for aquaculture production and values, as well as other FAO Fisheries Statistics databases including global capture data, commodities and trade data. Alternatively, the database can be queried online at

<http://www.fao.org/fishery/statistics/global-aquaculture-production/query/en>.

Further information can be obtained by email to Xiaowei.Zhou@fao.org

¹Aquatic Sciences and Fisheries Information System

Strengthening Aquatic Biosecurity Capacity in Southern Africa

Melba B. Reantaso

Aquaculture Service
FAO Fisheries and Aquaculture Department, Rome, Italy
Melba.Reantaso@fao.org

FAN 39 reported on the outcomes of the International Disease Investigation Task Force formed by FAO in response to a request for an emergency technical assistance from the Government of Botswana in connection with a serious disease affecting freshwater fishes in the Chobe-Zambezi River system reported since October 2006. The work of the Task Force confirmed the occurrence of the epizootic ulcerative syndrome (EUS) in the southern African region.

EUS is a serious finfish disease which has swept across Japan, Australia, many countries in Asia and the United States of America since the first outbreaks were reported in the early 1970s. EUS has caused major losses in fresh and estuarine fish species in many countries for over three decades during which time it was given several names, e.g. mycotic granulomatosis or MG in Japan; red spot disease or RSD in Australia; and ulcerative mycosis (UM) in the United States of America. The present name of EUS was given by an FAO Expert Consultation on Ulcerative Fish Disease (FAO, 1986) concerning similar conditions with dermal ulcerations and mortalities which have occurred throughout southeast and south Asia. Since 2000, during an Expert Consultation on EUS as a special session of the Fifth Symposium on Diseases in Asian Aquaculture held in Gold Coast, Australia where 36 EUS experts from Australia,

India, Japan, Philippines, Sri Lanka, Thailand, and the United States of America re-examined the causal factors, case definition and nomenclature of EUS and proposed two new common names: epizootic granulomatous aphanomycosis (EGA) and ulcerative aphanomycosis.

Following the request from the Government of Botswana in 2007, FAO had provided a wide range of technical assistance to help countries in dealing with this exotic aquatic disease incursion. Combined support came from FAO's Technical Cooperation Programme (TCP) and extra-budgetary funding resources, covering a wide range of activities/ outputs and extending the geographical scope of the assistance. These had resulted to a number of important activities as briefly described below.

FAO Regional Technical Cooperation Programme (TCP/RAF/3111), October 2007 to December 2009. Immediately following the Task Force mission (May 2007) and based on its recommendations, an FAO Regional Technical Cooperation Programme (TCP/RAF/3111 [E]) *Emergency assistance to combat EUS in the Chobe-Zambezi River* was prepared and approved for implementation beginning October 2007. Seven southern African countries (Angola, Botswana, Malawi, Mozambique, Namibia, Zambia and Zimbabwe) participated in this regional project. Major accomplishments included awareness raising

M.B. Reantaso, FAO



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Participants to the training course doing practical laboratory work, particularly examination of EUS slides

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Delegates participating in the FAO/WFC Workshop on Risk Assessment Methodologies and Tools for Aquaculture, July 2010, Zambia

and capacity building of participating countries on basic aquatic animal health management, Level I and II diagnosis of EUS (see photos on page 12), design and implementation of a targeted EUS surveillance, introductory course on risk analysis and aquatic biosecurity; support to the upgrading of a regional fish disease resource laboratory (University of Zambia, Veterinary Faculty). The project was completed in December 2009.

Regional Workshop on the Development of an Aquatic Biosecurity Framework for Southern Africa, Sunbird Hotel, Lilongwe, Malawi, 22-24 April 2008. The purpose of this regional workshop was to present the outcomes of a country-level survey which evaluated national capacities for managing aquatic biosecurity (i.e. risk associated with exotic or emerging pathogens of aquatic animals and invasive aquatic species), to provide a platform for discussion on an aquatic biosecurity framework for southern Africa and to identify regional capacity-building needs. Representatives from 9 countries (Angola, Botswana, Kenya, Malawi, Mozambique, Tanzania, Uganda, Zambia and Zimbabwe) with resource experts from FAO, Australia and the World Animal Health Organisation (OIE) participated in the workshop.

Training/Workshop on Basic Aquatic Animal Health Management and Introduction to Risk Assessment in Aquaculture, School of Veterinary Medicine, University of Zambia, Lusaka, 9-15 February 2009. Representatives from 10 countries (Botswana, Ghana, Kenya, Malawi, Mozambique, Namibia, South Africa, Uganda, Zambia and Zimbabwe) participated in this training/workshop that was supported by resource experts from

FAO/FIMA, Canada, Viet Nam and the Universiti Pertanian Malaysia.

Aquatic Biosecurity Framework for Southern Africa: a Scoping Meeting of Regional Fisheries and Veterinary Authorities, Thule Hotel, Windhoek, Namibia, 13-14 October 2009, hosted by the Namibia Ministry of Fisheries and Marine Resources and OIE as collaborator. The scoping meeting was aimed at initiating a process towards developing a harmonized aquatic biosecurity framework for Southern Africa and to evaluate the needs for implementing such a framework. Presentations delivered during the scoping meeting focused on aquatic biosecurity and the challenges



M.B. Reantaso, FAO

Members (from Namibia and Botswana) of the FAO International Disease Investigation Task Force collecting fish samples from the shallow part of the Choze River, May 2007

faced by the southern African region. The need for a regional approach to aquatic biosecurity was widely recognized and plan for concerted actions proposed. A Windhoek declaration outlining the concerns and commitment to developing and implementing an aquatic biosecurity framework was discussed and agreed upon by the 32 participating delegates from 10 countries and representatives from the World Organisation for Animal Health (OIE), Norway Veterinary Institute and the WorldFish Center (WfC). A major outcome was the “Windhoek Declaration on an Aquatic Biosecurity Framework for Southern Africa”.

The Minister of Uganda, during the Lake Victoria Fisheries Organization Council of Ministers extraordinary Meeting held in Kenya on 6 November 2009 raised the issue of aquatic biosecurity in this meeting.

FAO/OIE/MFMR Training/Workshop on Aquatic Biosecurity held at the Kamutjonga Inland Fisheries Institute (KIFI), Divundu, Kavango Region, 15-18 October 2009. Thirty seven delegates representing 9 countries (Angola, Botswana, Kenya, Mozambique, Namibia, South Africa, Uganda, Zambia, Zimbabwe) participated in the training/workshop. The training/workshop provided a short targeted training on aquatic animal biosecurity, including an overview of aquaculture and aquatic animal health management, emergency response and contingency planning and aquatic epidemiology delivered by FAO staff and consultants. A major outcome was further capacity building on aquatic biosecurity in the region and further input to the document “Strategy for the development of an aquatic biosecurity framework for the southern African region: a programme of capacity building activities”.

FAO/WfC Workshop on Risk Assessment Methodologies and Tools for Aquaculture. This regional workshop, held from June to 2 July 2010 in Lusaka, Zambia was attended by some 25 from Sub-Saharan Africa (with representatives from Botswana, Ghana, Kenya, South Africa, Uganda, Zambia and Zimbabwe), and resource persons from Australia, Canada, Italy, Malaysia, Sweden and the USA. The workshop trained a number of key staff on processes and tools for applying risk analysis in aquaculture and understanding basic features and application of the FAO Aquatic Animal Pathogen and Quarantine Information System. Valuable input, provided by participants will improve the information contained in the generic case studies that were used during the workshop.



Tilapia cages at Lake Harvest, Zimbabwe

Future Work

Past sessions of the Committee on Fisheries (COFI 28) and COFI Sub-Committee on Aquaculture (COFI/SCA IV and V) highlighted the importance of aquatic biosecurity as an essential element for sustainable aquaculture development and the need to support FAO Members to improve their capacity for “preventative actions” as well as “early action capacities” when dealing with biosecurity issues and emergencies. Effective national biosecurity governance, regional and global partnerships and champions are needed so that the risks and threats posed by transboundary diseases of aquatic animals can be minimised and associated losses and other negative impacts reduced.

FAO will continue to provide the assistance required by countries in the region in partnership with other organizations such as the OIE and WfC and building on the various capacity building initiatives already put in place since 2007.



A field visit to Lake Harvest tilapia culture facility in Zimbabwe was made as part of workshop activities. Example of farm level biosecurity practices at the tilapia farm

Ecolabelling, Certification and Responsible Fisheries and Aquaculture

Reported by **Devin M. Bartley**

Marine and Inland Fisheries Service
FAO Fisheries and Aquaculture Department, Rome, Italy
Devin.Bartley@fao.org

Introduction

The use of market forces, i.e. ecolabelling and certification, is becoming a common strategy to promote sustainable and responsible fisheries and aquaculture. The Department of Fisheries and Aquaculture of FAO (FI) is heavily involved through several current activities:

- In 2009, the 28th Session of the Committee on Fisheries (COFI) adopted the revised Guidelines on Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries¹ (referred to here as revised Marine Guidelines). The guidelines had been adopted by COFI in 2005 and revised based on an expert consultation in 2008.²
- At the request of COFI, an FAO expert consultation in May of 2010 revised the draft guidelines on Ecolabelling of Fish and Fishery Products from Inland Capture Fisheries (referred to here as draft Inland Guidelines). The guidelines were originally created by an expert consultation in 2006 and the revision will be submitted to the 29th Session of COFI for adoption³.
- After over four years of negotiation and consultations, the 5th Session of the COFI Sub-Committee on Aquaculture in October of 2010 adopted the draft Technical Guidelines on Aquaculture Certification⁴. These draft guidelines will also be submitted to the 29th Session of COFI for adoption.
- The FAO revised Marine Guidelines and draft Inland Guidelines currently provide minimum criteria for ecolabelling schemes but there is no agreed framework to evaluate the schemes' conformity with the FAO revised Marine and draft Inland Guidelines, i.e. how does one determine if a ecolabelling scheme really is consistent with the FAO guidelines. Therefore, COFI further requested FI to develop an

evaluation framework to assess the conformity of public and private ecolabelling schemes with the FAO Guidelines. FAO convened an expert consultation in November of 2010⁵ to develop such an evaluation framework. In light of the fact that the draft FAO Guidelines for the Ecolabelling of Fish and Fishery Products from Inland Capture Fisheries have been developed, it can be expected that a similar request will be forthcoming for inland fisheries. Therefore, the Expert Consultation noted that an evaluation framework should be produced for both marine and inland capture fisheries. The benchmarking framework will be developed in accordance with the minimum requirements set out in the FAO revised Marine and the draft Inland Guidelines.

The above guidelines all strive to ensure sustainable and responsible use of aquatic resources for food and aquaculture. There are, however, some significant differences between them. This brief note is to inform readers on FI's ongoing work, to look at those differences and to think about addressing them in the future.

Marine capture fisheries and inland capture fisheries guidelines and the role of enhancements

The draft Inland Guidelines and the revised Marine Guidelines are extremely similar. The major difference is in the scope of what types of fisheries are covered by the two sets of guidelines. The revised Marine Guidelines do not specifically address enhanced fisheries, i.e. there is no special consideration given to marine fisheries supported or supplemented by stocking, habitat modification, or other means of enhancement. The 2010 Expert Consultation on inland fisheries reiterated the point made by earlier Expert Consultations in 2006 and 2008 that the use of enhancement is common in inland fisheries and under specific conditions should be within the scope of fisheries covered by the draft inland guidelines.



A fish vendor gutting fish at Baghdad market

Enhancement practices range from no enhancement in pure wild production fisheries to highly controlled aquaculture systems. The Expert Consultation recognized the need to define carefully the scope of inland fisheries eligible for an ecolabelling related to, inter alia, the relationship between the type of enhancement activities or production system and the intent of management with respect to the “stock under consideration”.

The 2010 Expert Consultation agreed that a fishery management system for enhanced fisheries should take into account that:

- Stocking material originating from aquaculture facilities should meet relevant provisions of Article 9 of the Code of Conduct for Responsible Fisheries; and
- Natural production processes should be maintained and adverse impacts on ecosystem structure and function minimized.

The Expert Consultation concluded that culture-based fisheries (CBF), specifically, those fisheries that are supported solely by stocking (i.e. with no associated management intent to sustain the natural reproduction components and capacity of the “Stock Under Consideration”), are clearly different than stock enhancement programs and would not fall within the scope of the draft inland capture guidelines.

The Expert Consultation to develop an evaluation framework to assess the conformity of public and private ecolabelling schemes with the Marine Guidelines noted that enhancements are becoming

more common in marine fisheries⁶ and that further work was needed in order to address the role of enhancement in marine fisheries in regard to ecolabelling. There are some marine fisheries that are heavily supported by stocking that have been given an ecolabel. For example, the Marine Stewardship Council has certified Alaska salmon fisheries⁷ which include five species of Pacific salmon; the contribution of stocking to the catch of several of

these fisheries is more than 50 percent.

Similarly, the draft Inland Guidelines explicitly address the issue of species introductions and alien species. The 2010 Expert Consultation on inland fisheries realized that there may be circumstances where countries with depauperate inland fauna or modified aquatic ecosystems may wish to introduce new species to increase production and value from these areas. The 2006 Expert Consultation felt that, if these introductions followed international guidelines and risk assessment, the associated fisheries should be eligible for an ecolabel. However, the 2008 and 2010 Expert Consultations felt that application of guidelines, risk assessment and subsequent monitoring and enforcement were not sufficiently established to ensure adequate protection of aquatic ecosystems. Therefore, the Expert Consultation agreed that *new* introductions for fisheries would fall outside the scope of the guidelines. However, stocks introduced historically and that have subsequently become established as part of the “natural” ecosystem would be considered as being eligible for an ecolabel.

The 2010 Expert Consultation on inland fisheries noted that the CBF are becoming an increasingly important food fish production activity particularly in developing countries. CBF in developing countries are attractive to many governments as they involve low capital investment and entail use of small water bodies for the secondary purposes of food fish production, often managed under co-management regimes. Some CBF activities border on or fall within the realm of aquaculture. The Expert Consultation recommended that some

other guidelines could be developed or used for certifying good management practices for CBF, either using aquaculture certification guidelines under development or by establishing a separate set of certification guidelines for this category of enhanced fisheries.

Aquaculture Certification Guidelines

The aquaculture guidelines on certification are broader than the above *ecolabelling* guidelines for capture fisheries. The aquaculture guidelines consider a range of issues which should be considered relevant for the certification in aquaculture, including: a) animal health and welfare, b) food safety, c) environmental integrity and d) socio-economic aspects associated with aquaculture.

The extent to which a certification scheme seeks to address these issues depends on the objectives of the scheme, which should be explicitly and transparently stated by the scheme. Development of certification schemes should consider the importance of being able to measure performance of aquaculture systems and practices, and the ability to assess conformity with certification standards.

The Aquaculture Certification Guidelines will also be submitted to the 29th Session of COFI for adoption.

Conclusion

Throughout the process of developing the above guidelines there has been concern that the guidelines could result in barriers to trade. FI recognized these concerns, and had been explicit in the instructions given to the expert consultations and other meetings convened (as part of the process towards developing the the guidelines) to ensure that this was taken into account. Every effort had been made in the text of the guidelines to avoid the guidelines becoming a barrier to trade.

There are some differences between the Marine and draft Inland Guidelines, namely in the area of enhancements and species introductions. It may be necessary to re-examine the Marine Guidelines if addressing these issues is deemed to be important in ecolabelling programmes.

Additionally, it would seem to be expedient and in order to reduce confusion - to have a single set of guidelines on capture fisheries rather than

to maintain the current separation based on salt content of the water. This could eliminate the problem of deciding if a lagoon or estuary is inland or marine, where a delta wetland stops becoming coastal and becomes inland, and whether diadromous species are inland or marine. It would also eliminate the need and expense for two sets of consultations to address similar issues. The Expert Consultation to establish a benchmarking framework realized the value of a single framework for both inland and marine fisheries and is to be commended for taking the pro-active step and including inland fisheries in their deliberations. Indeed, all of the expert consultations are to be commended for the hard work and good advice given to FI. This advice is greatly appreciated.

It is expected that COFI 29⁸ will adopt the above guidelines on inland fisheries and aquaculture. It will be important to monitor the implementation of these guidelines to ensure that they are not hindering international trade and that they are accomplishing their intended goal, the sustainable and responsible use of living aquatic resources.

¹FAO Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries (Revision 1). Directives pour l'étiquetage écologique du poisson et des produits des pêches de capture marines (Révision 1). Directrices para el ecoetiquetado de pescado y productos pesqueros de la pesca de captura marina (Revisión 1). Rome, FAO. 2009. 97p.

²Report of the Expert Consultation on the FAO Guidelines for Ecolabelling for Capture Fisheries. Rome, 3–5 March 2008. *FAO Fisheries Report*. No. 864. Rome, FAO. 2008. 21p.

³Report of the Expert Consultation on the Development of Guidelines for the Ecolabelling of Fish and Fishery Products from Inland Capture Fisheries. Rome, 25–27 May 2010. *FAO Fisheries Report*. No. 943. Rome, FAO. 2010. 37p.

⁴Technical Guidelines on Aquaculture Certification. *FAO Fisheries and Aquaculture Report/FAO Rapport sur les peches et l'aquaculture/FAO Informe de Pesca y Acuicultura*. No. 950 Rome/Roma, FAO. 2010. 158p. Appendix/Annex/Appendice G.

⁵Report of the Expert Consultation to Develop an Evaluation Framework to Assess the Conformity of Ecolabelling Schemes with the FAO Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries. FAO Rome. November, 2010. In preparation.

⁶See for example the proceedings of the International Symposia on Stock Enhancement and Sea Ranching at

www.searanching.org

⁷www.msc.org

⁸As FAN 46 was going to press, the 29th Session of COFI adopted both the draft Guidelines on Ecolabelling of Fish and Fishery Products from Inland Capture Fisheries and the draft Technical Guidelines on Aquaculture Certification.

Global Conference on Aquaculture (GCA) 2010

22-25 September 2010, Movenpick Hotel, Phuket, Thailand

Reported by Rohana P. Subasinghe and Melba B. Reantaso

Reflecting on the progress made in developing aquaculture as a sustainable food producing sector through two milestone events beginning from the Kyoto Conference in 1976, and 25 years later during the Conference on the Third Millennium in 2000, the Global Conference on Aquaculture 2010 was designed to bring together a wide-ranging group of experts and important stakeholders to review aquaculture progress and further potential, as a basis for positioning the sector and its agenda to the global community. The conference was co-organized by FAO, the Network of Aquaculture Centres in Asia-Pacific (NACA) and the Department of Fisheries of the Royal Government of Thailand.

The objectives of the Conference were to:

- review the present status and trends in aquaculture development;
- evaluate the progress made in the implementation of the 2000 Bangkok Declaration and Strategy;
- address emerging issues relevant for aquaculture development;
- assess opportunities and challenges for future aquaculture development; and
- build consensus on advancing aquaculture as a global, sustainable and competitive food production sector.

Unique conference structure

In order to achieve the Conference objectives, this large event was uniquely structured into four dynamic sessions over four days. The Conference technical programme included: (a) two keynote addresses; (b) three invited guest lectures; (c) six regional reviews and one global synthesis; (d) 41 thematic presentations covering six broad thematic areas which included: (i) resources and technologies for future aquaculture, (ii) sector management and governance, (iii) aquaculture and the environment, (iv) responding to market demands and challenges, (v) improving knowledge, information, research, extension and communication in aquaculture, and

(vi) enhancing its contribution to food security, poverty alleviation and rural development.

The Conference was ceremonially opened by the representatives from FAO, NACA and the Thai Department of Fisheries. Mr Hiroyuki Konuma, Assistant Director General of FAO Regional Office for Asia and the Pacific, Professor Sena De Silva, Director General of NACA and Ms Somying Piumsombun, Director-General, Thai Department of Fisheries all gave welcome remarks during the opening of the conference.

Immediately after opening, Prof. Swaminathan, known as the Father of Green Revolution in India and World Food Prize awardee, delivered the first keynote address. Prof. Swaminathan emphasized the concepts of food security and nutrition while pointing out that the “nutritional security” becomes more and more relevant for humans in a changing world subject to new and increasing climatic and environmental threats. He also referred to the renewed commitment of the United Nations and UN organizations to deliver “as one” ensuring a coordinated approach to food security and nutrition. Prof. Swaminathan also pointed out that since agriculture and aquaculture are deeply connected, both sectors need to focus into the nutrition security system.

Mr Jiansan Jia, Chief of the Aquaculture Service of the FAO Fisheries and Aquaculture Department made the second keynote presentation. Mr Jia discussed the progress made in the aquaculture sector globally since 2000 and analyzed how such progress addressed the provisions of the Bangkok Declaration and Strategy, which was adopted during the Aquaculture in the Third Millennium Conference in 2000.

The keynote addresses and invited guest lectures provided the scene and gave inspiration and aspiration to aquaculture development. The regional reviews and global synthesis, and thematic papers facilitated global understanding of the



Top photo (L to R): Opening ceremonies of GCA 2010 commenced in the presence of dignitaries Mr Jiansan Jia (Chief, Aquaculture Service, FAO Fisheries and Aquaculture Department), Mr Hiroyuki Konuma (Assistant Director General, FAO Regional Office for Asia and the Pacific), Dr Somying Piumsombun (Director General, Department of Fisheries, Thailand), Mr Thammarat Wanglee (Advisor to the Minister of Agriculture and Cooperatives, Thailand), Prof. M. S. Swaminathan (UNESCO Chair in Ecotechnology and Chairman of M. S. Swaminathan Research Foundation), Prof. Sena De Silva (Director General, NACA), and Mr Killus Nguvauva (Deputy Minister, Ministry of Fisheries and Marine Resources, Namibia). Opening remarks were delivered by Dr Piumsombun (Left photo), Prof. De Silva (Bottom photo, left), and Mr Konuma (Bottom photo, right)



current status of aquaculture development and the numerous issues facing the sector on key aspects pivotal to aquaculture development, management and sustainability in the coming decades. A session of 149 posters (mainly coming from PhD students) enabled presentation of technical and experience papers and provided a forum for interaction between students, experts and stakeholders.

Four side events offered a platform to bring together various stakeholders to discuss important issues; these included:

1. GTZ and FAO – *Improving Sustainability of Seafood Production and Trade: Opportunities and Challenges*
2. Thai Department of Fisheries in collaboration with the Norwegian Ministry of Fisheries and Coastal Affairs and FAO – *Aquaculture Industry Dialogue*
3. SEA-EU NET, European Commission (Directorate General for Research Technological Development – DG RTD) and FAO – *Introducing Aquaculture Research Opportunities under the European Union's Seventh Framework Programme (FP7)*
4. ANAF, NACA, NACEE, RAA and FAO – *Regional Networking in Aquaculture*

An additional side event on Pacific Island Aquaculture was organized by FAO Sub-regional Office in the Pacific and the Secretariat of the Pacific Community.

In addition to the above, the conference co-organizers and side events co-organizers also made a display of posters and publications. FAO, in particular, prepared a special 15-minutes video entitled: Turning Points in Modern Aquaculture which run at the conference venue lobby and during the farewell dinner.

A summary of recommendations and conclusions for all thematic review presentations was discussed and adopted. The Conference concluded with a plenary presentation and adoption of the “Phuket Consensus”, aimed at re-affirming the commitment to the Bangkok Declaration and Strategy as the guidance for aquaculture development, and addressed the key elements that require further strengthening to increase effectiveness, achieve development goals, and address emerging threats and opportunities in the sector.

Well-attended and triggered great interest

The conference was very well attended and triggered great interest, in fact, registration was closed two weeks before the conference started because it had already reached the holding capacity of the meeting rooms. Indications of interest to participate came from a wide range of stakeholders, including government, academia, education, research, industry and many others. Over 650 participants (government, academia, education, research, industry and others) from 69 countries participated.

All presentations, including the side events were very well received. Participants congratulated FAO for the comprehensive coverage of reviews and for the neutral approach in which they were presented.

Outcomes and expectations

Three weeks after the conference, NACA has created a web link (<http://www.enaca.org/modules/aqua2010/presentations.php>) that contained audio recordings of keynote addresses, plenary lectures, invited guest lectures, thematic session presentations and discussions for download and online streaming.

The expected publication outputs of GCA 2010 include the following:

- GCA 2010 Conference proceedings containing all thematic review papers
- Six regional reviews to be published as six FAO Circulars
- One global synthesis as an FAO Fisheries and Aquaculture Technical Paper
- Phuket Consensus

On behalf of the Organising Committee,
we wish to express our sincere thanks
to all who supported and participated
in the Conference

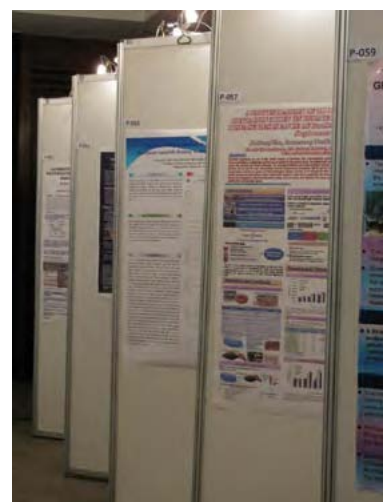
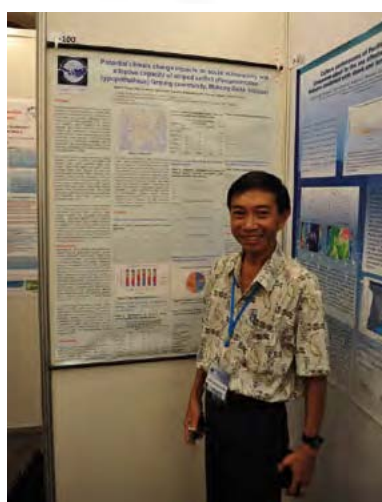


Top photo: The conference was attended by over 650 participants from public, private, and academic sectors from 69 countries. Middle photo, left: The first Opening Keynote Address was presented by Prof. M.S. Swaminathan on “Aquaculture and Sustainable Nutrition Security in a Warming planet”. Middle photo, right: The second Opening Keynote Address was delivered by Mr Jiansan Jia on “Global aquaculture development since 2000: progress made in implementing the Bangkok Declaration and Strategy for Aquaculture Development Beyond 2000”. Bottom photo: Plenary discussions were held after each thematic session presentation by lead author of the thematic review; members of the expert panel who contributed to the thematic review were invited on the stage, during the session





Top photo: Prof M.S. Swaminathan with members of FAO Conference Secretariat as FAO Regional Officers. Middle photo, left: He was handed a token of appreciation by Prof Sena De Silva. Middle photo, right: The conference attracted national as well as international attention, Dr Somying Piumsombun responded to questions by the national media after the opening ceremonies. Six regional reviews and one global review were presented at the conference; Dr Laszlo Varadi presented Aquaculture development in Europe: current status and future prospects in the session on regional review (Bottom photo, middle)



Snapshots of conference proceedings. Top and bottom photos: Participants during the session and in front of FAO booth. Middle photos: The conference had 144 posters on display, and there was a special session for viewing with authors Day 2 conference



On behalf of the Organising Committee,
we wish to express our sincere thanks
to all who supported and participated
in the Conference



Top photos: left: Prof Swaminathan (middle), Jiansan Jia (right) and delegate from India (left); right: Robin Wardle representing Intervet Schering-Plough Animal Health, one of the major sponsors of GCA 2010
Middle photos: Participants from various countries and organizations pose in front of FIRA poster
Bottom photos: left: Participants examines GCA 2010 aquaculture publications of FAO; right: more delegates





GCA 2010 co-organizers prepared posters showing the mission/objectives/activities of respective organizations: FAO (top photos), NACA (middle photos), and Thailand DoF (bottom photos)





Top photo: FAO Secretariat and Chairperson of the Fifth session of COFI Sub-Committee on Aquaculture Dr S. Chinabut (third from left) during the deliberation of Agenda No. 4 on Aquatic Biosecurity: a key to sustainable aquaculture

Middle photo: Members of the FAO Team from headquarters, regional and subregional offices pose after the end of the COFI SCA V session

Bottom photo: Members of FAO Secretariat and Thailand Department of Fisheries celebrate the successful conduct of the Fifth session of the COFI Sub-Committee on Fisheries



Fifth session of the COFI Sub-Committee on Aquaculture (COFI/SCA V)

27 September to 1 October 2010, Phuket, Thailand

Reported by Rohana P. Subasinghe and Melba B. Reantaso

Fifty nine Members of FAO, three observers each from inter-governmental and international non-governmental organizations attended the session which was hosted by the Department of Fisheries, Thai Royal Government. Ms S. Chinabut (Thailand), served as Chairperson and Mr M. Hlatshwayo (South Africa) as elected first Vice-Chairperson. Chile and France were elected second and third Vice-Chairpersons, respectively. Mr Y. Torgersen (Norway) served as Chairperson of the Drafting Committee with the membership composed of Canada, Germany, India, Norway, Papua New Guinea, South Africa, Thailand and the United States of America. Mr K. Cochrane provided the opening statement on behalf of the FAO Director-General, the Minister of Thai Agriculture Cooperatives provided the opening remarks.

Compared with the previous sessions, SCA V (Thailand) ranked second highest in attendance after SCA II (Norway).

Highlights of Discussions

Agenda 1: The FAO Fisheries and Aquaculture Department's Efforts in Implementing the Recommendations of the Past Sessions of the Committee on Fisheries Sub-Committee on Aquaculture (COFI/SCA). Introduced by Mr J. Jia, efforts by FAO were appreciated by members who expressed satisfaction on the progress made, within limited financial resources and reaffirmed support for FAO activities. Further support and priority to Africa was reiterated by the SCA; Pacific region countries requested SCA to also focus support to least developed aquaculture countries in the Pacific. Members appreciated FAO's role in promoting web-based informations systems, networks and other programmes among countries. Special reference was made to SPADA, ANAF, RAA and urged FAO for efforts to strengthen these networks. The session reiterated the need for strategic framework for the work of the SCA to better identify and evaluate completed and ongoing activities as well as priorities that could not be completed due to resource constraints and the importance of working closely with the Sub-Committee on Fish Trade.

Agenda 2. Improving the Progress Reporting on the Implementation of the Code of Conduct for Responsible Fisheries (CCRF), Provisions Relevant to Aquaculture and Culture-based Fisheries and the Proposal for a Revised Reporting Mechanism on CCRF with an Interactive Questionnaire Format. Introduced by Ms D. Soto, members appreciated significant improvement in the questionnaire and emphasized its importance as a tool for self-assessment and could assist members in improving aquaculture governance. An instruction manual with guidance for completion is necessary.

Agenda 3. Guidelines on Aquaculture Certification. Introduced by Mr L. Ababouch, the Sub-Committee thanked FAO and members for the hard work in preparing the guidelines. Because a consensus could not be reached even after extensive discussion in the Plenary, the Chair created a "Friends of the Chair" (FOC) group comprising of Brazil, Canada, Chile, Egypt, Germany, India, Kenya, Namibia, Norway, Senegal, South Africa, Thailand, Uganda and the United States of America in order to assist the Chair in reaching consensus. India was elected as the Chair of this group. Several Members, while supporting adoption of the draft guidelines, expressed their concern that the guidelines could result in barriers to trade. The Secretariat and other Members recognized these concerns, but emphasized that every effort had been made in the text of the guidelines to avoid this. Furthermore, the Secretariat informed that it is standard practice for FAO to work towards avoiding the creation of barriers to trade. Argentina and Brasil expressed some reservations and these have been reflected in the report. The need to review the guidelines in the future was emphasized and the Sub-Committee agreed that the performance and implementation along with a mechanism for review should be discussed at the next session of the Sub-Committee. With the above explanations and revisions, the Sub-Committee adopted the draft guidelines (The Technical Guidelines on Aquaculture Certification) and requested COFI to approve them at its 29th Session.



Opening ceremony



Plenary hall



Myanmar



Argentina



Azerbaijan



Bahrain



Guinea



Namibia

Agenda 4. Aquatic Biosecurity: A Key for Sustainable Aquaculture Development. Introduced by Ms M. Reantaso, the secretariat was congratulated for the comprehensive document covering many important issues within the broad concept of biosecurity and expressed appreciation to FAO for highlighting the subject as an essential element of sustainable aquaculture. While supporting the biosecurity actions presented in the working document, many Members noted that action should be taken as soon as possible on the principle that prevention is better than cure. Request for assistance to develop regional and national biosecurity strategies and plans as well as continued assistance to southern Africa on a regional policy framework and an implementation strategy on aquatic biosecurity were raised by many members. Development of technical guidelines on species introductions and incorporation of biosecurity in the preparation of the FAO CCRF Technical Guidelines on Recreational Fisheries. Irresponsible use of veterinary medicines was recognized as posing possible significant biosecurity risks not only for sustainable aquaculture development but also for human health and rural livelihoods. Risk assessment and analysis was recommended as an important decision-making tool to decide how to achieve the overlapping and sometimes conflicting goals of food security, economic growth and protection of biodiversity.

Agenda 5. Climate Change and Aquaculture: Opportunities and Challenges for Adaptation and Mitigation. Introduced by Mr M. Hasan, the Sub-Committee identified several groups that would be particularly vulnerable to the impacts of climate change, notably small-scale farmers who may have limited resources to adapt; some Members noted the impact of sea level rise already affecting small island developing states and countries with low-lying coastal areas. Members stated that both short and long-term adaptation and mitigation strategies are needed and a multi-disciplinary approach should be pursued. As climate change may affect availability of key resources used in aquaculture, an integrated ecosystem approach will need to be pursued with the aquaculture sector as a key stakeholder. Innovations that could help in reducing and mitigating the effects of climate change have been identified by Members who also recommended to expand the knowledge-base on climate change and its impacts with particular areas of emphasis on temperature rise, ocean acidification, use of predictive models, and alternative energy sources. A database for monitoring the impacts of climate change on aquaculture and for cataloguing projects dealing with climate change were also recommended. Harmonized methods of analysis of the impacts of climate change was suggested as needed so that information generated by different fora will be comparable. The importance and urgency of good governance to enable appropriate responses to address



FAO, SPC, Cook Islands



South Africa, FAO



Turkey



FAO, South Korea

Coffee break



Brazil, South Africa, Uganda



Cambodia, Malaysia, Viet Nam, Guinea



Cambodia, Viet Nam, Senegal



Canada, United States of America



China, FAO



Ghana, Botswana, Zambia, United States of America



NACA, Belgium



Thailand, Indonesia, Kazakhstan, Hungary

the uncertainty and unforeseen impacts of climate change were noted.

Agenda 6. Moving Aquaculture Further Offshore: Governance Issues and Challenges. Introduced by Mr N. Hishamunda, the Sub-Committee commended the Secretariat for the document, with some Members calling the document thought provoking or visionary whilst suggesting new points for discussion in future papers and clarification of terminology on the subject. It was recognized that it is inevitable that aquaculture will move further offshore if the world is to meet its growing demand for seafood, noting also development of offshore aquaculture in large inland water bodies. Targetted assistance in capacity building, identification of suitable commodities and assessment of socio-economic impacts on communities were requested. Caution regarding potential negative impacts of offshore aquaculture was raised; as well governance framework for aquaculture in the High Seas as an immediate priority was not recognized by some members. Some recommendations on further work by FAO include clarifying technical and legal terminology related to offshore aquaculture, assessment of impacts, analyses of geographical distribution of marine aquaculture, and documenting strategies to develop offshore aquaculture technologies.

Agenda 7. Coordinating Working Party on Fisheries Statistics. Introduced by Ms S. Tsuji, the Sub-Committee recognized the need for reliable and timely aquaculture statistics and to expand the scope to better monitor and manage aquaculture development worldwide. Updating of the aquaculture statistics framework, including the development of the CWP Handbook for Aquaculture Statistics were regarded as relevant. The inclusion of socio-economic aspects of aquaculture as an integral part of the aquaculture statistical data collection and reporting, wherever possible was widely recognized. The need to cover the production of ornamental fishes, an important livelihood of small-scale producers in many countries, was emphasized and that relevant statistical standards should be developed.

Special Event on the Global Conference on Aquaculture (GCA 2010) - Farming the Waters for People and Food. Presented by Mr D. Bartley, the main objectives of the Conference were to evaluate the global aquaculture development during the past decade since the Conference on Aquaculture in the Third Millennium and to examine the sector development and performance along the lines of the Bangkok Declaration and Strategy. The Sub-Committee took note of the Bangkok Declaration and Strategy, the Conference and the Phuket Consensus in seeking to enhance the aquaculture sector's contribution to achieving the Millennium Development Goals.



Kenya, Mozambique, Namibia



FAO, India, Norway



Sri Lanka, Viet Nam, Indonesia, Malaysia



SCA Chairperson, Thailand, FAO



DOF Thailand hosted SCA V Dinner



Dinner table 1



Dinner table 2



Buffet style dinner



Dinner table 3



Thailand

Any Other Matters. The Cook Islands on behalf of the Pacific Island members present at the Session asked for an FAO inter-regional technical cooperation project to strengthen cooperation among aquaculture networks and also requested FAO to develop technical guidelines for the use of alien species in aquaculture. Senegal delegate mentioned that Senegal and other African countries need to increase the use of native aquatic species by making them more productive through genetic improvement programmes and requested FAO's assistance for this purpose.

Acknowledgements. The Sub-Committee expressed its appreciation and gratitude to the Thai people and the Royal Thai Government for their warm hospitality and excellent organization in hosting this event.

Date and Place of the Sixth Session. The sixth session of the Sub-Committee will be held in South Africa in 2012. The Sub-Committee expressed its gratitude to the Government of South Africa for its offer to host the session. The exact date and place of the sixth session will be decided in consultation with the South African government and will be communicated to Members during the 29th session of the Committee on Fisheries. South Africa invited all Members and, in particular, the other African countries to participate in making the event a success. Further information can be obtained by writing to COFI/SCA Technical Secretary at: Rohana.Subasinghe@fao.org

On-Farm Feeding and Feed Management in Aquaculture

Manila, the Philippines, 13 - 15 September 2010
in collaboration with the Aquaculture Department, Southeast Asian Fisheries Development Center (SEAFDEC/AQD),
Iloilo city, the Philippines

Mohammad R. Hasan

Aquaculture Service
FAO Fisheries and Aquaculture Department, Rome, Italy
Mohammad.Hasan@fao.org

It is generally accepted that feed costs account for the highest single production cost in aquaculture grow-out production systems. Typically, in intensive production systems, feed accounts for between 60 and 80 percent of operational costs. In contrast, in semi-intensive systems, feed and fertilizer use represents between 30 and 60 percent of the total cost of production.

From an economic perspective, the high costs that accrue to feed use suggest that the optimization of feed management practices will have a significant impact on the economic viability of an operation. In this regard, farmers' perceptions play a critical role. Misconceptions and a poor understanding of the effect that feed management practices have on feed utilization and productivity often result in overfeeding stock in the belief that more feed will produce more fish. In many instances, these perceptions are created and perpetuated by feed manufacturers and result in production inefficiencies and the overuse of feeds. Often high quality, commercially produced feeds are provided to aquaculture systems with little regard to the economic or nutritional rationale for their use. Such practices may result in feed wastage and the poor economic performance of the production systems. Factors affecting the poor feed utilization and resulting in high feed conversion ratios (FCRs) include the inappropriate selection of feed type (pellet type and formulation), quality and the feeding strategy. Among others, the quality of the feed is influenced by the quality and digestibility of the feed ingredients, the suitability of the formulation in terms of supplying the nutritional requirements of the culture species, the stability of the feed in the water, the storage and handling of the feed, and whether the feed is extruded or pelleted. In this regard, some farmers have shown an inclination to use extruded floating pellet, probably without attempting to use other

management options to best utilize the sinking pellet or farm-made aquafeeds.

Two of the most important factors that can lead to feed wastage are overfeeding and the application of poor feed management strategies by farmers. In this regard, farmers can significantly improve FCRs by regulating rations and optimizing feeding frequency, duration and timing. Importantly, the application of appropriate feed management techniques and/or improving feed quality can improve feed utilization and overall farm productivity without increasing the cost of production. There have been many studies that have indicated that while the use of high-quality feed may not necessarily provide high returns, improvements to feed management protocols can significantly increase returns, and in this regard, it has been reported that improvements to feed management practices can reduce the feed cost by 15–20 percent.

Taking the above considerations into account, the Aquaculture Service (FIRA) of the FAO Fisheries and Aquaculture Department has initiated the work programme: "On-farm feeding and feed management in aquaculture". The objectives of this work programme are to evaluate the mechanisms available for introducing cost- and ingredient-saving feed management strategies for finfish and crustacean aquaculture and to develop suitable guidelines for their dissemination to farmers. The ultimate objective of the programme is to promote a reduction in feed use through the promotion of improved feed management practices.

In support of the above work programme, FIRA, in collaboration with the Southeast Asian Fisheries Development Center Aquaculture Department (SEAFDEC/AQD), organized an expert workshop entitled "On-farm feeding and feed management in aquaculture" in Manila, the



AQD Chief Dr Joebert D. Toledo (2nd from right), next to Dr Toledo is BFAR-IV Regional Director Dr Rosa Macas, Mr Kazuyuki Tsurumi (4th from right), the FAO Representative in the Philippines and Dr Mohammad R. Hasan (5th from right), Aquaculture Officer, FAO FIRA

Philippines, from 13 to 15 September 2010. The workshop was hosted by the SEAFDEC/AQD and was held at the Microtel Mall of Asia, Pasay City, the Philippines.

The objectives of the workshop were to: (a) review and analyze the existing knowledge on the application of feed management as a tool for reducing feed costs in aquaculture; (b) identify the major issues and constraints of feed management that need to be addressed; and (c) prepare a list of recommendations to define/suggest the future course of action, including preparation of technical manuals/guidelines for dissemination to farmers. The workshop brought together acknowledged international experts, including authors of invited reviews and case studies, and experts from government agencies, universities, international and regional organizations and private industries and organizations. The workshop was attended by 47 participants including 10 members of the local organizing committee and five observers. Participants came from Africa, Asia, Europe and North America.

The workshop convened both in plenary and in working groups. In the plenary, participants heard technical presentations intended to orient them on the issues and constraints pertaining to on-farm feed management. These presentations included invited reviews, case studies (11 case studies from 8 countries covering 6 species/species-groups) and global synthesis. The species/species-group included in the case studies are Nile tilapia, Indian major carps, striped catfish, whiteleg shrimp, tiger shrimp and freshwater prawn. Country coverage for the case studies are Bangladesh, China, India,

Philippines, Thailand and Viet Nam from Asia and Egypt and Ghana from Africa. The working group discussion specifically addressed three issues relating to on-farm feed management, namely: a) production and logistics (e.g. procurement, transportation and storage) of feeds (farm-made and commercial); b) feeding strategies and the assessment of feed quality and performance; and c) economics of feed management and the assessment of regulatory and legal frameworks. The groups were tasked with identifying the five major issues within their thematic areas, and to prioritize these issues, recommend actions required to address them. Following the working group deliberations and subsequent reporting to plenary, the workshop agreed on a series of recommendations and actions that could be implemented to improve on-farm feed management. The workshop identified seven major issues that need to be addressed, namely:

Issue 1: Limited access to information on feed and feed ingredients: availability, prices and quality.

Recommended actions:

- Identify and encourage local media and local agencies to disseminate feed ingredient information (e.g. quality, availability, cost, suppliers) at regular intervals and in local languages.
- Disseminate species-specific information on the recommended/optimal quality and inclusion rates of feed ingredients. Prior to dissemination, this information should be translated into local languages.
- Launch a pilot database (small area-specific programme) to inform farmers and feed suppliers of the current status of feed ingredient availability and price. If this intervention proves successful, it could be replicated in other areas.

Issue 2: Poor feed preparation, processing, handling and storage at the farm level.

Recommended actions:

- Improve farm-made/small-scale feed manufacturing through the development and promotion of simple on-farm feed processing (grinding/pelleting/drying, etc.) technologies.
- Maintain feed quality through the development and promotion of simple feed storage systems to protect feed products from deleterious environmental parameters (sunlight, humidity, rain, etc.).
- Discourage the unregulated top-dressing of commercial and farm-made feeds.

Issue 3: Inadequate monitoring of feed and farm performances.

Recommended actions:

- Develop feeding tables based on species, body mass, developmental stage, culture system and the associated environmental parameters.
- Promote the use of feeding devices to monitor feed consumption and feeding behaviour.
- Conduct on-farm research to evaluate and establish the nutritional contribution from natural productivity (qualitative and quantitative analyses), the nutritional status of the particular culture system, and the interaction between natural productivity and the supplemental feed requirement.
- Develop and adopt simple indicators that can be used by farmers to gauge the natural productivity in their production systems.
- Encourage farmers to improve their record keeping and monitoring activities through the use of record books and simple record tables outlining feed use, stocking, harvesting and sampling activities.
- Farmers need to be provided with training to improve their record keeping activities, and improve their abilities to assess the performance of their production systems (e.g. growth, FCR, health management, survival). Where appropriate, farmers need to be trained to undertake corrective actions to improve farm performance.

Issue 4: Low impact of current dissemination strategies on improved feeding and feed management.

Recommended actions

- Identify good/better feed management practices and demonstrate/disseminate them to other farmers through a cluster approach (farmer networks).
- Encourage dissemination of farmers' innovations on novel feed management practices.
- Identify key leader/innovative farmers, provide leadership training and encourage them to promote BMPs. Organize farmers into groups/cooperatives or establish networks of farmers and develop farmer-to-farmer training programmes/farmer field schools.

Issue 5: Gaps in the understanding of the economic aspects of feed management

Recommended actions:

- Farmers need to be provided with training in business management techniques that will enable them to make informed economic decisions in terms of feed choice and the feed



M. Hasan, FAO

During the workshop dinner: Dr Sadasivam J. Kaushik, INRA, France and Relicardo M. Coloso of SEAFDEC/AQD flanking Dr Mae R. Catacutan, Chairperson Local Organizing Committee

management protocols that they apply.

- Develop and disseminate to farmers user-friendly economic tools that are designed to demonstrate the impact of feed choice and feed management on the economic viability of the farming operation.

Issue 6: Health aspects and their implications on feed management.

Recommended action:

- At a species-specific level, develop simple and practical methodologies and indicators to assess fish health and integrate these into feed management protocols.

Issue 7: Feed quality – lack of regulatory mechanisms.

Recommended action:

- Encourage government and farmers to monitor the quality of feeds and feed ingredients.

The report of the workshop has been published as an FAO Fisheries and Aquaculture Report and is available online (<http://www.fao.org/docrep/013/i1915e/i1915e00.pdf>). The complete workshop proceedings will be published as an FAO Fisheries and Aquaculture Technical Paper entitled "On-farm feeding and feed management in aquaculture".

Further details of the workshop report and the proceedings can be obtained by email:

Mohammad.Hasan@fao.org

RECOFI Technical Workshop on Spatial Planning for Marine Capture Fisheries and Aquaculture

José Aguilar-Manjarrez¹, Fabio Carocci²,
Alessandro Lovatelli¹ and Valerio Crespi¹

¹Aquaculture Service

Jose.AguilarManjarrez@fao.org; Alessandro.Lovatelli@fao.org and Valerio.Crespi@fao.org

²Marine and Inland Fisheries Service

FAO Fisheries and Aquaculture Department, Rome, Italy

Fabio.Carocci@fao.org

A Strategy on spatial planning is considered one of the essential requirements for ensuring sustainable marine capture fisheries and aquaculture development in the RECOFI region.

The Fifth Session of RECOFI recommended that a joint Workshop between the Working Group on Fisheries Management (WGFM) and the Working Group on Aquaculture (WGA) concerning the use of spatial planning tools (i.e. geographic information system, remote sensing and mapping) for marine capture fisheries and aquaculture should be undertaken, with the main focus being to conduct an assessment of spatial planning tools in the region, focusing on the issues and needs of both marine capture fisheries and aquaculture. The WGFM further identified training exercises on the handling of national data as an essential requisite to raise awareness and enhance spatial analytical capacity in the region.

The Workshop, which took place in Doha, the State of Qatar (24–28 October), was hosted by the Department of Fisheries Wealth, Ministry of Environment, State of Qatar. Twenty-one delegates participated representing seven RECOFI Member countries (the Kingdom of Bahrain, the Kingdom of Saudi Arabia, Sultanate of Oman, the State of Qatar, the State of Kuwait, Islamic Republic of Iran and the United Arab Emirates) and FAO (secretariat staff/resource experts from Rome and consultants¹).

The significant outcomes of the technical workshop were the following:

- **Awareness and Capacity Building on Spatial Planning for Marine Capture Fisheries and Aquaculture** – a significant activity was presented by the FAO Secretariat to provide participants with the acquired knowledge on the use of spatial planning tools to support the ecosystem approach to aquaculture and fisheries (EAA/EAF), case studies to demonstrate experiences to address different issues such as (i) the potential for off-the-coast and offshore mariculture (Figure 1), and (ii) a habitat atlas for Marine Resource Management (CHARM) to assess the status of benthic invertebrate fauna and key commercial fish species of the Eastern English

Channel. Data from remote sensing covering the RECOFI region were also shown as an example of data availability in the region (Figure 2). A special presentation from the commercial sector provided an insight into the data and spatial analysis skills available among RECOFI countries that could be applied to fisheries and aquaculture.

- **RECOFI Regional Spatial Planning for Marine Capture Fisheries and Aquaculture Questionnaire Survey Analysis Report** – eight RECOFI Member countries fully cooperated in the completion of a subject-related questionnaire which was presented and further discussed during the Workshop and served as basis for the development of a regional Strategy for implementing Spatial Planning for Marine Capture Fisheries and Aquaculture.
- **Proposal for a Regional Programme for Implementing the Strategy on Spatial Planning for Marine Capture Fisheries and Aquaculture in RECOFI Member countries** – presented and further developed during the Regional Workshop based on the outcomes of the questionnaire survey, country presentations and the working group discussions. The draft Programme outlined short-, medium- and long-term agreed plans of activities

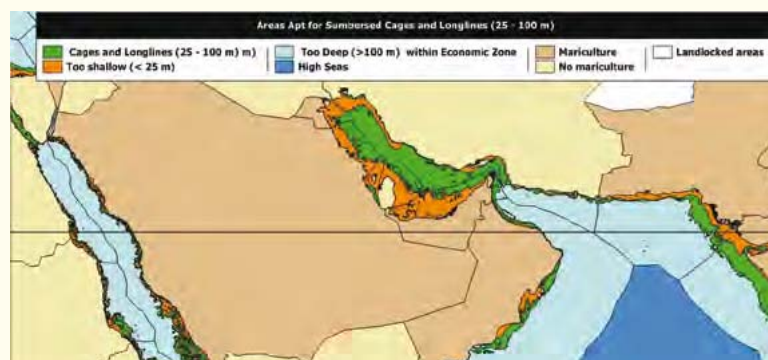


Figure 1. There are vast areas with depths suitable for submerged cages (25–100 m) mainly in the northern portions of the Gulf, but there are also vast areas that are too shallow (<25m), mainly on the southern side. Conversely, much of the Gulf of Oman is too deep for submerged cages. Source: J. Kapetsky and J. Aguilar, FAO

to implement the Strategy on Spatial Planning for Marine Capture Fisheries and Aquaculture in the RECOFI Member countries and identified activities of regional interest and importance.

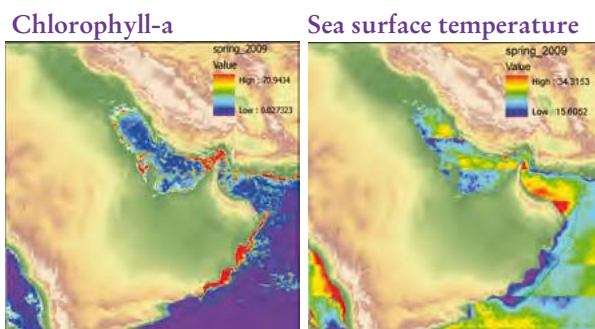


Figure 2. Seasonal snapshots for 2009 of environmental parameters available in the RECOFI region from remote sensing imagery. Source: F. Carocci, FAO

The introductory part of the Strategy sets out its evolution beginning with a recommendation of the RECOFI for a joint workshop between the WGA and the WGFM on the use of spatial planning tools. As a background to the Strategy, the status of both aquaculture and capture fisheries in the RECOFI region waters is described thus providing part of the rationale for spatial planning. Also outlined is the main purpose that is to present a Strategy to enhance and accelerate spatial planning for mariculture and marine capture fisheries in the region. The guiding principles that underlie the outlined components of the Strategy are founded broadly on the EAA and EAF. The Strategy is more narrowly guided by the principles of Marine Spatial Planning and finally by principles especially designed for the RECOFI region.

CONCLUSIONS

Issues in aquaculture pertaining to RECOFI Member countries, and more specifically, issues of farming fishes in cages in the RECOFI region were identified as well as other issues such as the lack of spatial planning. Marine capture fishery issues in the region were also identified from the survey questionnaire's and from a review prepared for this workshop by the international consultants. Many of these issues deal with fishing practices and marine environments. These issues lend themselves to resolution by spatial management but that is presently hampered by a lack of data and by a limited application of spatial planning tools in the Region.

The main strength of the Strategy is that it will allow for the delivery of a tried and tested spatial tool that, having the capacity to perform a vast range of analyses, is certain to bring huge benefits to activities (fishery and/or aquaculture management) whose problems are rooted in spatial differentiation. GIS will not solve every marine management problem but it will give the RECOFI Member countries infinitely greater possibilities than they have at present as well as a spatial framework within which to address the problems.

The Workshop greatly benefitted from participation of delegates from the RECOFI Working Group on Aquaculture and the Working Group on Fisheries Management to better address a number of common spatial planning issues (e.g. data, models, training, experience) requiring synergies that need to be strengthened for the future implementation of the proposed regional Strategy.

A key regional activity and a core component of the regional Strategy will be to identify RECOFI countries and appropriate government agencies who are willing to cooperate in developing regional plans (Marine Spatial Plans) to improve the environmental, social and economic conditions of the RECOFI region and to agree on cooperation. It will be up to RECOFI Members to address issues related to governance-related recommendations contained in the regional Strategy at government level, including, most importantly, acceptance by RECOFI countries on current approaches to marine spatial planning, fishery zoning, and the adoption of EAA and EAF.



Group photograph of workshop participants

A summary of the outcomes and recommendations derived from this technical workshop was presented at the Fifth meeting of the RECOFI WGA for discussion (see article on page 40). The following activities, derived from the proposed regional Strategy, were recommended for inclusion in the WGA Programme of work and budget for the next biennium (05/2011–05/2013): (i) capacity building for spatial planning and management, (ii) aquaculture inventory and zoning, (iii) access to spatial data and information, and (iv) use of the RAIS Web site (<http://rais-aquaculture.net>) as a platform to disseminate spatial data and information.

Further information can be obtained by email:

Jose.AguilarManjarrez@fao.org or

Fabio.Carocci@fao.org

¹Two international consultants on marine capture fisheries (Dr Geoff Meaden) and aquaculture (Dr James McDaidd Kapetsky) respectively, and one national consultant (Dr Talal Al-Awadhi) on GIS from the Sultanate of Oman.

FAO Expert Workshop on Enhancing the Contribution of Small-Scale Aquaculture to Food Security, Poverty Alleviation and Socioeconomic Development

21-24 April, 2010, Hanoi, Viet Nam

Melba B. Reantaso

Aquaculture Service

FAO Fisheries and Aquaculture Department, Rome, Italy

Melba.Reantaso@fao.org

Some 38 experts (see photo next page) from governmental (China, Ghana, Kenya, Uganda, Viet Nam), inter-governmental (NACA¹, SEAFDEC²), regional and international organizations (WorldFish Center, Infofish, CIRAD³, DANIDA⁴), universities (Australia, India, the Philippines, Thailand, Viet Nam and the United Kingdom), including FAO staff, participated in this expert workshop aimed at achieving the following objectives: (i) understand small-scale aquaculture (SSA): its contribution/potential contribution and challenges/issues facing the sector and SSA producers; (ii) identify and elaborate on entry points for enhancing the contribution of SSA to food security, poverty alleviation and socio-economic development; (iii) identify concrete action plans to strengthen capacity of SSA producers and households to deal with threats, risks, shocks, crises and emergencies; and (iv) identify elements of the FAO CCRF⁵ Technical Guidelines (TG) on Enhancing the Contribution of SSA to Food Security, Poverty Alleviation and Socio-Economic Development – based on the results of Objectives 1, 2 and 3.

Defining SSA

The workshop noted the existence of various definitions of SSA [e.g. rural aquaculture Type1, continuum of Type 1 to Type 2 more profit-oriented with small and medium enterprise (SME) characteristics, non-commercial SSA], the need to look at definitions used for small-scale livestock production and small-scale agriculture and the need for definitions to be flexible with changing context. The workshop recognized that SSAs in different countries and regions vary in a lot of ways, in terms of objectives (subsistence or home consumption, as a livelihood or business enterprise, as a response to declining catch from small-scale fisheries or natural resources), in terms of species (both low and high value species), systems (polyculture, mixed polyculture, integrated systems), management (family-based, community-based), intensity of operation (type and level of input, assets and other operations costs), size of operation, beneficiaries and kind of labour employed (family labour, caretakers,

owner-operators), level of profitability, thus, making a global or universal definition difficult. While majority of governments have their own specific definition of SSA (for their own purpose), which includes the physical dimension of the system (i.e. upper limit of the farm or household), some participants pointed out that there are still countries which needed guidance on defining SSA to suit their own purpose and to understand who needs most in terms of support and guidance. The workshop felt that while a definition of SSA is an important issue, it should be recognized that, in general terms, a definition serves a purpose (e.g. statistical purposes; for policy interventions; for measuring its contribution and others) and may not apply to all contexts, regions and countries. For purposes of the FAO CCRF TG on SSA, a description of SSA typology (characteristics, common traits, needs) will be sufficient. The TG will also try to capture the relevant people involved in the sector as well as an appropriate focus not only in Asia but also other aquaculture regions.

Understanding the contribution of SSA

In order to understand the contribution of SSA to the three pillars of food security, poverty alleviation and socioeconomic development, numerous case studies were presented which highlighted the extreme variety of SSA systems, geographical location, levels of contribution, size, investment, ownership patterns, productivity, specialization and intensification and sustainability. Information on the benefits derived from SSA generated from the case studies were based on anecdotal evidence, expert opinion, systematic assessment through an indicator system and other empirical data. Its contribution extends, beyond the primary producers, to secondary employment, i.e. those indirectly involved in providing ancillary services along the value chain (e.g. provision of inputs, trading/marketing and postharvest). The workshop recognized that availability of information, while still limited in terms of desired objectives, is changing rapidly, thus, utilization of currently available methods of measurement (e.g. Nha Trang indicator system, household surveys, impact assessment



studies) offer good guidance as a starting point. Although such methods of measurements of benefits – how, to whom accrued and how much – are useful starting points, a major long-term objective should be to make more systematic assessments based on a clear framework which could be based upon resource systems/agro-ecological zones.

The workshop recognized that with the current renewed interest in agriculture following the recent food crisis and in order to put aquaculture in the proper context, it is necessary to “mainstream” aquaculture and better link it to dominant development discourses. There is also a need to consider the relationship of SSA to the larger-scale aquaculture, aquaculture-based fisheries and agriculture. While SSA has an important role to play in poverty alleviation, as has been demonstrated under various programmes in many countries, it is only one among many options. New understanding of poverty indicates that it is complex, dynamic, multidimensional and very variable in terms of intensity, duration, etc. These are important considerations when determining the role of SSA. The Sustainable Livelihoods Approach has the potential to help the current thinking on SSA; however, there are new alternative frameworks that put people at the center. The following points were put forward as possible ways of moving forward, e.g. (1) giving more attention to SSA producers and how to improve their resilience rather than the SSA systems itself, (2) “deprojectisizing” SSA and giving emphasis to programmatic and longer-term approaches, using interdisciplinarity method (bringing in not only fisheries technical people, but also people with expertise on institutions and social aspects as well as the expertise of small-scale producers themselves); (3) getting out of respective silos and (4) focusing on cross-sectoral integration.

Four working group (WG) sessions followed the first session on understanding SSA. The second WG session, generated a list of issues which described the strengths, weaknesses, opportunities and threats on the role of SSA to the three pillars of food security, poverty alleviation and socio-economic development. While some of the issues identified reflect to a certain extent direct attribution to the role

of SSA to the above three pillars, many of the issues identified were not specific but were still very useful in providing a good overall diagnostic picture of the SSA sector and can be used in drawing the relevant elements that can potentially be included in the TG. The third WG session identified a number of entry points for enhancing the contribution of SSA to the three pillars, including some guiding principles, cross-cutting issues, necessary first steps and a list of ideas for maximizing poverty reduction efforts. The fourth WG session identified concrete action plans to enhance the contribution of SSA to the three pillars. The workshop also identified the elements of the SSA TG, the draft table of contents and a team of experts who will assist FAO in completing this task.

The Way Forward

The Way Forward concluding session came up with a number of activities/actions which may be considered by FAO (in partnership with governments and other relevant organizations) for implementation. These include: (i) assessment studies, (ii) best practices studies, (iii) best marketing practices studies, and (iv) guidance for SSA producer empowerment through small-scale producer organizations. Follow-up work include the following: preparation of workshop report and dissemination of publication; preparation of SSA TG supported by a technical document (FAO Fisheries and Aquaculture Technical Paper) containing background materials and papers contributed during the Hanoi SSA workshop; generating funding support to implement some of the identified action plans/follow-up recommendations as part of FAO normative programme and/or in collaboration with relevant partners; reporting of the outcomes of the Hanoi SSA expert workshop (SSA TG and implementation of follow-up work) as a potential agenda to future sessions of the COFI Sub-Committee on Aquaculture.

Further information can be obtained from:

Melba.Reantaso@fao.org

¹Network of Aquaculture Centres in Asia and the Pacific

²Southeast Asian Fisheries Development Center

³Agricultural Research for Development (France)

⁴Danish International Development Agency

⁵Code of Conduct for Responsible Fisheries

Fifth Meeting of the RECOFI Working Group on Aquaculture

Doha, the State of Qatar
27 October 2010

Alessandro Lovatelli and Valerio Crespi

Aquaculture Service

FAO Fisheries and Aquaculture Department, Rome, Italy
Alessandro.Lovatelli@fao.org and Valerio.Crespi@fao.org

The Fifth meeting of the Regional Commission for Fisheries (RECOFI) Working Group on Aquaculture (WGA) was held in Doha, Qatar on 27 October 2010, back-to-back to the joint RECOFI WGA and WGFM (Working Group on Fisheries Management) technical workshop on Spatial Planning for Marine Capture Fisheries and Aquaculture (see article on page 36). The meeting was attended by seven RECOFI Members. The RECOFI-WGA Focal Points presented the main achievements since the previous WGA meeting (see article on FAN 42, April 2009, page 14) and discussed regional aquaculture emerging issues elaborating a draft work plan and budget proposal for submission and consideration by the next Commission session (May 2011). See below the main summary outputs of the meeting¹:

Status review of aquaculture development by country – The National Aquaculture Sector Overviews (NASOs) for the RECOFI Member countries had been updated in close collaboration with WGA Focal Points and posted on both the FAO and RAIS (RECOFI Regional Aquaculture Information System) Web sites (www.fao.org/fishery/naso/search). The NASO updating process (started in 2010) is part of a partnership consolidation process between FAO and its Member countries aimed at ensuring an efficient aquaculture information exchanges to better monitor status and trend of aquaculture at the national and regional levels. The WGA at the meeting agreed to update the NASOs for the Region every two years six-months prior to the biannual RECOFI session. The next updating will take place in early 2012.

Review and country follow-up of the outcomes of two WGA workshops – The WGA discussed national and regional follow-up actions to the two WGA technical workshops on Aquatic Animal Health (Jeddah, Saudi Arabia, 6–10 April 2008; see FAN No. 41 page 18) and on Sustainable Marine Cage Aquaculture Development (Muscat, Oman, 25–27 January 2009; see FAN No. 42 page 10). In general it was agreed that the Members benefited from technical workshops organized under the *aegis* of the Commission. It was nevertheless noted that an efficient mechanism to ensure a coordinated and region-wide response and follow-up to key technical recommendations was still needed.

Regional Aquaculture Information System (www.raisaquaculture.net) – The WGA Focal Point of Kuwait presented a Web analysis report elaborated by the RAIS Regional Centre. The general trend indicated that there is a growing interest in RAIS since the last WGA meeting with a strong geographical coverage from the Arabic speaking countries (i.e. North Africa and Gulf Region). The trend clearly demonstrates the importance of regularly promoting the information system along with the timely insertion of information in order to attract and retain the maximum number of visitors/users.

The WGA Focal Points presented the status of aquaculture data collection in their respective country indicating that data submission to the RAIS was carried out on a regular basis. Participants agreed that the RAIS data entry modules along with the assistance of the RAIS User Manual were user-friendly and no particular problems were met during the online submission process. It was however noted that additional efforts should be done by all Focal Points to better promote the system at the national level as well as during significant and relevant events.

A. Lovatelli, FAO



Grouper broodstock in captivity at the Fish Farming Centre (FFC) in Jeddah, Kingdom of Saudi Arabia

A. Lovatelli, FAO



A view of the Fish Farming Centre (FFC) in Jeddah, Kingdom of Saudi Arabia

WGA programme of work and budget for the next biennium – The WGA delegates discussed its programme of work for the next intersessional period taking into account the recommendations made at the joint WGA/WGFM workshop on Marine Spatial Planning and the activities which had already been proposed and endorsed by the Commission at its Fifth session (Dubai, United Arab Emirates, 12–14 May 2009), but which had not been implemented due to budgetary constraints (see table below). The WGA agreed that the activities discussed and prioritized at its Fourth meeting (Muscat, Sultanate of Oman, 27–28 January 2009) remained important action priorities in support of a sustainable development of the aquaculture sector at the regional level.

The WGA recognized that the Commission, based on its current level of financial contribution, may required extra-budgetary funding to implement a comprehensive aquaculture programme for the Region. Main proposed activities for the next biennium are listed in the table below.

To obtain further details please contact:
Alessandro Lovatelli at: Alessandro.Lovatelli@fao.org or
Valerio Crespi at: Valerio.Crespi@fao.org

¹All RECOFI publication are available from the following link: www.fao.org/fishery/rfb/recofi/en

Priority	Activity	Location	Duration (days)
1	Capacity building for spatial planning and management (Training)	Qatar	4–5
2	Risk analysis to aquaculture (Training)	Oman	3–4
3	Environmental monitoring in cage aquaculture (Training)	Outside RECOFI Region	10–14
4	Development of a national strategy on aquatic animal health (Planning workshop)	TBD	3–4
5	Aquaculture recirculation technologies (Technical workshop)	TBD	2–3
6	Climate change challenges in aquaculture development (Awareness workshop)	TBD	2–3

FIRA Retreat: Strategic planning and preparation PWB 2012-2013

Compiled by Melba Reantaso

J. Jia, FAO



First row (L-R): Melba Reantaso, Pedro Bueno (facilitator), Danielle Rizcallah, Marika Panzironi, Ruth Garcia-Gomez, Sylviane Borghesi, Árni Mathiesen, Helen Nakouzi, Lei Chen, Claudia Aguado-Castillo, Kathrin Hett, Doris Soto, Brigitte D'Offay
Second row (L-R): Zhou Xiaowei, Uwe Barg, Rohana Subasinghe, Peter Deupmann, Ib Kollavik-Jensen, Devin Bartley, Valerio Crespi, Mohammad Hasan, Nathanael Hishamunda, Jia Jiansan, Jose Aguilar-Manjarrez, Alessandro Lovatelli, Matthias Halwart

While discussing the post-mortem of the recently concluded Global Conference on Aquaculture 2010 (GCA 2010), the 5th session of Committee on Fisheries Sub-Committee on Aquaculture (COFI/SCAV) and in addition to the ongoing departmental strategic planning and the Programme Work and Budget (PWB) 2012 - 2013 preparation exercise, it was felt that a more systematic way of planning FIRA's work programme is essential and that a 3-day retreat may provide an enriching and a more focussed way forward. Thus a strategic planning retreat was organized by the Aquaculture Service (FIRA) and was held in Corte del Sole in Petriano del Lago from 29 November to 1 December 2010.

Objectives

The objectives of the 3-day retreat were to undertake:

1. strategic discussion on where "aquaculture" is heading within the department, within the organization, within the sector and within other related sectors;
2. identification of priority areas of work based on recommendations of GCA 2010 and COFI/SCA V while reviewing the ongoing PWB 2010-2011 and reorganization of activities under different Unit Results (URs);
3. mid-term review of the current biennium work plan for 2010 and adjustment for 2011;
4. to elaborate on the description of the scope and detailed work plan of activities to be covered under the identified URs of the PWB 2012-2013 in terms of the proposed staff and non-staff resources allocations;
5. strategic discussion on how to ensure extra-budgetary funding;
6. organization and distribution of work among the staff and thematic teams; and
7. steps to complete for year-end PEMS¹ appraisal

Activities

All FIRA staff (professional and general service (GS) staff members with exception of 2) and with additional participants from FIRE, FIPS, and LEGN² attended the retreat. Assistant Director-General (ADG) Árni Mathiesen, Director

Kevern Cochrane and Programme Coordinator Ib Kollavik-Jensen also joined the retreat and participated in some parts of the sessions.

With seven agenda items, 11 plenary presentations (to set the scene and the framework for discussions) and several working group exercises and working group presentations were used to meet the objectives of the retreat.

Day 1 started with three presentations (workshop 4 P's³, external and internal environments) pertaining to Agenda 1; and two presentations (COFI/SCA V recommendations and GCA 2010 recommendations and follow-up work for both) under Agenda 2. A group exercise (SWOT⁴ analysis) immediately followed.

Day 2 discussed the following three agenda items: Agenda 3 (presentation of SWOT analysis); Agenda 4 (presentation of mid-term review of PWB 2010 and adjustments to PWB 2011); Agenda 5 (presentations on Unit Results (URs) and other URs on genetic resources and biosecurity/aquatic animal health). Group exercise and presentations followed concerning the URs in terms of title, scope, description, targets, indicators. The GS group also presented their comments on how best they can effectively contribute to the implementation of the URs. A presentation about FIRA work [staff, organization, work, 10-year accomplishment, future (2012-2013) and beyond] was made by FIRA Chief Jia. A viewing of an aqua video entitled Major Turning Points in Aquaculture Development was done during the coffee break.

Day 3 presented the day's tasks; group exercise was continued from Day 1 and presentations were made on the URs (baseline, means of verification and targets); discussion of Agenda 6 on Progress monitoring of implementation of FIRA Strategic Plan was initiated; and a brief presentation on Agenda 7 (PEMS – Performance Evaluation and Management System) was delivered. The retreat was concluded with a brief presentation on a summary of FIRA Retreat Highlights and the way forward.

Outcomes and follow-up

Of the seven agenda items discussed during the retreat, the following were accomplished: (1) review of recommendations for action from GCA 2010 and COFI/SCA V; (2) SWOT analysis

of FIRA; (3) mid-term review of PWB 2010 and adjustments to PWB 2011; (4) initiation of FIRA strategic planning (MTP 2014-2017) to be continued in 2011; (5) elaboration of URs under PWB 2012-2013; and (6) planning for PEMS year-end appraisal.

The expected output is a FIRA Retreat Report that will contain the following: (1) readjusted 2011 work activities; (2) elaborated description of the scope and preliminary proposed activities under the identified URs of PWB 2012-2013; and (3) preliminary road map to implement the strategic framework with priority actions as recommended by the GCA 2010 and the COFI/SCA V including those under extra-budgetary funding, and a scheme to monitor its progress.

Conclusions

The FIRA retreat was a very useful exercise; with a number of follow-up work to be accomplished. The FIRA strategic planning for MTP 2014-2017 will be a continuing process; an improved and more systematic way will be done as soon as practicable (allocating sufficient time prior to next biennium) and building on progress and expressed strong support by the new ADG.

¹PEMS Performance Evaluation and Management System

²FIRF – Marine and Inland Fisheries; FIPS – Statistics and Information ; LEGN – Legal Service

³Purpose, participation, process and products

⁴Strengths, weaknesses, opportunities, threats



J. Jia, FAO

Newly appointed Assistant Director General of the Fisheries and Aquaculture Department, took time to participate in the FIRA retreat, gave his impressions on the potentials of aquaculture and provided guidance on the way forward

ASSISTANT DIRECTOR-GENERAL FAO FISHERIES AND AQUACULTURE DEPARTMENT

Mr Árni M. Mathiesen, a national of Iceland and coming from a fishing family, was appointed as Assistant Director-General (ADG) of the Fisheries and Aquaculture Department of FAO, effective 2 November 2010.



Mr Mathiesen graduated from Flensborgarskóli in Hafnarfjörður with a university entrance diploma in 1978 and obtained a Bachelor of Veterinary Medicine and Surgery degree from the University of Edinburgh, U.K., qualifying as a veterinarian in 1983. He was awarded a Master of Science in Aquatic Veterinary Science from the Institute of Aquaculture, University of Stirling, U.K. in 1985. After completing his studies, he worked as a veterinarian, specializing in fish diseases from 1985 to 1995. He also served as Managing Director of Faxalax, an aquaculture firm, from 1988 to 1989.

Mr Mathiesen was a member of the Board of the Icelandic Veterinary Association from 1986 to 1987 and Chairman of the Council for the Prevention of Cruelty to Animals from 1994 to 1999.

In 1991, elected to the Icelandic Parliament (Althing) for the Independence Party, Mr Mathiesen was the youngest member of the Althing at the age of 33. From 1990 to 1994, Mr Mathiesen was a member of the Board of the Guarantee Division of Aquaculture Loans and, from 1994 to 1998, a member of the Board of the Agricultural Bank of Iceland and of the Agricultural Loan Fund. He was also an Icelandic representative on the Nordic Council from 1991 to 1995.

From May 1999 to September 2005, he served as Minister of Fisheries; the agency is responsible for fisheries policy, quota allocation, surveillance and enforcement, processing, research and development, marine aquaculture, marine food safety and management of international agreements.

From September 2005 to February 2009, Mr Mathiesen served as Minister of Finance; the agency is responsible for state budget, tax policy, revenue collection and forecasts, economic forecasts, pensions, government property and wage settlements in the public sector.

Prior to joining FAO, Mr Mathiesen was a consultant for the Confederation of Icelandic Employers and part-time general veterinary practitioner in the south of Iceland.

The Aquaculture Group extends its most cordial welcome and best wishes to the new ADG.

ASSOCIATE PROFESSIONAL OFFICER

Ms Anne Kathrin Hett, a German national, has joined the Aquaculture Management and Conservation Branch/Service (FIRA) of the Fisheries and Aquaculture Resource Use and Conservation Division (FIR) at FAO headquarters in Rome in October 2010, as an Associate Professional Officer (APO) funded by the German Government from October 2010 until October 2012.

She graduated in Environmental Sciences with a main focus on Experimental Ecology at the University of Essen, Germany in 2002, and carried out her PhD studies focusing on the evolution of nuclear genes in sturgeon species in the Evolutionary Genetics group at the Institute for Zoo and Wildlife Research in Berlin and the University of Potsdam.

Prior to joining the APO programme, she worked for three years as a postdoctoral researcher at the University of Rome "La Sapienza" and at the Rome-based ICRAM (Institute for Applied Marine Research). During this period, she dealt with different research projects addressing evolutionary and genetic questions in fish species.

She will provide assistance and technical support to normative and field activities regarding sustainable use and conservation of aquatic genetic resources.

Kathrin is located in Room C566, and can be reached at +39 06 57053537 and email: Kathrin.Hett@fao.org



AQUACULTURE OFFICER

Mr Junning Cai, a Chinese National, graduated in 1994 from Sun Yat-Sen (Zhongshan) University (Guangzhou, China) with a Bachelor's degree in Economics. He worked in Guangdong International Trust and Investment Corporation as a loan officer for three years before he obtained a fellowship from the East-West Center and went to Hawaii (USA) for graduate studies in 1997. Mr Cai graduated from the Department of Economics at the University of Hawaii at Manoa (UHM) in 1999 with a Master's degree in Economics and in 2004 with a Ph.D degree in Economics. Then he worked as a Post-doctoral Research Fellow for two years at the College of Tropical Agriculture and Human Resources at UHM before he went back to China to teach. He joined the Central University of Finance and Economics (Beijing, China) as an Assistant Professor in 2006 and worked there for three years. He started working as an FAO Consultant in April 2010 and joined the Aquaculture Service (FIRA) as an Aquaculture Officer starting December 2010.



He has extensive research experience in economic issues related to aquaculture, fisheries and agriculture and published a number of articles in international journals. He has also undertaken several aquaculture/agriculture consultancy work for FAO, ADB and the US government. He has expertise in assessment of a sector's socio-economic impacts (e.g., evaluating aquaculture's contribution to economic growth, food security and poverty alleviation), assessment of countries' comparative advantages in different economic activities, and assessment of the economic impacts of policies through inter-sectoral linkages. Mr Cai also has expertise in regional economics, macroeconomics and financial economics.

As an Aquaculture Officer in FIRA, he will work on how to improve aquaculture's positive socio-economic impacts and reduce its negative impacts and provide services to member countries in aquaculture governance, strategies and planning.

Junning is located in C566 and can be reached at +39 06 57053589 and email: Junning.Cai@fao.org

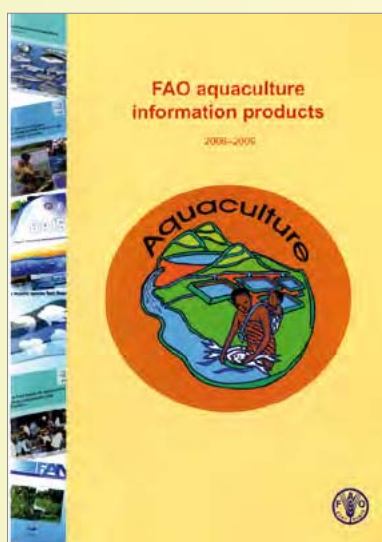
ASSOCIATE PROFESSIONAL OFFICER

Mr Koji Yamamoto, a Japanese national, has a Bachelor of Science degree in Marine Biology (2002) from the University of Wales Bangor, United Kingdom, and a Master of Applied Science in Aquaculture (2005) from the James Cook University (JCU), Australia. After his Bachelor degree, he worked as an aquaculture technician at an oyster farm in Ireland. In addition, as part of his post-graduate study, he undertook an internship at the Australian Institute of Marine Science (AIMS) in 2004. After his graduation from JCU, he joined the Network of Aquaculture Centres in Asia and the Pacific (NACA), an intergovernmental organization based in Bangkok, as a research associate. His work on the coastal aquaculture programme of NACA focused on better management practices (BMPs) and market access for small-scale aquaculture producers. He has co-authored 11 technical articles/reviews on aquaculture, and contributed to the development of the FAO/NACA/UNEP/WB/WWF *International Principles for Responsible Shrimp Farming*, and the *FAO Technical Guidelines for Aquaculture Certification*. He has travelled to over 10 different countries (mostly in Asia) under several national/regional projects and attendance to conferences, including a short-term consultancy work for the ADB Tsunami Rehabilitation Project in Aceh, Indonesia.



On 25th November 2010, he was appointed as Associate Professional Officer at the Aquaculture Service (FIRA) of the Fisheries and Aquaculture Department, until 24th November 2012. In his new position, he will contribute to the FIRA's work on small-scale aquaculture management including aquaculture certification, BMPs, and biosecurity governance in Asia and Africa.

Koji is located in F505 and can be reached at +39 06570 53970 and email: Koji.Yamamoto@fao.org



FAO. 2010. FAO aquaculture information products - 2008—2009. Rome, FAO, 2010. 16p.

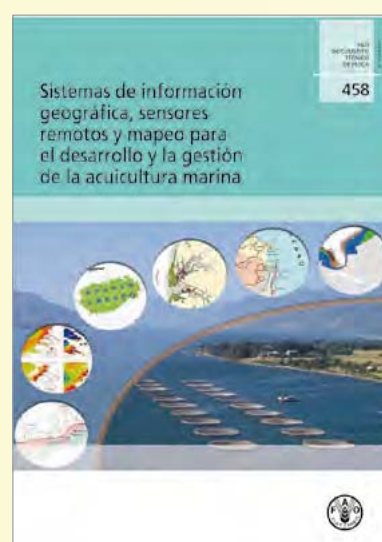
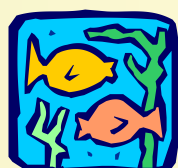
This publication is the second issue prepared by the Aquaculture Service of the FAO Fisheries and Aquaculture Department, which provides a list and relevant descriptions of FAO aquaculture information products published during the biennium 2008-2009. Fifty-six products related to aquaculture, including CD-ROMs and newsletters have been published and distributed worldwide during that time, in both hard and electronic versions.

FAO most popular publications include FAO Fisheries Technical Papers, reports of workshops and technical consultations, regional reviews and FAN (FAO Aquaculture Newsletters). Fact sheets and CD-ROM collections have also proven successful among users.

All titles listed in this publication are available either on the enclosed CD-ROM or through the FAO Aquaculture gateway page at: www.fao.org/fishery/aquaculture

For further information please contact:
Valerio.Crespi@fao.org

To order hard copies of the publication please contact: Publications-sales@fao.org



Kapetsky, J.M. & Aguilar-Manjarrez, J. 2007. Geographic information systems, remote sensing and mapping for the development and management of marine aquaculture. *FAO Fisheries Technical Paper* No. 458. Rome, FAO. 2007. 125p. Available in Arabic, Chinese and Spanish.

The objective of this document is to illustrate the ways in which Geographic Information Systems (GIS), remote sensing and mapping can play a role in the development and management of marine aquaculture. The perspective is global. The approach is to employ example applications that have been aimed at resolving many of the important issues in marine aquaculture. The underlying purpose is to stimulate the interest of individuals in the government, industry and educational sectors of marine aquaculture to make more effective use of these tools. A brief introduction to spatial tools and their use in the marine fisheries sector precedes the example applications. The most recent applications have been selected to be indicative of the state of the art, allowing readers to make their own assessments of the benefits and limitations of use of these tools in their own disciplines.

The applications are organized issue-wise along the main streams of marine aquaculture: culture of fishes in cages, culture of shellfishes and culture of marine plants. A case study is included that illustrates how freely downloadable data can be used to estimate marine aquaculture potential. Because the ultimate purpose of GIS is to aid decision-making, a section on decision support tools is included.

For further information please contact:
Jose.AguilarManjarrez@fao.org

FAO. 2010. Report of FAO Expert Workshop on Assessing the Contribution of Small-Scale Aquaculture to Sustainable Rural Development. Tagaytay City, the Philippines. 6–8 August 2009. *FAO Fisheries and Aquaculture Report*. No. 952. Rome, FAO. 2010. 34p.

The FAO Expert Workshop on Indicators for Assessing the Contribution of Small-Scale Aquaculture (SSA) to Sustainable Rural Development (SRD), held from 6 to 8 August 2009, in Tagaytay City, the Philippines, and participated by a total of twenty-three experts, was convened to achieve the following: (i) present the outcomes (results and analysis) of the case studies which pilot-tested the Nha Trang SSA contribution indicators using various types of SSA in the Philippines, Thailand and Viet Nam; (ii) present the cross-country analysis and synthesis based on the outcomes of the pilot tests; (iii) refine and validate the indicators and evaluate their robustness, replicability and applicability in helping measure SSA sector performance for wider adoption and (iv) draw up a list of recommendations to further support (e.g. appropriate interventions, priority setting and resource allocation) to the SSA sub-sector of sustainable aquaculture and rural development programmes based on a broad understanding of sector performance (as measured by indicators) as well as risks and threats.

The expert workshop carefully looked at each of the 14 Nha Trang SSA indicators and its applicability to the wide spectrum of SSA systems, based on the outcomes of the three country pilot tests covering seven SSA types, and the cross-country analysis/regional synthesis. The expert workshop brought forward a number of issues/concerns with respect to methodology, direct attribution to SRD, source of data and constraints in data collection. Recommendations were provided on which of the 14 Nha Trang indicators need further refining, merging, and/or deleting from the list, additional indicators as well as some aspects of the methodology used.

A number of general recommendations was drawn for follow-up work in terms of SSA systems and scaling up, special research topics/studies including a number of issues of wider concern, e.g., biosecurity and food safety, natural disasters and risks, statistical considerations, indicators for assessing impacts of SSA to the environment and biodiversity and networking.

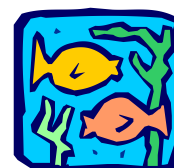
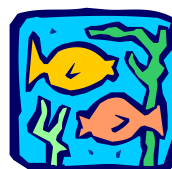
For further information please contact:
Melba.Reantaso@fao.org



FAO. 2010. Putting into practice an ecosystem approach to managing sea cucumber fisheries. Rome, FAO. 2010. 81p.

Pandemic overfishing to critical levels currently threatens the persistence of sea cucumber fisheries and the important role they play in the livelihoods of coastal fishers. Resource managers must embrace an ecosystem approach to fisheries, in which biodiversity conservation, ecosystem services and the concerns of stakeholders are taken into account together with the economic gains from fishing. This document is an abridged version of FAO Fisheries and Aquaculture Technical Paper No. 520 Managing Sea Cucumber Fisheries With An Ecosystem Approach. This document provides a “road map” for developing and implementing better management of sea cucumber fisheries. Also summarized here are the merits and limitations of potential management regulations and actions by the resource manager, and steps required for their implementation.

For further information please contact:
Alessandro.Lovatelli@fao.org

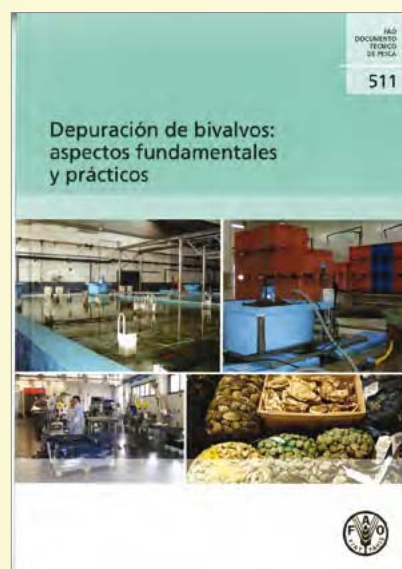
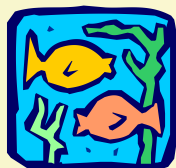
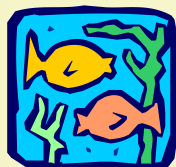




Purcell, S.W. 2010. Managing sea cucumber fisheries with an ecosystem approach. Edited/compiled by Lovatelli, A.; Vasconcellos M. & Yimin. Y. *FAO Fisheries and Aquaculture Technical Paper*. No. 520. Rome, FAO. 2010. 157p. (Available in Spanish and English.)

Sea cucumbers are important resources for coastal livelihoods in more than 40 countries. Sadly, widespread overexploitation of wild stocks risks biodiversity loss and the long-term viability of fisheries. Spawned from an FAO international workshop of experts, this document presents a “roadmap” to guide fishery managers in choosing appropriate regulatory measures and management actions for sea cucumber fisheries. It elaborates on their use, limitations and modes of implementation, with *Examples and lessons learned* from various fisheries. Achieving sustainable management of sea cucumber fisheries requires an ecosystem approach to fisheries (EAF), precautionary regulations, improved enforcement and stronger commitment of fishery managers and policy makers.

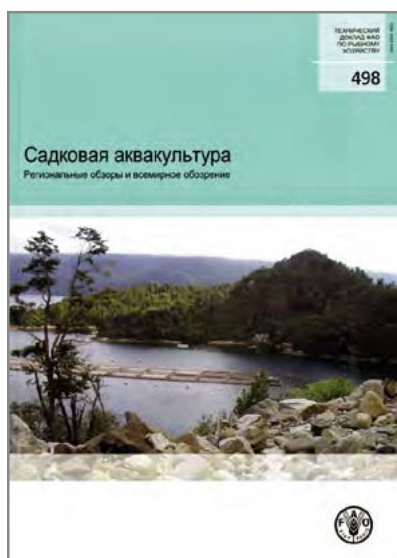
For further information please contact:
Alessandro.Lovatelli@fao.org



Lee, R.; Lovatelli, A. & Ababouch, L. 2008. Bivalve depuration: fundamental and practical aspects. *FAO Fisheries Technical Paper*. No. 511. Rome, FAO. 2008. 139p. (Available in Arabic, English, French, Chinese and Spanish.)

World bivalve production and consumption has increased significantly during recent years, from a combined total for wild catch and aquaculture of approximately 10.7 million tonnes in 1999 to 14 million tonnes in 2006. Furthermore, the development of freight by air and sea and preservation techniques has enabled consumers, in different parts of the world, to enjoy eating bivalves produced in distant waters. Such developments in distribution and trade have in turn led to emerging challenges for consumer protection, particularly in relation to the safety of bivalves from pathogenic micro-organisms. Several species of bivalves are consumed live or raw (e.g. oysters), or lightly cooked (e.g. mussels) which make them a high risk food product category requiring proper control measures to eliminate or reduce to acceptable levels potential biological, chemical and physical hazards. This document is intended to provide a basic introduction to the public health problems that can be associated with shellfish consumption and to provide guidance to the bivalve industry as to how a depuration centre, and the associated systems, should be planned, constructed and operated. It is mainly targeted at new operators or those with limited experience, as well as fishery and public health officers who deal with the bivalve industry. This is of particular importance for several developing countries, where the bivalve industry is expanding quickly with the aim of winning an ever larger share of the bivalve international market.

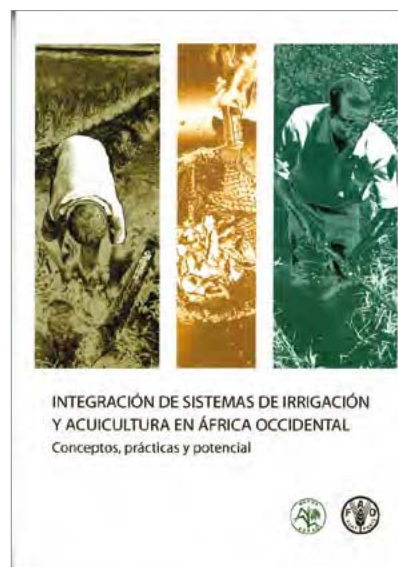
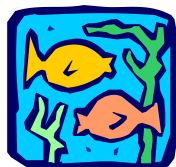
For further information please contact:
Alessandro.Lovatelli@fao.org



Halwart, M.; Soto, D. & Arthur, J.R. (eds.). 2007. Cage aquaculture – Regional reviews and global overview. *FAO Fisheries Technical Paper*. No. 498. Rome, FAO. 2007. 241p. (Available in Chinese and Russian.)

The FAO Fisheries and Aquaculture technical paper “Cage aquaculture - regional reviews and global review” highlight the tremendous importance of cage aquaculture today and its key role for the future growth of the aquaculture sector. The document includes all the papers presented during the FAO Special Session on Cage Aquaculture at the Asian Fisheries Society Second International Symposium on Cage Aquaculture in Asia in July 2006. Each review, by geographic region, includes information on the current situation, major regional issues and challenges. The global overview discusses trends in cage aquaculture, summarizes information on cultured species, culture systems and environments and explores the way forward for cage aquaculture, which offers especially promising options for multitrophic integration of current coastal aquaculture systems as well as expansion and further intensification at increasingly offshore sites.

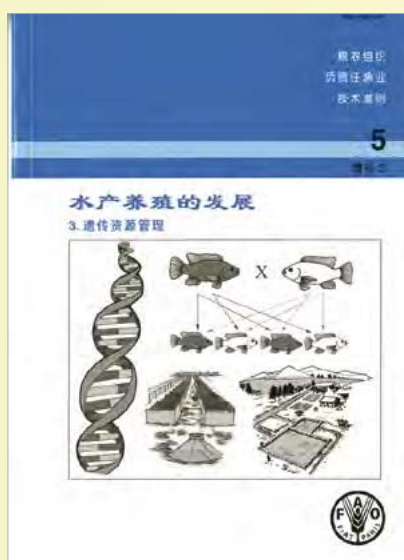
For further information please contact:
Matthias.Halwart@fao.org



Halwart, M. & Dam, A.A. van (eds). 2006. Integrated irrigation and aquaculture in West Africa: concepts, practices and potential. Rome, FAO. 2006. 181p. (Available in French and Spanish.)

This volume contains background documents and papers presented at the FAO-WARDA Workshop on Integrated Irrigation Aquaculture (IIA) held in Bamako, Mali, from 4 to 7 November 2003, as well as the findings of FAO expert missions on IIA in the West Africa region. The rationale for IIA development lies in its potential to increase productivity of scarce freshwater resources, enhance food security and poverty alleviation, and reduce pressure on natural resources, particularly in the drought-prone countries of West Africa. Irrigated systems, floodplains and inland valley bottoms are identified as the three main target environments for IIA in West Africa. In irrigated systems, aquaculture is a non-consumptive use of water that can increase water productivity. Pens and floating cages are often used to grow fish in the source, delivery and disposal subsystems of irrigation schemes (dams and canals). Rice-fish farming is the most common form of aquaculture in the use subsystem of irrigation schemes. Continuity of water supply, the effect of aquaculture on water conveyance and the use of agrochemicals are the main points of attention for aquaculture in irrigation systems.

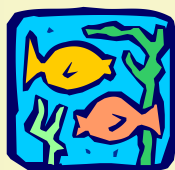
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Matthias.Halwart@fao.org



FAO. 2008. Aquaculture development. 5. Genetic resource management. *FAO Technical Guidelines for Responsible Fisheries*. No. 5, Suppl. 3. Rome, FAO. 2008. 125p. (Available in Arabic, Chinese and Russian.)

These Technical Guidelines have been developed to support sections of the FAO's Code of Conduct for Responsible Fisheries on aspects of genetic resource management in aquaculture. Guidance is provided on broodstock management and domestication, genetic improvement programmes, dissemination programmes for genetically improved fish, economic considerations in genetic improvement programmes, risk assessment and monitoring, culture based fisheries, conservation of fish genetic resources, gene banks, a precautionary approach and public relations. The effective management of genetic resources, risk assessment and monitoring can help promote responsible aquaculture by increasing production output and efficiency and help minimize adverse impacts on the environment. These benefits of the responsible application of genetic principles to aquaculture should be communicated to consumers, policy-makers, scientists and others interested in responsible fisheries and aquaculture.

For further information please contact:
Matthias.Halwart@fao.org



FAO/Regional Commission for Fisheries. 2010. Report of the fifth meeting of the Working Group on Aquaculture. Doha, the State of Qatar, 27 October 2010. *FAO Fisheries and Aquaculture Report*. No. 954. Rome, FAO. 2010. 70p.

The fifth meeting of the Working Group on Aquaculture (WGA) of the Regional Commission for Fisheries (RECOFI) was held in Doha, the State of Qatar, on 27 October 2010 and was attended by the representatives from seven Member countries. The WGA reviewed the outcome and recommendations of the Special Meeting on RECOFI Consolidation and Development held in Rome in May 2010. The WGA discussed national and regional follow-up actions to the two WGA technical workshops on aquatic animal health (Jeddah, Saudi Arabia, 6–10 April 2008) and on sustainable marine cage aquaculture development (Muscat, Oman, 25–27 January 2009). In general it was agreed that the Members benefitted from such technical workshops. It was nevertheless noted that an efficient mechanism on how to best ensure a coordinated and region-wide response and follow-up to key technical recommendations was needed. A brief presentation on the joint RECOFI WGA and Working Group on Fisheries Management (WGFM) Regional Technical Workshop on Spatial Planning for Marine Capture Fisheries and Aquaculture, held in Doha, Qatar, from 24 to 28 October, was presented highlighting the key recommendations and suggested follow-up outputs. The meeting discussed the Regional Aquaculture Information System (RAIS) following the presentation of the first Web analysis report which indicated a steady interest in the information system particularly among the Arabic speaking countries. Actions to further consolidate the system were discussed along with the need to improve the overall communication outputs at the national and regional levels. The WGA finalized its proposed programme of work for the next intersessional period based also on the recommendations from its previous technical workshops. The WGA recognized that the Commission, based on its current level of financial contribution, may not have the required budget to implement a comprehensive aquaculture programme and recommended that some activities could be implemented with extrabudgetary funds. The WGA Focal Point of Qatar was nominated as the new WGA Chairperson.

For further information please contact:
Alessandro.Lovatelli@fao.org

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Some groups have called for the removal or limited use of such species in fisheries and aquaculture. Strategies for removal have included selective overfishing, forced removal from farms and restricting farming licenses. In aquaculture, forced removal may be possible, but if farming the species is economically viable and responsible, we see no reason to restrict the use of introduced species for aquaculture. For fisheries based on historical introductions, once a species has become established, evidence indicates that eradication is always costly and seldom effective. The fact that these species have existed for decades, centuries and even millennia, and people fish or farm them indicates that people's tastes and aquatic ecosystems have changed over the course of human history; it will be difficult or even unwise to try to revert to past conditions.

A final complication is climate change. Whereas precise knowledge on the degree and location of the change is difficult to come by, it is agreed by the vast majority of scientists that aquatic environments will change. FAO and others are looking at mitigation and adaptation strategies to help deal with these changes. One adaptation strategy is the responsible use of introduced species and non-native genotypes. As habitats change, the "natural" components of biodiversity may no longer be able to support fishers or farmers. It may be necessary to introduce or transfer species among environments and farming areas. An American group working on climate change recognized this possibility and coined the term "assisted migration". How to know when this assistance is necessary will be complicated indeed.

Fortunately, awareness of these issues is rising and there are groups that have been requested to address these complications. Both the Global Conference on Aquaculture 2010 and the fifth session of the COFI Sub-Committee on Aquaculture in September/October 2010 recommended that FAO produce technical guidelines on the responsible use of introduced species. The CBD at the 10th Meeting of the Conference of Parties in October 2010, established an Inter-Governmental *Ad-Hoc* Technical Expert Group on Alien Invasive Species that has started its work in 2011. The FAO Sub-Regional Office for Central Asia and the Caucasus recently convened a workshop on introduced

species in fisheries and aquaculture that will use a data structure from a European Union Project to record information on introduced species in the sub-region and to contribute the information to the FAO Database on Introductions of Aquatic Species (DIAS)³. With the assistance of *inter alia* the Commission on Genetic Resources for Food and Agriculture and the government of Spain, FAO will be updating the records in DIAS and the online functionality of the database.

A blanket ban on the use of introduced species as advocated by some groups will not be in the best interest of many societies, especially with a growing human population and when there could be more risk from using native species. Many areas will need to supplement capture fisheries production with aquaculture; there is tremendous potential for the use of non-native genotypes that are genetically improved and farmed responsibly. We believe it is necessary to address the use of introduced species in a fair and balanced manner and to recognize that often adverse impacts are a matter of personal, societal and cultural opinion. *It would be nice if simply banning the introduction of species would help feed people and improve the environment, but it won't – it's complicated.*

Devin M. Bartley

Senior Fisheries Officer

Devin.Bartley@fao.org

Matthias Halwart

Senior Aquaculture Officer

Matthias.Halwart@fao.org

Ruth Garcia-Gomez

Associate Professional Officer

Ruth.Garciagomez@fao.org

¹Bartley, D.M. & Casal, C.V. 1998. Impact of introductions on the conservation and sustainable use of aquatic biodiversity. FAO Aquaculture Newsletter No. 20. Rome; Bartley, D.M.; Bhujel, R.C.; Funge-Smith, S.; Olin, P.G.; Phillips, M.J. (comps./eds.) International mechanisms for the control and responsible use of alien species in aquatic ecosystems. Report of an Ad Hoc Expert Consultation. Xishuangbanna, People's Republic of China, 27–30 August 2003. Rome, FAO. 2005. 195p.

²<http://www.cbd.int/convention/articles/?a=cbd-02>

³<http://firms.fao.org/fishery/topic/14786/en>



FAN

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Aquaculture Service
Fisheries and Aquaculture Department
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla, 00153 Rome, Italy

Tel: (39) 06 57054843/57055170 Fax: (39) 06 57053020

E-mail: Melba.Reantaso@fao.org
Sylviane.Borghesi@fao.org

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Chief Editor: **Melba B. Reantaso**
Editorial Board: **Jiansan Jia, Jose-Aguilar-Manjarrez, Devin M. Bartley, Nathanael Hishamunda, Audun Lem, Rohana P. Subasinghe**

Layout & Production: **Sylviane Borghesi**

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