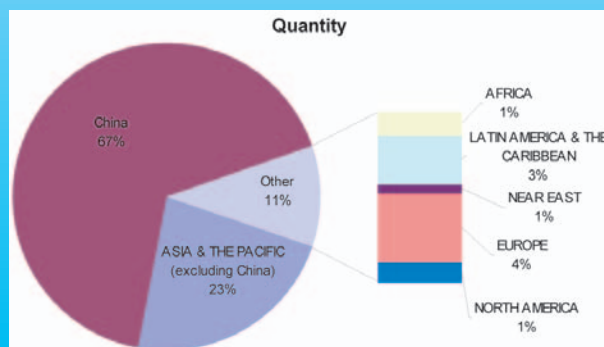


SPECIAL ISSUE

dedicated to

COFI Sub-Committee on Aquaculture IV
06-10 October 2008, Puerto Varas, Chile



“Ensuring that every human being has an adequate and stable supply of food is more than a moral imperative or an investment with potentially huge economic returns: it is the realization of a basic human right” - Jacques Diouf, World Food Day 2007.

Aquaculture and ‘the Right to Food’: for Mutual Supportiveness

The right to food is enshrined in international law. It is the right of every child, woman and man to have continuous access to the resources needed to produce, earn or purchase enough food not to prevent hunger alone, but to enjoy an active and healthy life. Its broader implication for world and national leaders is the need for an economic, political and social environment that will allow people to achieve food security through their own means.

Aquaculture, now producing more of the aquatic food the world needs, has an important role in the realisation of the right to food. It is recognized as the fastest food producing sector - contributing nearly half (47 %) of the world’s food fish consumption in 2007 - and expanding in recent years to meet the growing demand for fish. This contribution is expected to reach 50 percent by 2010.

The nutritional and health benefits from fish consumption has long been recognized: fish has superior nutritional profiles, containing high quality animal protein and a source of polyunsaturated fatty acids (omega-3), vitamins (A, B, D, and E) and minerals (iron, phosphorus, calcium, iodine and selenium). One billion people within 58 developing and low-income food deficit countries depend on food fish as primary source of animal protein. Fish, the staple animal protein source of traditional fisherfolk, is the single food that could address several different malnutrition disorders. Beyond providing food, aquaculture strengthens people’s capacity to exercise their right to food through employment, community development, generating income and accumulating other assets, and by compensating for declines in food sources because of the over-exploitation of natural resources.

The rapid expansion of the sector and the absence of appropriate legislative arrangements are hindering its sustainable development. Several issues in the field of aquaculture that can affect peoples’ livelihoods and thus, possibly, the people’s right to food. Failing to ensure conservation and sustainability of aquatic resources means that the ability of future generations to access this vital food resource will be seriously jeopardized. If not planned well and executed responsibly, diversification,

intensification and expansion of the aquaculture sector could result in social concerns, i.e. displacing traditional coastal fishers and damaging complex ecosystems that supported livelihoods of variety of users. This impairs the ability of such communities for access to food thus depriving their right to food and to live with dignity. While aquaculture can cause negative environmental impacts, significant improvements have been made in the environmental sector to reduce risks and impacts of aquaculture. However, there still exist many concerns and uncertainties (e.g. habitat degradation, food safety issues from the use of veterinary drugs, escapees and exotic species introduction, aquatic animal pathogens and pests, genetic impacts on wild populations, etc.) which, if not managed well, will decrease natural productivity and increase economic losses.

Aquaculture contributes increasing quantities to global aquatic food supplies, supplementing the declining contribution from capture fisheries. Sustainability -- food fish being accessible for both present and future generations -- and ensuring that its benefits accrue to society including and particularly rural communities, indigenous peoples and small-scale farmers -- are major challenges that the aquaculture sector must deal with if it has fulfill its role of supplying the food fish that the world needs. A human rights-based and ecosystem approach to aquaculture can ensure that aquaculture development is sustained. Human rights put emphasis on human dignity, equality, non-discrimination and empowerment, transparency and participation in decision-making processes and demands accountability from everyone but especially those in positions of authority. An ecosystem approach to aquaculture integrates the activity within the wider ecosystem in such a way that it promotes sustainable development, equity, resilience of interlinked social and ecological systems.

Right to food principles have several implications: (i) the necessity of clarifying roles, responsibilities and powers of institutions involved in aquaculture development and management including enforcement; (ii) the need to establish mechanisms that enable participation

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Fourth Session of the COFI Sub-Committee on Aquaculture

Aquaculture now produces nearly 50 percent of the world's food fish¹. The sector is growing and poised to contribute in increasing quantities, in the coming decades, to bridge the supply and demand gap created by the stagnant capture fishery production.

On the request of FAO membership, last year, the name of the FAO Fisheries Department was changed to the FAO Fisheries and Aquaculture Department. This demonstrates the importance attached to aquaculture by the world. Such an important food producing sector needs good governance to avoid the risk of unregulated development which could diminish world expectations. Regular and continuing global dialogue is therefore important at both the highest technical and political levels.

Established during the twenty-fourth session of 2 Session COFI, held in March 2001 in Rome, the COFI/SCA is the only such mechanism in place at the moment.

The fourth session of the COFI/SCA is planned to discuss several important issues.

1. As a standing agenda item, the Secretariat will present a document outlining the efforts of the Department in implementing the recommendations of the past sessions of the COFI/SCA.
2. The Department monitors the progress made in implementing the provisions of the Code of Conduct for Responsible Fisheries (CCRF), on a regular basis, through analysis of responses to a standard questionnaire sent to its membership. As a standing agenda item, the Secretariat will report this to COFI/SCA. This time the Secretariat has taken the opportunity to present both (a) the status of progress in implementing the aquaculture and culture-based fisheries provisions of CCRF and (b) a proposal to improve global monitoring and reporting by countries and their compliance. Owing to the low responses and the overall poor quality of information obtained from the past questionnaire surveys, the Department finds it difficult to comprehend the assistance required by the members in better implementing the CCRF provisions. Thus, a new proposal for further improvements to the reporting mechanism is proposed. The Sub-Committee will be invited to comment on the analysis and proposal, to recommend specific follow-up actions to develop and implement the recommended reporting mechanism and to recommend a time frame for the completion of the task.
3. As mentioned earlier, responsible governance is the key to long-term success and sustainable development of the aquaculture sector. Under the agenda item, "Towards better governance in aquaculture", the Secretariat

attempts to review and share the experiences of FAO member countries in ensuring the development of responsible aquaculture, be it through developing, establishing, maintaining and enforcing appropriate legal, regulatory and administrative frameworks or through diverse policies. The aim of this agenda item is also to explore the constraints that impede or could impede better governance of the sector and to suggest mitigating strategies.

Good governance has been ensured through predictable, transparent, equitable and easily enforceable legislative frameworks and simple regulations covering all aspects of aquaculture and its value chain, economic incentives that encourage best practices, prompting and assisting farmers to elaborate, support and enforce self-regulating management codes and the promotion of sustainability-conducive production systems. Although significant efforts have been made to develop suitable regulatory frameworks to comply with law and order in aquaculture development, there is still public concern that some forms of aquaculture are environmentally perturbing at the expense of society, and that local communities are neither sufficiently empowered nor aware of the safety and quality of aquaculture products. The lack of financial and skilled human capacities to establish, monitor and enforce regulations in developing countries, which lead aquaculture production, could particularly threaten efforts to properly govern aquaculture. The Secretariat invites COFI/SCA to review the ideas conveyed in the working paper and share national experiences in aquaculture governance, identify actions which could help the members improve aquaculture governance and provide guidance on the way forward on this issue in general.

4. "Technical guidelines on aquaculture certification" is an agenda item which the Secretariat believes will receive significant attention by the participating members at this fourth session.

There is a concern that at least some forms of aquaculture are environmentally unsustainable, socially inequitable and that products are unsafe for consumers. Over the years, there have been attempts to respond to the consequent public perception and market requirements, with varying degrees of success. One such attempt is the certification of aquaculture. FAO members expressed their concern that the emergence of a wide range of certification schemes and accreditation bodies created confusion amongst producers and consumers alike and recognized the need for more globally accepted norms for aquaculture production.

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¹Unless stated otherwise in this text the term fish includes also crustaceans and molluscs.

11th Session of FAO's COFI Sub-Committee on Fish Trade, Bremen, Germany, 2-6 June 2008

The 11th session of FAO's COFI Sub-Committee on Fish Trade held from 2-6 June 2008 in Bremen, Germany endorsed a set of technical guidelines aimed at promoting responsible international trade in fish and fishery products.

The voluntary guidelines will help countries ensure that international trade in fish and fishery products do not compromise the sustainable development of fisheries and responsible utilization of living aquatic resources.

They call on governments to take a number of steps, including:

- adopting conservation and management measures for long-term conservation and sustainable use of aquatic resources, as a necessary foundation for sustainable fish trade;
- developing indicators for measuring the biological, economic and social sustainability of fisheries;
- establishing catch documentation and certification schemes to track seafood and fish products from point of capture or production to final destination;
- targeting financial and technical assistance to developing countries to strengthen their capacity for fisheries management and responsible trade practices;
- conducting periodic reviews of laws and regulations related to the international trade in fish products to determine if the reasons for their original creation continue to exist; and

- collecting and disseminating accurate statistical information on international trade in fish.

The value of world exports of fish and fish products climbed to a record high of US\$92 billion in 2007. The proportion of world fish production (145 million tonnes) that is traded internationally now represents 38 percent of the total, or 55 million tonnes. This can involve significant benefits for poor countries – their net export revenues from fish trade currently run around US\$25 billion, translating into more jobs, better incomes, and increased government revenues.

However, fish trade can also pose some risks. Increased demand for fish to supply international markets can sometimes result in excessive fishing pressure, potentially leading to the over-exploitation and wasteful use of some fish stocks and thereby exacerbating the consequences of ineffective fisheries management regimes. This can in turn affect food security, especially where there is a high dependence on fish in the diet.

The guidelines offer advice on how to implement the trade-related provisions in the FAO Code of Conduct for Responsible Fisheries, will help countries maximize the poverty reduction, food security and nutrition benefits of fish trade while minimizing potential negative aspects.

More information can be obtained from William Emerson, Technical Secretary, Sub-Committee on Fish Trade at William.Emerson@fao.org

Fourth Session of the COFI Sub-Committee on Aquaculture

(continued from page 4)

They requested FAO to develop guidelines which could be considered as a benchmark when national and regional aquaculture certification schemes and standards are developed. Under this agenda item, the supporting working document describes the transparent and exhaustive consultation process which FAO used to develop the draft *Technical Guidelines on Aquaculture Certification*, and presented to the COFI/SCA for review, advice and approval.

5. The last technical agenda item is on "Opportunities for addressing the challenges in meeting the rising global demand for food fish from aquaculture" aimed at examining the status of aquaculture production and markets, with the view to identifying the most compelling issues that require attention by the aquaculture sector, in order to provide an enabling environment for the sector that will meet projected global demand for aquatic food. The secretariat seeks advice from the COFI/SCA to conduct priority activities as required.

A special event on the Department's Special Programme for Aquaculture Development in Africa (SPADA) will also be held. A presentation and a discussion (outside plenary) of the participating members will be undertaken aimed at raising awareness about SPADA to a wider audience as well as to gather ideas on future needs and assistance requirements.

As most of us believe that the aquaculture sector can grow responsibly to meet the future demand for aquatic food while preserving the natural resource base it needs to thrive, the decisions and recommendations of this fourth session of the COFI/SCA are vital.

Dates: 06-10 October 2008

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

Information: www.fao.org/fi/body/cofi/cofiaq/cofiaq.asp

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Regional Aquaculture Highlights from the Asia-Pacific Region

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Aquaculture zoning in the Asia-Pacific Region

For many countries in the Asia-Pacific region, the general policies for aquaculture have been directed towards intensification and expansion of the sector. Accompanying expansion and growth, problems started to emerge relating to environmental degradation and losses due to disease problems in production facilities. These emerging problems have been dealt with, either through government regulation or modifications in production techniques by the sector itself. In solving these problems, both government and private sector have used aquaculture zoning as part of the overall aquaculture planning approach. Aquaculture zoning is considered a useful management tool and should be an integrated part of an overall strategy to develop aquaculture in a sustainable manner. The question today is how to improve implementation of the planned zoning to make sure the plans are translated into action at the production level. FAO is currently working together with its member countries in the Asia-Pacific Region to facilitate this process of translating plans into actions.

Zoning of aquaculture should not be used in isolation but in combination with other tools for management. Alongside the control requirements for addressing environmental impacts of the sector and management of disease and movements are the increasing requirements for traceability of aquaculture products. This is becoming a mandatory aspect of assuring food safety and to some extent quality presently for exported products, but the need for tracing products consumed domestically will be a natural development as consumers in the region become more concerned about food safety and the production methods used. It is crucial that countries in the region adapt to this change and new standards. Increased traceability is also a useful tool for better management of the production.

FAO have been requested to give technical assistance from the Government of Thailand to support the development of a practical aquaculture information management and traceability system including components of aquaculture zoning.

Certification of aquaculture products in the Asia-Pacific region

The focus on certification of aquaculture products in the region is continuing. During an APFIC Regional

Consultative Forum held in Ho Chi Minh City, Viet Nam in late 2007, there were clear recommendations for more regional involvement in developing standards and certification systems. The APFIC region accounts for the major proportion of global aquaculture production and further represents a wealth of technical knowledge on sustainable aquaculture which is of relevance to certification. This regional capacity has prompted the development of a number of national certification schemes which are tailored to the socio-economic status of the producer's and then especially small-scale producers. The workshop adopted five main recommendations to member countries in the region:

1. Regional capacity and experience should be used to develop a regional certification scheme; other schemes operating in the region should be harmonized to and in compliance with the forthcoming FAO Guidelines for Aquaculture Certification.
2. Schemes operating in the region should be developed and/or revised to benefit producers, allow for cluster certification and incremental improvement against targets, especially in view of the predominance of small-scale producers in the region and their constraints in complying with many certification schemes.
3. Ensure that the benefits of certification are maximized and cost controlled. It was recognized that the costs associated with compliance to most certification schemes are typically not offset by premium prices and/or other clearly documented benefits.
4. Certification should be developed in compliance with international norms on development of standards, transparency and the FAO guidelines, particularly with respect to including directly affected stakeholders. It was also recognized that aquaculture sustainability is a responsibility shared by a broad range of stakeholders.
5. Members support capacity building on better management practices and certification issues in addition to developing mechanisms that facilitate capacity building (e.g. financial, insurance-based). Most member countries in the region have significant resourcing and capacity constraints, at the producer level and within fishery institutions to implement certification.

For more information about the workshop and workshop documents please visit the APFIC website at: www.apfic.org.

Nepal – a country with an aquaculture potential

FAO conducted, in December 2007, a review of the development potential for fisheries and aquaculture as requested by the government of Nepal. The review concluded that while not a main agricultural activity, fisheries and aquaculture are an important supplement to the daily food in rural areas of Nepal with a real potential for further development. Clear policies for developing coldwater aquaculture as well as enhancing both human and institutional capacities on adaptive research and development on such areas as seed production, feed production, and genetic improvement of carp will be essential.



S.FUNGE.SMITH, FAO RAP

Nepalese woman working after her cages in Pokhara Lake

FAO extends assistance to Malaysia on public health and aquatic animal health issues

Through a TCP Facility TCP/MAL/3201 *Identification of capacity building needs of the Malaysian inspection system to meet international market requirements*, FAO extended technical assistance, in August 2008, to assist the government of Malaysia in identifying capacity building needs (quality and safety and aquatic animal health aspects) in order to comply with international trading requirements particularly to implement the recommendations brought forward by the EU Food and Veterinary Office (FVO) as an outcome of an FVO visit in April 2008. In 2005, Malaysia's exported fishery products are worth more than USD 600 M; while the ornamental fish export is about 9 percent of the global share, Malaysia being the second largest producer of ornamental fish next to Singapore.

New Regional TCP Project on Utilization of Trash Fish/Low Value Fish

TCP/RAS/3203 *Reducing the dependence on the utilization of trash fish/ low value fish as feed for aquaculture of marine finfish in the Asian region* was recently approved for implementation from July 2008 to June 2010. NACA is responsible for overall coordination and implementation of this TCP which involves China, Indonesia, Thailand and Viet Nam. An Inception Workshop will be held from 8-10 September 2008, Krabi, Thailand to finalize detailed project implementation.

RECENTLY COMPLETED EVENTS (from December 2007)

December 2007

- ▶ FAO/NAFRI Workshop on Agrobiodiversity, 11-12 December 2007 and FAO/EC National Workshop on Fisheries Law of Lao PDR, 14 December 2007, Vientiane, Lao PDR. Matthias.Halwart@fao.org/Simon.FungeSmith@fao.org
- ▶ Regional Workshop on Inland Fisheries and Aquaculture in Central Asia: Status and Development Prospects, 11-14 December 2007, Demre, Turkey. Raymon.VanAnrooy@fao.org/Gerd.Marmulla@fao.org

January 2008

- ▶ FAO Workshop on Establishing a Coordinating Working Party on Aquaculture Statistics (CWP-AS), 8-10 January 2008, Nakorn Nayok, Thailand. Rohana.Subasinghe@fao.org/Sachiko.Tsuji@fao.org

February 2008

- ▶ FAO Expert Consultation on Assessment of Socio-Economic Impacts of Aquaculture, 4-8 February 2008, Ankara, Turkey. Nathanael.Hishamunda@fao.org
- ▶ FAO Expert Consultation on Climate-related Transboundary Pests and Diseases, including Relevant Aquatic Species, 25-27 February 2008, Rome, Italy. Doris.Soto@fao.org/Melba.Reantaso@fao.org
- ▶ FAO Expert Consultation on Improving Planning and Policy Development in Aquaculture, 26-29 February 2008, Rome, Italy. Cecile.Brugere@fao.org
- ▶ FAO/NACA Consultative Workshop on Guidelines for Aquaculture Certification, 28-29 February 2008, London, UK. Rohana.Subasinghe@fao.org

March 2008

- ▶ FAO Training/Workshop on Diagnostics, Surveillance and Reporting of Aquatic Animal Diseases (TCP/BIH/3101), 18-21 March 2008, Fojnica, Bosnia and Herzegovina. Melba.Reantaso@fao.org

(continued on page 21)



J. MOEHL, FAO

Low-volume high-density cage culture technology is developing in Uganda

A Synoptic View of FAO's African Aquaculture Programme: New Approaches for New Investors

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Aquaculture is considered by most as an innovation in the Africa Region. Whilst there have been traditional aquacultural systems including fish aggregating and concentrating methods, the raising of aquatic crops is most often seen as a new practice introduced some four to five decades ago for increased nutrition. This nutritional aim was targeting both the family and the worker; in the latter case, those in authority seeking cost-effective ways to improve nutrition to improve labour output.

The improved nutritional goal has been integral to the sub-sector since these early days. As the innovation became more widely spread and promoted by more diverse institutions, the goal expanded to include improved income since it was foreseen that part of the harvest would be sold; generally small quantities sold or bartered to neighbours on the pond bank.

The first systems were nearly universally earthen ponds, usually raising any of a variety of tilapias, but also culturing other local (e.g. *Clarias*, *Heterotis*, etc.) or introduced (e.g. Chinese carps) fishes. Suggested management practices varied, but most often were low-input involving seed and nutrients that were available on-farm, in the community or the general locale.

By the 1970s, nearly every country in sub-Saharan Africa had tried some form of aquaculture. These efforts were frequently donor-driven and donor supported, involving a medley of national agencies as the most appropriate “institutional home” of aquaculture remained elusive.

The aquaculture bubble burst by the late 1990s when scepticism and disillusionment replaced over-enthusiastic and unrealistic expectations: in spite of millions of dollars spent, aquaculturally, Africa remained the lowest producing region of the world.

NEW REALITIES

In many ways, as seen by the extracts from the 1975 FAO aquaculture workshop¹, the sub-sector was confronted by a perceived conundrum; what type of aquaculture was to be the object of development efforts? Should aquaculture be pro-poor or seen as an industry? Should aquaculture be a public-dependant subsidised activity or a private sector venture? What realistically could aquaculture do and how could this potential be tapped?

What was clear was that aquaculture, in whatever form, needed to have proven technical feasibility

and economic viability. This demonstration has been a long time coming but has only realistically arrived.

With the New Millennium, the Africa Region found itself with tens of thousands of family, or farm ponds scattered across the hinterland. These, the results of decades of effort, did contribute to better resource use, risk avoidance, diversification and even, in the best cases, improved nutrition. But they did little at all to contribute to overall food production, economic growth and employment. Nevertheless, they exist.

Thus, one of the new realities is that most national programmes will be bi-modal with a large number of farm ponds that make several valuable contributions but also have limitations which must be acknowledged. Most operators of farm ponds will not metamorphose into entrepreneurs with aqua-businesses and another of the new realities is that it is through a solid aqua-business establishment that the goals of increased food production, economic growth and employment through aquaculture will be reached.

As was recognised in 1975, before the footings for aqua-businesses could be established, demonstrations of

technical feasibility and economic viability were required. Although initially these demonstrations arose due to individual entrepreneurship in response to rising fish prices and improving technologies, and were not part of national programmes to promote aquaculture, the presence of profitable aqua-businesses in Zimbabwe, Uganda, Nigeria, Zambia, Ghana, Kenya, Madagascar and elsewhere served as real-life models of what could be done. Pioneering private investors diverted entrenched trends and showed that aquaculture can be a profitable enterprise at micro-, small-, medium, and large-scales.



Simple static-water cement-block tanks in Nigeria produce high yields

By 2004, the potential of a private-sector-led sub-sector became apparent and decision-makers began to revise their strategies for their national programmes². It was clear that the commercial producers, especially the small- and medium-scale investors, would be the motors for the expansion of the sub-sector and the contributors to the national good.

In the aggregate, the lessons from this evolution have been encapsulated in SPADA (see pages 33-35 of this issue of FAN 40)– the Special Programme for Aquaculture Development in Africa with the goal *to provide assistance to African countries to enhance aquaculture production, to facilitate producers' access to financial services and markets, to boost investment in aquaculture as well as to exchange knowledge*. SPADA represents a new approach to the sub-sector's development based on a series of recent analyses including the aforementioned Limbé Workshop and, among others, Guiding Principles for Promoting Aquaculture in Africa – benchmarks for sustainable development³.

WHAT'S COMING

There is a Central African proverb that says: MAN WE I GOW MUTIKA, NA I SABI HAMOS MUBUNGA KOS or, people who

live in a fishing village know the price of fish. When one actually witnesses something they take serious account of it – i.e., the demonstrations of profitable aquaculture are in process and people are taking note. The momentum is growing as is the investment. It is incumbent on those promoting and assisting the development to take the lead before they are pushed aside by this new wave of enthusiasm; hopefully a wave built on realities and not over-expectations.

New systems are coming on line; cages, concrete tanks, raceways and recirculating systems. New levels of yield are being achieved as new technologies are applied. Better quality seed will soon be available whilst better feeds are entering some markets and will soon reach others.

A new level of aquaculture activity is coming.

Governments must determine how best to service the bi-modal sub-sector, how to encourage investment whilst ensuring it is responsible and sustainable? How to address the socio-cultural and ecological complexities of the innovations, including the critical issues of access rights, whilst facilitating significantly increased investment? How to develop

effective information, input and market channels?

One important way of addressing these and other issues will be through improved communications and networking. At the 14th CIFA session in 2006, the Committee endorsed the establishment of an *ad hoc* Working Group which will lay the groundwork for establishing an African NACA termed ANAF - the Aquaculture Network for Africa (ANAF, see pages 29, 34 of this issue of FAN 40). When operational (first operations foreseen for 2009), ANAF should be able to provide much needed skills, technology and information exchange for the future development of aquaculture in the Region.

¹ FAO Report of Aquaculture Planning in Africa, Report of the First Regional Workshop in Aquaculture, 2-17 July 1975

² Limbé Declaration: A consensus statement by delegates to the FAO/WorldFish Workshop on Small-scale Aquaculture, 23-26 March 2004, Limbé, Cameroon..

³ CIFA Occasional Paper No. 28, 2006, FAO, Accra, Ghana.

Strengthening Aquaculture Health Management and Food Safety in the Baltic Region (Latvia and Bosnia & Herzegovina)

Melba B. Reantaso¹ and Raymon VanAnrooy²

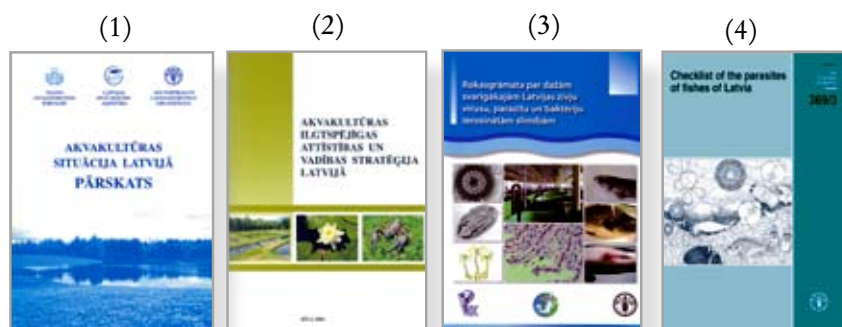
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TCP/LAT/3001 (A) IMPROVING AQUATIC ANIMAL HEALTH AND QUALITY AND SAFETY OF AQUATIC PRODUCTS

From 2005–2007, FAO implemented the above project with the National Board of Fisheries (NBF) of the Ministry of Agriculture as the responsible government authority for its execution. The project was actively participated by the Latvian Fish Resources Agency (LFRA), the Food and Veterinary Service, State Veterinary Medicine Diagnostic Center (VMDC), and the Latvian Crayfish and Fish Farmers Association. The project provided capacity building opportunities such as national training/workshops on aquatic animal health management (including quality and safety of aquaculture products) and aquaculture strategy/policy development. Two officers from LFRA and one from VMDC received overseas training on basic fish health management covering farm level health management, bacterial diseases finfish and crayfish histopathology, respectively, from the Centre for Environment, Fisheries and Aquaculture Science (CEFAS, Weymouth, UK) in January 2006. In addition, LFRA and VMDC both received laboratory equipments (e.g. autoclave, PCR machine and accessories, API system and accessories, microscopes

with camera, cooling incubators and precision balance) while NBF received miscellaneous office equipments. The project produced a number of publication outputs, namely: (1) Review of the current status of aquaculture in Latvia; (2) Strategy for sustainable development and management of aquaculture in Latvia; (3) Extension manual on some important viruses, parasites and bacteria of aquatic animals in Latvia (in Latvian language), and (4) Checklist of the parasites of fishes in Latvia.



TCP/BIH/3101 STRENGTHENING AQUACULTURE HEALTH MANAGEMENT IN BOSNIA AND HERZEGOVINA

FAN 37 (July 2007) introduced the background and objectives of this project. Since then, the project successfully completed 3 more training/workshops (EU Trading and Aquatic Animal Health Requirements and Risk Analysis, Bejasnica, October 2007; Food Safety and Quality Assurance and stakeholder seminar/workshop, Neum, December 2007; and Diagnostics, Surveillance and Reporting, Fojnica, March 2008). Two staff members from the University Sarajevo, Faculty of Veterinary Science received overseas training on viral disease examination (e.g. sampling procedures, handling and preparation of cell culture plates for diagnostics, cell culture inoculation and subculture, identification of virus-mediated CPE, cell sensitivity tests, ELISA test for identification of VHS, IHN and IPN virus, purification of viral RNA, RT-PCR and gel electrophoresis, handling of proficiency tests and introduction to quality assurance schemes according to ISO 17025 accreditation) at the European Community Reference Laboratory for Fish Disease at the National Veterinary Institute at Aarhus, Denmark for three weeks in January–February 2008. Equipments, to initiate furnishing a fish virology laboratory, are also being provided by the project. Project



40 participants (fisheries and veterinary authorities and private sector representatives from Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia) to the Western Balkan Regional Seminar/Workshop on Aquatic Animal Health held in Sarajevo from 19-22 May 2008

documentation outputs include a disease extension manual (in local dialect), a fish inspection checklist, a National Strategy on Aquatic Animal Health framework and an FAO Fisheries Technical Paper that will highlight the major outcomes of the TCP and the work of both national and international consultants on aspects of aquaculture, aquatic animal health and safety of aquaculture products in Bosnia and Herzegovina. Aside from several capacity building activities and stakeholder consultation, this TCP greatly assisted the country in getting an export license to EU through the various aquatic animal health protection measures that were put in place.

M. REANTASO, FAO



Participants to TCP/BiH/3101 Project Training/Workshop No. 5 on Diagnostics, Surveillance and Disease Reporting of Aquatic Animal Diseases, 18-21 March 2008, Fojnica

Last May 2008, the project organized the Western Balkan Regional Seminar/Workshop on Aquatic Animal Health which disseminated the outcomes on the TCP; exchanged information on the status of aquatic animal health, diseases affecting aquaculture, and programmes for disease diagnosis and prevention in Western Balkan countries; identified opportunities for seeking common solutions to common problems related to pathogen issues affecting regional trade between Balkan states and other key EU trading partners; and discussed and formulated a possible program of cooperation. A total of forty from fisheries and veterinary authorities and private

sector from Western Balkan countries and representatives from OIE and FAO participated in this event. A major outcome of this regional meeting was the development of a TCP Facility Concept Note on Assistance for Improving Compliance to International Standards for Aquatic Animal Health, which was strongly supported by representatives of all participating countries (Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia and including Albania). This request for TCP Facility funding will support the following activities: regional capacity and performance survey, regional field assessment, regional meeting and development of a further regional TCP proposal to FAO that will address several key areas of high importance to all participating countries. These include risk analysis; disease surveillance, monitoring and reporting; disease diagnostics including a regional reference laboratory; information and networking; and targeted capacity building.

Fisheries and Aquaculture Developments in Central Asia

KYRGYZSTAN

The EC-funded project “Development of inland fisheries and aquaculture in the Kyrgyz Republic to reduce rural food insecurity” (FishDev-Kyrgyzstan) (GCP/GLO/162/EC), was successfully terminated recently with the governmental approval of the “Strategy on Development and Management of the Fisheries and Aquaculture Sector of Kyrgyz Republic (2008-2012)”. Increased government attention to and prioritization of the fisheries and aquaculture sector development in the country was also reflected in the request to FAO for assistance in the formulation of a sector-wide donor-funded project. In response to this request, between April and June 2008, FAO assisted the country with a TCP facility project “Project Formulation of a Trust-Fund Project in Fisheries and Aquaculture” (TCP/KYR/3201). This small (USD46 000) project aimed to support the Ministry of Agriculture, Water Resources and Processing Industry of Kyrgyzstan, in the sustainable development and management of the capture fisheries and aquaculture sector, by formulating a donor-funded project through a participatory manner involving all relevant stakeholders. To this end, a mission by two Finnish consultants (expertise in fishery management and trout culture) was undertaken in May and a national workshop on aquaculture and ichthyology, was organized in Issyk-Kool Oblast Province from May 28-30, 2008. At present, the trust-fund project proposal is being discussed with the intended donor, the government of Finland. It is hoped that the project can start its implementation in early 2009.

More information can be obtained from Raymon van Anrooy, FAO Sub-regional Office for Central Asia (FAOSEC), Raymon.vananrooy@fao.org or Mr Heimo Mikkola, heimomikkola@yahoo.co.uk

TAJIKISTAN

Tajikistan is the poorest country in Central Asia, with 64 percent of the population living below the poverty line of USD 2/person/day (122nd of 177 on the Human Development Index). Poverty is particularly acute in rural areas. The FAO TCP/TAJ/3104 (E) “Emergency assistance to Tajikistan in the aquaculture sector, livestock sector and comprehensive assessment and programme development” was requested by the Ministry of Agriculture of Tajikistan in March 2008, following a winter season which was extremely severe and the coldest in 25 years. The extremely low temperatures caused not only frozen rivers, reservoirs, lakes and ponds; up to 37 cms of ice had also caused the mortality of a large part of the fish stock used for aquaculture production. Low water levels in the reservoirs used for hydropower production contributed to the extreme high mortality rate (60 percent) particularly of young fish (one-year old fingerlings). This USD393 000 TCP intends to support the rehabilitation of the aquaculture sector over the period April – December 2008. It is foreseen that the project will supply trout eggs, fish fry (carp species), fish feeds, fish cages, laboratory equipment and technical advice and training to the affected sector stakeholders. Project results will be presented in a future issue of FAN.



Left: Leaflet to promote fish consumption in Kyrgyzstan (GCP/GLO/162/EC - Kyrgyzstan) - in Russian



Right: Brochure to create awareness on the importance of fisheries and aquaculture for food security (GCP/GLO/162/EC -Kyrgyzstan) - in Russian

More information can be obtained from Raymon van Anrooy, Raymon.vananrooy@fao.org; Mohammed Hasan, at Mohammed.Hasan@fao.org or Rohana Subasinghe at Rohana.Subasinghe@fao.org, both of FAOs Aquaculture Management and Conservation Service (FIMA)

UZBEKISTAN

TCP/UZB/3103 (D) facility project “Development of strategic partnerships in support of responsible fisheries and aquaculture development in Uzbekistan” had been extended to July 2008. The “Aquaculture and capture fisheries development policy and strategy of Uzbekistan (2008-2016)”, one of the outputs of this USD120 000 project, was approved in June 2008 by the Cabinet of Ministers, and will thus be implemented as the official government strategy for aquaculture and fisheries, counting on the support from the Ministry of Agriculture and Water Resources of Uzbekistan. A series of 5 training manuals on aquaculture (see pictures of some covers) and the Policy and Strategy document were published in Issue No. 4 (2008) of the Ecological Herald of Uzbekistan. A trust-fund project formulation mission was carried out with support from national counterparts, an Indian aquaculture expert and an official of the Ministry of Agriculture and Rural Affairs of Turkey. The resulting project proposal entitled “Support to Fishery and Aquaculture Development for Poverty Alleviation in Fergana Valley and the Karakalpakistan Region of the Republic of Uzbekistan” is currently being discussed with the intended donor, the Government of Turkey.

More information can be obtained from Raymon van Anrooy, Raymon.vananrooy@fao.org or Gerd Marmulla, FIMF. Gerd.Marmulla@fao.org, Fisheries Management and Conservation Service (FIMF)



*Left: Training manual on carp culture and reproduction in ponds (TCP/UZB/3103) - in Russian
Right: Training manual on pond aquaculture in the Aral sea region (TCP/UZB/3103) - in Russian*

TURKEY

A USD 51 000 TCP/TUR/3101 facility project “Developing a roadmap for Turkish marine aquaculture site selection and zoning using the ecosystem approach to management” (TCP/TUR/3101) is assisting the Ministry of Agriculture and Rural Affairs of Turkey in the development of: (i) a roadmap for sound marine aquaculture site selection and (ii) a zoning plan for marine aquaculture following the pan-Mediterranean guidelines for fish farmers. In July a participatory consultative workshop was organized in Mugla, Turkey, on the identification of conflicts.

More information can be obtained from Ms Doris Soto of FAOs Aquaculture Management and Conservation Service (FIMA), at Doris.Soto@fao.org

SUPPORT TO THE IMPLEMENTATION OF THE FAO CODE OF CONDUCT FOR RESPONSIBLE FISHERIES IN CENTRAL ASIA

As requested by the Central Asian transition economies, a Regional Workshop on the 1995 FAO Code of Conduct for Responsible Fisheries in the Central Asian region: A Call to Action, was organized in Tashkent, Uzbekistan, from 8–10 April 2008. The regional workshop was hosted by the Ministry of Agriculture and Water Resources of Uzbekistan in close technical collaboration with FAOSEC and the International Institutions and Liaison Service (FIEL), and with organizational support from the State Committee for Nature Protection of the Republic of Uzbekistan and the Institute of Water Problems of the Academy of Sciences of the Republic of Uzbekistan. The workshop aimed to bring together policy makers, administrators, sector representatives and other main stakeholders from the fisheries sector in the Central Asian countries to increase awareness on and understanding of FAO’s CCRF; foster steps towards more effective implementation of the Code in the Central Asian region; encourage fishery policy revisions reflecting the objectives and general principles of the Code; and encourage an inclusive approach to management whereby stakeholders are involved in the development and review processes and the implementation of measures.

The workshop was attended by stakeholders from Kazakhstan, Kyrgyzstan, Tajikistan, Turkey and Uzbekistan. The workshop participants produced a number of conclusions and practical recommendations in support of the workshop objectives. The workshop recognized that the Code provides a suitable framework and guide for environmentally-compatible, socially-acceptable and economically-viable development and management of the fisheries



Participants to the Regional Workshop on Inland Fisheries and Aquaculture in Central Asia: Status and Development Prospects, Demre, Turkey, 11-14 December 2007

sector in the Central Asian region. It was noted that some of the countries in the region (e.g. Kyrgyzstan, Tajikistan and Uzbekistan) are using the Code as guidance in their policy and legal framework development.

The workshop concluded that additional efforts are needed by all fisheries and aquaculture sector stakeholders in Central Asia, including public and private sector stakeholders (e.g. policy makers, fishery officers and inspectors, trainers and extensionists, fisherfolk and aquaculture farmers and their organizations, researchers, civil society/NGOs, etc.) to implement the Code. The workshop emphasized that in the implementation of the Code, significant attention should be given to transboundary issues in relation to fisheries and aquaculture management in the region.

More information on this workshop can be found in the "Report of the Regional Workshop on the 1995 FAO Code of Conduct for Responsible Fisheries in the Central Asian Region: a Call to Action, Tashkent, Uzbekistan, 8-10 April

2008". FAO Fisheries Report. No. 866. Rome, FAO. 2008. (bilingual Russian & English) or can be obtained from Raymon van Anrooy at Raymon.vananrooy@fao.org

OUTCOMES OF THE REGIONAL WORKSHOP ON INLAND FISHERIES AND AQUACULTURE IN CENTRAL ASIA: STATUS AND DEVELOPMENT PROSPECTS, DEMRE, TURKEY, 11-14 DECEMBER 2007

Held at the Mediterranean Fisheries Research, Production and Training Institute (AKSAM) (Beymelek, Demre, Province of Antalya, Turkey), this workshop was jointly organized by the Ministry of Agriculture and Rural Affairs of Turkey (MARA), the Turkish International Cooperation Agency (TICA) and FAO with 35 participants from the five Central Asian countries, MARA and TICA representatives, university professors from various universities in Turkey, private-sector representatives, as well as MARA and FAO resource persons. The objectives of the workshop were: (1) to increase knowledge and understanding among national policy-makers, fisheries and aquaculture sector experts on the status of fisheries and aquaculture development in the Central Asian region by sharing national-level experiences, problems encountered and opportunities for development of the sector with others from the region; (2) to work towards finalization of the national review study reports for five Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan); and (3) to develop the basis for a strategic programme for fisheries and aquaculture development in the region. The workshop resulted to a SWOT (strengths, weaknesses, opportunities and threats) analysis of the fishery and aquaculture sector in Central Asia and the basic ingredients for a sectoral strategic programme.

FAO Aquaculture Field Projects in Latin America and the Caribbean¹

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Field work of FAO in Latin America and the Caribbean (LAC) related to aquaculture is being implemented through projects under different modalities (e.g. Technical Cooperation Project or TCP, TCP Facility or Unilateral Trust Funds or UTF) that are executed at regional, sub-regional and national levels. In countries like Mexico and Brazil, there are also projects in operation at the level of the federal states and provinces.

Preparation of aquaculture development plans is one subject of high interest in the region. FAO is currently providing technical assistance to several countries. Through TCP/URU/3102 *National plan for aquaculture development*, a General Strategy for the Sustainable Aquaculture Development together with a Business Plan for the Establishment of Aquaculture Investments and Feasibility and Economic Studies for Aquaculture Enterprises, all in accordance with the National Policy for Sustainable Aquaculture of Uruguay has been developed. In Peru, the development of a National Plan for the Sustainable Development of Aquaculture under TCP/PER/3101 *National Strategy for Development of Sustainable Aquaculture in Peru* will be concluded by the end of

2008. Nicaragua is also receiving FAO assistance in the same subject as part of a TCP Facility, TCP/NIC/3103 *Support to the Fisheries and Aquaculture National Institute of Nicaragua for Preparation of an Aquaculture National Project*. This project gives special attention to the North Atlantic Autonomous Region (RAAN) affected by the Hurricane Felix.

In Mexico, FAO's field programme in aquaculture provides support at the level of the federal states. The Mediterranean state of Puebla is receiving assistance through the project UTF/MEX/071/MEX *Support to the Secretariat of Rural Development for Preparation of a Fisheries and Aquaculture Master Plan* for the preparation of a master plan for aquaculture and inland fisheries development with trout, tilapia and carp as the main cultured species. The state of Michoacan is receiving assistance through the project UTF/MEX/067/MEX *Support for the Strengthening of Aquaculture Programmes in Michoacan State, Mexico* to develop a centre for producing genetically improved tilapia juveniles; activities for assessing biological feasibility of aquaculture in reservoirs have been also carried out. At the national level, the projects UTF/MEX/079

Socio-economic Studies of Fisheries and Aquaculture and TCP/MEX/3003 *Revision of the Fisheries and Aquaculture Legal Framework* are assisting in the analysis of the socioeconomic aspects of fisheries and aquaculture, and advising in the legal framework of the fisheries and aquaculture sectors, respectively.

Brazil receives technical assistance for mariculture development in the coastal areas of the country through UTF/BRA/066/BRA *Coastal Communities Development Programme* and a project for small-scale aquaculture in Parana state is under preparation using a TCP Facility, TCP/BRA/3002 *Programme for Aquaculture Productive Chain in the State of Parana*. A project in support of the Aquaculture and Fisheries Secretariat of Brazil (SEAP) has been recently completed under TCP/BRA/3001 *Institutional Strengthening of SEAP*.

Bolivia, Colombia and Cuba are receiving assistance for improving the fisheries and aquaculture under the following projects, namely: (i) TCP/BOL/3101 *Improvement of Fisheries and Aquaculture Legislation for Bolivia*, (ii) TCP/COL/3102 *Assistance of an Adviser in Fisheries and Aquaculture Legislation and an*

¹ Contribution and comments from J. AguilarManjarrez and D Soto, both of FIMA, are gratefully acknowledged.

Adviser in Fisheries and Aquaculture Policies for Colombia and (3) Cuba through TCP/CUB/3102 Assistance for the Formulation of a Project on Tilapia Genetics for Cuba.

Chile has recently completed a project TCP/CHI/3002 *Certification of the Compliance of Environmental Regulations by the Aquaculture Sector in Chile* and a pipeline project on biosecurity in aquaculture for southern Chile is under review. This project will be executed under UTF modality and is being formulated with the support of a TCP-Facility TCP/CHI/3201 *Formulation of Institutional Instruments for the Spatial Management of Aquaculture in the Magallanes and Chilean Antarctic Region*. These two projects are briefly described below.

TCP-FACILITY/CHI/3201

The outbreak of the Infectious Salmon Anemia virus in Chile was officially communicated in August 2007. On June 20th 2008, 24 farms were officially infected according to the National Fisheries Service. Twenty three of the infected sites are located in the “Lakes Region”, where more than 500 farms are operating. The negative production results generated a clear necessity to relocate farms in other regions. The only option which salmon farmers have is to migrate south, towards Aysén or Magallanes Region, both of which are in the Chilean Patagonia. Since these regions, and specially the Magellan’s Region, have tourism as their main activity, local communities and tourism boards estimate that the massive migration of salmon farming to this region is a threat to their development. NGOs have been already created and examples of impacts have been widely communicated. On the other side, aquaculture provides jobs and secure income during the entire year, causing an interesting local discussion to decide whether to accept or ban aquaculture in this region.

In order to minimize risks, take advantage of opportunities, and make a wise and coordinated use of the environmental capital of this region, the Magallanes Regional Authority requested for FAO assistance to develop a biosecurity framework, oriented to develop an Integrated Coastal Zoning for the 45 000 km long coast line, but also to contribute to sustainable operations by means of a biosecurity certification system. Finally, the request included also the strengthening of local capacities. The project proposal is currently under development.

TCP/CHI/3002

Chilean aquaculture has been growing at an average annual increase of 18 percent in the last 10 years, reaching, in 2007, a volume of nearly 800 thousand tonnes where salmonids represents more than 80 percent and with an export value of approximately USD2.5 M. The salmon industry provides nearly 50 000 direct jobs and is mainly concentrated in the “Lakes Region”. It has had strong economic and social impacts in this area. However, environmental interactions raised concern, despite the launching of the Environmental Regulation for Aquaculture (RAMA) in 2001. In order to assure the compliance of this regulation, the Chilean State requested in 2005 for FAO assistance to develop an evaluation and certification system.

The project finished in 2006 and proposed a certification system that considered the direct involvement of the International Standardisation Organisation (ISO) through its local accreditation body, the INN (Instituto Nacional de Normalización). It has been suggested that this body will evaluate and perform an accreditation process together with the National Fisheries Service. The system considers that only accredited laboratories will be able to take samples, transport them and perform the environmental analysis. On the other hand, it is proposed

that only certifying bodies will be able to evaluate the compliance of all other environmental requirements stated in the RAMA and provide a certificate, if appropriate.

The process of developing the certification system included a very active participation of civil society (industry, farmers, environmental consultants and laboratory personnel, NGOs and the different institutional offices) through several seminars and workshops.

Currently, the government undertakes internal discussions about the best implementation strategy and is expecting a pilot unit in the next couple of months.

The proposed system considers the hazard level associated with different locations, considering higher sampling schemes in high risk farms, as well as an information system to allow transparent and efficient data exchange and public outreach. Some relevant elements of the proposed system are:

- a third party certification system, with accreditation of certifying bodies and laboratories;
- a geographical approach (Geographical Certification Units/ Areas; GCU) to centralize the certification process around distinguishable aquaculture zones, producing scale economies thus lowering individual costs of certification process;
- generation of an entity (Certification Secretariat) which controls the operation of the system, including management of operational funds; and
- a vulnerability classification criteria which is farm specific with regards to compliance to RAMA.



Mussel farming off the Island of Chiloé

Development of Bivalve Aquaculture in Latin America

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Aquaculture in Latin America and the Caribbean region has expanded steadily since the past two decades, particularly with regards to selected shrimp and finfish species. Molluscs, especially bivalves, are currently the third largest group of marine organisms in terms of aquaculture production. In 2005, according to FAO statistics, the region produced approximately 130 000 tonnes of molluscs. This production has doubled since the beginning of this last decade.

The interest in farming a variety of bivalve species of commercial importance is increasing among both small and large investors active in the sector. Indeed, bivalves feed at the top of the food chain and hence, are a relatively cheap source of animal protein compared to farmed fish and crustaceans. The increase demand for such products may certainly help the aquaculture sector in the region to expand further and provide employment opportunities and businesses.

In order to promote the expansion and sustainable development of bivalve aquaculture and management in the region, FAO recently organized a regional workshop on the “Status of bivalve aquaculture and management and its future prospective: factors affecting the sustainability of this industry in



Harvesting of mussel off the Chiloé Island

Latin America”. The workshop, held in Puerto Montt, Chile, from 20 to 24 August 2007, and organized in collaboration with the Universidad Austral de Chile, was aimed at discussing technical and socio-economic issues related to bivalve farming as well as to identify future research and policy needs to promote the development of this economic sector.

The workshop highlighted the main features of bivalve aquaculture in terms of its economic and social impacts, scientific and technological developments, and proposed strategies for seizing the opportunities to promote its development in the region by overcoming the threats that are currently affecting the industry.

The workshop report, now available, analyzes and presents the results of the meeting, including a series of actions (national and regional) which have been grouped as follows: (i) identification of priority areas, trading opportunities and constraints faced by the bivalve aquaculture and fisheries management sectors in Latin America; (ii) a priority list of the main research and development needs to support bivalve farming and management in the region and in the single countries; (iii) a priority list of the major governmental policies, science and industry actions needed to contribute to the certification of farmed products in terms of food security; and (iv) a priority list of social responsibilities and policies that will allow its sustainable development. The report also contains the papers presented at the meeting some of which describe the status of bivalve aquaculture development in the major producing countries in the region while others focus on the different technical aspects of this industry.

FAO and Aquatic Animal Biosecurity in the Pacific Islands

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It is only in recent years that aquatic animal biosecurity in the Pacific Island region has become one of the main agenda in aquaculture development. In the past, several opportunities highlighted and discussed aquatic animal movements (e.g. introduction and transfer of exotic marine species, e.g. giant clams, trochus and other molluscs) and aquatic quarantine capabilities and regulations. These include regional meetings organized by the Secretariat of the Pacific Community (SPC, formerly the South Pacific Commission) in 1985, 1994 and 1999, the World Animal Health Organisation (OIE) in 2003, and the Pacific Islands Regional Ocean Policy Forum in 2004 (SPC, 2003)¹. Despite discussions concerning aquatic animal movements at the regional level, appropriate national policies on aquatic animal movements have not been in place in countries of the Pacific region. The Pacific Island nations are very rich in natural aquatic resources, strongly unique in their abundance of seafood and possession of pristine beaches, rich mangroves and beautiful coral reefs. A strong regional biosecurity programme will be needed to protect biodiversity and these natural tropical splendor.

To overcome the lack of technical capacity and infrastructure at national level to implement biosecurity regimes for aquatic

organisms, the establishment of a Regional Aquatic Biosecurity Programme was proposed by SPC and endorsed by the SPC Heads of Fisheries Meeting in 2003 (SPC, 2006², 2007³). This aquatic biosecurity programme was presented during the Regional Workshop on Implementing the Ecosystem Approach to Coastal Fisheries and Aquatic Biosecurity organized by SPC in New Caledonia from 28 October to 2 November 2007, participated by senior government officials from the fisheries, environment, quarantine and veterinary agencies and aimed at cross-sectoral dialogue to better understand how global commitments for biosecurity can be implemented at regional and national levels. This workshop was supported by FAO/SAP and FAO/FIMA.

In line with the above-mentioned regional initiatives and dialogue, FAO responded to formal requests from Micronesian countries (Federated States of Micronesia (FSM), the Republic of Marshall Islands (RMI) and the Republic of Palau) to strengthen their national capacities to assess the risks in aquaculture development through its Technical Cooperation Project (TCP) resources. A sub-regional TCP project (TCP/RAS/3101 *Sustainable aquaculture development in the Pacific Micronesia*) was the first opportunity for FAO in the Pacific region to organize a workshop on risk assessment and health management in Koror, Palau, in July 2006. Main topics in the workshop included an overview of risk in aquaculture development, introductions and transfers of live



M. REANTASO, FAO

The national workshop on risk assessment in aquaculture production held at the Ministry of Resources and Development (R&D), from 5-7 May 2008 was participated by 18 composed of representatives from MIMRA, Ministry of R&D, Office of Environment, Policy and Planning Coordinating, EPA, bi-lateral technical cooperation agency, the College of the Marshall Islands, NGOs and the private sector

aquatic animals in the Pacific, and risk analysis for movements of live aquatic animals.

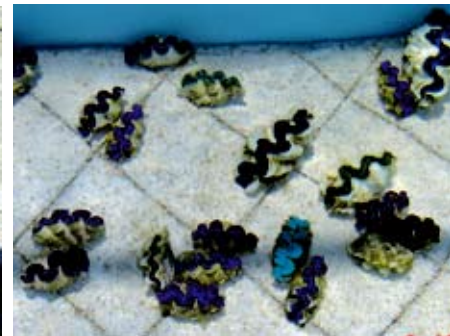
Further consultation with the Government of RMI, a national workshop on risk assessment in aquaculture development was conducted in Majuro, the Marshall Islands, in May 2008 under the TCP Facility project (TCP/MAS/3101 *Risk assessment in aquaculture development in the Marshall Islands*). This project was formulated in line with one of the recommendations on national capacity development as a priority in the region by the 7th Meeting of FAO South West Pacific Ministers for Agriculture held in Majuro in May 2007. The workshop was timely conducted during the period of consultation to address a central topic concerning the introduction of grouper and cobia to the Marshall Islands at the newly established Australian aquaculture farm, Good Fortune Bay Fisheries, Ltd., as well as an introduction of grouper under the Taiwanese International Cooperation and Development Foundation (ICDF, Taiwan Fish Farm). The workshop provided an overall perspective of risk analysis as a decision making tool, an overview of the process, the different risk sectors in aquaculture production, its application to aquaculture, and a better appreciation of what may be lacking in the recently concluded environmental impact assessment (EIA).

Currently, FAO/SAP is in the process of preparing a TCP Facility project (Risk assessment in aquaculture development in the FSM) in close cooperation with FAO/FIMA. Under the proposed project, a national workshop on risk assessment in aquaculture will be conducted in Pohnpei late 2008. It is also planned that under this project facility, a risk analysis training course material will be prepared and pilot-tested during the FSM workshop. It is anticipated that such material will be useful to concerned staff to further build national capacity including capacities of other concerned agencies/institutions on risk assessment. It is envisioned that staff from RMI will also participate in this workshop which can pave the way for initial networking (to exchange information and experiences) and building regional capacity on aquatic biosecurity.

The knowledge gained in understanding and applying risk analysis starting from the Palau workshop (TCP/RAS/3101), the Majuro workshop (TCP/MAS/3101) and the proposed Pohnpei workshop (late 2008) will provide perspectives on the local situation and specific capacity building needs in this region that will assist in better formulating a possible future aquatic biosecurity framework for the Pacific Islands.



M. REANTASO, FAO



A giant clam holding and raising facility in Majuro Island features a number of different species and sizes of giant clams for the aquarium market. Four species of Tridacna clams under cultivation include Tridacna maxima, T. squamosa, T. crocea and T. gigas. The farm operates with open flow grow-out systems in which fresh seawater is continuously pumped through. RMI (Majuro Island) is an ideal location for growing clams because of grow-out space and broodstock availability.

¹ SPC. 2003. SPC-HOF guidelines for the introduction and translocation of aquatic organisms for aquaculture and culture-based fisheries, Third SPC Head of Fisheries Meeting, Working Paper No. 8, 7 pp.

² SPC. 2006. Project pre-proposal: establishing aquatic animal biosecurity for responsible aquaculture and fisheries development in the Pacific region, Fifth SPC Heads of Fisheries Meeting, Information Paper No. 2, 3 pp.

³ SPC. 2007. Project pre-proposal: establishing aquatic animal biosecurity for responsible aquaculture and fisheries development in the Pacific region, SPC Regional Workshop on Implementing the Ecosystem Approach to Coastal Fisheries and Aquatic Biosecurity, 21 pp.

Near East and North Africa A Glance on the Development of Aquaculture

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The region covered by the FAO Regional Office for the Near East and North Africa extends across a wide and dispersed geographical area which includes different marine and freshwater ecosystems and fisheries with different characteristics and complexity. This FAO Region expands from the East Central Atlantic Ocean on the west, the large expanse of the Indian Ocean and Arabian Sea and the arid and dry highlands of Central Asia in the east, as well as regional seas (such as the southern and eastern Mediterranean Sea), national and regional rivers, lakes and various bodies of water.

At present, many countries in the region are engaged in aquaculture production, based mostly on the culture of low value, freshwater finfish in inland rural communities. These exist within semi-intensive or extensive farming systems that use moderate to low levels of production inputs and produce large quantities of affordable food fish for domestic markets and home consumption. Brackishwater culture is by far the most important practice in the region followed by freshwater culture and mariculture. Aquaculture production in the region is led by Egypt; the Islamic Republic of Iran is a distant second. Some countries are also engaged in the production of high value freshwater and marine species such as sturgeon and shrimp [e.g. shrimp farming in the Kingdom of Saudi Arabia (KSA)].



A. LOVATELLI, FAO

Grouper broodstock

Aquaculture production continues to grow and there is good potential for expansion particularly in most Arab nations where research and development of mariculture is underway. The Islamic Republic of Iran has considerable potential for increasing its aquaculture production. The major constraint for intensive aquaculture is the shortage of experienced personnel and the absence of well developed feed processing.

Only eight countries equal or surpass international average per capita fish consumption. With the uncertain potential for increasing fish supply from marine and inland capture fisheries, the future supply of fish in the Near East Region most likely will depend on aquaculture. There are, however, environmental, technical, economic and legal constraints of varying degrees that need to be overcome in many countries if aquaculture is to develop. Nevertheless, aquaculture will continue to expand, both in terms of quantity and quality, due to its economic importance and its quantifiable contribution to helping countries fill the growing gap between supply and demand of fisheries products.

The region benefits from the support provided by two FAO regional fisheries management organizations through their subsidiary bodies specifically dealing with aquaculture: the Working Group on Aquaculture (WGA) of the Regional Commission for Fisheries (RECOFI) and the Committee on Aquaculture (CAQ) of the General Fisheries Commission for the Mediterranean (GFCM). Moreover, some initiatives are being implemented

with the support of FAO some of which are described below.

Support to the Saharan aquaculture and valorization of salt ponds: The project (TCP/ALG/3103 *Appui au Développement de l'Aquaculture Saharienne*) is aimed to promote planning and development of desert aquaculture in Algeria. This will be mostly based on intensive tilapia culture. The initiative of supporting the Saharan aquaculture relies on significant freshwater and brackishwater resources available from deep ground water tables currently used for irrigation. Besides, the salt ponds occurring in the semi-arid regions are expected to be used for *Artemia* production. It is believed that the establishment of Saharan aquaculture in Algeria will contribute to economic development, improvement of food supply and diversification through increased availability of animal protein in the diet of the local population.

Western and Central Asian Artemia Reference Centre: The agreement for the establishment of the "Western and Central Asian Artemia Reference Centre" (WCAARC) was signed by the Iran Fisheries Research Organization (IFRO) and the FAO in May 2008 (UTF/IRA/061/IRA). The Islamic Republic of Iran, particularly the Urmieh Lake, is one of the most affluent sources of *Artemia* in the world. It is expected that WCAARC will serve as a centre for the coordination of *Artemia* research and extension activities in the countries of Western and Central Asia. The new Centre will be located in the premises of the Iranian *Artemia* Research Centre in Golmankhaneh on the shores of Lake Urmieh. The establishment of WCAARC offers a unique opportunity to bring together leading *Artemia* scientists and creating a global network to exchange ideas and knowledge on technical issues.

Support to the Fish Farming Centre in Jeddah, KSA: FAO has recently renewed its agreement with the KSA (UTFN/SAU/017/SAU) to provide technical advice in support of the Fish Farming Centre in Jeddah (pages 22-23, FAN 39) which was established to develop suitable aquaculture technologies and to provide support to the private sector. The main objectives of the current project are to support technical and scientific capacity, to develop and improve hatchery and on-growing technologies (including offshore cage culture) for selected marine finfish (e.g. groupers), to produce superior quality of white shrimp (*Ferropenaeus indicus*) breeders, and to improve the information dissemination system of the Center. The project started in 2007 and will run for five years.

Reinforcement of the role of women in the culture of clams: FAO and the Government of Tunisia have recently signed a Technical Cooperation Project (TCP/TUN/3203 – *Renforcement du rôle de la femme dans la filière pêche à pied de la palourde*) to support the expansion of clam farming in this southern Mediterranean nation. The project aims also at supporting and improving the role of women in this sector and to ensure a rational and responsible use of the resources.

RECENTLY COMPLETED EVENTS (continued from page 7)

April 2008

- ▶ RECOFI Regional Technical Workshop on Aquatic Animal Health, 5-10 April 2008, Jeddah, Kingdom of Saudi Arabia. Alessandro.Lovatelli@fao.org/
Melba.Reantaso@fao.org
- ▶ FAO Expert Consultation on Climate Change and Fisheries and Aquaculture, 7-9 April 2008, Rome, Italy.
Doris.Soto@fao.org/Cecile.Brugere@fao.org
- ▶ FAO Workshop on the Development of an Aquatic Biosecurity Framework for Southern Africa, 22-24 April 2008, Lilongwe, Malawi. Rohana.Subasinghe@fao.org/
Melba.Reantaso@fao.org

May 2008

- ▶ FAO/NACA Consultative Workshop on Guidelines for Aquaculture Certification, 6-8 May 2008, Beijing, China.
Rohana.Subasinghe@fao.org/Jiansan.Jia@fao.org
- ▶ FAO/MIMRA National Workshop on Risk Assessment in Aquaculture Development (TCPF/MAS/3101), 13-15 May 2008, Majuro, Republic of the Marshall Islands.
Masanami.Izumi@fao.org/Melba.Reantaso@fao.org
- ▶ Western Balkan Regional Seminar/Workshop on Aquatic Animal Health and Project Terminal Workshop (TCP/BiH/3101), 20-23 May 2008, Sarajevo, Bosnia and Herzegovina. Melba.Reantaso@fao.org
- ▶ 25th Session of EIFAC, including Symposium on Interactions between Social, Economic and Ecological Objectives of Inland Commercial and Recreational Fisheries and Aquaculture 21-28 May 2008, Antalya, Turkey.
Gerd.Marmulla@fao.org/Uwe.Barg@fao.org/
Raymon.Vananrooy@fao.org/Thomas.Mothpoulsen@fao.org
- ▶ FAO Consultative Workshop on Guidelines for Aquaculture Certification, 29-30 May 2008, Silver Springs, Maryland, USA.
Rohana.Subasinghe@fao.org/Lahsen.Ababouch@fao.org

August 2008

- ▶ APFIC 2nd Regional Consultative Forum (RCFM) "Promoting effective arrangements for managing fisheries and aquaculture in the Asia-Pacific region", 6-9 August 2008, Manado, Indonesia. Simon.FungeSmith@fao.org

(continued on page 51)

Support to Sustainable Aquaculture Development by Regional Fishery Bodies¹

There are at present six Regional Fishery Bodies (RFBs) established under the FAO Constitution which have mandates *inter alia* to promote the sustainable development of aquaculture. The essential purpose of an RFB is to provide an effective forum for international cooperation in order to enable States to promote conservation and management measures for living aquatic resources. RFBs offer an opportunity for government-nominated experts or delegates to exchange data and experience on fisheries and aquaculture issues, and to develop scientific, technical, policy and strategic advice to their Members:

- for decision, where RFBs have regulatory powers, or
- for consideration, but eventually for action by individual Members, where RFBs have advisory roles with no regulatory powers.

The following briefs present aquaculture activities of each RFB. Additional information on RFBs and RFB fact sheets are available at: <http://www.fao.org/fishery/rfb>.

Asia-Pacific Fishery Commission (APFIC)

<http://www.apfic.org/>

APFIC was established as the Indo-Pacific Fisheries Council in 1948; the name was changed to APFIC². APFIC, whose mandate is to facilitate the development of bilateral, trilateral and regional agreements, provides advice, coordinates activities and acts as an information broker to increase knowledge on fisheries and aquaculture to support decision-making. More, recently, APFIC Members have agreed to act more as a regional consultative forum in close partnership with other regional organizations. While APFIC's main area of responsibilities lies within fisheries, since there are many areas where fisheries and aquaculture interact, a joint approach is needed. Thus, APFIC also work with its Members on aquaculture and has been involved in the following aquaculture-related issues:

- development of a regional TCP *Reducing the dependence on the utilization of trash fish/low value fish as feed for aquaculture of marine finfish in the Asian region* (2007-2009);
- provision of regional input to the FAO Guidelines for Aquaculture Certification (2007/2008);
- review of the introduction and movement of *P. vannamei* into the region (2006); and
- addressing low-value and trash fish issues related to fisheries and aquaculture (2006).

The 2nd APFIC Regional Consultative Forum (6–9 August 2008) and the 30th APFIC Session (11–13 August 2008) will be held in Manado, Indonesia.

Committee for Inland Fisheries and Aquaculture of Africa (CIFAA)

<http://www.fao.org/fishery/rfb/cifaa>

Established in 1971, CIFA³, formally changed its name to CIFAA to accommodate its new co-thrust of aquaculture, and is in the process of reviewing its mandate. The original Terms of Reference (TOR) has strong emphasis on fisheries science (fisheries and limnological research) and fisheries technology. The 14th session (Accra, Ghana, November 2006), reviewed the regional dimensions of inland fisheries and aquaculture development in Africa *vis-à-vis* the roles and responsibilities of the Committee. CIFAA aims to: (i) be a source of high quality information on inland fisheries and aquaculture development, particularly with regard to social and economic dimensions of inland fisheries and aquaculture development, particularly with regard to social and economic dimensions; (ii) improve regional and sub-regional cooperation among Members; (iii) hold regular consultations among stakeholders; and (iv) respond more efficiently to the needs of countries and the region. CIFAA recognised the need to change and evolve into a structure that can better link the public and private sectors along with development partners as well as regional economic organisations and the New Partnership for Africa's Development (NEPAD)

¹Authorship for this article (arranged alphabetically): U. Barg, J. Clausen, S. Funge-Smith, J. Gonzales de la Rocha, A. Lovatelli, F. Massa, A. Mena Millar, J. Moehl and F. Poulain, with contributions by J. Aguilar-Manjarrez, D. Soto, V. Crespi and P. Mannini gratefully acknowledged.

as well as to have a higher degree of self-reliance. The 15th session, scheduled for December 2008, will review revised TOR to make the Committee more responsive and relevant to the needs of the Region.

Commission for Inland Fisheries of Latin America (COPESCAL)

<http://www.fao.org/regional/lamerica/organos/copescal/default.htm>

COPESCAL⁴ was established in 1976 in order to: (i) promote research and development programmes for the rational utilization of inland fisheries resources; (ii) assist Member Governments in establishing the scientific basis of regulatory measures for the conservation of inland fishery resources; (iii) support the development of aquaculture; and (iv) encourage education and training. Areas covered include rural aquaculture development, health management, aquaculture nutrition, processing and quality assurance of aquaculture and inland capture fishery products, legislation and aquaculture planning and management.

In 2005, the Organization for Fisheries and Aquaculture in the Central American Isthmus (OSPESCA) in cooperation with FAO's Aquaculture Management and Conservation Service (FIMA), conducted a regional study on the status and trends of aquaculture. Concerning the possibility of establishing a regional networking in the Americas, two separate studies were conducted by FAO (2004) and the Asia-Pacific Economic Cooperation (APEC, 2005) (see page 29). During the 10th session (Panama, 2005); COPESCAL approved the recommendations of the above FAO-OSPESCA regional study emphasizing the need to further analyse the socio-economic impact of aquaculture, strengthen sanitary and environmental measures and reinforce government institutions mandated to manage aquaculture; and supported the recommendations of the two networking proposals. COPESCAL is now embarking to revise its statutes and rules of procedure in order to be more responsive to the challenges facing aquaculture development.

European Inland Fisheries Advisory Commission (EIFAC)

<http://www.fao.org/fishery/rfb/eifac>

A major function of EIFAC⁵ (established in 1957) is to advise on development of inland fisheries and aquaculture. Presently, EIFAC's aquaculture activities cover:

- relationship between fish transfer and fish health, with emphasis on implications arising from EC Directive 2006/88/EC;
- aquatic resources management in aquaculture (review of use of water and integration into water resources management);

- market perspectives of European freshwater aquaculture;
- collaboration with the Network of Aquaculture Centers in Central and Eastern Europe (NACEE);
- eels, sturgeons, crayfish introductions and stocking;
- handling of fishes in fisheries and aquaculture;
- prevention and control of bird predation;
- recreational fisheries, socio-economic aspects of inland fisheries, ecosystem approach, climate change.

Aquaculture issues were discussed during the 2008 EIFAC symposium on interactions between socio-economic and ecological objectives of inland capture fisheries, recreational fisheries and aquaculture. EIFAC's next Session will be held in 2010, and its associated symposium will focus on "multi-functional inland aquaculture". In view of the growing importance of aquaculture, EIFAC recently agreed to initiate the process of changing its name to European Inland Fisheries and Aquaculture Advisory Commission. Recent EIFAC publications related to aquaculture include the EIFAC Code of Practice for Recreational Fisheries and expert meeting reports on a cormorant management plan and on handling of fishes in fisheries and aquaculture.

General Fisheries Commission for the Mediterranean (GFCM)

<http://www.gfcm.org/gfcm>

GFCM⁶ has a specific Committee on Aquaculture (CAQ) established to promote the sustainable development and responsible management of marine and brackishwater aquaculture in the region, and to provide independent advice at technical, socio-economic, legal and environmental level for common standards, norms, guidelines and decisions. In particular, CAQ assesses information or programmes provided by Members and relevant stakeholders on production statistics, market data, culture systems, technologies, farmed species and maintains related databases. CAQ operates through three *ad hoc* Working Groups on:

- Siting and carrying capacity (aquaculture integration with other coastal management issues; carrying capacity assessment, environmental monitoring programme, harmonised regional guidelines for aquaculture site allocation and management).
- Sustainability (selection of indicators, standards and reference points for aquaculture sustainable development, guidelines for their use); and
- Marketing (data collection on aquaculture products market; market synergies with capture fisheries; strategy development for aquaculture marketing and promotion);

Through the Information System for the Promotion of Aquaculture in the Mediterranean (SIPAM), CAQ aims

at improving the flow of information on aquaculture in the region particularly on production statistics. Recent GFCM publications on aquaculture deal with: interaction between aquaculture and capture fisheries; sustainable bluefin tuna farming practices; marketing of farmed seabass and seabream. The next session of CAQ will take place in December 2008 in Tirana, Albania.

Regional Commission for Fisheries (RECOFI)

<http://www.fao.org/fishery/rfb/recofi>

The main objective of RECOFI⁷ is to promote the development, conservation, rational management and best utilization of living marine resources, as well as the sustainable development of aquaculture within its area of agreement. RECOFI provides guidance to its Member countries on sustainable exploitation of capture fisheries and aquaculture development. The RECOFI Working Group on Aquaculture (WGA), formally established in 2004, provides advice to the Commission on technical and policy matters related to aquaculture. Furthermore, the WGA identifies and discusses regional issues related to aquaculture, and monitors and reports its development. The work programme and recommendations of the WGA are submitted for consideration and endorsement by the Commission during its regular biannual session. During the fourth session of RECOFI (May 2007, Jeddah, Kingdom of Saudi Arabia) the Commission endorsed two major activities aimed at the development of a regional strategy on aquatic animal health and marine cage culture. The latter activity will look into issues such as licensing procedures, site selection and environmental impact assessment protocols. The WGA recently launched the RECOFI Aquaculture Information System (RAIS).

²**APFIC Members** include Australia, People's Republic of Bangladesh, Cambodia, People's Republic of China, France, India, Indonesia, Japan, Republic of Korea, Malaysia, Myanmar, Nepal, New Zealand, Pakistan, Philippines, Sri Lanka, Kingdom of Thailand, United Kingdom, United States of America, and Socialist Republic of Viet Nam.

³**CIFAA Members** include Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Côte d'Ivoire, Egypt, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe.

⁴**COPESCAL Members** include Argentina, Bolivia, Brasil, Colombia, Costa Rica, Cuba, Chile, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Republica Dominicana, Suriname, Uruguay and Venezuela.

⁵**EIFAC Members** include Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, European Community, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

⁶**GFCM Members** include Albania, Algeria, Bulgaria, Croatia, Cyprus, European Community, Egypt, France, Greece, Israel, Italy, Japan, Lebanon, Libyan Arab Jamahiriya, Malta, Monaco, Montenegro, Morocco, Romania, Slovenia, Spain, Syrian Arab Republic, Tunisia and Turkey

⁷**RECOFI Members** include Bahrain, the Islamic Republic of Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates.

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Regional Aquaculture Networks¹

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John Moehl and Matthias Halwart

The need for the establishment of the Network of Aquaculture Centres in Asia-Pacific or NACA, was identified by the 1975 FAO Regional Workshop on Aquaculture Planning in Asia, and adopted by the 1976 FAO Technical Conference on Aquaculture in Kyoto. This call for establishing regional aquaculture centres was recognized on both occasions as essential to the coordination of research, training and information exchange to promote aquaculture development on a regional basis, especially emphasizing the sharing of available resources using the concept of Technical Cooperation among Developing Countries (TCDC). There has been continued acknowledgements from governments of the benefits from NACA, and an expectation from other regions that a NACA-like arrangement is worth emulating.

The twenty-seventh session of the FAO Committee on Fisheries (COFI) and the third session of the COFI Sub-Committee on Aquaculture in 2006 supported strongly the continuing work towards the development of regional aquaculture networks in Africa and the Americas, referring to the model of NACA and the more recently established Network of Aquaculture Centres in Central-Eastern Europe (NACEE). Furthermore, the Sub-Committee called for greater inter-regional cooperation among these regional networks. In the same vein, the 19th NACA Governing Council

Meeting held on 2-8 March 2008 in Nepal highlighted the need to promote inter-regional cooperation among regional networks.

The Asia-Pacific Fishery Commission (APFIC) Regional Consultative Forum Meeting held in 2006 noted that a regional approach for implementing the CCRF objectives is a key area for work in the region. Presently, activities of the European Inland Fisheries Advisory Commission (EIFAC) in aquaculture include initiatives on collaboration with NACEE.

The sessions of the Latin American Inland Fisheries Commission (COPESCAL) held more than a decade have discussed this subject and the fourteenth session of the Committee of Inland Fisheries and Aquaculture in Africa (CIFAA) recognized that an African NACA should be able to provide much needed skills, technology and information for future development of aquaculture in the region.

At present, there are four regional aquaculture networks established or beginning:

- Asia-Pacific-NACA – [established] www.enaca.org
- Network of Aquaculture Centers in Central and Eastern Europe (NACEE) – [established] <http://agrowebcee.net/subnetwork/nacee/index.php>

- Aquaculture Networking in the Americas (RedLAC/ANA) – [beginning]
- Aquaculture network for Africa (ANAF) – [beginning]

The FAO Aquaculture Newsletter, FAN No. 38 (November 2007 issue) provided a good summary about the institutional arrangements, and the opportunities and challenges of four existing or emerging regional aquaculture networks. Therefore, the present follow-on article provides briefs on the regional networks highlighting recent updates and new developments. A summary table is also provided for easy reference.

Network of Aquaculture Centres in the Asia-Pacific (NACA)¹

Almost three decades since its establishment (the first decade as a project) NACA has:

- placed aquaculture on equal footing with other sectors in government plans;
- proved that TCDC works;
- provided focus for donor-assisted development projects in the region;
- became a platform for a common voice among members on international issues;
- gained self-reliance from the strengthening of the capacity of its members, their technical cooperation, and a modest but stable funding and in-kind contributions of members.

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Sub-Committee on Aquaculture I Beijing, China, April 2002



Sub-Committee on Aquaculture II Trondheim, Norway, April, 2003



Sub-Committee on Aquaculture III New Delhi, India, September 2006



High Level Special Event on Aquaculture Rome, Italy, November 2007



	Asia-Pacific NACA	Central and Eastern Europe NACEE	Americas RedLac/ANA	Africa ANAF
Date of establishment	As regional project: Aug 1980; as independent organization: January 1990	2004	2008	2009
Host country/ Coordinating Institution	Bangkok, Thailand	Research Institute for Fisheries, Aquaculture and Irrigation (IFRI) in Szarvas, Hungary	RedLac: FAO initiative, location to be decided. ANA: Lima, Peru.	Uganda
Objective	Expand aquaculture development in the region; Promote rural development through sustainable aquaculture. NACA seeks to improve rural income, increase food production and foreign exchange earnings and to diversify farm production.	Facilitate effective integration of the aquaculture R&D institutions in Central and Eastern Europe (CEE) into the European Research Area and to develop an informal, flexible and highly functional network to accomplish significant goals of aquaculture research and development.	RedLac: FAO initiative (or "RedLac") is focused on food security issues and would enhance the exchange of experiences from more advanced countries to those in more need. ANA: The objectives of ANA are to assist the Stakeholders in their efforts to achieve the sustainable development of aquaculture through scientific, technical, economic and social perspectives	Responsible for coordinating and facilitating: (i) scientific and technical information exchange in aquaculture, (ii) regional and subregional collaborative aquaculture research, (iii) training of fish farmers and extension workers and (v) technology transfer between countries. Main objectives are to maximize and optimize utilization of the scarce resources for aquaculture development in Africa and to foster sustainable aquaculture development in the region as a means to fight poverty, ensure food security, provide employment and ensure rural development.
Membership	Current member governments are Australia, Bangladesh, Cambodia, China, Hong Kong SAR, India, Indonesia, I.R. Iran, Korea (DPR), Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam. Other participating (non-member) governments include Rep. of Korea, Lao PDR and Singapore. Associate member is the Secretariat of the Pacific Community.	Open to all research and educational institutions and producer associations in Central and Eastern Europe. NACEE's current membership includes 41 institutions and organizations from 15 countries.	RedLac: Open to all the countries of the Americas and would establish linkages with equivalent mechanisms in other regions. ANA: United States of America, Canada, Mexico, Peru + Brazil and Ecuador.	Presently a CIFAA <i>ad hoc</i> working group: Cameroon, Ghana, Mali, Uganda, Nigeria and Zambia pending formal establishment of the network
Current issues	Certification and trade; Best management practices; Farmers' organizations; Mangrove ecosystem and related livelihoods. Competitiveness of small aquafarmers. Adaptation of poor small farmers to climate change impacts. Impacts of loss of biodiversity on aquaculture resource base; and Post-tsunami rehabilitation and development.	Predominance of carp production, low production levels, inefficient farm management and marketing, lack of skilled staff, financial and legal problems; Opportunities for integration of aquaculture with other activities, enhancing exports and strengthening institutional capacity building; Need for RTD and investment to improve existing farming systems, to promote diversification using additional and high value species, and to expand marine production systems. Scope for human resources development, better collaboration among farmers, and between science and practice, and for international collaboration.	RedLac: The point of departure for determining the issues that are to be addressed by the network, are that it should contribute to sustainable aquaculture development by working closely with existing provisions in international instruments such as the Code of Conduct for Responsible Fisheries, the Bangkok Declaration and the recommendations of the Sub-Committee on Aquaculture of FAO's Committee on Fisheries (COFI). ANA: Enhance aquaculture production standards with respect to human related aquaculture food safety and quality, so as to improve public confidence on aquaculture and regional aquaculture products, to enhance its competitiveness in the global marketplace and to contribute to its sustainable development.	An integral part of SPADA: the Special Programme for Aquaculture Development for Africa with the overarching aim to improve economic and rural development by enhancing fish supply and distribution as well as benefiting nutrition through increased aquaculture production; this goal achieved by promoting sustainable aquabusinesses at national level including the necessary public and private support services
Core/current activities	Capacity building through education and training; Collaborative research and development through networking among centres and people; Development of information and communication networks; Policy guidelines and support to policies and institutional capacities; Aquatic animal health and disease management; and Genetics and biodiversity.	Five working groups: (1) sturgeon aquaculture, (2) fish genetics, (3) high value and new species, (4) aquaculture education and (5) aquaculture technologies.	RedLac: Efforts are being made by FAO to support the development of a regional aquaculture network. ANA: (1) MOU for the creation of the ANA network to be signed during the Fourth Meeting of the FAO, COFI Subcommittee on Aquaculture (2) Preparation and approval of a joint project proposal between NACA and ANA on a "Management System on Aquaculture Food Quality and Safety for the APEC+2 Economies".	Expected activities of the network: (1) Regional aquaculture research and development, (2) Capacity building, education and training, (3) Information exchange and (4) Technical assistance.
Web site	www.enaca.org	http://agrowebcee.net/subnetwork/nacee/index.php		Under construction

Its Work Programme is the equivalent of a regional aquaculture development policy. The formulation of the program, its implementation and uptake of its results involve governments, FAO (through participation in the Governing Council and Technical Advisory Committee meetings), donor agencies, partner organizations, and farmer, industry and civil society groups. A website, www.enaca.org reports specific activities and gives a broad view of the program.

Network of Aquaculture Centers in Central and Eastern Europe (NACEE)²

Members have reiterated the vision of NACEE becoming an intergovernmental organization, and agreed that NACEE should approach government authorities in charge of aquaculture sector management in CEE countries, both for strengthening national support to the network and for initiating the process of transforming NACEE into an intergovernmental body, following the NACA example. NACEE's Coordinating Institution has invited government officials from CEE countries to the Fifth NACEE Meeting which will be held in Lviv, Ukraine, during 15 -18 October 2008.

There is significant scope for NACEE to contribute strategic documentation on opportunities and needs for priority R&D initiatives in the field of aquaculture in the CEE region, and to facilitate international R&D cooperation in aquaculture with other regions.

NACEE continues to actively promote the network through articles in national and international aquaculture trade journals and newsletters, and to seek "associate membership" of aquaculture institutes from countries bordering the CEE region. NACEE experts contributed to the recent FAO/NACEE regional review on aquaculture development in Central and Eastern Europe. A sub-regional workshop on aquaculture

development in the Caspian region is envisaged for 2009, to be organized jointly by NACEE and FAO.

Regional Aquaculture Networks in the Americas (RedLAC/ANA)³

Much effort has been devoted to the establishment of a sustainable regional cooperation mechanism for the development of aquaculture in the region. Two initiatives have taken the floor recently, in 2004 and 2005, respectively. One was the initial developments for a potential FAO network (or RedLac) and the other originated from the Asia-Pacific Economic Cooperation (APEC) + 2 countries (Brazil and Ecuador). The aquaculture network in the Americas (ANA), being the APEC initiative, has been recently established in April 2008 and Peru has formally taken up the secretariat of ANA. Currently, there are several initiatives in development between this ANA and NACA on the preparation of a biosecurity framework for the involved regions. On the other hand, FAO is making relevant efforts to develop a more extensive network involving all countries, focusing on food security issues and enhancing the exchange of experiences from more advanced countries to those in more need.

Within the framework of the Decentralized Cooperation Program FAO/Galicia, FAO and the "Conselleria de Pesca y Asuntos Marítimos de la Xunta de Galicia" have recently agreed to collaborate in a project for the development of aquaculture in Latin America and Caribbean. The project profile contains some of the essential elements that will serve as a basis for supporting regional cooperation and networking. The formal cooperation agreement between the Xunta de Galicia and FAO was signed in Rome on 21 July 2008.

Aquaculture Network for Africa (ANAF)⁴

In 2006, the fourteenth session of CIFAA "recognised that an African NACA should be able to provide much needed skills, technology and information for future development

of aquaculture [and] unanimously endorsed the establishment of an *ad hoc* Working Group which will work towards the accomplishment of this objective". The group is composed of Cameroon, Ghana, Mali, Uganda and Zambia, with Nigeria also offering assistance.

The Working Group and its partners have begun work on a website and undertaken a review of the institutional aspects of establishing an effective regional network. The group is planning to meet several times during 2008 before the fifteenth session of CIFAA in December at which time they will report on their activities and make recommendation as to the structure and functions of ANAF. Concurrently, to ensure a prominent role for ANAF, the embryonic network has been integrated into activities planned to be undertaken through the Special Programme for Aquaculture Development in Africa (SPADA). It is expected that ANAF as a regional institution will enter the stage in 2009.

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The Challenges of Climate Change for Aquaculture

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The world's dependence on the capture fisheries and aquaculture sector is threatened not only by inadequate management of these aquatic resources but also on factors external to the sector such as climatic change. Fishers and fishfarmers in coastal and inland areas are particularly vulnerable to the direct and indirect impacts of climate change.

FAO, recognizing the importance of addressing food security and poverty reduction issues in the face of climate change and energy security, hosted a High-Level Conference on World Food Security: the Challenges of Climate Change and Bioenergy, in Rome, from 3 to 5 June 2008¹. In preparation for this conference, the Fisheries and Aquaculture Department organized an Expert Workshop on "Climate Change Implications for Fisheries and Aquaculture", 7-9 April 2008 (FAO, 2008), in order to provide the conference with a coherent and high quality understanding of climate change issues related specifically to fisheries and aquaculture. This workshop also served as a response to a request by the FAO Committee on Fisheries (27th Session). It identified and reviewed key issues of climate change in relation to fisheries and aquaculture and suggested policy options and activities to minimize its negative impacts, improve mitigation and prevention and build adaptive capacity in aquatic resource-dependent communities.

HOW ARE AQUATIC ECOSYSTEMS SUPPORTING AQUACULTURE AFFECTED BY CLIMATE CHANGE?

Climate change is felt through the modifications it brings to ecosystems and their productivity, and is characterized by its unpredictability and the large uncertainty that has to be factored in all models and the reaction of ecosystems to such changes. Such modifications include the following:

- Climate change is modifying the geographical distribution of areas offering optimal biophysical conditions for marine and freshwater farmed species. Increased risks of species invasions and spreading of diseases provide additional concerns. This is particularly relevant for the transboundary movement of live organisms used in aquaculture.
- In a warmer world, ecosystem productivity is likely to be reduced in most tropical and subtropical oceans, seas and large lakes, and increased in higher latitudes. Increased temperatures will affect physiological processes of aquatic plants and animals resulting in both positive and negative effects on aquaculture production systems.
- Differential warming between land and oceans and between polar and tropical regions will

affect the intensity, frequency and seasonality of climate patterns (e.g. El Niño) and extreme events (e.g. floods, droughts, storms) affecting the stability of marine and freshwater resources adapted to or affected by these. This has unpredictable consequences for aquatic production.

- Sea level rise, glacier melting, ocean acidification and changes in precipitation, groundwater and river flows will significantly affect coral reefs, wetlands, rivers, lakes and estuaries, requiring adapting measures to exploit opportunities and minimize impacts on fisheries and aquaculture systems.

In addition to the environmental changes brought about by climate change, the livelihoods of those depending on aquatic ecosystems for aquaculture activities will be indirectly affected by climate-related events. These include:

- Changes in habitats and physical/chemical conditions will require changes in farming practices and aquaculture operations, including selecting or adapting species and strains adapted to new growing conditions, with implications on the training and educational support needed.
- Extreme events will also impact on infrastructure, ranging from

farm sites to post-harvest facilities and transport routes. They will also affect safety in coastal zones and, at sea, with communities living in low-lying areas at particular risk.

- Global water stress and competition for water resources will affect aquaculture operations and are likely to increase conflicts among water-dependent activities.
- Reduced livelihood options inside the fishery sector will force occupational changes and may increase social pressures. However, the lack of options for diversification outside fisheries or aquaculture could negatively affect households' overall livelihood outcomes.
- Consequently, gender tensions may be heightened in the face of competition for access to resources and occupational change in markets, distribution and processing, where women currently play a significant role.

WILL AQUACULTURE BE HIT HARDER BY CLIMATE CHANGE? IF SO, WHERE?

Since the largest proportion of world aquaculture production is concentrated in tropical and sub-tropical climatic regions, and geographically in the Asian region, impacts from climate change are likely to have greater consequences there, with direct impacts on global food fish supply. However, it is predicted that global warming and the consequent increase in water temperature could impact significantly and negatively on aquaculture in temperate climatic zones, because such increases could exceed the optimal temperature range of cultured organisms, as opposed to potential positive impacts through enhanced growth and production in tropical and sub-tropical zones. Other impacts associated with higher temperatures

such as eutrophication in inland waters may be increasingly experienced along with possible outbreaks of virulent pathogens that had remained dormant under colder temperatures. Such changes will affect more aquaculture in temperate zones.

One of the most important, but indirect, impacts of climate change on aquaculture is likely to be brought about from limitations on fish meal and fish oil availability for feeds through a reduction in raw material supplies. These limitations will be mainly felt by aquaculture in temperate regions, where the mainstay of finfish aquaculture is based on carnivorous species. Increased variability in fish meal and fish oil availability resulting from El Niño and other climate-related events will not only affect aquaculture but all forms of animal farming, albeit to varying degrees.

WHAT CAN BE DONE TO INCREASE THE RESILIENCE AND ADAPTABILITY OF THE AQUACULTURE SECTOR?

Adaptation strategies for the aquaculture sector have to be context- and location-specific and need to consider both short-term (e.g. increased frequency of severe events) and long-term impacts (e.g. increasing water temperature). Adaptation must operate at community, national and regional levels and will require, and benefit from, stronger capacity building.

1. Implementation of an ecosystem approach to aquaculture

Options to increase resilience and adaptability through improved aquaculture management include the adoption as standard practice of adaptive and precautionary management. Through the holistic approach to aquaculture development it provides, the ecosystem approach to aquaculture (EAA)² offers a unique opportunity to increase the resilience and sustainability of aquatic resources ecosystems (including fisheries), aquaculture production systems,



Top: Salmon cages after an unusual storm
Bottom: Destroyed coastal village in the aftermath of Cyclone Nargis, Myanmar

and aquatic resource-dependent communities in the face of climate change.

2. Research and adoption of integrated and non-fed/less-fed aquaculture systems

Adaptations include changing to less carnivorous species, genetic improvements, feed source diversification, better feed formulation, quality control and management. The farming of extractive species – using nutrients and carbon directly from the environment such as bivalves and macro-algae – may deserve further attention for its positive impacts on the ecosystem and potential food security benefits. Integrating aquaculture with other practices, including agro-aquaculture, multitrophic aquaculture and culture-based fisheries, also offers the possibility of recycling nutrients and using energy and water much more efficiently. Short-cycle aquaculture may also be valuable, using new species or strains and new technologies or management practices to fit into seasonal opportunities. Aquaculture also could be a useful adaptation option for other sectors, such as coastal agriculture under salinization threats, and could also have a role in biofuel production, through use of algal biomass or dis-



Excessive rain can cause land slides affecting coastal farms

cards and by-products of fish processing. For feed-based aquaculture, reducing dependence of capture fisheries on fish meal and oil through alternative feeding materials and formulation strategies will be particularly important in maintaining and expanding output while containing costs and energy inputs. In addition, research into genetic improvements will be required to improve resilience to climate change (e.g. genetic improvement for more efficient feeding and diet specificity, and for increasing species resistance to higher temperatures, lower oxygen and pathogens).

3. Development and implementation of policies and strategies to enhance the resilience and adaptability of aquaculture-based livelihoods to climate change

National climate change adaptation and food security policies and programmes need to fully integrate aquaculture and the livelihoods of those it supports. If non-existent, such policies should be drafted and enacted immediately to ensure that potential climate change impacts are integrated into broader national development planning. Strategies promoting diversification options for households outside the sector, along with access to aquaculture crop insurance against potentially reduced or more variable yields should be emphasized. In addition, in the face of more frequent and severe weather events, strategies for reducing vulnerabilities of aquaculture-reliant communities could include investment and capacity building on improved forecasting, implementation of early warning systems and safer infrastructure building. More generally, adaptation strategies should promote disaster risk management, including disaster preparedness, and integrated coastal area management. Adaptations by other sectors will have impacts on inland fisheries and aquaculture (e.g. irrigation infrastructure, dams, fertilizer runoff), and will require careful consideration of trade-offs and interactions between food production systems.

Climate change will impact aquaculture and the livelihoods it supports, but will also create opportunities for new development. Whilst increasing preparedness to the consequences of extreme weather events and adaptation in communities most at risk are prerequisites for improved resilience to climate change, future challenges lie in identifying where aquaculture has a particular role to play. In this context, the flexibility and variety of fish production systems, if supported by necessary research, integrated development approaches, capacity building and diversification policies, will be a major asset in taking advantage of the 'niches' created by climate change and in maintaining overall fish production outputs.

More information, including the technical report of the Expert Workshop, is available at:

<http://www.fao.org/foodclimate/conference/doclist/en/>

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¹ <http://www.fao.org/foodclimate/expert/em7/outputs-em80/en/>

²The Ecosystem Approach to Aquaculture (EAA) is a strategic approach to development and management of the sector aiming to integrate aquaculture within the wider ecosystem such that it promotes sustainability of interlinked social-ecological systems (FAO, 2007; Soto *et al.*, 2008).

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SPADA -The Special Programme for Aquaculture Development in Africa¹

Selected Highlights

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FAN 39 featured an article on SPADA, the FAO Fisheries and Aquaculture (FI) Department's Special Programme on Aquaculture Development in Africa (Moehl *et al.*, 2008) which at the same time constitutes the aquaculture component of the FAO FI's Strategy for Fisheries and Aquaculture in Africa (FISA). It described some of the history and background of the programme; outlining the programme's aims, structure and the seven arenas where SPADA is planned to be active in congruence with the New Partnership for Africa's Development (NEPAD) Action Plan for the development of fisheries and aquaculture. Given the relevance of SPADA to building momentum for investment in aquaculture in Africa, this follow-up article takes a closer look at each of the individual arenas and explores how the current field programme (FAO's Technical Cooperation Projects (TCP)), Unilateral Trust Funds (UTF) and extra-budgetary funded projects) addresses these issues. The list is not meant to be exhaustive but rather aims at providing insight into working examples and approaches in the field.

SELECTED ONGOING ACTIVITIES IN SPADA ARENAS

(i) Strengthening institutions and enabling frameworks

SPADA will support national fora and stakeholder consultations that will lead to national aquaculture development strategies, plans and adjusted legal frameworks that enable increased investment and trade within the aquaculture sub-sector. Further, the programme will provide capacity building and advice as to how to efficiently structure aquaculture institutions at all levels including training on a broad spectrum of issues such as aqua-business management, production, aquaculture facilities siting and development, risk assessment and communication.

FAO has supported, and continues to support, the processes to develop national aquaculture development strategies and plans in many African countries including but not limited to Cameroon, The Gambia, Madagascar, Namibia, Nigeria, Tanzania, and Uganda. Cameroon requested the support of FAO for developing the first national strategy. This benchmark document, formulated in May 2003 by a team

of experts representing government agencies, World Fish Center and FAO, was subsequently discussed in stakeholder consultations before being adopted in December 2003. A second request for assistance in the implementation of the strategy is being achieved through TCP/CMR/3103 *Mise en place d'un plan de développement durable de l'aquaculture*). Efforts are continuing to reach as many countries as possible and feasible with existing resources. A key partner in this process is the Japanese-funded *GCP/INT/053/JPN Intra African Training and Dissemination of Technical Know-How for Sustainable Agriculture and Rural development with Africa-ASEAN Cooperation within the Framework of South-South Cooperation* which has capacity building for African aquaculture development under the framework of SPADA as one of its four main focal areas. Through TCP/RAF/3111 *Emergency assistance to combat epizootic ulcerative syndrome in the Chobe-Zambesi River* (involving Angola, Botswana, Malawi, Mozambique, Namibia, Zambia, Zimbabwe) and the PCA Norway-funded project on aquatic animal health and aquatic biosecurity, FAO continues to provide capacity building aimed at

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enhancing aquatic biosecurity (e.g. risk analysis, basic aquatic health management, disease surveillance and reporting, etc.).

(ii) Networking and outreach

SPADA will strengthen the nascent Aquaculture Network for Africa (ANAF) building effective links between extension/outreach and producer organizations including local farmer “clusters”. These activities will include publicizing information concerning opportunities in aqua-business to encourage investment in the sub-sector, as well as successful examples of the impact chain from national policies to access to financial and production inputs, farm production, processing and marketing. Websites, discussion fora and use of the latest information and communications technology will facilitate much needed networking and information exchange.

Significantly improved information flow has long been identified as one of the major needs for the sub-sector’s development. In order to achieve this, efficient information channels are necessary at all levels; national, sub-regional and regional. Recent efforts by FAO have been aimed at facilitating the establishment of ANAF on the basis of a decision by the fourteenth session of CIFAA (FAO, 2007). An *ad hoc* Working Group (WG) met in Kribi, Cameroon, in 2007 to establish a workplan incorporating the necessary tasks leading to a formal and legal panAfrican institution: ANAF. Further stakeholder consultations on the network are scheduled to take place in July and August 2008 with the generous assistance of the German Agency for Technical Cooperation (GTZ). The *ad hoc* WG will report back to CIFAA in December 2008. Meanwhile, FAO has facilitated an online ANAF stakeholder forum accessible at <http://www.fao.org/fi/fima/anaf-forum/forum.html> and is in the process of establishing an internet-based network similar to the Regional Aquaculture Information System in the Gulf

Region (RAIS) where members can share and access information from the region which is crucial for the development of aquaculture in their own country. These tools assist with improved access to current information. Fractionation of aquaculture programmes at national and regional levels has been a barrier to effective sub-sectoral programming; improved information channels potentially enhancing needed co-ordination. Inherent in the SPADA approach is the improved co-ordination also facilitated by national task forces and steering committees with wide stakeholder representation to guide the development of national programmes.

(iii) Capital and input supply

SPADA will assist in creating an enabling environment for access by investors to critical inputs including, among others, capital, seed and feed. This also includes certification programmes for the suppliers of such inputs as feed and seed to ensure quality and traceability.

An ongoing TCP/SIL/3104 *Assistance to fish farmers* and pipeline TCP/KEN *Strengthening fish production through adoption of improved aquaculture* provide the necessary technical advice and backstopping on the use and application of resource and planning tools in order to establish sustainable, private-sector driven fish farming through pilot sustainable production units that will ensure reliable supply of quality seed and farmer-friendly aquaculture technologies.

GCP/RAF/417/SPA *Aquaculture Investments for Poverty Reduction in the Volta Basin: Creating Opportunities for Low-Income African Fish Farmers through Improved Management of Tilapia Genetic Resources* supports the countries of the Volta Basin in developing responsible policies and practices for using genetically improved strains of Nile tilapia in small- and medium-size enterprises in the area. This sub-regional

project serves as an umbrella for co-ordination to facilitate the establishment of national task forces and other field programmes as well as bringing on board new development partners. One of the efforts is to develop links with the feed industries in an attempt to ensure that, as higher quality seed is available, the corresponding high quality feed will also be accessible.

(iv) Processing and marketing

SPADA will provide guidance as to options, methods and methodologies for processing and marketing including establishing quality control programmes. Adoption of standards and labels along the value chain will improve access to domestic, regional and export markets.

There are many activities undertaken in this regard as it ultimately concerns the consumption of aquatic products from both capture fisheries and aquaculture. A major focus, as underscored in the NEPAD Action Plan, will be intra-regional marketing and trade in aquaculture products including inputs. One example of widely applicable methods for improved fish processing is smoking in specialized ovens (e.g. the Chorkor system) which have been promoted in UTF/NIR/047/NIR *The National Special Food Security Programme, Nigeria*. Another example is the application of a Technological Platform Approach which has been successful in the Republic of Chad where better handling, storage and processing of fish resulted in improved hygiene and sanitation, improving fish quality and value and thus access to urban markets (Diei-Ouadi and Ndiaye, 2008).

(v) Research and education

SPADA will focus on proven technologies, co-ordinating and harmonizing research and education programmes across the region to identify comparative advantages for different research and education institutions. The programme will support regional research and education programmes, match

needs with providers and generally increase the overall efficacy of these operations.

This is an arena that requires special efforts and targeted resources and is likely to be picked up only when ANAF becomes operational. Collaboration is envisaged *inter alia* with the Sustainable Aquaculture Research Networks in Sub-Saharan Africa (SARNISSA). On the education side, it will include capacity building on application of resource and planning tools such as the African Water Resource Database (Jenness *et al.*, 2007).

(vi) Social, economic and environmental soundness

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

In conjunction with TCP projects in Malawi and the East African Community (LVFO), a standard user-friendly model is currently being developed to assist farmers in both pre- and post-investment aspects. On the environmental side, FAO has embarked on “Environmental Impact Assessment and Monitoring in Aquaculture” a component of GCP/INT/936/JPN *Towards sustainable aquaculture: Selected issues and guidelines* being implemented by FIMA under Japanese Government support. The Africa case study covers eight countries across the Region. The project is aimed at addressing key issues of environmental assessment and monitoring in aquaculture with a view to generate strategic advice and technical guidance information for use in policy making, capacity-building and training in the sector.

(vii) Monitoring, evaluation and planning

SPADA will implement regional and national monitoring and evaluation activities including improved and more precise statistical reporting mechanisms. Partners will be supported to access appropriate tools for planning, priority-setting, monitoring and impact assessment.

Current work done by FIMA focuses on the provision of timely and accurate information concerning the use of cultured species (FAO Cultured Aquatic Species), legislation (FAO National Aquaculture Legislation Overviews - NALOs) and overviews on the national aquaculture sector (FAO National Aquaculture Sector Overviews - NASOs). For Africa, information on NASOs and NALOs is currently available for 14 and 4 countries, respectively, and is expected to be consistently maintained and updated in close collaboration with ANAF.

Identification of high potential areas for aquaculture development and the planning and scaling of investments are facilitated through the application of planning tools such as the African Water Resource Database and the Aquaculture Recommendation Domains decision support tool (Kam *et al.*, 2008).

CALL FOR SUPPORT

The financial support received from FAO's member countries, notably the targeted funding for specific planning and projects as in the case of Sweden, Spain, Norway, Japan, and Germany, is gratefully acknowledged for all the ongoing activities contributing to SPADA as described above. FAO has established a Multi-Donor Trust Fund for SPADA, and member countries, donor and development organizations are invited to support additional work through this Trust Fund, e.g. within respective arenas, as cross-cutting themes, or as consortia of complementary activities with those of other organizations.

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Certification in Aquaculture: Additional Value or Cost?

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THE CONTEXT

While fish supply from wild capture fisheries has stagnated over the years, the demand for fish and fishery products has continued to rise. Consumption has more than doubled since 1973. The increasing demand has been steadily met by a robust increase in aquaculture production, estimated at an average 9 percent yearly growth in volume during the period 1990-2005. Likewise, the contribution of aquaculture to fish food supply has increased significantly to reach a high record of 45 percent in 2006 from a mere 8 percent in 1970. This trend is projected to continue, with the contribution of aquaculture to fish food supply estimated to reach 60 percent by 2020, if not before.

This development has taken place amid a growing concern of consumers about human and animal health, and the social and environmental impacts of aquaculture. NGOs have tapped into or driven these concerns and developed strategies to wield influence over consumers' purchasing decisions and/or over the procurement policies of importers and retailers. Buyers and retailers have, in turn, responded by imposing private standards and certification back through the supply chain, especially on producers and processors. These developments have resulted in the proliferation of certification bodies and schemes designed to trace the origin of fish, its quality and its safety, environmental and social conditions prevailing during aquaculture production, processing and distribution.

THE ISSUE AND ITS IMPLICATIONS

As standards, certification schemes and claims proliferate, both producers and consumers are questioning their value. Producers and producing countries, in particular, question whether these private standards and certification schemes duplicate or complement government work. In addition, consumers ask if private schemes really provide better protection for them and the environment and/or contribute to social equity.

In areas such as food safety, animal health and environmental sustainability, government authorities have enacted laws and regulations and developed inspection and certification programs to enforce their application. Therefore, it is legitimate to question whether the work of private certification bodies is actually complementing or adding value to the work of governments or just adding another level of compliance costs. These costs appear to fall disproportionately on producers. Concerns related to the cost and benefit for small-scale aquaculture producers in developing countries, have also been raised. Likewise, some have questioned the compliance of private certification schemes with the disciplines of the World Trade Organization's Agreement on Sanitary and Phytosanitary measures (WTO's SPS Agreement), in terms of transparency, scientific basis and consultation with stakeholders.

Consequently, many producers and exporting countries hold the view that private standards in the sanitary field represent unjustified restrictions to trade, especially where they introduce sanitary measures which duplicate those applied by the Competent Authority of the exporting country.

This raises the issue of how to define boundaries between public regulations on one hand and private market standards on the other? And who is responsible for what and accountable to whom? While governments that are seen to use standards as trade barriers can be challenged through the rules of WTO, what international mechanism, or agreement, should be invoked to challenge private companies whose standards are judged to create technical barriers to trade between countries?

POSSIBLE SOLUTIONS

These issues are not likely to be resolved without a concerted international effort. More must be known about the impact of certification in aquaculture. Any solution is likely to involve technical assistance and phase-in periods for small-scale producers and developing countries. Indeed, a large number of small-scale fish farmers face important technical, financial, knowledge and institutional constraints that hinder their ability to adhere to certification schemes. It is estimated that over 80 percent of the 12 million aquaculture farmers



in Asia operate small-scale farms, from which a significant proportion of the production enters the international markets. Their ability to conform to such schemes would increase if they were helped to develop farms associations, clusters or self help groups. They could then respond collectively and be better placed to absorb institutional services and technical assistance. Such an approach has been successful in countries such as India, Viet Nam, Thailand and China. These experiences could be documented and the lessons learned shared with fish farmers in other countries¹.

In FAO, the Sub-Committee on Aquaculture, while recognizing the value of better management practices (BMPs) and certification for increasing public and consumer confidence in aquaculture production practices and products, noted that many non-governmental certification schemes have resulted in higher costs for producers without delivering significant price benefits to small-scale producers. The Sub-Committee commented that the emergence of a wide range of certification schemes and accreditation bodies was creating confusion amongst producers and consumers alike and stated that there was a need for more globally accepted norms for aquaculture production. These norms could provide better guidance and serve as a basis for improved harmonization by facilitating mutual recognition and equivalence of such certification schemes.

In this regard, the Committee on Fisheries (COFI) Sub-Committee on Aquaculture requested FAO to play a lead role in facilitating the preparation of guidelines for certification in aquaculture. Since 2006, FAO and the Network of Aquaculture Centres in Asia-Pacific (NACA) have organized six consultative workshops in Asia, Europe, North and South America to develop draft guidelines for aquaculture certification. The draft guidelines will be submitted to the Sub-Committee, for discussion and decision at its fourth session to be held in Puerto Varas, Chile, in October 2008.

OUTLOOK AND FUTURE PERSPECTIVE

Several recent developments are likely to lead to an expanded use of certification in aquaculture. These include, *inter alia*,

- ◇ the increasing influence and concerns of civil society related to health, social and environmental issues;
- ◇ legal requirements on companies to demonstrate 'due diligence' in the prevention of food safety risks;
- ◇ growing attention to 'corporate social responsibility' and a drive by companies to minimize 'reputational risks';
- ◇ globalisation of supply chains and a trend towards vertical integration through the use of direct contracts between suppliers and retailers; and

- ◇ expansion of supermarkets in food retailing both nationally and internationally.

However, the extent and implications of these developments on governance of international fish trade are not yet known and need to be studied. The ongoing work in FAO and WTO, organizations that provide an international framework to ensure transparency, will continue to promote the development of science-based standards, harmonization and equivalence, in coherence with WTO trade measures and the standards of international standards setting bodies such as *Codex alimentarius* and the World Animal Health Organisation (or OIE). This may lead to an environment in which private standards and certification schemes complement and add value to the work of governments rather than duplicating it. If supported with appropriate technical assistance, such developments are likely to have positive economic implications, especially for small-scale aquaculture producers in developing countries.

¹Philips, M. and Subasinghe, R. 2007. Aquaculture production, certification and trade: challenges and opportunities for the small scale farmer in Asia, pp. 165-169. Proceedings of the Global trade conference on aquaculture. FAO Fisheries Proceedings 9. FAO, Rome, Italy.

Policies and Socio-economic Impacts of Aquaculture: What is Happening and What is Next?

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Recent years have seen an increasing role of aquaculture in social and economic development at national levels. This growing importance has called for the need for adequate planning to avert potential negative impacts of aquaculture and for policies that ensure a good distribution of benefits accruing from the development of the sector, thereby by ensuring its sustainability.

ON-GOING NORMATIVE WORK ON SOCIO-ECONOMIC IMPACT ASSESSMENT AND POLICY DEVELOPMENT IN AQUACULTURE

To respond to this need, the FAO Fisheries and Aquaculture Department organised two Expert Consultations in these areas in early 2008. The first consultation on “Assessment of socio-economic impacts of aquaculture”¹ debated on the many positive and negative impacts of aquaculture, including those on land and land-based habitats, water and wild species, the downstream and upstream industries of aquaculture, infrastructure, incomes, employment, food supply, food quality and safety, food access, food stability, human health, education and training, population and demography, and community and social order (Box 1), and emphasized that these impacts have profound interdependence and far-reaching socio-economic implications, which makes the task of assessing them difficult.

Experts agreed that Multi-Criteria Decision-Making (MCDM) frame-

Box 1. Framework for impact identification, with some examples of indicator categories

<p>Natural Capital/Resources</p> <ul style="list-style-type: none"> - Land, e.g. rent - Water, e.g. rent - Wild stocks, e.g. biodiversity, biosecurity <p>Human Capital/Resources</p> <ul style="list-style-type: none"> - Employment - Health, e.g. Health Impact Analysis - Education and training - Research - Migration - Gender <p>Physical Capital/Resources</p> <ul style="list-style-type: none"> - Food security, e.g. Food supply, food quality and safety, food access, food stability - Infrastructure - Other industries 	<p>Social Capital/Resources</p> <ul style="list-style-type: none"> - Social institutions and legal framework, e.g. property rights, customary rights, corruption, producers' organizations, community-based organizations, trade unions. - People's attitude (social acceptability) - Community cohesion and social order, e.g. morality, poaching, community organization - Cultural change - Equity - Indigenous people's well-being <p>Financial Capital/Resources</p> <ul style="list-style-type: none"> - Incomes, e.g. Income distribution, poverty, foreign exchange - Investment, e.g. FDI and capital flows, private and public investments - Fiscal policies, e.g. taxes, foreign exchange, international trade, subsidies - Financial institution/credit
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work using Analytical Hierarchy Process (AHP) as a measurement technique is a suitable method for assessing socio-economic impacts in a situation where multiple attributes are important and cannot be easily reduced to a single monetary measure of impacts as is the case in aquaculture. However, because of the tangibles which can be evaluated in monetary terms and the intangibles which are difficult to quantify in monetary value in socio-economics of aquaculture, and given the wide range of impacts to assess as well as various circumstances, experts agreed that there is no single method which could be used to assess the socio-economic impacts of aquaculture. In addition to MCDM using AHP, they suggested that other techniques such as the Cost Benefits Analysis (CBA) could also be used depending on circumstances.

The second consultation was on “Improving planning and policy development in aquaculture”². In this context, the consultation made major strides towards the definition of the various outputs of the planning processes: policy, strategy and plan (Box 2) and produced a detailed outline of the technical guidelines in improving policy and planning in aquaculture (Box 3).

While highlighting the importance of legitimacy, participation in policy and planning processes, experts stressed the inevitability of trade-offs and the possible resort to hard-choices in specific circumstances. They emphasized that coordination was one of the most important component of the policy implementation discourse; it is needed everywhere: in research, extension, legislation, between the public and private sectors and amongst donors.

Box 2. Agreed definitions of aquaculture policy, strategy and plan

- a. An aquaculture policy consists of a broad vision for the sector, reflecting its directions, priorities and development goals at various levels including provincial, national, regional and international.
- b. A strategy represents a roadmap for the implementation of a policy and contains specific objectives, targets and instruments to address issues which might stimulate or impede the comparative advantage of the sector and obstruct its development.
- c. An action plan represents a roadmap for the implementation of a strategy, that is, to achieve its objectives and implement strategy instruments. It is time-bound, contains specific programmes and activities and details the resources required to achieve them.

WHAT'S NEXT?

The work on these two key topics in aquaculture economics and policy does not end here. Important recommendations were made for FAO to pursue its endeavour in the documentation and analysis of policy formulation and impact assessment processes. These included, amongst other, case study documentation of the use of AHP, CBA and another technique to test and compare the applicability and results of these methods in assessing socio-economic impacts of aquaculture. Building capacity in developing countries in using the identified techniques was also recommended.

Moreover, experts recommended a compilation of “best practices” in policy formulation and implementation, and a synthesis of analyses (including cost/benefit) of the efficiency of policy formulation and implementation instruments in a number of developed and developing countries. The Department will work towards responding to these recommendations. For example, the development of a user guide on the implementation of methods for assessing the socio-economic impacts of aquaculture and the creation of a repository of policy information could be a means of

building capacity in these areas in developing countries.

¹ FAO. 2008. Report of the Expert Consultation on Assessment of Socio-economic Impacts of Aquaculture, Ankara, Turkey, 4-8 February 2008. FAO Fisheries Report No. 861. FAO, Rome.

² FAO. 2008. Report of the Expert Consultation on Improving Planning and Policy Development in Aquaculture, Rome, Italy, 26-29 February 2008. FAO Fisheries Report No. 858. FAO, Rome.

Box 3. Outline of the FAO Technical Guidelines on Improving Planning and Policy Formulation and Implementation for Aquaculture Development

THEME 1: POLICY FORMULATION PROCESS

Guideline 1.1: Aquaculture policy should reflect relevant national, regional and international development goals and agreements.

Guideline 1.2: The aquaculture sector should be enabled to develop optimally and sustainably.

Guideline 1.3: A legitimate and competent authority should lead the policy development process.

Guideline 1.4: General policy formulation approaches from other relevant sectors could be adopted and adapted for aquaculture purposes.

Guideline 1.5: Consultation with stakeholders should be as extensive as possible.

Guideline 1.6: Policy development based on consensus is desirable

THEME 2: POLICY IMPLEMENTATION PROCESS

Guideline 2.1: Implementation of policy should be operationalized through a set of well-defined strategies and action plans.

THEME 3: SUPPORTING POLICY IMPLEMENTATION

Guideline 3.1: Effective implementation of aquaculture policy requires systematic coordination, communication and cooperation between institutions, tiers of governments, producers and other stakeholders.

Guideline 3.2: Where possible, decisions should be taken by the lowest level competent authority according to the principle of subsidiarity.

Guideline 3.3: The development of human and institutional capacity should reflect sectoral needs (e.g. producer, research, management, trade development, regulatory and associated societal levels).

Guideline 3.4: In order to effectively implement policy, adequate resources need to be identified and allocated.

Guideline 3.5: Policy development and implementation should be supported by a suitable legal framework.

Guideline 3.6: Incentives, where appropriate, should be used to encourage good practice throughout the sector.

Guideline 3.7: Aquaculture policy implementation should be supported by appropriate research.

Data Collection, Packaging and Dissemination of Aquaculture Information¹

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INTRODUCTION

This article provides an overview (through some examples) on the approach used by the FAO Department Fisheries and Aquaculture to produce and disseminate aquaculture information such as databases, online publications, and the FAO fisheries technical papers, circulars and reports. All FAO products are subject to a meticulous validation process ensuring the use of current internationally accepted publication standards to which the FAO house style guidelines are based, ensuring the accuracy of information and paying particular attention to user needs and preferences including development of tools to facilitate information sharing. This article highlights the complex process and the high costs required to produce high quality information which is sometimes unrecognized.

REPORTING AQUACULTURE STATISTICS

At the international level, FAO plays a unique role in preparing and reporting global aquaculture statistics as well as aquaculture trends. Such reports are important in alerting regional organizations, national policy makers and advisors, industry, NGOs, and the general public on global aquaculture status and trends and emerging issues that can have effects at the regional and national levels.

Aquaculture statistics are collected through standardized questionnaires (on aquaculture production systems and production by species) which are regularly sent to the National Focal

Points of competent authorities in each FAO member country. They are responsible for the compilation of responses to the questionnaires through their own national mechanisms for statistical data collection and timely submission to FAO. Once received, data are entered into the aquaculture database (FishStat Plus), validated, analysed and disseminated through the FAO Yearbook of Fishery Statistics, FAO Web site (<http://www.fao.org/fishery/statistics/global-aquaculture-production/query>)

Some of the major challenges include development of national and regional capacities in collecting and reporting such statistical data as well as promoting improved approaches and techniques for data collection. FAO continuously develops unified standards and guidelines for data collection and analysis and assists countries in capacity building.

WEB-BASED PUBLICATIONS

The Department's web-based publications on aquaculture include the National Aquaculture Sector Overviews (NASO), the Cultured Aquatic Species Fact Sheets and the National Aquaculture Legislation Overviews (NALO). The preparation of these information sheets follows a rigorous process involving using a standard template for the required information and various layers of experts until publication. For example for NASO, described briefly are the processes involved: (i) the FIMA Information Officer, responsible for over-all coordination, critical review of questionnaire returns, closely

interacts and liaise with NASO authors for the required revision, if any; (ii) the NASO author, a national aquaculture expert, responsible for collecting information at national level and filling up of questionnaires; (iii) the language editors (for English, French and Spanish) responsible for reviewing draft documents for style, language, grammar and terminology, (iv) the FIMA technical officers responsible for final checking and validating according to his/her area of expertise, paying particular attention to accuracy, political implication, technical correctness and clarity, (v) a GIS consultant responsible for preparing spatial datasets, and (vi) an XML editor responsible for converting each NASO from MS-Word to XML-HTML and uploading of the information in the Web site.

Once published the fact sheets are sent for translation into other (outside the original language used) FAO official languages (English, French, Spanish, Arabic and Chinese). These information sheets are available at the Aquaculture Gateway Page (<http://www.fao.org/fishery/aquaculture>).

THE STATE OF THE WORLD FISHERIES AND AQUACULTURE (SOFIA)

Prepared under the coordination of a team consisting of staff members from the Department and a consultant, SOFIA is the main flagship publication of the Department. Printed in hard copy and contains a CD-ROM with the World Fisheries and Aquaculture Atlas, SOFIA consists of 4 parts: Part 1 – World review of fisheries and aquaculture,

Part 2 – Selected issues in fisheries and aquaculture, Part 3 – Highlights of special studies and Part 4 – Outlook. FIMA officers and relevant regional aquaculture officers contribute to this publication highlighting outcomes of selected aquaculture studies and themes and particularly aquaculture trends and emerging issues in the Outlook section. SOFIA is available in electronic format at: <http://www.fao.org/fishery/sofia/en>

FAO FISHERIES TECHNICAL PAPERS

The FAO Fisheries Technical Papers (FTPs) form one of the main regular and most popular publication series of the Department. The first volume was published in 1958 and more than 500 volumes in this series have now been published; new publications are made available in full-text in hard copies, CD-ROM and internet.

The FTP series are usually prepared by technical officers themselves or a commissioned author/s supervised by the officer/s. The arguments treated by these serial publications are those reflected in the Department's Programme of Work, related to the recommendations provided by FAO's Committee on Fisheries (COFI) and the Sub-committee on Aquaculture (SCA), as carried out through the various normative work and field programme activities. The document passes through several stages of quality control (e.g. technical, editorial and lay-out design) prior to final publication, archiving in the FAO document repository and uploading in the Web site. Aside from the technical quality, the control process is concerned with the correct use of the FAO publication style guidelines, language correctness, and political implication. The series are often published in more than one FAO official language based on the geographical importance of the treated subject. All FAO FTPs are available at the Department's Web site at: <ftp://ftp.fao.org/FI/CDrom/TechPapV2/techpap.htm> (from 1969 to 2004) and at: <http://www.fao.org/fishery/publications/technical-papers/en> from 2003 onward.

¹Contribution of M. Reantaso (FIMA) to this article is acknowledged

Box 1. Examples of FAO Publications on Aquaculture

- FAO. 2006. State of World Fisheries and Aquaculture 2006. FAO. Rome. 162 pp.
- FAO Fisheries and Aquaculture Department. State of world aquaculture 2006. *FAO Fisheries Technical Paper*. No. 500. Rome, FAO. 2006. 134 pp.
- Morales Q., V.V.; Morales R., R. *Síntesis regional del desarrollo de la acuicultura. 1. América Latina y el Caribe – 2005/Regional review on aquaculture development. 1. Latin America and the Caribbean – 2005*. FAO Circular de Pesca/FAO Fisheries Circular. No. 1017/1. Roma/Rome, FAO. 2006. 177 pp.
- Poynton, S.L. *Regional review on aquaculture development. 2. Near East and North Africa – 2005*. FAO Fisheries Circular. No. 1017/2. Rome, FAO. 2006. 79 pp.
- Network of Aquaculture Centres in Asia-Pacific. *Regional review on aquaculture development. 3. Asia and the Pacific – 2005*. FAO Fisheries Circular. No. 1017/3. Rome, FAO. 2006. 97 pp.
- Hecht, T. *Regional review on aquaculture development. 4. Sub-Saharan Africa – 2005*. FAO Fisheries Circular. No. 1017/4. Rome, FAO. 2006. 96 pp.
- FAO/Network of Aquaculture Centres in Central-Eastern Europe (NACEE). *Regional review on aquaculture development. 5. Central and Eastern European region – 2005*. FAO Fisheries Circular. No. 1017/5. Rome, FAO. 2007. 84 pp.
- Rana, K.J. *Regional review on aquaculture development. 6. Western-European region – 2005*. FAO Fisheries Circular. No. 1017/6. Rome, FAO. 2007. 56 pp. Contains a CD-ROM.
- Olin, P.G. *Regional review on aquaculture development. 7. North America – 2005*. FAO Fisheries Circular. No. 1017/7. Rome, FAO. 2006. 25 pp.

FAO FISHERIES CIRCULARS AND REPORTS/STATE OF WORLD AQUACULTURE

FAO Fisheries Circulars and Reports generally present the outcomes of meetings and/or expert consultations/workshops. Circulars represent the official document used to disseminate the reports of sessions of COFI/SCA, Regional Fishery Bodies (RFBs) and RFB's Working Groups; they can be also multilingual. Both reports follow the same quality control process as for FTPs with an additional layer whereby the final report is checked and endorsed by the respective bodies prior to final printing and distribution. Included under the same series are the regional reviews of aquaculture development status and trends produced on a regular basis. The regional reviews are conducted through a series of national and regional level consultations covering the seven FAO regions (i.e. Asia and the Pacific, Near East and North Africa, sub-Saharan Africa, North America, Latin American and the Caribbean, Central and Eastern Europe and Western Europe) and supported by information contained in the NASOs. The review process involves several iteration and participation by many national, regional and international

experts and culminates in a flagship publication "The State of World Aquaculture", an FAO Fisheries Technical Paper which is published on a regular basis.

FAO AQUACULTURE NEWSLETTERS (FAN)

The first issue of the FAO Aquaculture Newsletter or FAN was released in June 1992. Prior to this, the FAO Aquaculture Bulletin (1968-1977) and the "ADCP Aquaculture Minutes" (1988-1990) were the antecedents of FAN. Beginning 2008, FAN is issued thrice a year (April, August and December). FAN provides information on a broad range of topics of relevance to aquaculture in general, as well as socio-economic, food safety and trade related articles and events. FAN also provides our readers up-to-date information on various activities/events and projects both from FAO normative work and field programmes as well as significant developments and emerging issues affecting the aquaculture sector. Occasionally, special issues are dedicated to high-level events/sessions, e.g. Sub-Committee on Aquaculture (FAN 35, June 2006 and 40 – this issue, August 2008), High Level Special Event on Aquaculture (FAN 38, November 2007).

Glimpse of Global Aquaculture Production – from the FAO Fishery and Aquaculture Database

Fisheries and Aquaculture Information and Statistics Service (FIES)
FAO Department of Fisheries and Aquaculture, Rome, Italy

Global aquaculture¹ production increased to 51.7 million tonnes in 2006, with a value of USD78.8 billion, from a production of less than a million tonnes in the early 1950s. When aquatic plants are included, the world aquaculture production in 2006 was 66.7 million tonnes in weight and USD85.9 billion in value.

The share of aquaculture in total production of aquatic animals² continues to grow from 3.9 percent by weight in 1970 to 36.0 percent in 2006. During this same period, per capita supply of aquatic animals from aquaculture increased from 0.7 kg to 7.8 kg, with an average of 6.9 percent annual growth rate. Aquaculture now accounted for nearly half (47 percent) of the world's aquatic food supply.

China³ is still the dominating aquaculture producer. In 2006, the country accounted for 67 percent of the world's supply of cultured aquatic animals and 72 percent of its supply of aquatic plants. In 2005, 87 percent of aquatic food production within China came from aquaculture.

While the capture fishery production ceased to grow around the mid-1980s, the aquaculture sector, since 1970, has maintained an average annual rate of growth of 8.7 percent worldwide, and 6.5 percent per year when excluding China. Annual growth rates of world aquaculture production between 2004 and 2006 were 6.1 percent in volume and 11.0 percent in value, respectively.

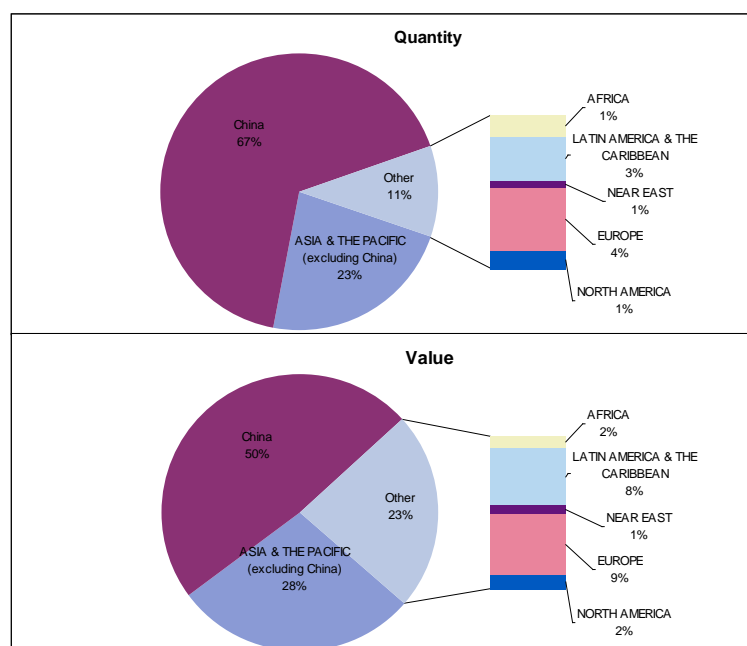
Asia continues to dominate aquaculture production. In 2006, the Asia-Pacific region accounted for 89 percent of the production volume and 77 percent of the value, of which China produced 75 percent by volume and 63 percent by value (Figure 1).

Aquaculture did not grow evenly around the world. Latin America and Caribbean Region showed highest average annual growth of 22.0 percent during the last three decades. Although the volume of production is small, Africa also registered a 12.7 percent growth rate during the same period. As a single country, China's aquaculture grew at an average annual rate of

11.2 percent over the same period. However, when examining on decadal basis, China's growth rate after 2000 declined to 5.8 percent from 17.3 percent in the 1980s and 14.3 percent during the 1990s. The aquaculture growth in Europe and North America has also slowed down substantially and since 2000, the rate is around 1 percent per year by volume.

The top ten aquaculture producing countries for cultured aquatic animals in 2006 are listed in Table 1. Whilst the first five countries in the list remained the same as in 2004, the Philippines entered the world's top ten aquaculture producers list in 2006.

Figure 1. Aquaculture production by regional groupings in 2006



Freshwater aquaculture contributed 58 percent by volume and 48 percent by value in 2006, while mariculture contributed 34 percent by volume and 36 percent of the total value of production. Brackishwater aquaculture, consisting of high value crustaceans and fish, contributed only 8 percent by volume to global production but a value of 16 percent of the global total. As a result of ever increasing production of white leg prawn, *Penaeus vannamei* in Asia, the production from brackish waters showed the highest annual growth rate of 11.6 percent by volume since 2000. With the unit price of *P. vannamei* declining in the world market corresponding to increased supply, the increase of value stagnated at the level 5.9 percent. Since 2000, the average annual increases in the production of aquatic products coming from freshwater and marine water environments were 6.5 percent and 5.4 percent in volume and 7.8 percent and 8.3 percent in value, respectively.

In 2006, more than half of the aquaculture production was freshwater finfish (27.8 million tonnes worth USD29.5 billion). Molluscs accounted for 14.1 million tonnes, or 27 percent of total production, with a value of USD11.9 billion. Although much smaller volumes of crustaceans (4.5 million tonnes) were produced, the value was around USD18.0 billion (Figure 2).

Globally, few countries still dominate production of major species groups. China produces 77 percent of all carps (cyprinids) and 82 percent of the global supply of oysters (ostreids). The top five producers of shrimps and prawns from the Asia-Pacific region, i.e. China, Thailand, Viet Nam, Indonesia and India, account for 81 percent of the global production. On the other hand, Norway and Chile continues to be the world's largest producers of cultured salmon (salmonids) accounting for 33 and 31 percent, respectively.

Table 1. Top ten aquaculture producers in terms of volume (tonnes) in 2006

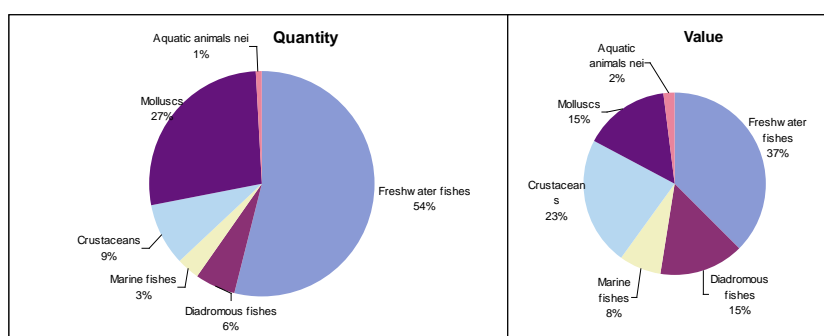
Country	2006
China	34429122
India	3123135
Viet Nam	1657727
Indonesia	1292899
Bangladesh	892049
Chile	802410
Japan	733891
Norway	708780
Philippines	623369

Plants not included

World aquatic plant production by aquaculture in 2006 was 15.1 million tonnes valued at USD7.2 billion. The culture of aquatic plants has increased steadily with an average annual growth rate of 8.0 percent since 1970 and in 2006, contributed 93 percent of the world's total supply of aquatic plants.

For a more detailed analysis of global aquaculture production, please refer to the next issue of the State of World Fisheries and Aquaculture 2008 (SOFIA 2008) which will be available in March 2009. Further inquiries may be directed to Sachiko.Tsuji@fao.org.

Figure 2. Production by ISSCAAP species division since 1970



¹Unless otherwise stated, aquaculture production in this article refers to aquatic animals (excluding aquatic plants).

²Aquatic animals in this article include, fish, crustaceans, mollusks and amphibians.

³Unless otherwise stated, data for China do not include Taiwan Province of China, Hong Kong Special Administrative Region and Macao Special Administrative Region.

Human Right to Food in Law and Practice: Salient Points

The right to food is a human right strongly enshrined in international law (see Box). The right-holders of this human right are individuals. This means, in practice, that every person – women, man, and child – has the right to access adequate food or means for its procurement.

The right to food does not mean, except under specific circumstances, that a person has the right to receive free food; each person should be able to feed herself in dignity. Individuals are expected, and indeed have the responsibility to ensure – through their own efforts and by use of their own resources – the satisfaction of their own needs. To be able to provide food for himself or herself in dignity, a person must live in conditions that allow him or her either to produce food or to buy it. To produce its own food, a person needs land, seed and water, and to buy it, it needs money and access to the market.

The state has an important role to play in supporting these efforts. Under the ICESCR, states must take continuous legal, administrative, financial and policy steps with a view to achieving progressively the full realisation of the right to food. In other words, the key obligation of states is to “take steps” towards the progressive realisation of the right to food. Even countries not experiencing economic growth can progressively realise the right to food by eliminating obstacles a person or group might encounter. There are three sets of steps a country must take: *respect*, *protect* and *fulfil* the right to food. In turn, fulfil includes two sets of steps – facilitate and provide. This typology of state obligations illustrates that compliance with the right to food – as with each and every human right – requires measures varying from passive non-interference to active ensuring of the satisfaction of individual needs, all depending on the concrete circumstances within a given country.

RIGHT TO FOOD LEGAL TIMELINE

The first assertion of the concept that every human being is born with the inherent right to food is generally credited to a famous 1941 speech by President Roosevelt of the United States of America. Called the “four freedoms” speech, it articulated freedom of speech, freedom of faith, freedom from want and freedom from fear.

The Universal Declaration on Human Rights (UDHR) of 1948 was the first international instrument that formally recognized the human right to food, as part of the right to a decent standard of living (article 25). Since then, the right to food or some aspects of it have been incorporated into a variety of other international instruments. The 1966 International Covenant on Economic, Social and Cultural Rights (ICESCR) is the instrument that deals most comprehensively with the right to food (Article 11). The ICESCR today has 158 State parties and is legally binding for those countries.

Other international instruments relevant to the right to food include several international human rights treaties dealing with the rights of certain categories of persons (e.g. children¹, women² and persons with disabilities³) and with specific situations such as armed conflict⁴. In addition, the right to food is addressed in a number of regional human rights instruments⁵ as well as numerous international declarations and UN resolutions⁶.

At the World Food Summit (WFS) organized by the Food and Agricultural Organization of the United Nations (FAO) in 1996, the States agreed to halve the number of undernourished people until 2015. In the Objective 7.4 of the adopted Plan of Action they also committed to give particular attention to implementation and full and progressive realisation of the right to food, and called for clarification of its contents. In 1999 the UN Committee on Economic, Social and Social Rights adopted the General Comment 12 which clarifies the normative contents of the right to food and state obligations under this right.

In 2004, the FAO Council adopted the Voluntary Guidelines to Support the Progressive Realization of the Right to Adequate Food in the Context of National Food Security (“**Right to Food Guidelines**”). The right to Food Guidelines recommend actions to be undertaken at the national level in order to build an enabling environment for people to feed themselves in dignity, and to establish appropriate safety nets for those who are unable to do so. While the Right to Food Guidelines are not legally binding, they are authoritative because they have been adopted by all FAO member states and express the political commitment of these to the realisation of the right to food.

¹International Convention on the Rights of the Child (CRC) of 1989

²International Convention on Elimination of all Forms of Discrimination Against Women (CEDAW) of 1979.

³Convention on the Rights of Persons with Disabilities of 2008.

⁴Convention of 1949 on the Protection of Civilian Population in Times of War; the Additional Protocol to the Geneva Conventions Relating to International Armed Conflicts, and the Additional Protocol to the Geneva Conventions Relating to Non-International Armed Conflicts.

⁵For example, American Convention on Human Rights (of 1978) and its Additional Protocol in the area of Economic, Social and Cultural Rights “Protocol of San Salvador” (of 1999), African Charter on Human and People’s Rights (of 1986).

⁶See for example, the Universal Declaration on the Eradication of Hunger and Malnutrition of 1974, the World Declaration on Nutrition, adopted at the International Conference on Nutrition in 1992, the Rome Declaration on World Food Security of 1966, the UN General Assembly Resolution 2004/19 of 2004, the FAO Voluntary Guidelines.

The obligation to *respect* requires states to refrain from taking any measure – through actions, policies of its own agencies and public officials – which may result in preventing or denying individuals or groups to provide food for themselves. The obligation to *protect* requires adopting specific legislative or other measures regulating third parties' activities so as to ensure that they do not negatively impact people's enjoyment of the right to food. The obligation to *fulfil* means that states must take positive measures to facilitate and provide for individuals' enjoyment of their rights. Facilitating the realization of the right to food requires more far-reaching measures on the part of the government in that it has to actively seek to identify vulnerable populations and implement policies and programmes to improve these people's access to food and their capacity to feed themselves. The obligation to fulfil the right to food by providing food directly will only apply at times and for persons or groups that are not able to exercise their right to food by their own means. The obligation to provide also includes the obligation to ensure, as a minimum, that no one in a country suffers from hunger.

Considering complex nature of the right to food, measures that may be required to give effect to this right will inevitably extend into many different areas. The FAO Right to Food Guidelines give practical recommendations on what needs to be done in all of the most relevant policy areas to promote food security using a human rights based approach. The 19 guidelines cover economic development policy; legal and institutional issues; agricultural and food policy; access to resources and assets; nutrition, food safety and consumer protection; education and awareness raising; social safety nets; emergencies; and international cooperation.

Countries on every continent are increasingly taking action to help their people realize the right to food; Brazil, Guatemala and Ecuador have adopted national laws on food and nutrition security that recognize the right to food and establish institutional mechanisms. Other countries have begun drafting legislation aiming at promoting the realisation of this right. These countries include Honduras, Malawi, Mozambique, Nicaragua,

Peru and South Africa. The judiciary in India and Brazil has taken up right to food violation in court cases. Tanzania, Kenya and Mozambique have revised their food security strategies to incorporate the right to food.

Nation legal and policy action is by no means complete; hunger and undernutrition, inequality and discrimination are among the gravest human rights concerns we face today. Over the last few years, FAO has supported efforts of several countries around the world. From 1st to 3rd October 2008, the representatives of many countries and organisations will meet in Rome (Italy) during the Right to Food Forum, convened by FAO, to review achievements and draw lessons learned from the experiences of key players in the field of the right to food. It is hoped that this Forum will contribute to advancing the realisation of this basic human right for all.

Further information may be obtained from Dubravka BojicBultrini, FAO's Right to Food Unit (ESAD) at Dubravka.BojicBultrini@fao.org.

Integrating Enhancement of Aquatic Biodiversity and Rice Intensification – a Workshop Summary

A national workshop on *Aquatic Biodiversity and Nutrition from Rice-based Ecosystems: Enhancing Biodiversity and Agricultural Productivity* on June 4-5, 2008 in Vientiane, Lao PDR brought together participants from seven international and nine national agencies. Presenting and comparing results from various studies in the course of the workshop, the participants agreed on the tremendous importance of the non-rice production coming from rice fields and their associated environment for the nutrition and livelihood of the Lao population and the urgent need to enhance it whilst at the same time increasing rice productivity.

The Lao people's major supply of animal protein comes from aquatic animals; fish, frogs and shrimps are normal part of the daily diet, either fresh or preserved. A recent FAO-

Netherlands Partnership Programme (FNPP) supported annual household survey in Lao PDR revealed that more than two thirds of all aquatic food items consumed originated directly from rice-based ecosystems. A survey on the value of fish from rice-based ecosystems in neighbouring Cambodia showed that without any management efforts and inputs, the value of the fish yield from a rice field surpasses two thirds of the profits from the rice crop itself. The International Rice Research Institute's (IRRI) Greater Mekong Coordinator stressed that it is possible to promote both aquatic biodiversity and higher rice yields, avoiding the perceived conflict between environment and agriculture. A speaker from the Lao PDR's Ministry of Health underlined the importance of proper nutrition in the light of widespread malnutrition in large parts of the country.

Rising commodity prices and limited supplies in combination with an ever increasing demand for rice emphasize the need to increase rice production. However, the dependency of the population on non-rice products from rice-based ecosystems means that attempts to intensify rice production require a careful approach. The participants concluded that there is an urgent need to document and promote biodiversity-friendly enhancements of the rice-based ecosystems in the country. A systematic collection of existing good management practices and enhancements to the rice-based ecosystems has highest priority; a compilation of the results then serving as basis for a widespread promotion of these good management practices throughout the country.

Further information may be obtained through Matthias.Halwart@fao.org

NEW STAFF PROFILE

Mr Miao Weimin



Miao Weimin supervising participants of an international training course on laboratory work

Mr Miao Weimin, a Chinese national, joined the Freshwater Fisheries Research Centre (FFRC) of the Chinese Academy of Fishery Sciences (CAFS) in 1982 after graduating from the Shanghai Fisheries University with a Bachelor of Science degree in agriculture majoring in inland fisheries. He joined a couple of research projects related to inland aquaculture and resource enhancement before he enrolled to a Master of Aquaculture program at the University of the Philippines in 1985 sponsored by the International Development Research Centre. He joined the Training Division of FFRC after returning from the Philippines with a Master in Aquaculture degree in 1986 as a lecturer and lately chief of the division.

In 1994, he was appointed by CAFS as Deputy Director of FFRC and Director of Asia-Pacific Regional Research & Training Centre for Integrated Fish Farming, NACA's¹ Regional Lead Centre in China. He has been coordinating international training and local higher education and international cooperation activities of FFRC during the past 15 years. As coordinator and one of the key resource persons, he has made great contribution to international training activities of FFRC to which over 1 000 senior fisheries technical and managerial personnel from

more than 80 countries attended for the last 28 years. In addition to his administrative work, he has led and participated in over a dozen of research projects sponsored by the Chinese government and international donor agencies concerning studies on carp genetic improvement, fisheries/aquaculture socio-economics and policy, aquaculture environment, community-based fish culture and integrated aquaculture systems. In recent years, he has actively participated in different types of FAO associated activities. He has travelled to over 20 different countries around the world for international collaborative projects, exchange programs and conferences and worked as a short-term consultant for UNDP HDI project in Myanmar in 1995.

Mr Miao Weimin was appointed by FAO as Aquaculture Officer at FAO RAP in Bangkok in June 2008. He is ready to serve the region with his knowledge and experience gained in aquaculture research, education and management for nearly 30 years. He can be reached via e-mail at Miao.Weimin@fao.org

¹ Network of Aquaculture Centres in Asia-Pacific (NACA) NACA is an intergovernmental organization that promotes rural development through sustainable aquaculture.

Dr Piero Mannini, an Italian national, joined FAO's Fisheries and Aquaculture Department from 1990 to 1997 and again in 1999. He has a degree on Biological Sciences (1987) and in 1998, he obtained a Ph.D. in Fisheries Ecology from the University of Hull, United Kingdom.



Since 1999, Piero worked as Fishery Monitoring Expert for FAO's AdriaMed project, in charge of the project's scientific components and acted as advisor to member countries, establishing a framework for regional scientific cooperation to support responsible fisheries in the Adriatic Sea. Furthermore, he was the technical coordinator of national and international activities and programmes concerning fishery resources appraisal, socio-economics monitoring and development of multidisciplinary sustainability indicators for marine capture fisheries. His previous work experience with FAO (1990-1997) includes project management and implementation of research activities in eastern, central and southern Africa.

From 2005 to 2007, Piero was based at the FAO Headquarters (HQ) in Rome, with the Fisheries Management and Conservation Service (FIMF) and served as Programme Coordinator with the responsibility for the planning and implementation of some of FIMF field projects, and HQ coordination responsibilities for four projects operating in the Mediterranean with

FIMF as Lead Technical Unit. He has authored and co-authored more than 70 scientific and technical publications and has more than 20 years of combined experience in fisheries research and appraisal, coordination of international scientific activities, project formulation and implementation.

In February 2008, Piero has been appointed Senior Fishery Officer at the FAO Regional Office for the Near East and North Africa in Cairo (Egypt); his responsibilities also include acting as Secretary of the Regional Commission for Fisheries (RECOFI). He can be reached at Piero.Mannini@fao.org; +2 02 33316141 or +2 02 33316000.

Mr Fabio Massa, an Italian national, has a degree in Biology and has been collaborating with FAO since 1984 when he started as Coordinator of the FAO Regional Project MEDRAP¹ - Aquaculture Training Centre in Policoro, Italy. He is an expert in marine aquaculture and fishery lagoon management, having an extensive experience in project management and coordination of national and international projects on Mediterranean fisheries and aquaculture. He



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Tel: +39.06.5705.3885

also undertook several missions to North Africa and Mexico for the development of aquaculture and fisheries in coastal lagoon areas with scientific responsibilities for the research projects as well as providing technical assistance to private aquaculture farms. He served as Project Coordinator of the FAO Regional Project AdriaMed² from 1999 to 2008 and of MedSudMed³ from 2001. He had the overall responsibility for the planning, implementation and technical operations of these two projects including supervision and technical support of research and cooperation activities within projects in the region. In this context, he contributed in reinforcing scientific coordination among fisheries research institutions of participating countries (Albania, Croatia, Italy, Libya, Malta, Montenegro, Slovenia, Tunisia). He has authored and co-authored many scientific works on capture fisheries and aquaculture published in international magazines. He also taught and acted as trainer in numerous training courses and seminars on aquaculture and fisheries.

In April 2008, he was appointed as Aquaculture Officer of the General Fisheries Commission for the Mediterranean (GFCM) with the responsibility of providing policy and technical advice towards the development of a Mediterranean support framework for economically, socially and environmentally sustainable marine and brackishwater aquaculture research and management. He also acts as Technical Secretary of the GFCM's Committee on Aquaculture.

¹Mediterranean Regional Aquaculture Project

²AdriaMed "Scientific Cooperation to Support Responsible Fisheries in the Adriatic Sea" is an FAO Regional Project and it is funded by the Italian Ministry of Agriculture, Food and Forestry Policies (MiPAAF) and since 2007 by the European Commission.

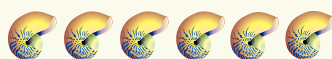
³MedSudMed "Assessment and Monitoring of the Fishery Resources and the Ecosystems in the Straits of Sicily" is a regional project with four participating countries (Italy, Libyan Arab Jamahiriya, Malta and Tunisia), executed by the Food and Agriculture Organization of the United Nations (FAO) and funded by the Italian Ministry of Agriculture Food and Forestry Policies (MiPAAF).



Glossary of aquaculture. Rome, FAO. 2008. 401 pp.

The FAO Fisheries and Aquaculture Department has published the hard copy and CD-ROM of the Glossary of aquaculture. The glossary was already available online at <http://www.fao.org/fi/glossary/aquaculture/> since April 2006. However in order to target a wider audience and particularly to make it available for those not having easy internet connection, it has been decided to produce a hard copy as well as a CD-ROM containing the same copy of the online version.

This aquaculture glossary was prepared by the Aquaculture Management and Conservation Service of the FAO Fisheries and Aquaculture Department and funded by the regular programme. This publication aims (i) to facilitate communication among technical experts and scientists involved in aquaculture research and development; and (ii) to enhance communication between aquaculture research and development technicians and scientists, developers, consultants and users from other disciplines such as administrators, agronomists, economists, engineers, environmentalists and policy-makers.



The glossary contains approximately 2 500 terms and includes definitions, information sources, synonyms and related terms when available. It has been compiled using existing textbooks and glossaries, in particular those already prepared by various services of the organization, namely the Fisheries and Aquaculture Department and the Agriculture and Consumers Protection Department.

The glossary is presented in the following format: terms, definitions, information sources aquaculture subject areas, synonyms, related terms and images.

Terms and definitions are available in five FAO official languages (English, French, Spanish, Arabic and Chinese) in the same page of the hard copy or the user can get instant translation from English, French, Spanish, Arabic and Chinese by clicking on the related language in the CD-ROM and the online version. The whole glossary is available as a PDF file in the entry page of the CD-ROM and at the end of each subject area.

This glossary will be revised continuously and updated with inputs from the users. Suggestions of new terms or definitions, comments on current terms and submission of new images are strongly encouraged. Submissions can be made simply by completing specific forms available on the Web site which are sent to the FAO-Glossary administrators for validation and then uploaded onto the online version.



FAO aquaculture information products 2006-2007. Rome, FAO. 2008. 18 pp. Contains a CD ROM.

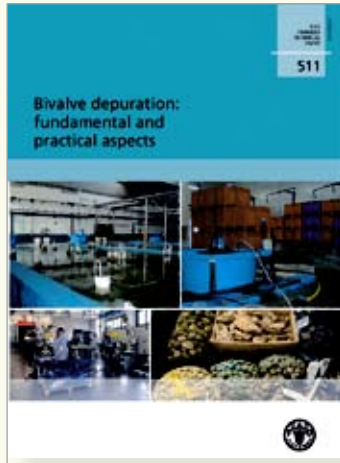
This publication provides a list and descriptions of FAO aquaculture information products published during the biennium 2006-2007. Fifty-three products related to aquaculture, including CD-ROMs and newsletters have been published and distributed worldwide during that time, in both hard and electronic 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: <http://www.fao.org/fishery/aquaculture>

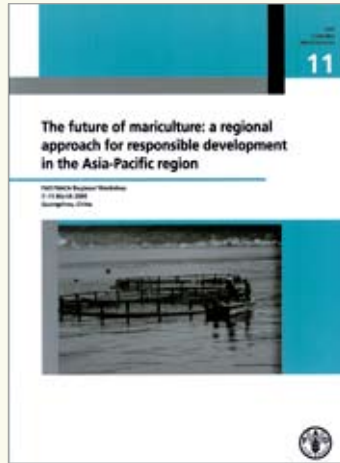
Further details can be obtained by writing to:
Valerio Crespi at FIMA
Aquaculture Management and Conservation Service
E-mail: Valerio.Crespi@fao.org

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



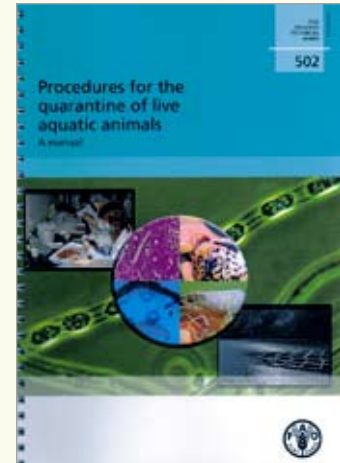
Lee, R.; Lovatelli, A.; Ababouch, L. Bivalve depuration: fundamental and practical aspects. *FAO Fisheries Technical Paper*. No. 511. Rome, FAO. 2008. 139 pp.

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.



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

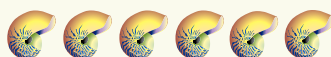
Aquaculture in the Southeast Asian region has been growing steadily over the last few decades, requiring more space to accommodate it. The search for additional areas to expand the aquaculture industry as a whole and the identification of new farming species of commercial value to satisfy the growing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



Arthur, J.R.; Bondad-Reantaso, M.G.; Subasinghe, R.P. *Procedures for the quarantine of live aquatic animals: a manual*. *FAO Fisheries Technical Paper*. No. 502. Rome, FAO. 2008. 74 pp.

Quarantine is an important risk management measure and a key activity that should be considered when developing national strategies for aquatic animal health management. It can also be used effectively to increase biosecurity at the farm production level. This manual outlines the technical requirements for setting up quarantine facilities at three levels, based on the general level of risk (as determined by risk analysis) represented by the specific consignment of aquatic animals being moved: (i) the quarantine of “high risk” species (e.g. aquatic animals being moved either internationally through introductions and transfers or domestically between regions of different health status) that are destined for use in aquaculture, capture fishery development or other applications where release or escape of animals or any pathogens they may be carrying into the natural environment is likely to occur; (ii) the quarantine of “lower risk” species (e.g. aquatic animals destined for the ornamental trade) to improve biosecurity for aquatic animals whose trade is an established practice; and (iii) the routine quarantine of aquatic animals at production facilities (e.g. new, domestically produced or locally captured broodstock or juveniles or animals whose movement has been contingent upon additional, more stringent, risk management measures, such as the use of specific pathogen free stocks, international health certification, pre-border and/or border quarantine, etc.).

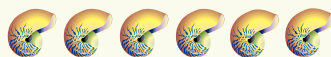
This manual should be useful to government policy-makers and responsible national and state agencies in assessing their need for quarantine capacity and in implementing aquatic animal quarantine in an effective and cost-efficient manner within the framework of national and state aquatic biosecurity programmes. It also provides useful guidance to responsible agencies, their technical staff and the private sector in setting up of effective quarantine facilities and their daily operation.



FAO. Report of the FAO Expert Workshop on the Use of Wild Fish and/or Other Aquatic Species as Feed in Aquaculture and its Implications to Food Security and Poverty Alleviation. Kochi, India, 16–18 November 2007. *FAO Fisheries Report*. No. 867. Rome, FAO. 2008. 31 pp.

The FAO Expert Workshop on the Use of Wild Fish and/or Other Aquatic Species as Feed in Aquaculture and its Implications to Food Security and Poverty Alleviation was convened in Kochi, India, from 16 to 18 November 2007. It was attended by a wide range of researchers, development specialists and industrial experts in aquaculture from around the globe and was hosted by the Marine Products Export Development Authority (MPEDA), India. The workshop was organized with three objectives: a) to review and analyse the status and trends of feed/reduction fisheries and the use of low-value/trash fish in aquaculture production; b) to identify key issues and challenges for sustainability of these fisheries in relation to food security, poverty alleviation, long-term ecological sustainability and environment; and c) to prepare an outline for technical guidelines on the “Use of wild fish and other aquatic species as feed in aquaculture”. The workshop consisted of technical presentations and working group discussions. The technical presentations were intended to orient the participants about the interregional commonalities, differences and issues pertaining to the use of wild fish as feed in aquaculture and included regional reviews, case studies, a global synthesis and a number of invited presentations. The workshop

served to address the following thematic areas and other issues of significance emerging from the regional reviews and case studies: a) fisheries management; b) policy development; c) food security; d) poverty alleviation; e) social and ethical issues; and f) aquaculture technology and development. Following several working group deliberations, the workshop agreed on a series of principles and guidelines on the use of wild fish as feed in aquaculture, concluded that such use should be governed by the above guiding principles and recommended a number of actions for the FAO to undertake to address issues raised. The workshop proceedings including the working group discussions and recommendations, regional reviews, case studies and global synthesis will form the basis of two major documents: a) an FAO Fisheries Technical Paper “Fish as feed inputs for aquaculture and its implication to food security and poverty alleviation”; and b) FAO Technical Guidelines for Responsible Fisheries on the “Use of wild fish and other aquatic species as feed in aquaculture”. The Technical Paper that will include the global synthesis, regional reviews and case studies, as well as a summary of key issues and findings on the status and trends in feed/reduction fisheries is currently in preparation and will be published in due course.



Lovatelli, A.; Holthus, P.F. (eds), Capture-based aquaculture. Global overview. *FAO Fisheries Technical Paper*. No. 508. Rome, FAO. 2008. 300 pp.

Aquaculture is a diverse and multibillion dollar economic sector that uses various strategies for fish production. The harvesting of wild individuals from very early stages in the life cycle to large mature adults for on-growing under confined and controlled conditions is one of these strategies. This system, referred to as capture-based aquaculture, is practised throughout the world using a variety of marine and freshwater species with important environmental, social and economic implications. The need to evaluate the sustainability of this farming practice in light of its economic viability, the wise use of natural resources and socio-environmental impacts as a whole has been extensively discussed at national, regional and international levels. This publication contains technical information prepared in support of and background material for the “FAO international workshop on technical guidelines for the responsible use of wild fish and fishery resources for capture-based aquaculture production” held in Viet Nam in October 2007. This publication contains two parts. Part 1 consists of two reviews on (a) environmental and biodiversity and (b) social and economic impacts of capture-based aquaculture and Part 2 consists of eleven species review papers. Both marine and freshwater examples have been reviewed and include finfish (mullet, bluefin tuna, European eel, cod, grouper, yellowtail, Clarias catfish, Indian major carps, and snakehead and Pangasiid catfish), crustaceans (mud crab) and molluscs (oyster).

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of stakeholders in the decision-making processes at all levels; (iii) the importance of facilitating access of fish farmers to water bodies and land for aquaculture production and providing support for traditional, community-based and small-scale aquaculture; and (iv) maintaining the integrity of the mechanisms that allow individuals to hold government accountable for what has been done or not done, and to obtain redress when their rights are violated. Human rights principles also require governments to monitor food security, environmental and social impacts of aquaculture operations and take adequate measures to enable those who are threatened or negatively impacted to have access to reliable and alternative sources of support.

Because rights give people a stake and make them active and responsible members of society, applying a human rights-based approach to aquaculture serves both national economic development goals and individuals' aspiration to self-sufficiency.

Ensuring an enabling environment and taking steps to achieve full realisation of the right to food for all is not a matter of policy discretion of governments but their legal obligation.

Dubravka Bojic Bultrini¹ and Melba B. Reantaso²

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²Aquaculture Management and Conservation Service (FIMA) and FAN Chief Editor, Rome, Italy, Melba.Reantaso@fao.org

UPCOMING EVENTS (from September 2008)

September 2008

- ▶ FAO/NACA Inception Planning Workshop of Regional TCP/RAS/3203 Reducing the dependence on the utilization of trash fish/low value fish as feed for aquaculture of marine finfish in the Asian region, 8-10 September, Krabi, Thailand. Mohammad.Hasan@fao.org/Cecile.Brugere@fao.org/Miao.Weimin@fao.org
- ▶ FAO Workshop on Environment Impact Assessment and Monitoring in Aquaculture, 15-17 September 2008, Rome, Italy. Uwe.Barg@fao.org/Doris.Soto@fao.org/Jose.AguilarManjarrez@fao.org

October 2008

- ▶ First Meeting of the FAO CWP Aquaculture Working Group, 3-4 October 2008, Puerto Varas, Chile. Sachiko.Tsuji@fao.org
- ▶ Fourth Session of the FAO COFI Sub-Committee on Aquaculture, 6-10 October 2008, Puerto Varas, Chile. Rohana.Subasinghe@fao.org/Jiansan.Jia@fao.org
- ▶ 5th NACEE Directors Meeting, 14-17 October 2008, Lvov, Ukraine. Uwe.Barg@fao.org/Jiansan.Jia@fao.org/Thomas.MothPoulsen@fao.org
- ▶ GFCM Committee on Aquaculture Working Group on Siting and Carrying Capacity, 21-23 October 2008, Crete, Greece. Fabio.Massa@fao.org

November 2008

- ▶ FAO/Chinese Ministry of Agriculture/FISHINFONETWORK Global Technical and Trade Conference on Shrimp, 6-9 November 2008, Guangzhou, China. infish@po.jaring.my/Audun.Lem@fao.org
- ▶ FAO/FSM National Workshop on Risk Assessment in Aquaculture Development, 10-12 November 2008, Pohnpei, Federated States of Micronesia. Masanami.Izumi@fao.org/Melba.Reantaso@fao.org
- ▶ FAO Expert Workshop on Methodologies and Indicators for the Appraisal and Evaluation of the Contribution of Small-scale Aquaculture to Sustainable Aquaculture and Rural Livelihood Development, 24-28 November 2008, Nha Trang, Viet Nam. Melba.Reantaso@fao.org/Susana.Siar@fao.org/Nathanael.Hishamunda@fao.org
- ▶ GFCM Committee on Aquaculture Workshop on Indicators for Sustainable Development of Aquaculture and Guidelines for their Use in the Mediterranean 27-28 November 2008, Montpellier, France. Fabio.Massa@fao.org
- ▶ FAO Workshop on Development of Guidelines on Ecosystem Approach to Aquaculture, 24-26 November 2008, Italy. Doris.Soto@fao.org/Jose.AguilarManjarrez@fao.org/Nathanael.Hishamunda@fao.org
- ▶ RECOFI-WGA Technical Workshop on Cage Aquaculture, November 2008, Muscat, Oman. Alessandro.Lovatelli@fao.org

December 2008

- ▶ CIFA Committee for Inland Fisheries and Aquaculture of Africa 15th Session, 9-11 December 2008, Lusaka, Zambia. John.Moehl@fao.org
- ▶ GFCM Committee on Aquaculture Information System for the Promotion of Aquaculture in the Mediterranean (SIPAM) Annual Meeting, 15-16 December 2008, Tirana, Albania. Fabio.Massa@fao.org
- ▶ GFCM Committee on Aquaculture 6th Session, 17-19 December 2008, Tirana, Albania. Fabio.Massa@fao.org

May 2009

- ▶ FAO/RECOFI Fifth Session, May 2009, United Arab Emirates. Piero.Mannini@fao.org/Alessandro.Lovatelli@fao.org



FAN

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

It is also available on the FAO Web page:
www.fao.org/fi/newslet/newslet.asp

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