

FAO Fisheries and Aquaculture Department. 2006. *The State of World Fisheries and Aquaculture 2006*. Rome, FAO. 162 pp.

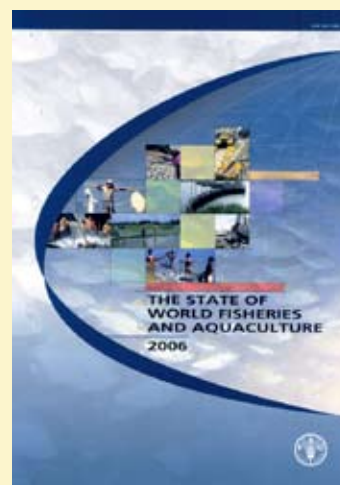
Several decades ago, the efforts of public administrations were concentrated on developing fisheries and aquaculture and ensuring growth in production and consumption. Then, in the 1980's, as many resources became fully or over exploited, attention of policy makers began to focus instead on fisheries management, in addition to development of aquaculture. Subsequent recognition of the many failures in management have now lead FAO Member States and other relevant stakeholders to broaden the approach and governance, that is the sum of the legal, social, economic and political arrangements used to manage fisheries and aquaculture in a sustainable manner, is currently seen as a necessary context for management and is becoming the main concern.

In keeping with these developments, the issue of governance features in several places of SOFIA 2006. Part 1 of the document - the World Review of Fisheries and Aquaculture - ends with a new section called "Governance and Policy". Governance issues and related concerns are addressed also in several places in the remainder of the text.

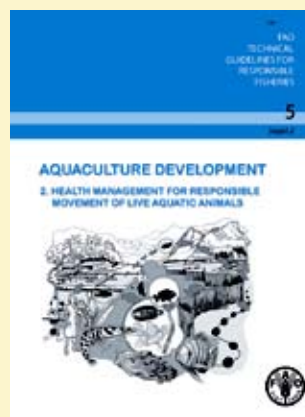
Aquaculture continues to expand, whilst marine capture fisheries - when summed together world-wide - seem to have reached a ceiling. This development was not unexpected. It has constituted a basic assumption in most discussions and studies concerned with the future of the fisheries sector. Past issues of SOFIA have reported on projections for the sector. Although it may be early to evaluate the accuracy of such projections, it can be interesting to compare them with the developments that actually took place. A brief attempt in this respect is made in the last section, entitled "Outlook". Reflecting the growing importance of aquaculture the section ends with a discussion of the challenges which aquaculture is facing as well as of the opportunities that are open to the sector. The discussion is based on a prospective analysis of the aquaculture sector world-wide, which was undertaken by FAO in the past two years.

The format of SOFIA remains unchanged. Like previous issues, this issue contains a CD with

the World Fisheries and Aquaculture Atlas. However, one more CD has been added. It contains FAO documents reviewed in Part 3 and a complete set of past issues of SOFIA.



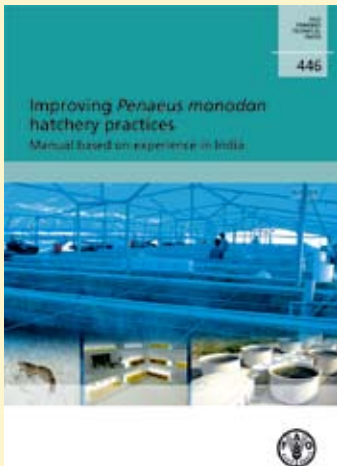
FAO. 2007. Aquaculture development. 2. Health management for responsible movement of live aquatic animals. *FAO Technical Guidelines for Responsible Fisheries*. No. 5, Suppl. 2. Rome, FAO. 31 pp.



These Technical Guidelines on *Health management for responsible movement of live aquatic animals* have been developed to support sections of FAO's Code of Conduct for Responsible Fisheries (CCRF) addressing responsible fisheries management (Article 7), aquaculture development (Article 9),

international trade (Article 11) and fisheries research (Article 12). The objective of these guidelines is to assist countries in reducing the risk of introduction and spread of serious transboundary aquatic animal diseases (TAADs). Although they deal primarily with safe transboundary movement at the international level, they are also applicable to domestic movements between different provinces, geographical areas or zones of differing disease status. These Technical Guidelines also include guidance for health management at the farm and farm-cluster level, to the extent that these local production units are involved in the spread of TAADs.

FAO Fisheries and Aquaculture Department. 2007. *Improving *Penaeus monodon* hatchery practices: manual based on experience in India. FAO Fisheries Technical Paper. No. 446.* Rome, FAO. 2007. 100 pp.



The successful farming of tiger shrimp (*Penaeus monodon*) in India is mainly due to the existence of some 300 hatcheries whose capacity to produce 12 000 million post-larvae (PL) annually has provided an assured supply of seed. However, the sustainability of the sector is still ham-

pered by many problems, foremost among these being a reliance on wild-caught broodstock whose supply is limited both in both quantity and in seasonal availability and that are often infected with pathogens. The current low quality of hatchery produced PL due to infection with white spot syndrome virus (WSSV) and other pathogens entering the hatcheries via infected broodstock, contaminated intake water or other sources due to poor hatchery management practices, including inadequate biosecurity, is a major obstacle to achieving sustainable shrimp aquaculture in India and the Asia-Pacific region. Considering the major contribution of the tiger shrimp to global shrimp production and the economic losses resulting from disease outbreaks, it is essential that the shrimp-farming sector invest in good management practices for the production of healthy and quality seed.

This document reviews the current state of the Indian shrimp hatchery industry and provides detailed guidance and protocols for improving the productivity, health management, biosecurity and sustainability of the sector. Following a brief review of shrimp hatchery development in India, the major requirements for hatchery production are discussed under the headings: infrastructure, facility maintenance, inlet water quality and

treatment, wastewater treatment, biosecurity, standard operating procedures (SOPS), the Hazard Analysis Critical Control Point (HACCP) approach, chemical use during the hatchery production process and health assessment. Pre-spawning procedures covered include the use of wild, domesticated and specific pathogen free/specific pathogen resistant (SPF/SPR) broodstock; broodstock landing centres and holding techniques; broodstock selection, transport, utilization, quarantine, health screening, maturation, nutrition and spawning; egg hatching; nauplius selection; egg/nauplius disinfection and washing and holding, disease testing and transportation of nauplii. Post-spawning procedures covered include: larval-rearing unit preparation, larval rearing/health management, larval nutrition and feed management, important larval diseases, general assessment of larval condition, quality testing/selection of PL for stocking, PL harvest and transportation, nursery rearing, timing of PL stocking, use of multiple species in shrimp hatcheries, and documentation and record keeping. Information on the use of chemicals in shrimp hatcheries and examples of various forms for hatchery record keeping are included as Annexes.



FAO Committee on Fisheries. 2007. *Report of the third session of the Sub-Committee on Aquaculture. New Delhi, India, 4–8 September 2006. FAO Fisheries Report No. 816.* Rome. FAO. 85 pp. Trilingual EN/FR/SP.

The third session of the Committee on Fisheries Sub-Committee on Aquaculture was held in New Delhi, India, from 4 to 8 September 2006 at the kind invitation of the Government of India. It was attended by 48 Members of FAO, by representatives from one specialized agency of the United Nations and by observers from four intergovernmental and four international non-governmental organizations. The Sub-Committee appreciated the effort of the FAO Fisheries Department in

responding to the recommendations of the second session of the Sub-Committee. Several working documents, including *State of world aquaculture 2006* and *Prospective analysis of future aquaculture development*, were presented by the Secretariat for information, discussion and decision by the Sub-Committee. They were received with compliments. The Sub-Committee agreed to the International Principles for Responsible Shrimp Farming. The Sub-Committee requested the Secretariat to ensure implementation of priority activities during the intersessional period. Recognizing the constraints in the Regular Programme budget of the FAO Fisheries Department, the Sub-Committee recommended that additional resources should be sought within the Regular Programme or through Extra-Budgetary resources to undertake aquaculture activities. The Sub-Committee expressed its appreciation to the Government and people of India for their hospitality and the excellent facilities that were provided for the session. The Sub-Committee agreed that its next session should be held in 2008 and appreciated the offer by the Government of Chile to host it.

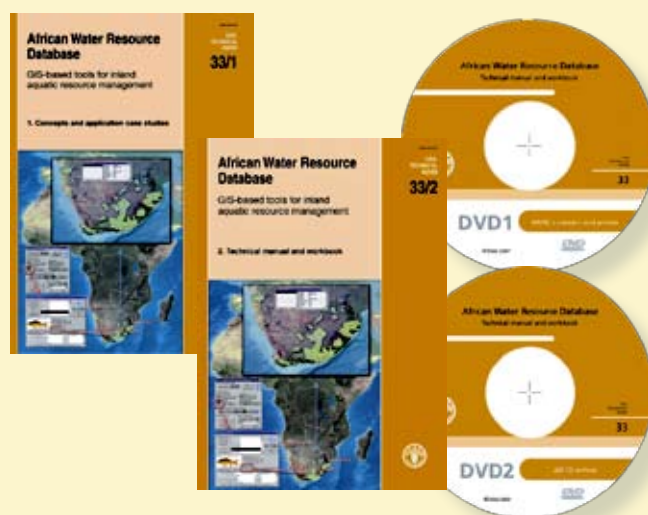


Jenness, J.; Dooley, J.; Aguilar-Manjarrez, J. & Riva, C. 2007. African Water Resource Database. GIS-based tools for inland aquatic resource management. 1. Concepts and application case studies. *CIFA Technical Paper*. No. 33, Part 1. Rome, FAO. 167 pp.

Jenness, J.; Dooley, J.; Aguilar-Manjarrez, J. & Riva, C. 2007. African Water Resource Database. GIS-based tools for inland aquatic resource management. 2. Technical manual and workbook. *CIFA Technical Paper*. No. 33, Part 2. Rome, FAO. 308 pp. (Includes two DVD's.)

The African Water Resource Database (AWRD) is a set of data and custom-designed tools, combined in a geographic information system (GIS) analytical framework aimed at facilitating responsible inland aquatic resource management with a specific focus on inland fisheries and aquaculture. It thus provides a valuable instrument to promote food security.

The AWRD data archive includes an extensive collection of datasets covering the African continent, including: surface waterbodies, watersheds, aquatic species, rivers, political boundaries, population density, soils, satellite



imagery and many other physiographic and climatological data. To display and analyse the archival data, it also contains a large assortment of new custom applications and tools programmed to run under version 3 of the ArcView GIS software environment (ArcView 3.x).

The database allows integration of different types of information into a cohesive program that, because of its visual nature, is easy to understand and interpret. Creative applications of these tools and data could deepen our understanding of inland aquatic resource management and be of immediate value in addressing a wide variety of management and research questions.

The AWRD was designed based on recommendations of the Committee on Inland Fisheries for Africa (CIFA) and is both an expansion and an update of an earlier project led by the Aquatic Resource Management for Local Community Development Programme (ALCOM) entitled the "Southern African Development Community Water Resource Database" (SADC-WRD).

The AWRD publication is organized in two parts to inform readers who may be at varying levels of familiarity with GIS and with the benefits of the AWRD. The first part describes the AWRD and is divided into two main sections. The first presents a general overview and is addressed to administrators and managers while the second is written for professionals in technical fields. The second part is a "how to" supplement and includes a technical manual for spatial analysts and a workbook for university students and teachers.

The primary AWRD interface, toolsets and data integral to the function of the AWRD are distributed in two DVDs accompanying part 2

of this publication, and are also available for download from FAO's GeoNetwork and GIS-Fish GIS portals. A more limited distribution of the above primary database/interface, but divided among ten separate CD-ROMs, is available upon request to the Aquaculture Management and Conservation Service of FAO. Also, high resolution elevation datasets and images amounting to 38 gigabytes are available upon request.

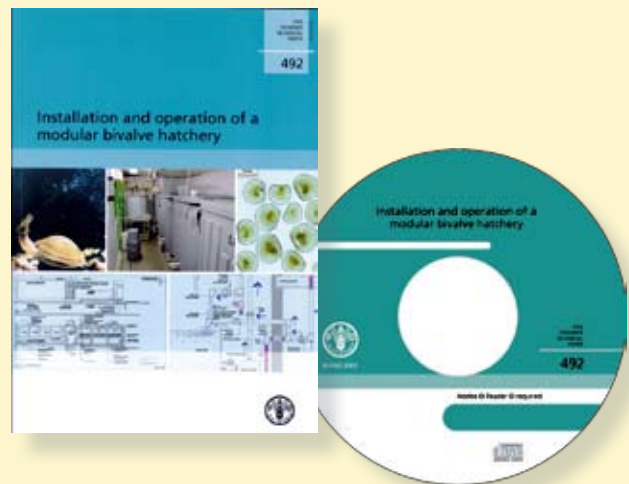


Sarkis, S. & Lovatelli, A. (comp./ed.). 2007. Installation and operation of a modular bivalve hatchery. *FAO Fisheries Technical Paper*. No. 492. Rome, FAO. 2007. 173 pp. (Contains a CD-ROM.)

The above publication was first announced by the FAO Fisheries and Aquaculture Department in the December 2006 issue of the FAO Aquaculture Newsletter (Issue No. 36; page 51). This technical publication was written for those interested in establishing a bivalve hatchery, with minimal experience in this activity and limited technical support and restricted access to information. The manual stands as an entity, providing not only the technicalities of setting up and operating a bivalve hatchery, but also makes some of the scientific background readily accessible. The manual is divided into chapters for each rearing stage: broodstock conditioning, algal culture, hatchery, nursery, growout and economic considerations. The first five chapters include both the physical requirements and culture considerations and procedures for the relevant rearing stage. The final chapter on economic considerations provides an insight into the labour involved for each stage of production, along with a list of equipment and supplies.

To further facilitate the use of this manual and interpretation of the technical drawings of the various hatchery sections the scaled drawings are available as PDF files in an enclosed CD-ROM at the back of the manual allowing the reader to print any of these for ease of use and consultation. The CD-ROM also contains PDF files of all chapters.

This new publication is part of three FAO technical publications dedicated to bivalve aquaculture. The first volume of this series entitled "Hatchery culture of bivalves: A practical manual" (*FAO Fisheries Technical Paper*. No. 471) was published in 2004 and is now available in Chinese, English, French and Spanish and shortly in Arabic. The third



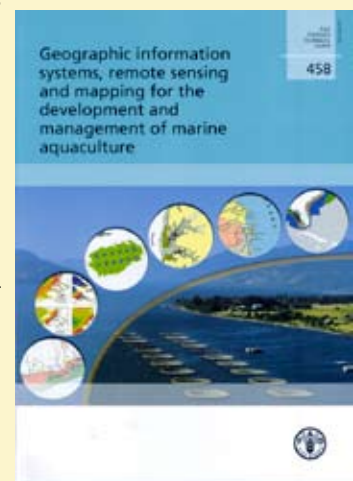
publication of this series deals with bivalve depuration. This volume will be available towards the end of 2007.

Further details can be obtained by writing to Mr Alessandro Lovatelli at FAO/HQ, E-mail: Alessandro.Lovatelli@fao.org.



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

The objective of this document is to illustrate the ways in which Geographic Information Systems (GIS), remote sensing and mapping can play a role in the development and management of marine aquaculture. The perspective is global. The approach is to employ example applications that have been aimed at resolving many of the important issues in marine aquaculture.



The underlying purpose is to stimulate the interest of individuals in the government, industry and educational sectors of marine aquaculture to make more effective use of these tools. A

brief introduction to spatial tools and their use in the marine fisheries sector precedes the example applications. The most recent applications have been selected to be indicative of the state of the art, allowing readers to make their own assessments of the benefits and limitations of use of these tools in their own disciplines.

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



The document was prepared under the supervision of Dr Melba B Reantaso, Fishery Resources Officer of the Aquaculture Management and Conservation Service (FIMA) of the FAO's Department of Fisheries and Aquaculture based in Rome, Italy.

This publication contains valuable information on these pathogens of aquatic animals (mainly salmonids and cyprinids) in Latvia. The information presented consist of the following: causative agent, host range, epizootiology, clinical aspects, diagnostic methods, modes of transmission and control measures. Colored photographs and life cycle illustrations are also provided.



Arthur, J.R. & Te, B.Q. 2006. Checklist of the parasites of fishes of Viet Nam. *FAO Fisheries Technical Paper*. No. 369/2. Rome, FAO. 133 pp.

The Extension Manual on Some Important Viruses, Parasites and Bacteria of Aquatic Animals in Latvia is one of the final outcomes of the FAO Technical Cooperation Project (TCP) TCP/LAT/3001 – Improving Aquatic Animal Health and Quality and Safety of Aquatic Products – implemented from 2004 to 2007. The aim of this manual is to provide useful guide for use by farmers, extension officers, researchers and students to identify some important viruses, parasites and bacteria of fishes in Latvia. This is part of FAO's continuing efforts to address the need for information on diseases and pathogens of aquatic animals.



This publication is a checklist summarizing information on the parasites of Vietnamese fishes contained in world literature dating from the earliest known record (Billet 1898) to the end of 2003. Information is presented in the form of parasite-host and host-parasite lists and contains

453 named species of parasites (not including 4 *nomina nuda*), distributed among the higher taxa as follows: Protozoa - 48, Myxozoa - 33, Digenea - 151, Monogenoidea - 112, Cestoda - 16, Nematoda - 53, Acanthocephala - 21, Hirudinea - 2, Branchiura - 3, Copepoda - 12 and Isopoda - 2. Many records of parasites not identified to species level are also included. The Parasite-Host List is organized on a taxonomic basis and provides information for each parasite species on the environment (freshwater, brackish water, marine), the location (site of infection) in or on its host(s), the species of host(s) infected, the known geographic distribution (by administrative division) in Viet Nam, and the published sources for each host and locality record. The Host-Parasite List is organized according

to the taxonomy of the hosts, and includes, for each host, the English language and local (Vietnamese) common names, environment (freshwater, brackish water, marine), status in Viet Nam (native or exotic), and information on the known distribution in Viet Nam of the parasites. Both lists are accompanied by remarks and footnotes, as warranted, giving specific information on points of systematics, nomenclature, possible misidentifications, introductions, etc. Citations are included for all references, as well as parasite and host indices. The following new taxonomic combinations are made: *Elongoparorchis siamensis* (Oshmarin, 1965) n. comb.; *Capillaria ariusi* (Parukhin, 1989) n. comb., *Falcaustra babei* (Ky, 1971) n. comb. and *Neocamallanus trichogasterae* (Pearse, 1933) n. comb.

The parasite fauna of fishes of Viet Nam has received considerable attention, particularly by scientists of the former Soviet Union, in the marine environment, and by Vietnamese and Czech freshwater scientists. Nevertheless, parasites have been recorded from only about ten percent of the more than 1 300 species of marine and freshwater fish occurring in the waters of Viet Nam. Knowledge of freshwater fauna is hampered by a lack of descriptive work and by many probable misidentifications of parasites, due to the tendency of Vietnamese workers to report European species from the local fish fauna.



Kirjušina, M. & Vismanis, K. 2007. Checklist of the parasites of fishes of Latvia. *FAO Fisheries Technical Paper*. No. 369/3. Rome, FAO. 113 pp.

This checklist summarizes information on the parasites of Latvia fishes contained in the world literature dating to the end of 2005. Information is presented in the form of parasite-host and host-parasite lists and includes 305 named species of parasites, distributed among the higher taxa as follows: Protista – 42, Myxozoa – 49, Digenea – 38, Monogenoidea – 81, Cestoda – 33, Nematoda – 31, Acanthocephala – 11, Hirudinida – 2, Mollusca – 6, Branchiura – 2 and Copepoda – 10. Also included are many records of parasites not identified to species level. The Parasite-Host List is organized on a taxonomic basis and provides information for each parasite species on the environment (freshwater, brackish, marine), the location (site of infection) in or on its host(s), the species of host(s) infected, the known geographic

distribution (by major waterbody) in Latvia, and the published sources for each host and locality record. The Host-Parasite List is organized according to the taxonomy of the hosts, and includes for each host, the English language, Latvian and Russian common names, environment (freshwater, brackish, marine), status in Latvia (native or exotic) and the list of parasites reported. Both lists are accompanied by remarks, as warranted, giving specific information on points of systematics, nomenclature, possible misidentifications, introductions, life cycles, etc. Citations are included for all references and parasite and host indices are included. The parasite fauna of fishes of Latvia has received considerable attention. Nevertheless, parasites have been recorded from only about 45 percent of the more than 114 species of marine and fish occurring in the country's waters. The common freshwater fish species (particularly those having economic importance, such as the cyprinids, percids, esocids and salmonids) have been particularly well studied, providing a good general picture of their parasite faunas and data having value for use in faunistic analyses.



Copies of the CD ROM "FAO publications and reports on inland fisheries and aquaculture, version 1 (English/French/Spanish)" now available from fi-library@fao.org



Morales, Q.V.V. & Morales, R.R. 2006. 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. 177 pp.

The FAO Fisheries Department conducts reviews of aquaculture development status and trends on a regular basis. This document is a result of such an exercise conducted during 2005 and 2006. The regional review is a synthesis of the National Aquaculture Sector Overview (NASO) of 22 countries from Latin America and the Caribbean. The production volume and value data have been derived from the latest FAO FISHSTAT Plus database for 2003. As part of the review process, a regional expert workshop was conducted in Panama, Republic of Panama, in 2005, to discuss the regional aquaculture development status and trends. The report of this expert workshop is also included in this review.

The regional review provides a description of how the aquaculture sector developed in Latin America and the Caribbean over the past decade. The review and analysis of data and information clearly show that the sector is growing exponentially with salmon, shrimp and tilapia as the leading species. However, according to data recorded by FAO it may be observed that during the last 10 years there are important increments in the production of other groups of species such as macroalgae, bivalves, caracids and catfish. Chile, Brazil, Mexico and Ecuador are the leading countries in terms of production for 2003. Most countries are showing a rapid growth of the sector thus having important social and economic effects on regional and local economies mostly through medium to larger scale commercial aquaculture. Rural aquaculture in Latin America is still largely dependent on State or international technical and financial support schemes. Overall, aquaculture in this region continues to grow steadily but will need greater organization and coordination between the private sector and government particularly to achieve larger social effects.

Network of Aquaculture Centres in Asia-Pacific. 2006. Regional review on aquaculture development. 3. Asia and the Pacific – 2005. *FAO Fisheries Circular*. No. 1017/3. Rome, FAO. 97 pp.

The FAO Fisheries Department conducts reviews of aquaculture development status and trends on a regular basis. This document is a result of such an exercise conducted during 2005 and 2006. The regional review is a synthesis of the National Aquaculture Sector Overview (NASO) of 16 countries from five sub-regions of Asia and the Pacific and information from two additional countries, Japan and the Democratic People's Republic of Korea. The review also contains a brief description of the aquaculture development trends and issues in the Pacific island nations. The production volume and value data have been derived from the latest FAO FISHSTAT Plus database. As part of the review process, a regional expert workshop was conducted in Ramzar, Islamic Republic of Iran, in 2006, to discuss the regional aquaculture development status and trends. The report of this expert workshop is also included in this review. The regional review provides a description of how the aquaculture sector developed in Asia and the Pacific over the past three decades. The review and analysis of data and information clearly show that the sector is growing and expanding and is predicted to meet the increasing demand for aquatic food products in the years to come, with a few clear trends. These are: (a) increasing demand for aquaculture products; (b) increasing intensification of production systems; (c) continuing diversification of production systems and species farmed; (d) increasing influence of markets, trade, consumers and consumption; (e) enhanced regulation and better governance; and (f) drive towards better management. The review also attempts to analyse the trends and look at the sector's sustainability and how the sector is behaving as a responsible food production sector in Asia and the Pacific.



Poynton, S.L. 2006. Regional review on aquaculture development. 2. Near East and North Africa – 2005. *FAO Fisheries Circular*. No. 1017/2. Rome, FAO. 79 pp.

The Fisheries Department of the Food and Agriculture Organization of the United Nations (FAO) regularly conducts reviews of aquaculture status and trends, most recently in 2005. This regional review for the 17 countries in the Near East and North Africa is a synthesis of the available National Aquaculture Sector Overviews (NASOs) and Prospective Analyses for Future Aquaculture Development (PAFADs), with a focus on the period 1994-2003. The review process also included regional expert workshops held in Cairo (Egypt) and Muscat (Oman) in 2005, for discussion of the regional aquaculture development, in particular the status, trends and challenges. The information from these workshops is also included in this regional review. In the last decade, the sector has demonstrated remarkable growth from 96 700 tonnes in 1994 to 566 250 tonnes in 2003, and the contribution of aquaculture to total fisheries increased from 4.5 percent to 18.7 percent. Nearly all countries are expected to increase their aquaculture production, manifest in increased production tonnage and diversity of culture species. Production is dominated by Egypt and the Islamic Republic of Iran, with Bahrain, Kuwait, Oman, the United Arab Emirates and Yemen being emerging producers. In many instances, increases in production are driven by a need to increase reliability of the domestic supply. Production of protein for human consumption is dominant, particularly of finfish such as tilapia, carps and marine finfish species; the Indian white prawn is the only crustacean of significant economic importance. Within food fish production the main trends are increased culture of marine species, intensification, and more integrated agriculture-aquaculture. Within non-food species, the main trend is towards production of ornamentals. Successfully addressing four key priority issues is essential for the continued growth of aquaculture in the region: (i) farming systems, technologies and species; (ii) marketing and processing; (iii) health and diseases and (iv) policies, legal frameworks, institutions and investment.



Hecht, T. 2006. Regional review on aquaculture development. 4. Sub-Saharan Africa – 2005. *FAO Fisheries Circular*. No. 1017/4. Rome, FAO. 96 pp.

The FAO Fisheries Department conducts reviews of aquaculture development status and trends on a regular basis. This document is a result of such an activity conducted during 2005 and 2006. This review was made by synthesizing National Aquaculture Sector Overview (NASO) from 16 countries in sub-Saharan Africa. The 16 countries included, Côte d'Ivoire, Ghana, Liberia, Nigeria, Sierra Leone in West Africa; Cameroon, the Republic of Congo and the Democratic People's Republic of Congo in Central Africa; Uganda, the United Republic of Tanzania and Kenya in East Africa; and Angola, Mozambique, Madagascar, Zambia, Malawi in southern Africa. South Africa was also included. The production volume and value data have been derived from the latest FAO FISHSTAT Plus database. As part of the review process, a regional expert workshop was conducted in Mombasa, Kenya, in 2005, to discuss the regional aquaculture development status and trends. The report of this expert workshop is also included in this document. The synopsis provided here summarizes the current status and recent advances that have been made by the aquaculture sector in the sub-Saharan Africa region during the last decade and the last five years in particular.



Olin, P.G. 2006. Regional review on aquaculture development. 7. North America – 2005. *FAO Fisheries Circular*. No. 1017/7. Rome, FAO. 25 pp.

The aquaculture industry in North America is a relative newcomer in the agricultural sector and has become well established in the last 25 years. Channel catfish (*Ictalurus punctatus*) and Atlantic salmon (*Salmo salar*) are the two major species cultured. The governments of Canada and the United States of America (USA) support the continued expansion of the aquaculture sector and are engaged with the industry to facilitate this development. At the same time there is a strong sentiment within the industry that regulatory agencies should take a much more proactive role to eliminate overlapping jurisdictions, resolve conflicting mandates and establish clear guidelines for industry expansion. A significant constraint

to future aquaculture development is public concern about environmental risks associated with aquaculture, the safety of aquacultured products, and the potential impact of fish farms on marine ecosystems. The industry is responding to these concerns with the development of best management practices and environmental codes of practice to insure the long-term sustainability of land based, coastal and offshore aquaculture systems. Current production technology and the extensive environmental regulatory processes in place in Canada and the USA are effective in preventing these concerns from becoming problems. The document analyses the state and the trends in aquaculture development over the past few years in the North American region.



2005 Statistics on Aquaculture Production Volume and Value Available Through FishSTAT

The FAO Fisheries database of statistics on aquaculture production and values has been updated to include data for 2005. Total aquaculture production of aquatic animals (i.e., excluding aquatic plants) for 2005 was reported to be 48.1 million tonnes¹ with a farm-gate value of US\$ 70.9 billion. With the inclusion of aquatic plants, the production increases to 63.0 million tonnes with a value of US\$ 78.4 billion. Growth in global aquaculture continues to be strong as these figures represent an increase in production of 5.2% from the total aquaculture production reported for 2004, and a 4.8% increase when only aquatic animals are considered. The entire database, containing data from 1950-2005, can be downloaded from the FAO Fisheries website at www.fao.org/fi/statist/fisoft/fishplus.asp. FISHSTAT Plus is a powerful and easy-to-use software package that allows the user to query the databases for aquaculture production and values, as well as the other FAO Fisheries Statistics databases, including global capture fishery data, fishery commodities data, and regional databases.

¹All FAO aquaculture and capture fishery production statistics are expressed in live weight-equivalent units

Moehl, J.; Brummett, R.; Kalende Boniface, M. & Coche, A. 2006. Guiding principles for promoting aquaculture in Africa: benchmarks for sustainable development. *CIFA Occasional Paper No. 28*. 122 pp.

In August, 2003, The Economist wrote about "The promise of a blue revolution: how aquaculture might meet most of the world's demand for fish without ruining the environment"¹. Two years later, the New Partnership for Africa's Development (NEPAD) recognised "growing opportunities and emerging successes of aquaculture development in the region". Aquaculture in Africa seems perched on the verge of a new era when high expectations can be matched with appropriate technologies and best practices to be able to put food on the table and money in the pocket. Aquaculture seems to have real potential and be able to realistically contribute to Africa's urgent need for significantly enhanced economic growth and food security.

This current situation is a long way from the prognosis given by FAOs Aquaculture Planning In Africa – Report Of The First Regional Workshop On Aquaculture, 2-17 July 1975, when it was stated: "failures of some of the ill-conceived programmes during the early part of the century have continued to remain a major constraint in convincing the farmers and investors of the economic viability of aquaculture". The Workshop noted that aquaculture: "should be organised either as a government subsidised food production industry to feed the poor, like agriculture or even fishing in many countries of the world, or in the alternative as an economically viable industry that can make substantial contributions to the overall food production, economy and employment situation in the country"².

Today, the option of supporting a "government subsidised industry" is a non-starter. Aquaculture is a business and must be promoted and managed as such.

It is imperative for us to take new and innovative approaches to aquaculture development if the current Blue Revolution is to succeed. We must shake off the remnants of the "state-does-it-all" approach and establish mechanisms and procedures which facilitate private-sector-led, technically sound, economically profitable, socially acceptable and environmentally sustainable national and regional aquaculture programmes. The present document looks back at those plush days of the 70s when donor-led aquaculture programmes abounded in Africa.

It extracts from these a clear suite of lessons which should guide our future aquaculture development efforts. We must heed these lessons, we must reform and adjust. The State has a key role as a facilitator and monitor. But the business of production, be it fish for the table or fingerlings for the pond, is the business of business and should be soundly put in the hands of the private sector with firm and appropriate public support. The future is promising and holds the best rewards for those with the foresight to change for the better.

¹ The Economist. London: August 9, 2003. Vol. 368, Iss. 8336; pg. 20.

² Aquaculture Planning in Africa, Report of the First Regional Workshop on Aquaculture Planning in Africa, Accra, Ghana, 2-17 July 1975, Aquaculture Development and Coordination Programme, FAO/UNDP, Rome, September 1975. pg. 1-3.



Nguyen T, N.; Hurwood, D.; Mather P; Na-nakorn U.; Kamonrat, W. & Bartley, D. 2006. Manual on Application of Molecular Tools in Aquaculture and Inland Fisheries Management, part I: Conceptual basis of population genetic approaches 80 pp. and part II: laboratory protocols and data analysis. 134 pp.

The aim of this manual is to provide a comprehensive practical tool for the generation and analysis of genetic data for subsequent application in aquatic resources management in relation to genetic stock identification in inland fisheries and aquaculture.

Part I of the manual contains general principles of genetic resource management.



Section 1. The fundamental nature of DNA.

1.1 Basic DNA structure

1.2 Where does variation in DNA sequences come from?

Section 2. Genetic variation in nature

Section 3. Basic concepts in population genetics

Section 4. Natural selection

Section 5. Genetic drift

Section 6. Non-random mating and population structure

Section 7. Environmental influences on population processes

Section 8. Ecological influences on population processes

Part II of the manual is to provide step-by-step laboratory protocols and methodologies for data analysis, and a guideline to design a population genetic study.

Part II covers most commonly used techniques for screening genetic variation, general background on the methodologies for estimation of important parameters in population genetic studies for different forms of molecular genetic markers.

Section I - Molecular markers - an overview: provides an overview of common molecular markers used in population genetic studies.

Section I - Laboratory protocols: provides step-by-step protocols of commonly used molecular genetic techniques.

Section III - Data analysis and project design: deals with aspects of data management such as data analysis, interpretation and presentation, and a guideline to design a population genetic studies.

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Some fish are considered by some that carry a "flag of convenience" - vessels that are officially registered in one nation, but are owned and operated by citizens of another nation. It is considered an irregular and illegal practice of non-national trade. FAD has encouraged the development of an international plan of action to help nations deal with this. That nation place a high priority on IUU is evidenced by the fact that 98 countries have developed or are in the process of developing a national plan to address it.

Ramsar Convention on Wetlands

Ramsar Convention on Wetlands, an intergovernmental treaty with more than 150 member countries, produced with FAO and other partners, a brochure to highlight the importance of fisheries and aquaculture in wetlands, and the importance of healthy wetlands to productive fisheries and aquaculture. In light of the following - one billion people rely on fish including both finfish and shellfish (molluscs and crustaceans) as their main or sole source of protein; - 35 million people are directly engaged, either full- or part-time, in fishing and aquaculture; over 95 percent of them live in developing countries, and the majority are smallscale fishers; - 75 percent of commercially important marine and many inland fish stocks are currently being overfished or are being fished at their biological limit; - demand for seafood products (including "sea food" from inland waters) has nearly doubled over the past 40 years and is likely to continue alongside a growing global population, the brochure discusses relations among wetlands, aquaculture, fishing, people and the environment. The brochure can be found at: http://www.ramsar.org/wwd/7/wwd2007_leaflet_e.pdf

The Code of Conduct for Responsible Fisheries

An ecosystem approach to sustainable management of fisheries, rather than management of individual fisheries or species, is now the favoured way forward - but many governments still work with the latter in their management practices.

Through the UN Convention on the Law of the Sea (UNCLOS), by 1994 coastal nations had exclusive rights for exploitation for 200 nautical miles out to sea - exclusive economic zones or EEZs - an area where about 90% of the marine catch is realised. This agreement significantly reduced the 'open access' area of the marine environment where there is no agreed control over exploitation (now only about 1% of the global catch comes from this 'open access' area), so it was generally seen as a 'good thing'. But it leads to management challenges:

International challenge: Unfortunately, fish don't take much notice of EEZs so for certain exploited species that readily cross these areas (or worse, for those species such as tuna and swordfish that are known to range thousands of kilometers) there is often a need for formal collaboration between neighbouring nations, and this is usually very challenging - a recent assessment reckons that effective bilateral or multilateral agreements are the exception rather than the rule.

To assist countries to take a more responsible, ecosystem-based approach to fisheries management, FAO introduced a Code of Conduct for Responsible Fisheries in 1995.

National challenge: Even at a national level, having, implementing and enforcing effective fisheries management plans, and putting the necessary laws in place to control exploitation in their exclusive fishing zones, is not easy and only a few countries are managing this particularly well.

A significant problem area that is being addressed at both international and national levels is 'IUU' - Illegal, Unreported and Unregulated - fishing. IUU fishing takes place in many capture fisheries but it is particularly prevalent in high value species, such as



Code of Conduct for Responsible Fisheries

The Code of Conduct for Responsible Fisheries is an important set of recommendations and guidelines for governments in managing their fisheries and aquaculture sustainably. Almost all national policy makers and fisheries managers, in every wide range of regions, from Asia to Latin America, and across their fleets, to have signed and endorsed the Code. It is a key reference for policy-makers, managers, and the public alike. It is also a key reference for the growing private sector in aquaculture, fisheries and aquaculture in remote sites and other wetlands.

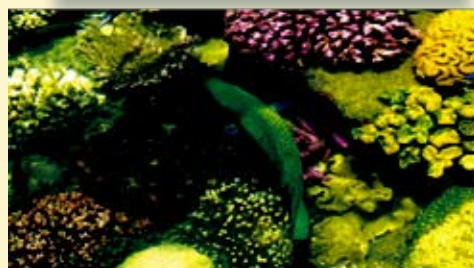
Key principles of the Code include:

- Manage stocks using the best available science.
- Use ecosystem approach to fisheries management when the effects of fishing practices are understood (ecosystem approach).
- Reveal everything you can about your fishery and aquaculture in remote sites and other wetlands.
- Prohibit destructive fishing methods.
- Review depleted fish stocks.
- Implement appropriate national laws, management plans, and means of enforcement.
- Monitor the effects of fishing on all species in the ecosystem, not just the target fish stock.
- Work cooperatively with other states to coordinate management plans and enforcement actions.
- Recognize the importance of artisanal and small-scale fisheries, and the value of traditional management practices.
- Develop aquaculture in an environmentally and socially responsible manner.

To support the Code, FAO has issued a number of technical guidelines for responsible fisheries that look in much greater detail at certain subject areas. For example, there are FAO guidelines on integrating fisheries management into coastal zone management, inland fisheries, developing aquaculture responsibly, and working on 'ecosystem approach' to fisheries.

The Southeast Asian Fisheries Development Center has carefully produced Regional Guidelines in several areas of fisheries management covered by the Code.

Read more about the Code of Conduct and associated guidelines at http://www.fao.org/fish/food/codc.htm#england-CCRF_group



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