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## FAO Aquaculture Newsletter



FAO AQUACULTURE NEWSLETTER FAO AQU  
FAO AQUACULTURE NEWSLETTER

Dear Reader

We are happy to bring the 26th Issue of FAN to you. This is the last issue of the year 2000. From Issue 27 (April 2001) FAN will have a wider language coverage; the entire newsletter will be made available in all five FAO official languages (English, French, Spanish, Arabic and Chinese) in the FAO website, while the printed version will continue in the English language. We hope this new development will facilitate wider dissemination of news on FAO activities on aquaculture and culture-based fisheries.

It is with great pleasure that we inform you of a major decision taken at the 24th Session of the Committee on Fisheries (COFI) held in Rome (26 February to 02 March 2001). The COFI agreed to establish the Sub-Committee on Aquaculture with its terms of reference as recommended by the Expert Consultation on the Proposed COFI Sub-Committee on Aquaculture, Bangkok, Thailand from 28-29 February 2000. There was general agreement on the terms of reference; however, there might be a need to clarify this further in the light of the development of the Sub-Committee. In order to ensure coverage of the needs of all Members it was recommended that the terms of reference should be kept flexible and should be revised as the aquaculture sector developed.

Several Members emphasized that the Sub-Committee should complement the work of regional fishery bodies, minimize duplication of effort and thus maximize resources. The Committee unanimously agreed with the recommendation of the Expert Consultation that the priority areas to be addressed by the Sub-Committee should include aquaculture development, statistics, implementation of the Code of Conduct for Responsible Fisheries, environmental aspects of aquaculture development, regional cooperation, aquaculture management, aquaculture and coastal zone management, and national and regional aquaculture capacity building. Some Members stressed the importance of the Sub-Committee also analyzing issues pertaining to safe aquaculture and technological development for cultivation of species.

The Committee agreed to establish the Sub-Committee, and gratefully acknowledged the offers from China, Norway, the United States of America and Italy to facilitate the convening of the sessions. It is likely that the first meeting of the Sub-Committee will be held in China in April 2002 in conjunction with the Conference of the World Aquaculture Society (WAS).

Editorial Board

# CONTENTS

Aquaculture Development in Azad Jammu and Kashmir, Pakistan <i>Richard Arthur, Malcom Dickson, Javaid Ayub</i>	4
Asia Regional Technical Guidelines in Support of the Implementation of CCRF Article 9 has been Developed <i>Rohana Subasinghe</i>	8
Aquaculture in Oxbow lakes with emphasis on women participation: a case from Bangladesh <i>Md. Ghulam Kibria, Raymon Van Anrooy</i>	12
New FAO Publications	16

# AQUACULTURE DEVELOPMENT IN AZAD JAMMU AND KASHMIR, PAKISTAN

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*AJK's most successful fish farmer, Mr Chaudry Khadim (centre) of Bhatti Sang, Mirpur District discussing fish culture with Mr Javaid Ayub (right), Assistant Director Fisheries, Muzaffarabad and Mr Muhammad Razaq, Chief Assistant Director/Game Warden, Mirpur Division*

## INTRODUCTION

Azad (free) Jammu and Kashmir (AJK) is a small (5134 km<sup>2</sup>, estimated population of 2.8 million in 1994) crescent-shaped state located in the northeastern corner of Pakistan, and administered by Pakistan as a semi-autonomous state under terms of a 1949 United Nations cease fire. It was created by what was at the time expected to be a temporary (pending a popular referendum) division of the Jammu and Kashmir state, itself created by Great Britain from former Sikh territories in 1846. The eastern portion of Kashmir and Jammu, known as India Occupied Kashmir, is controlled by India. The area has been the cause of two wars between Pakistan and India, the most recent in 1965. Tensions remain high along the "line of control" in the high mountains separating the two regions, with frequent artillery duels between the opposing forces and resultant civilian casualties. Additionally, there are strong sentiments for a united and independent AJK on both sides of the line of control, and armed guerilla activity in the Indian occupied areas. As a result of this political turmoil, most of the territory north of the state capital of Muzaffarabad (approximately 25 percent of AJK), including the scenic Neelum and Leepa river valleys and the high mountain passes, is closed to foreigners, as is a 16 km security zone running along the entire eastern line. At first glance, these problems and the mountainous and arid nature of most parts of the state would seem to make AJK an unpromising candidate for aquaculture development. However, the state has a small Fisheries Wing under its Department of Tourism, Wildlife, Fisheries, and Archaeology, which has achieved modest success in

the culture of exotic trouts to support a recreational fishery in the northern rivers, and the promotion of warmwater carp culture in the southern to central warm to temperate areas.

## FAO AND UNDP SUPPORT TO LOCAL AQUACULTURE DEVELOPMENT

Since 1991, the Food and Agriculture Organization of the United Nations (FAO), through support provided by the United Nations Development Programme (UNDP), has been assisting the development of aquaculture in Azad Jammu and Kashmir. Initially directed at the development of coldwater (trout) culture (Project PAK/88/048), the activity has evolved to address both cold- and warmwater aquaculture development (Project PAK/(94/005), to eventually become a component of the UNDP Area Development Programme AKJ (Project PAK/96/005). The main goal of these activities has been to assist the Government of AJK, through the Fisheries Wing, in developing its capacity to promote warmwater aquaculture development and enhance coldwater sport fisheries. This is being accomplished by enhancing capacity to produce hatchery-reared fry of coldwater species (rainbow and brown trout) for stocking in the Neelum Rivers and its tributaries, northern Muzaffarabad District, and the establishment of government hatcheries and extension capability for warmwater fish culture (common, Chinese and major carps) in the southern

districts of Mirpur, Kotli, Palandri and Poonch. Under the Fisheries Component of the current UNDP AJK Area Development Programme, emphasis is being given to community development and the use of sustainable small-scale warmwater aquaculture to improve the livelihoods of small farmers and the rural populations of AJK. Aquaculture-related project objectives include (i) the build up of institutional and technical capabilities of the Fisheries Wing to produce fish seed of different species of cultivable warmwater fishes, and (ii) the dissemination of technical know-how of warmwater fish culture, polyculture, and integrated fish culture, as well as fish seed production and distribution to farmers.

### **COLDWATER AQUACULTURE (AQUACULTURE UNDER FIRE!)**

Brown trout were first introduced to the Neelum River for sport fishing as early as 1886. Coldwater aquaculture in AJK had its beginnings in 1974, with the establishment of a trout hatchery at Salkhala, in northern Muzaffarabad District. Subsequently three other government-run trout hatcheries were established: Kutan (1982), Dowarian (1985), and Pattika (established in 1991 under project PAK/88/0048). The production from these small hatcheries (estimated to be 50 000 or less trout fry in 1991 – see Akhtar 1991) is intended to be used for stocking the recreational fishery in the upper reaches of the Neelum River. However, the security situation has deteriorated over recent years so that few local tourists and no foreign tourists are able to visit the area.

Although the licensing system is still oriented towards a recreational fishery, almost all the trout that are caught are illegally netted and consumed locally. Reform of the licensing system is urgently needed to reflect changed circumstances. A proposal is being considered for the introduction of community-based management, as is being promoted by the NGO, Agha Khan Rural Support Programme (AKRSP) in the Northern Areas of Pakistan.

The main rationale for project PAK/88/0048 and continuing support for the trout hatcheries by the Fisheries Wing is that a trout farming industry will develop in northern AJK. On the surface, this looks possible, because demand and prices are high (approximately \$US 5.00/kg); however, the best water sources are too close to the “line of control” for anyone to consider investing.

### **WARMWATER FISH CULTURE**

Warmwater fish culture was initiated in AJK only in 1993, when three earthen fish ponds were constructed at Panjgran, Muzaffarabad District under Project PAK/88/048 (see Shrestha 1995). Since then, a number of private-sector ponds, both earthen and cement, have been constructed in the southern districts of AJK, and stocking of common and Chinese carps in a number of lakes created by newly constructed mini- and small-dams has occurred. Under Project PAK/94/005, a small (1.3 ha) warmwater “Fish Seed Production and Distribution Centre” was established at Chikar (elevation 4500 ft). The hatchery became fully operational in 1999, and was targeted to produce some 500 000 fish seed annually for distribution to the private sector (Fisheries Wing undated). In 1999 the hatchery supplied its project-target figure of some 80 000 fry of three species of exotic carp (grass carp, silver carp and common carp) to the private sector (UNDP 1999). The production target for year 2000 is set at 100 000 fry. A second government hatchery planned for the Mirpur area to supply fry to aquaculturists in southern AJK has not yet been constructed.

Warmwater culture as currently practised in AJK is generally extensive polyculture of common carp with one or two species of Chinese carp [grass carp and silver carp, with occasional inclusion of major carps (rohu, catla and mrigal)], where available. As these are not being produced at the government hatchery at Chikar, they must be bought from hatcheries in Lahore or Islamabad in Punjab Province. Culture is mainly in small earthen ponds, with occasional use of cement ponds, and by stocking in mini- and small- dam-lakes constructed on seasonal streams to retain water for village use and irrigation. Inputs into these systems are minimal and at most, may consist of addition of organic manures and feeding of inexpensive organic materials such as leaves, rice bran or flour mill wastes.

Total farmed production of warmwater fishes in AJK was estimated to be some 400 000 kg in 1999 (UNDP 1999). At present, there are 75-80 fish farmers having a total of some 150 fish ponds, located mainly in the Mirpur and Muzaffarbad districts (about 100 and 31 ponds, respectively). In 2000, the Fishery Wing supplied some 171 000 fry and fingerlings to farmers. Most of these fry originated from government and private hatcheries in Rawalpindi and Lahore, in the adjacent Province of Punjab.

In addition to the Jhelum, Poonch and Neelum rivers and their tributaries (all tributaries of the great Indus River), AJK also shares with Punjab, the 27 000 ha Mangla Reservoir in Mirpur District, which was created by damming the Jhelum River at Mangla, in the far southern area. The reservoir, which is two-thirds in AJK and one-third in Punjab, supports a significant capture fishery, estimated at 900 mt in 1990 (Akhtar 1991). Management of the reservoir falls under the federal Water and Power Development Authority (WAPDA), which operates a hatchery to supply fry of warmwater species for stocking the reservoir.

## POTENTIAL FOR FUTURE DEVELOPMENT

At present there appears to be little possibility to realize the hoped-for potential for generating tourist dollars from the excellent sport fishing for rainbow and brown trout which exists in the upper Neelum River. Further development of coldwater aquaculture, including commercial trout farming in AJK will thus have to await a permanent political settlement to the long-running conflict. While rainbow trout populations must be maintained by stocking of hatchery-produced fry, there are self-sustaining populations of brown trout which could form the basis for small community-managed commercial fisheries to serve the luxury market in the high-end hotels of Islamabad.



*Grass carp broodstock, Fish Seed and Demonstration Centre, Chikar*

In contrast, there appears to be good potential for expansion of extensive warmwater pond culture of common, Chinese and major carps, as there are suitable growing conditions in the south of AJK and a high local demand and price for these species. Constraints to the development of warmwater aquaculture are seen mainly in terms of the need for adequate supplies of high-quality fry and fingerlings for stocking, and a need for increased and better extension services to advise potential fish farmers. There is also some potential for stocking of carps in small lakes created by "mini-dams" constructed on temporary streams for village water and crop irrigation.

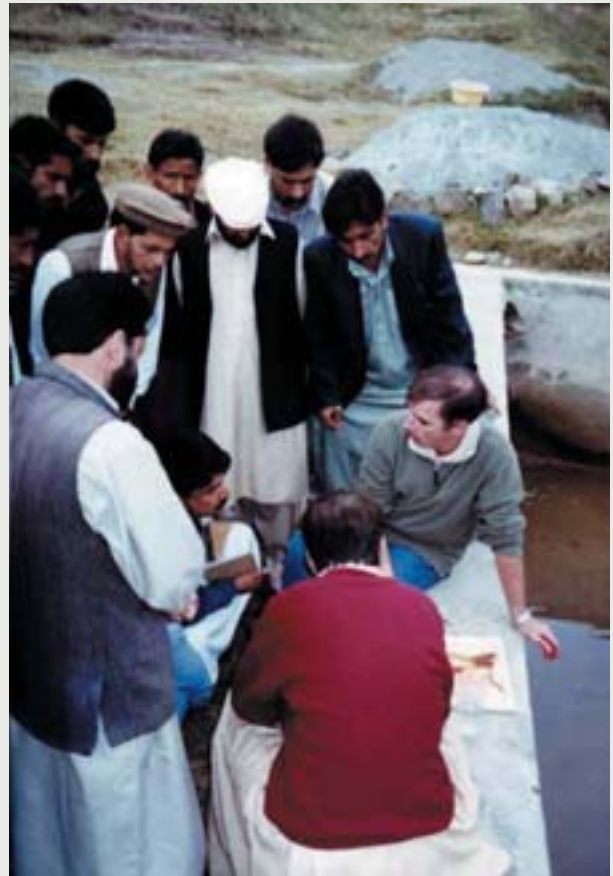
Due to the extensive nature of existing warmwater culture and its low level of development, there have been no reports of disease problems in AJK. However, serious outbreaks of epizootic ulcerative syndrome (EUS) in Punjab and Sind provinces were first reported in 1996, and thus the shared river systems which could facilitate the spread of this economically important disease into AJK are a cause for vigilance.

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*Seining a pond, Fish Seed and Demonstration Centre, Chikar*



*Malcolm Dickson, FAO Aquaculture Consultant (seated center), discussing pond management with training course participants, Chikar*



*Fisheries Wing and UNDP extension staff who participated in the UNDP/FAO Aquaculture Training Workshop, 20-22 November, 2000, Muzaffarabad*

The Food and Agriculture Organization of the United Nations (FAO) and the Network of Aquaculture Centres in Asia-Pacific (NACA) are pleased to announce that the Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals and their associated implementation plan, the Beijing Consensus and Implementation Strategy (BCIS), were developed by representatives from 21 Asian governments, scientists and experts on aquatic animal health, as well as by representatives from several national, regional and international agencies and organisations.

The Technical Guidelines provide valuable guidance for national and regional efforts in reducing the risks of disease due to transboundary movement of live aquatic animals. Their implementation will contribute to securing and increasing income of aquaculturists in Asia by minimising the disease risks associated with trans-boundary movement of aquatic animal pathogens. In many countries in Asia, aquaculture and capture fisheries provide a mainstay of rural food security and livelihoods, and implementation of the Technical Guidelines will contribute to regional efforts to improve rural livelihoods, within the broader framework of responsible management, environmental sustainability and protection of aquatic biodiversity.

The Technical Guidelines are based on a history of regional collaboration and discussion. They were initiated due to increased recognition of disease emergence being linked to live aquatic animal movements. The associated economic losses, impacts on rural livelihoods and national efforts in poverty alleviation and food security were recognised as being highly significant. New trade agreements and requirements generated by the World Trade Organization (WTO) further reinforced the necessity for improved live aquatic animal health management. The initial programme, upon which the Technical Guidelines were subsequently based, was the FAO/NACA Asia Regional Aquatic Animal Health Management Programme, officially launched in 1996 with the convening of the Regional Workshop on Health and Quarantine Guidelines for the Responsible Movement (Introduction and Transfer) of Aquatic Organisms, held in January 1996, in Bangkok, Thailand.

The governments participating in this regional programme clearly recognised the need for a region-wide approach to aquatic animal health management. They, therefore, requested FAO, through NACA, to assist production of a set of technical guidelines that could be used to improve and harmonise aquatic animal health management strategies for responsible trans-boundary movement of live aquatic animals.

An FAO Technical Co-operation Programme (TCP) Project (TCP/RAS 6714 (A) and 9065 (A) - "Assistance for the Responsible Movement of Live Aquatic Animals") was launched by NACA in 1998, with the participation of 21 countries from throughout the region. This programme complemented FAO's efforts in assisting member countries to implement the relevant provisions in Article 9 - Aquaculture Development - of the Code of Conduct for Responsible Fisheries (CCRF), at both the national and regional levels. A set of Guiding Principles, formulated by a group of aquatic animal health experts at the Regional Workshop held in 1996 in Bangkok, formed the basis for an extensive consultative process, between 1998-2000, involving input from government-designated National Co-ordinators (NCs), NACA, FAO, OIE, and regional and international specialists. Based on reports from these workshops, as well as intersessional activities co-ordinated by FAO and NACA, the final Technical Guidelines were presented and discussed at the Final Workshop on Asia Regional Health Management for the Responsible Trans-boundary Movement of Live Aquatic Animals, held in Beijing, China, 27<sup>th</sup>-30<sup>th</sup> June 2000.

The Technical Guidelines were reviewed and discussed by the participants of this meeting, which included the NCs, FAO, NACA, OIE (Representatives of the Fish Disease Commission and Regional Representation in Tokyo), and many regional and international aquatic animal health management specialists. The NCs gave unanimous agreement and endorsement of the Technical Guidelines, in principle, as providing valuable guidance for national and regional efforts in reducing the risks of disease due to the transboundary movement of live aquatic animals.

The States have primary responsibilities for implementation of the Technical Guidelines, and the workshop recommended that the Technical Guidelines be integrated within national development plans, and implemented in a phased manner building on current resources.

# Technical Guidelines in Support of Implementation of CCRF Have Been Developed

Recognizing the crucial importance of implementation of the Technical Guidelines, the participants prepared a detailed implementation strategy, the Beijing Consensus and Implementation Strategy (BCIS), focussing on National Strategies and with support through regional and international co-operation. This comprehensive implementation strategy was unanimously adopted by the workshop participants.

The National Strategies of the participating countries for implementation of the Technical Guidelines will be published separately by FAO/NACA.

The Technical Guidelines are also supported by the Manual of Procedures for the Implementation of the Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals, which will be published in early 2001. The Manual of Procedures provides background material and detailed technical procedures to assist countries and territories in the Asia Region in implementing the Technical Guidelines. In addition, an Asia Diagnostic Guide to Aquatic Animal Diseases was prepared to support regional countries in diagnosis of aquatic animal disease. This document will also be published in early 2001.

The countries that participated in the development of the Technical Guidelines and BCIS are Australia, Bangladesh, Cambodia, China P.R., Hong Kong China, India, Indonesia, Iran, Japan, Korea (D.P.R.), Korea (R.O.), Lao (P.D.R.), Malaysia, Myanmar, Nepal, Pakistan, the Philippines, Singapore, Sri Lanka, Thailand and Viet Nam.

FAO and NACA extend special thanks to all the governments, agencies, and organizations that took part in this significant, and sometimes daunting, endeavour, as well as to all the individuals who generously contributed time, effort and expertise to the compilation of this document and other information produced during the process.



## The Beijing Consensus

Representatives from governments of the Asian Region<sup>1</sup>, several regional and international organizations and aquatic animal health experts, met in Beijing between the 27<sup>th</sup> – 30<sup>th</sup> June 2000. The workshop was co-organised by the Network of Aquaculture Centres in Asia-Pacific (NACA) and the Food and Agriculture Organization of the United Nations (FAO), hosted by the Ministry of Agriculture of the People's Republic of China and held in co-operation with the Office International des Épizooties (OIE).

The Technical Guidelines are based on a history of regional collaboration and discussion. They were initiated due to increased recognition of disease emergence being linked to live aquatic animal movements. The associated economic losses, and impacts on rural livelihoods and national efforts in poverty alleviation and food security, were recognized as being highly significant. New trade agreements and requirements generated by the World Trade Organization (WTO) further reinforced the necessity for live aquatic animal health management. The initial programme, upon which the Technical Guidelines were subsequently based, was the FAO/NACA Asia Regional Aquatic Animal Health Management Programme, officially launched in 1996.

The governments participating in this regional programme clearly recognized the need for a region-wide approach to aquatic animal health management. They, therefore, requested FAO, through NACA, to assist production of a set of technical guidelines that could be used to improve and harmonise aquatic animal health management strategies for responsible transboundary movements of live aquatic animals.

An FAO Technical Cooperation Programme (TCP) Project (TCP/RAS 6714 (A) and 9065 (A) - "Assistance for the Responsible Movement of Live Aquatic Animals") was launched by NACA in 1998, with the participation of 21 countries from throughout the region. This programme complemented FAO's efforts in assisting member countries to implement the relevant provisions in Article 9 - Aquaculture Development - of the Code of Conduct for Responsible Fisheries (CCRF), at both the national and regional levels. A set of Guiding Principles formulated by a group of aquatic animal health experts formed the basis for an extensive consultative process, between 1998-2000, involving input from government-designated National Co-ordinators (NCs), NACA, FAO, and regional and international specialists. Based on reports from these workshops, as well as intersessional activities co-ordinated by FAO and NACA, the final Technical Guidelines were presented and discussed at the Final Workshop on Asia Regional Health Management for the Responsible Transboundary Movement of Live Aquatic Animals held in Beijing, China, 27<sup>th</sup>-30<sup>th</sup> June 2000.

The Technical Guidelines were reviewed and discussed by the participants of this meeting, which included representatives from governments of the Asian Region, FAO, NACA, OIE (Representatives of the Fish Disease Commission and OIE Representation for Asia and the Pacific), regional and international aquatic animal health management specialists, and representatives from regional organizations. The National Co-ordinators gave unanimous agreement and endorsement of the Technical Guidelines, in principle, as providing valuable guidance for national and regional efforts in reducing the risks of disease due to transboundary movement of live aquatic animals.



The Workshop participants further noted that implementation of the Technical Guidelines would contribute to securing and increasing income of aquaculturists in Asia by minimising the disease risks associated with transboundary movement of aquatic animal pathogens. In many countries in Asia, aquaculture and capture fisheries provide a mainstay of rural food security and livelihoods, and implementation of the Technical Guidelines will contribute to regional efforts to improve rural livelihoods, within the broader framework of responsible management, environmental sustainability and protection of aquatic biodiversity.

The States have primary responsibilities for implementation of the Technical Guidelines, and the workshop recommended that the Technical Guidelines be integrated within national development plans, and implemented in a phased manner building on current resources. Recognising the crucial importance of implementation of the Technical Guidelines, the participants prepared a detailed implementation strategy, focussing on National Strategies and with support through regional and international co-operation.

This comprehensive implementation strategy, as adopted by the workshop participants, together with the Technical Guidelines, is given in the FAO Fisheries Technical Paper 402: Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals and The Beijing Consensus and Implementation Strategy.



FAO/NACA Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals and the Beijing Consensus and Implementation Strategy. FAO Fisheries Technical Paper. No. 402. Rome, FAO. 2000. 53pp.



<sup>1</sup> Representatives from Australia, Bangladesh, Cambodia, DPR Korea, Hong Kong China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Pakistan, PR China, Republic of Iran, Republic of Korea, Republic of the Philippines, Singapore, Sri Lanka, Thailand, and Viet Nam attended the Beijing Workshop and Japan subsequently agreed to the Consensus.

# Aquaculture in Oxbow lakes with emphasis on women participation: a case from Bangladesh

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*This article discusses a successful project aimed at increasing participation of women in aquaculture activities. The concept of involvement of women in poverty alleviation, food security and social development activities receives high priority in the FAO regular and field programme activities. Fisheries Department activities on aquaculture development, in particular our efforts on finding avenues for rural development through aquaculture and aquatic resources management also address the active participation of women in the process. This article, based on real experience in Bangladesh, is a model for development agencies, which perceive rural development through aquaculture.*

## INTRODUCTION

Bangladesh is a land of ponds, haors (natural depressions), baors (oxbow lakes), beels (swamps) and rivers. The inland water bodies of Bangladesh are highly productive and contribute about 73 percent to the country's total fish production (BBS, 1990). The total inland water area of the country is 4.31 million ha. Of this, 4.05 million ha are floodplains, 87 300 ha are brackish water aqua-farms and 114 000 ha are natural depressions including beels and haors. It is estimated that there are around 1.36 million ponds in Bangladesh covering a total area of 1.47 million ha.

Fish and fisheries have always been an integral part of the culture and tradition in the life of men and women of Bangladesh. The fisheries sector (including aqua-culture) plays a significant role in the national economy and in the nutrient intake and consumption patterns of the people. The contribution of the fisheries sector as a whole to the gross domestic product (GDP), in the export earnings and as part of the agricultural earnings of the country is about 5 percent, 8 percent and 17 percent, respectively (Rahman et al., 1998). The fisheries sector provides a direct or indirect income to about 12 million people, however this number varies with the seasons and peaks in the monsoon from June through October (Talukder, 1997).

Fish is considered to be the cheapest source of animal protein in Bangladesh. At present, the fish protein consumption is only about 8kg/capita/year, while the Ministry of Health estimated that the minimum requirement is around 27 kg/capita/year (Hasan, 1990). The annual fishery production of Bangladesh in the year 1996-97 was 1.37 million MT of which aquaculture contributed 30 percent, marine fisheries 22 percent and the rest (48 percent) came from inland capture fisheries (DoF, 1997).

The majority of the so called oxbow lakes are situated in the southwestern part of Bangladesh. They were created in the process when young meandering rivers grew old, straightened their course leaving the erstwhile bend and deepest parts separated from the main flowing river course. The separated (lotic) bends became stagnant (lentic) water bodies separated from the river. Generally these water bodies are horse shoe or ox-yoke shaped and therefore called oxbow lakes. In total there exist around 600 of these oxbow lakes in 5 districts (Jessore, Jhenaidah, Kushtia, Faridpur, and Chuadanga) in Bangladesh covering a water surface of 5 488 ha. The study on which this article is based was conducted in two oxbow lakes (Hamidpur and Koikhali), both situated in the Jessore district, and aimed to investigate the women participation in aquaculture activities in oxbow lake systems.

## STUDY AREA AND METHODS

The study focused on Hamidpur lake and Koikhali lake of respectively 10 and 47 ha. Both lakes were, together with 21 other lakes, placed under the management of Oxbow Lakes Project II (OLP II) under the Directorate of Fisheries (DoF) in 1986. The OLP II established in 1996 Lake Management Groups for each lake consisting of representatives from the Lake Fishing Teams (LFT), Fish Farming Groups (FFGs), NGO's, OLP and DoF officials. The idea was to establish a community based oxbow lake management for each lake. The aims of this Lake Management Group are: 1) to support fisheries, stocking and harvesting of fish by LFT members, and 2) to support pond aquaculture in the shallow parts of the lakes by FFG members. At the time of this study no women were allowed to be member of the LFTs, but 83 percent of the (by the project established) FFGs members were women (Nathan et al.,1997). FFGs consisted of between 5 and 28 members.

In Hamidpur lake the FFG constructed 5 ponds covering a total of 2.57 ha, while in Koikhali

lake 6 FFG ponds were constructed covering 12.79 ha.

Primary and secondary data were collected between 7 March and 22 May 1999; interviewing all FFG members by using a structured questionnaire. The survey covered the role of women in all aquaculture related activities (Figure 1). In addition, group meetings/discussions were used to explain the outcomes of the questionnaire. Secondary data were collected from various sources: Directorate of Fisheries (DoF) Dhaka; District Fisheries Office in Jessore, Jhenaidah and Chuadanga; the Oxbow Lake Project-II in Jessore and NGOs like Bangladesh Rural Advancement Committee (BRAC).

## RESULTS

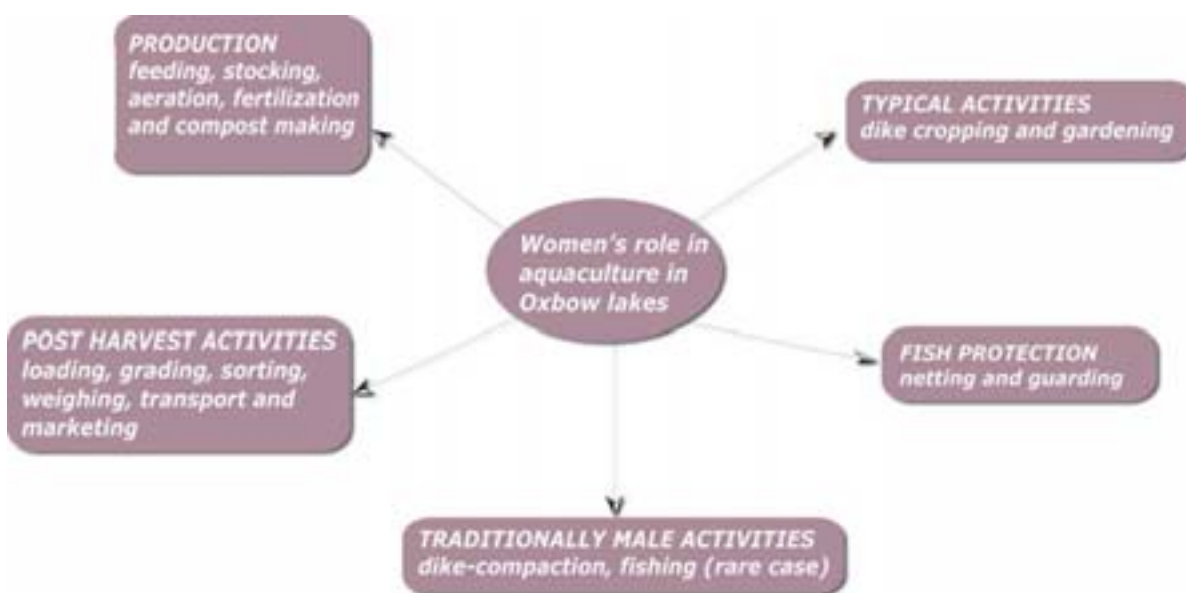
### Technical

In 1997 OLP-II project developed a large number of training manuals and a series of training poster/booklets on pond biology, pond preparation, pond stocking, pond feeding and fertilization and pond routine management and harvesting. The project provided these to the Fish Farming Groups (FFGs). In addition, the project

provided pond side small group training to the FFGs; this in close coordination with Bangladesh Rural Advancement Committee (BRAC) and DANIDA. As a result the participants started improving their fish culture practices and got some good results with respect to production, but unfortunately hardly any follow up training was given. Both men and women FFG members stressed that the further improvements in their fish culture practices were constrained by fish diseases, lack of Indigenous Technical Knowledge (ITK), lack of investment funds available and escaping fish during the yearly floods. Regarding the latter point, it is noteworthy that the fish rearing period is very short as the variation in available water is very high. The ponds get flooded for some months per year and almost dry up before just before the monsoon season.

Some technical support in the field of fish diseases was given by the project in order to avoid gill rot, fin rot and Epizootic Ulcerative Syndrome (EUS), but this did not produce the desired results so far. In response to the requests from the FFG members the BRAC officers are providing assistance by offering training, extension and credit services under the BRAC/DANIDA Agreement on Loan Guarantee Fund.

Figure 1. The role of women in pond aquaculture in Oxbow lakes divided



## Social

The introduction of a community management perspective in the common property oxbow lakes, supported by the project, allowed the active participation of women in aquaculture activities and in the management (an activity in which women were not involved so far). As Bangladesh is a Muslim country, it was prohibited for many women to work outside their homes without their husbands or other male family members. The promotion of women involvement by the DoF and the project and the results shown by the women, working in FFGs, during the project period increased the acceptance of women working independently outside their homes in their families and communities.

Although the participation of women in fish culture activities increased enormously during the project period, from almost no contribution to involvement in all but one activity (i.e. guarding), there is still a division in labour between men and women working in fish culture in oxbow lakes (Table 1). Nevertheless, it appears that the women FFG members (now their working outside is more accepted) are often working together in close collaboration with their male relatives in stocking, netting, harvesting and marketing of the fish.

Table 1 shows that both, the interviewed women and men, performed most of the aquaculture related activities except guarding. The women performed a greater role in feeding, fertilization, dike cropping and the husbands played a greater role in dike compaction/repair, stocking, harvesting, netting, guarding, marketing and decision making. The emancipation of women is still increasing and especially differences in participation in marketing and decision making are getting smaller according to the interviewed women. The project therefore appears to have contributed positively to the empowerment of women, a situation really appreciated by all.

That the results from this project are not the exception that confirm the rule can be read in a report of Das (1997) that stresses the involvement of Khasi women in fish marketing. Most of these women reported that their husband helped them in their fish selling business as and when required, and that both husband and wife usually made the decision together on how to spend the benefits from their sales of fish.

One can conclude that the social status of women, working as a group, increased their status within

their community and in their families. From a situation where women's involvement in outside (-home) labour was limited to helping their husbands and male relatives with carrying grain and collecting firewood, the women now are in contact with government, NGO and local officials, deal with activities like fingerling, seed and fertiliser purchase and market their fish themselves. The frequency of social interactions of women with others (merchants, officials, etc.) increased and they felt their dignity and respect received in society was higher than before their involvement in fish culture activities.

## Economic

As a result of the project the women FFG members changed their daily routines, from working in a kind of cottage industry (household handicraft) to livestock raising, fish culture and vegetable gardening. Their livelihood situation improved as the access to good protein rich food improved and the income received from especially fish culture was used to improve their accommodation, purchase clothes for them and their children and, last but not least, made it possible for their children to go to school. However, so far only very few women started saving money.

**Table 1 . Gender division of labour in FFG pond farming averaged between the two lakes**

ACTIVITIES	WOMEN	MEN	
Dike compaction/dike repair	++	+++	
Stocking	++	++++	
Fertilization	++	+	
Feeding	++	+	
Harvesting	+++	++++	
Netting	++	+++	0 = nil
Dike cropping	+++	+	+ = <25%
Guarding	0	+++	++ = 26-50%
Marketing	+	+++	+++ = 51-75%
Decision making	++	+++	++++ = 76-100% of the interviewed persons

## FOLLOW-UP

To extend and maintain the women participation in aquaculture activities in the Bangladeshi oxbow lakes it is necessary that training on stocking, feeding, disease control & prevention and pond management is conducted more frequently and that extension officers visit the FFGs more often. Awareness training, especially for women, aimed at harvesting, marketing and pond record keeping activities could increase the participation of women in all aquaculture activities even more, contribute to the empowerment of women and to the overall emancipation in their communities.

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1. Fish Farming Group (FFG) fish pond at Hamidpur lake in Bangladesh
2. Fish Farming Group male and female members at Koikhali lake in Bangladesh
3. Women Fish Farming Group with harvested fish  
(Photos courtesy of Md. Ghulam Kibria)

Walker, P., and R. Subasinghe, (eds.). 2000. DNA-based molecular diagnostic techniques: research needs for standardization and validation of the detection of aquatic animal pathogens and diseases. Report and proceedings of the Expert Workshop on DNA-based Molecular Diagnostic Techniques: Research Needs for Standardization and Validation of the Detection of Aquatic Animal Pathogens and Diseases. Bangkok, Thailand, 7-9 February 1999. FAO Fisheries Technical Paper. No. 395. Rome, FAO. 93pp.

This document contains the report, including recommendations, and thirteen papers presented at the Expert Workshop on DNA-based Molecular Diagnostic Techniques: Research Needs for Standardization and Validation of the Detection of Aquatic Animal Pathogens and Diseases, held in Bangkok, Thailand, from 7-9 February 1999.



of Aquatic Animal Pathogens and Diseases, held in Bangkok, Thailand, from 7-9 February 1999.

The Expert Workshop was jointly organized by FAO Inland Water Resources and Aquaculture Service, Network of Aquaculture Centres in Asia-Pacific (NACA), Commonwealth Scientific and Industrial Research Organization (CSIRO),

Australian Centre for International Agricultural Research (ACIAR), and the Department for International Development of the United Kingdom (DFID) and was held at the NACA Headquarters in Bangkok. The editing, publishing, and distribution of the document were undertaken by FAO, Rome.

Ekaratne, S.U. K. 2000. A Review of the Status and Trends of Exported Ornamental Fish Resources and Their Habitats in Sri Lanka. Bay of Bengal Programme (BOBP/REP/88), 87pp.

This document discusses the history and the current status of marine and freshwater ornamental fish species in Sri Lanka, which are exported to some 25 countries in response to demand. It contains lists of marine and freshwater species, including endangered species, and information on their population, biology, ecology and distribution. It briefly discusses the impact of the export effort on resources, and the status of information relevant for resource and habitat management.

This document, and the activities undertaken between 1994 and 1999 in Sri Lanka to support conservation and management of ornamental fish species in the island, were supported by the Bay of Bengal Programme (BOBP) as part of its management-oriented Third Phase.

The BOBP is a multi-agency regional fisheries programme that covers seven countries around the Bay of Bengal - Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka, Thailand. The Programme plays a catalytic and consultative role in developing coastal fisheries management in the Bay of Bengal, thereby helping improve the conditions of small-scale fisherfolk in the member countries.

The BOBP is sponsored by the Governments of Denmark and Japan. The executing agency is the FAO (Food and Agriculture Organization of the United Nations).



NACA/FAO 2000. Report on the conference on Aquaculture in the Third Millennium. 20-25 February 2000, Bangkok, Thailand. 120pp.

The Conference on Aquaculture in the Third Millennium (the Bangkok Conference on Aquaculture) was held on 20-25 February 2000 in Bangkok, Thailand, for the purpose of developing a strategy for aquaculture development in the next 20 years. It was a sequel to the Kyoto Conference on Aquaculture, which was organized by FAO in May-June 1976. The Bangkok Conference was attended by 549 participants representing all stakeholder groups in aquaculture. The participants were members of more than 200 organizations and came from 66 countries in Asia, Africa, Latin America and the Caribbean, Europe, the former Soviet Republics, the Near East, North America, and Oceania. The list of participants appears as Annex 1.

The Bangkok Conference crafted the document Aquaculture Development Beyond 2000: the Bangkok Declaration and Strategy, which has been published separately by NACA/FAO<sup>1</sup>. The Declaration addresses the role of aquaculture in alleviating rural poverty, improving livelihoods and food security, and maintaining the integrity of natural and biological resources and the sustainability of the environment. The Strategy comprises 17 elements that focus on measures that governments, the private sector and other concerned organizations can incorporate into their development programs for the aquaculture sector. It highlights the need for regional and inter-regional cooperation to assist in its implementation.

This Report of the Bangkok Conference on Aquaculture, the second publication arising from the Millennium Conference, includes the detailed recommendations of the fourteen thematic conference sessions. The third publication will be the Technical Proceedings of the Bangkok Conference.

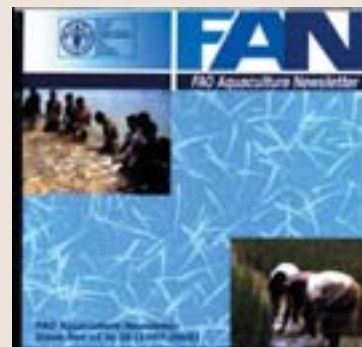


The Bangkok Conference was organized by NACA and FAO and hosted by the Government of Thailand. It was held at the Central Plaza Hotel in Bangkok, along with the Aquaculture and Seafood Fair 2000, which was seen by more than 3000 visitors.

<sup>1</sup>NACA/FAO. 2000. *Aquaculture Development Beyond 2000: the Bangkok Declaration and Strategy. Conference on Aquaculture in the Third Millennium, 20-25 February 2000, Bangkok, Thailand. NACA, Bangkok and FAO, Rome. 27pp.*

## FAO Aquaculture Newsletter on CD-ROM

We are pleased to present this CD-ROM of the FAO Aquaculture Newsletter, FAN, to provide wider dissemination of FAO aquaculture news and to increase the impact of FAN. The CD-ROM contains 11 past issues of FAN, from April



1997 to August 2000. The documents are in HTML format where issues can be accessed by clicking on the appropriate folders and browsing through the Contents.

FAN has come a long way since its inception. About 3000 copies are distributed worldwide and FAN is now available on the Internet under the FAO Website at: [www.fao.org/fi/newslet/newslet.asp](http://www.fao.org/fi/newslet/newslet.asp). Through FAN, we strive to update our users with the latest aquaculture development news and information from FAO and our partners.

To increase FAN's impact further, it is being expanded to include all the official FAO languages - Arabic, Chinese, English, French and Spanish. This will take time and mean extra resources and we are proceeding in a steady, step by step manner to ensure uninterrupted delivery. Beginning with the Internet version of FAN No. 27, the first official issue of the year 2001, all articles will be translated into these five languages.

We will periodically compile issues of FAN on CD-ROM and other electronic media to support our paper and Web-based distribution. We hope to continue improving FAN and we appreciate receiving your comments on our efforts. *Copy of this CD can be ordered from the Editor.*

The Editorial Board, February 2001.

Collins, J., and J. Mwobobia, (comps.) *Directory of fisheries and aquaculture information resources in Africa* (preliminary version). *FAO Fisheries Circular*. No. 960. Rome, FAO. 2000. 189pp.

An overview of the fisheries and aquaculture information resources available in Africa has been compiled using the CDS/ISIS software and the database structure and formats designed by the European Association of Aquatic Sciences Libraries and Information Centres. The Directory includes details of the information resources and services of international organizations, regional bodies and networks; and national institutions and organizations in Africa. Fisheries and aquaculture periodicals and newsletters published in Africa are listed. Relevant Internet sites are listed with their URL and a brief description. The Directory will be used to facilitate effective dissemination of FAO fisheries information and in efforts to promote collaboration and information resource sharing activities between fisheries institutions in Africa. Data gathered as a result of the distribution of this preliminary version will be incorporated in the database, which will also be published on the FAO Homepage.

The Directory has been distributed to the institutions listed and an updated version will be published in printed and in digital format. Further details may be requested from [jean.collins@fao.org](mailto:jean.collins@fao.org)

FAO Regional Office for Africa. *Africa Regional Aquaculture Review : Proceedings of a workshop held in Accra, Ghana, 22-24 September 1999*. *CIFA Occasional Paper*. No. 24. Accra, FAO 1999. 50pp.

In 1992, the Inland Water Resources and Aquaculture Service (FIRI) of the FAO Fisheries Department launched a Regional Study on Aquaculture Development and Research in sub-Saharan Africa, in collaboration with the Economic Commission for Africa and the European Commission.

In September 1993, the resulting synthesis of the information provided in 12 national reviews on development and research needs was presented to and discussed with the countries involved in the Second Session of the Working Party on Aquaculture of the Committee for Inland Fisheries of Africa (CIFA).

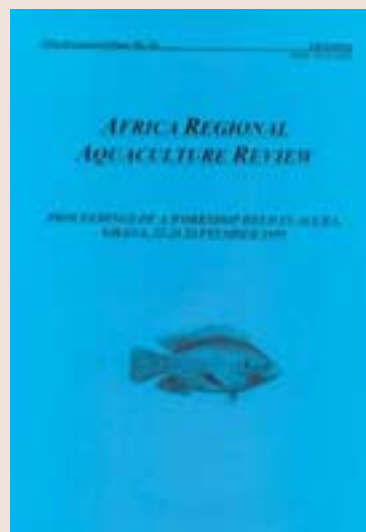
In 1998-99, authors' contracts were financed by the Fisheries Department Group of the FAO Regional Office for Africa (RAFI) and by the FAO Fishery Development Planning Service (FIPP) for the preparation of 17 reviews:

- to evaluate the past 30 years of aquaculture development efforts in ten selected countries, with specific focus on public sector support and extension;
- to identify those elements that were and were not sustainable;
- to review the status of aquaculture in Africa through an analysis of four production systems;
- to identify trends in aquaculture development.

As a follow-up, a Workshop was organized by RAFI to be held in September 1999 in Accra, Ghana, to bring together the authors of the reviews and other selected administrators and technicians, and to prepare an outline of the key elements of a general aquaculture development strategy.

The Workshop also served as the venue for the FIRI/RAFI regional review of Trends in Aquaculture Development in Africa. A separate document was prepared on this topic as the African contribution to a global review of the status of aquaculture.

This document was prepared by Drs J. F. Moehl, Jr of the Fisheries Department Group of the FAO Regional Office for Africa, A. G. Coche and V.O. Sagua, consultants.

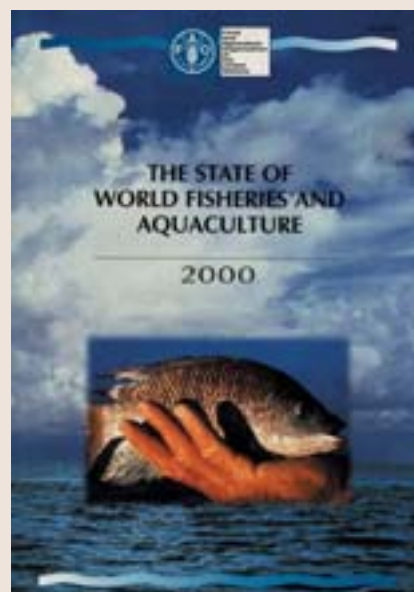


The state of World Fisheries and Aquaculture. 2000. 142pp.

This is the third issue of *The State of World Fisheries and Aquaculture*. It follows the pattern set by the previous issues, published in 1996 and 1998. The purpose continues to be to provide policy-makers, civil society and those who derive their livelihood from the sector a comprehensive, objective and global view of capture fisheries and aquaculture, including associated policy issues.

The concerns of consumers and fishers, which are central to the state of world fisheries and aquaculture, are reflected in a number of topics examined in *The State of World Fisheries and Aquaculture 2000*. A discussion of current issues is complemented by summary reports on national and international activities undertaken to address them. Some issues are well known and figure prominently in the international debate - the issue of fish quality and safety, for instance, and that of genetically modified organisms and fisheries. Also discussed are two important issues that are much less known and understood: the first is fishers' safety; the second is the culture of fishing communities. It is not commonly known that fishing at sea is probably the most dangerous occupation in the world. *The State of World Fisheries and Aquaculture 2000* reports on this issue in the hope that a more widespread realization of this aspect of fisheries will lead to effective measures to improve fishers' safety. Recent developments in fisheries governance seem to lead to a larger role for fishers in fisheries management. However, for fishers to become effective partners in management, a better understanding of their communities' culture is essential. Highlights from a recently completed FAO study of this subject are included in this publication on the premise that reaching a better understanding of such cultures is a key to fisheries management and food security in most artisanal and small-scale fisheries.

Sustainable exploitation continues to be a desirable goal for all fisheries and aquaculture operations. This year, we report on some aspects of the progress made by the international fisheries community towards achieving this goal. Summary information is provided on the state of fisheries management, and several factors to be considered in efforts to improve management are discussed,



for example: i) property rights - seen as a means for defining and specifying the entitlements, privileges and responsibilities created by different types of fisheries management regimes; ii) the role of indicators of sustainable development and their integration with the precautionary approach, as the use of such indicators is set to become a practice leading towards an ecosystems framework for management; iii) a plausible approach for dealing with illegal, unreported and unregulated fishing; and iv) ecolabelling, the basic principles of which are described, together with the somewhat controversial standing of this practice and its potential contribution to fisheries management.

As in the past, *The State of World Fisheries and Aquaculture 2000* begins by reviewing recent developments in the status of resources, production from capture fisheries and aquaculture, utilization and trade. Recent advances in fishing technology are also covered. This information is complemented by a now-report - in Part 3 - on the economic viability of selected commercial fishing fleets. A general outlook is provided in Part 4, which examines recent trends and their possible impact on the nature and character of the fishing industry, as well as on the level and distribution of future fish consumption.

It is our hope that *The State of World Fisheries and Aquaculture 2000* will generate awareness of the increasing global interaction inherent in the sector. In turn, this greater awareness should stimulate global, regional and national efforts to improve responsible practices and promote sustainability in fisheries and aquaculture.