

## The 9<sup>th</sup> International Association for the Study of Common Property Biennial Conference

Held in the beautiful landscape of Victoria Falls along the banks of the mighty Zambezi River in Zimbabwe, academicians, donors, practitioners, policymakers, government decision-makers and NGOs met on 17 to 21 June 2002 to discuss the development and challenges of studying and managing common pool resources (more commonly known as the commons). More than 200 delegates from various countries came to present papers and discuss 'The Commons in an Age of Globalization', the conference theme. The discussions tackled several important issues including

- governance, economic systems and hidden values, tourism and global ideology;
- trade regimes and globalization; issues of carbon sinks and climatic change;
- diversity versus uniformity and the prescriptive rules of joining the global market (liberal democracy);
- scale issues and nested hierarchies;

- intellectual property rights and tenure;
- problems of acceptance and resistance of globalization and the role of international markets as drivers;
- globalization - in the state versus local common property resource (whose interest does the state serve?);
- globalization as econo-centric and its relationship to sustainable use; and
- cultural diversity, marginalization and globalization links.

Globalization as a theme was chosen because of its pervasiveness in the domain of the world's political economy especially in the new millennium. Economic and political reconfiguration followed in its wake resulting in potentially social and environmental disruptive impacts. Globalization is putting new pressures on how the commons, such as fisheries, forest, pastoral lands, oceans, and air,

are to be used and managed and how local institutions response to challenges intrinsically brought about by global forces unaccustomed to local and indigenous realities. Common pool resources are not immune to these challenges. Its resilience and sustainability will be seriously tested in the years to come. Thus, studying how common pool resources are shaped or affected by this development is important.

Established in 1984, the International Association for the Study of Common Property (IASCP) is an eminent body of common property scholars and natural resource managers encouraging the exchange of knowledge among diverse disciplines, areas, and resource types; fostering mutual exchange of scholarship and practical experience; and promoting appropriate institutional design. The next IASCP Biennial Conference will be held in Oaxaca, Mexico.

## Planning Workshop for the Challenge Program Increasing Productivity in the Coastal Zone: Reversing Habitat Degradation and Advancing Livelihood Options

The Consultative Group on International Agricultural Research (CGIAR), of which WorldFish Center is a part, has recently announced the establishment of collaborative "Challenge Programs" to address environmental, food security and livelihood problems of regional or global significance.

Challenge Programs are designed to support research partnerships among international and national agencies, and CGIAR Centers. The programs are expected to have a longer-term horizon (seven to ten years), and to receive funding at the level of US\$ 5-10 million per year. Details of the approach can be found at [www.cgiar.org](http://www.cgiar.org)

A concept note submitted by

WorldFish Center to the CGIAR for a Challenge Program to address problems facing the coastal zone has been recommended for development as a pre-proposal.

As part of the pre-proposal development for the Coastal Challenge Program, a workshop entitled "Increasing Productivity in the Coastal Zone: Reversing Habitat Degradation and Advancing Livelihood Options" was organized on 3 to 4 June 2002 at WorldFish Center, Penang, Malaysia. A total of 28 delegates participated in the workshop of which 19 from national/regional institutions (e.g., AIMS, SEAFDEC, NACA, SEARCA, IRRI, IWMI, MEA, UNEP/GEF, UNEP-WCMC, TRAIN-SEA-COAST,

PCAMRD, Indonesia, Cambodia, Thailand, Malaysia, Philippines, United Kingdom, Vietnam).

At the workshop, the participants identified two broad research areas where they felt the joint efforts of CGIAR centers and their partners could best meet their needs. These two research areas involve finding ways to:

- 1. Reverse degradation of coastal resources due to land-based activities** (The main concern here was to find ways of reducing transfers of the chemicals, nutrients and sediments that originate from agriculture, aquaculture and forestry in catchments, to coastal waters), and
- 2. Enhance livelihood opportunities for coastal communities** (Determining



Participants at the planning workshop for the Challenge Program.

the factors that underpin livelihoods, and identifying the measures and technologies that will create alternative and supplementary livelihood opportunities from coastal resources, were the issues here).

The participants then outlined eight “Research Projects” within the two broad research areas to be addressed by the Challenge Program.

1. Understanding, modeling and evaluating material transfers from catchments, and their ‘downstream’ effects on sustainability and productivity of coastal aquatic ecosystems.
2. Identifying, developing and promoting improved management practices to reduce ‘down-stream’ effects resulting from agriculture

and forestry.

3. Evaluating existing policies and institutional arrangements at different levels relating to use of water and land, and their effects on coastal zones.
4. Socio-economic evaluation of the impacts of resource flows between interrelated resource systems.
5. Understanding the factors determining livelihood options for poor coastal people.
6. Developing and promoting strategies for increasing production from aquatic resources, especially from capture fisheries.
7. Developing and promoting feasible technologies for alternative or supplementary livelihood options for coastal communities.
8. Identifying and promoting feasible strategies to rehabilitate critical coastal habitats.

Based on the outcomes of the workshop, a draft pre-proposal for the Challenge Program has been prepared and circulated for review. The final draft of the pre-proposal is due for submission to CGIAR by 31 August 2002.

## 2002 Naga Award Competition

The 2002 Naga Award Competition is on!

You can nominate candidate(s) for the competition by sending us a scientific paper or book on any aspect of fisheries including aquaculture published in the last five years by developing country scientist(s), which might win the prestigious award. Tell us in your view the important contribution the paper/book has made to science and sustainable management of aquatic resources. Your nomination can win the author(s) of the paper/book the prestigious NAGA Award given by ICLARM, which includes a plaque of appreciation and US\$ 500. You as nominator of the winning submission will be rewarded with a book prize.

**The conditions:** The scientific paper or book should have been authored by a developing-country scientist(s)—that has made significant contribution to any area of fisheries science (capture fisheries/ aquaculture/resource management/ policy) within the last five years. Please include the curriculum vitae of the author(s) in your nomination. You cannot nominate yourself or colleagues from the same institution.

### Send your entries to:

The Communications Unit,  
WorldFish Center, P.O. Box 500 GPO,  
10670 Penang, Malaysia.

Deadline for submission for the 2002 Naga Award is **30 November 2002**. Please note that submissions received after this date will be considered for the 2003 Naga Award.



## Small-scale Aquaculture Credit Seminar

Yaoundé, 2 October 2002

57 farmers, 6 local NGOs and 4 micro-credit agencies participated in a one-day micro-credit seminar held at the Humid Forest Ecoregional Centre in Yaoundé. Organized by WorldFish Center and the Ministry of Research in collaboration with IRAD and MINEPIA, the seminar presented the

results of an economic viability appraisal of integrated and non-integrated aquaculture farming systems and brought together farmers and financiers to discuss the potential for increasing investment levels in order to achieve acceptable profit margins for IAA farmers. Discussions were open

and lively, with NGOs and credit agencies stressing the need for community organization to facilitate the administration of credit and offered assistance. The WorldFish Center-DFID project in Cameroon is focusing on methods to implement small-scale commercial IAA in periurban Yaoundé.

## NTAFP NEWS

### News from the Network of Tropical Aquaculture and Fisheries Professionals

#### Networking for aquatic animal health in Africa

WorldFish Center and the Food and Agriculture Organization of the United Nations (FAO) are working together to have the Africa chapter in the Aquatic Animal Pathogen and Quarantine Information System (AAPQIS), a major networking venue for aquatic animal health information.

For inputting in to the AAPQIS

Africa Chapter, WorldFish Center is seeking information on: (i) names and contact information of scientists and others interested in aquatic animal health in Africa; and (ii) laboratories, research centers, university departments, national institutions, regional bodies and networks, etc. working on aquatic animal health in

Africa. Please send information (names and contact details) to: Fernando A. Gonzales, WorldFish Center, Regional Research Center for Africa and West Asia, Abbassa, P.O. Box 2416, Cairo, Egypt; Tel: (20-5) 534-04226; 534-04227; Fax: (20-5) 534-05578; Email: [fishhealthafrica@iclar.org.eg](mailto:fishhealthafrica@iclar.org.eg); website: [www.worldfishcenter.org](http://www.worldfishcenter.org)

#### A global review of tilapia farming in 20<sup>th</sup> century

*Tilapia Farming in the 20<sup>th</sup> Century, A Global Review*, authored by Rafael Guerrero III of Philippine Council of Aquatic and Marine Research and Development (PCAMRD), Philippines is now available on CD-ROM. It has four main sections: (i) an Abstract or summary of the review; (ii) general introductory section describing the origins of tilapia, its important qualities as cultured species and global importance as food fish; (iii) review of milestones in the development of tilapia

farming from 1920s to 20<sup>th</sup> century; (iv) summary of major milestones in the development of tilapia farming in the 20<sup>th</sup> century and significant contributions of Philippine scientists and fishfarmers to its progress; and (v) discussions on future of tilapia farming. The author concludes that to sustain its phenomenal progress in the 20<sup>th</sup> century, tilapia farming needs further support for research and development, market diversification and the adoption of responsible aquaculture practices

worldwide to avert potential negative impacts on the environment with intensive farming systems.

For more information, contact: Dr. Rafael Guerrero, Executive Director, Philippine Council for Aquatic and Marine Research and Development, Dr. Alfonso Eusebio Bldg, BPI Economics Gardens, 4030 Los Baños, Laguna, Philippines; Tel: 6349 5361582; Fax: 63495365579; E-mail: [pcamrd@laguna.net](mailto:pcamrd@laguna.net)

#### Conference on organic aquaculture and sea farming

Viruses, particularly the white spot syndrome virus (WSSV) for shrimps and viral nervous necrosis (VNN) for marine finfishes which can cause mortality of 50-100% have been the major cause of losses in profits of fish farmers. These can wreak havoc in aquaculture industry if not properly detected and controlled early.

The Services of the Fish Health

Section of Southeast Asian Fisheries Development Center/Aquaculture Department (SEAFDEC/AQD) is now accepting shrimp samples for white spot syndrome virus (WSSV) and marine finfish samples for viral nervous necrosis (VNN) detections. The Fish Health Section of SEAFDEC/ AQD uses the Polymerase Chain Reaction (PCR) in the diagnosis of shrimp and

fish diseases.

For details, please contact: E. Lacierda, Head, Fish Health Section, SEAFDEC Aquaculture Department, Tigbauan, 5021, Iloilo, Philippines; Tel: (63-33) 336-2937; Fax: (63-33) 336-2891; E-mail: [eclacier@aqd.seafdec.org.ph](mailto:eclacier@aqd.seafdec.org.ph)

## New NTAFP Members

Please check the accuracy of your personal information below. Enclosed in parentheses are members' major and minor fields, species and geographical areas of interest. For any corrections, please write to NTAFP Secretary. Email: ntafp@cgiar.org

**Dr. Pathira Arachchilage Aruna Taranatha Jayawardane.** Research Officer, Marine Biological Resources Division, National Aquatic Resources Research and Development Agency (NARA), Crow Island, Mattakkuliya, Colombo 15, Sri Lanka. (*Major*: Population dynamics, Reproductive biology; *Minor*: Aquaculture; *Species*: shrimp; *Geographical areas of interest*: Western Indian Ocean)

**Dr. Siti Azizah Mohd. Nor.** Lecturer, School of Biological Sciences, University Sains Malaysia, 11800 Minden, Pulau Pinang, Malaysia. (*Major*: Resources/stocks - genetics, evolution, molecular biology, biotechnology, stock assessments;

*Minor*: resources/stocks – taxonomy, morphology; biodiversity; ecology; *Species*: Carps, barbels and other cyprinids, miscellaneous freshwater fishes, cods, hakes, haddocks, redfishes, basses, congers, jacks, mullets, miscellaneous marine fishes, turtles; *Geographical areas of interests*: Asia, Southeast Pacific)

**Dr. Pratap Chandra Das.** Scientist, Central Rice Research Institute (CRRI), Bidadharpur, Cuttack – 753006 (Orissa), India. (*Major*: Fish culture; Culture technology/systems. *Minor*: Shellfish culture; Integrated Fish Culture; Water quality, aquatic pollution. *Species*: Carps, barbels, and other cyprinids;

Miscellaneous freshwater fishes; Freshwater crustaceans; Shrimps, prawns, etc; Freshwater aquatic plants. *Geographical areas of interests*: Asia; Eastern Indian Ocean)

**Dr. Joseph Cheikyula Orkuma.** Assistant Lecturer, University of Agriculture, Makurdi (UAM), P.M.B 2373, Makurdi, Nigeria. (*Major*: Ecology, Geography, Water quality/aquatic pollution; *Minor*: Stock assessment, post-harvest technology, biodiversity; *Species*: Miscellaneous freshwater fishes, freshwater crustaceans, zooplankton; *Geographical areas of interest*: Africa)

## GIFT Foundation Board meets in Penang

The GIFT Foundation Board of Trustees held its 15<sup>th</sup> Board of Trustees and Annual Members' meeting at the WorldFish Center Headquarters, Penang, Malaysia on 17 September 2002. The meeting was chaired by Dr. Meryl J Williams, Chair of Board of Trustees and attended by Members of the Board: Drs. R. Undan and T. Abella of the Central Luzon State University, Mr. M. Tayamen

of National Freshwater Fisheries Technology Center/Bureau of Fisheries and Aquatic Resources, Mrs. Simeona Aypa, representative of the private sector and Mr. Basilio Rodriguez Jr. and Ms. Ravelina Velasco of the GIFT Foundation International Inc. from the Philippines and Dr. Modadugu V Gupta of WorldFish Center.



## Tropical marine ecologist and conservationist passes away

Robert "Bob" Johannes, a noted tropical marine ecologist and an international expert on live reef food fish trade and on the effects of cyanide fishing passed away on 4 September 2002 at the age of 66. Bob was also a 1993 Pew Fellow.

Bob pioneered an approach to the conservation of marine biodiversity that integrates the specialized ecological knowledge and traditional marine resource management systems of community-based tropical fishing peoples with Western-based scientific management in order to improve marine resource management. His efforts in this arena have helped highlight the

importance of indigenous knowledge and community-based systems as key factors in marine conservation.

His findings on Palau published in the book 'Words of the Lagoon' is considered a classic work in community based marine resource management and has been adopted as a supplemental text in a number of graduate fisheries, ocean policy and maritime anthropology courses around the world. With his Pew Fellowship and funds from Nature Conservancy and South Pacific Forum Agency, he conducted a nine-country study of cyanide fishing trade and promoted its environmental, economic and social effects. The findings from

this study were covered by international media, resulting in significant attention to the issue.

He will be remembered for his exemplary contributions to applied conservation of global marine environment and for his dedication in combining science with traditional knowledge to support sound policy for the oceans and for society.

Source: PFP SeaSpan: Bi-monthly electronic newsletter of the Pew Fellows Program in Marine Conservation, September 2002/A & B double issue 2002, 6:16-17.

# Management of Broodstock and Quality Control of Fish Seed in Hungary

L. Varadi, S. Gorda, J. Bakos and Z. Jeney

## Abstract

Common carp (*Cyprinus carpio*) breeding has a long tradition in Hungary. However, recent economic changes in Eastern Europe and new developments in aquaculture necessitated the need for ensuring quality of the brood stock used in hatcheries and the legal and institutional frameworks needed to implement the program. In addition to good research and development programs and gene banking, it became essential to establish an appropriate legal framework, organize, coordinate and control breeding activities, and provide financial support. It was a major breakthrough for carp breeding when *C. carpio* was recognized as one of the cultivated animals in the Animal Breeding Act in 1993. The Carp Breeding Section of the Hungarian Fish Producers Association plays an important role in carp breeding programs. Thirteen breeding farms of the Carp Breeding Section have 24 certified *C. carpio* varieties. In Hungary, about 80 % of the seed used as stocking for commercial production are from high quality certified breeders.

## Introduction

Breeding and cultivation of common carp (*Cyprinus carpio*) is the backbone of fish farming in Hungary. Sixty seven percent of the total aquaculture production (19 904 tons) was accounted for by *C. carpio* in the year 2000. *C. carpio* breeding has a long tradition in Hungary and its techniques have been known and applied worldwide in carp breeding programs. However, recent economic changes in Eastern Europe and new developments in aquaculture have necessitated the development of carp breeding programs that ensure quality of seed as well as the legal and institutional frameworks to support them.

## Broodstock Management

The main elements of the efficient management and maintenance of broodstock in Hungary are the following:

- appropriate legal framework (Ministry of Agriculture and

- Regional Development);
- good research and development programs, gene banking (research institutions);
- quality control (National Institute for Agricultural Quality Control);
- efficient organization and coordination (Hungarian Fish Producers Association);
- financial support (Ministry of Agriculture and Regional Development).

## Legal Framework

After the political and economic changes of the early nineties in Hungary, new laws and regulations were established to provide the appropriate legal framework for carp breeding programs. The main Acts and regulations relevant to carp breeding are the following:

- Animal Breeding Act (1993 CXIV);
- Ministry decree on approval and registration of breeding organizations (30/1994);

- Ministry decree on certification of breeders (31/1994);
- Ministry decree on the performance of progeny testing (32/1994);
- Ministry decree on the maintenance of indigenous species stocks (37/1994);
- Ministry decree on the operation of fish hatcheries (41/1994).

## Research and Development

Research and development activities for a good national carp breeding program have been well established in Hungary, mainly through the activities of the Research Institute for Fisheries, Aquaculture and Irrigation (HAKI) at Szarvas, and the Saint Stephan University (SZIE) at Godollo. Broodstock management technologies have been elaborated and tested for many years and are now available for practical application. A live *C. carpio* gene bank (consisting of 17 Hungarian and 15 foreign strains and races) has been

in operation since 1962 in HAKI. The aerial view of the ponds for the *C. carpio* gene bank is shown in Fig. 1. Advanced research has been ongoing, with the cryopreservation of sperm, at both HAKI and SZIE. In-situ gene banking of wild carp strains such as the Tisza wild carp (Fig. 2) has also been undertaken.



Fig. 1. Ponds for gene banking and breeding at HAKI.



Fig. 2. Female brood *C. carpio* from River Tisza.

### Quality Control

Quality control is an increasingly important activity in the management and maintenance of high quality broodstock. The National Institute for Agricultural Quality Control (OMMI) is the main institution in Hungary with responsibilities for quality control in fish breeding operations through the following activities:

- certify and control fish hatchery operations;
- certify high quality breeders (according to the Code for Carp Performance Test);
- certify and control the operation of registered carp breeding farms.

Breeding farms have to pay for most of the services of OMMI. However there is State support for the certification process of the high quality breeders from a special fund established by the Ministry of Agriculture and Regional Development.

### Organization and Coordination

Efficient breeding programs and quality control cannot be accomplished without the appropriate organization of complex activities and coordination between farms and the relevant organizations and institutions. A breakthrough in the development of carp breeding programs and the improvement of broodstock management in Hungary was the establishment of the Carp Breeding Section within the Hungarian Fish Producers Association (HOSZ) in 1995. HOSZ encompasses more than 70 member farms, which account for about 60% of the total aquaculture production in Hungary. The Carp Breeding Section has 14 member farms that are registered as carp breeding organizations. These farms have their own carp varieties that are certified by OMMI. At present, the 13 breeding farms have 24 certified *C. carpio* varieties. Through its Carp Breeding Section, HOSZ organizes standardized carp performance tests, annual meetings, occasional expert consultations, and provides consultancies and other services. With the assistance of HOSZ and its Carp Breeding Section, broodstock nucleus comprising of 25 males and 25 females in each of the breeding farms are being marked with PIT tags since 2002 (Fig. 3).

### Financial Support

The two-year carp performance

test, basic precondition for the certification of a carp variety is a major cost for breeding farms. OMMI contributes 50% of the total cost, using funds from the Ministry of Agriculture and Regional Development. The cost of the full two-year test for one carp variety is about US\$5 000. Special funds are also available for the maintenance of registered gene banks of indigenous carp varieties. The financial support is about US\$7 per breeder for up to 100 individuals of a recognized indigenous carp variety. Funds are also available for the improvement of the infrastructure and technical conditions for breeding activities. R&D funds are also used for breeding works and for the development of broodstock rearing technologies. It is becoming a common practice for farms and the research institutions to jointly apply for such funds and implement R&D projects together.

### Carp Seed Distribution

Quality carp seed production is based on the use of high quality broodstock and good broodstock management practices as described above. All fish hatcheries in Hungary that produce seed for their own use and for sale are obliged to get the hatchery certified by OMMI. Certification also includes



Fig. 3. Marking a brood fish with PIT tag.

veterinary inspection and approval.

Fish farms that produce seed for their own grow-out can do it without complying with any special regulations on seed distribution. However, fish farms that sell the seed to other farms are obliged to produce the seed from certified breeders. There are 23 certified fish hatcheries in Hungary, most of them for carp seed production. These hatcheries propagate mainly the farm's own certified carp varieties. The hatcheries have to monitor the propagation and sales activities using standard forms issued by OMMI. They also provide a

Certificate of Origin when the seed is sold to another farm. The hatcheries are inspected occasionally by OMMI and they have to renew the certification of operation every three year.

In order to encourage the wide use of seed from certified breeders and to improve the production, only the fish farms that produce seed from certified breeders are entitled to apply for financial support from the FVM budget.

As a result of all these efforts aimed at the improvement of carp breeding, and thus for increasing of quality and competitiveness of the

carp breeding sector, about 80 % of the seed used as stocking material for commercial production are from high quality certified breeders.

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# Genetic Enhancement and Conservation of Aquatic Biodiversity in Africa

M.V. Gupta

## Abstract

There is a pressing need to enhance fish production in Africa through improved farm management and the use of improved fish breeds and/or alien species in aquaculture while at the same time conserve the aquatic genetic diversity. This paper presents the outcome of the Expert Consultation on Biosafety and Environmental Impact of Genetic Enhancement and Introduction of Improved Tilapia Strains/Alien Species in Africa held in Nairobi, Kenya on 20-23 February 2002. The main topics discussed were status of aquaculture in Africa and the role of genetic enhancement; potential benefits and risks involved in introduction of genetically improved strains and/or alien species with specific reference to tilapias; existing policies and legislation for the conservation of biodiversity, their strengths and weaknesses; capacity for undertaking genetic enhancement research and implementation of policies for the conservation of aquatic biodiversity.

## Introduction

Africa is the world's repository of diverse freshwater fish fauna and the home of tilapias. With the increasing interest in aquaculture and the initiatives in progress for genetic enhancement of tilapias, the possibility exists that improved strains and alien species introduced for aquaculture will escape into natural waters. While there is a need to enhance fish production through use of improved fish breeds and/or alien species, it is imperative that valuable aquatic genetic diversity is conserved/protected.

This has been the subject of an expert consultation organized by WorldFish Center in collaboration with the Technical Center for Agriculture and Rural Cooperation (CTA), the Food and Agriculture Organization of the United Nations (FAO), the World Conservation Union (IUCN), the United Nations Environment Program (UNEP) and the Convention on Biological Diversity (CBD) in Nairobi, Kenya on 20-23 February 2002. The discussions focused on the status of aquaculture in Africa and the role of genetic enhancement; potential

benefits and risks involved in introduction of genetically improved strains and/or alien species with specific reference to tilapias; policies and legislation in existence for the conservation of biodiversity, their strengths and weaknesses; capacity for under-taking genetic enhancement research and implementation of policies for the conservation of aquatic biodiversity.

The consultation meeting was attended by 45 fishery and conservation experts, resource managers, geneticists and policymakers from 10 African countries (Cameroon, Cote d'Ivoire, Ghana, Kenya, Malawi, Nigeria, South Africa, Tanzania, Uganda and

Zambia), advanced scientific institutions and regional and international organizations. The major findings from the meeting are presented here in brief while full proceedings are being published separately.

## The Issues

The meeting concluded that there is high potential for aquaculture development in Africa with some regional variations. However, to achieve this potential, a number of constraints such as lack of knowledge of indigenous species, shortage of fish seed due to poor hatchery infrastructure, lack of credit facilities,



lack of incentives from existing policies, etc. need to be addressed. While in small-scale aquaculture improvements in farm management are more important, in commercial aquaculture operations the need/demand for improved strains is high.

Genetic improvement programs have been initiated in some countries, but institutional capacity for undertaking the research is inadequate. Alien species/strains are being introduced for aquaculture and impacts of these introductions are not fully known, but are likely to pose threats to biodiversity especially in regions where there is rich diversity of indigenous aquatic species.

## Policies

Many African countries have formulated policies, enacted laws and established agencies to conserve

biological diversity. In addition, there are a number of sub-regional and regional conventions. While their existence is acknowledged, these are not specific to conservation of aquatic biodiversity and strategies for their implementation are lacking. Implementation is constrained by lack of human capacity, political will and accountability. Responsibilities for implementation of policies are split among ministries and agencies that are poorly funded and coordinated resulting in poor compliance. There is conflict of interest between development and conservation and the public is not aware of the issues as the stakeholders have not been involved in formulation of these policies and instruments.

A number of international codes of practice and protocols have been developed to deal with the introduction of alien species, but these

have no legal status until governments pass relevant national legislation to bring such laws into effect. Where these exist there is lack of clarity and capacity to implement. The voluntary nature of protocols makes them non-binding.

The participants of the consultation, after deliberating the issues for three days, came out with a formal statement, the *Nairobi Declaration: Conservation of Aquatic Biodiversity and Use of Genetically Improved and Alien Species for Aquaculture in Africa* (see Box 1). The document, which represents the main conclusions and recommendations of the workshop, is expected to serve as guidelines that will help foster the development of aquaculture in the region while maintaining biodiversity.

## Conservation of Aquatic Biodiversity and Use of Genetically Improved and Alien Species for Aquaculture in Africa Nairobi Declaration

Fish are a critical source of animal protein to the people of Africa, and fishery resources play a central role in sustaining rural and urban livelihoods across much of the region. Yet for the continent as a whole per capita supply is declining and current projections of supply and demand indicate that this gap will continue to grow in the coming decades.

If this gap is to be bridged capture fisheries need to be sustained and the potential of aquaculture developed. In doing so, attention needs to be given to protecting the rich aquatic biodiversity of Africa especially the freshwater fish biodiversity and its role in sustaining capture fisheries and providing species for aquaculture.

Aquaculture is a relatively new farming activity in much of Africa and the region's production of farm-raised fish remains low. While there are many reasons for this, amongst the most important are poor management practices and the use of undomesticated stocks. This contrasts with crops, livestock and poultry where large increases in production have been achieved through application of breeding programs and other genetic improvement procedures.

To address these constraints, a greater range of management practices and approaches need to be considered. These should include improved pond and broodstock management and better performing breeds/strains. In doing so, however, these approaches need to be adapted to local social, economic, institutional and biophysical context. While the improved strains/alien species have potential to improve production there is clear risk of these improved/alien species escaping into the wild and contaminating the native population and affecting the biodiversity.

In light of these considerations, an Expert Consultation on Biosafety and Environmental Impact of Genetic Enhancement and Introduction of Improved Tilapia Strains/Alien Species in Africa was convened in Nairobi, Kenya from 20-23 February 2002 under the sponsorship of WorldFish Center, CTA, FAO, IUCN-The World Conservation Union, UNEP and the CBD to discuss and develop guidelines that will foster the development of aquaculture while maintaining biodiversity. The meeting was attended by aquaculturists, geneticists

and conservation specialists from Africa and from international organizations. The recommendations of the expert consultation follow hereunder.

### Recommendations

1. Given that aquaculture from small-scale, low-input systems to large-scale intensive systems can achieve potential benefits from genetic enhancement, quality seed should be made available and used in conjunction with proper broodstock and farm management.
2. Since genetic resources in cultured populations can be degraded as a result of captive breeding, genetic aspects of broodstock management need to be a basic element within all types of aquaculture and stock enhancement systems.
3. Introductions of fish, including genetically improved (altered) strains and alien species, may have a role in the development of aquaculture. Any movement of fish between natural ecological boundaries (e.g. watersheds) may involve risk to biodiversity and

there is need for refinement and wider application protocols, risk assessment methods, and monitoring programs for introductions of fish, including genetically improved (altered) species and alien species. States have important responsibility in the development and implementation of such protocols and associated regulations, the establishment of clear roles and responsibilities, and capacity building. Such efforts should be linked to obligations pursuant to the Code of Conduct for Responsible Fisheries, the Convention on Biological Diversity, and other relevant international agreements.

4. Unique wild stocks of important tilapia species still exist in many parts of Africa. Priority areas should be identified and managed as conservation areas in which introductions of alien species and genetically altered species should be prevented.
5. The majority of issues and problems associated with movement of fish and the use of genetically altered species are common to most African countries and they are encouraged to (a) look beyond borders for examples of workable policies and legislation, adopt them where appropriate to fill national policy gaps, and harmonize them where

necessary; and (b) use existing regional bodies or form new bodies to assist in coordinating management activities and taking into account ecological realities, in particular transboundary watersheds.

6. Baseline information on fish genetic diversity, environmental integrity and aquaculture practices exist, but it is neither comprehensive nor easily accessible. The existing mechanisms for collection and dissemination of information on fish genetic diversity, environmental integrity and aquaculture practices need to be strengthened.
7. Internationally accepted codes and protocols for reducing the risk of transboundary movement of pathogens (including parasites) through movement of fish including alien species do exist, but they do not address any specific needs regarding genetically improved (altered) species. States and other relevant bodies should evaluate the existing codes and protocols for reducing the risk of transboundary movement of pathogens (including parasites) through movement of fish including alien species and genetically improved (altered) species, and adapt them for African conditions.
8. Policymakers, enforcement agencies, stakeholders and the general public need to be made aware of issues related

to, and the need for, policy on the movement of alien species and genetically improved (altered) species, and this should be high on national agendas.

9. Some policies relevant to movement of fish seem difficult to implement, are unknown to users, create conflicts of interest, or are viewed as restrictive, in part because they have been developed with limited consultation and participation. Formulation of policy and legislation concerning fish movement should seek to engage all stakeholders in a participatory process. In addition, governments should establish advisory groups with links to independent and scientifically competent expert bodies such as FAO, IUCN, and WorldFish Center.
10. Although economic benefits can be derived through the use of alien and genetically altered fish species in aquaculture, in many cases, those to whom benefits accrue do not bear the costs associated with adverse environmental impacts. In view of this, there should be provision for liability, compliance (e.g., incentives), and restoration within policies and legislation concerning the movement and use of alien and genetically altered fish species in aquaculture.

## Expert Consultation to Develop Strategies and Plans for Dissemination of Improved Fish Breeds

In recent years, genetic improvement has progressed with the development of national breeding programs in member countries of the International Network on Genetics in Aquaculture (INGA). Improved carp and tilapia breeds now exist in some of the member countries (e.g. Bangladesh, China, Fiji, India, Indonesia, Malaysia, Philippines, Thailand and Vietnam) and some of these breeds are being disseminated to farmers. However, strategies and plans for dissemination of these strains are lacking in most of these countries. The ultimate benefits of a genetic improvement program can only be achieved if improved breeds

are effectively disseminated to targeted beneficiaries without losing, due to inbreeding, the genetic gains. Further, the member countries have been facing constraints in implementing genetic management protocols that will minimize inbreeding and maintain the characteristics of the breed during the process of dissemination. Sustaining the program and farmer confidence will require the demonstration and monitoring of impacts. Unlike in crops, there are no proven dissemination strategies for fish breeds and different social, economic and institutional set-ups in member countries makes it difficult for a single

system to work. In view of this, the need for guidelines that will help the member countries in maintenance and dissemination of improved fish breeds was felt necessary.

With funding support from the Norwegian Agency for Development Cooperation (NORAD), WorldFish Center, in collaboration with National Aquaculture Genetics Research Institute (NAGRI) of the Thailand Department of Fisheries organized an Expert Consultation on Strategies/ Plans for Dissemination of Improved Fish Breeds from 4-7 June 2002 in Pathumthani, Thailand. Thirty nine participants from member countries of INGA, advanced scientific

institutions, regional and international organizations, non-government organizations, private sector, farmers associations and resource persons from crops and livestock sectors attended the meeting. The meeting reviewed the principles, requirements and protocols for effective management/maintenance of improved strains at research stations, discussed the status of and constraints to maintenance and effective dissemination of improved fish breeds in member countries and formulated recommendations for addressing the constraints. The meeting strongly recommended that member countries develop national dissemination strategies with a focus on the development of plans, which lay out a road map for the successful and



*Participants of the Expert Consultation on Strategies and Plans for Dissemination of Improved Fish Breeds, NAGRI, Pathumthani, Thailand, 4-7 June 2002*

sustainable dissemination of improved fish breeds.

During the last day of the meeting,

the participants visited the tilapia/fish hatcheries in Prachinburi and Chachengsao Provinces, Thailand.

### **A preliminary genetic study of Vietnamese common carp (*Cyprinus carpio*) using mtDNA sequencing.**

Although a significant number of genetic studies have been undertaken in common carp (*Cyprinus carpio*) using a range of approaches, none has examined in detail the genetic variation in mitochondrial (mt) gene regions using direct sequencing. Under a collaborative program between Deakin University, Victoria, Australia and Research Institute for Aquaculture No. 1 (RIA1) in Vietnam preliminary study on molecular genetic variation in Vietnamese *C. carpio* strains using mtDNA sequencing was completed in 2001. Using samples obtained from stocks maintained at the Research Institute for Aquaculture No. 1, Vietnam and specimens from feral populations in Australia, genetic variation was assessed using direct sequencing of fragments amplified from the mitochondrial 16S rRNA and cytochrome *b* gene

regions and from the control regions. As is typical for fish species, the 16S rRNA gene region showed the least variation and the control region the greatest variation (average nucleotide diversity 0.00966, haplotype diversity 0.842).

Genetic variability among 4 indigenous Vietnamese strains, along with Hungarian, Indonesian, Australian and the RIA No. 1 improved strain, was investigated. All three mtDNA gene regions identified a 'Hungarian' or 'European' lineage; however only data from the control region was useful for the identification of indigenous Vietnamese strains. Three distinct indigenous mtDNA haplotypes were identified, however mixing of stocks also appears to have occurred as European and Indonesian haplotypes were also found within indigenous strains. Overall, the level of divergence

between samples originating from European and Asia was found to be surprisingly low considering their original geographic isolation. No differences were detected between the samples of Vietnamese and Australian *C. carpio* derived independently from European stocks.

Generally, results indicate that the analysis of certain mtDNA gene regions has the potential to be a useful additional tool for studying genetic diversity within and between *C. carpio* populations and strains. As part of ongoing collaboration between RIA 1 and Deakin University this project will be extended, using funds provided by AusAID. This will be done through detailed survey of mtDNA variation in indigenous Vietnamese *C. carpio* stocks and sequencing a wider range of *C. carpio* samples from different countries. The latter

will be a first step towards the establishment of a world-wide genealogy of *C. carpio* strains derived from mt DNA sequences which will provide a valuable data base for genetic improvement programs and the management of

genetic diversity within this important species.

The collaborative project would welcome receiving donation of ethanol preserved carp tissue samples from researchers working on this species in different parts of

the world for its second part of the project

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Contributed by Chris Austin<sup>1</sup>, Pham Tuan<sup>2</sup>, T.T.T. Nguyen<sup>1,2</sup>

## Training on quantitative genetics

With the objective of strengthening the capacity of scientists from INGA member country institutions in the field of quantitative genetics, especially in analysis and interpretation of genetic data, INGA and WorldFish Center with financial support from Norwegian Agency for Development Cooperation (NORAD) organized a three week training course on *Quantitative Genetics and its Application to Aquaculture* during 1-21 October 2001 in Bangkok, Thailand. A total of 28 participants from 12 member countries of INGA (Bangladesh, China, Egypt, Fiji, Ghana, India, Indonesia, Malawi, Malaysia, Philippines, Thailand and Vietnam) attended the course. The course program was developed specifically to meet the needs of the participants and was based on needs assessment survey undertaken prior to the training. The course curriculum covered the following modules: strain comparisons and crossing, estimation of heritability, phenotypic and genetic correlations,



selection index methodology for single and multiple traits, selection methods and prediction response, BLUP methodology, breeding program design and use of statistical softwares (SAS, ASREML). The training program comprised lectures and practical exercises but emphasis was placed on hands-on analysis of actual breeding/genetic datasets. The three-week training also included presentations by

participants on the status of genetic improvement/breeding programs in their countries and a visit to aquaculture station/farms in Chonburi Province, Thailand.

Each participant who completed the training was provided a CD-ROM copy of non-commercial software (ASR, GPEX, SIP and KUNZI) to assist them in analysis of breeding datasets.

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<sup>2</sup>Research Institute for Aquaculture No. 1, Dinh Bang, Bac Ninh, Hanoi, Vietnam

## Developing the capacity on fish molecular genetics in Vietnam

Through a grant from the Australian government (AusAID), Deakin University and its partner institution in Vietnam, the Research Institute for Aquaculture No. 1 (RIA 1) are undertaking a collaborative project that focuses on capacity building in molecular genetic research and education in Vietnam. The project aims to heighten awareness of and skills of young researchers in the application of molecular genetic approaches in a range of fields relating to the management of fish biodiversity and genetic improvement of fish for aquaculture. These will be achieved through a range of activities that will include short-term and Masters level training of technicians and

researchers at Deakin University and in-country workshops and research activities that focus on genetics of wild and cultured populations of catfish of the genus *Pangasius* and grass carp (*Ctenopharyngodon idellus*).

The first of two planned workshops was held on 1-7 July 2002 at RIA1 (Vietnam). Twenty young Vietnamese researchers and a researcher from Thailand, an INGA sponsored participant, attended the workshop. The workshop provided an introduction to basic theory relating to the application of molecular genetic techniques and population genetics and an introduction to protein-based (allozyme) and DNA-based

(RFLPs, SSCPs and RAPDs) techniques for assaying and measuring genetic variation.

For further information please contact either Chris Austin, Senior Lecturer, Head of Aquatic Ecology, Coordinator of Postgraduate Aquaculture Courses, School of Ecology and Environment Deakin University, PO Box 423, Warrnambool, 3280, Victoria, Australia; Tel: 03 55633518; Fax: 03 55633462; email; cherax@deakin.edu.au; or Pham Anh Tuan, Research Institute for Aquaculture No. 1, Dinh Bang, Bac Ninh, Hanoi, Vietnam; e-mail: patuan@fpt.vn

## National genetics meeting in Malaysia

The Malaysian national network of INGA held its second national genetic workshop on 19 April 2002 in Kuala Lumpur. The meeting was hosted by University of Malaya and was attended by 31 participants

from Malaysian national research institutions involved in fish genetic research and WorldFish Center. The workshop identified three research priority areas for collaborations: invasive species and their impacts,

population genetics and genetic improvement of *Macrobrachium rosenbergii*, and use of markers in tilapia selective breeding research.

## Training on analysis of genetic data

Through the project 'Transfer of Selective Breeding Technology for Aquaculture Improvement from Asia to Sub-Saharan Africa and Egypt, a 5-day training course on the

Analysis of Breeding Data was organized for 17 scientists from Cote d'Ivoire, Egypt, Ghana, Kenya, Malawi and South Africa at the WorldFish Center Regional Center

for West Asia and Africa, Abbassa, Egypt on 12 – 16 May 2002. The training focused on analysis of data from selective breeding experiments and estimation of genetic parameters.

## Publication of interest

### A special issue on genetics

The proceedings of the Seventh International Symposium on Genetics in Aquaculture (ISGA) hosted by the Australian Institute of Marine Science (AIMS) and held in Australia in July 2000 has been published in a special issue of *Aquaculture* (volume 204, nos. 3-

4). The 517-page journal which was edited by J.A.H. Benzie and G. Hulata contains abstracts and 21 full papers under 6 topic areas: (i) gene expression, transgenesis and molecular techniques; (ii) application of molecular markers; (iii) gene/genome mapping; (iv) ploidy manipulation; (v) breeding and quantitative genetics; and (vi)

wild and farmed genetic resources.

For further information, contact: J.A.H. Benzie, Centre for Marine Coastal Science, University of New South Wales, Sydney, New South Wales 2052, Australia; or G. Hulata, Agriculture Research Organization, Volcani Centre, Department of Agriculture, P.O Box 6, Bet Dagan 50250, Israel.

### Indian Branch to hold Sixth Indian Fisheries Forum

The Sixth Indian Fisheries Forum is scheduled to be held 17-20 December 2002 at the Central Institute of Fisheries Education (CIFE), Versova, Mumbai in the State of Maharashtra. This activity is being organized in collaboration with the Indian Fisheries Association and the Central Institute of Fisheries Education.

Scientific Sessions will cover the following topics: Fish and Environment; Aquatic Pollution; Aquaculture; Ornamental Fish; Genetics and Stock Improvement; Germplasm Conservation; Fish Pathology; Biotechnology; Fisheries Resources & Management; Aquaculture Engineering; Harvest & Postharvest Technology; Fisheries Economics,

Trade and Laws; Computer Application & Modeling; Fisheries Education & Administration; Fish & Human Health; Fisheries Extension & Information technology; WTO and IPR in Fisheries. A Special Symposium on *Policy Issues in Fisheries* is scheduled on 19 December 2002

#### **Submission of Abstracts**

Abstracts must be submitted only in the official abstract form. It must be typed in double space and should be within 300 words. Preference may be indicated whether papers would be presented orally or through poster sessions. Abstracts must be sent no later than 30 September 2002 to: Dr. S. Ayyappan, Convener, Sixth Indian Fisheries Forum, Central Institute of

Fisheries Education (CIFE), Versova, Mumbai-400 061, Maharashtra, India

For further information of the forum, please contact: The Forum Convener, Dr. S. Ayyappan, Convener, Sixth Indian Fisheries Forum, Central Institute of Fisheries Education (CIFE), (Deemed University), ICAR, Fisheries University Road, Andheri (W), Versova, Mumbai-400 061. Tel.: 0091 22 6361446 (to 48); Fax: 0091 2222-6361573; Email: cife@x400.nicgw.nic.in; AFSIB Secretariat: Dr. P. Keshavanath, Secretary, AFS Indian Branch, College of Fisheries, Mangalore 757-002, Karnataka, India. Tel.: 0091 824 439322; Fax: 0091 824 438366

### Fish Health Experts support 5<sup>th</sup> Symposium on Diseases in Asian Aquaculture

The Fish Health Section of the Society has been getting tremendous support from various sectors in fisheries and aquaculture not only in the region but the world over. There has been an increasing interest in the forthcoming 5<sup>th</sup> Symposium on Diseases in Asian Aquaculture (25-28 November

2002, Surfers Paradise, Queensland, Australia).

For details on symposium, please contact: Daniel Havas, Event Manager, OzAccom Conference Services 5th Symposium on Diseases in Asian Aquaculture, PO Box 164 Fortitude Valley QLD 4006, Australia. Tel: +61 (0) 7 3854

1611; Fax: +61 (0) 7 3854 1507; E-Mail: daa5@ozaccom.com.au; Internet: <http://afs-fhs.seafdec.org.ph> For further information about the workshops, please contact: Dr. Chris Baldock - Tel: +61 7 3255 1712 (Epidemiology and Risk Assessment); Dr. Rob Allard - Tel: +61 7 3840 7723 (Molluscan Health)

### 7<sup>th</sup> Asian Fisheries Forum all set for 2004

The Society will be holding the 7<sup>th</sup> Asian Fisheries Forum in Penang, Malaysia on 29 November to 3 December 2004. The Forum venue is at the Hotel Equatorial. The Forum is being organized with support from the Universiti Sains Malaysia (USM), WorldFish Center, the Universiti Putra Malaysia (UPM), the Fisheries Development Authority (FDA) and

the Malaysian Fisheries Society (MFS).

The Forum theme is centered on *New Dimensions and Challenges in Asian Fisheries in the 21<sup>st</sup> Century*.

To run in tandem with scientific sessions are special symposia on: (1) Gender and Fisheries; (2) Shrimp Technology (with clinics); (3) Aquatic Health Ecosystems; and (4) Stock Enhancement in Asia and

the Pacific.

For more details, please contact: The Secretariat, 7<sup>th</sup> Asian Fisheries Forum, School of Biological Sciences, Universiti Sains Malaysia, 11700 Minden, Penang, Malaysia. Tel: +60-4-6577888 (Ext. 4005); Fax: +60-4-6565125; Email: [wkng@usm.my](mailto:wkng@usm.my)

## Council names new Co-opted Member

At its recent Council Meeting held in Penang, Malaysia, the Council named Mr. Gopinath Nagaraj as co-opted member to the Society Council. As a member of the

scientific community and former office bearer of the Malaysian Fisheries Society, Mr. Nagaraj has been involved as member of the Steering Committee in the

organization of the 7<sup>th</sup> Forum. Mr. Nagaraj is an active figure in the fisheries sector and is presently associated with Fanli Marine & Consultancy Sdn. Bhd.

## Post-Retirement Careers in Fisheries and Aquaculture

AFS Special Publication No. 12  
ISBN-971-802-015-2

Edited by M.B. New and I.C. Liao

This book contains papers presented during a special session on "Post-Retirement Careers in Fisheries and Aquaculture held during the 6<sup>th</sup> Asian Fisheries Forum. The session speakers were invited because of their contribution to the development of fisheries and aquaculture in Asia. After reviewing his pre-retirement

career, each author describes his continuing involvement in his specific professional field, as well as new promising activities. The book comprises six chapters, each author contributing views and perspectives intended to be useful to younger scientists and encouraging other scientists to continue contributing to the development of fisheries and aquaculture even after their formal retirement age. These include Post-retirement experiences of a fisheries

administrator by Deb Menasveta; From shrimp to fish by Alain Michel; Post-retirement opportunities after a career in Southeast Asia by Herminio Rabanal; My second 25 years in fish nutrition research and development (1975-2001) by John Halver; Administration-free aquaculture by Michael B. New; Circumnavigating the small world of fisheries science by Roger S.V. Pullin.

For details of another publication – from a special symposium held at the 6th Asian Fisheries Forum in 2001, Global Symposium on Women In Fisheries, please see next section.