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Training workshop on molecular genetics

A ten-day training workshop the *Application of molecular genetic techniques in inland fisheries and aquaculture management*, was successfully completed on 9 December 2005. A total of 19 participants attended from 11 NACA member countries - Bangladesh, Cambodia, China, India, Malaysia, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. The objectives of the workshop were to:

- Introduce participants to molecular genetic techniques and their application in characterization of genetic resources.
- Train participants in techniques of genetic resource characterization, data analysis (for example in evaluating genetic diversity) with a view to building capacity in use of molecular genetic tools in aquaculture and inland fisheries management in Asian nations.
- Initiate the establishment of a network of personnel and institutions to share experience in use of molecular genetics in aquaculture and inland fisheries management.

It is expected that the training will assist countries to understand and manage the genetic status of their fish stocks, both for wild populations and for captive aquaculture broodstock. The participants will also provide the basis for the development of a regional network and research program, to be implemented by the trainees with coordination through NACA.

The participants expressed their thanks to NACA and collaborators for providing them the opportunity to be exposed to and strengthen their knowledge and skills in molecular genetics for practical application in fisheries and aquaculture management.

The workshop was funded by the FAO and supported by the Mekong River Commission, and organised and conducted by NACA in association with the Genetics Laboratory, Kasetsart University, Thailand and the Department of Fisheries, Thailand.

Resource persons were Dr. Devin Bartley of the Food and Agriculture Organisation, Prof. Uthairat Na-Nakorn of the Kasetsart University, Dr. Wongpathom Kamonrat of the Department of Fisheries, Thailand, Dr. Menchie Ablan of the WorldFish Centre and Dr. Thuy Nguyen of the Network of Aquaculture Centres in Asia-Pacific. Dr. Thuy Nguyen was also responsible for the organisation. Laboratory demonstrators include Ms. Srijanya Sukmanomon and post-graduate students undertaking research projects at the Fish Genetics Laboratory, Walailak Centre, Kasetsart University.

Outcomes of the 8th Technical Advisory Committee meeting

Iran was host to the eighth Technical Advisory Committee (TAC8), held in Ramsar from 1-3 October 2005, and preceded by the FAO Expert Workshop and Regional Aquaculture Review for Asia, which provided a valuable background for discussions. The meeting enjoyed broad participation with a total of 49 experts attending from 16 countries and representatives of 18 organizations including NACA's regional lead centres, FAO, and the Secretariat of the Pacific Community.

The objectives of the meeting were to assess the status of deliverables in the 2003-2005 work plan and identify new and emerging priorities and mechanisms for implementation, ie. to provide the technical basis for the development of the 4th Five-Year Work Programme (2006-2010), which will be discussed by the NACA Governing Council meeting in February. Discussions at TAC8 were opened with an overview presentation *Looking back – and looking ahead*

by the Director General, Mr Pedro Bueno. Country experts and representatives of regional organizations presented review papers on priorities and emerging issues before breaking into working groups. Key priorities and recommendations of the meeting are summarised below:

Aquatic animal health

- Enhance regional and international cooperation in aquatic animal health. Proposed activities include conducting joint exercises in risk management in trans-boundary movement and trade in aquatic animals and maintaining the Advisory Group on Aquatic Animal Health in support of the NACA Health Programme.
- Develop and implement practical national aquatic animal health strategies. Activities include studying the reasons for poor implementation of technical guidelines in some countries; provision of technical assistance to members in support of development and implementation; and development of protocols to assess the economic and socio-economic impact of aquatic animal disease in member countries.
- Improve surveillance, reporting and response to disease emergencies in the region through activities to build national and regional diagnostic capacity and strengthen disease reporting systems; and to better understand aquatic animal diseases and their control.
- Develop harmonised diagnostic procedures and approaches to risk assessment in the region through activities to improve national and regional capacity for import risk analysis, and through implementation of the three-tier regional resource base for aquatic animal health.
- Promote widespread adoption of better aquatic animal health management practices in the region through activities to better understand extension systems for health management, improve awareness and communication of responsible health management practices and related food safety issues; reduce the usage of harmful chemicals in aquaculture and explore the feasibility of alternative disease treatments.

Education and training

- Establish a regional network of training providers and follow up on formation of a regional Aquaculture Education Consortium, which will provide regionally accredited qualifications.
- Establish a Technical Cooperation Fund to facilitate exchange of expertise and support participation of national personnel in priority training courses.
- Develop a directory of training providers and publish a 'training calendar' for the network, on the NACA website.
- Develop a secondment program scheme.

Information and communications

- Provide a responsive information service and improve the accessibility of information on responsible aquaculture through analysis of stakeholders, their needs and information access capabilities.
- Encourage the participation of stakeholders in the information program through establishment of two-way information exchange and discussion fora with NACA centres, STREAM hubs and field projects such as the One-stop Aqua Shops and Self-Help Groups, industry and governments.
- Assist NACA centres to develop their own website presence and digital publishing activities in order to enable them to publish their own literature in local languages, through provision of training.
- Establish a regional network of webmasters in participating NACA centres, as a mechanism to exchange experience and share the limited IT expertise available in the network.
- Provide information support to the proposed coldwater fisheries network (subject to its substantive formation at the Mahseer workshop in Malaysia in March 2006).

Research and development

- Develop a new work program component on genetics, biodiversity, breeding and seed quality. The need for management of broodstock genetic resources was recognized as a long-standing issue for member countries as reports of genetic deterioration have been increasing in recent years. It was also recognized as an important component of seed quality and as a precondition for conducting genetic improvement programmes. The potential impact of stock enhancement on biodiversity and the genetic integrity of indigenous populations was also recognized as a priority issue.
- Improve aquaculture technology across the aquaculture sector in the region, as a common issue raised by all countries. Improvements to hatchery technology were identified as a special need, but the meeting recommended that specific technological needs should be defined through stakeholder meetings and included within the major components of the NACA work plan as appropriate.
- Develop and extend better management practices (BMPs) into new commodities and systems of importance to NACA members. BMPs were recognised as a cross-cutting issue within the NACA work program. The importance of the work conducted to support responsible shrimp farming through the Shrimp Farming Consortium and ACIAR funded work on cultured based fisheries was recognized.
- Increase emphasis on trade-related activities through activities including development of quality standards and certification for aquaculture inputs and products in

association with FAO and other international organizations; and facilitate members input into the CODEX Alimentarius to ensure that issues relevant to the Asian region and small-scale farmers are addressed.

- Strengthen work on environmental sustainability through research and guidelines on effluent treatment, environmental planning, zonation and carrying capacity and the development of environmental indicators for aquaculture.
- Strengthen work on socio-economic aspects of aquaculture, in particular the impacts of emerging trends such as increasingly stringent food safety and international trade requirements on small producers.

Support to Regional Aquatic Resource Management

- Help service providers to better understand the livelihoods of poor people involved with aquaculture and aquatic resources.
- Provide support and strengthen institutions to better support the needs of poor people involved with aquaculture and aquatic resource use.
- Support poor people involved with aquaculture and aquatic resource use to have a voice in policy development.
- Improve communication between policy-making institutions, service providers and poor people involved with aquaculture and aquatic resource use.

Sharing tsunami lessons

- TAC8 recommended adding an additional purpose to the work programme in Developing and Sharing Information to Address Emergencies, drawing on lessons learned from the tsunami recovery.

The full report of the meeting is available for download from the NACA website at: http://www.enaca.org/modules/mydownloads/viewcat.php?cid=175.

Taking the 'grey' out of 'grey literature'

In 2002 NACA adopted a policy of publishing all of our publications on the website for free download. We had no idea at the time that distribution of publications by electronic means would rapidly dwarf the distribution of hard copies, and for a very marginal cost. As we did not have access to a web developer on staff, and as few funds were available, we had to maintain the site ourselves with very limited technical and financial resources. This is a situation that many NACA Centres will be well familiar with. Hiring IT staff is not always a priority for organizations working on aquaculture development, and websites must compete with research projects for a slice of the organizational budget. In this kind of operating environment, organizations need to find a low-cost solution for web publishing that requires minimal technical input from IT staff. Only then can it be sustainable.

Fortunately, improvements in web technology have made this possible. The development of content management systems – computer programs that automate website management – mean that nearly anyone can run their own website. Many of these programs are available as free open-source software so affordability is no longer an issue. Over the past few years, the NACA Secretariat has used such tools to develop a low-cost and low technical input model for web publishing that can be sustained with few resources, making it highly suitable for adoption by NACA centres facing similar constraints. Accordingly, the Secretariat has developed a training course in Digital Publishing and Website Administration, which is set to become a regular offering. The objective of the course is to help network partners to establish and maintain their own website presence, and to publish their own literature online in their own languages for their own people. A secondary objective of the course is to establish a network of website administrators among participating NACA centres to provide mutual support in website development and also to improve the exchange of information between centres and countries.

Mr Nguyen Huu Nghia, NACA's first trainee in Digital Publishing and Website Administration.

The first training course in Digital Publishing and Website Administration was held from 21-25 November, for Mr Nguyen Huu Nghia from the Research Institute for Aquaculture No. 1 (RIA 1) in Vietnam. Mr Nghia had independently constructed the RIA1 website using the XOOPS content management system (free download from www.xoops.org), the same as used to maintain the NACA website. You can visit the RIA1 website, which Mr Nghia maintains in both Vietnamese and English, at http://www.ria1.org/.

A second training course is planned for March 2006, for two trainees from Can Tho University in Vietnam, and one trainee from the CHARM project in Thailand. The Secretariat welcomes expressions of interest from other centres that wish to participate in a regional network.

An introduction to the South Iran Aquaculture Research Center

Khouzestan Province is an area that is considered to have a very high potential for fisheries and aquaculture development, with more than 30% of Iran's freshwater resources, in addition to around 200km of coastline in the north of the Persian Gulf and a high fish biodiversity. Given these resources, it is not surprising that Khouzestan has been designated as the main focus for development of aquaculture in Iran. With plenty of non-agricultural soil, long periods of high temperature and sunlight the area has excellent potential for freshwater aquaculture and mariculture including shrimp. The northern mountainous part of the province also features a cool climate with plenty of cold streams that offer the opportunity for cold water fish culture.

History

Khouzestan Fisheries Research Centre (KFRC), as it was first known, started research activities with nine staff members in 1988 and a mission to support aquaculture development in the province. However, as the industry has developed in Iran the research needs have changed, with each major Iranian research centre moving to specialize in a particular field so as to contribute to the overall national fisheries and aquaculture development plan. KFRC is focussed on aquaculture research activities relevant to southern Iran; consequently KFRC was renamed the South Iran Aquaculture Research Centre (SIARC).

Location

SIARC is located 12km north of Ahwaz, city centre of the Khouzestan Province. It has a seven-hectare research farm with space to extend to fifteen hectares, a 2500 m^2 office building, five research departments, laboratories, a library, adminstrative support offices and a hatchery site. A mariculture station located in Bandar Imam Khomaini Port adjacent to the Persian Gulf is also affiliated to the centre.

Activities and Achievements

The centre has research departments in Aquaculture, Disease, Ecology, Stock Management and Biotechnology. Presently more than 100 staff members are working in the centre, mainly engaged in research activities. Up to now around 170 projects have been conducted of which about 70 were jointly conducted with Iranian universities and one in association with Kuwait as an international project. The results of the projects are usually transferred to the private sector for commercial application.

Most significant executed projects:

Aquaculture Department

- Artificial breeding of grouper *E.coioides*.
- Artificial breeding of *Barbus sharpeyi*.
- Artificial breeding of *B. grypus*.
- Artificial breeding of *B. xanthopterus*.
- Brood stock development from wild caught juvenile shrimp cultured under controlled conditions.
- Effects of salinity on growth and survival of Indian white shrimp.
- Nutritional requirements of Indian white shrimp.

Stock Management Department

- Khouzestan Province aquatic stock monitoring.
- Khouzestan Province white shrimp biomass monitioring.
- Stake net catch of Mahshahr region.
- Catch status of Karoon River.
- Silver promfret stock assessment in northwest of Persian Gulf (joint project with Kuwait).

Ecology Department

- Ecological survey and productive potential of Karkheh River and Dez Dam Lake.
- Heavy metal pollution in water and sediment of Khouzestan estuaries.
- Site selection for fish cage culture development in Bandar Mahshahr creeks.
- Ichthyoplankton survey of Khouzestan coast in three phases.

Fish Diseases Department

- Survey of the cause of death of amour in Khouzestan culture ponds.
- Survey of parasitic infections in endemic fishes of Hoor-Al-Azim marsh.
- Study of external hematic infections in fishes of Karoon river.
- Survey of bacterial and parasitic infections in cultured fish in Khouzestan.
- Surveillance for white spot disease in cultured prawn in Khouzestan.

Biotechnology Department

- In vitro application of green algae *Tetraselmis succica* as a growth inhibitor for *Vibrio harveyi* bacterium.
- The use of genetic markers in identification of *Barbus* fishes.
- Genetic improvement of *Barbus sharpeyi*.

Bandar Imam Marine Station

This station is mainly involved in mariculture activities and provision of support to other departments involved in maritime operations. The station comprises a small sea farm established with cages made from local materials.

Continued on back page.

Aquaclubs in India achieve good crops this year, with further challenges ahead

A collaborative team of NACA/ MPEDA staff has been working in India since 2001. Demonstration farms employing Better Management Practices for shrimp farming have been effectively disseminating improved farming techniques to farmers in the region via the formation of farmer groups (aquaclubs) and the number of the villages joining the programme is expanding every year. In 2005, another 20 villages join in West Godavari, Orissa, Tamil Nadu, Karnataka and Gujarath states.

In December 2005 the team visited three shrimp farming areas in India, Mogaltur, Bhimavaram and Narasapur and visited Sri Subramaneswara Aquaclub, Mathsyapur Aquaclub and Badwa Aquaclub to talk with the farmers and to discuss their views on the BMP project and issues on the last crop. Most of the farmers in the aquaclubs achieved good outcomes and harvests in their last crop. The leader of Mathsyapur Aquaclub told the team that that they were happy about the outcome and think they could have avoided suffering the heavy losses of three to four years ago if the BMP project support had been available back then. However, there is still much to do. Farmers will still face many challenges during 2006. Some of the issues ahead include:

Flood damage to ponds in Dhabharevu. Ponds without the protection of a mangrove buffer suffered severe damage. Areas protected by mangrove faired much better (note the lesser damage to the dyke in the background).

Eutrophication of water supply

The reason for the slow growth during the last crop in Sri Subramaneswara Aquaclub, Serepalem and the Kota area is suspected to be due to the eutrophication of the water supply in Uchinta. The ammonia level in this canal during the last crop was almost 1ppm and the pH was more than 9. One of the big paper mills releases its effluent to the upper part of this canal and many paddy fields also drain water into it. There has been a lot of siltation in the canal and the water flow during the high tides seems to be lower compared to previous years.

Low market price

Although the yield of the last crop was good, the price farmers received was low due to a price slump caused by increasing international supply and competition. Development of a way to distinguish BMP shrimp from other products would help motivate farmers to sustain the practice.

Increasing cost of production

Most of the farmers rely on diesel-fuelled pumps for conducting water exchange. The increase in the cost of fuel, due to the substantial increase in oil price in recent times has increased the cost of shrimp production. Farmers feel electrification of their farms could help to offset this.

High interest rates of loans to farmers

Most of the small farmers are relying on loan from local agents who are charging them 3% interest per month (36% per year). Even though they make profit through BMP implementation, they lose a lot of it in servicing such debts. One way to avoid this trap would be to create a revolving fund where farmers can borrow at more reasonable rates.

Flood damage in Badwa and Dharbharevu

During the wet season between September to October 2005, most of the ponds in Badwa and Dharbharevu were damaged by the floods, with severe damage to ponds near the river where there was no mangrove coverage to protect them. The other side of the river, where there is a rich mangrove plantation, suffered no visible damage. To prevent future flood damage to the shrimp ponds, mangroves need to be planted around the edges and this issue needs to be addressed in future farmers meetings.

Report contributed by Umesh N.R.

Rebuilding resilience of coastal populations and aquatic resources

NACA will collaborate with Wageningen University of the Netherlands in a new five-year project aimed at enhancing sustainable production in mangrove estuaries and adjacent coastal waters. The project, known as RESCOPAR, will focus on shrimp farming and coastal fisheries and will work in the Mekong Delta of Vietnam and in the Mahakam and Berau Delta in East Kalimantan, Indonesia. It is funded by the Wageningen University Interdisciplinary Research and Education Fund (INREF).

Due to the pressure by wild fisheries, mariculture is becoming increasingly important as an alternative source of aquatic food. However, there are many competing demands on coastal resources. For development to be sustainable, consideration must be given to the implications for people's livelihoods, maintenance of the long-term viability of the resource base including biodiversity, and alternative and future usage scenarios. In the case of shrimp farming, failure to address the trade-offs between the culture system and the natural resource base can lead to declining coastal productivity, increased risk of disease and crop loss, abandonment of ponds and impact the livelihoods of local people.

The RESCOPAR project will help facilitate sustainable use of coastal resources through:

i) The identification of ecologically sustainable production practices, and
ii) The development of adequate tools and information base to support better decision-making in coastal management, balancing the interests between poverty reduction and the sustainable use of aquatic resources.

The ultimate aim of the program is to develop scenarios enhancing sustainable production methods of living aquatic resources. The scenarios will be based on a multidisciplinary analysis of the interactions between global trade in shrimp, local livelihoods, mariculture and the estuarine environment. The activities are defined in four interdisciplinary research themes, and will be carried out through nine sandwich PhD-projects:

Theme 1: Impacts of spatial arrangements and temporal changes of aquaculture and fisheries activities in coastal ecosystems

1. Trade-offs in coastal fisheries production, mangrove structure and extent and shrimp-culture: a spatial modelling approach, Mekong Delta, Vietnam, in partnership with Can Tho University (CTU).
2. Marine protected areas, shrimp farms and coastal fisheries: linkages through cascading effects. Berau Delta, East Kalimantan, Indonesia, in partnership with the World Wildlife Fund for Nature Indonesia, The Nature Conservancy and the Mulawarman University (UNMUL).

Theme 2: Spatial interactions and resilience of shrimp pond – mangrove forest ecosystems

3. Spatial spread and virulence development of White Spot Syndrome Virus in cultured shrimp. Ca Mau Province, Vietnam, in partnership with CTU.
4. Disease transmission of White Spot Syndrome Virus in shrimp. Ca Mau Province, Vietnam, in partnership with CTU.
5. Shrimp life-support system: mechanistic analysis and (possible) optimisation of management measures on pond level and adjacent mangrove forest, East Kalimantan, Indonesia, in partnership with Mulawarman University (UNMUL) and Bogor Agricultural University.

Theme 3: Trade offs and feedbacks in resource use patterns, institutions and livelihoods.

6. Decision-making and change in coastal fish-based livelihoods in the Mekong Delta, Ca Mau province, Vietnam, in partnership with CTU.
7. Decision-making and livelihoods in East Kalimantan, Indonesia in partnership with UNMUL and the Indonesian Institute of Sciences.

Theme 4: Governance arrangements facilitating change in aquatic natural resource use

8. Global and local governance over coastal zone management in the Mekong Delta: the resilience of coastal communities to ecological change. Ca Mau province, Vietnam, in partnership with CTU.
9. Coastal governance between decentralisation and trans-national forces in East Kalimantan, Indonesia, in partnership with UNMUL and the University of Bogor.

The third theme on livelihoods aspects will be conducted in Indonesia in association with the EU program MANGROVE. The process of trans-disciplinary exchange between studies, themes and stakeholders will be ensured through annual local and regional workshops. To reach effective responses, governments at different levels, civil society organisations and market partners will be engaged in the program's activities.

The project will start on 29-30 April with an inception workshop for all partners in Can Tho, Vietnam.

Recent activities in STREAM

Self-help groups involved with advocacy for policy change now benefit from their efforts and links with the Fisheries Department

During its recent suite of DFID NRSP funded policy research work in India, the STREAM Initiative of NACA, together with the ICAR Central Institute for Freshwater Aquaculture and the NGO GVT, has worked with a wide range of stakeholders, including farmer colleagues in Fulwartoli in Bundu block of Jharkhand state and the Department of Fisheries of Jharkhand.

Following excellent work by the DOF, the farmers of Fulwartoli and community leader Bhin Nayak, their nearby 36 ha tank (which features in the video documentary reported to policy makers in Delhi through project R8100) has now been cleared of weeds and debris by the Department of Fisheries and the fishermen and will soon be handed over to four Self-Help Groups inspired by Bhim's visit to Jabarah and formed with the support of the NGO ODA, under the DFID-NRSP project R8334 Promoting the Pro-Poor Policy Lessons of R8100 with Key Policy Actors in India.

The second time we visited Fulwartoli with the Deputy Director Fisheries, Ashish Kumar, we presented Bhim Nayak with a STREAM t-shirt, joking that this was the only tangible outcome we could guarantee from the experiment in facilitated advocacy by the project.

We congratulate Bhim, the fishers and the Fisheries Department on their success, and wish them well with this great new opportunity! We also look forward to hearing more about the progress made.

Rural aquaculture manual for Western Orissa

The Orissa Watershed Development Mission in collaboration with the Western Orissa Rural Livelihoods Project, NR International and STREAM has produce a rural aquaculture manual for western Orissa in the form of nineteen Better-Practice Guidelines in English and Oriya.

The Better-Practice Guidelines (BPGs) are intended as a step-by-step guide to the activities that occur within a typical aquaculture year in western Orissa and are aimed at people interested in starting activities as well as those already practicing aquaculture. They can be consulted individually, and also build into a manual with key topics including pond construction, seed and fish production and advice on marketing and maintaining a healthy stock.

To view the nineteen Better-Practice Guidelines please visit the Better-Practice Guideline page of the STREAM Virtual Library: http://www.streaminitiative.org/Library/bpg/index.html.

Western Orissa fish nursing network makes profit in its first year of operation

In collaboration with the Government of Orissa Watersheds Mission and the STREAM Initiative, the NGO Sahabhagi Vikash Abhiyan (SVA) has established a nursery network for managing and marketing the carp seed produced from the newly-installed hatchery at its rural Western Orissa campus. The carp hatchery, designed by STREAM, was built by SVA with support from DFID through NR International and uses fiberglass reinforced tanks designed and built locally by CIFA. In its first year the pilot network comprised farmers managing a total of 53 nursery ponds (24 in Nuapada, 7 in Kalahandi, and 11 each in Bargarh and Bolangir districts). The SVA hatchery supplied 5, 600,000 seed to these nursery pond owners in its first period of operation, during capacity building for its newly recruited staff. The network farmers harvested a total of 686,200 fry and 143,000 fingerlings, which were all stocked in different water bodies by late October 2005. Nursing can provide rapid returns to small-scale farmers with just one or two small (around 0.04 ha) ponds. Farmer profits in the first year of the network (and for many their first attempt at aquaculture) ranged between Rs 6,000 to Rs 13,000 in just three weeks. A leading farmer from the network who has five small ponds made a profit of Rs 70,000 in two months. Three farmers failed to make a profit on nursing. In Western Orissa income generating opportunities are relatively limited. Nursing fish provides a livelihood option for small-scale farmers with tiny farm ponds and contributes fry and fingerlings to an area deficient in seed for on-growing.

Training of Rural Aquaculture Trainers in Western Orissa

STREAM in collaboration with Western Orissa Rural Livelihoods Project completed a third training of rural aquaculture trainers in Padmapur, Bagarh district, Orissa from the 16th to the 18th of November 2005. The purpose of these workshops is to assist WORLP to support aquaculture Western Orissa by building aquaculture capacity in the context of watershed management.

Provincial Consultation on National Fisheries Policy and Implementation, Pakistan

Mr. Bill Savage and STREAM Communications Hub Manager for Pakistan, Mr. Junaid Wattoo recently conducted provincial consultations on the National Fisheries Policy in Punjab and Sindh provinces. These consultations, held from 9-22 November are the latest activities in the project Support to Fisheries Sector Policy and Strategy Formulation. The project is funded by FAO under the Technical Cooperation Program.

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First international PCR training workshop completed

Participants in the first PCR training workshop, Central Institute for Brackishwater Aquaculture, India.

PCR is now widely used to screen shrimp seed prior to stocking in many countries of the region. However, disease continues to impact seriously on production due to variations in the reliability of screening, compounded by on-farm factors that may result in disease even when seed has been properly screened. Of the several possible reasons, some of the important ones include (a) low-level or low-prevalence WSSV infections that escape detection during PCR screening (b) other potential sources of WSSV infection such as naturally recruited shrimp, crustacean carriers and zooplankton, (c) other pathogenic viruses that occur commonly in shrimp and may contribute to disease, (d) lack of harmonization and inter-calibration of PCR testing capabilities of different laboratories and (e) inadequate communication to farmers of effective health management practices. In response to such problems, the Australian Centre for International Agricultural Research (ACIAR) has developed a regional project - *Application of PCR for improved shrimp health management in the Asian region*. The three-year project commenced implementation in January 2005. Key partners include CSIRO in Australia; MPEDA, CIBA and College of Fisheries, Mangalore in India; Mahidol University, BIOTEC and NACA in Thailand and the Ministry of Marine Affairs and Fisheries in Indonesia.

Under the broad framework of the regional ACIAR project, a week-long PCR training work shop was held on 17-21 October, in CIBA, Chennai, India. Dr. P. Ravichandran, Director, CIBA-ICAR welcomed the workshop participants, and the workshop was formally inaugurated by Dr. Yugraj Yadva, Member Secretary, Aquaculture Authority of India.

The objective of the first PCR training workshop was to provide basic training on PCR technology in order to improve the participant's understanding on the subject and to ensure quality and reliability in their results. The course was presented by an expert panel of instructors/ demonstrators from Australia (Prof. Peter Walker, Mr Nick Gudkovs, Dr Rajendran), Thailand (Prof. Timothy Flegel, Dr Nusra Sittidilokratna, Dr C.V. Mohan) and India (Dr Vijayan, Dr Indrani Karunasagar, Dr Santiago, Dr Satlin, Ms Sanjuktha). Lectures included emphasis on basic virology, molecular biology, nucleic acids, principles of PCR, PCR detection of DNA and RNA viruses, shrimp viral diseases, their diagnosis and management. The practical contents were designed to provide good understanding of PCR methodology, laboratory practices and trouble shooting in detection of both DNA and RNA viruses. To ensure effective learning and uptake, practical classes were conducted in five small batches of six participants and each batch was provided with one expert demonstrator. In addition, all the participants were provided with a practical course manual, detailing step-wise procedures for all the practical exercises.

The breakdown of 25 participants included private PCR service providing laboratories (twelve), PCR laboratories in hatcheries (five), Government PCR service providing laboratories (six) and research institutions (two). In addition, three participants, one each from Bangladesh, Sri Lanka and Myanmar attended the workshop fully supported by ACIAR. As places were limited, applicants who could not be selected for the training workshop were invited to attend the theory classes. A large number of them attended and participated in the discussions.

The formal valedictory function was held at CIBA on 21 October 2005. Dr Ravi Chandran, Director of CIBA, welcomed the guests and participants. Dr Peter Walker spoke briefly about the broader aspects of the regional ACIAR project, the training workshop and the proposed PCR calibration programme. Mr Pedro Bueno, DG of NACA emphasized the importance of sharing regional resources and expertise to address common problems like shrimp health in the region. He also distributed a certificate of completion to all the participants. Dr Mohan Kumar, Chairman of MPEDA delivered the valedictory address and stressed the importance of providing the farmers with reliable and accurate PCR results and supported the need to organize PCR calibration programmes that could lead to some form of future accreditation schemes in the country. Representatives from amongst the participants shared their views about the training programme and thanked the organizers and resource experts for their excellent contributions. It was widely acknowledged by the participants that the hands on training workshop was very useful for them and would help them to improve performance in their laboratories.

Financial support for the activities in India was provided from MPEDA and ACIAR. Technical support for the programme was provided from other ACIAR project partners, namely CSIRO, CIBA, NACA, Mahidol Biotech and College of Fisheries, Mangalore. In addition, CIBA, CSIRO and NACA contributed significantly in kind for the preparation and implementation of the training workshop and the proposed PCR calibration programme.

Considering the importance of reliable PCR screening to the profitability of the industry, the workshop made the following key recommendations:

- PCR service providers (government, private independent and hatchery-based) should consider establishing a Professional Association of PCR Service Laboratories and develop codes of practice for members, minimum standards of training and an email communication network.
- Resource experts involved in the project should consider developing a better practice (BP) manual for PCR testing in government and private laboratories and hatcheries. It should include all aspects of sampling, transport and storage, extraction, testing and analysis and reporting of data.
- Concerned organizations (MPEDA/CIBA/NACA/ACIAR) should develop and implement a transparent PCR calibration programme amongst interested PCR service providing laboratories and subsequently offer assistance to laboratories that need improvement.
- The project should consider developing a way forward document - ensuring reliability of PCR testing - for implementation by MPEDA. The document should outline implementation strategies that MPEDA/or other agencies in India could use as the basis to implement some form of quality assurance programme and possibly a mechanism of accreditation of PCR labs and a mechanism for monitoring their performance.

Recent activities in STREAM

Continued from page 7.

The project aims to gather the views and opinions of fishing communities and fish farmers on the first ever National Fisheries Policy for Pakistan.

One-stop Aqua Shop established in Punjab, Pakistan

A One-stop Aqua Shop (OAS) has been established in AliPur District Gujranwala Province, Punjab, Pakistan, making Pakistan the third country to establish an OAS following India and Vietnam. During a recent workshop of the Provincial Community Consultation on National Fisheries Policy the OAS concept was discussed with members of the NGO Nature Farming Research and Development Foundation (NFRDF) and local fish farmers. Following this with the support of STREAM Pakistan and fish farmers an OAS has been established by NFRDF in the heart of area comprising of more than 10,000 acres of fishponds. It is intended that the AliPur OAS will provide a range of services including fingerlings of aquaculture species, fish feed, fertilizers and chemicals at reasonable prices. The OAS will also act as a source of extension services including information on training, sources of loans and information about relevant government schemes. A water quality testing facility will also be provided free of charge as the area has recently suffered from massive fish kills thought to be due to poor water quality. Literature produced by STREAM will be made available though STREAM's OASIS service. The OAS was inaugurated on the 18th of December 2005 by the Communications Hub Manager from STREAM Pakistan Mr. Junaid Wattoo. More OASs are planned in collaboration with NFRDF in the near future.

AusAID funds two aquatic animal health projects

AusAid, under the ASEAN-Australia Development Cooperation Program's Regional Partnership Scheme (AADCP-RPS) has recently approved funding support for two aquatic animal health projects - i) Strengthening Aquatic Animal Health Capacity and Biosecurity in ASEAN and ii) Operationalise Guidelines on Responsible Movement of Live Food Finfish in ASEAN. These two projects will contribute significantly towards implementation of the Asia Regional Technical Guidelines for Responsible Movement of Live Aquatic Animals in ASEAN member countries.

Strengthening Aquatic Animal Health Capacity and Biosecurity in ASEAN

NACA will coordinate this project with the Australian implementing partner, AusVet Animal Health Services. Other partners are the ASEAN Secretariat, Aquatic Animal Health Research Institute (AAHRI) of Thailand and the Department of Agriculture, Fisheries and Forestry (DAFF), Australia. As part of the AADCP-RPS, the project will be managed by ACIL Australia Pty Ltd.

The project goal is to enhance the capability of ASEAN member countries to implement ASEAN-harmonized national aquatic animal health strategies to manage risks to the biosecurity of fisheries industries, particularly those related to trade and impacting on the poor. The project has the following objectives:

- Development of harmonized approaches to aquatic animal health management and biosecurity in ASEAN.
- Improving capacity to implement ASEAN-harmonized national aquatic animal health and biosecurity strategies.

The expected outputs include:

- Guidelines prepared for ASEAN members on harmonized aquatic animal health and biosecurity strategies within ASEAN, including an operational strategy for their implementation.
- Technical support provided to four ASEAN countries (Cambodia, Lao PDR, Myanmar, Vietnam) for development of national aquatic animal health and biosecurity strategies.
- Training courses implemented for twenty personnel from ASEAN in epidemiology, surveillance, risk analysis and contingency planning.
- Training material developed on aquatic animal health and biosecurity for all ASEAN countries and made widely available.

The following activities will be carried out over the next 18 months (January 2006 to June 2007) to accomplish the project objectives and goals.

Policy workshops

Two regional workshops of four days duration will be organized with participation of all ASEAN members to build consensus and support preparation of harmonized national strategies for aquatic animal health and biosecurity. The workshops will involve two people per country, including designated National Coordinators and a technical/policy person, together with NACA resource persons from Australia, ASEAN and concerned international agencies such as FAO and OIE. The first workshop will analyze the status of aquatic animal health management plans, capacities and institutional arrangements in ASEAN members, identify gaps, and prepare an overall workplan and detailed outputs for the project. The second will adopt the harmonized guidelines for implementation of national strategies for ASEAN countries prepared during the project. Technical support will be provided during the inter-workshop period to assist in preparation of the national strategies.

Technical assistance

Country specific activities (e.g. establishing national aquatic animal health committees, developing national list of diseases of concern, developing national strategies, piloting surveillance and disease reporting systems, developing contingency plans) will be conducted in Cambodia, Lao PDR, Myanmar and Vietnam in collaboration with relevant stakeholders including producers, disease support personnel and policy makers. Experts and institutions from ASEAN and Australia will be involved as resource persons/institutions to support country specific activities.

Capacity building

Two regional training programs of seven days duration will be conducted over two years. The emphasis will be on development of practical skills, particularly in the areas of epidemiology, surveillance, risk analysis, contingency planning, disease reporting and information management. NACA, in consultation with National Coordinators and other relevant bodies, will identify key participants for the training. Two participants per country will be identified considering their qualification, experience and responsibilities. The training program will be organized by NACA with support from experts and institutions from ASEAN and Australia as resource persons. To ensure long-term benefits

and sustainability, emphasis will be given to practical and low-input methods to allow the sustainable application by countries with limited resources.

Aquatic animal health training and educational materials

Training/educational materials from the course will be made widely available to ASEAN education and training institutes, in hard copy and web-based electronic formats, to support capacity building in ASEAN in aquatic animal health and biosecurity. Strategies for effective dissemination will be developed in consultation with National Coordinators and trainees during workshops.

Operationalise Guidelines on Responsible Movement of Live Food Finfish in ASEAN

Australian implementing partner, AusVet Animal Health Services, will be coordinating this project with ASEAN Secretariat and NACA, in partnership with the ASEAN Sectoral Working Group on Fisheries (ASWGFi). As part of the AADCP-RPS, the project will be managed by ACIL Australia Pty Ltd.

The project aims to enhance the biosecurity of food finfish industries in ASEAN Member Countries by reducing the risk of spread of specific fish pathogens. It is intended to enable ASEAN to develop harmonized standard operating procedures for health certification and quarantine measures for transboundary movement of live food finfish. The project has the following objectives:

- To develop an inventory of ASEAN member health certification and quarantine procedures for live food finfish and finalize the ASEAN model to specify the scope of Standard Operating Procedures.
- To develop a set of ASEAN Standard Operating Procedures for health certification and quarantine measures for international trade in live food finfish.
- To raise awareness of and provide training in the use of the Aquatic Animal Pathogen and Quarantine Information System (AAPQIS).

The key output from the project will be a documented set of ASEAN standard operating procedures (SOPs) for health certification and quarantine measures for international movement of live food finfish that are accepted and adopted by all ASEAN member countries. It will be the responsibility of each country to implement the SOPs under the guidance of the ASWGFi and in consultation with NACA and ASEC.

The following activities will be carried out over the next 18 months (January 2006 to June 2007) to accomplish the project objectives and goals.

Development of an inventory

Baseline information on current practices in ASEAN member countries is a prerequisite for both identifying existing best practice and where major deficiencies exist. The ASWGFi has already indicated that this is best achieved through an inventory to be completed by each country. A template will be developed to collect information on member countries' current systems. This will be distributed to member countries to be completed by project members. Responses will be collated and distributed. This instrument can also be used to detail the species and numbers of fish involved in international trade.

Policy workshops

Two regional workshops (duration two days each) will be organized with participation of all ASEAN members. The proposed objectives of the workshop are to finalize the ASEAN export-import model, which will specify the scope of the SOPs, and to form the necessary working groups to write them and develop a detailed work plan. Mentoring the four workgroups to develop consistent SOPs will run over approximately 12 months. The second workshop will ratify SOPs and agree to their adoption.

Training in AAPQIS

In order to effectively implement the agreed model and SOPs, it is essential that ASEAN member countries have ready access to the information required upon which to base policy decisions on the movement of aquatic animals. AAPQIS provides this information and is an essential tool for analysts and decision makers in this field. This objective will be met by holding two one-day training sessions, following immediately after each of the two SOP workshops.

To know more about these two projects, please contact CV Mohan at mohan@enaca.org or David Kennedy at david@ausvet.com.au.

250,000 free downloads and 2,000 registered members

We are pleased to announce that the publication download counter on the NACA website (active since March 2004) has just ticked over 250,000 mark. We are also pleased to welcome the 2,000th registered member of our online community, Michael Sheam from Singapore..

Why don't you join us?

www.enaca.org

Asia Regional Advisory Group continues to support aquatic animal disease management in the region

Participants in the Advisory Group meeting.

The fourth meeting of the Asia Regional Advisory Group (AG) on Aquatic Animal Health (AGM-4) was held at Hotel Taj Samudra, Colombo, Sri Lanka on 22-24 October 2005 in conjunction with the 6th symposium on Diseases in Asian Aquaculture. The meeting, attended by ten Advisory Group and six co-opted members, addressed key aquatic animal health issues in Asia, including the regional quarterly aquatic animal disease reporting system; the spread of emerging aquatic animal diseases in the region; implementation of the Asia Regional Technical Guidelines on Health Management and the Responsible Movement of Live Aquatic Animals; operation of the three-tier regional resource base for health; and ways to further strengthen regional and international cooperation in Asian aquatic animal health management. The AG, constituted by the NACA Governing Council in 2001, in cooperation with OIE and FAO, has been providing advice to Asian governments and NACA on aquatic animal health management matters in the region. Some of the key points discussed and recommendations made are summarized below.

Emerging diseases

The AG expressed concern that transboundary diseases are still hampering or threatening the sustainable development of aquaculture in the region. The spread of diseases such as infection with KHV and taura syndrome was recognized as a serious issue. Emerging diseases such as red spot disease in grass carp; white tail disease (WTD) in *Macrobrachium rosenbergii*; white body disease and slow growth syndrome in *P. monodon*, and abalone viral mortality were recognized as having serious potential to spread. WTD appears to be present in an increasing number of countries, although this is not yet reflected in the QAAD. Underestimated bacterial diseases like streptococcosis (*Streptococcus iniae* and *S. difficilis*), nocardosis (*Nocardia seriolae*) and infection with *Tenacibaculum maritimum* are believed to be associated with serious losses in finfish culture. The AG emphasized the need to increase awareness on emerging and underestimated diseases in the region.

The cryptic nature of shrimp viruses and their often high prevalence even in the absence of clinical disease has strong aquatic animal health management implications. The high number of variants of the same virus (e.g. taura syndrome virus) represent a threat of unknown proportions. The fact that *P. vannamei* has now replaced *P. monodon* as the leading cultivated species in Asia has several aquatic animal health implications. The use of specific pathogen free (SPF) shrimp represents an important way forward, but the fact that non-SPF *P. vannamei* is being used in the region, leading to the emergence of several health problems (e.g. TSV, NHP), is a serious concern. In view of this, IMNV first reported in *P. vannamei* in Brazil may represent a threat to *P. vannamei* farming in the Asian region also. Transboundary movement of broodstock still plays a major role in the spread of shrimp pathogens. The practice of holding broodstock of different species in the same holding space by brokers should therefore be avoided.

Considering the increasing trend of transboundary movement of live aquatic animals for aquaculture, the AG recommended a continued sharing of regional experiences and lessons learned. The AG recognized that it is difficult for regional and international organizations to recommend a blanket ban on introduction of exotic species, however, the AG considered that it would be worthwhile to discourage irresponsible introduction of exotic species.

Asia Regional Technical Guidelines

Considering the differences in implementation of the technical guidelines across countries, the AG recommended that countries second staff to support the development and implementation of country-specific aquatic animal health work programmes. Based on the experiences and lessons learnt from Vietnam, the AG recognized the significant advantages of in-country projects in progressing implementation of the guidelines. The AG recommended that NACA should work with countries to develop generic health projects that could be used as entry points to progress the implementation of elements of the technical guidelines. NACA should investigate the development of simple and practical surveillance systems in other countries to suit the existing resources and expertise based on the lessons learned in Vietnam.

The AG appreciated the initiatives taken by NACA to promote communication between National Coordinators (NCs) and Chief Veterinary Officers (CVOs). The AG appreciated the role played by NACA in working with the fisheries authorities towards helping member countries to send comments to reports of AAHSC and in the nomination of national focal points for aquatic animal health. The AG recommended that NACA continue working in this direction and facilitate implementation of the "Noumea OIE recommendations" in the region. Considering the proposed OIE global conference in Norway (October 2006) to promote cooperation between veterinary and fisheries authorities, the AG recommended that NACA should explore opportunities to bring fisheries authorities (e.g. National Coordinators) to the meeting and initiate discussions with OIE and FAO. The AG took note of the proposed model for cooperation between fisheries and veterinary authorities in Sri Lanka and recommended that NACA facilitate formation of a national advisory committee on aquatic animal health there with representatives from veterinary and fisheries authorities and provide technical assistance so that a national aquatic animal health strategy could be developed and implemented with the involvement of both.

Considering the revisions carried out to the OIE disease list and the inclusion of several diseases of regional concern in the QAAD, the AG agreed that the Asia Diagnostic Guide to Aquatic Animal Disease (ADG) should be revised. The AG suggested that the revised ADG should contain all the QAAD listed diseases and additional diseases which the AG considers important for the region. In addition to the hard copy, web based interactive versions and CDs of the revised version should also be produced.

Regional and international cooperation

The AG appreciated the efforts of NACA in securing funding support from AusAid under the AADCP-RPS framework for implementing two projects in the ASEAN region. These were: i) Strengthening Aquatic Animal Health Capacity and Biosecurity in ASEAN and ii) Operationalise Guidelines on Responsible Movement of Live Food Finfish in ASEAN (see page 10). The AG recommended that NACA should use the project activities to progress the implementation of important elements contained in the technical guidelines in ASEAN member countries. Recognizing the value of the project to other NACA member countries, the AG suggested that NACA should explore opportunities to involve member countries from south Asia in the programme, where possible.

The AG was informed of the progress made under the Australian Centre for International Agricultural Research (ACIAR) funded regional project - Application of PCR for improved shrimp health management in the Asian region. Under the broad framework of the regional project, PCR training workshops were completed in Indonesia and India (see page 8). The AG took note of the proposed PCR calibration exercise under the project and appreciated the initiatives taken to achieve harmonization in the region.

The AG appreciated the progress made with respect to the Australian Department of Agriculture, Fisheries and Forestry/NACA initiative "to enhance regional capability to quickly and effectively respond to aquatic animal disease emergency incidents, through the development of coherent emergency disease plans and by enhancing the emergency management framework within the region", and recommended that NACA work closely with DAFF to modify the Australian disease identification field guide to become an Asia-Pacific regional disease identification field guide and modify AQUAVETPLAN of Australia to become a regional resource.

Considering the potential utility of the three tier regional resource base to support implementation of the technical guidelines, the AG recommended that the number of resource experts and resource centres be expanded to include new subject areas, to follow the specific elements within the technical guidelines (e.g. epidemiology, surveillance, risk analysis, disease diagnosis). Recognizing the fact that WTD is spreading in the region and that robust diagnostic methods are available in select number of laboratories, the AG recommended that a regional reference laboratory for WTD be identified and made operational.

The AG was pleased to note the excellent regional and international cooperation that had contributed to the development and implementation of the regional aquatic animal health program in Asia. It was generally agreed that such cooperation should be further pursued, and the AG took note of various opportunities to further strengthen cooperation with

regional and international bodies to support Asia in effective implementation of the regional aquatic animal health program.

Outputs from the OIE General Session and Aquatic Animal Health Standards Commission meeting

Considerable changes have been made to the OIE list of diseases. All diseases previously listed by OIE have now been assessed against the new listing criteria and diseases that did not meet them have been removed. The delisting of four diseases (infectious pancreatic necrosis, bacterial kidney disease, infection with *Mikrocytos mackini*, infection with *Perkinsus olseni*) and the addition of three diseases (Koi herpesvirus disease, necrotizing hepatopancreatitis and infectious myonecrosis) appear as under study in the 8th (current) edition of the 2005 *Aquatic Animal Health Code*. The new OIE online reporting mechanism will include the reporting of:

- The status of all OIE-listed diseases to be conducted every six months.
- Findings of epidemiological significance for non-listed diseases on a six-monthly basis.
- Other information of significance to other countries on an annual basis.
- The occurrence of emergencies within 24 hours. For listed diseases: specified events (e.g. first occurrence or re-occurrence; new host; new strain; new manifestation; new zoonotic potential). For non-listed diseases: emerging disease or pathogenic agent should there be findings that are of epidemiological significance to other countries.
- Weekly follow-up reports on emergencies until the situation is sufficiently stable to revert to six-monthly reporting, in which case the reporting of an emergency should conclude with a final report.

Regional quarterly aquatic animal disease (QAAD) reporting

The AG noted the significant improvement of QAAD reporting in the region over the years (since the 3rd quarter of 1998), and emphasized the need to further strengthen it. It was decided that the regional reporting system should keep its quarterly format, but that changes could be made at a later stage in view of the experiences gathered by the OIE through their new six-monthly online reporting system. For all the countries in the region, the AG strongly recommends use of existing structures (e.g. government institutions, private sector, research institutions, etc.) within the country to collect information to be used for the regional disease reporting. NACA should provide countries with technical assistance to strengthen surveillance, especially passive surveillance. It was recommended that efforts should be exerted by member countries towards the development of surveillance systems for commodities other than shrimp.

Changes to the QAAD reporting form

The list of diseases included in the QAAD reporting form are revised annually to conform with changes to the OIE Aquatic Animal Health Code and to reflect the aquatic animal disease situation in the region. The following revisions were approved by the AG:

Under Diseases Prevalent in the Region:

- *Onchoryncus masou* virus disease, infection with *Mikrocytos roughleyi*, infection with *Haplosporidium nelsoni* and spawner isolated mortality virus will be delisted.
- Viral encephalopathy and retinopathy, enteric septicemia of catfish and infection with *Martelia sydneyi* will be included under non-OIE listed diseases relevant to the region.
- Infection with koi herpes virus and necrotising hepatopancreatitis will be moved from non-OIE listed diseases relevant to the region to OIE listed diseases prevalent to the region.

Under Diseases Presumed Exotic to the Region:

- White sturgeon iridoviral disease and infection with *Haplosporidium costale* will be delisted.
- Infectious myonecrosis will be included under diseases presumed exotic to the region, but listed by OIE.
- Channel catfish virus disease and piscirickettsiosis will be included under diseases presumed exotic to the region, not listed by the OIE, but of potential relevance.

The full report is available for download under http://www.enaca.org/modules/mydownloads/visit.php?cid=154&lid=818.

News in brief

Indonesia accedes to the NACA Agreement

We are very pleased to announce that the Government of Indonesia has acceded to the NACA Agreement, upon signature of the President in November 2005. Indonesia's membership application will be formally presented to the 17th Governing Council Meeting, in Iran, February 2006.

The Government of Indonesia has been actively involved in and supported NACA activities from its first days as an FAO project in 1979. In recent years Indonesia has played a key role in the Asia-Pacific Marine Finfish Aquaculture Network, leading the way with ground-breaking research and sharing its expertise through activities such as the Grouper Hatchery Production Training Course.

We look forward to welcoming Indonesia as the 17th member government of NACA in February.

Governing Council 17 to set NACA Work Programme 2006-2010

The 17th Governing Council Meeting will be held in Tehran, 25-28 February. The main issue on the agenda will be the development of the next NACA five-year work programme for the period 2006-2010. Detailed information on the work programme will be made available on the NACA website www.enaca.org as it becomes available. The Council will also elect the next Director General of NACA.

Marine fish culture manuals now available in Thai

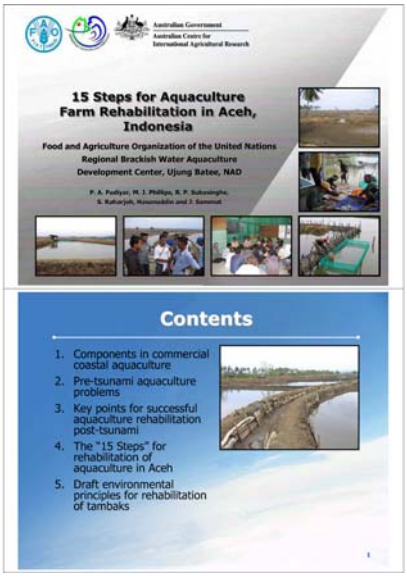
We are pleased to announce that a printed Thai language version of A Practical Guide to Feeds and Feed Management for Cultured Groupers, and A Guide to Small-Scale Marine Finfish Hatchery Technology, are now available. To order, contact the NACA Secretariat. Electronic versions are also available in Thai, Mandarin, Bahasa Indonesia (and soon in Vietnamese) for download from the NACA website, www.enaca.org.

Diseases in Asian Aquaculture V: Proceedings

The FHS/AFS is proud to announce the release of DAA V, the fifth volume of a series of the Fish Health Section's Diseases in Asian Aquaculture book publications. DAA V contains papers originally presented during the Fifth Symposium on Diseases in Asian Aquaculture, held in Gold Coast, Australia on 24-28 November 2002 and participated by 212 scientists from 32 countries. This fifth volume consists of 53 contributions peer-reviewed by 71 aquatic animal health experts around the globe. For more information, download the table of contents from the NACA website at: http://www.enaca.org/uploads/daav-contents.pdf.

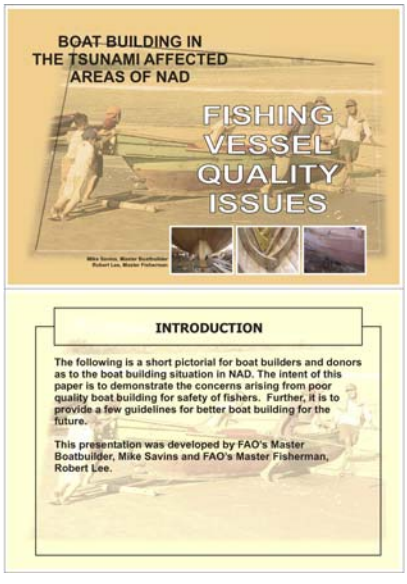
Aquaculture Rehabilitation Guide in Aceh, Indonesia

FAO and Directorate General of Aquaculture, Indonesia have released a guide on "15 steps for aquaculture farm rehabilitation in Aceh, Indonesia". This newly released guide, available in English and Bahasa language and prepared in collaboration with the Australian Centre for International Agricultural Research (ACIAR), provides a step by step approach to aquaculture rehabilitation and is intended to support agencies involved in rehabilitation of coastal pond aquaculture in Aceh. The guide is available for download from: http://www.enaca.org/modules/mydownloads/singlefile.php?cid=168&lid=780.



Boat building in the tsunami affected areas of NAD: Fishing vessel quality issues

This is a short pictorial guide for boat builders and donors as to the boat building situation in NAD. The intent is to demonstrate the concerns arising from poor quality boat building for safety of fishers. It also provides a few guidelines for better boat building for the future. The guide provides illustrations of poor quality construction, wood and fastenings, and guidelines on proper drying of wood and how to build boats better. The guide was developed by FAO's Master Boatbuilder, Mike Savins and FAO's Master Fisherman, Robert Lee. *An excellent publication that should also be read by donors engaged in procurement and provision of boats. Ed.*



Australasian Aquaculture 2006, 27 - 30 August, Adelaide

Australasian Aquaculture 2006, to be held in Adelaide, South Australia, will be the second in a series of international conferences, meetings, events and trade shows held biennially near the major aquaculture producing regions in the Asia Pacific. The theme for Australasian Aquaculture 2006 is "Innovation in Aquaculture". Innovation is not only new technology. Increasing product entering new markets, obtaining skilled labour, in fact, all aspects of aquaculture require a level of innovation. Adelaide is close to some of the most active aquaculture producing regions of Australia that produce southern bluefin tuna, oysters, mussels, abalone, yellowtail kingfish, mulloway and barramundi.

East Asian Seas (EAS) Congress, 12-16 December 2006, China

The GEF/UNDP/IMO Regional Programme on Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), together with the PR China government, State Oceanic Administration (SOA), Hainan Provincial government and partner organizations, will co-organize the East Asian Seas (EAS) Congress 2006. The staging will be a follow-up to the successful Congress held in Putrajaya, Malaysia in 2003, highlighted by the endorsement of the landmark Sustainable Development Strategy for the Seas of East Asia (SDS-SEA) and the signing of the Putrajaya Declaration by ocean and environment ministers from PEMSEA's 12 participating countries during the Ministerial Forum.

For more information visit http://www.eascongress.way.to/.

Aquafeed Production Workshop, 8 March 2006, Thailand

An aquafeed production workshop will take place along side Victam Asia 2006 at the Queen Sirikit National Convention Center, Bangkok.

The aim of the one-day technical workshop is to help manufacturers optimize formulations and production processes to create better quality and more profitable aquafeeds. It will be a unique chance for aquaculture feed producers and others interested in aquafeed production to learn expert tips from some of the best technical brains in the business.

The workshop will be taught by: Dr. Mian N. Riaz, Texas A&M University; Dr. Chhorn Lim, USDA-ARS; Colin Mair, Dragon Feeds; Dr. Dan Fegan, Alltech; Merryl Webster, Format International; Galen J. Rokey, Wenger; Stuart Howsam, Buhler; Gary Minor, Mill Technology; Paul D. McKeithan, Aeroglide; and Bernard Devresse, BernAqua.

Topics discussed will include:

- Making more profit with new technologies for aquafeed.
- Moisture uniformity, why should you care?
- Optimizing size reduction technology to process better quality, more profitable aquafeeds
- Optimization of formulation and product quality parameters of extruded aquafeeds.
- Manufacturing micro-diets.
- Increasing aquatic feed production rates through plant audits.
- Novel protein alternatives for aquaculture.
- Formulation software and handling variability.

The conference is organized by Aquafeed.com, the aquafeed information portal, in association with Victam Asia 2006 and supported by the Thai Department of Fisheries, Ministry of Agriculture & Co-operatives, Thai Feed Mill Association and the Thai Chamber of Commerce. For more information, contact: editor@aquafeed.com or visit: www.aquafeed.com.

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NACA is a network composed of 16 member governments in the Asia-Pacific Region.

This newsletter is sent free to governments, libraries, development agencies and other interested parties on request.

Introduction to SIARC

Continued from page 4.

The farm is used to maintain broodstock. The main site of the station is located in the port of Bandar Imam. The facilities include a small research vessel, phycolab, indoor and outdoor live food space, spawning tanks, incubation place, larvae rearing place, water processing facilities, power and pump stations and staff accommodation. For more information about the centre, please contact Dr. Jassem Maramazi, email siarc_ifro@yahoo.com.

Profile by Vahid Tofighi.