

improvement of the ulcerative condition is noticed within a week days of application of the medicine as the ulcers heal up slowly.

Impact of EUS infected fish on trade

The majority of the fish sales in urban, suburban and rural markets decreased due to this EUS disease outbreak. Consumers hesitate to purchase diseased fish in local markets. Consequently, pecuniary losses are suffered by farmers and fishers when EUS occurs.

Conclusions

In Andhra Pradesh, since fresh water aquaculture or inland capture and culture-based fishery activities are predominantly rurally based, the adverse effects of EUS disease outbreaks are felt mainly by the poor fishers. It is thus essential that adequate attention be given to the management of fish habitat

and fish health in India. This would involve firstly, developing trained staff and infrastructure for fish health research, diagnosis and extension; and secondly, establishing a proper network for dissemination of information on fish disease and fish health management to interested parties during disease outbreaks.

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Development of pond reared broodstock / spawners of green mud crab *Scylla serrata*

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Mud crabs, species of genus *Scylla*, are one of the most traded live seafood commodities in India and southeast Asian countries. Although seed production techniques for mud crabs have been improved during the last one decade, the consistent availability of stockable 'crab seed' is a constraint for commercial mud crab culture. The main reason can be attributed to inconsistent availability of quality broodstock and unreliable hatchery seed production. Therefore, mud crab farming has largely remained as an extensive fishery based aquaculture. This necessitates to explore the possibility of development of pond reared broodstock for mud crab domestication. It has been reported that even though ovary maturation and spawning of mud crabs usually takes place in the sea, broodstock of matured crabs maintained in coastal ponds with salinity above 34 ppt have been found to be ovigerous^{1,2}. Keeping this in view, we attempted to condition mud crab broodstock using on station and on farm experimental trials.

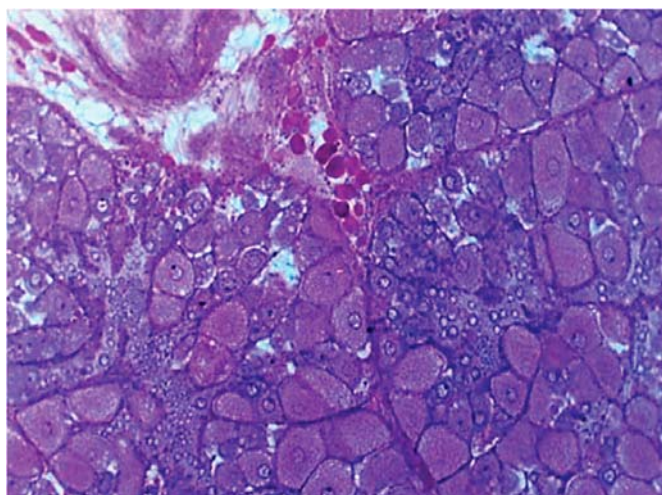
In the on-station experiment, a 143 day culture experiment was carried out using hatchery reared seed in experimental ponds at Kakdwip Research Centre, Central Institute of Brackishwater Aquaculture (ICAR), Kakdwip, South 24 Parganas, West Bengal. Nursery-reared crab juveniles (mean: 60.87 ± 6.89 g ♂ and 54.57 ± 4.87 g ♀) were stocked at a density of 0.5 individuals / m² in 100 m² ponds. The crabs were reared as monosex (all female population) or as mixed sex ratio (1♂: 1♀). During the culture, with intervening rains the temperature and salinity of water varied from 27 to 10 °C and 13.3 to 8.1 ppt, respectively. After 143 days of grow out rearing, the crabs were harvested with a total survival rate of 57 and 50 % in monosex female and mixed sex culture respectively. Female crabs above 300 g had fully developed semicircular (half-moon shaped) abdomens. The percentage of females crabs that reached broodstock size (>300 g) was



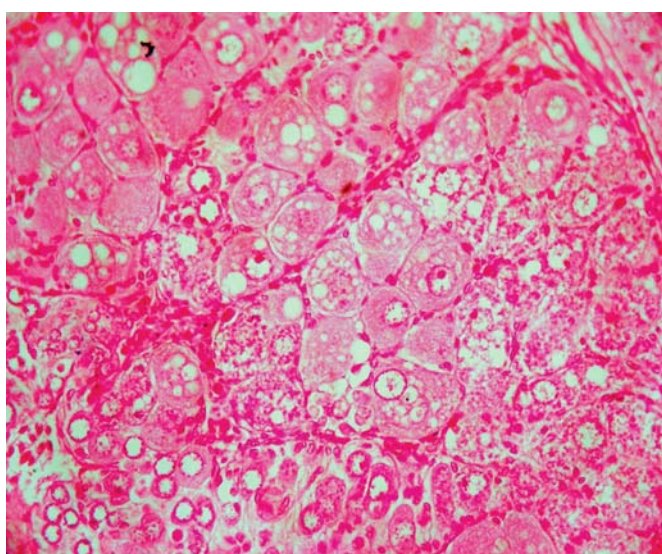
Ovary fills carapace and body of the female crab.

about 5.8% in monosex culture and 22 % in mixed sex culture (see adjacent histograms of percentage of female crabs with different size groups). A representative sample from the broodstock group (>300 g) were dissected and the ovarian stages were studied macroscopically and histologically. The gonado somatic indexes (GSI) of females were 10.55 ± 0.94 and 50% of crabs were in the ripe stage. However, none of the crabs were ovigerous. Histology results revealed that most animals were in early and advanced stage of vitellogenesis. In the early stage of vitellogenesis yolk globules start to appear, whereas in late stages the yolk globules are abundant.

In the on farm experimental trial, ponds with high saline water (18-25 ppt) were selected. Nursery-reared mud crabs (39-43 g) were stocked at a stocking density of 0.7 individuals / m²



Histology of ovary showing early vitellogenic oocytes.



Histology of ovary showing late vitellogenic oocytes.

Table 1. Water quality parameters of green mud crab in grow out pond.

Water Quality parameters	Range
ph	7.9-8.1
Salinity (ppt)	18.7-25
Alkalinity (mg CaCO ₃ /L)	140-164
Total ammonia nitrogen (µg/L)	105.36-132.65
Nitrite-N (µg/L)	29.37-35.72
Nitrate-N (µg/L)	123.49-153.41
Phosphate-P (µg/L)	22.46-43.23

Table 2. Growth characteristics of female black berried green crab *Scylla serrata*.

Growth characteristics	
Carapace length	110 mm
Carapace width	154 mm
Total weight	590 g
Weight of cheliped legs	90 g
Weight of ovary	57 g
Fecundity	1.21 million eggs

for grow out culture in farmers ponds (1000 m²). The water quality parameters were within the optimum range for mud crab growth. The crabs were fed with 25% molluscan meat and 75% locally available trash fish feed at 5% body weight. The farmer used to provide continuous aeration for minimum 4 h during late night and early morning to reduce DO problem. Water exchange was also carried out at 15 day intervals. The crabs were harvested after 9-10 months. A total of 2% mud crabs were ovigerous in different phases of egg development and about 70% of females were at the advanced reproductive stage. The fecundity of crabs ranged between 1 to 1.42 million eggs. The colour of the berried crabs varied from yellow, orange to greyish black. Microscopic examination of berried eggs shows black eyespots as developing zoea.

In addition to the berried crabs, 81 juvenile mud crabs (below 5-20g) were also obtained from the crab ponds. The finding indicates that broodstock of green mud crabs can be developed in brackishwater ponds with juvenile mud crabs obtained within less than one year. These studies show that crab seed production can be conducted in backyard hatchery using pond reared broodstock.

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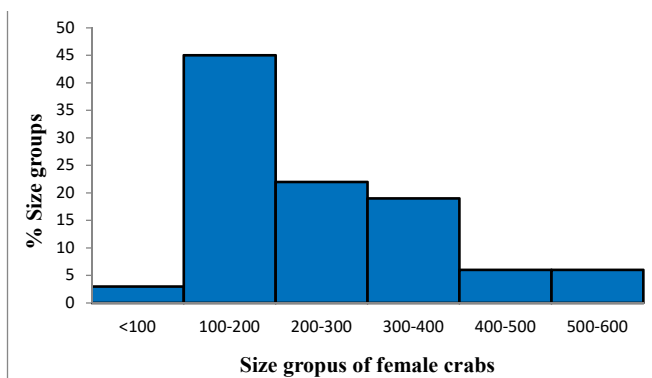


Fig 1. Percentage of different size groups of female crabs in mixed sex culture in on-station experimental ponds.

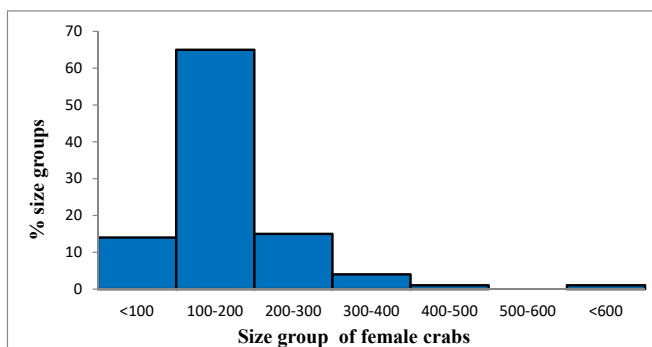
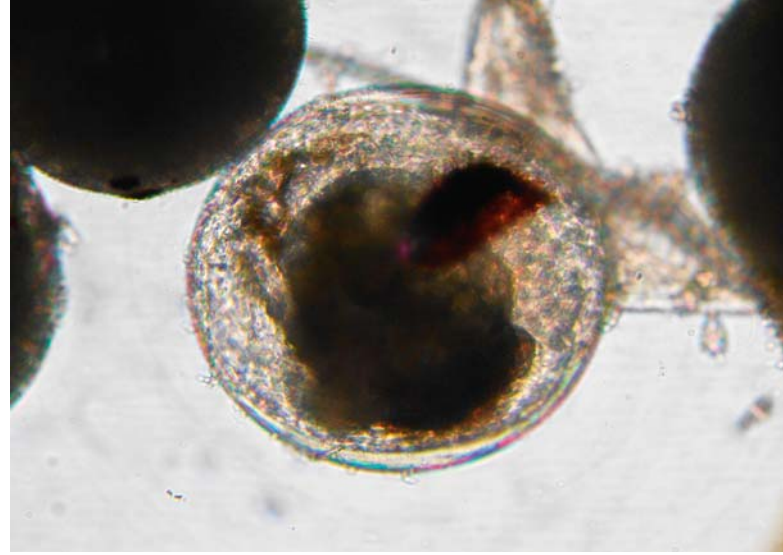


Fig 2. Percentage of different size groups of female crabs in monosex culture of mud crabs in on-station experimental ponds.



A fully gravid female mud crab.



Microscopic view of bunches of eggs.



Fully matured berried green mud crab.



Green mud crab ponds at Uttarchandpiri, Namkhana.



Berried green crab with yellow coloured ovary



12th Technical Advisory Committee held in Cha-am, Thailand



Participants from TAC 12 visiting the Petchaburi Coastal Fisheries Research and Development Centre.

The twelfth meeting of NACA's Technical Advisory Committee (TAC) was held in the coastal town of Cha-am, Thailand from 9-12 March, approximately two hours' drive south of Bangkok. The meeting was attended by participants from sixteen NACA member states, the Regional Lead Centres for China, India, the Philippines and Thailand and the Food and Agriculture Organization of the United Nations.

The TAC meets every two years to review NACA's rolling work programme and propose amendments to realign it with the current needs of member governments and to account for new and emerging issues. In proposing changes, the TAC prioritises issues of common concern to multiple member governments where there are good prospects for regional collaboration. The NACA Secretariat uses the output to revise the work programme, which

is submitted to the next meeting of the NACA Governing Council for consideration and adoption.

While there are many 'persistent' issues of ongoing interest to the region such as nutrition and environmental impact this year's meeting saw several shifts in regional priorities. Food safety and related certification and traceability issues are heating up with regards to international trade. Labour conditions, including for undocumented and migrant workers, are becoming a hot topic as major export markets are increasingly taking an interest in the conditions under which food is produced. Tough new legislation to address illegal, unreported and unregulated (IUU) fishing is likely to have traceability implications for the aquaculture industry, which will need to be able to demonstrate that its products have been farmed rather than fished, in order to avoid potential restrictions on trade.

Fish seed quality and availability was another standout issue. Given the near-absent genetic management of broodstock in hatcheries in the region it is not surprising that concerns about genetic degradation of broodstock, and as a consequence the quality of seed, are mounting. There is significant interest in selective breeding for the development of genetically improved varieties of important cultured species, but the general lack of capacity in broodstock management is a significant barrier to both developing and maintaining such lines.

Aquatic animal health remains a burning issue for the aquaculture industry with no letup in sight as far as the emergence of new pathogens is concerned. However, the TAC felt that it would be wise to invest more effort into the proactive management of health issues, such as through improving disease surveillance and early warning systems, biosecurity and quarantine, laboratory



Left to right: P. Jayashankar, Vice Chair; Brett Ingram, Chair; Cherdasak Virapat, Director General; and Hassanai Kongkeo, Technical Assistant to the DG.

capacity and investment in vaccines and better management practices as alternatives to the use of veterinary chemicals. It is well established that prevention or early containment of a disease outbreak is massively cheaper than responding after it has been given a chance to spread.

The environment, feeds and nutrition are core issues that are discussed at every TAC meeting, but the effect of environmental quality on aquaculture is gaining prominence. Pollution from external urban and agro-industrial sources and water quality degradation is increasingly causing problems for the aquaculture industry, notably in inland areas. For example cages installed in river systems suffering fish kills as a result of the release of industrial effluent upstream, which is driving a move into land-based pond systems in some countries. Assessments of carrying capacity and zoning of areas for aquaculture use are as-yet underutilised partial solutions worthy of wider investigation. Feed costs have risen heavily as the price of ingredients has escalated. Some countries such as Lao PDR and Sri Lanka are still heavily dependent on importation of commercial feeds as quality, locally made feeds are unavailable.

Other issues discussed included gender mainstreaming, a new area of work for NACA and a high priority for many member states, the potential impacts of climate change, integrated multi-trophic aquaculture and technology transfer between different administrative units of government (national, provincial) and at the regional level were also discussed.

As TAC members are usually also high-level officials from research centres participating in the network, the meeting also provides a good opportunity to discuss implementation of the work programme by the people at the coal face. The final half day of the meeting was spent drawing up a number of joint project concepts of broad regional interest on sustainable farming systems, aquatic animal health, genetics and biodiversity, climate change and south-south cooperation in aquaculture development.

The NACA work programme is currently undergoing revision and will be considered at the 26th Governing Council Meeting, which will be held in Bali, Indonesia, in May. The final document will be published on the NACA website shortly thereafter.



TAC working groups hard at it.

Audio recordings: WAS special session on regional cooperation for improved biosecurity

Audio recordings of the presentations from the ACIAR-funded Special Session on Regional Cooperation for Improved Biosecurity, held at the World Aquaculture Adelaide 2014 conference, are available for download. The session discussed i) regional cooperation in biosecurity, ii) dealing with emerging diseases, focussing on acute hepatopancreatic necrosis disease, and iii) domestication programmes and their implications for genetic diversity, disease susceptibility and resistance.

To listen or download the recordings please visit:

http://www.enaca.org/modules/podcast/programme.php?programme_id=14

AFSPAN Final Technical Report now available!

The final technical report of the AFSPAN Project is now available for download from www.afspan.eu.

Executive summary

The objectives of the Aquaculture for Food Security, Poverty Alleviation and Nutrition (AFSPAN) project were to strengthen the knowledge base and develop new and more rigorous methodologies of quantifying the contribution of aquaculture to combat hunger and poverty, thus providing the evidence upon which sound strategies, policies and research programs can be developed to support the sustainable expansion of aquaculture to maximise its impact on food and nutrition security and poverty alleviation.

The three-year project was implemented by eighteen partners in eleven Asian, African and South American developing and Low Income, Food Deficit Countries (LIFDCs), encompassing the spectrum of development conditions and role of aquaculture in national economies. The partnership also included EU partners and international organisations.

A theory of change was elaborated and range of analytical frameworks, economic models and indicators, complemented by surveys and case studies developed. The contribution of aquaculture to national GDP, excluding multiplier effects, was found to vary from negligible in countries with emergent aquaculture sectors up to 5% or more of national GDP in countries where the sector is very dynamic. Aquaculture was shown to have helped lower global fish prices, increasing economic access for all but the very poorest consumers. Although households engaging in aquaculture were found less likely to be poor than those that did not, poor households too benefitted from engaging in fish farming, irrespective of

scale of operation. Fish consumption rates of households engaged in fish farming were typically higher than national averages.

Both immanent (e.g. economic growth) and interventionist (the implementation of policies promoting aquaculture development, improving governance and capacity) factors, as well as institutional arrangements, public-private partnerships and pioneering companies and individuals, were found to be capable of creating enabling conditions for aquaculture growth. Socio-cultural factors, especially gender and ethnicity, were also important: interventions tailored to match given specific socio-cultural contexts were most likely to lead to successful adoption and retention and delivery of equitable development outcomes, with lasting impact on livelihoods.

The volumes of seafood exported from developing to developed countries were found to approximate those of seafood imported by developing from developed countries. While expensive seafood may be being exchanged for cheaper but not necessarily less nutritious seafood, thereby minimising threats to food security, there remains a lack of supporting evidence that this is the case. With the exception of Bangladesh no policies or interventions linking fish, aquaculture and nutrition were found in study countries and little is included in nutrition education on aquatic animal foods.

Project outputs are being disseminated among the development community to help improve efficiency and coordination of development initiatives focused on aquaculture that promotes food and nutrition security and alleviates poverty and helps focus research on addressing researchable gaps. The development of science outputs has also begun.

Pillay Aquaculture Foundation Awards for Scientists in Least Developed Countries

The Pillay Aquaculture Foundation will confer awards that recognize and support scientists in least developed countries for outstanding contributions to national aquaculture research and development, education and extension.

The awards are available for the following fields:

- Aquaculture research and technology development.
- Aquaculture institution building and strengthening.
- Aquaculture education and extension.
- Promotion of aquaculture as a co-operative venture.
- Aquaculture product development and export promotion.

Eligibility

In 2015 the awardees will be selected from nationals of Nepal, Bangladesh, Bhutan and Myanmar who have contributed substantially to the cause of aquaculture development in the sectors as listed above. Their contribution should have qualitatively or quantitatively impacted aquaculture production and the quality of life of those involved in this venture.

Application for the awards needs to be routed through the head of the institution, along with:

- Three copies of his/her five best publications, if any, or proof of work done, in the related field.
- Three recommendation letters from persons occupying high positions in national aquaculture/fisheries institutions or government departments.

- A professional reference issued by his/her superior officer, preferably Head of Department.
- A brief resume, along with a summary of his/her work.

Nomination can also be made by any Board Members of the Pillay Aquaculture Foundation, either past or present (but not by office bearers).

Selection of awardees

Selection will be made by the Award Judging Committee of the Pillay Aquaculture Foundation.

Award

The award will consist of a citation and a gold plated silver medal.

The Pillay Aquaculture Foundation will provide an economy class air ticket and local hospitality to the awardees to attend the ceremony at the foundation's congress, 15-17 July 2015. Awardees are required to present their contribution before the congress.

The last date to receive applications for the award is **May 31, 2015** at the following Address:

Pillay Aquaculture Foundation
AFSIB Building
College of Fisheries Campus
Mangalore 575002
India.

Gender Seminar Conducted and ASEAN Gender Network Launched

The Gender and Aquaculture Seminar: Equity and Regional Empowerment in the Aquaculture Value Chain, a culminating activity for the NACA/USAID/MARKET Project's Thematic Studies of Gender in Aquaculture, was held on 24 to 25 February 2015 in Bangkok. The year-long project conducted research on women's roles and influence on selected aquaculture value chains in Cambodia, Lao PDR, Thailand and Vietnam.

The goal of the research was to raise awareness and increase recognition of gender roles, policies and programs in the aquaculture industry in the selected countries to support more sustainable and responsible development. The outcomes and recommendations of the thematic studies were presented at the seminar, as part of the dissemination strategy for raising awareness, and to obtain feedback from other gender practitioners in the region. The seminar also provided a venue for public and private sector stakeholders to share their current activities supporting gender equity and empowerment in the aquaculture value chains. Discussions on creating opportunities to harness contributions of women provided insights on how an enabling environment especially in policy and engaging communities and the private sector could encourage equity and empowerment. In addition, a the panel discussion on gender education, training and capacity building revealed insufficiency in current capacities in the academic arena for gender inclusion, as well as the urgent need for equipping practitioners with tools in the field.

The lack of gender disaggregated data in aquaculture value chains has also been seen as a major issue, which will have an impact on formulating relevant policies on gender integration in aquaculture, business decisions and project interventions. The seminar was attended by project partners from Cambodia, Lao PDR, Thailand and Vietnam, and from relevant and interested stakeholders from universities, NGOs, and private sector in the ASEAN, including NACA and USAID/MARKET team.

Sharing experiences by those involved in varied networks for gender or other fields in various parts of the world provided a good lead on towards the introduction and launch of the ASEAN Gender in Aquaculture Practitioners' Network. As the aquaculture sector has become increasingly aware of the importance of gender sensitivity and integration in all its activities, there is a need for people working in this area to have a gender perspective. Currently there are a number of aquaculture practitioners and stakeholders advocating for gender integration and mainstreaming in aquaculture activities. In addition, there are already women involved in aquaculture and working alongside with the men. As they learn and gain experiences, there is a need to be able to share this knowledge so more people will become more aware and gain a gender perspective. This network therefore will be composed of people who are interested in advocacy for gender integration in aquaculture.

The objectives of the network are to promote gender integration in aquaculture and fisheries, advocate for and advance the status of women in aquaculture in ASEAN, assist practitioners in implementing projects which integrate gender at all levels, serve as a venue for information exchange and experiences sharing, conduct capacity building activities on gender development in aquaculture, and promote collaboration among organizations and development projects. The network will also be responsive to emerging issues at the regional level which have implications on gender issues in aquaculture.

During its launch, a set of activities for the first six months has been set-up by the members. This includes strategic planning, networks mapping, writing of concept notes/proposals, setting up a website and fund sourcing. The Gender Programme at NACA in Bangkok will coordinate network activities.

For more information, email arlene@enaca.org.

A two-tube, nested PCR detection method for AHPND bacteria

A new method for the detection of AHPND-bacteria (AP4) has been published and is available for download at:

http://www.enaca.org/modules/library/publication.php?publication_id=1145

The advantage of the AP4 method over the previously published AP3 method is that it has 100 times higher sensitivity. Because of its higher sensitivity, the bacterial culture enrichment step needed when using the AP3 with low levels of AHPND bacteria may be omitted. However, the AP4 method should not be considered as a replacement for the AP3 method but simply as an alternative choice for the users to choose should they need a more sensitive detection method.

The AP4 method has been tested with the same 104 bacterial isolates that were used for validating the AP3 detection method, and the results were identical, i.e., 100% specificity and sensitivity with the 104 isolates but at 100x lower template levels.

As with the previous announcements in this series, the AP4 method is provided for free use in the detection of AHPND bacteria. A positive control plasmid for the AP4 method will

be sent out to those who are already on our mailing list as recipients of plasmids for our previous AP methods to detect AHPND bacteria. For those not already on our list, the plasmid will also be provided upon request to: Dr. Kallaya Sritunyalucksana (email kallaya@biotec.or.th). To join the mailing list, please visit the AHPND Detection Google Group, which you can join at:

<https://groups.google.com/forum/#!forum/ahpnd>

The AP4 PCR method was developed entirely by Thai scientists working in Thailand at Centex Shrimp, the Shrimp-virus interaction laboratory, BIOTEC and Aquatic Animal Health Research Center and Charoen Pokphand Co. Ltd. It was also supported entirely by research funding from Thailand. The author would like to acknowledge the support and encouragement for our research on AHPND from the Agriculture Research and Development Agency, the National Research Council of Thailand, the Thai Commission for Higher Education, Mahidol University, Faculty of Marine Technology at Burapha University, the National Science and Technology Development Agency, the Patani Shrimp Farmers Club, the Surathani Shrimp Farmers Club, the Thai Frozen Foods Association, Charoen Pokphand Company, SyAqua Co. Ltd. and Thai Union Co. Ltd.

9th Regional Grouper Hatchery Production Training Course – apply now!

NACA in collaboration with the Krabi Coastal Fisheries Research and Development Centre (Department of Fisheries, Thailand) will hold a training course on grouper hatchery production from 12 to 30 October 2015 at the Krabi centre.

The course is suitable for both commercial hatchery operators, technical staff and research biologists. Course contents:

- Biology of Grouper
- Site Selection, Hatchery Design, Equipment and Setup
- Broodstock Selection and Management
- Eggs Handling and Development Stages
- Culture Environment and Water Quality Management
- Larviculture and Nursery
- Live Food Production – Phytoplankton
- Live Food Production – Zooplankton
- Nutrition and Feed for Grouper Larvae (include artificial feed)
- Diseases and Fish Health Management in Hatchery
- Harvest, Packaging and Transportation

Participants are expected to gain the following skills:

- Assess a site for building a hatchery

- Select, maintain and handle broodstock
- Induce fish to spawn
- Incubate eggs
- Prepare live feed and develop feeding regimes for newly hatched larvae, and
- Nurse fry prior to seed harvesting, packaging and transportation.

The course will consist of approximately 30% classroom presentations on biological and hatchery management exercise, 50% hands on practical training and 20% field trips.

Applications and further information

The course fee covers costs for tuition, working lunches, coffee/tea breaks, airport pickup, local transportation and materials and supplies for training related activities. The fee does not cover the costs for international and domestic flights to and from the nearest airport, accommodation, breakfast and suppers, allowance and other personal expenses. To apply for the course please download the:

- Applications form: <http://enaca.org/publications/announcements/2015/marine-fish-hatchery-training-application-form-2015.doc>
- Course brochure: <http://enaca.org/publications/announcements/2015/marine-fish-hatchery-training-brochure-2015.pdf>

Developing an environmental monitoring system to strengthen fisheries and aquaculture in the Lower Mekong Basin

FAO and NACA convened a stakeholder consultation in Bangkok 25-27 March 2015 to discuss development of an environmental monitoring system for the lower Mekong Basin. The objective of the system is to strengthen the resilience of fisheries and aquaculture and to improve early warning for fishers and farmers.

The workshop was preceded by baseline assessments of existing environmental monitoring and early warning systems relevant to fisheries and aquaculture in the target area, which covers Vietnam, Cambodia and Thailand. The assessments also reached out to relevant agencies in the target countries to gather feedback on what environmental issues they considered important and what parameters should be monitored to meet these ends. While the main goal of the system is to serve the daily needs of farmers and fishers – providing information and warnings important to their livelihoods - a secondary objective is to facilitate long-term monitoring of the impacts of climate change over the long term.

The state of environmental monitoring was observed to vary between countries. Some such as Thailand, for example, have very good monitoring systems in place for meteorological and water management. Vietnam's meteorological bureau monitors also river levels and publishes flow and height forecasts. Cambodia has strong programmes to monitor water quality and biodiversity aspects, such as surveys of fish larvae and fish diversity and abundance in deep pools. However, these diverse systems are owned and operated by a raft of different agencies, as they have been developed to serve different purposes, and are not necessarily connected or sharing data. The workshop identified a need to try and integrate the available data produced by

existing sources and to build on it, where required, to provide a unified environmental monitoring system capable of sharing data and reporting over different geographic scales, from the wider basin level (ie. between countries) to the local-level advisories of interest to farmers and fishers.

Another crucial issue is connecting the reports generated by the system to fishers and farmers using appropriate communication channels, to ensure that they actually receive the kind of information they need in a timely manner and can benefit from it. As accessibility to different forms of media, language and literacy skills are all substantial issues for often remote communities, communication channels must be chosen very carefully, and in line with the access, skills and convenience of fishers and farmers.

The consultation spent some time discussing recent technological developments. The dramatic increase in the penetration of mobile phones (especially smart phones) and coverage of mobile networks offers a way to directly deliver area-specific information services to farmers and fishers as well as the opportunity to involve them in data collection through custom applications. The 'internet of things' also offers new opportunities for low-cost data gathering. Cheap programmable micro-controllers - essentially the tiny computer you might find operating a hotel door lock - are now widely available even as hobbyist kits, excellent documentation and can be fitted with a surprisingly wide array of off the shelf environmental sensors to monitor anything from light, temperature and humidity to gas and radiation levels.

The findings of the consultation will be used to develop a pilot project, to be implemented on a long term or ongoing basis.



Participants in the workshop.

Regional Workshop on the Status of Aquatic Genetic Resources

FAO and NACA organised the Regional Workshop on the Status of Aquatic Genetic Resources in Asia-Pacific at Hotel Centara Grand Ladprao, Bangkok from 23-26 March 2015. This was the first workshop in the series of four to be conducted globally by FAO. The workshop was intended to enhance the capacity of national focal Points on Aquatic Genetic Resources within Asia-Pacific Region regarding the preparation of national reports on the current status of aquatic genetic resources for food and agriculture (use, conservation and management). These will be used as the major source of information for the first State of the World's Aquatic Genetic Resources for Food and Agriculture report, under the umbrella of the FAO Commission on Genetic Resources for Food and Agriculture (CGRFA).

The national focal points from fifteen countries in Asia; Thailand, Cambodia, Lao PDR, Vietnam, Indonesia, Malaysia, Philippines, India, Pakistan, Nepal, Myanmar, Japan, South Korea and the Pacific participated in the workshop, along with Fiji and global experts. FAO staff including Dr Devin Bartley, Dr Halwart Matthias and NACA staff Dr Kuldeep K. Lal facilitated the process of workshop with expert input from Dr Graham Mair (Australia), Dr Tim Pickering (SPC), Dr Clemens Fieseler (Germany) and Dr Ruth Garcia Gomez (FAO consultant).

The workshop started with the welcome address from Dr Cherdarak Veerapat, Director General of NACA and opening remarks by Dr Devin Bartley. The workshop was opened by Dr Miao Weimen, FAORAP, Bangkok on behalf of Dr H. Konuma, ADG, FAO Office for Asia Pacific, Bangkok. The participants

were given an appraisal on the theme and concept of this workshop through four expert presentations on workshop content, process, expected outcomes and outputs and introduction to the CGRFA by Devin Bartley. The Aquatic Genetic Resources Component of CGRFA and the steps towards the State of the World's Aquatic Genetic Resources report were addressed by Matthias Halwart; the German National Technical Programme on the conservation and sustainable use of aquatic genetic resources by Clemens Fieseler and perspectives on aquatic genetic resources management and conservation in Asia-Pacific by Kuldeep K. Lal.

The national focal points and experts discussed each chapter of the report in the respective groups. The groups also prepared each chapter as an exercise with information from one member country as an example followed by a presentation on the chapter by respective group. This exercise was found useful by the national focal points as this not only provided them first hand feel of the whole questionnaire but also served as useful feedback for FAO colleagues to incorporate suggested modifications in the report format. Delegates found the training useful and that it will help them facilitate preparation of national reports.

A one day field visit was organised by NACA for the delegates to see the activities related to aquatic genetic resources in Thailand. The forenoon session was devoted to observing activities at the Thai Department of Fisheries Inland Fisheries Research Station at Bangsai. In addition to various aquaculture activities, an interesting feature was on farm conservation of the



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NACA is a network composed of 19 member governments in the Asia-Pacific Region.



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Mekong giant catfish *Pangasianodon gigas*, a near extinct species conserved through a dedicated breeding program. In the afternoon delegates visited National Centre for Genetic Engineering and Biotechnology (BIOTEC) at Thailand Science Park. Here delegates were exposed to the activities through presentations about BIOTEC and its shrimp biotechnology program by Dr Sirawut Klingbunga, Director of the Animal Biotechnology Research Unit. The delegates visited the laboratories and also the pilot testing plant.

