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Regional consultation on culture-based fisheries developments in Asia

A regional consultation was held to discuss culture-based fisheries development in Asia from 21 to 23 October 2014 in Siem Reap, Cambodia. The consultation was funded by the Australian Centre for International Agricultural Research (ACIAR) as part of the project Culture-based fisheries development in Lao PDR and Cambodia. The consultation provided the opportunity to discuss the outcomes of a series successful projects that have been implemented over the past decade in the Asian region by both Deakin University and NACA with financial support from ACIAR.

The consultation was welcomed by His Excellency Mao Vuthy, Vice Governor of Siem Reap Province and opened by His Excellency Nao Thuok, Director General of the Fisheries Administration of Cambodia. Introductory remarks were made by Dr Chris Barlow, Fisheries Programme Manager of ACIAR, Dr Cherdsak Virapat, Director General of NACA, Dr So Nam, Coordinator of the Fisheries Programme of the Mekong River Commission, and Dr Chumnarn Pongsiri, Director General of the Southeast Asian Fisheries Development Center.

The consultation began with a session on the general considerations to be taken into account in culture-based fisheries activities. Presentations addressed general aspects of stock enhancement, site selection and genetic considerations. This was followed by a series of presentations on the project's outcomes in Lao and Cambodia, including both technical aspects, profit sharing models developed by participating communities, induced breeding and broodstock management, and the use of reciprocal exchange visits and communication centres to help sharing of experience both between countries and individual communities.

The following sessions were dedicated to presentations and discussions on stock enhancement practices in Mekong riparian countries and on culture-based fisheries experience from other Asian countries, including China, Sri Lanka, Myanmar and Vietnam. Participants spent the last day of the meeting visiting the Great lake (Tonle Sap) to observe fisheries practices and the way of life of the fishing communities living out on the water.

From the discussions it was evident that culture-based fisheries are very much seen as a valuable and environmentally friendly development option for rural communities. It was noted that culture-based fisheries has gained significant momentum over the past few years and recently become something of a hot issue, being taken up in Sri Lanka, Vietnam, Thailand, Lao PDR and with the first steps having been made to introduce it to Cambodia under the present project. Participants strongly requested both NACA and ACIAR to pursue follow up activities to consolidate the gains that have been made.

The proceedings of the consultation are in preparation and scheduled for publication by May 2015. In the meantime, audio and video recordings of the technical presentations from the meeting are in preparation and will shortly be made available for download / viewing on the NACA website shortly. Please check http://www.enaca.org/modules/podcast/.

Participants in the Regional consultation on culture-based fisheries developments in Asia.

Gender Assessment Synthesis Workshop

During 29 September to 1 October 2014, the NACA/USAID MARKET Gender Project organised a Gender Assessment Synthesis Workshop, which was attended by the MARKET gender project teams from Cambodia, Thailand and Vietnam, as well as the regional gender focal point of the Network for Gender Promotion in Fisheries in the Lower Mekong Basin countries, and the Coordinator of the Gender in Fisheries Programme of the Mekong River Commission. Other participants included USAID and MARKET project team staff, India Gender Expert, and NACA core staff. A total of 20 participants attended the three-day workshop held at Centara Grand Hotel, Central Plaza Ladprao, Bangkok.

The objectives of the Synthesis Workshop were to:

- Assess the status of work on the in-country gender assessment reports and the case studies, including make a start on writing of case studies.
- Participate in a one-day training on gender in aquaculture and fisheries tools.
- Contribute ideas to the regional gender practitioners' network action plan.
- Discuss future work activities / plans to achieve expected project outcomes.

After the three day workshop, these objectives were met and participants evaluated the workshop as excellent and most useful for their project work especially in achieving their target deliverables. The one day training on gender dimensions framework and tools was also assessed as useful and participants appreciated the learnings they gained from the training. The exchange of experiences from various practitioners from India, Lao PDR, MRC, NGF and Thailand on how gender is integrated in their own workplaces and projects provided the participants with some ideas and skills on gender integration.

The expected outputs from the workshop were submitted by the participants, such as the status reports and drafts of the in-country gender assessment reports, case study status reports and abstracts, country – specific work and activity plans and ideas for the Regional Gender Practitioners Network Action Plan. A "write shop" during the workshop provided the country teams with the opportunity to discuss the data collected for the gender case studies, to create an outline and write a rough draft of the case studies. A half-day session was also conducted for status reporting and preparation for the Special Workshop on NACA/USAID/MARKET during the 5thGlobal Symposium on Gender in Aquaculture and Fisheries in Lucknow, India in November 2014 (see separate article below)..

NACA participation in the 5th Global Symposium on Gender in Aquaculture and Fisheries, Lucknow, India

The Network of Aquaculture Centres in Asia-Pacific team participated actively during the 5th Global Symposium on Gender in Aquaculture and Fisheries (GAF5) held during 12-15 November 2014, in Lucknow, India. This event was held simultaneously with the 10th Indian Fisheries and Aquaculture Forum and the International Workshop on Aquatic Animal Disease Surveillance, wherein NACA was also represented.

Dr Cherdsak Virapat, NACA Director General, in his speech at the 10 IFAF and GAF5 opening ceremony, introduced NACA's programmes with gender as one of the cross cutting themes, and giving acknowledgement to various organisations providing support, both local and international. The major international supporters were NORAD for GAF5 organisation, and USAID for the MARKET Special Workshop and MARKET Gender Project as a whole.

Dr Meryl Williams, NACA Gender Mentor and the main organiser of GAF5, presented how interest in the then women in fisheries initiatives has evolved through the years into what is now known as the gender in aquaculture and fisheries.

The half-day Special Workshop on MARKET Project on 14 November 2014 presented the initial results of the gender assessments in each country (Cambodia, Lao PDR, Thailand and Vietnam) and the various case studies prepared by the

country teams. The case studies highlighted the gender aspects in selected aquaculture value chains. The Special Workshop was chaired by Dr Cherdsak Virapat, Ms Gladys Villacorta (USAID/MARKET), Dr Nikita Gopal (CIFT/ICAR) and Dr Arlene Nietes Satapornvanit (NACA).

The following presentations were given during the special workshop:

- NACA/USAID Thematic Studies on Gender in Aquaculture in Cambodia, Lao PDR, Thailand and Vietnam by Dr Arlene N. Satapornvanit, NACA.

- Success story of a woman in aquaculture, Cambodia by Mr. Kao Sovityea, Cambodia Fisheries Administration.
- Small-scale marine shrimp culture in Chanthaburi, Thailand by Dr. Amonrat Sermwatanakul.
- Small-scale tilapia cage culture in Sakhon Nakhon, Thailand by Dr. Kanit Naksung, Department of Fisheries.
- Red tilapia cage culture in Tieng Giang, Vietnam by Dr. Truong Hoang Minh, Cantho University.
- Rice-shrimp rotation farming in Soc Trang, Vietnam by Ms. Nguyen T.K. Quyen, Cantho University.

These presentations were also made into posters so the information could be disseminated to a larger audience and for the whole duration of the conference, which was held simultaneously with the 10th Indian Fisheries and Aquaculture Forum. Dr. Yuan Derun (NACA Education and Training Coordinator) also chaired a GAF5 session on Global Innovations.

The final session was the GAF Network meeting, wherein issues on how networking among interested gender stakeholders could be sustained through the years. Details were asked about the regional gender practitioners network being coordinated by NACA/USAID/MARKET.

In addition, Dr. Eduardo Leano (NACA Aquatic Animal Health Programme Coordinator) shared his experiences and the mechanisms within the Fish Health Section network of the Asian Fisheries Society (AFS-FHS).

Arlene Nietes-Satapornvanit (NACA), Nikita Gopal (CIFT), Cherdsak Virapat (NACA) & Gladys Villacorta (USAID/MARKET).

Broodstock Management in Aquaculture: Long term effort required for regional capacity building

Asia produces nearly 90% of world aquaculture output. However, growth of the industry is increasingly constrained by various factors, including poor broodstock quality and genetic deterioration of domesticated stock. This has arisen in part from a general lack of planning, knowledge and skills in broodstock management. Capacity building across the region is urgently required for hatchery operators at different scales through information exchange, experience sharing and training.

The United Nations University Fisheries Training Programme (UNU-FTP), Network of Aquaculture Centre in Asia-Pacific (NACA) and Nha Trang University jointly initiated a project on “Development of a Regional Training Course for Capacity Building on: Finfish Broodstock Management in Aquaculture Broodstock Management in Aquaculture” in collaboration with Deakin University and Fisheries Victoria (Australia) and Holar University (Iceland) in 2012. The objective was to develop and test a training course on principles and practices of broodstock management with hatchery managers and key in-service personnel associated with hatchery operations. To date, a set of training materials have been developed, covering most aspects of broodstock management including broodstock nutrition, genetic maintenance and improvement, disease and health management and hatchery operation. The training materials have been continuously evolving through consultation in various expert workshops and accumulation of practical knowledge.

Two pilot training courses were conducted in 2013 and 2014 respectively in Nha Trang University, Vietnam, for some 80 professionals from 19 countries in Asia and Africa. The training courses took a learner-centred approach, encouraging active participation of trainees in learning process, emphasing practical experience and problem solving skills of participants.

Broodstock management is an important part of general aquaculture practice and interrelated to all other segments of aquaculture production cycle. It is however often considered to be difficult by some hatchery operators due to lack of know-how or simply overlooked by others. The issue is further complicated by lack of overall planning, little collaboration among seed producers, insufficient financial input for R&D, and lack of institutional support.

Efforts to maintain and improve broodstock quality of any major cultured species requires long-term strategic planning at national and regional level and practical approaches involving public sectors, breeding centres, and private hatcheries at various operational scales. Capacity building for all stakeholders through training is therefore fundamentally important to raise awareness, update knowledge and enhance skills.

Participants considered that the training courses were highly relevant and important in addressing the issue of deteriorating broodstock quality. They were satisfied with the course organisation and logistic support and voiced their continuing effort to amplify the course impacts upon return to their work through application of knowledge and skills they acquired during the training.

Development and successful implementation of the training course on broodstock management in aquaculture by UNU-FTP, NACA and Nha Trang University turned over a new leaf for regional capacity building in broodstock management in aquaculture. Admittedly this is just a start and there is still long way to go.

Urgent appeal to control spread of the shrimp microsporidian parasite *Enterocytozoon hepatopenaei* (EHP)

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What is EHP?

Enterocytozoon hepatopenaei (EHP) is a microsporidian parasite that was first characterized and named from the giant or black tiger shrimp *Penaeus monodon* from Thailand in 2009 (Tourtip et al. 2009. *J. Invertebr. Pathol.* 102: 21-29). It was discovered in slow growing shrimp but was not statistically associated with slow growth at that time. EHP is confined to the shrimp hepatopancreas (HP) and morphologically resembles an unnamed microsporidian previously reported in the HP of *Penaeus japonicas* from Australia in 2001. Together, these studies suggest that EHP is not an exotic pathogen but that it is endemic to Australasia. Later, it was found that EHP could also infect exotic *Penaeus vannamei* imported for cultivation in Asia and that it could be transmitted directly from shrimp to shrimp by the oral route (*Tangprasittipap et al. 2013. BMC Vet Res*. 9:139). This differed from the most common microsporidian previously reported from cotton shrimp, where transmission required an intermediate fish host, allowing disruption of transmission by exclusion of fish from the production system.

Why is EHP important?

Although EHP does not appear to cause mortality, information from shrimp farmers indicates that it is associated with severe growth retardation in *P. vannamei*. Thus, we began to warn Asian farmers and hatchery operators after 2009 to monitor *P. vannamei* and *P. mondon* for EHP in broodstock and post larvae (PL). However, the warnings were not heeded because of the overwhelming focus on early mortality syndrome (EMS) or acute hepatopancreatic necrosis disease (AHPND). We feared that lack of interest in EHP would lead to its build up in production systems and that its spread would be masked by EMS/AHPND because it kills shrimp before the negative effects of EHP on growth are apparent. We feared that solution of the EMS/AHPND problem would probably lead to succeeding widespread problems with slow growth. Indeed, this seems to have happened in the past year or so. We now have information indicating that EHP outbreaks are occurring widely in China, Indonesia, Malaysia, Vietnam and Thailand. Very recently, we have also received samples PCR-positive for EHP from slow growing shrimp in India. Thus, EHP is an emerging problem that is under urgent need of control.

How to control international spread of EHP

A nested PCR detection method and a LAMP method are available to check faeces of broodstock and to check whole PL for the presence of EHP (Tangprasittipap et al. 2013. *BMC Vet Res.* 9:139; Suebsing et al. 2013. *J. Appl. Microbiol*. 114: 1254-1263). The pathogen can also be detected by light microscopy using a 100 times objective with stained HP tissue sections or HP smears, but this is based on finding the characteristic spores that are extremely small (less than 1 micron in length) and are sometimes produced only in small numbers, even in heavily infected specimens. Thus, the PCR detection method is preferred.

We have data indicating that most SPF stocks of *P. vannamei* imported to Thailand are negative for EHP but that they often become contaminated in recipient maturation facilities and hatcheries because of poor biosecurity. One serious fault in biosecurity is the widespread practice of using live animals (e.g., polychaetes, clams etc.) from local sources or as imports to feed broodstock shrimp, despite our constant warnings against the practice. We have firm data that some live polychaetes from local and imported sources in Asia can give positive PCR test results for both AHPND bacteria and EHP. However, there is also a possibility that some imported stocks of *P. vannamei* labeled SPF may also be positive for EHP, since it is not on the OIE list that is used by many SPF suppliers or quarantine agencies responsible for confirming SPF status. This problem could be rectified by adding EHP to the SPF list of both suppliers and quarantine agencies. The faeces of the broodstock can be tested for EHP presence by nested PCR.

The best approach for maturation and hatchery facilities to avoid EHP is to never use live animals (e.g., live polychaetes, clams, oysters, etc.) as feeds for broodstock. If this advice is ignored, at the very minimum, such feeds should be frozen before use since this would at least kill AHPND bacteria and EHP. Better would be pasteurization (heating at 70°C for 10 minutes) since it would also kill major shrimp viruses (which freezing would not). Another alternative would be to use gamma irradiation with frozen feeds.

How to control EHP in hatcheries

EHP and AHPND bacteria have both been found in broodstock from China, Vietnam and Thailand. Both have also been reported from living polychaete samples used to feed broodstock shrimp. EHP can be suspected if post larvae from any hatchery grow slower than would be expected.

Therefore, the first issue is to ensure that broodstock maturation facilities and hatchery facilities are CLEAN! To achieve this goal, all shrimp must be removed from the hatchery and it should be washed followed by cleaning using 2.5% sodium hydroxide solution (25 gms NaOH/L fresh water) with the solution left on and washed off after 3 hours contact time. This treatment should include all equipment, filters, reservoirs and pipes. After washing to remove the NaOH, the hatchery should be dried for 7 days. Then it should be rinsed down with acidified chlorine (200 ppm chlorine solution at pH <4. 5).

The next issue is the broodstock. As indicated above some SPF shrimp broodstock gave positive PCR test results for EHP but none for AHPND bacteria. Thus, purported SPF broodstock should also be checked for EHP while in quarantine and before being admitted to a cleaned maturation and hatchery facility. Our work in Thailand revealed that locally pond-reared broodstock derived from imported SPF stocks initially free of EHP showed very high levels of prevalence for EHP infection. As stated above, broodstock faeces may be checked for EHP by nested PCR using DNA extracts from feces as the template. Confirmation should be conducted on HP tissue after the usefulness of the broodstock has expired.

How to control EHP in farms

For farmers, there are two main issues to contend with. The first issue is to ensure that the PL used to stock ponds are not infected with EHP. This can be done most easily by PCR testing. If DNA has already been extracted from the PL to check for AHPND bacteria by PCR, a portion of the same DNA extract can be used to test for EHP. A farmer should not use batches of PL positive for either of these pathogens for stocking ponds.

The second issue for farmer concerns appropriate preparation of ponds between cultivation cycles, especially when a cultivation pond has previously been affected by EHP. The spores of EHP have thick walls and are not easy to inactivate. Even high levels of chlorine alone are not effective. In addition, potential environmental carriers are currently unknown. Both may remain in a pond after harvest and it is important that both be inactivated before the next cultivation cycle.

To disinfect earthen ponds of EHP spores, apply CaO (quickl ime, burnt lime, unslaked lime or hot lime) at 6 Ton/ha. Plow the CaO into the dry pond sediment (10-12 cm) and then moisten the sediment to activate the lime. Then leave for 1 week before drying or filling. After application of CaO, the soil pH should rise to 12 or more for a couple of days and then fall back to the normal range as it absorbs carbon dioxide and becomes $CaCO_3$.

A special warning for Mexico

There are rumors that the outbreaks of AHPND in Mexico originated from contaminated broodstock of *P. vannamei* illegally imported to Mexico from Asia for production of PL to stock rearing ponds. If these rumours are true, given the high prevalence of EHP in Asia, it is quite probable that the imported shrimp would also have been infected with EHP. Thus, it is urgent that the Mexican quarantine authorities check their current and archived DNA samples used to monitor for AHPND bacteria by PCR to also check for the presence of EHP target DNA by PCR. If they find it, it would support the hypothesis that AHPND bacteria were imported from Asia. It is also possible that timely preventative measures or continued surveillance of imported, living shrimp stocks could prevent the unfortunate introduction and establishment of what is probably an exotic parasite to Mexico and the rest of the Americas.

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