Regional Cooperation in Sustainable Fisheries Sciences: Fostering Young and Female Researchers from Southeast Asia

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This article is based on the Report of the Wrap-up Workshop of the Fellowship Program "Advanced Program to Foster Young and Female Researchers from Southeast Asia in Sustainable Fisheries Sciences in 2011" organized in Bangkok, Thailand on 13 December 2011. The Workshop which was sponsored by the "Invitation Program for East Asian Young Researchers" of the Japan Society for the Promotion of Science (JSPS) through the Faculty of Fisheries Sciences of Hokkaido University in Japan, was attended by the 2011 Southeast Asian research fellows as well as officers and representatives from the Faculty of Fisheries of Kasetsart University in Bangkok, Thailand; Asian Institute of Technology (AIT), Thailand; School of Agricultural Technology of Walailak University, Nakhon Si Thammarat, Thailand; and the Southeast Asian Fisheries Development Center (SEAFDEC) in Bangkok, Thailand.

In 2009-2010, the "Fostering Program for Young and Female Researchers in Sustainable Fisheries Sciences in Southeast Asia" under the Japan-East Asia Network of Exchange for Students and Youths (JENESYS) Programme, was successfully implemented by the Hokkaido University Faculty of Fisheries Sciences (HUFFS) of Japan (Okamoto *et al*., 2010) with funding support from the Japan Society for the Promotion of Science (JSPS). Subsequently, two programs were approved for implementation by HUFFS starting in 2011, namely: Asia-Africa Science Platform Program for 2011-2013, which aims to create high potential research hubs in selected fields within the Asian and African regions while fostering the next generation of leading researchers; and the 2011 Invitation Program for East Asian Young Researchers under the JENESYS Programme to create regional cooperation among Asian countries through exchange of next generation researchers.

Invitation Program for East Asian Young Researchers: 2011

Following the feat of the 2009-2010 Fostering Program, the 2011 Invitation Program invited 15 young researchers as exchange fellows for short-term cooperative research at HUFFS in Japan in 2011. The research fellows came from Kasetsart University, AIT, SEAFDEC Aquaculture Department (Philippines), Walailak University (Thailand), and Sam Ratulangi University (Indonesia).

The Program has been structured in such a way that after selection, the exchange fellows would have to conduct research on special topics at HUFFS, where they would join study tours and excursions, take part in lectures given by young researchers to Japanese students in English, attend lectures by visiting researchers, and participate in the international workshop at Hokkaido University as well as the wrap-up workshop in Bangkok, Thailand. The 2011 Invitation Program gave more focus on female researchers considering that in many countries in the Asian region including Japan, the number of female researchers involved in fisheries sciences is very limited. Therefore, it has become necessary to bring together female researchers especially from Southeast Asia in order to learn about their activities as well as enhance their capabilities. Thus, from

Prof. Dr. Katsutoshi Arai from Hokkaido University, explaining the coverage of the 2011 Invitation Program for East Asian Young Researchers

Participants of the Wrap-up Workshop: 2011 Invitation Program for East Asian Young Researchers

Box 1. Research studies conducted by the 2011 exchange fellows

(1) **Identification of DNA markers associated with WSSV resistance in *Penaeus monodon*** by Ms. Opor Siwasutham (Walailak University)

The study aimed to detect the DNA markers associated with WSSV resistance in the black tiger shrimp *Penaeus monodon* which could respond more efficiently to marker assisted selection than to phenotypic selection. This is considering that selection for immune response could lead to improved general disease resistance. The results of the study would be useful for the application of DNA marker assisted selection in breeding of WSSV resistant strain of *P. monodon*.

(2) **Control of white feces disease of white shrimp (*Litopenaeus vannamei*) by feeding *Lactobacillus casei* and *Saccharomyces cerevisiae*** by Ms. Supannee Suwanpakdee (Walailak Univeristy)

The study aimed to determine the efficiency of *Lactobacillus casei* and *Saccharomyces cerevisiae*, most widely used probiotics in aquaculture, in controlling white feces disease and immune gene expression of the white-leg shrimp (*L. vannamei*). The results indicated that using *L. casei* which can grow in wide range of pH and salinity could be an alternative means of controlling white feces disease in shrimp culture.

(3) **Some aspects of Japanese policy and fishery cooperative association** by Mr. Pichet Plaipetch (AIT)

The study mainly aimed to know the reasons why Japanese fishers have high level of achievements in fishery and resources management, based on the information gathered from two fisheries cooperative associations in Shiriuchi and Usujiri, Hokkaido Prefecture. In spite of the nature of fisheries in Southeast Asia which is multi-species and multi-gear which is quite different from that of Japan, countries in the region could secure sustainable fishery and resources management through systemic establishment of fishery associations and decentralization of authority of fishery management to the fishers, which should be appropriately supported by laws and legal schemes of the respective countries.

(4) **Kuril harbor seal and coastal fishery conflict** by Ms. Supanuth Chuerattanakul (AIT)

Kuril harbor seals and humans compete for the same source of food which comprises mostly salmon, leading to the conflict between the seals and coastal fisheries especially in Cape Erimo in Southern Hokkaido. The seals have been killed as they cause damages to fishing gears and to the salmon catch of the fishers, resulting in the decreasing population of the seals. To mitigate this concern, fishers applied various methods to scare the seals away from the coastal fishing areas but these were effective only in the beginning because the seals became smarter as time goes by. In this regard, better gears should be developed to release the seals from the nets and thus, create a harmonious co-existence between the seals and the fishers. In the Southeast Asian region, the said gear is still to be developed especially for the release of dugongs from fishing gears, but such effort could be expensive unless co-management is implemented between government and coastal fishing communities, where the government would provide the financial resources and technology while the communities would implement the said innovation.

(5) **Seasonal variation of marine phytoplankton in Oshoro Bay, Hakodate, Japan** by Dr. Yaowaluk Monthum (Kasetsart University)

The study aimed to determine the abundance of marine phytoplanktons in Oshoro Bay considering that phytoplanktons are important in marine ecology, although a disadvantage could be the impact of overpopulation of certain phytoplanktons such as the occurrence of red tide phenomenon. Phytoplanktons were collected from the Bay in January to represent winter season, in April for the spring season, and in August for the summer season. The results showed that the dominant genus in spring and summer seasons was *Chaetoceros* spp. while *Skeletonema* sp. was dominant in the winter season. The study may be continued to estimate the productivity of the Bay.

(6) **Study of fishing gears and fishing operations of octopus trap in Aomori Prefecture, Japan** by Dr. Charuay Sukhsangchan (Kasetsart University)

Information gathered from two fisheries cooperatives in Aomori Prefecture, namely: Sai Fisheries Cooperative (Isoya Branch) and Ishimochi Fisheries Cooperative, indicated that five types of gears have been used to catch octopus (common and giant octopus) in the said prefecture, these are: long line, box, trap, floating barrel, and spear, although before the use of gastropod shell was common but the shell has become too expensive for fishers. Since these gear types are selective, no by-catch and environment-friendly, efforts should be made to modify them for possible application in the octopus fisheries in the Southeast Asian countries especially in Thailand.

(7) **Localisation of *follicle-stimulating hormone receptor* (*fshr*) transcripts in Nile tilapia (*Oreochromis niloticus*) female gonads** by Dr. Nichanun Phochanukul (Kasetsart University)

Nile tilapia is considered as an excellent model for studying the gonad differentiation in aquatic animals because of its well-known stable XX/XY system and availability of all-male and all-female populations. In an ongoing study, real-time RT-PCR was used to determine the precise timing of gene expression during the early stages of undifferentiated gonads of the fish, while the expression profiles between males and females had been compared. The number of genes potentially involved in tilapia gonad differentiation was established which included the follicle-stimulating hormone receptor (*fshr*) which produces receptors of follicle-stimulating hormone. This particular study aimed to visually localize the *fshr* transcripts in tilapia female gonads using *in-situ* hybridization (ISH) to learn more about the *fshr*. However, due to limited time for the study and considering that it was the first attempt to conduct ISH, no conclusion could be derived, although efforts are being made to continue the study by University students. Nevertheless, the study could improve tilapia production without harming the environment since the use of hormones in production is eliminated.

(8) **General histology of Corallimorpharian (*Actinodiscus* sp.)** by Mr. Sahabhop Dokkaew (Kasetsart University)

The study made use of histology technique to describe the general tissue of mushroom corals, corallimorpharian (*Actinodiscus* sp.) which was observed by cross and longitudinal section. Through such technique, the organelle and types of layer were identified. The structure of corallimorpharian could be used as basis for studying the development of tissue culture and the technique could be used as model for tissue degeneration of species that could be cut into small pieces and still can grow completely, and thus could be used as basis for cell development by micro-propagation. The mechanism could also be applied to other invertebrates such as soft coral and sea anemone but could not be applied for jellyfish.

Box 1. Research studies conducted by the 2011 exchange fellows (Cont'd)

(9) **Training in molecular biological laboratory techniques and preliminary study on molecular phylogeny of Arcidae (Bivalvia: Pteriomorphia) in Thailand** by Mr. Teerapong Duangdee (Kasetsat University)

The activity involved training in various molecular biology laboratory techniques, PCR techniques for the thermocline profiles, and sequence analysis using automatic DNA sequencer. Ark shell, Arcidae specimens collected from the Gulf of Thailand and Andaman Sea were used to study the molecular phylogeny of Arcidae in Thailand. The ark shell specimens were identified through the morphological characters of the shell as *Anadara antiquata*, *A. cuneata*, *A. granosa*, *A. nodifera*, *A. trocheli*, *Arca ventricosa*, *Barbatia foliata*, *B. fusca*, *Scapharca cornea*, and *S. inaequivalvis*. With very close morphological characteristics it would be very difficult to distinguish the various species but with the use of DNA analysis and sequencing, species identification could be done.

(10) **Chemical characterization of lipid extracts from brown seaweeds in Thailand** by Dr. Praiboon Jantana (Kasetsart University)

Eight species of brown seaweeds, *i.e. Sargassum* sp., *Turbinaria decurrens*, *T. conoides* (TCT), *T. conoides* (TCC), *Dictyota cervicornis*, *Dictyota* sp., *Padina australis*, and *Colpomenia sinuosa*, were investigated for their lipid contents, considering that fucoxanthin as lipid component found in brown seaweeds offers several health benefits. The results of the analysis showed that the fucoxanthin contents in *T. conoides* (TCT), *D. cervicornis*, and *P. australis* were relatively high. Moreover, the analysis of the fatty acid composition indicated that palmitic acid which is the most common saturated fatty acids in animals and plants, was mostly found in all species of the seaweeds examined, while the highest level of Vitamin E in the forms of α-tocopherol and δ-tocopherol was found in *P. australis* with *D. cervicornis* having the highest content of γ-tocopherol. Furthermore, the highest content of polyphenol, an antioxidant was found in *T. conoides* and *Dictyota* sp. These results seem to suggest that brown seaweeds have the potentials to be used as ingredients for the production of nutraceuticals and novel functional formulations.

(11) **Techniques for detection of Myosin denaturation** by Dr. Jirawan Maneerote (Kasetsart University)

The study aimed to master the biotechnical techniques for quantitatively detecting myosin denaturation in fish fillet, using the Tilapia myofibrils, which included analysis of the ATPase enzyme activity, salt-solubility and chymotrypsin digestion. Based on the results of the analysis, myosin denaturation was sensitively detected in the fish fillet, suggesting that changes in the biochemical function or structural changes of the myosin which are also known as denaturation could be effectively used for the quality of muscle-based specimens and thus, could be used for examining the quality of frozen shrimps from aquaculture.

the fifteen research fellows in 2011, only five were male researchers.

Wrap-up Workshop of the 2011 Invitation Program

For one reason or another, only 11 fellows were able to take part in the Wrap-up Workshop which was conducted in Bangkok, Thailand on 13 December 2011, and presented the results of their research studies (**Box 1**). While one fellow from Indonesia sent a Poster of the results of her study, two fellows from the Philippines presented the results of their research studies in a separate workshop held at the SEAFDEC Aquaculture Department in Iloilo, Philippines. The Wrap-up Workshop was sponsored by the "Invitation Program for East Asian Young Researchers" of the JSPS through the HUFFS in collaboration with the Faculty of Fisheries of Kasetsart University (Bangkok, Thailand), AIT (Thailand), School of Agricultural Technology of Walailak University (Nakhon Si Thammarat, Thailand), and SEAFDEC (Bangkok, Thailand).

Prof. Dr. Katsutoshi Arai from Hokkaido University, explaining the guidelines for the Group Discussion during the Wrap-up Workshop: 2011 Invitation Program for East Asian Young Researchers

A group discussion which focused on the ways and means of improving education and training in fisheries by universities and inter-governmental organizations for the promotion of sustainable fisheries in Southeast Asia was a new component and very important feature of the 2011 Wrap-up Workshop. The topics brought forward for discussion included fisheries and policy, aquaculture and the environment, and food science and utilization. The discussion was designed in such a way that the main outputs would include design of program to include priority areas and target groups, program implementation to include activities and topics to be covered, and evaluation plan that could be used to assess the effectiveness of the proposed programs (**Box 2**).

It should be noted that the specific recommendations included the need to: improve curricula and training courses to cover the important topics suggested; deliver the programs to the right target groups and evaluate the programs using appropriate indicators; and consider

Box 2. Summary of outputs of the group discussion

1. Fisheries and Policy

Programs	Implementation Activities	Target Groups	Evaluation Plan
1.1 Fisheries management	Training and workshops	GOs, NGOs, researchers, fishers, students	Questionnaire survey
1.2 Fishery policy-making process	Training and workshops	GOs, NGOs, fishers,	Questionnaire survey
1.3 International fisheries-related issues	Training and workshops	GOs, NGOs, researchers, fishers, students	Questionnaire survey
1.4 Fisheries technology	Training and workshops	GOs, NGOs, researchers, fishers, students	Questionnaire survey
1.5 Fisheries livelihood	Training and workshops	Students, fishers, researchers	Questionnaire survey

2. Aquaculture and the Environment

Programs	Implementation Activities		Target Groups		Evaluation Plan	
	Degree	Non-degree	Degree	Non-degree	Degree	Non-degree
2.1 Coastal aquaculture	Lectures, seminars, study tours, training and workshops, exhibitions, exchange programs	Lectures, seminars, study tours, training and workshops, exhibitions	GOs, students (graduate, undergraduate), policy makers	GOs, NGOs, fish farmers, students (graduate, undergraduate), policy makers, other stakeholders	Satisfaction of students, employability of graduates, types of jobs (staff *vs* managerial), satisfaction of employers	Immediate applicability of acquired skills, satisfaction of trainees, output (increased production), no increase in pollution, acceptability of products, reduced ecological footprints
2.2 Inland aquaculture	Lectures, seminars, study tours, training and workshops, exhibitions, exchange programs	Lectures, seminars, study tours, training and workshops, exhibitions	GOs, students (graduate, undergraduate), policy makers	GOs, NGOs, fish farmers, students (graduate, undergraduate), policy makers, other stakeholders	Satisfaction of students, employability of graduates, types of jobs (staff *vs* managerial), satisfaction of employers	Immediate applicability of acquired skills, satisfaction of trainees, output (increased production), no increase in pollution, acceptability of products, reduced ecological footprints

3. Food Science and Utilization

Programs	Implementation Activities	Target Groups	Evaluation Plan
3.1 Waste utilization	Research and training, use of multi-media	Companies, undergraduate students	Project report of companies, reports of students
3.2 Innovations	Research and training, use of multi-media	Companies, undergraduate students	Project report of companies, reports of students, survey, questionnaire

improvements based on the results of the evaluation (HUFFS, 2011). To cap the Workshop, representatives from the collaborating institutions, namely: Asian Institute of Technology, Kasetsart University, Southeast Asian Fisheries Development Center, and Walailak University summarized their observations and comments on the Invitation Program (**Box 3**).

References

Okamoto, J., K. Arai and S. Chamsai. 2010. Boosting the Capacity of Young and Female Researchers for Achieving Sustainable Fisheries in Southeast Asia: Initiative of Hokkaido University, Japan. ***In:*** Fish for the People Vol 8 No 3 (2010). Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 37-43

Box 3. Observations and comments on the Invitation Program

1. Structure of program gives good opportunities of fellows in experiencing life in Japan as well as cultural exchange between Japan and participating countries.
2. Program presented solid step towards developing research in fisheries science.
3. Knowledge gained by fellows from HUFFS complements and supplements with what they learned from their base institutions.
4. Two-way learning is boosted, where fellows maximize learning from each other's expertise, not only among research fellows but also to the students of HUFFS.
5. Capacity building of researchers is timely for the promotion of sustainable fisheries under the roadmap of fisheries integration which will be realized upon the establishment of the ASEAN Economic Community in 2015.
6. Program should be sustained and continued to enhance cooperation in fisheries research and to "shine the light" on deserving young and female researchers in the Southeast Asian region.

HUFFS. 2011. Proceedings of the Wrap-up Workshop 2011: Advanced Program to Foster Young and Female Researchers for Southeast Asia in Sustainable Fisheries Sciences-Interuniversity Exchange Program of Hokkaido University. Bangkok, Thailand, 13 December 2011. JSPS Invitation Program for East Asian Young Researchers 2011 of the Faculty of Fisheries Sciences, Hokkaido University, Hakodate, Japan (*in press*)

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