JSPS Asia-Africa Science Platform Program:
Brief summary of first year activities

Katsutoshi Arai, Junichiro Okamoto, Nobuo Kimura, Yasuaki Takagi, Kunihiko Konno, John Bower, and *Virgilia Sulit*

Hokkaido University is now leading a three-year project that aims to establish a research and educational network and platform to assist young researchers in developing sustainable fisheries production and advanced utilization of fisheries products in Southeast Asia, and to internationalize higher education in fisheries. This paper summarizes the main activities of the program during the first year of its implementation.

Under the Asia-Africa Science Platform (AASP) Program, the Japan Society for the Promotion of Science (JSPS) sponsors three-year projects designed to contribute to the efforts in addressing a wide range of problems in Asia and Africa. In these projects, research institutions in Japan have been collaborating with those in Asia and Africa, to form research hubs that both implement the projects and foster young researchers from these regions.

The Hokkaido University's Faculty of Fisheries Sciences (HUFFS) is now leading the implementation of three-year (April 2011- March 2014) AASP project that aims to establish a research and educational network and platform to assist young researchers in developing and conducting research in the areas of sustainable fisheries production and advanced utilization of fisheries products in Southeast Asia, and to internationalize higher education in fisheries. The project comprises five subjects, namely: fisheries policy, sustainable fisheries production, environment-friendly aquaculture, advanced fisheries-product utilization, and international higher fisheries education (**Box 1**).

Each subject comprises research and seminar activities, where research activities involve cooperative research, and where the concerned researchers exchange their findings through academic meetings among the participating institutions. Most research activities during the first year were conducted at HUFFS, while the seminars were held at the SEAFDEC Secretariat in Bangkok, Thailand and in the respective locations of the Departments.

The International Seminars

In order to provide a forum for sharing the results of research activities conducted under each subject, four seminars were held in late 2011 and early 2012 (**Box 2**).

Subject 1: Marine fisheries policy in Southeast Asia

To promote research on marine fisheries policy, fellowships were provided to one staff member from the SEAFDEC Secretariat and to two staff members from the SEAFDEC Training Department (HUFFS, 2012). *Ms. Sawitree*

Box 1. Subjects, team leaders and in-country partners and coordinators for the AASP project

Subject	HUFFS Team Leaders	In-country Partners	In-country Coordinators
Marine fisheries policy in Southeast Asia	Junichiro OKAMOTO	SEAFDEC Secretariat	Kenji MATSUMOTO
Sustainable production of fisheries resources in Southeast Asia	Nobuo KIMURA	SEAFDEC/MFRDMD	Mahyam Mohd ISA
	Takashi MATSUISHI*		
Environment-friendly aquaculture and stock enhancement in Southeast Asia	Yasuaki TAKAGI	SEAFDEC/AQD	Joebert TOLEDO
Highly efficient utilization and processing of fisheries resources in Southeast Asia	Kunihiko KONNO	SEAFDEC/MFRD	Soon-Eong YEAP
Globalization of higher education of fisheries sciences in Southeast Asia	John BOWER	Kasetsart University	Nontawith AREECHON
			Wanchai WORAWATTANAMATEEKUL**
		Asian Institute of Technology	Wenresti GALLARDO

AQD: Aquaculture Department of SEAFDEC in Iloilo, Philippines
HUFFS: Hokkaido University, Faculty of Fisheries Sciences, Hakodate, Hokkaido, Japan
MFRD: Marine Fisheries Research Department of SEAFDEC in Singapore
MFRDMD: Marine Fishery Resources Development and Management Department of SEAFDEC in Kuala Terengganu, Malaysia
** Sub-leader*
*** Sub-coordinator*

Box 2. Seminars held during the first year of the AASP project		
Subjects	**Location/Venue**	**Date**
Marine fisheries policy in Southeast Asia	SEAFDEC Secretariat	21 February 2012
Globalization of higher education of fisheries sciences in Southeast Asia		
Sustainable production of fisheries resources in Southeast Asia	SEAFDEC/MFRDMD	15 December 2011
Environment-friendly aquaculture and stock enhancement in Southeast Asia	SEAFDEC/AQD	1 December 2011
Highly efficient utilization and processing of fisheries resources in Southeast Asia	SEAFDEC/MFRD	11 January 2012

Chamsai of the SEAFDEC Secretariat conducted research that aimed to enhance the management of fishery resources in Southeast Asia using lessons learned from the Japanese Fisheries Cooperative System. The results of the research included recommendations suggesting that devolution of legislative and policy directions as well as authority to the local government and fishers' organizations would enhance fisheries management in the Southeast Asian region. The development of legitimate definition of property rights and decision-making arrangements as well as appropriate local responsibilities and authorities should be carried out in the region while the establishment of a mechanism to facilitate the process of consultation and negotiation building upon the involvement of relevant stakeholders should also be focused.

Moreover, for sustainable fisheries management, community initiatives should be mainstreamed into national policies; self-reliance should be practiced considering the limited manpower and budget provided by governments; careful management of existing resources should be promoted taking into account the rapid human population growth in the region, changes in social structures, globalization, and increasing cost of living. In community-based resource management, enhancing the stakeholders' understanding of the elements of resilience and their adaptive capacity to the various drivers of change should be promoted.

However, considering the small-scale and multi-species nature of fisheries in Southeast Asia, the concept of cooperativism based on the Japanese fishery cooperative association (FCA) could not be readily applicable in the region if a sense of ownership of the fisheries is not yet institutionalized within the fishers groups.

SEAFDEC officers led by Secretary-General, Dr. Chumnarn Pongsri *(right)* and Deputy Secretary-General Mr. Kenji Matsumoto *(second from right)* during the International Seminar on Marine Fisheries Policy and Higher Education in Fisheries in Southeast Asia held at the SEAFDEC Secretariat in Bangkok on 21 February 2012

Another study was conducted to create a better understanding of the demographic and social dynamics of coastal fishing communities that contribute to the development of policies for coastal resource use and conservation. *Ms. Sumitra Ruangsivakul* of SEAFDEC Training Department (TD) carried out a socio-economic study on coastal fisheries in Thailand, taking into consideration the current situation of small-scale fisheries in three coastal fishing areas and comparing these with those from other established fishing communities. The study adopted a two-prong survey approach (*i.e.*, interview with local officials and sample survey of households) in order to identify the common issues that could be used to improve

Participants in the International Seminar on Marine Fisheries Policy and Higher Education in Fisheries in Southeast Asia held at the SEAFDEC Secretariat in Bangkok, Thailand on 21 February 2012

small-scale fisheries policies that are based on national and local initiatives. Results of the analysis showed that most fishers seem to be unaware of the implications of IUU fishing but fishers understand the impacts of climate change on fisheries. The non-cognizant of fishers on the impacts of IUU fishing on fisheries contributed to their negative attitude and non-participation in enforcing the regulations on IUU fishing. Meanwhile, many fishers have not considered safety at sea as a priority issue, and in the sample areas fishers do not carry life-saving equipment onboard other than transistorized radio to monitor the weather condition of their fishing grounds. Many fishers however, recognized the need to adopt energy-saving in fisheries as means to reduce operations costs.

The development of a fishery information factsheet (FIF) for tuna fisheries management in Southeast Asia based on lessons learned in Japan was attempted by *Ms. Namfon Imsamram* of SEAFDEC/TD. Since FIFs have been used in Japan to support self-management of fisheries by FCAs and ensure sustainable fisheries operations, the possibility of introducing Japan's FIF system and management mechanism to fishers, policy makers and other stakeholders in the Southeast Asian region was explored to support sustainable fisheries management, initially focusing on neritic tuna fisheries in the Andaman Sea. However, it was noted that in order to adopt the FIF system, it is necessary for concerned countries to improve their systems of collecting tuna statistics, specifically the trend of tuna catch. Moreover, in order that the countries could adopt the FIF for tuna fisheries management in Southeast Asia, capacity building is necessary which could focus in the areas of population dynamics as well as on the development of relevant models for stock assessment including catch forecasting, bio-economics, and biometrics. Meanwhile, improving their respective fishery statistics collection systems is very crucial to enable the countries to carry out the necessary stock assessment analyses.

Subject 2: Sustainable production of fisheries resources in Southeast Asia

A research fellowship grant was awarded to *Noorul Azliana J.* of SEAFDEC/MFRDMD to conduct a study on the genetic identification of commercially-important pelagic fishes in the South China Sea and Andaman Sea. Through the study, she was able to acquire knowledge on the identification of selected fish species using molecular techniques, adoption of the polymerase chain reaction (PCR) process, sequencing techniques from the cytochrome b region of the mitochondrial DNA (mtDNA) of selected species, and analyzing the data obtained from the aforementioned techniques, and also in determining the phylogenetic relationships between selected species (HUFFS, 2011). For the study, 20 samples each of Indian mackerel (*Rastrelliger kanagurta*), short mackerel (*R. brachysoma*), round scad (*Decapterus macrosoma*), and horse mackerel or Japanese scad (*D. maruadsi*) were collected from the South China Sea and the Andaman Sea.

The DNA of the selected samples was analyzed for genetic variation using cytochrome b of mtDNA. The cytochrome b gene was amplified using PCR, and a 461 bp partial fragment of the gene was sequenced in 58 samples to determine the haplotype differences and phylogenetic relationship among the species. A total of 14 haplotypes were obtained in the *Rastrelliger* spp. and 8 in the *Decapterus* spp. From the phylogenic tree constructed using the Neighbor-Joining (NJ) method, *R. kanagurta* and *R. brachysoma* could be differentiated as two different species.

However, the phylogenetic relationships among the *Decapterus* spp. could not be determined. While DNA degradation might have occurred during the long storage of the samples, genomic DNA was successfully amplified by the PCR method for all selected samples. The inability of the analysis to identify the

Participants in the International Seminar on Sustainable Production of Fisheries Resources in Southeast Asia held at the MFRDMD facilities in Kuala Terengganu, Malaysia on 15 December 2011

Ms. Noorul Azliana Binti Jamaludin *(left)* presenting the results of her research during the International Seminar on Sustainable Production of Fisheries Resources in Southeast Asia held at the MFRDMD facilities in Kuala Terengganu, Malaysia on 15 December 2011

Decapterus spp. suggests that morphological studies of the species should also be done along with the genetic analysis.

Therefore, a molecular study using nuclear DNA or microsatellites as other markers should also be conducted in the future, for the proper identification of various fish species. Nevertheless, the study proved the importance of genetic identification for taxonomy validation in addition to the morphology analysis of the species.

Subject 3: Environment-friendly aquaculture and stock enhancement in Southeast Asia

The populations of important endemic fish species in Philippine waters have been dwindling due to excessive fishing by local fishers. Silver therapon *Leiopotherapon plumbeus* (Kner, 1864) is an endemic freshwater fish that can be caught in Laguna de Bay, Philippines, and in order to conserve this fish resource, hatchery techniques should be developed for culture purposes. Hence, knowledge on the morphological development, growth, and suitable live foods for the first-feeding larvae is important to develop effective hatchery techniques and feeding regimes. Previous rearing trials of silver therapon ended with high mortalities four days after hatching (DAH).

Thus, a study was conducted by *Dr. Frolan Aya*, a research fellow from AQD to characterize the developmental changes in the morpho-anatomical traits of the silver therapon, in order to better understand the larval development of the fish focusing on the feeding apparatus (*i.e.*, mouth gap size) and the rate of growth, the ways of predicting the initial time of feeding, and the developmental stages of the larvae based on histological studies. Samples of silver therapon larvae from 0 to 4 DAH collected from hormone-induced spawning trials showed that the average growth rate calculated from total length measurements was 0.124 mm/day. The time for initial feeding of silver therapon larvae was predicted at 2 DAH (total length of 2.15 mm) based on oil globule and yolk volume measurements. The mouth gap size of the larvae was 0.139 ±0.027 mm at first-feeding (2 DAH) and increased to 0.221 ± 0.050 mm at 4 DAH. Sections of the larvae confirmed that yolk reserves were used up at 2 DAH, the pancreas and liver were not well-developed, and looping intestines had been noted. The kidney started to develop at 3 DAH, and at 4 DAH, cells were observed to have vacuoles, indicating that the cells had been inactive and in the dying state. Based on these preliminary results, the larval food appropriate for the mouth gap size of the fish larvae will be investigated to develop a feeding regime for larval rearing of this species.

Another research fellow from AQD *Dr. Maria Michelle Peñaranda* carried out a study on the partial purification of carrageenase from a Philippine seaweed bacterial isolate at the Laboratory of Marine Biotechnology and Microbiology at HUFFS from 22 August to 26 September 2011. Strain improvement of commercially-important seaweeds (*i.e.*, disease-resistant and fast-growing) and production of quality seedstocks have been considered as means of addressing one of the major concerns of the seaweed industry in the Philippines. One method of improving the strain of seaweeds is by somatic hybridization via protoplast fusion, which permits the rapid development of new strains and the transfer of genes and traits between species. SEAFDEC/AQD has been successful in the isolation of protoplasts for some *Kappaphycus* sp. and significant efforts are continuously being made to isolate and culture protoplasts from other species of red seaweeds. However, compared with the protoplasts of other seaweeds that can be obtained using commercially-available cellulases alone, the red seaweeds require other enzymes such as agarases and carrageenases, the latter of which are not commercially available and are expensive to produce. In this regard, the possibility of using polyssacharidases to isolate the protoplasts of a variety of commercially-important red seaweeds had been explored.

Moreover, another research fellow from AQD *Ms. Ellen Grace Tisuela* learned at HUFFS the technical methodologies for cytogenetic studies on hybridization and polyploidization of abalones. The technique included preparation of chromosome slides for karyotyping analyses using the abalone *Haliotis discus hannai* from Kumaishi Hatchery in Japan. The chromosome slides were prepared using air (flame)-dry method to improve the cytogenetic results. Well-done spreads

Participants in the International Seminar on Environment-friendly Aquaculture and Stock Enhancement in Southeast Asia held at the AQD facilities in Tigbauan, Iloilo, Philippines on 1 December 2011

Ms. Ellen Grace Tisuela presenting the results of her research during the International Seminar on Environment-friendly Aquaculture and Stock Enhancement in Southeast Asia held at the AQD facilities in Tigbauan, Iloilo, Philippines on 1 December 2011

of the metaphase was obtained, and the chromosomes were distinct enough for microscopic observation. Secondly, the DNA content in the cell nucleus was measured using a Partec flow cytometer.

As a rapid and easy method to identify triploid and hybrid individuals, the gill tissue and epipoidal tentacles were sampled from the abalone, and stained with DAPI solution and read using a Partec flow cytometer. Another technique introduced during the training was on the preparation of samples for histological analyses, which comprised: 1) placing the cells in paraffin wax; 2) slicing thin sections; and 3) putting the sections on glass slides. After washing in different staining solutions, the samples were ready for microscopic viewing. This histological technique is important to assess the reproductive capacity of hybrid and triploid individuals.

Subject 4: Highly efficient utilization and processing of fisheries resources in Southeast Asia

After the international seminar at MFRD and as a follow-up on this activity, the Chief of MFRD visited HUFFS in late February 2012 to gain a better understanding of the research work and discuss the details of the collaborative research program between HUFFS and MFRD. This was intended to help MFRD select a prospective research fellow for the AASP, and decide on an appropriate research area to be conducted under the research fellowship (SEAFDEC, 2012).

Participants in the International Seminar on Highly Efficient Utilization and Processing of Fisheries Resources in Southeast Asia held at the premises of MFRD in Singapore on 11 February 2012

Subject 5: Globalization of higher education of fisheries sciences in Southeast Asia

In order to promote international higher education in fisheries in Southeast Asia, two exchange research fellows from Thailand were granted fellowships to conduct studies aimed at evaluating the internationalization of higher education in fisheries in Southeast Asia (HUFFS, 2012). The studies have been considered very timely, especially that the ASEAN Economic Community (AEC) which is expected to be achieved by 2015, will result in the free flow of skilled labor including experts in the ASEAN region. Therefore, universities will need to ensure that their graduates can compete in the education market with the regional supply of highly qualified experts.

An internationalization survey was conducted by *Ms. Sirisuda Jumnongsong* of Kasetsart University involving faculty members and students from several universities and institutions of learning in Thailand as respondents. The survey required the respondents to assess the importance, rationale, benefits, and risks of internationalization at their respective universities and institutions. In July 2012, a similar study was conducted at the University of the Philippines in the Visayas (Miag-ao, Iloilo, Philippines) College of Fisheries and Ocean Sciences, and the study will be expanded in 2013 involving another ASEAN member state.

For the Asian Institute of Technology (AIT) which is a leading postgraduate institution in the Asia-Pacific region promoting technological changes and sustainable development through higher education, research and outreach programs, research fellow *Dr. Wenresti Gallardo* emphasized that in the course of implementing graduate programs, AIT has been confronted with various problems and challenges. Considering that AIT students come from many countries in the Asia-Pacific region, some students have poor English communication skills, especially those coming from universities where English is not the medium of instruction. To address this concern, it has become a challenge for AIT to teach its students using English, although applicants for graduate programs at AIT are now screened using certain criteria, *i.e.* applicants should have an average score of 4.5 based on the International English Language Testing System (IELTS) to enter a master's degree program and an IELTS score of 5.5 for the doctoral degree program.

In addition, AIT also offers English courses to students while they are taking their respective academic courses. Nevertheless, considering that there had been a recent steep decline in financial support received by AIT in terms of scholarships, AIT had to intensify its campaign to secure scholarships for deserving students, welcome more self-supporting students, raise funds for salaries and operating expenses, and promote the establishment of public-private partnerships. This concern has emanated from the fact that the original charter of AIT seemed ambiguous. AIT was legally declared as an international organization under a revised charter, so it is now able to seek sources of financial support from abroad, and extend cooperation and support from other international institutions of higher learning. Thus, internationalization of higher education is also being sustained especially in sciences.

Way Forward

As one of the pillars of the ASEAN regional integration, the ASEAN Economic Community (AEC) aims to develop a single market and production base, competitive economic region with equitable economic development, and a region fully integrated into the global economy by 2015. Achieving a single market and production base means that there will be a free flow of goods, services, investment, skilled labor, and capital. Since the education environment has been continuously changing, the ASEAN countries must enhance their respective education systems to adapt to such changes and to go along with the AEC Blueprint. In the past, most graduates worked in their home countries, but today graduates must prepare to work outside their home countries in a multi-cultural setting. Therefore, educational institutions must adapt to these changing conditions and create programs that fit the needs of the market at regional and global levels, which now focus on "open market".

For educational institutions to better respond to global changes and adjust to this changing environment, they should have foresight on the changes that are happening. More specifically, information should be processed and used for data analysis (*e.g.*, probability statistics, decision analysis), collaboration with other sectors should be enhanced, new teaching technologies should be adopted (*e.g.*, electronic readers, video lectures/conferencing), more active learning classrooms should be created, and cosmopolitanism (an idea that all humanity belongs to a single community) should be promoted.

Similarly, research institutions dealing with marine sciences must be able to address the emerging issues that now prevail including those on marine ecosystem conservation and stable seafood production to supply the growing populations and alleviate poverty, especially in Southeast Asia. It is also important for these institutions to stand together for sound and sustainable utilization of marine resources in the region. Thus, the paradigm now in fisheries science of "sustainability" in all aspects of research, education, international exchanges and academia-government-industry collaboration should be adapted by these educational institutions. One of the goals of the AASP program is also to contribute to the realization of the AEC, especially in the aspect of education in marine sciences.

References

HUFFS. 2011. Proceedings of the International Seminar on Sustainable Production of Fisheries Resources in Southeast Asia (S-2), SEAFDEC/MFRDMD, Kuala Terengganu, Malaysia, 15 December 2011; 47 p

HUFFS. 2012. Proceedings of the International Seminar on Marine Fisheries Policy and Higher Education on Fisheries in Southeast Asia (S-1), SEAFDEC Secretariat, Bangkok, Thailand, 21 February 2012; 78 p

SEAFDEC. 2012. Asia-Africa Science platform program (AASPP) of Hokudai and MFRD. ***In***: SEAFDEC Newsletter Vol. 35 No. 1 (January-March 2012). Southeast Asian Fisheries Development Center, Bangkok, Thailand; pp 13

About the Authors

Katsutoshi Arai is a Professor at HUFFS and Coordinator of the AASP Program.

Junichiro Okamoto is a Professor at HUFFS and Team Leader of the subject area on "Marine Fisheries Policy in Southeast Asia". During 2002-2005, he served as the Deputy Secretary-General of SEAFDEC and Deputy Chief of SEAFDEC/TD.

Nobuo Kimura is a Professor at HUFFS and Team Leader of the subject area on "Sustainable Production of Fisheries Resources in Southeast Asia".

Yasuaki Takagi is a Professor at HUFFS and Team Leader of the subject area on "Environment-friendly Aquaculture and Stock Enhancement in Southeast Asia".

Kunihiko Konno is a Professor at HUFFS and Team Leader of the subject area on "Highly Efficient Utilization and Processing of Fisheries Resources in Southeast Asia".

John Bower is an Associate Professor at HUFFS and Team Leader of the subject area on "Globalization of Higher Education of Fisheries Sciences in Southeast Asia".

Virgilia Sulit is Managing Editor of "Fish for the People" and is based at the SEAFDEC Secretariat in Bangkok, Thailand. She participated in the International Seminar on Marine Fisheries Policy and Higher Education in February 2012 in Bangkok, Thailand.