

SEAFDEC Annual Report

2013



Southeast Asian Fisheries Development Center

SEAFDEC Annual Report 2013



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Preparation and Distribution of this Document

This SEAFDEC Annual Report 2013 was prepared by the Secretariat of the Southeast Asian Fisheries Development Center (SEAFDEC) in collaboration with the SEAFDEC Departments, namely: Training Department (TD), Marine Fisheries Research Department (MFRD), Aquaculture Department (AQD), and Marine Fishery Resources Development and Management Department (MFRDMD). The Annual Report is distributed to the SEAFDEC Member Countries and Departments, partner agencies and other fisheries-related organizations, and to the public to make them aware of the activities of SEAFDEC and promote the visibility of the Center.

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EXECUTIVE SUMMARY

The programs and activities implemented by SEAFDEC in 2013 were formulated and implemented in-line with the priority needs and policy directives of the Member Countries conveyed through the SEAFDEC Council and Program Committee. Moreover, appropriate provisions in the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020 adopted in 2011 by the ASEAN-SEAFDEC Ministers responsible for fisheries also serve as basis for the charting of the SEAFDEC programs, which have been categorized into: Programs under the Fisheries Consultative Group of the ASEAN-SEAFDEC Strategic Partnership (FCG/ASSP): 22 programs; Departmental Programs: 8 programs; and Other Programs (1 program). Specifically, the Programs under the FCG/ASSP Mechanism, the projects have been grouped under five (5) Program Thrusts, namely: (i) Developing and Promoting Responsible Fisheries for Poverty Alleviation and Food Security; (ii) Enhancing Capacity and Competitiveness to Facilitate International and Intra-regional Trade; (iii) Improving Management Concepts and Approaches for Sustainable Fisheries; (iv) Providing Policy and Advisory Services for Planning and Executing Management of Fisheries; and (v) Addressing International Fisheries-related Issues from a Regional Perspective.

The year 2013 saw several initiatives in improving the planning and working mechanism of SEAFDEC, particularly in the SEAFDEC programming exercise, where monitoring and evaluation processes had been strengthened. The Third SEAFDEC Review which started in 2012 came up with the final recommendations which were submitted to the SEAFDEC Council for consideration, while the establishment of the new Inland Fishery Resources Development and Management Department (IFRDMD) in Indonesia has been progressing well. Furthermore, SEAFDEC also continued to enhance its collaboration with several international/regional organizations, and availed of the support from various partners in the conduct of activities that are of common interest and render maximum benefit to the Member Countries.

This SEAFDEC Annual Report 2013 summarizes the results of the activities undertaken by SEAFDEC during the year 2013, as well as briefly introduces the planned activities for 2014. It is the wish of SEAFDEC that this Annual Report would provide revealing information on our activities and a better picture on the role of SEAFDEC in supporting the Member Countries in their efforts towards achieving sustainable development of fisheries.

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LIST OF ACRONYMS

AFCF	ASEAN Fisheries Consultative Forum
AIFS	ASEAN Integrated Food Security
AQD	SEAFDEC Aquaculture Department
ASEAN	Association of Southeast Asian Nations
ASSP	ASEAN-SEAFDEC Strategic Partnership
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CTI-CFF	Coral Triangle Initiative – Coral Reefs, Fisheries and Food Security
FAO	Food and Agriculture Organization of the United Nations
FCG	ASEAN-SEAFDEC Fisheries Consultative Group
GEF	Global Environmental Facility
ICES	International Council for the Exploration of the Sea
IDB	Islamic Development Bank
IUU Fishing	Illegal, Unreported and Unregulated Fishing
JTF	Japanese Trust Fund to SEAFDEC
LRFFT	Live Reef Food Fish Trade
MCS	Monitoring, Control and Surveillance
MFRD	SEAFDEC Marine Fisheries Research Department
MFRDMD	SEAFDEC Marine Fishery Resources Development and Management Department
NATC	National Agricultural Training Council, Malaysia
PSM	Port State Measure
RFVR	Regional Fishing Vessels Record for Vessels 24 m in Length and Over
RIHN	Research Institute for Humanity and Nature, Japan
SEAFDEC	Southeast Asian Fisheries Development Center
TD	SEAFDEC Training Department

ABOUT SEAFDEC

The Southeast Asian Fisheries Development Center (SEAFDEC) is an autonomous inter-governmental body established in 1967. SEAFDEC comprises 11 Member Countries: Brunei Darussalam, Cambodia, Indonesia, Japan, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. The Center operates through the Secretariat located in Thailand and has four Technical Departments, namely: the Training Department; the Marine Fisheries Research Department; the Aquaculture Department; and the Marine Fishery Resources Development and Management Department. The mandate of SEAFDEC as endorsed by the 41st Meeting of the SEAFDEC Council is *“to develop and manage the fisheries potential of the region by rational utilization of the resources for providing food security and safety to the people and alleviating poverty through transfer of new technologies, research and information dissemination activities”*.

The Secretariat

The SEAFDEC Secretariat is mandated to coordinate and oversee the general policy and planning of the Center, and acts as the focal point for channeling and implementing the decisions and resolutions of the SEAFDEC Council of Directors. In addition, the Secretariat also organizes regular SEAFDEC meetings to obtain directives and guidance from the Member Countries on the operation of the organization, as well as regional technical consultations and meetings on issues as recommended by the Member Countries.

The Training Department (TD)

Established in Thailand in 1968, TD has been focusing its efforts on the development of modern fishery techniques to aid regional fisheries in a more sustainable approach through the promotion of responsible fishing technologies and practices, exploration of resources, and advancing the coastal fisheries management approach. Under the new Strategic Plan which was endorsed by the SEAFDEC Council in 2006, the structure and activities of TD have been adjusted to emphasize on the promotion



SEAFDEC Secretariat



SEAFDEC/TD



SEAFDEC/MFRD



SEAFDEC/AQD



SEAFDEC/MFRDMD



of coastal fisheries management to ensure responsible resource utilization and sustainable livelihoods in coastal communities, and the promotion of off-shore fisheries through the development of best fishing practices and energy optimization technology to ensure stable supply of food fish and reduce fishing pressure in coastal areas.

The Marine Fisheries Research Department (MFRD)

MFRD was established in Singapore in 1969 and is responsible for promoting, undertaking, and coordinating research in fisheries post-harvest technology and furthering the development of the fish processing industry in the region. Its task includes research and development on fisheries post-harvest technology and practices, such as fish processing technology to optimize the utilization of harvested fish and enhancing the quality and safety of fish and fishery products. MFRD also develops technology-based analytical methods to assess seafood safety and quality, and publishes several manuals as reference materials for the Member Countries.

The Aquaculture Department (AQD)

Established in the Philippines in 1973, AQD has been carrying out research, technology verification, training and information dissemination on a wide range of aquaculture disciplines, including broodstock management and seed quality improvement, promotion of responsible and environment-friendly aquaculture, diagnosis and control of aquatic diseases, aquaculture for stock enhancement, and culture of aquatic species under international concerns. The aquaculture commodities covered by AQD include fishes, shrimps, mud crab, mollusks, and seaweeds. In addition, AQD also promotes good aquaculture practices and effective management of aquatic resources to support rural development and alleviate poverty.

The Marine Fishery Resources Development and Management Department (MFRDMD)

MFRDMD was established in Malaysia in 1992 to conduct activities on marine fishery resources focusing on biological studies of commercially-important fish species, resource assessment and management, and conservation and management of aquatic species under international concern, *e.g.* sharks and marine turtles. MFRDMD also implements activities that support the Member Countries in gathering information on inland capture fisheries, information collection for small pelagic species, and development of indicators to be used for the sustainable development and management of fisheries.

SEAFDEC COUNCIL IN 2013

Chairperson of the SEAFDEC Council for the Year 2013-2014:

Atty. Asis G. Perez

SEAFDEC Council and Alternate Council Directors:

Brunei Darussalam

Council Director: Mr. Abdul Halidi Mohd. Salleh
Acting Director, Department of Fisheries

Alternate Council Director: Ms. Ranimah Haji A. Wahab
Acting Deputy Director, Department of Fisheries

Cambodia

Council Director: H.E. Dr. Nao Thuok
Director-General, Fisheries Administration

Alternate Council Director: H.E. Dr. Sam Nouv
Deputy Director-General, Fisheries Administration

Indonesia

Council Director: Dr. Gellwyn Jusuf (*until March 2013*)
Secretary-General of Ministry of Marine Affairs and Fisheries

Dr. Sjarief Widjaja (*from March 2013*)
Secretary-General of Ministry of Marine Affairs and Fisheries

Alternate Council Director: Dr. Dedi Sutisna (*until March 2013*)
Director-General of Capture Fisheries

Dr. Achmad Poernomo (*from March 2013*)
Advisor to Minister for Public Policy, Ministry of Marine Affairs and Fisheries

Japan

Council Director: Mr. Masanori Miyahara
Deputy Director-General, Fisheries Agency

Alternate Council Director: Mr. Tadashi Yokoyama
Director, First Country Assistance Planning Division

Lao PDR

Council Director: Dr. Bounkhouang Khambounheuang
Director-General, Department of Livestock and Fisheries

Alternate Council Director: Mr. Bounthong Saphakdy
Deputy Director-General, Department of Livestock and Fisheries



Malaysia

- Council Director: Dato' Hj. Ahamad Sabki bin Mahmood
Director-General, Department of Fisheries Malaysia
- Alternate Council Director: Dato' Hj. Ismail Abu Hassan
Deputy Director-General, Department of Fisheries
(Development), Malaysia

Myanmar

- Council Director: Mr. Khin Ko Lay (*until September 2013*)
Director-General, Department of Fisheries
Mr. Khin Maung Maw (*from October 2013*)
Director-General, Department of Fisheries
- Alternate Council Director: Mr. Kyaw Myo Win (*until September 2013*)
Deputy Director-General, Department of Fisheries
Mr. Htun Win (*from October 2013*)
Deputy Director-General, Department of Fisheries

Philippines

- Council Director: Atty. Asis G. Perez
Director, Bureau of Fisheries and Aquatic Resources
- Alternate Council Director: Mrs. Drusila Esther E. Bayate (*from January 2013*)
Assistant Director for Technical Services, Bureau of
Fisheries and Aquatic Resources

Singapore

- Council Director: Mr. Lee Kwong Weng
Deputy CEO, Agri-Food & Veterinary Authority of
Singapore
- Alternate Council Director: Ms. Tan-Low Lai Kim
Group Director, Food Supply Resilience Department,
Agri-Food & Veterinary Authority of Singapore

Thailand

- Council Director: Dr. Wimol Jantrarotai (*until September 2013*)
Director-General, Department of Fisheries
Mr. Niwat Sutemechaikul (*from October 2013*)
Director-General, Department of Fisheries
- Alternate Council Director: Mr. Chirdsak Vongkamolchoon
Deputy Director-General, Department of Fisheries

Vietnam

Council Director: Dr. Pham Anh Tuan
Deputy Director-General, Fisheries Administration,
Ministry of Agriculture and Rural Development

Alternate Council Director: Mr. Nguyen Viet Manh
Director of Science, Technology and International
Cooperation Department, Fisheries Administration,
Ministry of Agriculture and Rural Development



SEAFDEC SENIOR OFFICIALS IN 2013

Secretary-General

Dr. Chumnarn Pongsri

Deputy Secretary-General

Mr. Kenji Matsumoto (*until March 2013*)

Mr. Hajime Kawamura (*from April 2013*)

Training Department (TD)

Chief

Dr. Chumnarn Pongsri

Deputy Chief

Mr. Kenji Matsumoto (*until March 2013*)

Mr. Hajime Kawamura (*from April 2013*)

Marine Fisheries Research Department (MFRD)

Chief

Mr. Yeap Soon Eong

Aquaculture Department (AQD)

Chief

Dr. Felix G. Ayson

Deputy Chief

Dr. Teruo Azuma

Marine Fishery Resources Development and Management Department (MFRDMD)

Chief

Ms. Mahyam Mohd. Isa

Deputy Chief

Dr. Masaya Katoh

MESSAGE FROM THE CHAIRPERSON OF SEAFDEC COUNCIL FOR THE YEAR 2013-2014



First of all, let me express my great pleasure for having served as Chairperson of the SEAFDEC Council for the Year 2013-2014. The year 2013 was indeed one of the very promising years of SEAFDEC with several attempts to improve the organization including its working mechanisms to better address the priorities and issues that arise from the fisheries sector in our region. Specifically in 2013, SEAFDEC was in the process of reviewing the organization to ascertain its continued relevance while also improving its efficiency and effectiveness. During the year, we also witnessed the progress of the establishment of the new SEAFDEC Inland Fishery Resources Development and Management Department or IFRDMD in Indonesia. The establishment of IFRDMD is envisioned to strengthen the role of SEAFDEC in the development of sustainable fisheries covering all aspects and environments, from marine, coastal to inland waters.

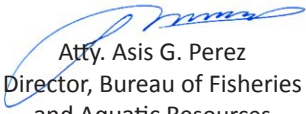
We are aware that during the year, the Southeast Asian region continued to be confronted with emerging challenges. Enhanced fishing pressure continued to prevail in response to the up-rising demand for food. IUU fishing, the impacts from land-based and coastal activities to fishery habitats, disease outbreaks in aquaculture, and more stringent quality and safety requirements as prerequisite for trade of fish and fishery products had not been fully addressed. Without taking these challenging issues for granted, considering the danger that these would cause to the sustainability of the fisheries in our region, SEAFDEC and the Member Countries exerted much effort to alleviate the impacts. We must also look back that during the year, we continue to see the drastic effects of climate variability in several countries in the region including the Philippines.

At this juncture, let me also take this opportunity to express our sincere appreciation to those who offered words of sympathy and extended assistance to the Government and people of the Philippines, after the country was drastically devastated by the super-typhoon Haiyan. The strongest typhoon ever recorded. Haiyan caused much destruction to the coastal communities, affecting large numbers of people in the country who had been engaged in fisheries and aquaculture. This phenomenon signified the need for countries in our region to foster stronger commitment and efforts in mitigating the impacts of climate change, particularly in enhancing the resilience of the fisheries sector towards calamities caused by drastic weather conditions, which could occur more frequently in the future.

Now that my term as Chairperson of the SEAFDEC Council ends in early 2014, I would like to express my deepest gratitude for the support extended to me during the past year by my colleagues in SEAFDEC. More particularly, I am very thankful to the other SEAFDEC Council Directors, the Secretary-General and his Deputy, and the officers and staff of SEAFDEC, for their assistance and cooperation that enabled me to carry out my role as Chairperson of the SEAFDEC Council effectively and efficiently. I look forward to a much revitalized SEAFDEC so



that its Secretariat and the Departments would continue the momentum that has already been initiated in support of the sustainable development of fisheries and aquaculture in Southeast Asia.



Atty. Asis G. Perez
Director, Bureau of Fisheries
and Aquatic Resources

MESSAGE FROM THE SEAFDEC SECRETARY-GENERAL



The year 2013 is another remarkable period for SEAFDEC, especially in advancing itself to adequately respond to the regional fisheries priority and emerging issues. While the Southeast Asian region has been encountering many challenges including changes in the fisheries situation and requirements of importing countries, SEAFDEC considered it an opportune time to explore the ways and means of improving its overall organization to improve its capability in rendering better services to the Member Countries.

In 2013, SEAFDEC has achieved substantial progress in various areas such as in the aspect of combating IUU fishing, where several initiatives were stepped up and pushed forward. More particularly, the development of Regional Fishing Vessel Records (RFVR) starting from vessels 24 meters in length and over was initiated and is almost complete, the regional guidelines preventing the entry of fish and fishery products from IUU fishing practices into the supply chain has been drafted and circulated for final exchange of views among the Member Countries, and the development of the ASEAN catch documentation system has been launched and prepared for a series of discussions. In the aspect of improving fisheries data and information collection, various activities had been pursued resulting in better understanding of the status of the region's fishery resources. Through the promotion of the community-based fisheries/resources management approach, data and information collection from small-scale fisheries had been enhanced leading to the identification of gaps in research, *e.g.* on data collection for sharks and tunas, and on assessing the status of marine fishery resources in several waters of Southeast Asia using the SEAFDEC research vessels.

In fisheries and resources management, the region's concerns on over-exploitation of resources and conservation of fishery habitats have been addressed by SEAFDEC through its projects on by-catch management, management of transboundary fishery resources and habitats, improving fish quality through proper handling of catch onboard, and preservation technologies. Moreover, the competitiveness of the region's fish and fishery products from capture and aquaculture had been enhanced to meet the requirements of global markets. Thus, the safety and quality of the region's fish and fishery products could now be assured making responsible fisheries management and good aquaculture practices the present buzzword in the fishery sector behind the backdrop of ensuring food security and sustainability for future generations.

The year also saw the development of new global fisheries policy framework. SEAFDEC therefore welcomed the development of the International Guidelines on Security Sustainable Small-Scale Fisheries as it signifies the importance given to small-scale fisheries and its contribution to livelihood and food security of peoples. Considering the very large number of small-scale fishers in the Southeast Asian region, SEAFDEC commits itself to continually and actively get involved in this endeavor by providing inputs in the process of developing and finalizing the guidelines, to make sure that the Guidelines would be practical enough for adoption and application in the Southeast Asian region.



SEAFDEC could not have achieved such considerable progress in its activities in 2013 without the close cooperation and support of the Member Countries. On behalf of SEAFDEC, I would therefore wish to take this opportunity to express our sincere appreciation to the Member Countries for providing directives and guidance, and working closely together with us throughout the year. I would also wish to extend our gratitude to our collaborating partners for extending their support to SEAFDEC. Specifically, I wish to express our appreciation to the Government of Japan through its Fisheries Agency, the Government of Sweden through the Swedish International Development Cooperation Agency (Sida) and the Global Environmental Facility (GEF), and to our other collaborating partners for the support and cooperation that enabled SEAFDEC to effectively implement our programs and activities in 2013. We continue to look forward to much closer cooperation with the various stakeholders for the sustainable development of fisheries for food security in the Southeast Asian region in the years to come.

A handwritten signature in black ink, appearing to read 'Chumnarn Pongsri'.

Chumnarn Pongsri, Ph.D.
Secretary-General

OVERVIEW OF SEAFDEC PROGRAMS IN 2013

The activities of SEAFDEC in 2013 were formulated and implemented in line with the policy directives given by the SEAFDEC Member Countries during SEAFDEC annual meetings, *i.e.* the 35th Meeting of the SEAFDEC Program Committee (26-28 November 2012, Thailand), 15th Meeting of the Fisheries Consultative Group of the ASEAN-SEAFDEC Strategic Partnership (FCG/ASSP) (29-30 November 2012, Thailand), and the 45th Meeting of SEAFDEC Council (1-5 April 2013, Philippines), respectively.

Formulation and development of the programs and activities of 2013 had been guided by regional and international fisheries policy frameworks, particularly the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020, adopted by the ASEAN-SEAFDEC Ministers during the ASEAN-SEAFDEC Millennium Conference in 2011. Moreover, under the ASEAN-SEAFDEC Strategic Partnership (ASSP) established since 2007, SEAFDEC has been implementing activities to support the ASEAN in its efforts towards the realization of the ASEAN Economic Community, particularly the ASEAN Roadmap for Integration of the Fisheries Sector, the ASEAN Integrated Food Security (AIFS) Framework, and the ASEAN Fisheries Consultative Forum (AFCF).

The progress of the programs and activities implemented in 2013 has been approved and endorsed by the 36th SEAFDEC Program Committee Meeting held in Penang, Malaysia on 25-27 November 2013, and the 16th Meeting of the FCG/ASSP on 28-29 November 2013, also in Malaysia, for subsequent submission to the SEAFDEC Council at its 46th Meeting in 2014.

The programs and activities implemented by SEAFDEC in 2013 included:

Program Category/Project Title	Responsible Department	Funding Sources
ASEAN-SEAFDEC FCG/ASSP Programs		
Thrust I: Developing and Promoting Responsible Fisheries for Poverty Alleviation and Food Security		
1. Rehabilitation of Fisheries Resources and Habitat/ Fishing Grounds for Resources Enhancement	TD	JTF
2. Human Resources Development for Sustainable Fisheries	TD	JTF
3. Optimizing Energy Use and Improving Safety in Fishing Activities	TD	JTF
4. Resource Enhancement of International Threatened and Over-exploited Species in Southeast Asia through Stock Release	AQD	JTF
5. Promotion of Sustainable and Region-oriented Aquaculture	AQD	JTF



Program Category/Project Title	Responsible Department	Funding Sources
Thrust II: Enhancing Capacity and Competitiveness to Facilitate International and Intra-regional Trade		
6. Chemical and Drug Residues in Fish and Fish Products in Southeast Asia: Biotoxin Monitoring in ASEAN -- ASP, AZA and BTX	MFRD	JTF
7. Traceability Systems for Aquaculture Products in the ASEAN Region	MFRD	JTF
8. Utilization of Freshwater Fish for Value Added Products	MFRD	Singapore
9. Accelerating Awareness and Capacity-building in Fish Health Management in Southeast Asia	AQD	JTF
10. Food Safety of Aquaculture Products in Southeast Asia	AQD	JTF
Thrust III: Improving Management Concepts and Approaches for Sustainable Fisheries		
11. Strategies for Trawl Fisheries Bycatch Management (REBYC-II CTI)	TD	FAO/GEF
12. Promotion of Countermeasures to Reduce IUU Fishing Activities	TD	JTF
13. Combating IUU Fishing in the Southeast Asian Region through Application of Catch Certification for International Trade in Fish and Fishery Products	MFRDMD	JTF
Thrust IV: Providing Policy and Advisory Services for Planning and Executing Management of Fisheries		
14. Fisheries Resource Survey and Operational Plan for M.V. SEAFDEC 2	TD	JTF
15. Offshore Fisheries Resources Exploration in Southeast Asia	TD	JTF
16. Research and Management of Sea Turtles in Foraging Habitats in the Southeast Asian Waters	MFRDMD	JTF
17. Enhancing the Compilation and Utilization of Fishery Statistics and Information for Sustainable Development and Management of Fisheries in the Southeast Asian Region	TD	JTF
18. Comparative Studies for Management of Purse Seine Fisheries in the Southeast Asian Region	MFRDMD	JTF
19. Research and Management of Sharks and Rays in the Southeast Asian Waters	MFRDMD	JTF
Thrust V: Addressing International Fisheries-related Issues from a Regional Perspective		
20. Assistance for Capacity Building in the Region to Address International Fisheries-related Issues	Secretariat	JTF
21. Strengthening SEAFDEC Network for Sustainable Fisheries	Secretariat	JTF

Program Category/Project Title	Responsible Department	Funding Sources
Special Project		
22. Fisheries and Habitat Management, Climate Change and Social Well-being in Southeast Asia	Secretariat	Sweden
Departmental Programs*		
1. Tailor-made Training Programs	TD	Requesting Institution(s)
2. Promotion and Enhancement of Fisheries Information	TD	Thailand
3. Improvement of Fisheries Technology and Reduction of the Impact from Fishing	TD	Thailand
4. Adapting to Climate Change Impacts	AQD	Philippines
5. Healthy and Wholesome Aquaculture	AQD	Philippines
6. Maintaining Environmental Integrity through Responsible Aquaculture	AQD	Philippines
7. Meeting Socio-economic Challenges in Aquaculture	AQD	Philippines
8. Quality Seed for Sustainable Aquaculture	AQD	Philippines
Other Program		
1. Coastal Area Capability Enhancements in Southeast Asia	TD	RIHN

* Funding sources for Departmental Programs are mainly the regular contribution from respective Host Government.

SEAFDEC PROGRAMS OF ACTIVITIES IN 2013

Programs and activities in 2013 have been formulated and undertaken by SEAFDEC in response to the requirements of the Member Countries, taking into consideration the relevant provisions in the “Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020”. In 2013, the programs of activities under the ASEAN-SEAFDEC FCG/ASSP Mechanism, Departmental Programs and Other Program could be categorized into five (5) Program Thrusts and summarized as follows:

THRUST 1. DEVELOPING AND PROMOTING RESPONSIBLE FISHERIES FOR POVERTY ALLEVIATION AND FOOD SECURITY

1.1 Habitat Conservation and Resources Enhancement

Rehabilitation of Fisheries Resources and Habitat/Fishing Grounds through Resources Enhancement has been undertaken by TD since 2010 to identify appropriate resource enhancement tools, develop strategies and guidelines for resources enhancement for various types of aquatic habitats, and support capacity building for the ASEAN Member States in the implementation of their respective resource enhancement programs. In 2013, the activities pursued with local communities in sites selected as critical fishing grounds in marine and inland areas, included conservation and rehabilitation measures that had been initially undertaken in the previous years of the project.

For marine fishing grounds, a deteriorated sea grass bed area in Sriboya Island, Krabi Province, Thailand was selected as one of the pilot sites to mitigate the depleted stocks of a species of edible snail, the dog conch, which is commonly harvested by fishers and local communities by hand or using gears such as dredges and nets installed in motorized boats. This method of harvesting the snail has led to degradation of the sea grass bed habitats as well as deterioration of the dog conch population. Following-up with the release of dog conch in an area identified for conservation purposes in 2012, TD continued to enhance the public’s awareness on the need for sustainable utilization of the resources through the conduct of the “Seminar on Dog Conch Resource Management Measures” on 31 August 2013. Various management measures to enhance the optimum/sustainable utilization of the resources were discussed during the seminar, *e.g.* setting up of minimum harvestable size for the dog conch, prohibiting the use of fishing gears and motorized boats in collecting



Activities in the project sites in Sriboya Island (left), and Nam Houm Reservoir (right)

dog conch, declaring conservation areas, etc. In addition, TD also continued to examine the areas where artificial reefs had been deployed to observe their condition, structures and usage by local fishers.

For inland fishing grounds, the man-made Nam Houm Reservoir in Lao PDR was identified as the pilot site, with the nursery grounds identified and demarcated during the previous years of the project serving as conservation areas. With the objective of enhancing the fishery resources in the reservoir, TD organized the “Training on mobile hatchery for breeding the common silver barb (*Barbonymus gonionotus*)”, one of the commercially-important species for the fishing communities around the reservoir. Transfer of the hatchery/nursery techniques for this species would allow the communities to continue necessary resource enhancement activities that would sustain their livelihoods in the future.

SEAFDEC in collaboration with FAO, and with support from the Australian Centre for International Agricultural Research (ACIAR) and the Mekong River Commission (MRC) also organized the “Workshop on Principles of Improved Fish Passage at Cross-river Obstacles with Relevance to Southeast Asia” on 17-20 March 2013 in Khon Kaen Province, Thailand to discuss the effects of installing cross-river obstacles, *e.g.* weirs, dams, especially the drastic impacts of such installations to the inter-connectivity of inland aquatic habitats and the biodiversity of species that require migration. Construction of suitable fish passages could therefore mitigate such impacts and help in enhancing the sustainability of inland fisheries for food security and livelihoods of the people in Southeast Asia.



Fish Passage Workshop: (left) participants visiting Nong Wai Weir in Khon Kaen Province; and (right) participants during the workshop session

1.2 Optimizing Energy Use and Improving Safety in Fishing Activities

Optimizing Energy Use and Improving Safety in Fishing Activities was initiated by TD in 2013 to investigate and transfer appropriate/applicable technologies on optimizing energy from fossil fuel especially for small trawlers which consume higher amount of fuel compared with those that use other fishing gears, and in enhancing safety at sea particularly for small fishing vessels in the region. As an initial activity, TD convened the “Regional Training Workshop on Optimizing Energy and Safety at Sea for Small-scale Fishing Vessels” on 3-8 February 2013 in Bangkok, Thailand to transfer knowledge on energy optimization and safety at sea through the use of extensive information and tools available at the national, regional and global levels, which could be adapted, packaged and applied by the Member Countries.

*Regional Training
Workshop on Optimizing
Energy and Safety at Sea
in early 2013*



To promote the concept in the Member Countries, TD collaborated with the Ministry of Agriculture and Rural Development (MARD) of Vietnam for the conduct of “On-site Training on Optimizing Energy and Safety at Sea for Small Fishing Vessels” on 19-21 March 2013 in Da Nang, Vietnam, and with the Department of Fisheries of Myanmar for the “On-site Training on Optimizing Energy and Safety at Sea for Small Fishing Vessels” on 23-25 July 2013 in Myeik Archipelago, Myanmar. Basic and applicable knowledge on energy saving technologies including the use of a fuel measuring equipment to verify energy efficiency of various gears, and on safety at sea were transferred to the participants of the respective countries. A similar on-site training is planned for Semarang, Indonesia in early 2014, where some preparatory works including the survey of shipyard facilities in Indonesia and venue for the proposed training have already been undertaken in collaboration with the Fishing Technology Development Center of Indonesia. In support of the dissemination of safety at sea to target users, TD published a comic booklet on “Story of a Fisherman” that aims to enhance the awareness of fishers on the basic requirements and serves as a checklist for their safety at sea.



*Training on Optimizing Energy and Safety at Sea
in Myeik Archipelago, Myanmar*

Fishing Vessel Energy Audit was conducted by TD in collaboration with FAO to identify fuel saving potentials through energy efficiency practices. As an initial activity, a survey on the use of energy in trawl nets was conducted in Chonburi Province, Thailand from 13 to 15 November 2013. The project is expected to come up with information on the pattern of energy usage in different phases of fishing operations as well as on potential energy saving measures and their energy saving performances, which are necessary not only for fishing companies/operators to make decisions in changing their practices and technologies to save energy use and reduce operating costs in the future, but also for the fisheries sector to demonstrate its commitment of reducing greenhouse gas emission from fishing operations at the global perspective.

1.3 Improvement of Responsible Fisheries Technology

Improvement of Fisheries Technology and Reduction of the Impact from Fishing which includes a study on the “Reduction of manpower onboard fishing vessels for purse seiners and otter-board trawlers” is TD’s response to the concern on shortage of skilled fishing crews onboard fishing vessels, particularly in Thailand. At the start, an observation was made on the use of a net hauling device (power block using hydraulic system) installed onboard purse seiners in Malaysia which is also applicable for Thai purse seiners. In addition, TD developed a stern deck net drum for trawlers to reduce the number of manpower onboard trawlers.

TD also conducted an experiment on the “Use of low energy consumption trawl net or LEC-trawl”, where a trawl net was modified to weigh only two-thirds of its original weight to reduce fuel consumption during fishing operations. A series of sea trials using the LEC-trawl was conducted in Thailand in 2013, of which the preliminary results suggested that with less dragging force of the net, the engine’s RPM could be reduced.

1.4 Coastal Area Capability Enhancement

Coastal Area Capability Enhancement in Southeast Asia, a collaborative project with the Research Institute for Humanity and Nature (RIHN) of Japan, is aimed at gaining a full understanding of how people utilize the coastal resources through “holistic approach”, and coming up with guidelines for new research approach using the concept of “Area Capability”. The project has study sites in the Philippines (Panay Island), Thailand (Rayong and Prachuap Khiri Khan Provinces) and Japan (Ishigaki Island), and with set-net fisheries as the core activity. In this collaborative project, TD is responsible for the coordination and conduct of activities in the project sites in Thailand which focus on the conduct of preliminary surveys to examine the present status of the resources, biology, livelihoods, social activities, and the environment, *e.g.* collection of data on the present status of the set-net sites and other related activities; conduct of biological resource survey; conduct of field testing trials on the use of hydro-acoustic equipment for data collection; and evaluation of the impacts of such fisheries on the environment, *e.g.* wind and water current, on the catchability of the set-net and other fishing activities.



Joint Seminar for the project on Coastal Area Capability Enhancement in Southeast Asia

In order to discuss and exchange ideas and experiences from the activities implemented under the project, the “Coastal Area Capability Enhancement in Southeast Asia Project Joint Seminar” was organized by TD and RIHN in collaboration with the Faculty of Fisheries of Kasetsart University (KU), Bangkok, Thailand; University of the Philippines in the Visayas (UPV), Iloilo, Philippines; and the Eastern Marine Fisheries Development Center (EMDEC), Rayong Province, Thailand, on 11-13 November 2013 in Bangkok and Rayong Province,

Thailand. The outputs and recommendations of Seminar would be referred to in developing and adjusting the project activities for the succeeding year.

1.5 Quality Seeds for Sustainable Aquaculture

AQD conducted various projects that will determine the optimal conditions and methods for the production of quality seed stock in sufficient quantities, which entail the use of methods for stock improvement such as domestication, broodstock management, strain evaluation, and selective breeding or genetic improvement of traditional and emerging freshwater and marine species.

Development of Good Quality Broodstock and Implementation of Proper Broodstock Management Protocols focused on domestication activities such as monitoring the genetic structure of base populations, establishing husbandry techniques, culture of live food necessary for good reproductive performance and developing suitable diets for the different life stages of various commodities. With regard to shrimps, juveniles and sub-adults of *Penaeus monodon* are currently being grown as potential broodstock that will produce 'high health' F₃ post-larvae. Molecular markers that will identify stocks and consequently aid in determining genetic quality are currently being developed for several commercial aquaculture species including the seaweeds, *Kappaphycus* and *Euचेuma*. Through collaboration with the Philippine Department of Science and Technology (DOST) and the University of the Philippines (in the Visayas and in Quezon City), development of quality milkfish broodstock using conventional stock monitoring and management protocols was continued to initiate a molecular marker-based broodstock management method on the Philippine milkfish (*Chanos chanos*) stocks.

Nutritional approaches to improve egg production and quality were also investigated for grouper, milkfish, abalone, and freshwater prawn. In improving the reproduction in the donkey's ear abalone, a maturation diet was formulated for both wild and hatchery-bred stocks. Results of the feeding trials of efficient low-pollution diets developed for rearing potential broodstock of giant freshwater prawn in lake-based cages indicated that the specific growth and survival rates were not affected by the replacement of fish meal with cowpea meal as protein source in the test diets, while giant freshwater prawn spawners stocked in tanks and fed the broodstock diets exhibited fecundity that increased with increasing levels of cowpea meal in the diet.

For emerging species, broodstock conditioning methods for the sandfish *Holothuria scabra*, have been developed to improve its reproductive performance through refinements in the spawning protocols. In the stocking experiments, slow growth rate was recorded at high stocking densities of 1,000/hapa and 2,000/hapa after one month of rearing.

For stock enhancement purposes, broodstock development of the Napoleon wrasse will be continued as soon as permits are approved for broodstock collection in areas with potential stocks. Meanwhile, a preliminary survey was conducted in the Igang Marine Station (IMS) where sightings of small Napoleon wrasse juveniles were noted. Fin clips of specimens collected from IMS, Bohol and Tawi-Tawi were sent to Hokkaido University for genetic characterization.

Refinement of Hatchery and Nursery Management Methods is being implemented through studies which aim to improve seed stock quality and production. One of the studies involves the mass production and utilization of copepods as natural food and potential alternative to *Artemia* in intensive marine fish larviculture. Nutritional interventions through tryptophan supplementation in the diets have been used to minimize cannibalism and improve production of marine fish larvae, especially the carnivorous species. Preliminary trials in grouper larvae which involved weaning the fish to a formulated diet had encountered difficulties as the larvae were very sensitive to experimental activities that require routine tank maintenance, although this was not the case for sea bass larvae which were collected for serotonin level analysis and for correlation with aggressive behavior. For the pompano *Trachinotus blochii*, the optimum conditions for breeding and seed production were determined, while results of the use of copepods as larval diet and alternative to *Artemia*, showed best survival (96%) in the copepod-fed larvae, but highest weight and length increment in *Artemia*-fed larvae.

Results of the verification study on brackishwater nursery pond culture of sea bass to assess the optimal stocking density, feeding frequency and effect of in-pond sorters on the yield of sea bass juveniles indicated that the use of in-pond sorters did not improve fry survival. Regular size sorting (1-2 times per week) gave better survival after 63 days than when sorting was not done, where the optimum stocking density for 2.5 cm juveniles is 100/m³ and survival rate was better when fish were stocked at 150 or 200/m³.

On the culture of pompano in floating net cages fed pompano feed and cheaper siganid feed, pompano fry grew better when fed pompano feed than with siganid feed, while the growth rate of fish stocked at 4,000/cage (5x5x3m) was slower compared with those in cages stocked at 2,000 fish per cage. When thraustochytrid *Schizochytrium* sp. (LEY7) was used to enrich feeds for fish larvae and abalone, results of feeding trials in pompano revealed that larvae fed rotifer enriched with hatchery prepared thraustochytrids emulsion and those fed rotifer enriched with freshly harvested thraustochytrids had the highest body weight increase.

In improving the hatchery rearing techniques of abalone, benthic diatom such as *Nitzschia* and *Cocconeis*, were used as feeds, where feeding with *Nitzschia* showed high settlement rate in abalone larvae. After 60 days of rearing, higher survival was observed in abalone fed continuously with *Nitzschia* followed by a combination of *Nitzschia* and *Cocconeis*. Bigger juveniles were attained in abalones fed a combination of *Nitzschia* and *Cocconeis* and when fed solely with *Nitzschia* but were not significantly different with abalone juveniles fed the other diatom diet. Abalone hatchery production was improved using agar-bound micro-particulate diets as alternative feed and that feeding the diet bound with 7.5 mg/ml agar solution to abalone on a daily feeding frequency improved post-larval settlement and survival.

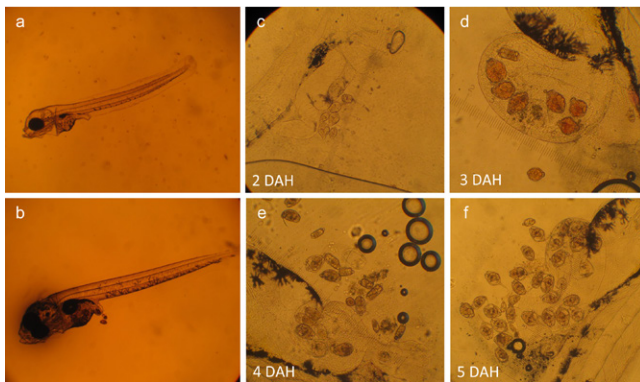
Tryptophan (TRP) diets did not contribute much in reducing the incidence of cannibalism in mud crab, *Scylla serrata*, while in terms of stocking density, crabs at 30/m² had higher survival than those at 50/m². Feeding the crabs with natural food promoted higher survival, but increasing the dietary TRP level decreased the survival. Refinements of the optimal natural food and artificial diet ratio, and feeding rate for mud crab indicated that a combination of mussel and artificial diets gave best results while no significant variation was



Harvest of *Scylla serrata* crablets (left) from nursery net cages in ponds (right) at AQD's Dumangas Brackishwater Station

noted when different feeding rates were used. Larvae treated with antibiotics commonly used in hatcheries survived the longest (9-10 days) compared with other treatments (5-6 days).

A fertilizer was tried to improve natural food production and optimum stocking density of silver therapon *Leiopotherapon plumbeus*, which is considered an emerging species for aquaculture. Silver therapon larvae stocked in ponds with organic fertilizer had highest specific growth rates (7.2% per day), compared with those in the inorganic fertilizer (6.0%

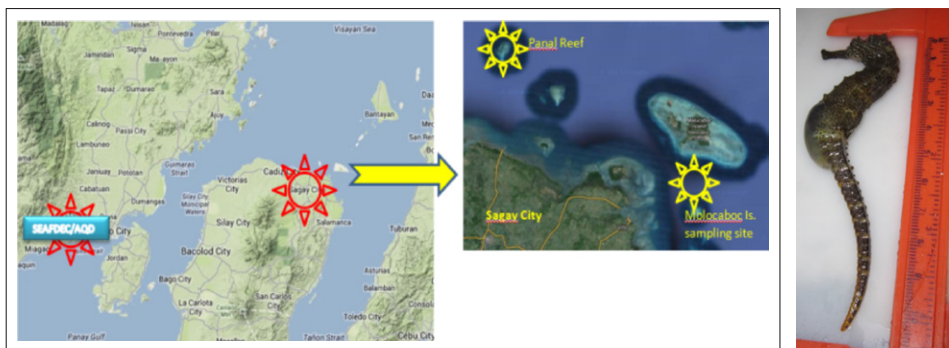


Early stage of silver therapon (*L. plumbeus*) reared in outdoor concrete tanks. (a) larvae at 2 days after hatching (DAH) at the initiation of exogenous feeding, (b) larvae at 4 DAH, (c-f) gut contents showing the importance of zooplankton in the diet of first-feeding silver therapon larvae

per day) and natural feeds (6.3% per day). On the effects of weaning age (abrupt and gradual) and larval diets (artificial and live foods) on survival and growth of silver therapon, results indicated that in the abrupt weaning treatment, survival, final body weight and total length significantly increased with weaning age, but there was no significant difference on specific growth rate (SGR) with increasing weaning age. Survival was best in larvae fed *Artemia* nauplii and poor in copepod-fed larvae, while the best growth and SGR were also obtained in larvae fed *Artemia* nauplii.



Extracting and purifying DNA samples from seahorse as part of the genetic characterization study at Hokkaido University, Japan



SEAFDEC/AQD seahorse hatchery and seahorse sampling site in Molocaboc Island, Sagay City, Philippines (left); and Stretched length of seahorse (*H. comes*) (right)

Other ongoing activities of AQD include stocking density experiment to improve survival of sandfish juveniles in floating hapas, propagation of seahorses, *Hippocampus barbouri* and *H. comes* for stock enhancement, monthly on-site assessment of seahorses at Molocaboc Island, Sagay City to monitor the baseline population of wild seahorses, and DNA analysis of samples from several collection sites.

Development of Schemes for Production, Management, Maintenance and Dissemination of Genetically-selected and Improved Stocks involves selective breeding for selected crustaceans (mud crab, shrimps and freshwater prawns). Stress tests (formalin tolerance and disease challenge response tests) were done on mud crabs while for the giant freshwater prawn, genetic improvement was initiated with potential broodstocks from two sources, *i.e.* Calumpit, Bulacan; and Pampanga River which were grown to compare growth and reproductive performance.

Hybridization of the local commercial abalone species (*Haliotis asinina*) by crossing with other Philippine abalone species such as *H. planata* and *H. glabra*, was conducted to produce stocks with improved traits. Initial results indicated that in terms of body weight and shell length, pure *H. asinina* attained optimum growth at a shorter period compared to the hybrid HAFPM (or hybrids of *H. asinina* female parent and *H. planata* male parent). In an effort to produce triploid abalones, samples of hybrid stocks and triploid abalones were sent to Hokkaido University, Japan, for genetic analysis and confirmation of success in hybrid and triploid induction.

In developing resistant strains of *Kappaphycus* and reduce epiphytes as well as evaluating the performance of haploid and diploid *Kappaphycus*, preliminary results showed that growth rates of sporophytes and gametophytes were significantly different in land-based nursery, while no epiphytes and ice-ice disease were observed when tissue-cultured *Kappaphycus* were grown in net cages and culture lines. A significant breakthrough achieved in seaweed research at AQD in 2013 was the completion of the life cycle of *K. alvarezii*, *in vitro*.

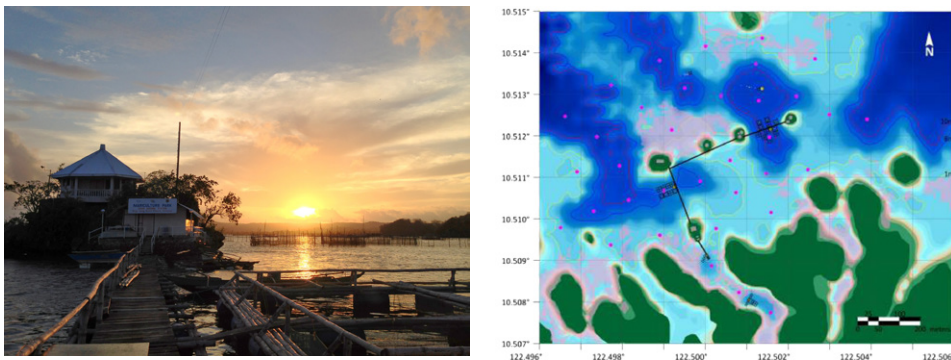
Adoption of Economically-viable Systems to Produce Sufficient Seed Stock was meant to demonstrate the viability of small-scale and/or large-scale seed production systems. This included mass production of sex-reversed and mixed-sex Nile/red tilapia fingerlings, and large-scale production of abalone juveniles.

Capacity Building of Fishfarmers and Other Industry Stakeholders on Appropriate Breeding and Larval Rearing Technologies was conducted for the DOST-funded mud crab program which includes activities on technology dissemination and the involvement of private sector in on-site technology demonstration. Several specialized training courses were also offered to five private hatchery operators that entered into agreements on hatchery operation with AQD, beneficiaries of on-farm demonstration activities covered by externally supported studies, as well as local government representatives, private sector investors and fisherfolks. Technical assistance was also provided to local and international private sector clients through the Agree-Build-Operate and Transfer Aqua Negosyo Program, the most notable of which was the technical support extended to the ACDI-VOCA project in Timor Leste.

1.6 Maintaining Environmental Integrity Through Responsible Aquaculture

This is aimed at developing environment friendly-based aquaculture technologies by integrating environmental factors in AQD's research activities and promoting responsible aquaculture.

Assessment of Impacts of Aquaculture on Biodiversity, and Water and Sediment Qualities was focused on the culture areas and adjacent ecosystems both in marine and freshwater systems. Regular monitoring of AQD research stations is sustained using the established monitoring system for water and substrate quality. At AQD's Igang Marine Station and near the cage set-up, the biodiversity of various ecosystem types indicated the presence of 805 species in 292 families and 20 major taxa. At its Tigbauan Main Station, the shore areas revealed some 533 species in 10 major taxa, while at Binangonan Freshwater Station, a comparison of phytoplankton, zooplankton and fish and other vertebrate diversity in two sites (east cove and west cove) around the station was made.



Igang Marine Station (left); and bathymetric profile (right) showing sea grass cover (pale red shade) and sediment monitoring stations (purple dots). Inset photo: Igang Marine Station's Mariculture Park

On the biodiversity of milkfish and shrimp fry fishery in the surf zones in southern and western Panay, Philippines, specifically on the various fry collection sites in Antique and Guimbal, more than 12 species of fish larvae and juveniles were identified in the catches. However, decline in fry catch from previous years was attributed to rice field pesticides, oil spills and fishing.

Integrated Multi-trophic Aquaculture

(IMTA) was initiated by AQD by identifying the appropriate extractive species that could be used. The effect of an integrated culture of sandfish *Holothuria scabra*, bivalve mollusk *Anodontia philippiana* and seaweed *Gracillaria heteroclada* is being investigated, while the co-culture of these extractive species with other commercially-important commodities, such as the polyculture of sandfish *Holothuria scabra*, with milkfish and other selected marine fish species, and co-culture of seaweed *G. heteroclada* with sea bass were also undertaken. *A. philippiana*, which is known to assimilate sulfide, is being cultured with seaweeds to improve the culture conditions of milkfish ponds.



Milkfish harvest in integrated multi-trophic aquaculture experimental ponds in Ajuy, Iloilo

Development and Promotion of Efficient and Suitable Environment-friendly Culture Systems were continued and as part of these initiatives, AQD evaluated the culture parameters for optimal growth and survival of sandfish, *H. scabra*. For pond/pen culture, various pond sites were surveyed but those in Concepcion, San Dionisio and Ajuy showed good potentials, while for sea ranching, Concepcion was considered as an appropriate pilot site.

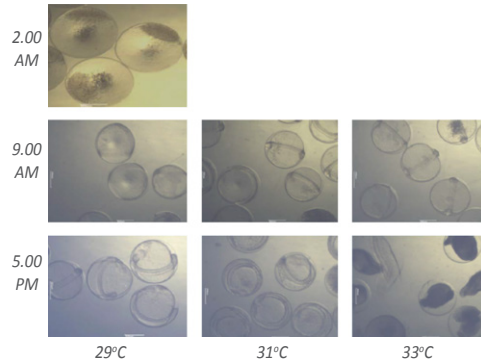
Information on the carrying capacity of some freshwater systems in the Philippines based on modeling was compiled in cooperation with the Australian Centre for International Agriculture Research (ACIAR). Model results and sensitivity analysis showed fish carrying capacity tonnages are within the range of literature values for Asia and slightly higher than annual production recorded for some Philippine lakes. The dominant parameters driving the carrying capacity were initial nutrient loading then increasing lake surface area, mean lake depth and flushing rates.

Biological and Ecological Studies on Species with Potentials for Resource Enhancement were conducted for such species as the giant clam *Tridacna gigas*, abalone *Haliotis asinina*, and three species of mud crabs *Scylla serrata*, *S. olivacea* and *S. tranquebarica*. As for mud crabs, stocks obtained from Dumangas, Iloilo were tagged and released in the mangroves in Barangay Rojas, Ajuy, Iloilo in November 2013. For the giant clam, stock enhancement in marine protected areas in San Joaquin, Iloilo elicited positive results in promoting protection of wild clams.

1.7 Adapting to Climate Change Impacts on Aquaculture

Adapting to Climate Change Impacts aims to identify the accompanying changes in the environment brought about by the changing climate that may affect the aquaculture sector, prepare the sector to the possible effects that these changes may have on aquaculture operations, minimize and mitigate the adverse impacts of climate in aquaculture, and ensure the continued operation of all aquaculture production systems under changing climatic conditions.

In 2013, AQD focused on examining how climate change affects the biology of various species presently farmed and the various support systems required. For rabbitfish, spawning was best in breeders maintained at ambient temperature (29-30°C) followed by those maintained at 31°C. The effects of elevated water temperature were also evaluated on embryonic development of the other important marine fishes such as milkfish, rabbitfish and the Asian sea bass, as well as on important mollusks such as abalone. For the three marine fishes, embryonic development success and hatching rate were high when embryos were incubated in ambient temperature of 28-29°C, and as for their respective larval performance, survival was best when species were reared at ambient water temperature.



Embryonic development of milkfish exposed to high temperature

For abalone larvae, survival and settlement rates were highest at ambient temperature and very low at 33°C and 31°C. Rotifers and copepods, which are important zooplanktons in fish hatcheries, were found resilient to elevated temperature but the resulting acidic conditions significantly affected their growth and survival.

1.8 Meeting Social and Economic Challenges in Aquaculture

Meeting Social and Economic Challenges in Aquaculture is aimed at developing and implementing social and economic strategies in aquaculture and resource management to secure food and income through stakeholder collaboration.

Prioritizing Collaborative R&D in Aquaculture in the Region started with lake-based grow-out polyculture of hatchery-produced giant freshwater prawn (GFP) with tilapia in Laguna Lake in collaboration with a fish-farmer cooperative. However, environmental constraints such as algal blooms (*Microcystis* sp.) that affect water quality, and harsh weather conditions in Laguna Lake during monsoon resulted in low survival rates (39% for tilapia and 43% for GFP) and limited economic benefits.



Culture of giant freshwater prawn with tilapia in cages in Laguna Lake being demonstrated to fish farming families and cooperatives

Small-scale fishers in Negros Occidental, Philippines, organized into a Barangay Fisheries and Aquatic Resources and Management Council (BFARMC) continued to cooperate in AQD's activities on community-based stock enhancement of threatened high-value species in Sagay Marine Reserve and development of release strategies for sea cucumber and seahorse. For abalones, the "stock-protect-partial harvest" protocol has been successfully demonstrated and practiced by the BFARMC. Relevant lessons from this community-based abalone stock enhancement are now applied for shrimp (*Penaeus monodon*) stock enhancement in New Washington, Aklan, Philippines. Community-based stock enhancement strategies demonstrate the importance of synergy on the biological and social dimensions of fisheries management.



*Shrimp (*P. monodon*) larvae in hatcheries prior to intermediate culture and release in estuaries in New Washington, Aklan*

Allocating R&D Resources to Address Emerging Issues focuses on AQD's efforts to address such issues that include the need for reliable supply of breeders of aquaculture species in remote rural areas; enhancement of organizational solidarity and commitment among stakeholders; and improvement of financial management skills to enable participation of fish farmers in domestic and international trade. Seed production and grow-out activities on-farm sites are expected to enhance the participation of organized fisherfolks by training them on entrepreneurial skills development.

Enhancing Multi-agency Collaborations has been strengthened by AQD to address the complexity of social and economic challenges in aquaculture. In demonstrating culture methods, on-farm collaboration with potential technology adopters such as fish farming households and fisherfolk cooperatives was enhanced while fish farmer collaborators offered their farms for the experiments with AQD providing the technical guidance and some farm inputs. For stock enhancement using hatchery-bred juveniles, fishers, organized either as Fisheries and Aquatic Resources Management Council (FARMC) or as small-



Elected Barangay Molocaboc FARMC officers and other members of the coastal community with project partners – representing SMR-LGU, Peace Corp Volunteer and SEAFDEC/AQD

scale fisherfolk associations (SFA) directly contributed the manpower requirements while local government units at the village and city level provided the logistical and regulatory oversight with AQD and partner local academic institution, such as the Aklan State University providing technology and social support. Formulation of policies and regulations necessary to implement stock enhancement (establishment of protected areas) and the measures to sustain released stocks (abalone catch size regulation) were achieved in coordination with local government units (LGUs), through the SMR-Protected Area Management Board. The involvement of traders ensured that market practices conform to fisheries regulations and policies formulated to ensure the sustainability of the fisheries.



Multi-agency collaboration in coastal area capability development through shrimp stock enhancement project where partnership is extended to local Aklan State University, in addition to the initial team involving fisherfolks, international donor, Japan's Research Institute for Humanity and Nature, local government of New Washington, and AQD

1.9 Resource Enhancement of International Threatened and Over-exploited Species in Southeast Asia through Stock Release

Resource Enhancement of International Threatened and Over-exploited Species in Southeast Asia through Stock Release addresses issues related to the listing or proposed listing of several commercially-exploited species in the CITES Appendices, e.g. seahorse, Napoleon wrasse, sandfish, donkey's ear abalone, and mud crab. On stock enhancement of international threatened species, tissue samples of seahorses and Napoleon wrasse were obtained for genetic characterization. Site assessment was conducted to monitor baseline population of wild seahorses and for the Napoleon wrasse, Danajon Bank was selected as new resource enhancement site for the conduct of relevant research activities. For regionally over-exploited species, community-based resource management studies were undertaken for the sandfish, mud crab and abalones that focus on spawning trials and wild stock monitoring.



(left) Tagged Scylla olivacea inside bamboo baskets ready for release; (right) Tagged S. olivacea released in mangroves of Ajuy, Iloilo for mud crab stock enhancement study

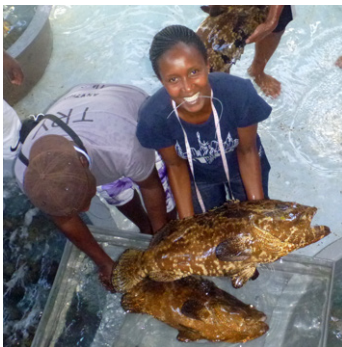
In the development of adaptive measures for coral replenishment, field surveys for coral reef substrates through line-intercept-transect and temperature profiling of coral reef areas were undertaken along Nogas Island, Anini-y, Antique, Philippines. A new methodology for determining the density of zooxanthellae, a symbiont of reef building corals, was developed using fragments of *Porites* sp. taking into account the negative effects of acidification and warming on the growth and photosynthetic rates of *Porites* sp.

1.10 Promotion of Sustainable and Region-Oriented Aquaculture

Biologically, environmentally and socio-economically acceptable, and region-oriented approaches have been promoted by AQD, by establishing reliable mass seed production techniques through selective breeding and developing hatchery technology of important species. For selective breeding of mud crab *Scylla serrata*, bacterial challenge test was used to assess its resistance to the luminescent bacteria, *V. harveyi*. For the spotted scat *Scatophagus argus*, optimum hormone concentration to induce spawning was identified. In developing hatchery technologies for emerging species, the potential use of copepod was examined as larval diet for pompano *Trachinotus blochii*. For the development of efficient and low-pollution diets for *M. rosenbergii* broodstock, the inclusion of up to 30% cowpea meal protein improved its reproductive performance.



Examination of bighead carp breeder during the practical session on induced carp breeding



Sampling of grouper broodstock during the international training on Marine Fish Hatchery

The capacity of the Philippines and Member Countries has been enhanced through the implementation of training activities under AQD's technology extension and demonstration activities, *i.e.* Abalone Hatchery and Grow-out, Marine Fish Hatchery, Aqua-Nutrition (on-line training program), Regional Program on Dissemination of Black Tiger Shrimp Farming, and Community-based Freshwater Aquaculture for Remote Areas of Southeast Asia.

1.11 Other R&D Activities

AQD's **ABOT AquaNegosyo** received inquiries from 50 local and 11 foreign clients, mostly on the culture of sea bass, grouper, milkfish, mud crab, abalone, shrimp, tilapia and freshwater prawn. Eight local clients which require mostly evaluation of sites and pond operations on tilapia, milkfish and sea bass had been served, while three international

clients were provided technical assistance such as on sandfish hatchery and nursery to the Century Marine Products, Inc. in Kota Kinabalu, Malaysia; site assessment for tilapia farming to Microtend Enterprise LDA in Luanda, Angola; and on several aspects of mud crab hatchery to the Cooperative Development International and Volunteers in Overseas Cooperative Assistance (ACDI/VOCA) in Timor Leste.



AQD scientist demonstrating to Timor Leste participants the technique of assessing sexually mature mud crab

Training and Information includes the conduct of training courses at AQD's premises and on-site on various topics, such as: marine fish (grouper, snapper, sea bass, pompano, rabbitfish and milkfish) hatchery operations; hatchery, nursery and grow-out of tilapia, catfish, giant freshwater prawn, abalone, mud crab; hatchery and nursery of sea cucumber; shrimp hatchery and culture; seaweeds nursery; community-based mangrove rehabilitation; freshwater aquaculture; algal culture; fish health management; and techniques in bacteriology and microbiology. A distance learning course on principles of health management in aquaculture (AquaHealth Online) which started in September 2012 was completed in February 2013, while the distance learning course on principles of nutrition for tropical aquaculture (AquaNutrition Online) was completed in December.



International mud crab training: during practical session on ablation and tagging of mud crabs; measuring the carapace length of mud crab



Participants examining the sandfish during the practical session of the training on hatchery and nursery of sea cucumber

Internship program at AQD was availed of by 39 individuals while the students' on-the-job training program catered 225 students from 31 schools/ universities in Luzon (9), Visayas (17) and Mindanao (5). The various capacity building programs of AQD had produced a large number of technical personnel from the Member Countries who are now in the aquaculture business themselves or conducting or directing further R&D in their home countries.



AQD researcher demonstrating the use of scanning electron microscope to local secondary school students

In addition to scientific publications in international peer-reviewed journals, AQD published/disseminated a new manual (production of microalgae for aquaculture) and a field guide for mangroves, flyers about AQD, and reports from the Development Bank of the Philippines-funded Sustainable Mariculture Investment Program Survey. Other manuals are still in various stages of publication while other information materials were produced.

In enhancing AQD's visibility to various stakeholders, its website has been frequently updated, stories about the Department's events posted in Facebook, press releases facilitated and important AQD events and technological developments aired in the weekly Philippine television program ('Mag-Agri Tayo' or Let us do Agriculture). AQD also participated in fairs and exhibits, while a mall exhibit featuring technologies developed and disseminated by AQD was organized as part of the activities for the celebration of AQD's 40th Anniversary in July 2013.



Ceremonial opening of AQD's Mall Exhibit in Iloilo City by officials of AQD and University of the Philippines in the Visayas



AQD's participation in Agri-Biotechnology exhibit organized by the Philippine House of the Representatives

THRUST 2. ENHANCING CAPACITY AND COMPETITIVENESS TO FACILITATE INTERNATIONAL AND INTRA-REGIONAL TRADE

2.1 Biotoxins Monitoring in the ASEAN Region

About 400 poisonous fish species exist in the world and the substances responsible for the toxicity of these species are known as biotoxins. Marine biotoxins represent a significant and expanding threat to human health and its impact is visible in terms of human poisoning or even death following consumption of contaminated shellfish or fish, mass kills of fish and shellfish, and death of marine animals and birds.

To address such concern, **Chemical & Drug Residues in Fish and Fish Products in Southeast Asia – Biotoxins Monitoring in Fish and Fish Products in ASEAN** (2009-2012) was conducted by MFRD that covered training in analytical methods for Diarrhoeic Shellfish Poisoning (DSP) toxins, lipophilic toxins, Paralytic Shellfish Poisoning (PSP) toxins and Tetrodotoxin (TTX), and monitoring survey on PSP toxin in the ASEAN countries. Due to the expressed needs of the Member Countries, the project was extended for four years (2013-2017), to include other biotoxins like the Amnesic Shellfish Poisoning (ASP) toxin, Azaspiracids (AZA), as well as Brevetoxins (BTX). Methodologies for analyzing biotoxins (ASP, AZA and BTX) had been developed through human resource training while understanding of the levels of these biotoxin occurrences and incidences in fish and shellfish in the Southeast Asian region was enhanced.



Regional Technical Consultation on Biotoxins Monitoring in the ASEAN Region



(left-right) Training on biotoxins analysis

The “Regional Technical Consultation for the New Project on Biotoxins Monitoring in ASEAN Region: ASP, AZA and BTX (2013-2017)” was organized by MFRD on 24-25 July 2013 in Singapore, where the project scope, activities and time schedule were agreed upon. The training needs of Member Countries, as well as the contents, venue and trainers were also identified for a training course tentatively scheduled in June 2014 in Singapore, as well as the Key Project Leader (KPL) for each Member Country.

2.2 Utilization of Freshwater Fish for Value Added Products

In many ASEAN countries, freshwater fish is an important source of raw materials for processing into a variety of traditional fish products, largely processed by household producers and small- and medium-sized establishments which are usually family-owned operations with little mechanization. Upgrading the processing and packaging technologies for freshwater fish products is therefore necessary to improve quality and safety with the possibility of commercialization.

Utilization of Freshwater Fish for Value Added Products has been implemented by MFRD starting 2011 to utilize freshwater fish species for the development of value-added products and assist participating countries in upgrading their respective processing and packaging technologies. The project participating countries, namely: Lao PDR, Myanmar, Vietnam, and Indonesia had developed their respective value-added products using indigenous fish species by making use of the knowledge gained through the regional training course in 2011. A processing handbook on “Utilization of Freshwater Fish for Value Added Products” which contains description of freshwater fisheries in the participating countries, freshwater species used in processing, value-added products developed, the processing steps and procedures, and shelf-life studies, was published after the end of the project in 2013.

“End-of-Project Seminar” was organized by MFRD on 11-12 September 2013 in Singapore, where participating countries presented their respective value-added products developed through the project. The subsequent networking-cum-product tasting session provided an opportunity for the project’s commercial (private sector) co-operants from the participating countries to network with the local Singapore industry participants, which could lead to business opportunities in the future.



End-of-Project Seminar on Utilization of Freshwater Fish for Value Added Products (left); and fish product testing (above)

2.3 Traceability Systems for Aquaculture Products

Traceability is a major concern of the aquaculture industry, especially since it has become a legitimate requirement in major international markets such as the EU and USA. As aquaculture production becomes more market and consumer driven, the greatest pressure for product traceability has been coming from the general public, where consumers are getting more and more concerned on whether their food comes from safe and sustainable source, and whether production, transportation, and storage conditions guarantee food safety. Traceability can be used to achieve different purposes or objectives, such as for food safety, bio-security and regulatory requirements or to ensure quality and other contractual requirements. While external traceability allows the tracking of a product and/or attribute(s) of that product through the successive stages of the distribution chain (from farm to fork), internal traceability (or enterprise traceability) is aimed at productivity improvement and cost reduction within a production unit (e.g. fish processing plant).

Traceability Systems for Aquaculture Products in the ASEAN Region has been implemented by MFRD since 2010 to enable regional aquaculture industries to implement appropriate traceability systems for aquaculture products, and meet international traceability requirements in the network of aquaculture production, marketing, and trade. Specifically, the project intends to promote the implementation of traceability systems for aquaculture products in the ASEAN.

The “2nd On-site Regional Training Workshop on Traceability Systems for Aquaculture Products in the ASEAN Region” was organized on 5-7 November 2013 in Bangkok, Thailand to provide a platform for sharing of information and experiences among ASEAN countries on the implementation of traceability systems for aquaculture products, particularly on shrimps, and enhance regional capability on the implementation of traceability systems for aquaculture products. The Workshop reached a consensus on the final generic supply chain flow for aquaculture shrimps in the region, and identified relevant information and data necessary for each link in the chain, which would be



Participants of the 2nd On-site Training Workshop on Traceability Systems for Aquaculture Products in the ASEAN Region (left); and breakout session facilitated by the resource person (right)

incorporated as an essential component for the subsequent development of the “Regional Guidelines on Implementation of Traceability for Aquaculture Products” in the region.

2.4 Accelerating Awareness and Capacity-building in Fish Health Management

Accelerating Awareness on Fish Health Management in Resource-deprived Countries has been carried out by AQD through industry-wide capacity building. At the onset, AQD conducted surveys in Cambodia, Lao PDR, Myanmar, and Philippines to identify the gaps and needs for enhancing the capability of these countries, especially in disease monitoring and fish health management. Compared to Myanmar and the Philippines, small-scale farmers in Lao PDR and Cambodia had low level of awareness on fish health management, food safety and other issues affecting fish production in ponds. Results of the survey led to the conduct of on-site basic training on freshwater fish health management initially in Yangon, Myanmar in October 2013 at its Aquatic Animal Health and Disease Controlling Section of the Department of Fisheries. In a surveillance study on parasite fauna of freshwater fish in Dumangas, Oton and Arevalo (Iloilo, Philippines), results were negative for the presence of zoonotic parasites in fish.

Innovative Research to Guarantee Food Safety and Sustainable Production led to the optimization of q-PCR protocols for WSSV, RSIV, KHV, VNN, IMNV and IHNV by AQD through the “Molecular diagnosis and prevention of economically-important viruses in fish and shrimp”. In establishing the immunization regimen for the prevention of viral nervous necrosis in high value marine broodfish, pompano broodstocks were intraperitoneally (IP) booster vaccinated with inactivated Philippine strain of NNV. In order to establish novel prophylactic and therapeutic methods for the prevention of viral infections in commercially-important maricultured fish, *Ulva pertusa* extract was used which exhibited potent antibacterial activity against *Aeromonas hydrophila* and *A. sobria* at 100 and 50 mg, while the minimum inhibitory concentration and minimum bactericidal concentration of the *U. pertusa* aqueous extract on *Vibrio alginolyticus*, *V. parahaemolyticus*, *Edwardsiella tarda*, and *Streptococcus* spp. are being determined.



On-site Training on Freshwater Fish Health Management in Myanmar: Trainees processing fish samples on-site for detection of fish-borne zoonotic parasites during the field sampling

2.5 Food Safety of Aquaculture Products

Food Safety of Aquaculture Products in Southeast Asia which is being carried out by AQD focused on: (i) determination of withdrawal period of antibiotics in some fish species cultured in the tropics; (ii) surveillance of chemical contaminants in aquaculture products and feeds; (iii) investigation on antibiotics/chemical usage and regulations in aquaculture; and (iv) development of guidelines on appropriate administration and regulation of antibiotics/other chemicals.

The estimated time to eliminate Oxytetracycline (OTC) and Oxolinic acid (OXA) residues from muscle of the orange spotted grouper were 21 and 17 days, respectively. With regard to the establishment of micro-organism method to detect antibiotics, protocols are being developed for the detection of OXA and OTC in fish and shrimp muscles. The guidelines on appropriate administration and regulation of antibiotics/other chemicals which include detailed recommendations for antibiotics/chemicals usage, information on withdrawal periods, and emerging chemicals (e.g. ethoxyquin) which are of recent concern among the Southeast Asian countries is being prepared. On 8-9 May 2013, AQD organized the International Workshop on Food Safety of Aquaculture Products in Southeast Asia in Iloilo City, Philippines which gathered 150 participants from 11 countries.



Representatives from SEAFDEC Member Countries during the International Workshop on Food Safety of Aquaculture

2.6 Healthy and Wholesome Aquaculture

Healthy and Wholesome Aquaculture is aimed at improving aquaculture production through innovations in nutrition and feeding as well as fish health management, and in preserving the environmental integrity of aquaculture areas.

Fish Meal Substitutes and Effective Feed Management Schemes include, among others, studies on soybean meal and soy protein concentrate as alternative to fish meal in practical diets for milkfish *Chanos chanos*. Results showed that after 120 days of culture, daily feeding treatment had the highest mean weight gain of 1118% and average body weight of 418 g from initial stocking weight of 35 g. Milkfish subjected to feeding skipped every other day and those with feeding skipped every two days attained average body weights of only 326 g and 352 g, respectively. In evaluating the performance of cowpea and mung bean based diets for milkfish in brackishwater ponds, results showed that after 84 days of culture, milkfish fed mung bean and cowpea based diet had higher average body weight of 448 g and 421 g, from initial body weight of 103 g and 101 g, respectively, while those fed the commercial diet attained only 368 g average body weight. Feed conversion ratios (FCR) for the two diets (1.55 for mung bean and 1.35 for cowpea) were likewise better compared with those fed the commercial diet (FCR=1.71).

Development of Aquafeeds for Selected Species at Specific Growth Stages focused on species or stages for which no artificial feed has been formulated. Nine test diets at different protein levels (54, 46 and 38% CP) and lipid levels (8, 11 and 14%) were formulated for feeding experiments in tanks using golden pompano fry. Nutrient composition for pompano feed formulation showed no effects of lipid dietary level in terms of growth rate in all levels of protein, while for mud crab experiments to identify potential formulated diet that would partially replace (at least 50%) natural feed, the results showed that formulated feed containing 48% protein was able to replace 50% or more of the natural feed (trash fish).

Promotion of Better Understanding of the Concept of Feed Conversion Ratio has been undertaken by AQD to assess the adequate nutrition and efficient feeding practices of fish farmers. Different pellet shapes were tested to determine the preference of mud crab, and the results showed that mud crab preferred the spherical balls and cube shapes compared to the spaghetti-like or tablet shapes, which could be attributed to ease in grasping the feed and thus can be handled and eaten quickly using chela or the walking leg. Experiments were also conducted to assess the economic feasibility of rearing pompano and rabbitfish in brackishwater ponds using either commercial diet or the AQD-formulated diet, while experimental runs to test the effects of AQD-formulated feed in the combined culture of tilapia and freshwater prawn in net cages in freshwater dam showed technical and economic feasibility. Pond trials were conducted for mud crab to develop protocols for the production of hatchery-reared juveniles for soft-shell crab farming. Comparison of the growth performance of *Gracilariopsis heteroclada* using fixed bottom line and broadcast method showed that fixed bottom line gave better growth both in ponds and intertidal areas.

Efficacy of Probiotics and Rationalization of the Needs and Application of Diagnostics to Ensure Biosecurity in Culture Systems was investigated by AQD, starting with the application and investigating the mode of action of probiotic *Bacillus* species in larviculture, while the degradation capacity of different enriched AHL-degrading mixed bacterial cultures was determined using plate diffusion method. Results showed that the enriched mixed bacterial cultures from sea sediments produced the highest degradation rate while the lowest was observed in *Pseudomonas* strain P3/PME 6863. For the effect of application and mode of action of polyhydroxybutyric acid (PHB) in the larviculture of *Penaeus* spp., dietary treatments of 0, 2, and 5% PHB supplementation in AQD-formulated shrimp diets resulted in highest weight gain for shrimps fed 2% PHB supplementation which was significantly



(Left) Abalone larval rearing plates and (inset) biofilm on the surface of the plates; (Right) Sampling of biofilm on the surface of plate in a 2x2" area using sterile spatula

different from all the other shrimp groups, while survival was highest for shrimps fed 5% PHB supplementation. The experiment to determine the bacterial diversity and algal community structure in biofilms of settlement plates for the abalone (*Haliotis asinina*) larvae resulted in the isolation of 67 bacterial strains from the biofilm of abalone rearing plates.

Quantitative and qualitative analyses of bacterial microbiota were used as a tool to investigate the emerging and re-emerging diseases of tilapia cultured in earthen grow-out ponds. As a result, 685 bacterial isolates have been purified and are now stored at -80°C.

Promotion for Wider Use of Conventional Diagnostic and New Methods for Newly Reported, Emerging Diseases was undertaken by AQD initially using shrimp (*P. monodon*) samples, gills and pleopods taken from 10 of the 15 farms in Region 9 (Zamboanga Peninsula, Philippines) for viral detection/analysis. In a subsequent interview, 14 shrimp farmers in Region 9 reported that there was no occurrence of yellow head virus disease in their shrimp stock. As part of the surveillance of emerging diseases in wild and farmed mud crab, samples collected from ten provinces in the Philippines – Albay, Bataan, Cagayan, Camarines Sur, Camarines Norte, Capiz, Northern Samar, Pangasinan, Quezon, and Sorsogon and from three types of culture environments (poly/monoculture ponds, aquasilviculture and natural bodies) are being processed for bacterial and fungal isolation, parasite and viral detection.



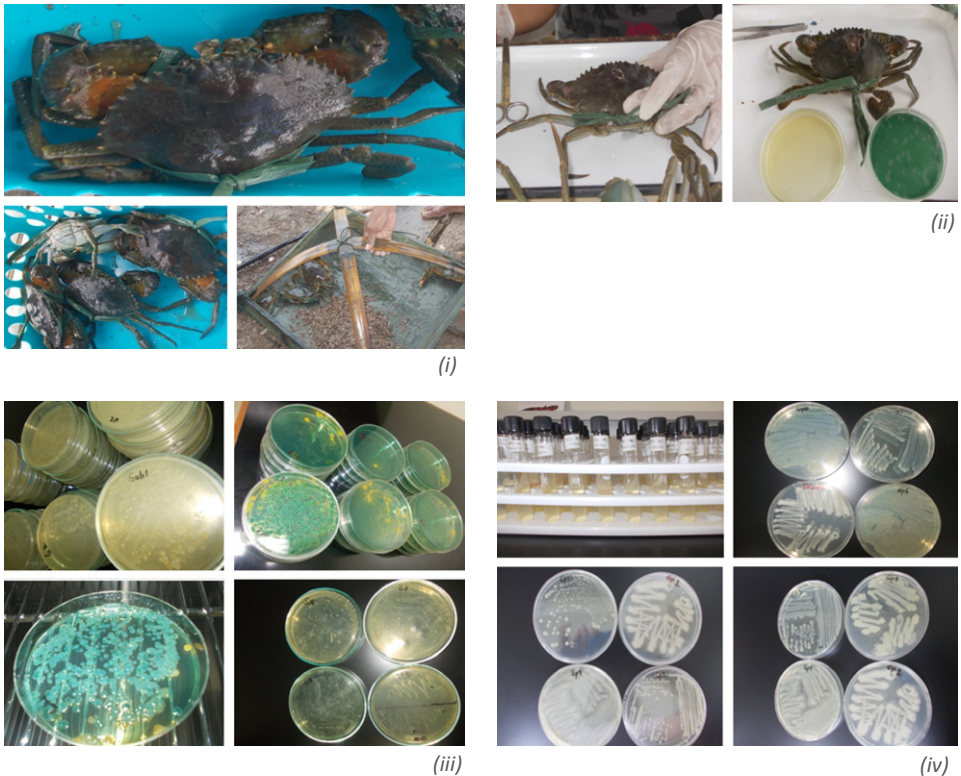
Sampling sites in Pontevedra, Capiz (brackishwater ponds) and Ajuy, Iloilo (near shore area)



Effective Alternative Safe Drugs/Chemicals to Manage Aquaculture Diseases in lieu of Harmful Chemicals and Drugs is being identified by examining the host response to pathogens and developing control methods such as the use of natural immunostimulants for marine fishes as an approach to counter the epizootics that occurred in the AQD marine fish hatchery, specifically the host defense of marine fishes against *Amyloodinium ocellatum*. Although designed to describe the infection of *A. ocellatum* on sea bass, optimization of *A. ocellatum*, *in vivo* passage procedure using pompano and siganids was also conducted, the results of which suggested that for sea bass fry there is threshold concentration for dinospores to be infective and increasing the dinospore concentration above 0.02% does not result in increased trophont attachment and infectivity rate.

The lower infectivity rate (0.02-0.22%) of sea bass compared to pompano (7%) indicates that sea bass is more resistant to *Amyloodinium* than pompano. A new antiviral screening protocol for antimicrobial activities of crude extracts from the seaweed, *Gracilaria* spp. was developed and modified to better investigate the antiviral property of test seaweed extracts and carrageenan. Experiments were also initiated to develop novel strategies to reduce disease incidence in mud crab hatchery and grow-out using live crab and pond sediment samples collected from Pontevedra, Capiz; Ajuy, Iloilo; Aklan; and Roxas City (Philippines).

Solvent extracts from natural products and powdered leaves of plants were tested for *in vitro* antimicrobial activity against aquaculture and human pathogens. Crude extracts from *Curcuma longa* (turmeric), *Echinacea angustifolia* (cone flower), *Nephelium lappaceum* (rambutan), and *Terminalia catappa* (tropical almond or talisay in the Philippines) showed significant antibacterial activity against *V. harveyi* with inhibition zones of 10 cm or more. *C. longa* and *T. catappa* also showed antibacterial activity against *Micrococcus luteus* and *Escherichia coli*.



(i) mud crab (*S. serrata*) sampled from brackishwater pond; (ii) isolation of bacteria from the hepatopancreas of mud crab; (iii) mixed bacterial culture from mud crab and pond sediments; (iv) pure bacterial culture from mud crab and pond sediments



Some terrestrial plants (L-R, 1st Row: wild tea, lagundi, neem; L-R, 2nd Row: guava, rambutan, talisay; L-R, 3rd Row: pagatpat, mahogany, makahiya) being air dried for extraction of antimicrobial compounds

THRUST 3. IMPROVING MANAGEMENT CONCEPTS AND APPROACHES FOR SUSTAINABLE FISHERIES

3.1 Promotion of Fisheries Management and Combating IUU Fishing

TD had been supporting the Member Countries in the promotion and application of appropriate fisheries management approaches, particularly in co-management and rights-based fisheries, *e.g.* promotion of fisheries management approaches that are practical for the region. Specifically, the issue on Illegal, Unreported and Unregulated (IUU) fishing had been discussed at various events taking into account the several attempts that had been initiated at national, regional and international levels to address issues on IUU fishing and ensure sustainable utilization of the fishery resources.

Promotion of Countermeasures to Reduce IUU Fishing Activities was implemented by TD in 2013 where various tools have been developed and promoted, *e.g.* the “Regional Fishing Vessels Record (RFVR)” for vessels 24 meters in length and over, and “Port State Measures (PSM)”, to reduce IUU fishing in the region. Support for such activities were obtained during the 45th Meeting of the SEAFDEC Council in 2013 where the establishment of regional database of fishing vessels was also considered as this would contribute to the regional efforts in combating IUU fishing, as well as during the subsequent 21st Meeting of ASWGFi in 2013.

To initiate the RFVR, TD sent questionnaires to concerned Member Countries in order to review their respective fishing vessel situations and explore the possibility of data sharing among the countries based on the basic information requirements of the RFVR, and to gather updated information on the number of fishing vessels 24 meters in length and over in the respective countries. The results would be used as inputs during the conduct of on-site workshops that aim to enhance the capacity of countries in providing data and information to the RFVR database.

Human Resources Development (HRD) Program on Fisheries Management Approaches for Sustainable Fisheries was implemented by TD in 2013 through a series of activities that are meant to strengthen the capacity of fishery officers of the Member Countries on sustainable fisheries management, *e.g.* through appropriate Monitoring, Control and

Surveillance (MCS), application of Ecosystem Approach to Fisheries Management (EAFM), and combating IUU fishing.

The “Training on Practical Approach to Co-management in Inland Fisheries of Cambodia” was organized by TD on 20-23 May 2013 in Siem Reap. Subsequently, TD supported the Fisheries Administration of Cambodia in the conduct of “On-site Training on Applicable Fisheries Management Approaches for Sustainable Inland Fisheries in Cambodia” on 3-7 June 2013 also in Siem Reap where fisheries officers of Cambodia who were previously trained by TD were mobilized as resource persons to convey the knowledge they gained to fisheries community members in their respective areas, for them to learn the ways and means of protecting and managing critical fisheries habitats in their communities.

With the collaboration of the Philippine Bureau of Fisheries and Aquatic Resources (BFAR), TD organized the “On-site Training Course on Practical Approach to Community-based Fisheries Management in Coastal Areas of the Philippines” on 15-19 July 2013 in Quezon Province. The training enabled the resource persons to transfer their knowledge to fisheries officers of BFAR who would later serve as trainers to convey the knowledge gained from the training course to local fisher groups in their respective jurisdictions.

The “On-site Training Course on Practical Approach for Enhancing Community-based Fisheries Co-management and Inland Fisheries of Thailand” was organized by TD on 13-18 January 2013 in Lamtakong, Thailand while the “Training Course on Sustainable Fishery Resources Management” was subsequently convened on 23-27 September 2013. The training sessions enhanced the capacity of the staff of DOF Thailand on resources management, which was promoted through various measures such as IUU fishing countermeasures and MCS for sustainable fisheries.

Combating IUU Fishing in the Southeast Asian Region through Application of Catch Certification for International Trade in Fish and Fishery Products was initiated by MFRDMD in 2013 as part of SEAFDEC integrated initiatives to combat IUU fishing. With the main objectives of investigating the existing fishing practices of the region, and analyzing problems associated with compliance of the EC Regulation No. 1005/2008, the project also aims to develop possible catch documentation system for capture fisheries to ensure that fish and fishery products being traded in the region are derived from non-IUU fishing practices.

The meeting with Malaysian officials organized by MFRDMD on 11-13 June 2013 came up with the questionnaire to be used for collecting information on existing fishing and trading practices of small-scale fisheries in the region, as well as information on the impacts of the implementation of the EC Regulation 1005/2008 on small- and large-scale fisheries of the Member Countries.

Responses of the ASEAN countries to the questionnaire were subsequently used as inputs during the “Core Expert Meeting on Combating IUU Fishing in the Southeast Asian Region through Application of Catch Certification for International Trade in Fish and Fishery Products” on 7-9 October 2013 in Kuala Lumpur, Malaysia, as well as in finalizing the “Regional Guidelines on Preventing Landings, Import and Export of IUU Fishing Products”, and in identifying the minimum requirements in the formulation of the proposed ASEAN Catch Certificate/Documentation System.

Participants in the Regional Core Expert Meeting on Combating IUU Fishing in Southeast Asian Region through Application of Catch Certification for International Trade in Fish and Fishery Products



3.2 Management of By-catch from Fisheries

Strategies for Trawl Fisheries Bycatch Management or REBYC-II CTI was initiated by TD in 2012 to address challenges related to by-catch through sustainable fishing, adoption of best fishing practices, and development of rational approach to maximize benefits from landed by-catch, considering that by-catch from fishing operations is among the most serious issues that create substantial impacts on the sustainability of fisheries and aquatic ecosystems. While taking into account the nature of fisheries in the region where the catches are multi-species, and trawls are commonly used which are non-selective, the project specifically aims to identify specific technological practices and develop management plans in partnership with the private sector at national and regional levels. Guidelines for “best practice in fishing operations” will be produced with the cooperation of the participating countries, namely: Indonesia, Papua New Guinea, Philippines, Thailand, and Vietnam.

The “Regional Technical Workshop on Data Collection of Trawl Fisheries Management – Information and Data Requirements” was organized by TD on 8-11 May 2013 at the TD premises in Samut Prakan, Thailand to come up with agreed data collection methodologies for the implementation of project activities by the respective countries, and indicators that could be used to evaluate impacts of management measures on fisheries. Information on trawl fisheries in the region and its by-catch composition would be compiled for the formulation of regional guidelines and advice/tools for improved governance and policy for trawl fisheries.



Regional Technical Workshop on Data Collection of Trawl Fisheries Management – Information and Data Requirements

Subsequently, the “Regional Training-cum-Workshop on Co-management and Selective Fishing Gears and Other Practices” was organized by TD on 7-11 October 2013 in Samut Prakan, Thailand for the officers of participating countries serving as trainers at the project sites in their respective countries for them to gain improved knowledge and skills on trawl fisheries management measures focusing on co-management, ecosystem approach to fisheries, and trawl selectivity.



Regional Training-cum-Workshop on Co-management and Selective Fishing Gears and Other Practices



Demonstration during the Stakeholder Consultation in Chumphon Province, Thailand

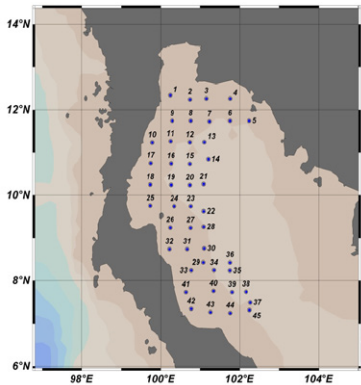
As part of the national activity of the project, the first “Stakeholder Consultation” was organized in Chumphon Province, Thailand on 7 November 2013 to introduce the project and seek views/cooperation from fishers and relevant stakeholders in the planning and implementation of the project activities.

THRUST 4. PROVIDING POLICY AND ADVISORY SERVICES FOR PLANNING AND EXECUTING MANAGEMENT OF FISHERIES

4.1 Improving Understanding on the Status of Fishery Resources in Southeast Asia

Fisheries Resources Survey and Operational Plan for M.V. SEAFDEC 2 and Offshore Fisheries Resources Exploration in Southeast Asia have been implemented by TD for better understanding of the status of fishery resources in the region including environmental parameters which could serve as basis for the development of policies and plans for sustainable management of fisheries. A series of cruise surveys were undertaken in 2013, such as the cruise conducted in collaboration with the Phuket Marine Biological Center of the Department of Marine and Coastal Resources (DMCR) of Thailand, on 10-31 August 2013 using the M.V. SEAFDEC 2, and subsequently from 10 November to 25 December using the M.V. SEAFDEC. Environmental data, including physical and chemical parameters, were collected through such cruises which could be useful for the environmental management in the Gulf of Thailand.

TD also organized the “Collaborative Research Survey on Fisheries Resources and Marine Environment of the Central Gulf of Thailand” from 14 March to 12 April 2013 in collaboration with researchers from various fisheries universities in Thailand and the Department of Fisheries of Thailand. The survey served as a forum for the conduct of 33 research topics which could be categorized into four (4) aspects, namely: 1) atmospheric and physical parameters; 2) chemical features; 3) biological information; and 4) fishery resources situation. TD in collaboration with the DOF Thailand subsequently convened the “Conference on the Results of Fishery Resources and Environmental Survey in the Gulf of Thailand” on 11-12 December 2013 in Bangkok, Thailand, to provide a venue for the researchers to present the preliminary findings of the research survey.



*Collaborative Research Survey in the Gulf of Thailand:
Map showing data collection stations (left), and researchers
involved during the research cruise (right)*

TD conducted the “Training Workshop on Benthic Habitat Mapping” on 18-22 February 2013 in Samut Prakan, Thailand for technical personnel of the Member Countries to gain better understanding of benthic habitats in the Southeast Asian countries. The training covered such topics as sampling design, survey tools and techniques, as well as data collection and analysis for mapping of various types of habitats on seafloors. Hydro-acoustic and underwater video equipment were introduced as tools that could support the assessment of benthic habitats.

For offshore fisheries, TD organized the “Regional Workshop on Offshore Fisheries in Southeast Asian Waters” on 3-4 December 2013 in Bangkok, Thailand, which reviewed and updated research works and initiatives on offshore fisheries resources exploration



Regional Workshop on Offshore Fisheries in Southeast Asian Waters



On-site Training on Offshore and High Sea Fisheries Management in Vietnam

conducted in the Southeast Asian waters. The workshop also reviewed offshore sampling gears, and relevant handbooks and publications produced by SEAFDEC, Member Countries and other agencies, to be used as reference in re-packing of a handbook taking into account the recommendations of the workshop. As a parallel activity in the Member Countries, TD organized the “On-site Training Course on Offshore and High Sea Fisheries Management and Reducing IUU Fishing Activities” on 15-18 October 2013 in Hai Phong, Vietnam, and on 10-13 December 2013 in Indonesia. These sessions focused on capacity building of the countries on resource management framework and its implementation in offshore and high sea fisheries, and enhancing the knowledge of the countries’ researchers in developing offshore and high sea resources management plans for international and regional activities, and IUU fishing countermeasures.

Embedded in the project is an activity on improving post-harvest fish handling at sea which TD promoted through the “Regional Training Course on Improvement of Tuna Handling” conducted on 11-13 December 2013 in General Santos City, Philippines. The course trained fisheries officials of the Member Countries on such topics as improvement of handling and reduction of post-harvest losses, particularly for tuna caught from hand-line fishing gear which is commonly used in the Philippines, Malaysia and Indonesia.



Regional Training Course on Improvement of Tuna Handling held in the Philippines

4.2 Regional Cooperation for Tunas Fisheries Management

Regional Cooperation for Sustainable Tuna Fisheries in the Southeast Asian Region, particularly for joint stock assessment of neritic tuna resources which are economically-important for several countries in the Southeast Asian region, has been supported by the SEAFDEC Council during its 45th Meeting in 2013. At the onset, TD organized the “Sub-regional Technical Meeting for Development of Joint Research Program for Tuna Research Survey in Sulu-Sulawesi Seas” on 20-21 August 2013 in Kuala Lumpur, Malaysia, which provided a forum for relevant countries, namely Indonesia, Malaysia and the Philippines,

to discuss the “Joint Research Program on Tuna Resources in Sulu-Sulawesi Seas” using the M.V. SEAFDEC 2 under a cost-sharing scheme, targeting the yellow-fin, big-eye, and skipjack tunas. Establishment of sub-regional working groups for data collection and analysis was also agreed upon to comprise representatives from the three countries, who would be tasked to jointly work on tuna stock assessment, study the impacts of Fish Aggregating Devices (FADs), identify larval and spawning grounds of target tuna species.

To broaden the management framework for the management of tuna resources, SEAFDEC also organized the “Consultative Meeting on Regional Cooperation on Sustainable Neritic Tuna Fisheries in Southeast Asian Waters” on 8-10 October 2013 in Songkhla Province, Thailand, where dialogue and regional cooperation had been initiated for the tuna resources, particularly focusing on neritic tunas. Issues and concerns of neritic tuna fisheries were discussed taking into consideration sub-regional groups/fishing grounds, namely: South China Sea, Gulf of Thailand, Andaman Sea, and Sulu-Sulawesi Seas. The meeting also agreed that the status and trend of neritic tuna resources should be updated since the current data/information collection system in many countries are still inadequate. As a way forward, the meeting suggested that a “Regional Plan of Action for Sustainable Neritic Tuna Fisheries (RPOA-Neritic Tuna) in Southeast Asian Waters” should be developed to include aspects on traceability, catch certification, joint stock assessments of tuna resources, and combating IUU fishing in neritic tuna fisheries.

4.3 Research and Management of Sharks and Rays

Research and Management of Sharks and Rays in the Southeast Asian Waters has been implemented by MFRDMD to address concerns on the listing in the CITES Appendices of economically-important species that inhabit the Southeast Asian waters, *e.g.* oceanic whitetip shark, hammerhead sharks and manta rays, especially during the 16th Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES CoP16) held in 2013 in Thailand. The project aims to assist the Member Countries in enhancing the capacity of their technical officers to collect taxonomic and biological data on sharks and rays through research as well as on other common and threatened species to enhance sustainable management of the species. In 2013, MFRDMD compiled genetic information on sharks and rays through an alternative identification method known as “DNA barcode”, while the “Standard Operating Procedures (S.O.P.) for Tissue Sample Collection and Preservation of Sharks and Rays” was prepared for publication in early 2014. Laboratory works on DNA Barcode analysis made use of 35 samples of sharks and 51 samples of rays collected (not over 5 samples for each species). Through PCR reaction and primers, a sub-unit 1 (652 bp) of the scalloped hammerhead shark (*Sphyrna lewini*) was successfully sequenced.

A simple user-friendly brief description on the similarities and distinctive characteristics of 15 pairs of sharks, 20 pairs of rays and two pairs of skates look-alike species, is contained in the “Field Guide to Look-alike Sharks and Rays of the Southeast Asian region” published by MFRDMD in 2013. This is a valuable addition to the “Field Guide to Sharks of the Southeast Asian Region” also published by MFRDMD in 2012. Compilation of information on biodiversity of batoids in the region and their biology is also carried out by MFRDMD for the publication of the “Field Guide to Rays, Skates and Chimaeras of the Southeast Asian Region” in 2014.

MFRDMD have been providing technical support to global and regional initiatives on sharks and rays, *i.e.* technical inputs during the “Regional Workshop on the Development of Species Identification Guides for Deep-sea Elasmobranch of the Indian Ocean, in Mauritius” and development of a field guide to be published by FAO; and inputs during the CITES CoP16 in Bangkok, Thailand, and during the “Regional Workshop on Data Collection Methodology for the Assessment of Shark Stock Status” convened by TD on 23-25 October 2013 in Bangkok, Thailand where papers on “Initiative to record sharks and rays landing by species” and “Current status of mitochondrial DNA research on sharks and rays” were presented.

To enhance the capacity of MFRDMD in undertaking research on sharks and rays, its staff attended the “Laboratory Workshop: Basics of DNA Barcoding” and “Public Seminar: The International Barcode of Life” on 22-23 October 2013 at University of Malaya, Kuala Lumpur. In November 2013, SEAFDEC and Marino-Forum 21 of Japan supported a study trip of MFRDMD senior researcher to visit shark landing sites and processing factories at Kasenuma and Shark Research Laboratory, Okinawa Churashima Foundation on Okinawa Island.

4.4 Small Pelagic Fisheries Management

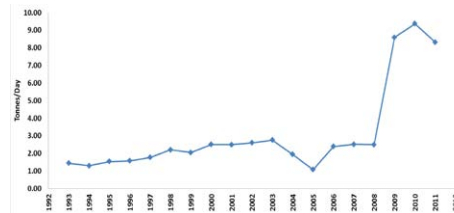
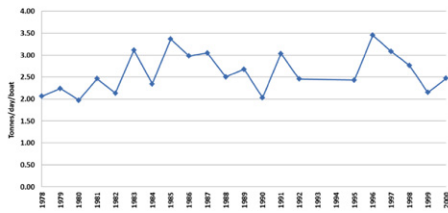
Comparative Studies for Management of Purse Seine Fisheries in the Southeast Asian Region had been initiated by MFRDMD in 2013 by compiling data on catch per unit effort (CPUE) available during the past three decades, and comparing the results of the CPUE analysis with that of total allowable catch (TAC) system. Small pelagic fisheries are important fishing industry in the Southeast Asian region, and statistical records have shown that in 2010, more than 800,000 tons of *Rastrelliger* spp., 700,000 tons of *Decapterus* spp. and 800,000 tons of *Sardinella* spp. were captured in the region’s waters using purse seine as one of the major fishing gears. The only common management measures for purse seine fisheries is licensing, while the application of other measures like “closed areas” and “closed seasons” are not generally applied due to insufficient scientific information, and only few scientific stock assessment activities had been conducted for small pelagic fishes in the region during the past decades.

This project would also include the conduct of genetic study for commercially-important pelagic species to analyze fish population structure, and come up with management strategies for sustainable purse seine fisheries in the Southeast Asian region.

Results of the compilation of catch-effort statistics conducted by MFRDMD in 2013 for Malaysia and Thailand to generate the CPUE trends for pelagic fishes in these countries indicated that the CPUE value was higher for Thailand than for Malaysia.



Workshop for TAC data analysis in October 2013



Trends of CPUE in terms of number of days for purse seine fisheries in Thailand (left) and Malaysia (right)

This suggested that the efficiency of vessels in catching small pelagic fishes was higher in Thailand.

4.5 Research and Management of Sea Turtles

Research and Management of Sea Turtles in Foraging Habitats in the Southeast Asian Waters had been continued by MFRDMD taking into account previous activities such as scientific surveys on sea turtle foraging habitats in Lawas of Brunei Bay in July 2010; and in Sipadan–Mabul of Sabah waters in September 2011. Based on the compiled scientific information, MFRDMD prepared the draft “Regional Plan of Action for Managing Foraging Habitats of Sea Turtles in the Region” in 2013, outlining the need for management of fishing activities that could threaten adult sea turtles, as well as reduction of poaching of sea turtle eggs in nesting areas. A series of meetings were organized to support the preparation of the “Regional Plan of Action” and the “Standard Operating Procedures (S.O.P.) on Conducting Research in Sea Turtle Foraging Habitats”, the first of which was held on 21-22 March 2013 at the MFRDMD premises in Kuala Terengganu; and the second on 21-23 May 2013 in Kuala Lumpur, Malaysia.

During the “Regional Meeting on Conservation and Management of Sea Turtle Foraging Habitats in Southeast Asian Waters” organized by MFRDMD on 22-24 October 2013 in Kuala Lumpur, Malaysia, findings of the scientific survey of foraging habitats at Lawas and Sipadan-Mabul Islands were used as basis for the development of the “Draft of Regional Plan of Action”.

4.6 Improving Information and Statistics Collection for Management of Fisheries

Enhancing the Compilation and Utilization of Fishery Statistics and Information for Sustainable Development and Management of Fisheries in Southeast Asian Region has been carried out by TD starting in 2013 to compile quality fisheries data and information in a timely manner to support policy planning and management of fisheries. This project comprises three sub-projects, namely: 1) improvement of data collection of the commercially-exploited aquatic species and threaten species; 2) gathering of fisheries activity information through the introduction of community-based management; and 3) harmonization of fishery statistics in the Southeast Asian region. While the first sub-project is specifically intended to improve the data collection of commercially-exploited aquatic species and threatened species, the second sub-project focuses on the collection of information on small-scale inland and coastal fisheries through community-based management to enhance the capacity of Member Countries in fisheries statistics and data

collection. The last sub-project emphasizes on coordination and supporting the reporting systems of statistics from the Member Countries to come up with the timely regional fishery statistics.

For data collection of commercially-exploited species, the focus in 2013 was on sharks considering that several species of sharks are commercially threatened and proposed for listing under the Appendices of the CITES during CITES CoP16. To review the existing shark landing data collection systems of the Member Countries, TD in collaboration with MFRDMD organized the “Regional Workshop on Methodology of Shark Data Collection and Assessment of Stock Status” on 23-25 October 2013 in Bangkok, Thailand. The pilot activities for collecting shark landing data in Indonesia, Malaysia, Philippines and Thailand were also discussed during the workshop.

In enhancing the compilation of information from small-scale coastal and inland fisheries through the introduction of community-based management, TD organized the “Regional Workshop on Improving Information Gathering from Small-scale Coastal and Inland Fisheries” on 28-30 January 2013, in Bangkok, Thailand, where the Member Countries discussed the ways and means of improving fisheries data collection for small-scale fisheries, and the possible tools/methodologies to support data collection. While current data collection approaches include “top-down” approach, *i.e.* statistics survey, licensing, registration, documentation, “bottom-up” approach should be promoted through autonomous community development. Although “bottom-up” approach could be cost-effective, cooperation and reliability of information compiled should be ensured. Therefore, bottom-up data collection by autonomous communities should be undertaken first as pilot project, before applying such approach nationwide.

As a follow-up, TD conducted a “Regional Training Course on the Improvement of Fisheries Information Collection in Coastal Small-scale and Inland Fisheries of the Southeast Asian” from 26 February to 3 March 2013 in Samut Prakan, Thailand to discuss various types of fisheries information collection techniques and develop a model for regional fishery information collection taking into account the trainees’ experiences in fishery information collection. To introduce the use of autonomous community-based resources management including the methodologies on gathering fisheries activity information, TD conducted the



On-site Training on Facilitating Fisheries Information Gathering Through Introduction of Community-based Fisheries Management in Lao PDR



On-site Training on Facilitating Fisheries Information Gathering Through Introduction of Community-based Fisheries Management in Vietnam

“On-site Training on Facilitating Fisheries Information Gathering Through Introduction of Community-based Fisheries Management” on 13-16 May 2013 in Thanh Hoa, Vietnam; on 17-20 June 2013 in Luang Prabang, Lao PDR; on 1-5 July 2013 in Can Tho City, Vietnam; and on 28 October -1 November 2013 in Champasak, Lao PDR.

While supporting Member Countries in improving their respective systems of fisheries data collection, SEAFDEC also pursued its on-going mandate in compiling the regional fishery statistics. In 2013, SEAFDEC published the “Fishery Statistics Bulletin of Southeast Asia 2011 using the statistics and data submitted by the Member Countries. SEAFDEC also updated the “List of Aquatic Animals and Plants in Southeast Asia” to be used as reference by the respective Member Countries in providing fisheries statistics data to SEAFDEC.

THRUST 5. ADDRESSING INTERNATIONAL FISHERIES-RELATED ISSUES FROM A REGIONAL PERSPECTIVE

5.1 Addressing International Fisheries-related Issues

Assistance for Capacity Building in the Region to Address International Fisheries-related Issues had been sustained by SEAFDEC in 2013 to support the Member Countries in addressing international issues that may impede sustainable development of fisheries in the region. The important issues addressed was the listing of commercially-exploited aquatic species (CEAS) in the Appendices of CITES during the CITES CoP16. In order to discuss the regional common/coordinated positions on a number of relevant proposals of CITES and to support the countries in conveying their respective positions towards such CITES proposals, the “ASEAN-SEAFDEC Regional Consultation on Common/Coordinated Position of CEAS at the CITES CoP16” was convened by SEAFDEC on 22 January 2013 in Bangkok, Thailand.

SEAFDEC was also actively involved in the initiative of FAO to develop the “International Guidelines on Securing Sustainable Small-scale Fisheries”, through its participation in the “FAO Technical Consultation on International Guidelines on Securing Sustainable Small-scale Fisheries” on 20-24 May 2013 at FAO Rome. Part of the draft text agreed upon during the Consultation was subsequently submitted to the 16th Meeting of the FCG/ASSP in November 2013 to seek additional views/inputs from the Member Countries to be conveyed to the Resumed Session of the Consultation in early 2014. In addition, SEAFDEC was also involved in discussions during the “Ninth Session of the Scientific Committee of the WCPFC” on 6-14 August 2013 in Pohnpei, Micronesia, where the status of tuna resources and management measures in the WCPFC area were discussed, the results of which could serve as reference for SEAFDEC in developing activities related to data collection and management of tunas in the region.

Formulation of concept notes to consolidate its important works based on programs/projects implemented was initiated by SEAFDEC to be used as documents in seeking policy support from high-level authorities of the ASEAN. In 2013, concept notes on “Regional Cooperation to Promote the Sustainable Tuna Fisheries in the Southeast Asian Region”, “Catch Documentation System”, and on “Regional Records of Fishing Vessels (RFVR) for vessels 24 meters in length and over” received support from the 45th Meeting of the SEAFDEC Council and the 21st Meeting of the ASWGF; while the policy directives and

guidance provided to such issues would be accommodated in the implementation of relevant SEAFDEC projects.

SPECIAL PROJECT

Fisheries and Habitat Management, Climate Change and Social Well-being in Southeast Asia, a five-year collaborative project (January 2013–December 2017) has been pursued by SEAFDEC upon receiving funding support from the Government of Sweden. The scope of this project has close linkages to various Program Thrusts of SEAFDEC, particularly Thrust 3 on “Improving Management Concepts And Approaches For Sustainable Fisheries”, with crosscutting activities that contribute to the well-being of people in the region. The project aims to promote responsible utilization of marine and aquatic resources giving due recognition on the need to maintain environmental health and conservation of critical habitats. While the project also aims to enhance the social well-being as well as working conditions and alternative livelihoods, emphasis is given in seeking the commitment of the Member Countries in following-up the development and implementation of sub-regional and regional agreements with special focus on four sub-regions, namely: Gulf of Thailand, Andaman Sea, Sulu-Sulawesi Seas and Mekong River Basin.

The goal of the project is sustainable use of aquatic resources and reduced vulnerability to climate change by coastal/rural (fishing) communities in the ASEAN with specific objectives of building the capacity of participating countries for: 1) integrating habitat and fisheries management and adapting to climate change; 2) management and improvement of systems for fishing capacity (monitoring, record and control); and 3) drafting and implementing regional and sub-regional agreements and improvement of policy development processes. The ultimate beneficiaries of the Project are the poor coastal and inland communities who continue to experience declining catch as well as increased competition and conflict over natural resource use and space in coastal and inland waters of Southeast Asia.

The basic strategy of this SEAFDEC-Sweden Project is to build upon the expressed needs of participating countries in enhancing social well-being and environmental health, through the promotion of processes that would improve the management of fisheries, fishing capacity and better management of aquatic environments and habitats of importance for key species, applying the ecosystems approach, especially on management matters, such as (larger) fish resources conservation areas (*e.g.* building upon MPAs, *refugia*, etc.),



Dr. Chumnarn Pongsri and Ms. Anna Maria Oltorp signing the Agreement to promote responsible utilization of fisheries and aquatic resources in Southeast Asia

management of fishing capacity (combating IUU fishing), social mobility and conflict. Process results and outcomes and indicators on positive achievements and impacts would be reflected in indications and reports from bodies, and individuals outside of the project, *i.e.* SEAFDEC Council, ASEAN, FAO/APFIC, RPOA, BOBLME in recognition of the steps being taken and the impacts achieved.

Highlight of Achievements in 2013

Promotion of Sub-regional Cooperation in Southeast Asian and Strengthening Regional and Sub-regional Programs and Organizations has been continued in 2013 to cover four sub-regions (Andaman Sea, Gulf of Thailand, Sulu-Sulawesi Seas and the Mekong) as endorsed by the SEAFDEC Council. Specifically in the Gulf of Thailand sub-region, a study visit to the eastern coast of Thailand and southwestern coast of Cambodia was arranged on 2-6 July 2013 to learn and share experiences on community-based fisheries management (CBFM), habitat (mangrove) rehabilitation, and to observe the operations in fish landing sites at the border provinces of Thailand and Cambodia.

On 6 June 2013, a paper on “Practical Approach on Marine Protected Area and Fisheries *Refugia* Network Development: Regional Cooperation and Experience” presented at the National Workshop on Developing MPA Network in Vietnam---Status and Challenges, highlighted on the conservation and regulation of migratory fish stocks through the establishment of “larger fisheries resources conservation areas” as foundation in habitat management by incorporating existing “management areas”. The Vietnam network is important since MPAs are considered as practical management tools with potential to support the establishment of fish *refugia* and larger fisheries resources conservation areas to ensure the sustainability of fisheries resources.



During the study visit to Thailand and Cambodia: (left) Discussion at Trat Provincial Fisheries Office; and (right) Observing fishing community in Cambodia

The “4th Meeting of the Gulf of Thailand Sub-region” was organized on 18-19 December 2013 in Bangkok to discuss and identify suitable actions as follow up to recommendations from the previous Meetings. Focus was made on concerns common to the sub-region such as capacity to strengthen monitoring of fishing efforts; monitoring and capacity-building at ports and landing sites; and development of options for joint approaches to conserve the Indo-Pacific mackerel. As the ecosystem approach to fisheries management would be applied, the sub-regional cooperation around the Gulf of Thailand would focus not only on pure fisheries aspects but also on the aspects of habitat management with a range of



Participants in the 4th Meeting of the Gulf of Thailand Sub-region

stakeholders involved in the utilization of resources. Prior to the Gulf of Thailand Meeting, the plan of work was presented to and endorsed by the RPOA-IUU Steering Committee on 19-21 November 2013, considering that the Gulf of Thailand is one of the identified sub-regions covered in the RPOA framework. Bilateral consultations between bordering countries have been facilitated (*i.e.* Cambodia-Vietnam, Thailand-Malaysia, and Thailand-Cambodia) to work on possible common actions for implementation between and among countries. The Cambodia-Vietnam roundtable on 17 December 2013 came up with an agreed (zero) draft MoA for cooperation. The project framework was also introduced to the CTI-CFF (under Sulu-Sulawesi Seas sub-region) Regional Priorities Workshop on 20-22 August 2013 in Manado, North Sulawesi Province of Indonesia considering that the project is within the regional programs of ASEAN-SEAFDEC Strategic Partnership (ASSP) that support the ASEAN countries in ensuring sustainable fisheries in the region. In the Andaman Sea sub-region, cooperation with the Bay of Bengal Large Marine Ecosystem (BOBLME) Project was continued to ensure common efforts in promoting fisheries management between and among the countries concerned in the sub-region.

Cooperation with Regional and International Organizations was pursued with various regional and international organizations such as the ASEAN, CTI-CFF, BOBLME, MRC has been strengthened. On 12 March 2013, a full-day seminar on Introduction to the SEAFDEC-Sweden Cooperation 2013-2017 was held in Bangkok with the participation of delegates from the Swedish, Australian, and Norwegian Embassies in Bangkok; as well as representatives from



Participants in Seminar on Introduction to SEAFDEC-Sweden Cooperation 2013-2017

partner organizations, namely, Sida, FAO/APFIC, IUCN, UNEP, MRC/Fisheries Programme, CORIN-Asia, and Swedish Agency for Water and Marine Management (SwAM). The seminar provided a forum for partners to discuss ways to enhance coordination and joint approaches towards social and environmental sustainability in the region. Dialogue was also facilitated with UNEP, IUCN/MFF, WorldFish Center, WWF and ICSF, and local/national organizations. The link and cooperation with the ASEAN is of special importance in view of the ASEAN-SEAFDEC Strategic Partnership (ASSP).

On 11-13 December 2013, SEAFDEC supported the conduct of sub-regional dialogue on labor, migration and fisheries management by BOBLME in cooperation with ICSF and SDF to address the needs for improving labor standards in fishing and enhance the overall capacity to comply with fisheries management measures and obligations at the national, bilateral, regional and international levels. SEAFDEC introduced the concept of “Labor, Migration and Fisheries Management in the Context of Sustainable Use of Fisheries Resources in the ASEAN” taking into account the 2011 Resolution and Plan of Action which emphasized on the need to improve the working conditions of people engaged in fishing activities and strengthen measure for the safety of fishing vessels taking into consideration regional specificity.



Sub-regional dialogue on labor, migration and fisheries management

Promotion of the Regional Cooperation on Sustainable Management of Neritic Tuna Resources in Southeast Asia was undertaken by SEAFDEC with support from the SEAFDEC-Sweden through the process of developing a regional plan of action for regional cooperation on neritic tunas during the “Consultative Meeting on Regional Cooperation Sustainable Neritic Tuna Fisheries in Southeast Asian Waters” from 8 to 10 October 2013 in Songkhla Province, Thailand. The Meeting served as a first step towards providing a platform to initiate and coordinate dialogue and cooperation on “regional” (neritic) tuna resources. Information on the status of neritic tuna in the region and sub-regions were revealed and experiences shared not only within SEAFDEC but also with partner organizations at regional



Participants in the Consultative Meeting on Regional Cooperation Sustainable Neritic Tuna Fisheries



Group discussion on the way forward to manage neritic tuna resources in the region

and sub-regional levels. The initiative was important as it could be linked to another Swedish supported initiative (with Abba Seafood) that aims to verify the sustainability of tonggol tuna fisheries, processing and trade. The Meeting recommended that the status and trend of neritic tuna resources should be updated and data/information availability improved in view of the inadequacy of data collection systems in many countries. The Meeting also proposed to establish working group(s) for the drafting the Regional Plan of Action for Sustainable Neritic Tuna Fisheries (RPOA-Neritic Tuna) in Southeast Asian Waters. The process would be carried out through a series of Regional Technical Consultations starting in 2014 and onwards with defined tasks to be performed by working groups between sessions. Specifically, there should be working groups in each sub-region (*e.g.* South China Sea, Sulu-Sulawesi Seas, Gulf of Thailand, and Andaman Sea) with developed TOR for the working groups/task forces. Biological studies on the status and distribution of neritic tuna should be carried out to support the development of management plan for sustainable neritic tuna fisheries in the Southeast Asian region. Capacity building/training programs would also be provided as and when necessary.

Promotion of the Policy Development Process is being carried out by SEAFDEC through its participation in various levels of policy fora, such as the 5th Meeting of the ASEAN Fisheries Consultative Forum (AFCF) in Lao PDR on 22-23 July 2013. The Meeting discussed the prioritized activities for ASEAN cooperation on fisheries under the 2011 Strategic Plan of Actions (SPA), which are in line with the ASEAN Economic Community (AEC) Blueprint and the ASEAN Socio-Cultural Community (ASCC) Blueprint. SEAFDEC also supported the International Ocean Institute (IOI) for the conduct of the “Pacem in Maribus XXXIV International Forum on Sustainable Governance of the Ocean” on 4-6 September 2013 in Bangkok. The forum addressed important and emerging global, regional and national issues and ocean concerns related to hazards in water and flood management policy implications, protection, mitigation, and adaption. It was a follow-up of the outcome of Rio+20, implementation of UNCLOS and related instruments in the Southeast Asian region.



*Pacem in Maribus XXXIV
International Forum on Sustainable
Governance of the Ocean*



Strengthening the Network among Member Countries through Human Capacity Program on Regional Fisheries Policy Network has been continued by SEAFDEC through the representatives from Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, and Vietnam serving as members of the Regional Fisheries Policy Network (RFPN). Stationed at SEAFDEC Secretariat in Bangkok, the RFPN members serve their terms of appointment on one-year basis starting from January to December. The RFPN members play active role in coordinating and communicating between SEAFDEC and their respective countries, and during their tenure, they are provided the opportunity to attend and provide technical contributions in various events of SEAFDEC and others to enhance their knowledge and experiences, and gain better understanding of major global and regional fisheries issues confronting the region. They also support the efforts of SEAFDEC in developing strategies to promote fisheries policy dialogues as well as regional and sub-regional cooperation among the Member Countries and in following-up the commitment for the implementation of policies for the ASEAN.

SEAFDEC PROGRAMS FOR 2014

As scrutinized and endorsed during the 36th Meeting of the SEAFDEC Program Committee in 2013, the programs and activities to be implemented by SEAFDEC in 2014 (subject to consideration of the SEAFDEC Council in April 2014) include:

Program Category/Project Title	Responsible Department	Funding Sources
ASEAN-SEAFDEC FCG/ASSP Programs		
Thrust I: Developing and Promoting Responsible Fisheries for Poverty Alleviation and Food Security		
1. Rehabilitation of Fisheries Resources and Habitat/ Fishing Grounds for Resources Enhancement	TD	JTF
2. Human Resources Development for Sustainable Fisheries	TD	JTF
3. Optimizing Energy Use and Improving Safety in Fishing Activities	TD	JTF
4. Resource Enhancement of International Threatened and Over-exploited Species in Southeast Asia through Stock Release	AQD	JTF
5. Promotion of Sustainable and Region-oriented Aquaculture	AQD	JTF
Thrust II: Enhancing Capacity and Competitiveness to Facilitate International and Intra-regional Trade		
6. Chemical and Drug Residues in Fish and Fish Products in Southeast Asia: Biotxin Monitoring in ASEAN -- ASP, AZA and BTX	MFRD	JTF
7. Traceability Systems for Aquaculture Products in the ASEAN Region	MFRD	JTF
8. Accelerating Awareness and Capacity-building in Fish Health Management in Southeast Asia	AQD	JTF
9. Food Safety of Aquaculture Products in Southeast Asia	AQD	JTF
Thrust III: Improving Management Concepts and Approaches for Sustainable Fisheries		
10. Strategies for Trawl Fisheries Bycatch Management (REBYC-II CTI)	TD	FAO/GEF
11. Promotion of Countermeasures to Reduce IUU Fishing Activities	TD	JTF
12. Combating IUU Fishing in the Southeast Asian Region through Application of Catch Certification for International Trade in Fish and Fishery Products	MFRDMD	JTF



Program Category/Project Title	Responsible Department	Funding Sources
Thrust IV: Providing Policy and Advisory Services for Planning and Executing Management of Fisheries		
13. Fisheries Resource Survey and Operational Plan for M.V. SEAFDEC 2	TD	JTF
14. Offshore Fisheries Resources Exploration in Southeast Asia	TD	JTF
15. Research and Management of Sea Turtles in Foraging Habitats in the Southeast Asian Waters	MFRDMD	JTF
16. Enhancing the Compilation and Utilization of Fishery Statistics and Information for Sustainable Development and Management of Fisheries in the Southeast Asian Region	TD	JTF
17. Comparative Studies for Management of Purse Seine Fisheries in the Southeast Asian Region	MFRDMD	JTF
18. Research and Management of Sharks and Rays in the Southeast Asian Waters	MFRDMD	JTF
Thrust V: Addressing International Fisheries-related Issues from a Regional Perspective		
19. Assistance for Capacity Building in the Region to Address International Fisheries-related Issues	Secretariat	JTF
20. Strengthening SEAFDEC Network for Sustainable Fisheries	Secretariat	JTF
Special Projects		
21. Fisheries and Habitat Management, Climate Change and Social Well-being in Southeast Asia	Secretariat	Sweden
22. Establishment and Operation of a Regional System of Fisheries <i>Refugia</i> in the South China Sea and Gulf of Thailand (<i>New Project</i>)	TD	UNEP/GEF
23. Enhancing Coastal Community Resilience for Sustainable Livelihood and Coastal Resources Management (<i>New Project</i>)	MFRDMD	IDB
Departmental Programs*		
1. Tailor-made Training Programs	TD	Requesting Institution(s)
2. Promotion on Strengthening of SEAFDEC Visibility and Image	TD	Thailand
3. Improvement of Fisheries Technology and Reduction of the Impact from Fishing	TD	Thailand
4. Adapting to Climate Change Impacts	AQD	Philippines
5. Healthy and Wholesome Aquaculture	AQD	Philippines

Program Category/Project Title	Responsible Department	Funding Sources
6. Maintaining Environmental Integrity through Responsible Aquaculture	AQD	Philippines
7. Meeting Socio-economic Challenges in Aquaculture	AQD	Philippines
8. Quality Seed for Sustainable Aquaculture	AQD	Philippines
Other Programs		
1. Coastal Area Capability Enhancements in Southeast Asia	TD	RIHN
2. Conservation and Management of Eel Resources in Southeast Asia	Secretariat	JTF

* Funding sources for Departmental Programs are mainly the regular contribution from respective Host Government.

IMPROVING SEAFDEC ORGANIZATION AND PERFORMANCE

Third SEAFDEC Review was conducted in 2012-2013 based on the endorsement of the SEAFDEC Council during its 44th Meeting in 2012. As specified in its TOR, the Third SEAFDEC Review was aimed at: 1) assessing the continued relevance of SEAFDEC with respect to the changing situations of fisheries in the Southeast Asian region by considering the views of the Member Countries on the roles, functions and activities of SEAFDEC; 2) examining and reviewing the Plans of Operation and activities of the SEAFDEC Secretariat and Departments, taking into consideration their respective short-, medium- and long-term operations; 3) reviewing the financial management of SEAFDEC, taking into account the diminishing funds from external sources and avoiding substantial increases in the Minimum Regular Contribution of the Member Countries *vis-à-vis* the operations of SEAFDEC; and 4) recommending ways and means to improve the working mechanism and management of the SEAFDEC Secretariat and Departments to ensure continued cost effectiveness, including exploring possible alternative structures to the Departmental set ups. During its second Meeting on 6-8 March 2013, the SEAFDEC Review Committee concluded thirty-five (35) recommendations based on results of series of missions to visit and discuss with some Member Countries and SEAFDEC Departments, which were submitted for consideration by the Council during its 45th Meeting in April 2013. During the Special Meeting of the SEAFDEC Council on 3-4 October 2013, such recommendations were resubmitted for consideration by the Council, together with their financial implications as well as the indications for possible amendment of the Agreement Establishing SEAFDEC, and cost and benefit of the recommendations (*detailed decision of the Council could be gleaned from the Report of the SEAFDEC Special Council Meeting*).



(Left) The 2nd Meeting of the Third SEAFDEC Review Committee; (Right) Members of the Third SEAFDEC Review Committee: (from left to right) Dr. Deb Menasveta, Dr. Purwito Martosubroto, Dr. Rolando Platon, Prof. Junichiro Okamoto, Mr. Hla Win, Dato' Junaidi bin Che Ayub, and Dr. Le Thanh Luu

Progress in the Establishment of the Inland Fishery Resources Development and Management Department (IFRDMD) has been reported by SEAFDEC during SEAFDEC meetings. The proposal to establish a new SEAFDEC Department spawned from the recognition of the importance of inland fisheries which has been well reflected at the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2020 in June 2011, when the Minister of Marine Affairs and Fisheries of Indonesia proposed to establish a Regional Center for Inland Fisheries Development as part of SEAFDEC organization. The proposal was supported in principle by the ASEAN-SEAFDEC Member Countries and subsequently by the SEAFDEC Council during its 44th Meeting in 2012.

In order to move forward on the establishment of the so-called IFRDMD, SEAFDEC in collaboration with the Ministry of Marine Affairs and Fisheries (MMAF) organized the first Meeting of the “Working Group on the Establishment of the IFRDMD” on 24-25 January 2013 in Palembang, Indonesia where the plan of operation, functions and work plan were initially discussed, the results of which were presented at the SEAFDEC Interdepartmental Meeting on 2 March 2013, where the participation of representatives from other SEAFDEC Departments was encouraged to ensure that duplication of efforts among the existing Departments and the new IFRDMD is avoided.



The Working Group Meeting for establishment of new SEAFDEC Department

The draft of plan of operation, function and work program of IFRDMD was proposed to the SEAFDEC Council during its 45th Meeting in April 2013, and subsequently to the Special Meeting of the SEAFDEC Council in October 2013 for consideration. While the Plan of Operation was still subject to endorsement by the Council, the progress in the establishment of IFRDMD was already put forward by the Government of Indonesia, with the land area and budget allocated for the construction of buildings and facilities for the Department, as well as sourcing of budget from external sources to support the implementation of regional programs/project that would address the issues and concerns on inland capture fisheries.

Enhancing Coordination through the Regional Fisheries Policy Network has been sustained by SEAFDEC through an arrangement nominating officials from the SEAFDEC Member Countries to be stationed at the SEAFDEC Secretariat to facilitate closer dialogues between SEAFDEC and their respective host governments and among the Member Countries; provide views and inputs on various fisheries priority issues and development of regional fisheries policy recommendations; and provide assistance and inputs in the implementation of various regional programs of SEAFDEC. In 2013, nine members were nominated by the respective Member Countries, namely *Mr. Leng Sam Ath* (Cambodia), *Ms. Hotmaida Purba* (Indonesia), *Mr. Vankham Keophimphone* (Lao PDR), *Ms. Imelda Riti Anak Rantty* (Malaysia), *Mr. Aung Toe* (Myanmar), *Mr. Ronaldo R. Libunao* (Philippines) followed by *Mr. Neil Kenneth P. Catibog* (Philippines), *Mr. Sarayoot Boonkumjad* (Thailand), and *Mr. Tran Van Hao* (Vietnam). The RFPN members had the opportunity to participate in



First row (L-R): Mr. Aung Toe (Myanmar), Ms. Imelda Riti Anak Rantty (Malaysia), Ms. Hotmaida Purba (Indonesia), and Mr. Leng Sam Ath (Cambodia);

Second row (L-R): Dr. Ronaldo R. Libunao (Philippines), Mr. Tran Van Hao (Vietnam), Mr. Vankham Keophimphone (Lao PDR), and Mr. Sarayoot Boonkumjad (Thailand)

technical events organized by SEAFDEC in order to share views and enhance their awareness and knowledge on the issues towards developing regional policy. The RFPN members stationed at SEAFDEC would also be exposed to and acquire experiences in working within a multi-national environment, thus, have the opportunity to create network among the members stationed during the same period and facilitate close cooperation among the Member Countries in the future.

Improved Program Planning and Implementation has been continued by SEAFDEC to ensure the effectiveness of SEAFDEC programs of activity and to deliver maximum benefits to the Member Countries. The SEAFDEC Secretariat has been conducting regular Program Review Meetings, particularly for the projects supported by the Japanese Trust Fund and Sweden. In 2013, the Third Japanese Trust Fund Review Meeting was convened from 28 February to 1 March 2013 in Bangkok, Thailand, while the SEAFDEC-Sweden Annual Review Meeting was organized on 14 March 2013, also in Bangkok, Thailand.

In order to improve the programs of activities specifically reflecting the consequences and impacts of the activities in line with the recommendations made by the SEAFDEC Council during its 45th Meeting, SEAFDEC also convened the “In-house Training on Project Planning, Monitoring and Evaluation” for the staff of SEAFDEC Training Department and Secretariat on 4-8 September 2013 in Petchaburi, Thailand. The workshop aimed to enhance the knowledge and capacity of SEAFDEC Secretariat and TD staff on project planning, monitoring and evaluation using the results-based management (RBM) approach. Similar course could be conducted in other SEAFDEC Departments as and when necessary. For AQD, its annual “In-house Review and Planning Meeting” was held on 19-20 September 2013 at its main station in Iloilo, Philippines. Attended by AQD’s partners and senior staff, the Meeting aimed to ensure that R&D activities to be undertaken by AQD would address the needs of the industry.



Participants in the 3rd Meeting of SEAFDEC Program Review for Japanese Trust Fund (JTF) (left); and Participants in In-house Training on Project Planning, Monitoring and Evaluation (right)



COOPERATION WITH DONORS AND PARTNER ORGANIZATIONS IN 2013

ASSOCIATION OF SOUTHEAST ASIAN NATIONS

Cooperation between SEAFDEC and the Association of Southeast Asian Nations (ASEAN) has been pursued since 1998 with the establishment of the Fisheries Consultative Group (FCG) Mechanism. The cooperation was formalized in 2007 with the signing of the Letter of Understanding on the ASEAN-SEAFDEC Strategic Partnership (ASSP), where SEAFDEC serves as a technical arm to implement fisheries programs/projects for the benefit of the ASEAN countries. In 2013, twenty-two (22) programs were implemented under the FCG/ASSP Mechanism, of which the progress of projects in 2013, and the projects to be implemented in 2014 were reported to the 21st Meeting of the ASEAN Sectoral Working Group on Fisheries (ASWGF_i) on 24-26 July 2013 in Vientiane, Lao PDR. SEAFDEC also supported the Member Countries in the implementation of the “Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020”, which was adopted by the ASEAN Ministers and Senior Officials responsible for fisheries in 2011.

In 2013, SEAFDEC participated in and provided inputs to ASEAN Meetings, namely: the Regional Expert Forum on Climate Change, Agriculture and Food Security in ASEAN (2-3 May 2013, Bangkok, Thailand); 2nd Meeting of the *Ad-hoc* Steering Committee on Climate Change and Food Security (16-17 May 2013, Jakarta, Indonesia); 4th ASEAN National Focal Point of Tuna Working Group Meeting (19-21 June 2013, Bangkok, Thailand); 5th Meeting of the ASEAN Fisheries Consultative Forum (22-23 July 2013, Vientiane, Lao PDR); Technical Consultation Meeting of the ASEAN-Australia Development Cooperation Programme Phase II (AADCP-II) Project: Establishment of ASEAN Good Aquaculture Practices (GAqP) (2-4 December 2013, Bangkok, Thailand); ASEAN-FAO-WOCAN-GIZ Regional Workshop on Gender and Climate Smart Agriculture in ASEAN (11-12 December 2013, Bangkok, Thailand); and the 1st ASEAN/MARKET Stakeholders’ Meeting of the ASEAN Fisheries Improvement Project (FIP) Protocol (16 December 2013, Bangkok, Thailand).

SEAFDEC was requested to serve as executing agency for the proposed “ASEAN Fisheries and Aquaculture Conference and Exposition” which was endorsed by the ASWGF_i and subsequently at the 35th AMAF Meeting, to be hosted by the Department of Fisheries of Thailand and tentatively scheduled on 22-24 January 2015 in Bangkok, Thailand. The Press Conference was convened on 23 September 2013 in Thailand to announce the said “Conference and Exposition” to the public while other technical preparatory works for the Conference were discussed between the DOF of Thailand and SEAFDEC.

CORAL TRIANGLE INITIATIVE ON CORAL REEFS, FISHERIES AND FOOD SECURITY

In 2013, SEAFDEC was involved in various activities of the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF), particularly during the Intergovernmental Forum on Live Reef Food Fish Trade (LRFFT) on 31 January-1 February 2013 in Bangkok, Thailand; 2nd CTI-CFF Regional Priorities Workshop (20-22 August 2013, Manado, Indonesia); and the 4th Meeting of the CTI-CFF Ecosystem Approach to Fisheries Management (EAFM)



Technical Working Group. For such events, SEAFDEC sent representatives to provide technical inputs.

Specifically on the Live Reef Food Fish Trade, the Forum came up with the “Resolution on Sustainable LRFFT for the Southeast Asian Region and CTI-CFF Member Countries”, which was subsequently supported by the SEAFDEC Council during its 45th Meeting in 2013. The SEAFDEC Council also authorized SEAFDEC to be the Interim Secretariat for the LRFFT Regional Forum, and for SEAFDEC to enter into collaborative arrangement with the CTI-CFF in order to formalize future cooperation. As a move forward to address the issue on sustainable LRFFT, a dialogue with LRFF market side was initiated while a mission of SEAFDEC and CTI-CFF to Hong Kong Government’s Agriculture Fisheries and Conservation Department (AFCD) was organized on 5-9 August 2013 to discuss possible cooperation and address the issues that impede the sustainability of LRFFT.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

SEAFDEC signed agreement with FAO on February 2013 for the SEAFDEC/AQD to implement the project on “Aquaculture for Food Security, Poverty Alleviation and Nutrition (AFSPAN)” with funding support from FAO. The project started on 15 January 2013 and will end on 31 December 2014, with objectives to better understand the current status of the contribution of aquaculture to food and nutrition security and poverty alleviation. In particular, the Project will: (a) review the current knowledge on the contribution of aquaculture to food and nutrition security and poverty alleviation; (b) develop methodologies for better assessment of the contribution; (c) disseminate widely the knowledge gained among countries, governments and civil society; and (d) elaborate strategies for improving the contribution of aquaculture to food and nutrition security and poverty alleviation.

SEAFDEC and FAO also signed a “Partnership Agreement Providing for Cooperation in the Preparation and Publication of the Aquatic Sciences and Fisheries Abstracts (ASFA) and for the Reconstitution of the Advisory Board” in February 2013. Under this Agreement, SEAFDEC shall serve as an international ASFA partner, and shall be responsible for the monitoring of all serials, monographs and other information emanating from its organization relevant to the scope of ASFA, and for preparing bibliographic citations, indexing and abstracts of relevant literature for input to ASFA. Under the Agreement, SEAFDEC shall also nominate one member of the ASFA Advisory Board to decide upon, and oversee the implementation of policy matters with respect to the ASFA service; and attend where possible in meetings of the Board as well as other editorial staff meetings to make recommendations to the Board.

Furthermore, TD also collaborated with the Food and Agriculture Organization of the United Nations (FAO) to launch a pilot project on “Fishing Vessel Energy Audit” in 2013. Under this project, a survey of the trawl nets was conducted in Thailand to verify fuel saving potentials and identify various energy efficiency practices.

In 2013, TD continued to serve as executing partner in the implementation of the FAO project on “Strategies for Trawl Fisheries Bycatch Management (REBYC-II CTI)” funded by the Global Environment Facility (GEF). The project, to be implemented in 2013-2017,

aimed to address the issues on by-catch from fishing operations, particularly from trawl fisheries, which create substantial impacts on the sustainability of fisheries and aquatic ecosystems of the Coral Triangle and Southeast Asian waters, by promoting sustainable fishing practices and improved trawl fisheries management.

SEAFDEC Secretariat also collaborated with FAO for the conduct of the “Workshop on Fish Passage in Southeast Asia: Principle of improved fish passage at cross-river obstacles, with relevance to Southeast Asia” on 17-20 March 2013 in Khon Kaen, Thailand. SEAFDEC also participated in and provided technical inputs to the Technical Consultation on International Guidelines for Securing Sustainable Small-scale Fisheries (20-24 May 2013, Rome, Italy).

GOVERNMENT OF SWEDEN

The Government of Sweden continued cooperation with SEAFDEC and provided funding support for the 5-year project on “Fisheries and Habitat Management, Climate Change and Social Well-being in Southeast Asia” starting 2013. The Agreement between SEAFDEC and Sweden which was signed on 5 March 2013 allows the partners to agree in actively promoting the responsible utilization of marine and aquatic resources based on due recognition of the need to maintain environmental health and conservation of critical habitats. The geographical scope targeted in the Agreement is the ASEAN with special focus on four sub-regions, namely: the Gulf of Thailand, the Andaman Sea, the Sulu-Sulawesi Seas, and the Mekong River Basin. During the implementation of this project, SEAFDEC would cooperate with key partners in the region and sub-regions, NGOs as well as agencies at national levels, in sharing good practices and resources for the implementation of activities. This cooperation is also expected to further contribute to the sustainable fisheries development of the ASEAN Community.

HOKKAIDO UNIVERSITY, JAPAN

Through the MOU between SEAFDEC/TD and Hokkaido University, staff of TD undertook study trip to the Hokkaido University campus in Hokkaido, Japan from 10 September until 31 October 2013 to take part in the cooperative research on “Environment Friendly Aquaculture and Stock Enhancement in Southeast Asia”.

INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA

TD collaborated with the International Council for the Exploration of the Sea (ICES) for the conduct of the “Mini Symposium on Impact of Fishing on the Environment” and “Meeting of the Working Group on Fishing Technology and Fish Behaviour (WGFTFB) 2013” on 6-10 May 2013 at the premises of the SEAFDEC Training Department in Samut Prakan, Thailand. The symposium devoted time to the thematic discussions on: Low Impact and Fuel Efficient Fishing (LIFE); Use of Artificial Light as a Stimulus on Fish Behaviour in Fish Capture (LIGHT); and Selectivity of Trawls in Multispecies/Crustacean Fisheries (SHRIMP). The remaining featured the business meeting of ICES working group that included sessions on specific topic groups as well as on the selection of a new ICES/WGFTFB chair, selection of chairs and Terms of Reference for the 2013 Joint Session with WGFAST and proposals for topics to be discussed in 2014.

NATIONAL AGRICULTURAL TRAINING COUNCIL, MALAYSIA

Under MOU between TD and the National Agricultural Training Council (NATC) of Malaysia, TD organized a “Tailor-made Training Course on Shipboard and Simulators Training on Navigation and Marine Simulators”, upon the request of the NATC. The training course focused on the operation of navigation and marine engineering simulators, both onshore and onboard of M.V. SEAFDEC. The shipboard training was held on 28 May-2 June, while the practical session was conducted on 3-9 May 2013.

NHA TRANG UNIVERSITY, VIETNAM

TD established cooperation with the Nha Trang University of Vietnam through the signing of a 5-year Memorandum of Understanding (MoU) on 3 May 2013 at the premises of TD in Samut Prakan, Thailand. This MoU covers the areas on: (i) staff/student exchange; (ii) joint development of collaborative research projects; (iii) joint organization of scientific and cultural events; (iv) shared conduct of training courses on the related subjects; and (v) joint issuance of certificates of shared trainings/educational programs in the future.

PHILIPPINE COUNCIL FOR AGRICULTURE, AQUATIC AND NATURAL RESOURCES RESEARCH AND DEVELOPMENT-DEPARTMENT OF SCIENCE AND TECHNOLOGY

Memoranda of Agreement were executed between AQD and the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development-Department of Science and Technology (PCAARRD-DOST) in 2013 for the implementation of 3-year programs, such as: (i) National R&D Program for the Donkey’s Ear Abalone, *Haliotis asinina*; and (ii) National R&D Program for Blue Swimming Crabs. The program for abalone aims to increase abalone production in the Philippines for domestic/export markets through refinement of existing culture technologies, while the program for blue swimming crabs is aimed at refining existing hatchery technology and developing the nursery technology.

POST-HARVEST TECHNOLOGY CENTRE, SINGAPORE

The Post-harvest Technology Center (PHTC) of the Agri-Food & Veterinary Authority (AVA), Singapore serves as the Collaborating Center of SEAFDEC to implement the activities of MFRD under the SEAFDEC regional programs, as approved by the SEAFDEC Council during its 39th Meeting in 2007. In 2013, the PHTC supported MFRD in enhancing the development of fisheries post-harvest technology in the Southeast Asian region through three regional projects, namely: 1) Biotoxins Monitoring in the ASEAN Region; 2) Utilization of Freshwater Fish for Value Added Products; and 3) Traceability Systems for Aquaculture Products.

PTT EXPLORATION AND PRODUCTION PUBLIC COMPANY LIMITED, THAILAND

While the high cost in field data collection had confined most past studies of the Gulf of Thailand to the coastal areas, the support from the PTT Exploration and Production Public Company Limited in providing cruise fuel enabled TD to undertake a 30-day research cruise using the M.V. SEAFDEC in 2013 in order to obtain understanding on the status of fishery resources and the environment of the central Gulf of Thailand. The cruise, which set off on 14 March 2013 during the post northeast monsoon season, accommodated

the cooperative works between SEAFDEC and researchers from Thailand's Department of Fisheries, Department of Marine and Coastal Resources, Pollution Control Department, a number of universities in Thailand, and the private sector through the conduct of an extensive research program as well as training of university students in marine sciences.

RESEARCH INSTITUTE FOR HUMANITY AND NATURE, JAPAN

TD is taking part in the cooperative project launched by the Research Institute for Humanity and Nature (RIHN) of Japan on "Coastal Area Capability Enhancements in Southeast Asia". With the main objective of obtaining full understanding of how people utilize the coastal resources through a "holistic approach", the project also expects to come up with guidelines for new research approach using the concept of "Area Capability". The project comprises project sites in the Philippines (Panay Island), Thailand (Rayong and Prachuap Khiri Khan Provinces) and Japan (Ishigaki Island); and project components, namely: (i) capture capability survey for coastal fisheries; (ii) biological resource survey; (iii) environment assessment and ecosystem health survey; (iv) human capability survey for coastal area; (v) development of acoustic survey equipment and systems for shallow waters; (vi) community-based set-net introduction for coastal management and HRD; (vii) community-based fishery resource rehabilitation for coastal management and rural development, and (viii) database development, workshops and wrap-up activities. TD's participation is focused on the implementation of the project components in the project sites in Thailand.

QUEENSLAND UNIVERSITY OF TECHNOLOGY, AUSTRALIA

A five-year Memorandum of Understanding between AQD and Queensland University of Technology (QUT), Australia was signed in November 2013 with the following objectives: (i) research collaboration including joint application for research funding and development of joint venture projects between SEAFDEC/AQD and QUT; (ii) organization of joint scientific activities such as courses, conferences, seminars, symposia or lectures; (iii) exchange of staff and/or students including guidance in research proposal drafting for staff and students who intend to enter science graduate programs at QUT; and (iv) exchange of materials and publications of common interest. Cooperative projects arising from the agreement will include relevant disciplines common to both SEAFDEC/AQD and QUT.

SAN MIGUEL FOODS INC., PHILIPPINES

AQD signed separate Letters of Agreement with San Miguel Foods Inc., a private company in the Philippines for implementation of the following collaborative research projects: (i) verification and demonstration of the efficiency of dietary immunostimulant on the yield of tilapia reared intensively in lake-based cages; (ii) evaluation of practical and eco-friendly supplemental feeding schedule for Nile tilapia in cages in Laguna de Bay (Philippines); (iii) verification and demonstration of the efficiency of immunostimulant-containing feeds in increasing yield of milkfish reared intensively in ponds and cages; and (iv) assessment of the impacts of feeds with immunostimulant as additive in terms of growth and survival of milkfish reared in brackishwater ponds. Under such Agreement, AQD would provide human resource expertise, technical assistance and qualified staff to perform the activities for the different stages of each project.

SOPHIA UNIVERSITY, JAPAN

AQD entered into a Memorandum of Agreement with the Faculty of Science and Technology, Department of Materials and Life Sciences of Japan's Sophia University on 25 June 2013. The two collaborating parties have mutually agreed to strengthen common interest in fostering research and training programs. It is expected that the collaboration would develop cooperative and collaborative activities in the furtherance of the common goals and objectives of AQD and Sophia University. Specifically, this would involve a conduct of short-term experiments on the reproductive physiology of seahorse at AQD by professors/researchers from Sophia University.

UNIVERSITY OF THE PHILIPPINES IN THE VISAYAS

AQD continued its collaboration with the University of the Philippines in the Visayas (UPV) through a Memorandum of Understanding (MOU) signed on 28 January 2013. This collaborative arrangement aims to: (i) develop collaborative activities in the furtherance of the common goals and objectives of AQD and UPV; (ii) undertake collaborative instruction, research, training and extension programs; (iii) promote exchange of scientists and researchers between AQD and UPV for instruction, research, training and other related activities; and (iv) strengthen the capabilities of AQD and UPV in the fields of aquaculture, fisheries, aquatic sciences and related fields through the cooperative use of materials and facilities. The collaborative activities would cover joint undertakings in research, instruction, training and extension programs of AQD and UPV.

UNIVERSITY OF TOKYO AND TOKAI UNIVERSITY, JAPAN

AQD signed an Agreement for research cooperation with two universities in Japan – the Laboratory of Global Fisheries Science, University of Tokyo and the School of Marine Science and Technology, Tokai University, to develop and implement collaborative activities as part of the research objectives of Components 3 (Environmental Assessment and Environmental Health Survey) and 7 (Community-based Stock Enhancement of Shrimps) of the collaborative project on Coastal Area Capability Enhancement in Southeast Asia spearheaded by the Research Institute for Humanity and Nature (RIHN). The Agreement also aims to exchange research findings and general knowledge regarding aquatic ecosystems and environments in the estuaries of New Washington and Batan Bay (Philippines) in order to promote their conservation and to enhance area capability of the local people. The other two institutions involved in this collaboration are the Aklan State University (Philippines) and the University of the Philippines in the Visayas.

ZOOLOGICAL SOCIETY OF LONDON-COMMUNITY-PHILIPPINES

A Memorandum of Agreement was forged between AQD and Zoological Society of London-Community-Philippines (ZSL-Philippines) on 7 November 2013. ZSL-Philippines is a non-government organization mandated to promote sustainable conservation of mangroves for the benefit of coastal communities and society as a whole. Under such Agreement, AQD conducted the training course on "Mangrove Conservation, Management and Rehabilitation" on 17-22 November 2013.

ENHANCING SEAFDEC VISIBILITY

Since its establishment, SEAFDEC has been implementing fisheries-related programs/projects that cover wide aspects of research, training and information. Starting in 2007, the SEAFDEC Secretariat and Departments made full use of the Information Strategies as guiding principles in formulating and implementing information-related activities that aim to enhance the Center's image and visibility. The Information Strategies have been developed to enhance the effectiveness of the implementation, monitoring, and reporting of the progress of SEAFDEC information-related activities.

In 2013, the progress and achievements made by SEAFDEC in the implementation of the information activities during the year were monitored and discussed during the 14th Meeting of the Information Staff Program (ISP) on 30 October-1 November 2013 in Thailand, corresponding to the five Information Strategies, as follows:

STRATEGY 1: PRODUCTION OF RELEVANT, TIMELY, AND USEFUL INFORMATION MATERIALS TO MEET THE REQUIREMENTS OF THE TARGET AUDIENCE

- Produced and disseminated 27 titles/issues of technical/scientific materials (8,980 copies produced; 3,377 copies distributed);
- Produced and disseminated 42 titles of technical/scientific articles (12 titles published in SEAFDEC publications and 30 titles published in non-SEAFDEC publications); and
- Recorded 845 queries for information through the SEAFDEC libraries, and 682 materials sold.

STRATEGY 2: RAISING SEAFDEC IMAGE AT NATIONAL, REGIONAL AND INTERNATIONAL LEVELS

- Produced and disseminated 52 titles/issues of promotional materials (34,559 copies produced; 23,762 copies distributed);
- Established and administered SEAFDEC Websites and web blocks: SEAFDEC Departmental websites received a total of 93,031 unique visitors, made 8,722 links from other websites, and recorded 85,113 annual downloads;
- Took part in eight (8) exhibitions and related events with 53,550 visitors recorded at SEAFDEC exhibition booths and displays; and
- Officially released six (6) press statements, and recorded SEAFDEC appearances (54) in public media and websites.

STRATEGY 3: ENHANCING COMMUNICATION AND INFORMATION SHARING BOTH WITHIN SEAFDEC AND WITH MEMBER AND NON-MEMBER COUNTRIES, OTHER INTERNATIONAL/REGIONAL ORGANIZATIONS, AND PUBLIC

- Continued to maintain the libraries of the SEAFDEC Secretariat and Departments, and provide library services;
- The SEAFDEC libraries acquired a total of 1,138 issues of newsletters/serial publications, 685 titles of technical publications and 19 items of audio-visual materials;
- Sustained cooperation and exchange of materials with 379 network libraries within and outside the region;



- Disseminated 56 titles (with 2,741 copies) of technical materials, and 39 titles (with 17,876 copies) of promotional materials to target groups;
- Made accessible 1,227 downloadable materials and 19 databases in SEAFDEC websites;
- Enhanced the use of e-mail systems (including e-groups) to facilitate communications both among SEAFDEC staffs and with other concerned personalities;
- Recorded a total number of 21,426 direct visitors to SEAFDEC Secretariat and Departments which had been increasing;
- Dispatched 193 SEAFDEC officials to participate in 93 events organized by other organizations (145 officials in events at regional/international levels, and 48 at national local levels);
- Organized SEAFDEC events, which include:
 - Regional/International meetings, seminars, workshops (23 meetings with a total of 1,159 participants)
 - National/local meeting, seminars, workshops, consultations (15 meetings with a total of 723 participants)
 - International/regional training courses (23 courses with a total of 248 trainees)
 - National, on-site training courses (29 courses with a total of 666 trainees)
 - Study tours (6 programs with a total of 141 trainees)
 - Internships (2 groups with 4 persons)
 - On-the-job training (3 colleges with a total of 44 students)
 - Internal meetings (22 meetings with a total of 1,555 participants);
- Facilitated the participation of officials from Member Countries to events organized by SEAFDEC:
 - Regional/International meetings, seminars, workshops (511 participants)
 - National/local meetings, seminars, workshops, consultations (440 participants)
 - International/regional training courses (191 trainees)
 - National, On-site training courses (643 trainees)
 - Study tours (7 trainees)
 - Internships (4 persons)
 - On-the-Job training (30 students);
- Established the networking and cooperation mechanisms with 71 fisheries-related organizations for the implementation of collaborative activities at national, regional and international levels; and
- Received support from other organizations and donor agencies for relevant activities in the total amount of US\$ 4,131,914 representing the non-regular sources of funds for the activities of SEAFDEC.

STRATEGY 4: STRENGTHENING SEAFDEC CAPABILITY IN INFORMATION-RELATED ACTIVITIES

- Enhanced the capabilities of the staff in information-related offices through HRD taking into account the scope and requirements of the staff, and during the annual ISP Meeting; and
- Enhanced the financial sustainability of the publication and information activities through intensified sale of technical publications and souvenir items on cost-recovery basis.

**STRATEGY 5: REGULAR MONITORING AND EVALUATION OF INFORMATION
ACTIVITIES**

- Obtaining feedback mechanism for materials produced by SEAFDEC was established for the training, research, and development transfer through communication channel, *e.g.* dedicated e-mail, etc. AQD's 40th Anniversary Celebration in 2013 also received positive feedbacks from collaborating partners as well as general recommendations (particularly on AQD's research activities) that indicated positive comments on aquaculture technologies developed; and
- Organized the Fourteenth Meeting of the SEAFDEC Information Staff Program (ISP) to monitor the implementation of information-related activities, in accordance with the Information Strategies for Enhancing SEAFDEC Visibility and Communication.

**SEAFDEC REVENUES AND EXPENDITURES IN 2013****Un-audited Abridged Consolidated Financial Statements (In US\$)**

	2013 (Un-audited)	2012 (Audited)
REVENUES		
Contributions from :-		
Member governments	7,976,372	8,119,058
Other sources	2,817,975	2,533,017
Total Revenues	<u>10,794,347</u>	<u>10,652,075</u>
EXPENDITURES		
Operating and Capital Expenditures		
Research	3,289,577	3,221,215
Training	719,843	1,053,758
Information	784,543	850,836
Collaborative	86,236	177,863
Others	661,050	412,780
Administrative	3,250,906	3,554,004
Total Expenditures	<u>8,792,155</u>	<u>9,270,456</u>
SURPLUS (DEFICIT), For the year	2,002,192	1,381,619
FUND BALANCE, Beginning of year	6,032,453 ^{1/}	5,004,647
FUND ADJUSTMENT	<u>-3,763</u>	
FUND BALANCE, End of year	<u>8,030,882</u>	<u>6,386,266</u> ^{1/}
REPRESENTED BY:		
Cash and cash equivalents	8,159,671	6,586,261
Other receivables and Advances	670,514	617,982
Supplies Inventory	87,804	62,075
Fuel oil for vessels	102,768	188,783
Prepayments	25,760	14,959
Total current assets	<u>9,046,517</u>	<u>7,470,060</u>
Reserved budget for vessel periodic maintenance	102,889	70,068
Termination indemnity fund	1,949,619	1,953,013
Other assets-Net	360,844	419,502
Total Assets	<u>11,459,869</u>	<u>9,912,643</u>
Less : Liabilities		
Accrued payable	476,074	600,655
Contribution received in advance	856,351	760,373
Funds held in trust	146,943	212,336
Provision for termination indemnity	1,949,619	1,953,013
Total Liabilities	<u>3,428,987</u>	<u>3,526,377</u>
NET ASSETS	<u>8,030,882</u>	<u>6,386,266</u>

Remark:^{1/} Difference of US\$ 353,813 is a result of change of rate in US\$ transaction

Un-audited Contribution Received by SEAFDEC from Member Countries and Other Sources of Funds for the Year 2013 (In US\$)

Sources	Secretariat	TD	MFRD	AQD	MFRDMD	Total	
						In US\$	%
Brunei Darussalam	7,000					7,000	0.07
Cambodia	6,000					6,000	0.06
Indonesia	26,000					26,000	0.24
Japan	280,000					280,000	2.59
Lao PDR	5,000					5,000	0.05
Malaysia	21,000				1,013,388	1,034,388	9.58
Myanmar	21,000					21,000	0.19
Philippines	25,000			4,004,711		4,029,711	37.33
Singapore	13,000					13,000	0.12
Thailand	20,000	2,520,273				2,540,273	23.53
Vietnam	14,000					14,000	0.13
Sub-total	438,000	2,520,273	0	4,004,711	1,013,388	7,976,372	73.89
Other Sources ^{2/}	114,110	1,141,060		1,562,805		2,817,975	26.11
Total	552,110	3,661,333	0	5,567,516	1,013,388	10,794,347	100

Remark:

^{2/} Other sources of contributions include bank interests, gain/loss from varying exchange rates, contributions from donors directly given to Departments and miscellaneous receipts.

Other Contributions Received by SEAFDEC in 2013 (In US\$)

Sources	Amount in US\$ ^{3/}
Fisheries Agency-Japan(TF-V)	704,938
Fisheries Agency-Japan (TF-VI) (excluded: Japan-MRC=US\$280,000)	934,703
Sweden	1,250,000
Total	2,889,641

Remark:

^{3/} Other sources of contribution which are not reported in the SEAFDEC Financial Statement



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