REPORT OF
THE TWENTY-NINTH MEETING OF THE PROGRAM COMMITTEE OF THE SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER

Thailand

4-6 December 2006

THE SECRETARIAT

SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER

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EXECUTIVE SUMMARY

The Twenty-ninth Meeting of the Program Committee of the Southeast Asian Fisheries Development Center (SEAFDEC) was held in Bangkok, Thailand from 4 to 6 December 2006 and hosted by the Secretariat. The objectives of the Meeting were to review the results of SEAFDEC program implementation for the year 2006, and endorse the proposed programs of activity for the year 2007. The Committee also discussed required changes to the Program Committee and its meeting arrangement resulted in the change of policy in annual contribution to SEAFDEC. The outcomes of the program scrutiny and agreed recommendations of the Committee will be submitted to the forthcoming meeting of the Council for consideration and approval.

The followings are outcomes and recommendations of the Meeting:

PROGRAM MATTERS

a.) Departmental Programs

1. With regards to the annual **Fishery Statistical Bulletin**, the Committee requested the Secretariat to explore ways to fast track the production and publication of the Bulletin.

2. The Committee urged the Member Countries to nominate their respective focal points to enable the **Regional Fisheries Policy Network** (RFPN) to function effectively, and requested the Secretariat to explore ways on how to improve the communication system for the RFPN.

3. TD was requested to incorporate a training course on monitoring, control and surveillance (MCS) both for coastal and offshore fishing into their **Training Programs** by making use of the currently available facilities at TD.

4. With regards to the **Distance Learning Program** conducting by TD in collaboration with the Australian Maritime College (AMC). TD and AMC are currently discussing the appropriate subjects, curriculum and the detailed arrangements of the program for student/researchers in the region to obtain the Degree from AMC.

5. With respect to the **Research and Development Framework** adopted by AQD in 2006, activities of AQD for 2007 would be grouped to 1) Integrated Mollusk Production, 2) Mud Crab and Shrimp Domestication Program, 3) Marine Fish Program, 4) Freshwater Aquaculture Program, 5) Seaweeds Program, and 6) Aquatic Ecology Program.

6. The Committee suggested that the programs should have more regional aspects and impact with benefits to be extended to the Member Countries.

b.) Program under the ASEAN-SEAFDEC Fisheries Consultation Group (FCG) Mechanism

7. The support to the Member Countries for implementation of the **Regionalization of the Code of Conduct for Responsible Fisheries** will be continued in 2007 with the Sida funding support through the activities under program on Human Resources Development to Support the Implementation of the developed/endorsed Guidelines.

8. With respect to the program on **Assistance in Capacity Building in the Region to Address International Trade Related Issues**, the Committee requested SEAFDEC to continue monitoring the emerging international issues that may have impact on fisheries in the region, and provide technical assistance to the Member Countries in developing a coordinated position

on the issues, particularly on the issues of Eco-labeling, Fishery Subsidies, Shrimp Embargo, Sea Cucumbers, Small-scale Fisheries, and Ecosystem Approach. SEAFDEC and Member Countries were requested to active participate in relevant international for a with the aim to develop and demonstrate a coordinated position on important issues, e.g. High Sea Bottom Trawling, Listing of shark species to CITES appendices.

Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region (2006-2010)

Component Program I: Fisheries Management

9. Under the project on **Strengthening Small-scale Fisheries Management through the Promotion of Rights-based Fisheries and Co-management** the Committee suggested that the concept of co-management should focus not only on marine fisheries, but also on inland fisheries. The project would be transferred from the Secretariat to TD starting in 2007 for harmonizing with other similar TD activities.

10. With regards to the project **Improvement of Statistics and Information for Planning and Management of Fisheries in the ASEAN Region** the Committee considered/supported the initiative to develop a **National Status and Trends of Fisheries** and the establishment of a **Regional Scientific Advisory Committee**. However, clarification on the Terms of Reference, linkages with existing regional collaborative mechanism, and financial implication and arrangements is required.

11. The Committee suggested TD, under the project on **Responsible Fishing Technologies and Practices** (Fishing in Harmony with Nature), that the Turtle Excluder Devices and Juvenile and Trash Excluder Devices models still need to be modified for practical usage and acceptable by fishers.

12. The Committee suggested that a clear demarcation between the project **Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement** of TD and the program **Stock Enhancement for Threatened Species of International Concern** of AQD should be made in order to avoid a duplication of activities.

13. Under the project on **Sustainable Utilization of Potential Fisheries Resources and Reduction of Post-harvest Losses**, the Committee stressed the importance of the future training on fish larvae identification as the knowledge on identification of small pelagic species and shared-stock is still lacking and would be useful in further promoting the fishery refugia in the region.

14. Under the project on **Use of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region,** supplementary materials for further promotion on the **use of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region** would be prepared/developed.

Component Program II: Aquaculture

15. With the respect to the project on **Development of Technologies for Sustainable Aquaculture** and **Human Capacity Building for Sustainable Aquaculture** by AQD the Committee emphasized the importance on the use of formulated fish feed in order to substitute the use of low value fish (trash fish) for aquaculture.

Component Program III: Utilization of Fish and Fishery Products

16. Due to unavailability of funds, two projects on **Quality Assurance Systems for Small and Medium-sized Fish Processing Establishments in ASEAN Member Countries** and **Utilization of Freshwater Fish in ASEAN Member Countries** were not implemented in 2006. The Secretariat and MFRD were requested to source funds to complete the implementation of the project on **Good Laboratory Quality Management in ASEAN Member Countries**.

17. The data obtained through the program on **Information Collection for Sustainable Pelagic Fisheries in the South China Sea** could be used as basis for the new proposed program on "Tagging program for economically important pelagic species in the South China Sea and the Andaman Sea". The Committee suggested that linkages between information collection and other research works on management of fisheries should be investigated.

18. The Program on **Research and Analysis of Chemical Residues and Contamination in Fish, Fish Products and the Environment such as Fishing Ground and Aquaculture Field** that formerly supported by the Japanese Trust Fund IV would be supported by the Japanese Trust Fund II in 2007 with focus on the issue of regional migratory species.

19. The Committee suggested that the Ecological Impact Assessments of the program on **Research and Development of Stock Enhancement for Species under International Concerns** should be conducted for the restocking program on endangered species particularly those that are produced from non-indigenous broodstock. The Committee also suggested that the outcome from the study on interaction between sea turtles and fishing operations should be provided to all Member Countries prior to the next COFI Meeting.

20. The activities of the program on **Capacity Improvement of Fisheries Community for Fisheries Management and Alleviation of Poverty** in Thailand and Malaysia on the issue would be terminated by the end of 2007 while the activity in Cambodia would be continued with a more regional context.

New Proposed Programs under the ASEAN-SEAFDEC FCG

21. The Committee endorsed the following new proposed programs:

- SEAFDEC-Sida Project on Support to Tsunami Rehabilitation of Affected Countries in the ASEAN Region
- SEAFDEC-Sida Cooperation for Extension/Bridging year 2007
- Quality Assurance Systems for Small and Medium-sized Fish Processing Establishments in ASEAN Member Countries
- Tagging program for economically important pelagic species in the South China Sea and Andaman Sea
- Deep Sea Fisheries Resources Exploration in the Southeast Asia (new)
- Fisheries Resource Survey and Operational Plan for M.V. SEAFDEC 2

22. With regards to the SEAFDEC-Sida project related to **human resources development for fisheries management**, the Committee suggested that capacity building should also focus on fisheries communities and institutional capacity. And the SEAFDEC-Sida project addressing the **tsunami rehabilitation** should also be coordinated with the project funded by ASEAN Foundation.

23. Regarding the **operational plan of the M.V. SEAFDEC 2**, Cambodia would withdraw the Cruise proposed for Cambodia in 2007. As a consequence, additional two cruises could be incorporated in the 2007. The operational cost of SEAFDEC in 2007 and onwards would be obtained mainly from the Member Countries through a Minimum Regular Contribution.

Japanese Trust Fund Manager was requested to consider in the support to the vessel operational cost under the existing plan.

PROPOSED CHANGES OF MODALITY AND ARRANGEMENT OF FUTURE SEAFDEC PROGRAM COMMITTEE MEETINGS

24. With regards to future SEAFDEC programming exercises due to the policy change in the annual regular contribution to SEAFDEC: the Role and Responsibility of Member Countries, Secretariat and Departments during the Inter-sessional Period; Cancellation of the Special 5-year Program Framework (not individual project); Development of ASEAN-SEAFDEC Program Thrusts; and Roles and Responsibilities at the PCM, were proposed to the Meeting.

25. Considering the implication of the change that goes beyond the future SEAFDEC programming exercises, the Committee agreed that the Secretariat should prepare a paper for consideration and decision by the Council, on the following issues:

- Roles and terms of reference of the Program Committee;
- Roles and terms of reference of the Member Countries, the Secretariat and the Departments in future programming exercises;
- Need for Program Committee Meeting or other alternative forum for the Member Countries to discuss and scrutinize priority issues of the region prior to approaching donors for program support and implementation;
- Hosting arrangement of the Program Committee Meetings or other alternative forum; and
- "Donor Consultation" as a useful mechanism for consultation among the Member Countries and respective donor agencies/countries, should be separately conducted.

COOPERATION WITH NON-MEMBER GOVERNMENTS AND INTERNATIONAL /REGIONAL ORGANIZATIONS

26. SEAFDEC was requested to assist the ASWGFi in formulating draft joint ASEAN positions on fisheries issues in the international fora. And fishery representative of each Member Country was requested to play role in providing inputs to their national trade agencies on the progress of implementation of the ASEAN Roadmap for Integration of Fisheries Sector.

27. The Committee suggested that introductory presentation on the "Follow-up actions of the Meeting of the ASEAN Sectoral Working Group on Fisheries" could be made prior to the discussion on program matters.

28. The representative from the FAO/RAP looked forward to cooperate with SEAFDEC on the issues relate to reduction of fishing capacity, fish trade, and policy on trade of fisheries and aquaculture products. SEAFDEC moving as a regional scientific advisory committee for fisheries management was also envisaged.

29. The Director-General of NACA expressed his strong determination to strengthen the collaboration between NACA and SEAFDEC on the issue of common interest, e.g. the issues on inland fisheries management, aquaculture certification, biodiversity, and animal health.

PIPELINE PROJECTS AND EMERGING NEEDS FOR PREPARATION OF FUTURE PROJECT PROPOSALS

30. The Committee took note of the efforts and provided suggestions for formulation of the programs by sourcing of potential funding supports from various donors: including ASEAN Foundation, Islamic Development Bank (IDB), Japanese Trust Funds to SEAFDEC for 2008 and onwards, and Wetland Alliance Program (WAP).

OTHER MATTERS

Review and Proposed Plan of Japanese Trust Fund (JTF) Programs

31. The Committee requested the JTF Program Manager to continue providing clear JTF scope and objectives to Member Countries for their inputs and requests for SEAFDEC future program planning.

Information Collection of Economically Important Species as Surimi Materials

32. The Committee reviewed the status of the surimi industry in Southeast Asia based on existing information available and the fisheries resources surveys conducted by the M.V. SEAFDEC 2. With this regards, MFRD could assist in the future undertaking of its activities to investigate the appropriateness of the resources for surimi production.

Other Issues

33. The Committee requested the Secretariat to make compilations of produced publications and information packages for appropriate distribution to the Member Countries.

34. Secretariat and the Departments were requested to provide program information for the program scrutiny by avoiding unnecessary scientific and technical detailed information. The Committee suggested that report on technical issues and policy recommendations could be made as a separate agenda as and when required.

35. The Committee requested the Secretariat and the Departments to ensure that invitation for participation of the Member Countries to the future training programs of SEAFDEC is also copied to the National Coordinators with the ample time for the selection and nomination of the countries' participants to the training.

36. In response to the query on the role of SEAFDEC in the ASEAN Shrimp Alliance, the Special SOM requested Thailand to provide more detailed information on the proposal for submission to the Special SOM-28th AMAF Meeting.

SEAFDEC DEPARTMENTAL PROGRAMS
FOR THE YEAR 2006-2007

Programs	Responsible Departments
Programs Implemented in the year 2006	
1. Center-Wide Information Network	Secretariat
2. Working Group on Regional Fisheries Policy (WGRFP)	Secretariat
3. Information and Communications Technology	TD
4. Integrated Mollusc Production	AQD
5. Mud Crab	AQD
6. Shrimp Domestication	AQD
7. Marine Fish	AQD
8. Small-holder Freshwater Aquaculture	AQD
9. Seaweed Strain Improvement	AQD
Programs Proposed for the year 2007	
1. Center-Wide Information Network	Secretariat
2. Information and Communications Technology	TD
3. Integrated Mollusk Production	AQD
4. Mud Crab and Shrimp Domestication	AQD
5. Marine Fish	AQD
6. Freshwater Aquaculture	AQD
7. Seaweed	AQD
8. Aquatic Ecology	AQD
9. Other R&D Activities	AQD

PROGRAMS OF ACTIVITY UNDER ASEAN-SEAFDEC FISHERIES CONSULTATIVE GROUP (FCG) MECHANISM FOR THE YEAR 2006-2007

I. Existing Programs[a]

Programs	Lead ASEAN Country	Lead SEAFDEC Depts.	2006	2007
1. Regionalization of the Code of Conduct for Responsible Fisheries[1]	Indonesia	SEC		
○ Component I: Formulation and Dissemination of the Regional Guidelines for Responsible Fisheries			✓	-
○ Component II: Human Resource Development on the Support to the Implementation of the CCRF in the ASEAN Region			✓	✓
- Fishing capacity in Southeast Asia				
- Integration of fisheries management into habitat management				
- Development or establishment of incentives or rewards for fishermen in promotion of environmentally sound and sustainable fisheries e.g. eco-labeling				
- Promotion of regional and sub-regional agreements on fisheries and aquatic/coastal environmental management				
- Fisheries/environmental management together with increasing of efforts to find a balance between large and small-scale fisheries in managing the fishing capacity				
- Integration of local knowledge and local organization in planning process				
2. Assistance of Capacity Building in the Region to Address International Trade Related Issues[2]	Thailand	SEC	✓	✓
3. Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region (2006-2010)				
○ Component I: Fisheries Management				
3.1 Strengthening Small-scale Fisheries Management through the Promotion of Rights-based Fisheries and Co-management	Indonesia	SEC	✓	✓

[1] The program is scheduled to end by the year 2006; however the activities under Component II of the program have been extended until the year 2007.
[2] The program was formerly referred to as 'Fish Trade and Environment'; the new title has been endorsed since 2005.

3.2 Improvement of Fishery Statistics and Information for Planning and Management of Fisheries in the ASEAN Region	Thailand	SEC	✓	✓[b]
3.3 Responsible Fishing Technologies and Practices (Fishing in Harmony with Nature)	Thailand	TD	✓	✓
3.4 Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement	Thailand	TD	✓	✓[b]
3.5 Sustainable Utilization of Potential Fisheries Resources and Reduction of Post-harvest Losses	Thailand	TD	✓	✓
3.6 The Use of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region	Malaysia	MFRDMD	✓	✓[b]
3.7 Development of Integrated Inland Fisheries Management in ASEAN Countries	Malaysia	MFRDMD	✓	✓[b]
○ Component II: Aquaculture				
3.8 Development of Technologies for Sustainable Aquaculture	Philippines	AQD	✓	✓
3.9 Human Capacity Building for Sustainable Aquaculture	Philippines	AQD	✓	✓
○ Component III: Utilization of Fish and Fishery Products				
3.10 Quality Assurance Systems for Small and Medium-sized Fish Processing Establishments in ASEAN Member Countries	Singapore	MFRD	✓	✓
3.11 Utilization of Freshwater Fish in ASEAN Member Countries	Singapore	MFRD	✓	-[c]
3.12 Good Laboratory Quality Management in ASEAN Member Countries	Singapore	MFRD	✓	-[c]
4. Information Collection for Sustainable Pelagic Fisheries in the South China Sea (in collaboration with TD and MFRD)	Cambodia	MFRDMD	✓	-
5. Environmental Related Tasks in Southeast Asia (in collaboration with the Departments)[3]	Malaysia	SEC	✓	✓
6. Establishment of Disease Surveillance System of Aquatic Animals	Philippines	AQD	✓	✓
7. Chemical and Drug Residues in Fish and Fish Products in Southeast Asia	Singapore	MFRD	✓	✓
8. Research and Development (R&D) of Stock Enhancement for Species under International Concerns	Philippines	AQD	✓	✓

[3] The program was formerly referred to 'Management of Fisheries and Utilization of Shark in Southeast Asia'(2002-2006 in Japan fiscal year), the new titled has been endorsed since 2005

9. Research for Stock Enhancement of Sea Turtles (in collaboration with TD)[4]	Malaysia	MFRDMD		✓
10. Capacity Improvement of Fisheries Community for Fisheries Management and Alleviation of Poverty ○ Component I: Follow-up of the on-going projects ○ Component II: Extension of the project concept to other Member Countries ○ Component III: International Training Course on Coastal Fisheries Management for Fishery Managers	Thailand	TD	✓	✓
11. Human Resource Development (HRD) for Sustainable Development of Fisheries in Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA) Region (in collaboration with the Departments)[5]	-	SEC	✓	-

[a] The programs have been endorsed at the 8th Meeting of ASEAN-SEAFDEC FCG, 38th Meeting of SEAFDEC Council, and the 14th Meeting of ASWGFi.
[b] Some part of activities is on going and to be implemented in the year 2007 based on the availability of fund.
[c] The programs are deferred until funding is available.

IX.

[4] The program was formerly under component II of the program 'Research and Development (R&D) of Stock Enhancement for Species under International Concerns', in order to follow-up the progress initiatives on 'Conservation and Management of Sea Turtles in Southeast Asian Countries' in 2004. The program is proposed to entitle as appears in the table in the year 2007.
[5] The program started since 2005 but did not report under the ASEAN-SEAFDEC FCG mechanism. The program is expected to complete by early 2007.

II. Proposed New Programs for the Year 2007

Programs	Lead ASEAN Country	Lead SEAFDEC Depts.
12. SEAFDEC-Sida Project on Support to Tsunami Rehabilitation of Affected Countries in the ASEAN Region	TBD (*To be decided*)	SEC
13. Fisheries Resource Survey and Operational Plan for M.V. SEAFDEC 2	TBD	TD
14. Tagging Program for Economically Important Pelagic Species in the South China Sea and Andaman Sea (in collaboration with TD)	TBD	MFRDMD
15. Deep Sea Fisheries Resources Exploration in the Southeast Asia (in collaboration with MFRDMD)	TBD	TD

CONTENTS

ANNEXES

REPORT OF THE TWENTY-NINTH MEETING OF THE PROGRAM COMMITTEE SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER

BANGKOK, THAILAND
4-6 December 2006

I. INTRODUCTION

1. The Twenty-ninth Meeting of the Program Committee of the Southeast Asian Fisheries Development Center (SEAFDEC) was held in Bangkok, Thailand from 4 to 6 December 2006 and hosted by the Secretariat. The Meeting was attended by the National Coordinators from Brunei Darussalam, Cambodia, Indonesia, Japan, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam as members of the Program Committee together with their respective delegates. The SEAFDEC Secretary-General, Deputy Secretary-General, Department Chiefs and Deputy Chiefs as *ex-officio* members attended the Meeting together with officers from the Secretariat and the Departments. The Meeting was also attended by the representatives from the ASEAN Secretariat, Food and Agriculture Organization of the United Nations/Regional Office for Asia and the Pacific (FAO/RAP), and the Network of Aquaculture Centres in Asia-Pacific (NACA). The list of participants appears as **Annex 1**.

II. OPENING OF THE MEETING

2. The Secretary-General of SEAFDEC, Dr. Siri Ekmaharaj, in his capacity as Chairman of the Program Committee, welcomed the participants and observers to the Meeting. He emphasized the importance of the Program Committee Meeting to scrutinize SEAFDEC past year and future programs, to ensure the efficiency and effectiveness of the program planning and implementation, and to strengthen the cooperation and partnership between SEAFDEC and other international/regional organizations in the sustainable development of fisheries in the region. He then declared the Meeting open. His opening address appears as **Annex 2**.

III. ADOPTION OF THE AGENDA

3. The Agenda of the Meeting, which appears as **Annex 3**, was adopted.

IV. SCRUTINY OF SEAFDEC PROGRAMS OF ACTIVITY FOR THE YEAR 2006-2007

4. The Committee scrutinized the SEAFDEC programs of activity for the year 2006-2007 as presented by the Secretariat and the Departments comprising a) Departmental Programs (**Annex 4**) and b) Programs under the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) Mechanism (**Annex 5**).

5. The Committee expressed its appreciation on the accomplishments made by the Secretariat and the Departments and endorsed the results of the program implementation in 2006. The Committee also endorsed the program proposals for the year 2007 after accommodating their suggestions.

4.1 Departmental Programs

6. With regards to the annual Fishery Statistical Bulletin, the Committee requested the Secretariat to explore ways to fast track the production and publication of the Bulletin, and to ensure that the statistics are compiled as correctly and completely as possible.

7. The Committee noted that the program on Working Group on Regional Fisheries Policy (WGRFP) has been converted to the SEAFDEC Regional Fisheries Policy Network (RFPN) as decided at the 38th Meeting of SEAFDEC Council. The RFPN is envisaged to play an important role in providing advice and inputs for the formulation of regional fisheries policy on important regional issues. Considering the limited number of the representatives in the RFPN, the Committee urged the Member Countries to nominate their respective focal points to enable the network to function effectively. While noting the difficulty faced in working through e-mail communication among the RFPN virtual members, the Committee requested the Secretariat to explore ways on how to improve the communication system for the network.

8. The Committee also requested TD to incorporate a training course on monitoring, control and surveillance (MCS), both for coastal and offshore fishing, into their training program making use of the currently available equipment at TD.

9. With regards to the distance learning program to be conducted by TD in collaboration with the Australian Maritime College (AMC), the Meeting noted that the program would provide opportunity for officers or students from the Southeast Asian countries to obtain their Masters Degree from AMC. By attending one semester course at AMC, one semester study at TD based on existing competencies, and another semester conducting a research project either at TD or in respective countries, one can already complete a course. Currently, TD and AMC are discussing the appropriate subjects, curriculum and the detailed arrangements for the program.

10. The Committee was informed on the new Research and Development Framework recently adopted by AQD in 2006. The activities of AQD for 2007 would be grouped to 1) Integrated Mollusk Production, 2) Mud Crab and Shrimp Domestication Program, 3) Marine Fish Program, 4) Freshwater Aquaculture Program, 5) Seaweeds Program, and 6) Aquatic Ecology Program. Along this line, each project would comprise and cut-across activities in research, technology generation, and training and information aspects.

11. The Committee highlighted the increasing importance of issues on aquaculture and environment, e.g. eco-labeling issue, fish meal replacing diet, and bio-security, as aquaculture is envisaged to reduce the pressure on capture fisheries in the long run.

12. In scrutinizing the future Departmental Programs, the Committee suggested that the programs should have more regional aspects and impact with benefits to be extended to the Member Countries.

4.2 Programs under the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) Mechanism

4.2.1 Existing Programs under the ASEAN-SEAFDEC Fisheries Consultative Group (FCG)

- **Regionalization of the Code of Conduct for Responsible Fisheries in Southeast Asia**

13. The Committee commended SEAFDEC for the success in implementing the program on the Regionalization of the Code of Conduct for Responsible Fisheries, which has tremendously contributed to the development of fisheries in the region, and acknowledged the completion of the program by the end of 2006. However, it was noted that dissemination of the Regional Guidelines and support to Member Countries in the implementation of the Guidelines would still be continued. The Guidelines would also be used as basis for the formulation of SEAFDEC programs that will address important issues contained in the Guidelines, e.g. Management of Fishing Capacity, IUU fishing.

14. The Committee also took note of the Component on Human Resources Development to support the implementation of the Guidelines, which would be continued with funding support from the Swedish International Development Cooperation Agency (Sida). In this connection, the Committee Member from Vietnam requested that the activities be continued in Vietnam in 2007 considering the usefulness of the HRD activities, which was conducted for local officers of Vietnam in 2006.

- **Assistance in Capacity Building in the Region to Address International Trade Related Issues**

15. The Committee acknowledged the importance of the Program on Assistance in Capacity Building in the Region to Address International Trade Related Issues, and expressed its appreciation to SEAFDEC for supporting the participation of representatives from Member Countries in relevant international fora, e.g. AEG-CITES in November 2006.

16. The Committee encouraged SEAFDEC to continue monitoring the emerging international issues that may have impact on fisheries in the region, and provide technical assistance to the Member Countries in developing a coordinated position on the issues. In particular, the Committee identified some of the important issues that SEAFDEC should carefully consider, e.g. Eco-labeling, Fishery Subsidies, Shrimp Embargo, Sea Cucumbers, Small-scale Fisheries, and Ecosystem Approach. In addition, issues on aquaculture and inland fisheries should also be addressed in addition to the issues on marine capture fisheries.

17. The Committee stressed the important role of SEAFDEC in providing assistance and up-to-date information on emerging issues to the Member Countries, including the position paper of other countries on specific issues. In addition, the Committee encouraged SEAFDEC and the Member Countries, particularly from fisheries-related agencies, to take a more active participation in relevant international fora, and develop and demonstrate a coordinated position on important issues, e.g. High Sea Bottom Trawling, Listing of shark species to CITES appendices.

- **Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region (2006-2010)**

Component Program I: Fisheries Management

- Strengthening Small-scale Fisheries Management through the Promotion of Rights-based Fisheries and Co-management

18. The Committee suggested that the concept of co-management should focus not only on marine fisheries, but also on inland fisheries. The Committee Member from Thailand also informed the Committee that Thailand has successfully translated the Regional Guidelines for Co-Management Using Group User Rights for Small-scale Fisheries into the Thai language and distributed to concerned institutions for implementation. In addition, the Committee noted that the project would be transferred from the Secretariat to TD starting in 2007 in order that this would be harmonized with other TD activities of similar nature.

- Improvement of Statistics and Information for Planning and Management of Fisheries in the ASEAN Region

19. The Committee acknowledged the importance of fishery statistics and information for development planning and management of fisheries, and suggested that the fishery statistics, not only for marine but also for inland waters and aquaculture should be strengthened. The Committee supported the initiative to develop a national Status and Trends of Fisheries (STF) to support fisheries planning and management at the national level, and facilitate data exchange and sharing in the region. The Committee also supported the on-going harmonization of statistical standards and streamlining the exercise for statistics reporting from the Member Countries to FAO and SEAFDEC, which could contribute to improvement of the future annual Fishery Statistical Bulletins.

20. The Committee considered the concept of establishing a Regional Scientific Advisory Committee, but noted with reservation the proposal of Malaysia. However, the Committee requested that such proposal should be further elaborated for thorough review by the Member Countries. In particular, the Terms of Reference, linkages with existing regional collaborative mechanism, and financial implication and arrangements need to be clarified.

- Responsible Fishing Technologies and Practices (Fishing in Harmony with Nature)

21. The Committee expressed its appreciation on the activities of TD on the experiments and demonstration of TEDs and JTEDs that have been extended to the Member Countries and which have provided positive results. TD was encouraged to continue the activities in the future. However, the Committee suggested that the TEDs and JTEDs model still need to be further modified to make them more practical in handling and storage, and make them more acceptable for adoption by the fishermen. This would also include a cost-benefit study of the TEDs and JTEDs to facilitate the future promotion of the device in the Member Countries.

- Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement

22. The Committee suggested that a clear demarcation between the project on “Resource Enhancement” conducted by TD and the program on “Stock Enhancement for Threatened Species of International Concern” of AQD should be made. In this connection, TD was asked to adjust its proposal for the year 2007 in order to avoid a duplication of the scope of activities with those of AQD.

- Sustainable Utilization of Potential Fisheries Resources and Reduction of Post-harvest Losses

23. The Committee took note of the project activities in data collection and analysis on potential fisheries resources (large pelagic and demersal resources) in the EEZ of Member Countries, focusing on the untrawlable and offshore areas; development of regional database; development of on-board fish handling and preservation technology; and training on fish larvae identification. The Committee also stressed the importance of the training on fish larvae identification, as the knowledge on identification of small pelagic species and shared-stock is still lacking and would be useful in further promoting the fishery refugia in the region.

- The Use of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region

24. The Committee took note of this Project as a continuation of the project on "Identification of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region" (Special 5-year Program on Sustainable Fisheries for Food Security in the Region, 2002-2005). Under the Project, the "Regional Guidelines on the Use of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region" has been developed and disseminated. Supplementary materials would be prepared and disseminated to promote the use of indicators in fisheries management.

Component Program II: Aquaculture

25. The Committee took note with appreciation the implementation of the project on "Development of Technologies for Sustainable Aquaculture" and "Human Capacity Building for Sustainable Aquaculture" by AQD. The activities undertaken under the two projects covered the scopes of Freshwater Aquaculture of Indigenous Species; Integrated Aquaculture System; Coastal Aquaculture and Mariculture; and Captive Broodstock Development.

26. The Committee also emphasized the importance on the use of formulated fish feed in order to substitute the use of trashfish for aquaculture.

Component Program III: Utilization of Fish and Fishery Products

- Quality Assurance Systems for Small and Medium-sized Fish Processing Establishments in ASEAN Member Countries

27. The Committee took note of the Project Planning Meeting conducted and hosted by Singapore in March 2006 instead of the other planned activities, which were not implemented due to unavailability of funds. The Committee also took note of the proposal that the planned activities would be conducted in 2007 with funding support from the Japanese Trust Fund.

- Utilization of Freshwater Fish in ASEAN Member Countries

28. The Committee took note of the project, which was not be implemented in 2006 due to unavailability of funds, and suggested that the implementation of the proposed project be deferred until funding is available.

- Good Laboratory Quality Management in ASEAN Member Countries

29. The Committee took note of progress and outcomes of the project. However, due to unavailability of funds, the Committee suggested that the project would be deferred and requested the Secretariat and MFRD to source funds in order to complete the implementation of the project.

- **Information Collection for Sustainable Pelagic Fisheries in the South China Sea**

30. The Committee, while noting the completion of project by the end of 2006, emphasized the importance of the utilization of collected data and information for fisheries management. In response, the Committee was informed that the data obtained through the program could be used as basis for the new proposed program on "Tagging program for economically important pelagic species in the South China Sea and the Andaman Sea". Appropriate data management software and database could also be developed through the program to promote data usage for fisheries management by the Member Countries.

31. In developing similar initiatives in the future, the Committee suggested that linkages between information collection and other research works and management of fisheries should be investigated and developed. This is to make sure that the results of such undertaking be fully utilized and used as basis for improved fisheries management in the region.

- **Research and Analysis of Chemical Residues and Contamination in Fish, Fish Products and the Environment such as Fishing Ground and Aquaculture Field**

32. The Committee was informed that the Program (formerly supported by the Japanese Trust Fund IV), would be supported by the Japanese Trust Fund II in 2007, but with focus on the issue of regional migratory species. In this regard, MFRD would further consult with the Trust Fund Manager to adjust the priority activities to focus on the analysis for fisheries products.

- **Research and Development (R&D) of Stock Enhancement for Species under International Concerns**

33. The Committee suggested that the Ecological Impact Assessments should be conducted for the restocking program on endangered species particularly those that are produced from non-indigenous broodstock.

34. The Committee expressed the importance of the study on the interaction between sea turtles and fishing operations (e.g. purse seine, pelagic and bottom vertical longline, gillnet, FADs, illegal fishing targeting on sea turtles), and suggested that the outcome from this study should be provided to all Member Countries prior to the next COFI Meeting in order that this could be presented to the COFI Meeting. TD informed the Committee that the Preliminary Report would be available by the next COFI Meeting, and the full report is expected to be published in 2007.

35. The Committee was informed on the study conducted by TD to compare the use of J-hook and Circle Hook in pelagic longline fisheries. The result shows that Circle hook, as compared to J-hook, has higher catch rate of target species and lower by-catch.

36. The Committee Member from the Philippines informed the Committee of the experiment on the use of Circle Hook to reduce sea turtle by-catch from longline fisheries; and that in 2007 a commercial operator from the Philippines would apply the use of the Circle Hook in the actual operation, which is also expected to provide useful information.

- **Capacity Improvement of Fisheries Community for Fisheries Management and Alleviation of Poverty**

37. The Committee was informed that the activities in Thailand and Malaysia would be terminated by the end of 2007 while the activity in Cambodia would be continued with a more regional context.

4.2.2 <u>New Proposed Programs under the ASEAN-SEAFDEC Fisheries Consultative Group (FCG)</u>

38. The Committee considered and endorsed the following new proposed programs to be placed under the ASEAN-SEAFDEC FCG Mechanism, and also provided corresponding comments for the finalization of the proposals.

- SEAFDEC-Sida Project on Support to Tsunami Rehabilitation of Affected Countries in the ASEAN Region
- SEAFDEC-Sida Cooperation for Extension/Bridging year 2007
- Quality Assurance Systems for Small and Medium-sized Fish Processing Establishments in ASEAN Member Countries
- Tagging program for economically important pelagic species in the South China Sea and Andaman Sea
- Deep Sea Fisheries Resources Exploration in the Southeast Asia (new)
- Fisheries Resource Survey and Operational Plan for M.V. SEAFDEC 2

39. With regards to the SEAFDEC-Sida project related to human resources development for fisheries management, the Committee suggested that capacity building should not focus only on individual fishers, but also on the fisheries communities and institutional capacity, in order to sustain the initiatives of the project. The SEAFDEC-Sida project addressing the tsunami rehabilitation should also be coordinated with a similar project to be funded by the ASEAN Foundation.

40. Regarding the operational plan of the M.V. SEAFDEC 2, the Committee took note and supported the cruise plan for 2007 to be undertaken in Myanmar, Thailand, Cambodia, Indonesia, and the Philippines under a cost-sharing basis. However, the Committee Member from Cambodia informed the Meeting that Cambodia would withdraw the Cruise proposed for Cambodia in 2007 due to financial constraints. As a consequence, TD informed the Committee that additional two cruises could be incorporated in the 2007 Cruise Plan, and requested Member Countries to submit their proposals by the end of December 2006.

41. The Committee Member from the Philippines, suggested that the Cruise to be conducted in the Celebes Sea of the Philippines should also involve Indonesia, as part of the Celebes Sea is under Indonesian waters; and the resources survey should cover the whole Celebes Sea.

42. The Committee took note of the financial situation of SEAFDEC, specifically that in the year 2007, the operational cost of SEAFDEC would be obtained mainly from the Member Countries through a Minimum Regular Contribution (MRC). The MRC would be used for the operation of the Secretariat and operation and maintenance of M.V. SEAFDEC 2. However, as the provision of MRC has been confirmed only by some of the Member Counties, confirmation from all Member Countries on this matter is envisaged as this is critical for the operation of the Vessel in 2007.

43. The Committee requested the Japanese Trust Fund for the possibility of providing some financial support for the operation of the M.V. SEAFDEC 2 from the Trust Fund. In this regard, the Committee Member from Japan informed the Committee on the possibility of the JTF covering part of the operation cost under the existing plan, excluding the cost of insurance and maintenance. However, it was also emphasized that the principle of cost-sharing by Member Countries needs to be maintained for the operation of the vessel within the EEZs of respective countries.

V. PROPOSED CHANGES OF MODALITY AND ARRANGEMENT OF FUTURE SEAFDEC PROGRAM COMMITTEE MEETINGS

44. The Committee was informed of the policy change in the annual regular contribution to SEAFDEC, and its implication on future SEAFDEC programming exercises and that most of the regional programs under the ASEAN-SEAFDEC FCG Mechanism would depend on donors' support. In response to this, the Role and Responsibility of Member Countries, Secretariat and Departments during the Inter-sessional Period; Cancellation of the Special 5-

year Program Framework (not individual project); Development of ASEAN-SEAFDEC Program Thrusts; and Roles and Responsibilities at the PCM, were proposed.

45. Considering the implication of the policy change in the annual regular contribution that goes beyond the future SEAFDEC programming exercises, the Committee agreed that the Secretariat should prepare a paper for consideration and decision by the Council, on the following issues:

- Roles and terms of reference of the Program Committee
- Roles and terms of reference of the Member Countries, the Secretariat and the Departments in future programming exercises
- Need for PCM or other alternative forum for the Member Countries to discuss and scrutinize priority issues of the region prior to approaching donors for program support and implementation;
- Hosting arrangement of the PCMs or other alternative forum; and
- "Donor Consultation" as a useful mechanism for consultation among the Member Countries and respective donor agencies/countries, should be separately conducted.

VI. COOPERATION WITH NON-MEMBER GOVERNMENTS AND INTERNATIONAL/REGIONAL ORGANIZATIONS

46. The representative from the ASEAN Secretariat informed the Committee on the current ASEAN cooperation activities in fisheries, focusing on the outcomes from the 14th Meeting of the ASEAN Sectoral Working Group on Fisheries, where the SEAFDEC activities under the ASEAN-SEAFDEC FCG Mechanism were acknowledged. In addition, important SEAFDEC-related issues discussed at the Meeting included activities on avoiding overcapacity in fisheries, tsunami project (coastal rehabilitation and early warning system), and establishment of ASSP. In addition, the 14th Meeting of ASWGFi also expressed appreciation to SEAFDEC in monitoring the issues of international concerns to the fisheries sector, and requested SEAFDEC to assist the ASWGFi in formulating draft joint ASEAN positions on fisheries issues in the international fora for presentation and discussion at future ASWGFi meetings.

47. He also informed the Committee that ASSP, including its Terms of Reference, Scope and Cooperation Mechanism, has now been endorsed by the 28th Meeting of the ASEAN Ministry on Agriculture and Forestry (AMAF) in November 2006.

48. He also highlighted the ASEAN important initiative, i.e. the ASEAN Roadmap for Integration of Fisheries Sector and the ASEAN Charter, and encouraged SEAFDEC and Member Countries to consider these two initiatives and the overall priority economic sectors of the ASEAN in the formulation of future project proposals. In this connection, the Committee Member from Malaysia requested the fisheries representative in each country to play active role in providing inputs to national trade agencies on the progress of implementation of the ASEAN Roadmap for Integration of Fisheries Sector.

49. The Committee suggested that in the future conduct of PCMs, introductory presentation on the "Follow-up actions of the Meeting of the ASEAN Sectoral Working Group on Fisheries" could be made prior to the discussion on program matters, in order that relevant information could be considered when scrutinizing the SEAFDEC programs.

50. The representative from the FAO/RAP congratulated SEAFDEC for the progress of its activities in the Southeast Asian region, and noted the active participation of SEAFDEC in various FAO fora including the Meeting of Regional Fisheries Bodies (RFBs). FAO looked forward to cooperating with SEAFDEC in issues relating to reduction of fishing capacity, fish trade, and policy on trade of fisheries and aquaculture products. FAO also looked forward to see SEAFDEC moving as a regional scientific advisory committee for fisheries management. FAO

would continue to work alongside and support the future activities of SEAFDEC. His statement appears as **Annex 6**.

51. The Director-General of NACA expressed his strong determination to strengthen the collaboration between NACA and SEAFDEC in the future on the issue of common interest, and for the better well-being of the poor, e.g. the issues on inland fisheries management, aquaculture certification, biodiversity, and animal health. He made a suggestion that NACA and SEAFDEC could collaborate in developing a consortium of Universities permitting credit transfers, to deliver relevant courses in the region, at a lower price The collaboration is envisaged to enhance implementation of these activities in a more effective manner, and could possibly attract more donors to support the implementation of these activities in the region.

VII. PIPELINE PROJECTS AND EMERGING NEEDS FOR PREPARATION OF FUTURE PROJECT PROPOSALS

52. The Committee took note of the on-going progress and commended the Secretariat and the Departments for their efforts in formulating programs and sourcing of potential funding supports from various donors (**Annex 7**), including the ASEAN Foundation, the Islamic Development Bank (IDB), the Japanese Trust Funds to SEAFDEC for 2008 and onwards, and Wetland Alliance Program (WAP).

53. However, before proceeding with such undertakings, the Committee provided the following comments and suggestions:

- Program thrusts should be developed as guidelines for the Committee to consider the pipeline projects;
- Project on poverty alleviation should focus not only on coastal community but also the inland areas;
- The project on FOVOP and poverty alleviation are supplemental with each other, thus linkages on these two activities should be made;
- As many countries have been promoting OVOP as one of their national policies, the project title should be modified in order not to duplicate the national initiatives, and should consider FOVOP as one of the project components;
- AQD project on Institutional Capacity Development, should not only involve selected countries, but should also open to all SEAFDEC Member Countries, and the level of implementation should also be at the policy and planning levels;
- Practicality of the outcomes from the project on Indicators should be verified in real situations;
- In the implementation of activities, close coordination with Host Countries (e.g. Council Directors and National Coordinators), should be made; and
- The programs to be supported by the Japanese Trust Fund should include program justification in line with the existing scope of the Trust Funds. Japan would further communicate with the Secretariat and Departments to consider incorporating the suggestion in the proposed project under the JTF in 2008 and beyond.

VIII. OTHER MATTERS

8.1 Review and Proposed Plan of Japanese Trust Fund (JTF) Programs

54. The Committee took note of the overview of the framework, budget scale, and work plan of the SEAFDEC Japanese Trust Fund projects (**Annex 8**) as presented by the SEAFDEC JTF Manager. Up to the present, four Japanese Trust Funds have been granted to SEAFDEC and implemented under the ASEAN-SEAFDEC FCG Mechanism.

55. The Committee was also informed that the JTF Programs for the year 2007 and onwards would accommodate, within a limited budget, the requests of the ASEAN Member Countries that are in line with the objectives and scope of the projects under the Japanese Trust Fund. The Committee noted that the scope of the Japanese Trust Fund has been used as basis for the formulation of the programs. In this connection, the Committee requested the JTF Program Manager to continue providing clear JTF scope and objectives as basis for the Member Countries to provide their inputs and requests for future program planning.

56. The representative from Japan informed the Committee on the Japanese Official Development Assistance (ODA) policy and that the ODA should be basically implemented under the JICA framework as bi-lateral cooperation, and there must be clear reasons for the Fishery Agency to provide the ODA. While JICA's assistance is bilateral and for humane purposes, the ODA to be provided by the Fisheries Agency should be multi-lateral so as to provide benefit not only to developing countries but also to Japanese fisheries sector or consumers. The Committee also noted the increasing concerns of Japan on the usefulness and effectiveness of the ODA programs.

8.2 Information Collection of Economically Important Species as Surimi Materials

57. The Committee took note of the presentation made by TD, which appears as **Annex 9**. The presentation reviewed the status of the surimi industry in Southeast Asia based on existing information available and the fisheries resources status in the region based on the results of the fisheries resources surveys conducted by the M.V. SEAFDEC 2 and the national fisheries resources surveys.

58. MFRD informed the Committee that the Department could assist TD in the future undertaking of its activities to investigate the appropriateness of the resources harvested by M.V. SEAFDEC 2 for surimi production.

8.3 Other Issues

59. While noting that a wide range of publications and information packages have been produced by the Secretariat and the Departments, the Committee requested the Secretariat to make a compilation of these publications for appropriate distribution to the Member Countries.

60. In scrutinizing the SEAFDEC programs of activity in the future, the Committee requested the Secretariat and the Departments to provide and present program information that is required for the program scrutiny avoiding unnecessary scientific and technical detailed information. Report on technical issues and policy recommendations could be made as a separate agenda as and when required.

61. In ensuring appropriate arrangement for future SEAFDEC training programs, the Committee requested the Secretariat and the Departments to ensure that invitation to the training is also copied to the National Coordinators (NCs). The Committee also requested that ample time should be provided for the selection and nomination of the countries' participants to the training.

62. In response to the query of the Committee Member from Singapore on the role of SEAFDEC in the ASEAN Shrimp Alliance, the Committee Member from Thailand stated that Thailand proposed an initiative in establishing the ASEAN Shrimp Alliance during the Special SOM-27th AMAF Meeting. The Special SOM requested Thailand to provide a more detailed information on the proposal for submission to the Special SOM-28th AMAF Meeting.

63. The representative from Japan informed the Committee that from 29 January-9 February 2007, a mission from Japan would visit SEAFDEC in Thailand in order to investigate the ODA assistance and the M.V. SEAFDEC 2 provided to SEAFDEC. Japan would further communicate with the Secretariat and would provide more detailed information and discuss the required arrangements for the mission.

IX. RECOMMENDATIONS OF THE TWENTY-NINTH MEETING OF THE PROGRAM COMMITTEE

9.1 Adoption of Report of the Meeting

64. The Committee adopted the report of the Twenty-ninth Meeting on 6 December 2006, which would be submitted to the next SEAFDEC Council meeting and high authority of ASEAN through the ASEAN-SEAFDEC Fisheries Consultative Group (FCG).

9.2 Date and Venue of the Thirtieth Meeting of the Program Committee

65. While noting that arrangement of future Program Committee meetings would be discussed and decided at the next Council meeting, the Chief of AQD expressed his Department's willingness to host the Thirtieth Meeting of the Program Committee in the Philippines. He would further seek the guidance of the Secretariat in finalizing the schedule and related arrangements for the Meeting including the date and venue of the Meeting.

X. CLOSING OF THE MEETING

66. In his Closing Remarks, SEAFDEC Secretary-General, Dr. Siri Ekmaharaj, in his capacity as Chairman of the Program Committee, thanked the Committee Members and observers for their active participation and contributions to the Meeting. He expressed his appreciation to the meeting secretariat staff for their efforts in making the Meeting a success. He then declared the Meeting closed. His closing address appears as **Annex 10**.

Annex 1

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Annex 2

OPENING STATEMENT

By Dr. Siri Ekmaharaj, SEAFDEC Secretary-General

Distinguished Members of SEAFDEC Program Committee,
Deputy Secretary-General,
SEAFDEC Department Chiefs, and Senior Officials,
Representatives from Partner Organizations,
Ladies and Gentlemen,

Good morning and welcome all of you to the Twenty-ninth Meeting of SEAFDEC Program Committee.

The Program Committee is a subsidiary body of the Council responsible for scrutinizing SEAFDEC programs of activity to ensure that they match with the needs of the Member Countries and implement in efficient and effective manner.

The year 2006 has brought about important challenges that would influence SEAFDEC programming exercises. Firstly is the policy change in annual contribution to SEAFDEC, which starting in 2007 onwards all SEAFDEC programs of activity will be funded by irregular funding sources. Secondly is the progress in the ASEAN-SEAFDEC Strategic Partnership arrangement. These would imply that future SEAFDEC programs would need to be adjusted so as to ensure their relevance to the needs of the Member Countries and impacts to sustainable development of fisheries in the region. This Program Committee Meeting is therefore vitally important not only in terms of scrutinizing annual work programs but also setting the tone and trends of future work of SEAFDEC.

Presentation and discussion during this meeting would not only be SEAFDEC Programs but include also reviews and presentation of the current and future cooperation with ASEAN and other International/Regional Organizations to strengthen our future collaboration and partnership in sustainable development of fisheries in the region.

The programs, proposals and results considered by the Committee, together with its recommendations, will be submitted to the forthcoming Council Meeting for final endorsement through the ASEAN-SEAFDEC Fisheries Consultative Group Meeting, which from this year onward will be held back-to-back with this Program Committee Meeting.

Now, ladies and gentlemen, may I request your utmost concentration to make this meeting a partway to even grater success in the year ahead of us. There is much to discuss and our time together is short so I shall waste no more time and declare this Meeting open.

Thank you.

Annex 3

AGENDA

Agenda 1 Opening of the Meeting

Agenda 2 Adoption of Agenda and Arrangement of the Meeting

Agenda 3 Review of SEAFDEC Program Implementation for the Year 2006 and Proposed Programs for the Year 2007

3.1 Departmental Programs[1]
- 3.1.1 Secretariat
- 3.1.2 Training Department
- 3.1.3 Aquaculture Department

3.2 Programs under ASEAN-SEAFDEC Fisheries Consultative Group (FCG) Mechanism
- 3.2.1 Secretariat
- 3.2.2 Training Department
- 3.2.3 Marine Fisheries Research Department
- 3.2.4 Aquaculture Department
- 3.2.5 Marine Fishery Resources Development and Management Department

Agenda 4 Proposed Changes of Modality and Arrangement of Future SEAFDEC Program Committee Meetings

Agenda 5 Pipeline Projects and Emerging Needs for Preparation of Future Project Proposals

Agenda 6 Cooperation with Non-Member Government and International/Regional Organizations

Agenda 7 Other Matters

Agenda 8 Recommendations of the Twenty-ninth Meeting of the Program Committee
8.1 Adoption of Report of the Meeting
8.2 Date and Venue of the Thirtieth Meeting of the Program Committee

Agenda 9 Closing of the Meeting

[1] Marine Fisheries Research Department (MFRD) and Marine Fishery Resources Development and Management Department (MFRDMD) have no Departmental Programs for the year 2006 and 2007.

Annex 4

SCRUTINY OF SEAFDEC PROGRAMS OF ACTIVITIES FOR THE YEAR 2006-2007:

DEPARTMENTAL PROGRAMS

INTRODUCTION

SEAFDEC program for the year 2006-2007 are listed below and proposed activities which detailed of their projects as attached as Appendix 1 and 2

Programs	Responsible Departments
Programs Implemented in the year 2006	
1. Center-Wide Information Network	Secretariat
2. Working Group on Regional Fisheries Policy (WGRFP)	Secretariat
3. Information and Communications Technology	TD
4. Integrated Mollusc Production	AQD
5. Mud Crab	AQD
6. Shrimp Domestication	AQD
7. Marine Fish	AQD
8. Small-holder Freshwater Aquaculture	AQD
9. Seaweed Strain Improvement	AQD
Programs Proposed for the year 2007	
1. Center-Wide Information Network	Secretariat
2. Information and Communications Technology	TD
3. Integrated Mollusk Production	AQD
4. Mud Crab and Shrimp Domestication	AQD
5. Marine Fish	AQD
6. Freshwater Aquaculture	AQD
7. Seaweed	AQD
8. Aquatic Ecology	AQD
9. Other R&D Activities	AQD

Appendix 1 of Annex 4

OVERALL REVIEW OF THE DEPARTMENTAL PROGRAM IMPLEMENTATION IN THE YEAR 2006

1. Center-wide Information Network

The program on Center-wide Information Network aims at keeping the Member Countries, other organizations and public well informed of SEAFDEC activities; and providing various forms of fisheries information to support decision-making, management and development of fisheries sector. And in order to improve the quality of information and relevant tools, the program also aim at developing SEAFDEC human resources in production and promotion of the information. Activities under the program are also formulated to be in-line with the Information Strategies for Enhancing SEAFDEC Visibility and Communication adopted at the 38th Meeting of SEAFDEC Council

In 2006, activities under the program include:

- Production and dissemination of reports of SEAFDEC annual meetings (28th PCM, 8th FCG, and 38th Council);
- Production and dissemination of Annual Report 2005;
- Production and dissemination of publications e.g. Newsletter Volume 29 Number 1-4, Special Publication "Fish for the people" Volume 4, Number 1-2, Fishery Statistical Bulletin for the South China Sea Area (1999-2001 and 2002-2003) and SEAFDEC Information Catalogue 2005
- Development of framework for the new Fishery Statistical Bulletin
- Maintaining and improving of the SEAFDEC Integrated Homepage
- Arrangement for exhibition and production of brochures, posters, etc.
- Organization of the Seventh SEAFDEC Information Staff Exchange Program Meeting

2. Working Group on Regional Fisheries Policy (WGRFP)

Since the establishment of the WGRFP in 1999, the WGRFP has actively provided technical contribution and coordinate with Member Countries on the implementation of programs particularly the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) mechanism, and other SEAFDEC priority activities. The WGRFP Members also provide inputs to the Special Publication "Fish for the People" as well as other information materials of SEAFDEC to promote the sustainable fisheries in ASEAN region. However, in response to the current tight financial situation, SEAFDEC Council, at its 38th Meeting, agreed to Convert WGRFP to SEAFDEC Regional Fisheries Policy Network (RFPN). The network's members could be Secondment Member (to be stationed at the Secretariat subject to availability of funds), or Virtual Member (to be based in the Member Countries working through e-mail network communication). In accordance with the RFPN Term of Reference, the RFPN will continue to provide technical contribution to SEAFDEC on the policy issues that are important for fisheries development of the region.

3. Information and Communications Technology

To publicize SEAFDEC visibility, TD took part in a number of exhibitions relating to fisheries to present and promote SEAFDEC roles in Sustainable Fisheries Development in the ASEAN Region. Two publications were published 1) Inland Fishing Gear and Methods in Southeast Asia: Myanmar and 2) Preliminary results on the large pelagic fisheries resources survey in the Andaman Sea. The TD library also exchanged and disseminated information and publications to other network libraries.

In addition, TD also produced souvenirs that relate to TD projects like sea turtle conservation and tuna key chain and dissemination to the public via exhibitions, training course, seminar, and workshop and etc., as well as VCDs of project implementation and supporting the training course conducted by TD.

Based on the suggestion from the 28th PCM, TD carried out a study on the effectiveness of the past e-learning courses and reformulated the implementation of Distance Learning Program. The Collaborative Distance Learning Program with the educational institute as Australian Maritime College was initiated.

Furthermore on line classroom of the courses which conducted by TD in the year 2006 was created and provided as on line society for the participants, course organizer, and interested people. The updated of TD information is available at TD Homepage (http://td.seafdec.org), emphasizing the movements within TD including TD activities and events was frequently updated.

4. Integrated Mollusc Prodution

The program aims to develop and demonstrate economically viable mollusk production technologies and make mollusk production an important industry in suitable coastal communities. The activities focus on the following: (i) refining the seed production techniques for donkey ear abalone, *Haliotis asinina*, (ii) pilot testing on the propagation and use of diatoms for larval settlement of the donkey ear abalone, (iii) comparing the economic viability of producing advanced abalone juveniles in tanks and sea cages set in open waters and developing viable technology package for the intermediate nursery culture; and (iv) developing a technology package for marketable abalone production.

A total of 136,343,559 abalone eggs/trocophores and 61,427,619 veliger larvae were produced during the period January to September 2006. Average survival from trochophore to veliger larvae stage was 45.05%. In an experiment which compared the use of hanging and rack type of plates for settlement of abalone larvae, initial results showed a survival of 0.3% after 30 days in hanging plates, while no larvae settled in rack type plates.

A validation experiment was also done to compare the effects of diatom density and frequency of feeding on larval settlement using a mixture of 50% *Amphora sp*. and 50% *Navicula sp*. Abalone larvae fed diatoms at higher density and more frequent feeding attained a higher settlement rate on day 5, 10 and 15. A 15-day experiment was also conducted to evaluate the effects of number of settlement plates measuring 43x54-cm in the settlement rate of abalone larvae. Tanks with 100 plates per 1-ton tank attained a higher settlement rate on day 5, 10 and 15.

The use of different stocking densities in nursery rearing of abalone in cages suspended in land-based flow-through tanks was evaluated. Each cage was installed with pvc shelters with total surface area of 0. 46 m^2 resulting in stocking density/m^2 equivalent of 2174, 3260, and 4348 per cage, respectively. After 60 days of feeding *Gracilaria*, juveniles stocked at 2,174 and 3,260 per cage grew similarly and had higher growth than juveniles stocked at 4348/cage. Percent survival ranged from 96 to 98 which were similar for all treatments. In separate experiment, two groups of abalone juveniles stocked separately in net cages suspended in flow-through tanks were fed either fresh seaweed *Gracilaria* or formulated feed. After 75 days of rearing, abalone fed seaweed grew bigger than juveniles fed with formulated feed.

A sea cage experiment in Igang Marine Sub-Station has also been initiated to evaluate the growth of three size groups of juveniles (7-9 mm; 10-14 mm, and 5-19 mm shell length). In a separate experiment, the effects of different stocking densities (500, 100 and 1500 individuals/m^2) on growth of juveniles are also being investigated.

Apart from research, the Abalone Program of AQD participated in various activities. An example of such activity was the First Regional Cluster Technology Forum and Product Exhibition held in Iloilo in July 2006. The exhibition was sponsored by the Department of Agriculture Region 6 which featured abalone hatchery and farming technologies. Moreover, the Program, in coordination with the AQD Training and Information Division, conducted a 14-day special training course on Abalone Hatchery and Seed Production on 15-29 August 2006. Sixteen participants representing the Zamboanga provincial government, the academe, and the private sector completed the course. On November 9-30, 2006, nine foreign participants and four local trainees attended another run of the same course. On-the-Job and Internship training programs were also organized, in coordination with the Training & Information Division, for students from nearby colleges and universities and private individuals.

5. Mud Crab

The major objective is to refine hatchery techniques and farming systems for the mud crabs and enable the industry to expand and supply the export market. Activities focus on (i) testing the viability of concentrated microalgae for culture, rotifer feed and acceptability for crab and fish larvae after storage, (ii) improving the survival of *Scylla* spp. through refinement of broodstock management and hatchery rearing techniques, (3) improving the survival of crab instar to juvenile stage through behavioral studies and culture strategies, (4) reducing the use of fish by catch in nursery and grow-out culture, and (5) pilot testing and packaging the technology.

The 2006 studies on broodstock management and larviculture focused on improving the culture systems. Results showed that crab broodstocks held in outdoor tanks had better reproductive performance than those in the indoor tanks. With regard to study that evaluated the larval performance of mud crab using different schemes, it was found that highest survival from megalopae 4-5 was obtained in treatment involving water change every 5 days plus addition of microalga, *Nannochlorum* sp at 100 x 10^3 cell/ml and lowest, in treatment involving daily water change and *Nannochlorum* sp at 50 x 10^3 cell/ml. In another study, water was aged for 3 or 5 days after water treatment (15 ppm chlorination for 24 h and deactivation of chlorine with sodium thiosulfate) prior to use for larval rearing of *S. serrata* zoea to megalopa. Water used within 24 hours after treatment served as the control (0d). Survival was comparable in 0 day (5.24%) and 3 days (5.21%), and lowest, in 5 days (2.58%). Larval stage index was comparable among treatments.

A study was done to evaluate the application of microalgae (*Tetraselmis tele, Chaetoceros calcitrans, Skeletonema tropicum,* and *Nannochlorum* sp) during crab larval rearing. After 16 days, average survival of $zoea_1$ to megalopa was highest in *T. tele* fed larvae and lowest, in *S. tropicum.* Larval stage index showed that larvae in *T. tele* treatment reached the megalopa stage faster than larvae in the other three treatments.

Differences in agonistic behavior between the three *Scylla* spp juveniles were assessed based on whether they displayed the following: threat, attack, fight, defense, retreat, rest and bury. *S. olivacea* was the most aggressive spending significantly more time in threat, while. *S. tranquebarica* was the subordinate, spending more time in defense and retreat displays. Morphological differences, color adaptation and burying behavior between the hatchery-reared and wild *S. serrata* juveniles were also evaluated. The frequency and variation of morphological abnormalities in hatchery-reared were higher than in wild juveniles.

Hatchery-reared crab instars nursed in concrete tanks and net cages in earthen ponds were compared. After a month, the survival of crabs was higher in tanks than in net cages. However, mean body weight and internal carapace width were higher in crabs held in net cages than in tanks.

A follow-up study to address the preference of crab growers for larger size *S. serrata* juveniles for stocking in ponds was determined. Crabs previously cultured in net cages for a month were stocked in net cages, and in lined and unlined ponds at 5 individuals/m^2. After a month, survival of crabs was highest in net cages and lowest in unlined ponds. Mean body weight and internal carapace width of crabs were highest and lowest in unlined ponds and in net cages, respectively.

There has been a growing interest by private sector to adapt the hatchery technology; hence, SEAFDEC/AQD has extended its initial assistance to two private hatchery owners, located in Misamis Oriental and Roxas City, Capiz.

A low cost diet for mud crab was formulated to reduce the use of fish by catch. Hatchery-reared *S. serrata* juveniles were stocked in two pond compartments at 0.3 individuals/m^2 in October. Crabs are being fed either with fish alone or 50% fish and 50% formulated diet until they attain marketable size. The study is still on-going.

A verification study is being conducted for grow-out production of mud crab *S. serrata* in mangrove pens. Hatchery-reared *S. serrata* were stocked in pens with mangroves at 0.50 crab/m^2 in September. Crabs are being fed mussel at 10% of body weight daily with the gradual introduction of formulated diet until 50% of the feed ration is composed of formulated diet.

6. Shrimp Domestication

The long term goal of the Shrimp Program is to develop a viable technology for production of captive spawners of native shrimp species (P. monodon, P. indicus, and P. merguiensis) that can be genetically selected for desired heritable characteristics, particularly disease resistance or fast growth while maintaining or even improving favorable inherent traits. The activities focus on: (i) developing the technology to produce viable P. monodon and P. indicus/P. merguiensis broodstock in captivity and determining the economic viability of such activity; (ii) maintaining the family lines of the 3 species; (iii) refining the techniques for broodstock management of P. monodon and P. indicus/P. merguiensis; and (iv) refining the techniques and evaluating the commercial viability of P. indicus and P. merguiensis hatchery and grow-out culture.

P. monodon broodstock development. Culture of marketable size *P. monodon* (30-50 g body weight) to broodstock size (80-100 g body weight) is being tested in outdoor concrete tanks with sand substrate. Males and females previously cultured in a farm in Negros Occidental were stocked in 40-ton tanks. After nine months, males attained an average weight of 67.9 g while females had 112 g body weight. Another batch of *P. monodon* males and females that had been cultured for five months in ponds in Negros Oriental attained an average body weight of 74.1 g for males and 83.9 g body weight for females after seven months in tanks. Females from both batches after 4-5 months in tanks attained ovarian maturity (Stage 1 to Stage 3) without eyestalk ablation. All females were then subjected to eyestalk ablation; however, none has attained full ovarian maturity (Stage 4) to date.

P. merguiensis/P. indicus broodstock development. Eight out of 17 wild caught *P. indicus* spawners collected from Negros Occidental spawned viable eggs. Fecundity ranged from 8,000 to 26,000 nauplii/spawner. Nauplii from one spawner were divided equally into two groups and one was reared using Oxytetracycline and the other, with Biodream probiotics. Faster growth was observed in all tanks reared with antibiotics. Postlarvae from each spawner were stocked separately in 10-ton outdoor concrete tanks, reared to 5-10 g body weight size and

stocked in two ponds at Dumangas Brackishwater Station. After 2.5 months body weight ranged from 6-11g (male) and 16-25 g (female). These were stocked in half-ton tanks with or without sand substrate. After 20 days, 934,000 nauplii were produced,, with most of the spawnings coming from tanks without sand. Fecundity for this stock ranged from 20,000 to 150,000 nauplii per female. From the 8 original spawnings, only 3 families were developed.

Transport simulation tests using *P. indicus* juveniles (8-10g body weight) were conducted to reduce mortalities during transport of shrimp stocks. The first trial compared the different transport conditions for juveniles using plastic-lined styrofoam boxes: clear water provided with sand substrate; clear water without sand, and with water treated with blue food coloring. Survival at the end of the 8hours simulated transport and at 24hours, 48hours, and 72hours after transport was similar (90 to 100% survival) in all conditions. The second trial was a factorial experiment where transport condition (with food coloring and no sand substrate, clear water with sand, clear water without sand) and packing/oxygenation method during 12hours was simulated. Survival rates immediately after transport (82-90%) were similar in all treatments.

P. merguiensis produced from wild spawners from Negros Occidental were reared in the hatchery and stocked in a 40-ton outdoor concrete tank (1.5m depth) provided with sand bottom. After five months, body weights ranged from 6-15 g (males) and 11 to 22 g (females). These were used in experiments to test the effect of sand substrate in broodstock tanks.

Juveniles (2-3 g body weight) collected from the tanks were stocked in Dumangas Brackishwater Station ponds and Tigbauan Marine Station tanks. The stocks in the pond were harvested after a month due to the WSSV contamination in the Dumangas Brackishwater Station area.

Adults that had been previously separated by sex were stocked at a ratio of 1 female: 1 male in broodstock tanks with or without sand substrate. After two weeks, more matings occurred in tanks without sand substrate. The fecundity observed for this stock ranged from 5,000 to 26,000 nauplii/spawner, while estimated fecundity for the original parental stock was 2,000 nauplii/ spawner.

P. merguiensis subadults (body weight ranging 4-6 g) were also collected from Panguil Bay, further grown in tanks and mated with stocks from Negros Occidental.

A study is being conducted to develop the commercial culture and harvesting of *Artemi*a biomass for commercial shrimp farming. Two runs were conducted using the Hudson Bay and Vietnam *Artemia* strains. Poor production of cysts and nauplii was brought about by bad weather conditions.

A verification study is being conducted to evaluate the impact on pond environment, growth, survival, production and economic performance of modified-extensive prawn culture using environment-friendly scheme fed SEAFDEC formulated diet. The pond in Dumangas Brackishwater Station was prepared and readied for stocking prawn fry. Hatchery-bred prawn fry from commercial hatchery were stocked on October 5, 2006.

The environment-friendly technology and schemes used in *P. monodon* grow-out culture were used to compare the efficiency of the two SEAFDEC formulated shrimp diets for *P. monodon* and *P. indicus* as treatments. With an estimated 70% survival, biomass ranging from 700 to 800 kilograms will be harvested in late October or mid-November 2006. However, the stock was found to be positive for WSSV in an on and off manner. Close diagnostic analysis was done by the Fish Health Section of Tigbauan Marine Station.

7. Marine Fish

The Program aims to refine broodstock management, seed production, and grow-out technologies for marine fishes and promote marine fish hatcheries for livelihood in coastal areas. The program comprises studies on the following: (i) breeding and seed production of 5 species of marine fish namely milkfish, rabbitfish, grouper, snapper and seabass, as well as of seahorses; (ii) the potential use of insulin-like growth factor II (IGF-II) mRNA expression as molecular marker for egg quality in fish; (iii) verification studies on the use of SEAFDEC AQD formulated grow-out diets for milkfish cultured in marine cages, and for grouper, snapper and sea bass cultured in ponds; (iv) verification study on the use of a low grade metaldehyde to control snail population in milkfish grow-out culture ponds; and (v) production runs for milkfish fingerlings production in ponds, grow-out culture for milkfish, rabbitfish and grouper in brackishwater ponds, and grouper culture in floating net cages. The studies on fish seed production focused on the use of SEAFDEC AQD-formulated larval diets for milkfish, rabbitfish, grouper, red snapper and sea bass. The breeding and seed production of seahorse is in support of future stock enhancement activities.

Studies to verify the seed production techniques of milkfish, rabbitfish and the three high value marine fish species (grouper, red snapper and sea bass) and the use of AQD formulated diets during larval rearing are in-progress. These fish species were spawned and seed production was assessed in terms of fecundity, fertilization and hatching rates. For milkfish, the average fertilization rate in August was 85% and hatching rate was 57%. For rabbitfish, only 2.3 million eggs were produced and this was by natural spawning. For grouper, a total 77 million eggs were produced from July to September. Fertilization (15-81%) and hatching rates (15-90%) were variable, and abnormal larvae from these batches of eggs were also high. With regard to sea bass, induced spawning in July and September produced 6 million eggs. Fertilization rate (0.4-89%) and hatching rate (0-81%) were variable. For snapper, egg production was very minimal because of limited number of breeders. A total of 1.8 million eggs were spontaneously spawned during July but no spawning was observed during August and September SEAFDEC AQD formulated diets were used and tested during the larval rearing..

One of the strategies seen to repopulate the natural stocks of sea horse is by stock enhancement. This however, demands the availability of a steady supply of seeds for restocking. Hence, the development of breeding and seed production protocols for this species is necessary. Breeding activities for this commodity are on-going. Broodstock for 3 species of seahorses (*Hippocampus barbouri*, *H. kuda* and *H. comes*) were acquired from Palawan in April 2006. However, 31 broodstock died due to various diseases. In terms of seed production, *H. comes* broodstock produced a total of 8,013 juveniles from 36 spawning events. Pooled survival of juveniles was about 4%.

A study to evaluate if IGF-II gene could be used as a molecular marker for determining the quality in fish eggs and larvae of grouper, milkfish and rabbitfish is in-progress. For rabbit fish, the expression ratio was 1.88 in early embryo, 2.11 in late embryo and 2.06 in hatched larvae. In low fertilization rate samples, hatched larvae also exhibited high expression ratio (2.01) compared to early embryo (1.35) and late embryo (1.68). The mean relative expression ratio in no hatching samples at early embryo stage was 2.41. For grouper, mean values for expression ratio in high fertilization rate samples was higher in late embryo (11.26) than in early embryo (8.43) or hatched larvae (1.7). In low fertilization rate samples, early embryo exhibited higher expression ratio (3.05) compared to late embryo (2.11) and hatched larvae (1.51). Mean IGF II relative expression ratio in sink eggs was 1.33 and 2.84 in high and low fertilization rate, respectively. The mean relative expression ratio in spawns that exhibited no hatching despite attaining early embryo stage was 1.86.

The use of SEAFDEC AQD formulated diet for milkfish cultured in marine cages is being assessed in collaboration with private fish cage operator. Initial results showed that the present formulation needs to be improved to give a better performance when used in milkfish that are grown in full-strength seawater. Changes in the lipid content of the diet will be done and will be tested in fish cages of the farmer collaborator. A Memorandum of Agreement has been signed with the private fish cage operator for this activity.

Studies to verify the grow out diets formulated by AQD for grouper/snapper reared in cages in pond and seabass reared in ponds are also underway. For grouper/snapper, the activity was just started in October 2006. For seabass, the practical diet developed for the grow-out culture of grouper will be evaluated. Together with the SEAFDEC AQD diet, a commercial diet and a polyculture of seabass with tilapia will also be tested. In the latter case, the small-sized tilapia will serve as food for the seabass. The pond is presently being prepared for this experiment.

The effect of metaldehyde to control snail population in milkfish grow-out culture pond is being assessed.. Initial snail population in the pond was assessed by quadrat method from 10 different sites of the pond. Initial average population showed 3910/m^2 live snails (89%) and 485/m^2 dead snails (11%).

Ponds are presently under preparation to initiate a verification study on modified extensive grow-out culture systems for milkfish in brackishwater ponds.

An initial experiment to test the polyculture of milkfish and rabbitfish in ponds was conducted. For this, pond was prepared and stocked with milkfish and rabbitfish fingerlings at 2000 and 1000 pcs/ha, respectively last 8 August 2006. After 60 days of culture, the average body weight of milkfish was 231.8 g and 8.0 g for rabbitfish.

As part of the activity to develop and refine the grow-out culture technique for the production of grouper *Epinephelus fuscoguttatus* in ponds, a study is in-progress to test the effectivity of grouper culture in cages set in ponds using SEAFDEC AQD diet. However, due to some manpower problem, survival rate at nursery stage was only 33%. On 28 September 2006, a second batch of grouper fry (5000 pieces) was stocked in net cages and fed SEAFDEC AQD formulated diet at 10% feeding rate and feeding frequency of 6x/day.

The performance of tiger grouper (*Epinephelus fuscoguttatus*) and humpback grouper (*Cromileptis altivelis)* fed SEAFDEC AQD formulated diet in floating net cages in Igang Marine Substation was assessed. After 51 days of culture, the average body weight of the stock was 150.2 g. Performance parameters showed a feed conversion ratio (FCR) of 2.44, a specific growth rate (SGR) of 1.31 % BW d^{-1}, growth rate (GR) of 1.44 g day^{-1} and a survival of 91.55%. . For humpback grouper, the initial stock showed an average body weight of 62.5 g., a survival of 86.78 % at 42 days of culture, feed conversion ratio of 4.23, a specific growth rate of 0.53 % body weight d^{-1} and a growth rate of 0.3 g day^{-1}.

As part of the Program's continuing efforts to disseminate the technologies for the seed production of marine fish species in the country and in the region, SEAFDEC AQD offers a regular training course on Marine Fish Hatchery Operations. For 2006, the training course was conducted on 03 May to 16 June 2006 and 8 participants from 5 different countries (Australia, Cambodia, Indonesia, Viet Nam and the Philippines) completed the course. In addition, technical assistance was extended to the Government of Viet Nam on Milkfish Hatchery Operation. The staffs trained are working for the Ministry of Fisheries' Research Institute for Aquaculture. Three of these technical staff also came to SEAFDEC AQD for the said special training program from 29 May until 29 June 2006.

8. Small-holder Freshwater Aquaculture

The main objective of the Program is to improve the seed production and grow-out technologies for commercially important freshwater commodities (tilapia, catfishes, carps, and freshwater prawn) and promote freshwater aquaculture for livelihood, particularly among the landless in inland rural areas. Activities focus on: (i) refining the seed production methods of selected freshwater commodities (e.g. giant freshwater prawn, catfish, carp, tilapia and milkfish); (ii) developing grow-out production of giant freshwater prawn in lakes using cages; (iii) improving the production of both the hatchery and grow-out of the aforementioned freshwater commodities; (iv) assessing the social and economic impact of aquaculture in Laguna de Bay region; (v) verifying and commercializing the freshwater aquaculture technologies; and (vi) disseminating the verified freshwater aquaculture technologies through publications and conduct of seminars, workshops and hands on-training.

A study is in-progress to develop the commercially viable nursery techniques for *Clarias* species in lake-based facilities and also to develop an approach for stock enhancement program for *C. macrocephalus* in Laguna lake. Preliminary data showed that growth of native catfish fry after two weeks of rearing in hapa net cages was highest in both fish stocked at 100 fry/cage, given artificial diet and in fish stocked at 200 fry/cage without supplemental diet. Lowest growth rate was observed in fish stocked at 100 fry/cage without supplemental feed . Survival rates were generally higher in catfish fry that received artificial diet than in fish reared without supplemental feed.

An experiment aimed at improving the carcass traits in Nile tilapia (*Oreochromis spp*) through farm-based mass selection and interspecific hybridization is on-going. The selective breeding protocol has been adopted and the scheme is currently being followed. Selected and control lines from F1 generation were set up and are currently being spawned in tanks. The first harvest of fry was done in October 2006.

The economic impacts of aquaculture development in Laguna Lake over time are also being assessed. A questionnaire has been prepared, pre-tested and finalized for survey that has been scheduled during the last quarter of 2006. Continuous gathering of secondary data and information has been conducted in the institutional source.

A study is being conducted to develop *M. rosenbergii* seedstock tolerant to low salinity and/or freshwater and to reduce the cost of giant freshwater prawn seedstock production. Several female breeders were spawned and batches of larvae were reared separately in 12 ppt and 6 ppt salinity levels. Postlarvae were harvested from the batches reared in 12ppt while the oldest stage of larvae which survived in 6ppt was stage 9. New protocols are currently being tried to improve and meet the study objectives.

With regard to a study which aims to assess the bioeconomics of freshwater prawn *(Macrobrachium rosenbergii*) hatchery production in different larval rearing system, preliminary results showed that *M. rosenbergii* larvae reared in clear water had an average survival of 37.1% compared to larvae reared in green water. However, in terms of larval development, the larvae reared in green water took 25 days to reach the post larval stage compared to larvae reared in clear water, which took 30 days to become post larvae. Another run of the experiment is on going.

The reproductive performance and fry production of bighead carp *Aristichthys nobilis* using different feeding regimes are being assessed. Preliminary results showed that female bighead carp broodstock in treatment 1 (one month feeding before spawning) had highest average percent gonadal maturity (83.33%) and lowest, in treatment 4 (no feeding). However, for male bighead carp broodstock, the percent gonadal maturity was highest in treatment 3, (96.5%) and lowest,in treatment 4 (40.33%). The first run for induced spawning was done on September 26, 2006.

An experiment aimed at producing milkfish *Chanos chanos* fingerlings from fry in small freshwater ponds and modular lake-based cages in Laguna de Bay has been initiated. However, the infestation of parasite *Laernia* in finfish stocked in the experimental area has delayed the stocking of milkfish.

The farming of the *Macrobrachium rosenbergii* in modular cages in Laguna de Bay is on-going. Polyculture nursery trial of bighead carp *Aristichthys nobilis* and *Macrobrachium rosenbergii* was conducted in hapa cages in the lake for two months using the following treatments: 40freshwater prawn post larvae and 40 bighead carp fry per m^2; 40 freshwater prawn postlarvae and 80 bighead carp fry per m^2; 40 freshwater prawn postlarvae and 120 bighead carp fry per m^2; 40 freshwater prawn post larvae per m^2 only; and 120 bighead carp fry per m^2 only. No significant differences in growth and in survival was observed for freshwater prawn in all treatments. However, bighead carp survival was affected by the treatments; highest and lowest survival rates were obtained in 40 freshwater prawn + 40 bighead carp fry and 120 bighead carp fry only, respectively. No differences in mean weight was observed for bighead carp among all treatments. Bighead carp survival was relatively low because of ectoparasitic infestation (*Laernia* sp). A second trial is being conducted. Two other experiments involving polyculture with red tilapia and the use of different types of commercial diets for grow-out of *M. rosenbergii* are also on-going.

9. Seaweed Strain Improvement

The Seaweed Program is focused mainly on species *Kappaphycus, Eucheuma*, and *Gracilaria.* The Department has embarked on *Strain Improvement* of *Kappaphycus*, *Eucheuma* and other economically important seaweed that use both the vegetative and reproductive explants as mother plants.

With regard to study which aims to propagate *Kappaphycus* plantlets from callus-like structures by tissue culture, callus cells were released at the medullary layer with the use of ESS/2 + E3 antibiotic + plant growth regulator. Cell division was both anticlinal and periclinal. Callus formation is in process.

Characterization of carrageenan properties and screening for disease resistance of farmed carrageenophytes is in-progress. Thirty-two morphotypes/ecotypes of *Kappaphycus alvarezii* (28), *Kappaphycus* sp.(1) and *Eucheuma denticulatum* (3) were collected from different seaweed farms in the Philippines. Characterization of carrageenan properties of these cultivars has been completed. Parent stocks that will serve as starting materials for seedstock production have been chosen based on carrageenan qualities, and will be further subjected to infection and growth experiments to determine disease resistance traits and growth performance. The cultivars chosen were those collected from Guiuan (Eastern Samar), Tawi-tawi, Zamboanga, Barobo (Surigao), Bohol and Palawan.

Growth experiments in concrete tanks and growth chambers were also undertaken to identify which among the collected cultivars can be cultured in land-based facilities and to develop protocols for land-based seaweed culture. Initial results showed that *K. alvarezii* cultivars collected from Panagatan Is., Antique and *Eucheuma denticulatum* regardless of origin grow well in tanks and growth chambers. Other cultivars, particularly those with high gel strength,

poorly grow and survive in tanks at the wet lab due to low (30 ppt) salinity levels in the past two months. Culture collections are maintained in growth chambers, tanks and in the phycology laboratory.

Molecular strategies to characterize and improve farmed carrageenan-producing marine macroalgae. Primer designing and optimization of DNA extraction have been undertaken. DNA from *K. alvarezii* cultivars collected from seaweed farms all over the country have been extracted and will be subjected to RFLP analysis (to determine genetic heterogeneity or homogeneity of different cultivars) as soon as the requested chemicals and supplies are delivered.

Plans for 2007:

- Propagation of *Kappaphycus* plantlets from callus-like structures by tissue culture
- Seed Production of *Kappaphycus*: A. Protoplast isolation and sporulation of *Kappaphycus*

Appendix 2 of Annex 4

PROPOSED DEPARTMENTAL PROGRAMS FOR THE YEAR 2007

1. Center-wide Information Network

In 2007, activities to be implemented under the program are:

- Production and dissemination of reports of SEAFDEC annual meetings (29th PCM, 9th FCG, and 39th Council)
- Production and dissemination of Annual Report 2006
- Production and dissemination of Newsletter Volume 30 Number 1-4
- Production and dissemination of Special Publication "Fish for the people" Volume 5, Number 1-2
- Fishery Statistical Bulletin for the South China Sea Area (2004)
- Development of the New Bulletin Framework
- Maintaining and improving of the SEAFDEC Integrated Homepage
- Arrangement for exhibition and production of brochures, posters, etc. (on an ad-hoc basis)
- Organization of Eight SEAFDEC Information Staff Exchange Program Meeting
- Other Activities As proposed at the 7th ISEP Meeting (20-22 December 2006)

2. Information and Communications Technology

In the year 2007, a distance learning program will continual developed in collaboration with educational institutes. Workshops related to ICT and fishery training will be organized with the aim to develop fishery information and extension program of TD and to make certain collaboration between SEAFDEC and others related institutes/organizations in both national and international levels.

Concurrently, the Department will continue to carry out information activities in compiling, designing, producing, disseminating, acquiring and exchanging printed and non-printed, general and technical information material on fisheries and the marine sciences for the users' benefit and training purposes through its Integrated Information and Extension Packages. Various databases and information files will be designed and compiled to serve as effective tools. The Department's library will be upgraded to provide effective library services for users both inside and outside the Department. The exchange of information through the library services and the internet network will be carried out.

TD will actively participate in national and international exhibitions as well as produce and disseminate multimedia formats including VDO, brochures, booklets, posters, and souvenirs, to promote TD activities and its services, as well as publications and documentary videos produced by TD.

The envisioned outcomes of the foregoing programs are designed to achieve benefits that accrue to the fisheries of the region with particular emphasis on long-term sustainability. Furthermore, this program will ensure that TD's information will be available worldwide and will serve as an effective educational tool for fisheries related organizations, schools, universities and the general public.

3. Integrated Mollusc Production

The Program will conduct studies to further refine the breeding and egg production techniques for captive abalone broodstock. Some environmental and bio-physical factors including feed manipulation that may regulate the spontaneous spawning will be looked into. Transport

techniques for eggs and larvae will be developed to encourage small private hatchery operators to venture into abalone seed production.

To enhance production of abalone during early juvenile stage, studies on larval settlement and metamorphosis will be conducted. Alongside this, efforts will also be made to develop a micro-particulate diet that can help provide alternative food source during early juveniles.

Studies for next year on intermediate nursery and grow-out are geared towards increasing the survival of juveniles and marketable size abalones through cost-effective stocks management techniques.

4. Mud Crab

Eight projects will be implemented next year. Of these projects, 5 are continuing and 3 are newly proposed. The 2007 activities will focus on the following:

- *Cost effective culture, harvesting and preservation techniques of green microalgae for crab and fish seed production*. The new study involves testing of other preservation techniques and the feeding of rotifers with microalgae that have been cultured after preservation. Thereafter, the rotifers will be fed to crab or fish larvae. Samples of the microalgae and the rotifers fed with these microalgae will be taken for biochemical analyses.
- *Refinement of broodstock management and seed production techniques.* Broodstock and larval diets that have been formulated in previous studies will be improved. Trials will also include the improvement/control of water quality and reduction of the use of antibiotics. Water parameters and microbial profile of the rearing water will be monitored in all the trials. Strategies to reduce cannibalism from megalopa to juveniles stage will be continued.
- *Domestication of mud crab*. The project will identify the potential sources of good quality adult mud crab, develop healthy broodstock from highly genetically variable wild stocks, and use molecular genetic tools in the effective management and selective breeding of good quality mud crab.
- *Pilot testing of mud crab hatchery technology*. Extension of the technology on *Scylla* spp. seed production to hatchery operators will continue.
- Verification of nursery technology for mud crab. A series of verification trials such as provision of 3-dimensional shelters and adequate nutrition using formulated diet will be done to mitigate the high level of cannibalism that is typical of the post-larval culture of mud crabs in the nursery phase.
- *Mud crab S. serrata culture using formulated diet in brackishwater ponds.* This is a continuing study which aims to evaluate the production and economic viability of mud crab in brackishwater ponds using formulated diet.
- *Comparison of hatchery-reared and wild in ponds*. With recent progress in the development of hatchery systems for *Scylla* spp. there is growing interest in evaluation of the quality of hatchery-reared juveniles relative to wild seed crabs as currently used in aquaculture. This study will assess the performance of hatchery-reared in comparison with wild mud crab juveniles grown in ponds up to market size.
- *Grow-out production of the mud crab S. serrata in mangrove pens*. This is a continuing study which aims to reduce the utilization of fish by using formulated diet in crab culture in mangrove pens

5. Shrimp Domestication

P. monodon

- Genetic characterization of wild and existing captive broodstock will be done to be able to identify potential sources of good quality tiger shrimp broodstock that can serve as baseline population for future breeding programs.

- The status of research on captive broodstock will be determined as a guide for the studies that need to be conducted at SEAFDEC/AQD. Experts within the region who are working on this area will be consulted to gather information on the experiences of ASEAN Member Countries on the culture of exotic species and on the use of captive broodstock.

- Trials on growing 30-60 g animals to broodstock size ($\geq$100g) will be continued. The effect of rearing males and females separately on the survival and mating success will be assessed. These captive broodstock will be used in experiments aimed towards improvement of mating success, fertilization rate, and fecundity. Spermatophore transfer will be tested to improve the fertilization rate of eggs.

P. indicus/P. merguiensis

- Females of one species (*P. indicus or P. merguiensis*) from one family will be mated with the male of another family and vice versa. Genetic characterization of both the parent stocks and offsprings will be conducted. Reproductive performance will be monitored. Larvae produced from this will be grown to postlarvae.

- Refinement of broodstock management techniques to improve spawning frequency and fecundity will be pursued. This will include tests on artificial formulated and unprocessed feeds, and tests on different sex ratios.

- Refinement of hatchery techniques will likewise be continued. Comparison of SEAFDEC-developed probiotics and different antibacterial commercial products will be done.

6. Marine Fish

- All the studies/activities that were initiated in 2006 will be continued in 2007. One of the new planned studies will look at the possibility of developing mass propagation and preservation techniques for mysids, a good natural food for the hatchery rearing of grouper and a good substitute for *Artemia* biomass.
- Cannibalism in carnivorous species is still a problem in the hatchery and nursery. Understanding the 'physiology" behind this cannibalistic behavior may help us design strategies to minimize its effect in our culture systems.
- Prolonging or extending the spawning season of milkfish, red snapper and seabass beyond their normal spawning season will also be a new activity for the coming years. For year 2007, efforts toward extending the spawning season of seabass will be initiated.
- The yearly regular training course for Marine Fish Hatchery Operations will be offered. In addition, non-formal training courses for nursery and grow-out cultures of marine fish species in ponds or in cages may be offered in response to requests for technical assistance.

7. Small-holder Freshwater Aquaculture

- Screening of possible natural products from freshwater microalgae
- Testing the viability of algal beads immobilized in various matrices: Response to different environmental conditions
- Integrated fisheries resource management (Rinconada Lakes, Philippines and NSW Australia)
- Hatchery seed production of the native catfish *C. macrocephalus*
- Advanced fingerling production for freshwater fish
- Continue with training courses (international, local)
- Publication of manuals on freshwater commodities

8. Seaweed Strain Improvement

- Propagation of *Kappaphycus* plantlets from callus-like structures by tissue culture
- Seed Production of *Kappaphycus*: A. Protoplast isolation and sporulation of *Kappaphycus*

9. Aquatic Ecology (New Proposed Program)

The objectives of the Program are the following: (a) to determine existing policies, institutions and ordinances to protect and ensure a sustainable aquaculture development in selected local government units in Western Visayas, Philippines, (b) to recommend improvement in existing institutional arrangement in managing coastal resources in support of sustainable aquaculture in the selected local government units, (c) to demonstrate how environmental capacity can be determined in waters around Igang Marine Sub-station and other important aquaculture sites, and (d) to maintain good environmental condition of coastal areas and improve the condition of some degraded areas by growing seaweeds that absorb excess nutrients from the water.
Plans for 2007:

- Institutional arrangements in local governance for sustainable aquaculture in selected provinces in the Philippines
- Assessment of environmental capacity of Igang Bay (Guimaras, Iloilo) and other aquaculture sites

10. Other R&D Activities

- Screening of alternative lipid sources for aquaculture feeds

In order to sustain the rapid growth of aquaculture industry, there is a need to partially or totally replace fish oil with cheaper and sustainable sources of dietary lipid. (for example, from terrestrial or plant lipid sources). The study is being conducted: (i) to find suitable and sustainable sources of dietary lipids for aquaculture feeds; and (ii) to determine the levels of incorporation and effects of these levels on the survival, growth and health status of selected aquaculture species.

Plant samples have been collected and fatty acids are being extracted. The study has just been started.

- Polyunsaturated Fatty Acids (PUFA) as useful compounds in aquaculture and human nutrition

A study is being conducted in collaboration with Mindanao State University (Philippines) to determine the abundance and synthesis of polyunsaturated fatty acids from selected marine invertebrates of different trophic levels and to investigate extrinsic factors that influence their biosynthesis. New thraustochytrid isolates were added in the collection, such as the strains from Zambales, Bohol and Surigao del Norte. PUFA production was correlated with different carbon sources and concentrations in culture media. Outdoor production technique of cells in large amounts was successfully done using filtered aeration of sterilized glass chambers. Feeds with freeze-dried thraustochytrids cells were formulated for abalone and shrimp nutrition studies. Preliminary study on diet supplementation showed the potential of live and freeze-dried thraustochytrid cells as enrichment material in rotifers and shrimp zoea. Because thraustochytrids consume a wide range of carbon sources, indigenous materials (brown seaweeds and mangrove senescent leaves, aquaculture wastes such as feed leftovers and fishpond sludge) are currently being tested as possible alternative media formulations. Thraustochytrids were also found having high lipolytic activity based on tributyrin agar test. Preliminary tests showed that thraustochytrids (including the strains from Guimaras) could emulsify, degrade and consume petroleum oil; however, chromatographic analysis is still needed for support. The study is on-going.

SEAFDEC DEPARTMENTAL PROGRAMS OF ACTIVITY FOR THE YEAR 2006-2007

SECRETARIAT

1. OVERALL REVIEW

During the year 2006, two departmental programs were undertaken by the Secretariat as on-going activities: 1) Center-wide Information Network; and 2) Working Group on Regional Fisheries Policy.

The Program on **Center-wide Information Network** was implemented since 1998 to keep the Member Countries, other organizations and public informed of SEAFDEC plans and activities, and promote visibility of the Center. In addition, the program is also expected to provide various forms of fisheries information to support decision-making, management and development of fisheries sector. With the endorsement of the Information Strategy for Enhancing SEAFDEC Communication and Visibility by the 38th Meeting of SEAFDEC Council in April 2006, activities under the program are also adjusted to be in line with the Information Strategy. In general, activities under the program could be classified into major areas as follow:

1. Production and dissemination of Report of SEAFDEC annual meetings e.g. SEAFDEC Program Committee, ASEAN-SEAFDEC FCG and SEAFDEC Council Meetings;
2. Promoting activities and visibility of the center e.g. through Newsletter; SEAFDEC Integrated Homepage; Information Catalogue as well as ad-hoc events, exhibitions, etc.
3. Compilation and production of fisheries information to support fisheries planning and management, e.g. fishery statistical bulletin, Special Publication "Fish for the People";
4. Information staff development activities.

For the Program on **Working Group on Regional Fisheries Policy** (WGRFP, since 1999), the program was converted to **Policy Regional Fisheries Policy Network** (RFPN) in accordance with the recommendation made at the 38th Meeting of SEAFDEC Council. The Network comprises members stationed at the Secretariat based on availability of fund; and virtual members stationed at Member Countries and communicated through e-mail network. The Term of Reference of the RFPN was drafted and circulated to all the Member Countries.

In overall, the WGRFP members have provided technical contribution and coordinate with Member Countries on the implementation of programs under the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) mechanism, and other SEAFDEC priority activities. The WGRFP members also provided inputs to the Special Publication "Fish for the People" as well as other information materials of SEAFDEC to promote the sustainable fisheries in ASEAN region. With conversion of the WGRFP to RFPN, the main role of the RFPN would be to identify important fisheries issues, and coordinate with both Member Country and SEAFDEC Departments to compile information or conduct study to come up with policy options on the issue to be further proposed to Member Countries for consideration and follow-up actions.

2. LIST OF PROGRAMS

1. Center-wide Information Network
2. Working Group on Regional Fisheries Policy

PROGRAM DOCUMENT

Program Category: Departmental Program
Program Title: Center-wide Information Network
Responsible Department: SEAFDEC Secretariat
Total Duration: Since 1998

1. INTRODUCTION

Considering vital role of information as a tool in the development and management of fisheries sector, a program on Center-wide Information Network was initiated and adopted by the Council of SEAFDEC in 1998. Since then, based on SEAFDEC Information and Communication Policies, the Secretariat has developed several information and statistics programs and services to support management and development of sustainable fisheries in the region. In addition, during the 38th Meeting of SEAFDEC Council, the Council endorsed the Information Strategies for Enhancing SEAFDEC Visibility and Communication which is envisaged to streamline information activities in a more cost-effective manner, and enhance visibility of the organization. Framework and activities under the program has been adjusted to be in-line with the Information Strategy.

2. PROGRAM

The program on Center-wide Information Network aims at keeping the Member Countries, other organizations and public well informed of SEAFDEC activities; and providing various forms of fisheries information to support decision-making, management and development of fisheries sector. And in order to improve the quality of information and relevant tools, the program also aim at developing SEAFDEC human resources in production and promotion of the information.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

The progress of Information activities undertaken during the year 2006 is:

Project/Activity Title	Duration	Remarks
Production and dissemination of reports of SEAFDEC annual meetings		
• Report of the 28th SEAFDEC Program Committee Meeting	Feb 2006	Completed
• Report of the 8th ASEAN-SEAFDEC FCG Meeting	May 2006	Completed
• Report of the 38th SEAFDEC Council Meeting	May 2006	Completed
Production and dissemination of Annual Report 2005 SEAFDEC Annual Report publishes highlighted activities and achievement of SEAFDEC, as well as summary of progress of SEAFDEC programs, activities undertaken in a year. Number of production is 1,000 copies, distributed to Member Countries, Network Libraries, fisheries-related institutions/organizations, collaboration organizations, and interested people.	June 2006	Completed

Production and dissemination of Newsletter Volume 29 Number 1-4 SEAFDEC Newsletter publishes activities of SEAFDEC in promoting fisheries development in Southeast Asia, with inputs from all SEAFDEC Departments and Member Countries (if any). Current production is 1,700 copies, distributed to Member Countries, Network Libraries, fisheries-related institutions/organizations, collaboration organizations, and interested people. Newsletter is also available via SEAFDEC integrated homepage.	Q1-Q4	(4 issues per year) Vol29 No1-3 were published Vol29 No4 is under process 75%
Production and dissemination of Special Publication "Fish for the people" Volume 4, Number 1-2 The Special Publication will be in easy reading style, targeting not only the technical people but also the non-technical including policy makers, young scientists and managers and others who are interested in the fisheries issues in ASEAN region. Number of production is 1,300 copies per issue. The Special Publication may also extend to donors and technical institutions that can be potential collaborators for the promotion of sustainable fisheries in ASEAN region. The Special Publication is available via SEAFDEC Integrated Homepage	Q2, Q4	2 issues per year Completed
Fishery Statistical Bulletin for the South China Sea Area • Production of Bulletin for 1999-2001 (100 copies) • Production of Bulletin for 2002-2003 (300 copies) • Compilation of Bulletin for 2004 • Development of the New Bulletin Framework (for Bulletin 2005 and onwards)	 June 2006 Oct 2006 Nov-Dec 2006 On-going	 Completed Completed 90% 80%
Maintaining and improving of the SEAFDEC Integrated Homepage SEAFDEC Integrated Homepage was restructured based on recommendation at the 6th Information Staff Exchange Program Meeting. In the future, the Homepage will contain information on progress of SEAFDEC programs, updated news, regional fisheries issues, SEAFDEC publications, event calendar, and press release from SEAFDEC meetings. Information for internal SEAFDEC use will also be uploaded e.g. exhibition materials, documents for download, etc.	Q1-Q4 2006	60% On-going
Arrangement for exhibition and production of brochures, posters, etc. • Thai Fish Expo 2006 (by DOF Thailand) • Thai Agricultural Expo (by Ministry of Agriculture and Cooperatives, Thailand)	 June 2006 July 2006	 Completed Completed

• Preparation for poster for exhibition posters to commemorate 120 Year Thai-Japan Relationship	Mid 2007	20%
Seventh SEAFDEC Information Staff Exchange Program Meeting 0ISEP is organized annually on a rotation basis (hosted by Secretariat and each SEAFDEC Department) Main objectives of the 7th ISEP Meeting are 1) to review and monitor progress of implementation of SEAFDEC information Strategy for Enhancing Visibility and Communication; 2) To introduce and exchange view on initiatives in information aspects undertaken by AQD (as host department) among information officers as part of developing SEAFDEC human resources in production and promotion of the information; and 3) To discuss activities to be incorporated under the Center-wide Information Network Program framework	20-22 Dec 2006	To be organized after the 29th PCM

Activities under the program were in-line with the Information Strategies for Enhancing SEAFDEC Visibility and Communication endorsed by SEAFDEC Council. However, in response to the suggestion made by the Council that the clear objectives and performance indicators for enhancing visibility and profile of SEAFDEC should be further elaborated, the issue will be discussed at the 7th SEAFDEC Information Staff Exchange Program Meeting.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

The Information activities proposed to be undertaken in the year 2007 are:

Project/Activity Title	Duration	Remarks
Production and dissemination of reports of SEAFDEC annual meetings: 29th PCM, 9th FCG, and 39th Council	Q1-Q2	-
Production and dissemination of Annual Report 2006	Q2	-
Production and dissemination of Newsletter Volume 30 Number 1-4	Q1-Q4	-
Production and dissemination of Special Publication "Fish for the people" Volume 5, Number 1-2	Q2, Q4	-
Fishery Statistical Bulletin for the South China Sea Area • Production of Bulletin for 2004 (300 copies) • Development of the New Bulletin Framework	by February by April	Responsibility for production of Bulletin for 2005 and onwards will be shifted to TD, using the new Bulletin Framework.
Maintaining and improving of the SEAFDEC Integrated Homepage	On-going	-
Arrangement for exhibition and production of brochures, posters, etc.	On ad-hoc basis	-
Eight SEAFDEC Information Staff Exchange Program Meeting	Q4 prior to 30th PCM	-
Other Activities		As proposed at the 7th ISEP Meeting (20-22 December 2006)

PROGRAM DOCUMENT

Program Category: Departmental Program
Project Title: Working Group on Regional Fisheries Policy (converted to SEAFDEC Regional Fisheries Policy Network)
Responsible Department: SEAFDEC Secretariat
Total Duration: Since 1999

1. INTRODUCTION

With the endorsement of the 30th Meeting of SEAFDEC Council, the Working Group for Regional Fisheries Policy (WGRFP) was established and stationed at the Secretariat since 1999. The WGRFP has been responsible in giving timely advice to SEAFDEC and its Member Countries on relevant regional and global issues, and if necessary, recommended regional policy guidelines and appropriate action for priority issues in the Southeast Asian region. However, in response to the current tight financial situation, SEAFDEC Council, at its 38th Meeting, agreed to Convert WGRFP to SEAFDEC Regional Fisheries Policy Network (RFPN). The network's members could be Secondment Member (to be stationed at the Secretariat subject to availability of funds), or Virtual Member (to be based in the Member Countries working through e-mail network communication). The new Term of Reference of the RFPN was drafted and circulated to all the Member Countries for consideration and nomination of RFPN member.

2. PROGRAM

The program aims at supporting the SEAFDEC Member Countries in formulating regional fisheries policies on important issues. As a coordinating body, the group kept tract to the planned activities by supporting views and appropriate recommendations on certain matter relating to the operation of the Secretariat regional activities.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Since the establishment of the WGRFP, the WGRFP has provided technical contribution and coordinate with Member Countries on the implementation of programs under the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) mechanism, and other SEAFDEC priority activities. The WGRFP Members also provide inputs to the Special Publication "Fish for the People" as well as other information materials of SEAFDEC to promote the sustainable fisheries in ASEAN region.

With the conversion of WGRFP to RFPN in April 2006 based on recommendation made at the 38th SEAFDEC Council Meeting, The Term of Reference of the RFPN are:

a) To identify and prioritize issues related to fisheries, raised at regional and international levels, which may have potential impacts on fisheries in the region;
b) To identify studies and activities that should be conducted to compile information on the identified issues as a basis for developing policy recommendations;
c) To initiate and promote the formulation of regional fisheries policies an d policy recommendations, including the preparation and finalization of the required working/position papers;
d) To promote in-country (for Member Countries) or inter-department (for SEAFDEC Departments) coordination to compile relevant views as well as information and data as inputs for the conduct of such studies and activities;

e) To develop strategies to promote closer policy dialogues among the Member Countries and SEAFDEC: and
f) To follow-up implementation of agreed policy in the Member Countries and programs of SEAFDEC Departments.

In 2006, Members of the SEAFDEC RFPN include:

1. Virtual Members
    1. Mr. Dilky Suganda (Indonesia)
    2. Mr. Tun Win (Myanmar)
    3. Mr. Arsenio S. Bañares (Philippines)
2. Secondment Members
    1. Mr. Suy Serewath (Cambodia) *with support from SEAFDEC-Sida tsunami project*

In 2006, the RFPN was mobilized to provide update information on fisheries policy-related issues undertaken by SEAFDEC, and formulation of coordinated approach of the region on the issue.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

In the year 2006, the WGRFP would be converted to SEAFDEC Regional Fisheries Policy Network. The RFPN will provide technical contribution to SEAFDEC on the policy issues that are important for fisheries development of the region according to its Terms of Reference.

SEAFDEC DEPARTMENTAL PROGRAMS OF ACTIVITY FOR THE YEAR 2006-2007

TRAINING DEPARTMENT

1. OVERALL REVIEW

In the year 2007, TD continues to implement a program related to Information and Communication Technology under the Departmental program. The Information and Communication Technology is essential for the extension, education, and research programs of the Department. Under the program, a distance learning program will continual developed in collaboration with educational institutes. Workshops related to ICT and fishery training will be organized with the aim to develop fishery information and extension program of TD and to make certain collaboration between SEAFDEC and others related institutes/organizations in both national and international levels.

Concurrently, the Department will continue to carry out information activities in compiling, designing, producing, disseminating, acquiring and exchanging printed and non-printed, general and technical information material on fisheries and the marine sciences for the users' benefit and training purposes through its Integrated Information and Extension Packages. Various databases and information files will be designed and compiled to serve as effective tools. The Department's library will be upgraded to provide effective library services for users both inside and outside the Department. The exchange of information through the library services and the internet network will be carried out.

TD will actively participate in national and international exhibitions as well as produce and disseminate multimedia formats including VDO, brochures, booklets, posters, and souvenirs, to promote TD activities and its services, as well as publications and documentary videos produced by TD.

The envisioned outcomes of the foregoing programs are designed to achieve benefits that accrue to the fisheries of the region with particular emphasis on long-term sustainability. Furthermore, this program will ensure that TD's information will be available worldwide and will serve as an effective educational tool for fisheries related organizations, schools, universities and the general public.

2. LIST OF PROGRAMS

Programs	Responsible Departments
Programs Implemented in the year 2006	
1. Information and Communications Technology	TD
Programs Proposed for the year 2007	
1. Information and Communications Technology 1.1 Public Relations 1.2 Production of Integrated Information and Extension Packages 1.3 Distance learning Program 1.4 Workshop arrangement 1.5 Update of TD Information Online	TD

PROGRAM DOCUMENT

Program Category: Departmental Program
Program Title: Information and Communications Technology
Responsible Department: Training Department
Total Duration: 1 year (Jan-Dec 2007)

1. INTRODUCTION

Information and Communications Technology is essential for the current Information and Extension programs of the Training Department to successfully deliver its information service and training courses to audiences around the world as it allows for continuous access at any location. The Internet is a very efficient and fast way for global businesses to obtain regular information.

The Department will carry out information activities in regard to compiling, designing, producing, disseminating, acquiring and exchanging printed and non-printed information. The information is provided for the user's benefit and training purposes through the Integrated Information and Extension Packages. Various databases and information files will be designed and compiled to serve as effective tools. The Department's on-line library will be upgraded to provide effective library services for users both inside and outside the Department including distance learning relate to fishery field will be produced for worldwide. Moreover, following the directive of the SEAFDEC Council on enhancing SEAFDEC visibility, the activity relating to Public Relation will be emphasized and implemented.

2. PROGRAM

2.1 Objectives:

1) To publicize SEAFDEC visibility through the promotion of TD activities and roles in the Development of Sustainable Fisheries
2) To design, compile and disseminate Information and Extension Packages in various media forms to be distributed to all ASEAN Member Countries and interested users
3) To develop distance learning relate to TD mission with the collaboration from other educational institutes
4) To collaborate with others related institutes/organizations in the development of fishery information and extension program
5) To maintain and update TD Information Online

2.2 Program description:

There are five mission cores of the program, the first is public relation and promote TD activities via multimedia equipment as website, printing advertisement, and actively participation in fisheries events and exhibitions in both national and international levels. The second is being to continue the design and production audio-visual, printed and other media, then disseminate to member/non-Member Countries. The third is the development distance learning with the close collaboration with educational institutes which has MOU with SEAFDEC as the Australian Maritime College in Australia, the Marine Institute of Newfoundland in Canada. The curriculum of the course will relate to fishery field and professional of organization. The forth is extension and dissemination fishery information technology to fishery officer and worldwide via workshop arrangement. The last is update, review and improve TD's online website, including the online library. This program will ensure that TD's information will be available worldwide and will serve as an effective educational

tool for fisheries related organizations, schools, universities and the general public.

3. PROGRESS

In 2006, the Training Department continued to implement a project on Information and Communications Technology under the Departmental Program. The following activities were implemented:

3.1 Public Relation

To publicize SEAFDEC visibility, TD took part in a number of exhibitions relating to fisheries to present and promote SEAFDEC roles in Sustainable Fisheries Development in the ASEAN Region as following:

- Thai Children day in January 2006
- Thai Fish Expo 2006 during 24-27 June 2006
- Thai Exposition of Sufficiency Economy for Sustainable Development: the 60th Anniversary Celebrations of His Majesty's Accession to the Throne during 24-28 July 2006
- Fishery exhibition in Samut sakorn Province in November 2006

Moreover, TD also produced souvenirs that relate to TD projects like sea turtle conservation and tuna key chain and dissemination to the public via exhibitions, training course, seminar, and workshop and so on.

3.2 Production and Distribution of Integrated Information and Extension Packages

In 2006, TD continued to distribute information on Fisheries and the Activities of the Southeast Asian Fisheries Development Center to visitors and audiences at exhibitions. Two publications were published. There are Inland Fishing Gear and Methods in Southeast Asia: Myanmar and Preliminary results on the large pelagic fisheries resources survey in the Andaman Sea. The TD library also exchanged and disseminated information and publications to other network libraries.

The following is a list of publications distributed by the TD library in 2006:

- Preliminary Socio-Economic Survey in Comune Teuk Thla, Sihanoukville, Cambodia.
- Inland Fishing Gear and Methods in Southeast Asia: Myanmar.
- Preliminary results on the large pelagic fisheries resources survey in the Andaman Sea.
- The regulation of Sea Conservation in Locally Based Coastal Resource Management project, Pathew District, Chumphon Province, Thailand

Further, VCDs of TD project implementation and supporting the training courses conducted by TD were produced and distributed to target audiences. The following is a list of VCDs produced and distributed in 2006

- The International Training Course on Coastal Fisheries Management and Extension Methodology.
- Training Course on Fishery Technology and Responsible for university student No.42
- Introduction of Semi - curve Rigid Sorting grid JTEDs (Construction and Installation)
- Demonstration and Training on By - Catch Reduction Devices JTEDs (Merauke, Papua, Indonesia)

3.3 Development of Distance Learning Program

Based on the suggestion from the 28th PCM, TD carried out a study on the effectiveness of the past e-learning courses and reformulated the implementation of Distance Learning Program. The Collaborative Distance Learning Program with the educational institute as Australian Maritime College was initiated.
Furthermore on line classroom of the courses which conducted by TD in the year 2006 was created and provided as on line society for the participants, course organizer, and interested people.

3.4 Up date of TD Information Online

The TD Homepage (http://td.seafdec.org), emphasizing the movements within TD including TD activities and events was frequently updated**.** The web based technology was used as a tool for the Announcement of forthcoming training activities, workshops, and meetings. Interested people can apply for some training programs through the web site. Moreover, web pages of fishery information warehouse that that contains knowledge and information in the Fishery field and gathering information through TD Research Projects were continual developed. The Webpage of fishing gear and methods in Southeast Asia which presents information on series of handbook of Monograph of fishing gear and methods in Brunei Darussalam, Cambodia, the Philippines, Thailand, and Vietnam was created and located at http://map.seafdec.org/Monograph_project/index.php.

4. PROPOSED FUTURE ACTIVITIES

The following activities will be implemented in 2007:

4.1 Public Relations

TD will being to continue public relation and promote TD activities through the production of brochure and souvenirs that relate to TD projects and dissemination to the public via exhibitions, training courses, seminars, etc., In addition, TD will produce interactive VCD media on progress of TD project and activities then distribute to worldwide. Further, TD will join in a number of exhibitions relating to fisheries both at national and international levels.

4.2 Production of Integrated Information and Extension Packages

TD plan to produce information and extension packages as multimedia including VDOs, brochures, booklets and posters to promote “Surimi Material in Southeast Asian and The successful of Locally Based Coastal Resource Management in Chumphon project”. The information and extension packages will distribute to SEAFDEC members/non-Member Countries and publicity.

4.3 Distance learning Program

In the year 2007, TD plan to collaborate with educational institutes as AMC to develop and delivery the Distance Learning Program on Living Marine Resources in the Southeast Asian region. This program is a part of Master of Applied Science for overseas students. Distance-mode will delivery of coursework coupled with short, intensive tutorial and practical sessions in TD.

4.4 Workshop arrangement

In order to increase the efficiency of TD fishery information and extension program as well as provide the forum for people in fisheries to exchange information and build up the capacity in using of Information technology for fishery works, TD will arrange two workshops namely; 1) Regional Workshop on Information and Communication Technology for Fisheries, and 2) Workshop on Fishery Education and Training in Thailand.

4.5 Update of TD Information Online

TD's web page and online library will be improved and updated. The TD Library Database will be modified into two Databases; A Publication Database and An Audio-Visual Material Database. These databases will be contained in the SEAFDEC homepage to allow access for worldwide users.

LIST OF THE PROPOSED PROGRAM FOR THE YEAR 2007
Departmental Programs
Training Department

Program Title: Information and Communications Technology

Projects/Activities Title	Period												Remarks
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1. Public Relation													
• Exhibition													
• Souvenir													
• TD Brochure													
2. Production of Integrated Information and Extension Packages													
• The package of Surimi Material in Southeast Asian													
• The package of the successful of Locally Based Coastal Resource Management in Chumphon project													
3. Development Distance Learning													
4. Workshop													
• Workshop on Information and Communication Technology for Fisheries													
• Workshop on Fishery Education and Training in Thailand.													
5. Update of TD Information On-line													
• Update TD website information													
• Modify TD website structure and design													

SEAFDEC DEPARTMENTAL PROGRAMS OF ACTIVITY FOR THE YEAR 2006-2007

AQUACULTURE DEPARTMENT

1. OVERALL REVIEW

The Research and Development programs of SEAFDEC Aquaculture Department (AQD) which have been approved for implementation during 2006-2010 are the (i) Departmental Programs; and (ii) Programs under the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) Collaborative Mechanism. Under the Departmental Programs, AQD, in 2006, initiated programs that are in line with redefined thrusts for 5 years (2006-2010) and these are the following: (i) Integrated mollusk production, (ii) mud crab; (iii) shrimp; iv) marine fish; (v) small-holder freshwater aquaculture, and (vi) seaweed strain improvement. The activities under these programs have focused on research and verification of aquaculture technologies in support of the intensified FCG Programs in the ASEAN region. These activities are in line with the areas of importance to and priority needs of the region (i.e. broodstock development, genetic improvement, seed production, and grow-out culture) and the recommendations made at the 28th Program Committee meeting held in 2005. The following sections describe the highlights of achievements of AQD Departmental programs in 2006 and planned activities for 2007.

In June 2006, AQD convened an in-house workshop and this resulted in identification of gaps for further research and verification and formulation of plans for dissemination and transfer to farmers. Based on outcomes of this workshop, AQD has embarked on initiatives that would address the gaps and technological needs for various commodities.

Mollusk Program has conducted experiments aimed at refining the techniques for seed production of abalone and determining the suitable condition for larval settlement. Optimum stocking densities for nursery rearing of abalones in cages suspended in land-based flow-through tanks and grow-out culture in floating sea cages have been assessed. The use of fresh seaweed and formulated feed was also compared in terms of performance of juveniles during rearing in net cages.

Under Mud crab program, studies have been continued to refine the techniques of broodstock management, seed production and hatchery rearing. The use of outdoor tanks and indoor tanks was compared in terms of effects on reproductive performance of broodstock. The application of different management schemes and their effects on survival and performance of larvae were also assessed. As part of the strategy to improve the survival of crab instar to juvenile stage, experiments were conducted to investigate the agonistic behavior of three mud crab species. Morphological differences, color adaptation and burying behavior between hatchery reared and wild juveniles were also assessed. Studies have also been initiated to reduce the use of fish by-catch during hatchery rearing and to verify the grow-out production of mud crab in mangrove pens.

Regarding the shrimp program, experiments aimed at developing the technology to produce viable broodstock in captivity have been continued. The use of outdoor concrete tanks with sand substrate for culture of marketable size to broodstock size of *P. monodon* has been tested. The effects of presence of sand substrate in tanks for spawnings of *P. indicus* and *P. merguiensis* was also evaluated. Transport simulation tests were also conducted to reduce mortalities experienced during transport of shrimp stocks.

Marine Fish Program has embarked on studies that would verify the seed production techniques of milkfish, rabbitfish and the 3 high value marine fish species (grouper, red snapper and sea bass), including the use of AQD formulated diets during larval rearing. Efforts are also underway to help rehabilitate the wild natural resource of sea horse through initiation of breeding and seed production experiments. The potential use of insulin-like growth factor II (IGF-II)mRNA expression as molecular marker for egg quality in fish was also investigated. As part of the activity to develop and refine the grow-out culture techniques for the production of marine fishes, studies have also been conducted to assess the effectivity of AQD formulated diets in performance of milkfish in marine cages; snapper and sea bass cultured in ponds, and grouper, in ponds and floating net cages. The efficiency of low-grade form metaldehyde to control snail population in brackishwater milkfish ponds has also been tested. Initial experiments were also conducted to test the polyculture of milkfish and rabbitfish in ponds.

Concerning the Small-holder Freshwater Aquaculture Programs, studies in 2006 focused on improving the seed production and grow-out technologies for commercially important freshwater commodities (tilapia, catfishes, carps and freshwater prawn). Experiment was done to compare the growth and survival performance of native catfish fry in hapa net cages with or without supplemental feeding. Efforts have also been made to improve the carcass traits in Nile tilapia through farm-based mass selection and interspecific hybridization. To reduce the cost of giant freshwater prawn seedstock production, AQD has also conducted trials to develop stocks that are tolerant to low salinity. Initiation of the studies that will assess the bioeconomics of freshwater prawn hatchery production in different larval rearing systems has also been made. Polyculture nursery trial of bighead carp *Aristichthys nobilis* fry and giant freshwater prawn larvae was conducted in hapa cages in the lake to determine how different stocking density combinations affect the performance of these commodities. Another area of research that has been initiated is on the assessment of social and economic impacts of aquaculture development in Laguna de Bay.

With regard to Seaweeds Program, AQD has continued studies for the strain improvement of *Kappaphycus, Eucheuma* and other economically important seaweeds. Characterization of carrageenan properties of farmed carrageenophytes has been completed and experiments to determine disease resistance traits and growth performance have been initiated. Growth experiments in concrete tanks and growth chambers were also undertaken to identify which among the collected cultivars can be cultured in land-based facilities and to develop protocols for land-based seaweed culture.

Apart from research and verification studies, efforts were also made by various Programs, in collaboration with the Training and Information Division, in dissemination of viable technologies to various stakeholders. This was done through organization of international and local training programs (including provision of technical assistance, on-the job and internship programs), participation of AQD in technology forum and exhibition and publication of information materials (e.g. manuals). For 2006, training courses were conducted on various topics; namely: marine fish hatchery operations; abalone hatchery and seed production; seabass culture in cages and ponds; seaweed farming; farm based feed preparation for freshwater aquaculture; freshwater prawn hatchery and grow-out operations; tilapia feed formulations; and freshwater aquaculture operations.

Most of the activities initiated in 2006 will be continued in 2007. However, one new program (Aquatic Ecology) has been added in response of AQD to growing needs of the region to address issues related to sustainability of the aquatic environment. In view of this, the proposed AQD Departmental Programs for 2007 will comprise the following: (i) Mollusk; (ii) Mud Crab; (iii) Shrimp; (iv) Marine Fish; (v) Strain improvement of seaweeds; (vi) Small holder Freshwater Aquaculture; and (vii) Aquatic Ecology.

The Philippines and elsewhere in the region are in dire need of aquaculture technologies that will bring about improvement in production of commercially important aquatic products while protecting the environment. The year 2006 marked the achievement of significant milestones that would contribute to addressing this need.

2. LIST OF PROGRAMS

Programs	Responsible Departments
Programs Implemented in the year 2006	
1. Integrated Mollusc Production	AQD
2. Mud Crab	AQD
3. Shrimp Domestication	AQD
4. Marine Fish	AQD
5. Small-holder Freshwater Aquaculture	AQD
6. Seaweed Strain Improvement	AQD
Programs Proposed for the year 2007	
1. Integrated Mollusc Production	AQD
2. Mud Crab	AQD
3. Shrimp Domestication	AQD
4. Marine Fish	AQD
5. Small-holder Freshwater Aquaculture	AQD
6. Seaweed Strain Improvement	AQD
7. Aquatic Ecology	AQD
8. Other R&D Activities	AQD

PROGRAM DOCUMENT

Program Category: Departmental Program
Program Title: Integrated Mollusk Production
Responsible Department: Aquaculture Department (AQD)
Total Duration: Five Years (2006-2010)

1. INTRODUCTION

Abalones are some of the most valuable sea food commodities in the world as they command a high price and have a great demand in the export market. There are more than 70 species of abalone belonging to the genus *Haliotis* that are distributed worldwide. The Philippines is one of the principal countries harvesting abalones from the natural fishery mainly for export to other Asian countries and the United States. In recent years however, there was a fast decline in abalone production from the natural fishery of major abalone producing countries including the Philippines due to heavy exploitation of the resource. The decreasing commercial catch and the high price of abalone both in the domestic and export markets have stimulated interests in the development of its aquaculture for commercial production and for restocking purposes to enhance its fishery resource.

The Southeast Asian Fisheries Development Center Aquaculture Department has been in the forefront of developing the technology for controlled hatchery seed production and culture of the tropical abalone, *Haliotis asinina*. At present, significant results have been achieved in terms of consistent spawning of captive broodstock year-round, improved larval settlement and survival due to improved techniques in large-scale production of diatoms as food for larvae resulting in increased early juvenile production. The grow-out culture technology in floating sea cages is currently being developed.

In addition to abalone, studies on the biology and fishery as well as developing the hatchery seed production techniques of indigenous mollusk species such as the angelwing *Pholas orientalis* and sea cucumber *Holothuria* sp. will be conducted.

2. PROGRAM

2.1. Objectives

The main objective of the Program is to develop and demonstrate economically viable mollusk production technologies and make mollusk production an important industry in suitable coastal communities. The specific objectives are to: (1) refine techniques on broodstock management and spawning of captive spawners, (2) improve the seed production technology by enhancing the growth of natural food (mainly diatoms) favored by the abalone and by understanding the role of microbial communities in the survival of newly settled larvae; (3) compare the economic viability of producing advanced juveniles in tanks and sea cages set in open waters and develop viable technology package for the intermediate nursery culture of abalone; and (4) develop a technology package for marketable abalone production.

2.2. Program Description

The Integrated Mollusks Program consists of four components: (1) broodstock management and breeding to refine the spawning and egg and larvae production techniques, (2) primary nursery rearing and natural food production to improve on larval settlement and metamorphosis, increase early juvenile production and develop protocols for sufficient natural food (mainly epiphytic diatoms) production, (3) intermediate nursery culture to develop a rearing technology

package for juveniles and assess its economic viability under land-based nursery tank system as well as in floating net cages in open-waters, (4) grow-out culture in bottom-set and suspended cages to demonstrate the technical and economic viability of abalone marketable-size production. This program has a linkage with the Stock Enhancement/Sea Ranching Program in that it provides hatchery-produced juveniles or seeds for stocking.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

3.1. Refinement of seed production techniques for abalone, Haliotis asinina

Captive abalone broodstock spawned spontaneously at regular interval of 13-15 days. The eggs or trochophore larvae were collected from the spawning tanks at 700 hrs and incubated in UV-treated seawater until they metamorphosed to early veliger larvae at 1300 hrs. A total of 136,343,559 abalone eggs/trocophores and 61,427,619 veliger larvae were produced during the period January to September 2006. Average survival from trochophore to veliger larvae stage was 45.05%. The veliger larvae were directly stocked in the settlement tanks, with settlement plates pre-grown with monocultured diatoms *Amphora sp* and *Navicula sp*. Mixed culture of diatoms was fed to the larvae from day 10 until they reached the post veliger stage. The total abalone early juvenile production from January to September 2006 was 155,627 pcs.

In another experiment, abalone larvae were stocked in 3-ton rectangular concrete tanks at 381,000/tank to compare the settlement rate of larvae between hanging and rack type of settlement plates (43 x 54 cm^2). Initial results showed a survival of larvae in hanging plates was 0.3% after 30 days while no larvae were found in plates in the rack type plates.

A pilot testing of abalone hatchery techniques is being conducted in a private hatchery in Oton, Iloilo which is about 10 km from Tigbauan Marine Station. Trochophore larvae were packed in oxygenated plastic bag at 500,000 larvae density and transported to the hatchery by land. Larvae were stocked directly in a prepared settlement tanks containing suspended diatom plates as substrates. Initial stocks are still being monitored for percentage settlement and survival of early juveniles.

The Abalone Hatchery has a total income of P 245,781.50 (1US$=P50.00) derived from the sale of juveniles and marketable size abalone for the period from January to September 2006

3.2. Pilot testing on the propagation and use of diatoms for larval settlement of the donkey-ear abalone (*Haliotis asinina*)

This study was conducted to develop techniques on the propagation and use of epiphytic diatoms as larval food as well as inducer of larval settlement in the donkey-ear abalone, *Haliotis asinina*. Based on the results of two earlier runs, a validation experiment was done to compare the effects of diatom density and frequency of feeding on larval settlement using a mixture of 50% *Amphora* sp. and 50% *Navicula* sp. Results showed that abalone larvae fed diatoms at higher density and more frequent feeding attained a higher settlement rate on day 5 (8.6 ± 1.4%), day 10 (5.1 ± 0.8%) and day 15 (5.46 ± 1.8%) compared to low feeding density and frequency (day 5, 2.9 ± 0.9%; day 10, 2.4 ± 1.0%; day 15, 2.4 ± 0.5%).

A 15-day experiment was also conducted to evaluate the effects of number of settlement plates measuring 43x54-cm in the settlement rate of abalone larvae. Tanks with 100 plates per 1-ton tank attained a higher settlement rate on day 5 (4.45 ± 1.0%), day 10 (0.94 ± .01%), day 15 (0.42 ± .04%) compared to 75 (day 5, 2.04 ± .40%; day 10, 0.34± 0.2%; day 15; .20 ± .03%) and 50 plates (day 5, 1.5 ± .1%; day 10, 0.45 ± .1%; day 15, 0.12± .02). This run produced 1,678 pieces of 0.5 cm juveniles.

3.3. Nursery rearing of abalone (*Haliotis asinina*) in land-based flow-through tanks and in floating sea cages

Nine mesh cages suspended in a flow-through tank were stocked each with 1000 (Treatment 1), 1500 (Treatment 2), or 2000 (Treatment 3) abalone juveniles (mean=14 mm shell length, 0.53 g body weight) with three replicates. Each cage was installed with pvc shelters with total surface area of 0. 46 m^2 resulting in stocking density/m^2 equivalent of 2174, 3260, and 4348 per cage, respectively. After 60 days of feeding *Gracilaria*, juveniles in Treatments 1 and 2 grew similarly with mean shell length of 26.1 mm and 25.4 mm and mean body weights of 3.79 g and 3.51 g which were higher than juveniles in Treatment 3 with mean shell length and body weight of 22.1 mm and 2.14 g, respectively. Percent survival ranged from 96 to 98 which were similar for all treatments. Feeding rates ranged from 22-30% during the early days of culture and decreased to 20% during the last sampling.

In separate experiment, two groups of abalone juveniles (mean=17.2 mm shell length, 0.95 g body weight) were stocked separately in net cages suspended in flow-through tanks. Juveniles were fed either fresh seaweed *Gracilaria* or a formulated feed. After 75 days of rearing, abalone fed seaweed grew bigger with mean shell length and body weight of 29 mm and 5.5 g, respectively as compared to juveniles that fed on formulated feed with mean shell length and body weight of 26 mm and 3.6 g, respectively.

In a sea cage experiment conducted at Igang Marine Sub-Station, three size groups of juveniles (treatment 1: 7-9 mm; treatment 2: 10-14 mm, and treatment 3: 15-19 mm shell length) were stocked in triplicate cages at 1000 per cage on 22 August 2006. However, this trial will be repeated due to heavy mortalities that occurred in treatments 2 and 3 cages towards the end of the first month of rearing. The movement of juveniles might have been restricted by the excessive amounts of seaweeds placed inside the cage resulting in the suffocation of the animals. Seaweed rations are usually given every 3-4 days so that the amount of ration might have been more than the capacity of the cage to accommodate.

3.4. Grow-out culture of abalone (*Haliotis asinina*) in floating sea cages

A study on grow-out culture of abalone in floating sea cages is being conducted at the Igang Marine Substation in Nueva Valencia, Guimaras and still on-going. Fabricated round mesh cages (60 cm in diameter, 60 cm in height) were stocked at 500, 100 and 1500 hatchery-bred juveniles measuring 30-35 mm in shell length. Cages were suspended from a 5x5-m wooden raft with plastic drum floaters. Abalones are fed fresh seaweed *Gracilariopsis bailinae* given at 20-25% of body weight given every three days. The animals are sampled at monthly intervals and will be reared over 10-11 months or until they attained an average marketable size of 55-60 g body weight.

3.5. Other Activities

Exhibit participation. The Abalone Program of AQD participated in the First Regional Cluster Technology Forum and Product Exhibition, held in Punta Villa Resort, Arevalo, Iloilo last July 2006. The exhibition was sponsored by the Department of Agriculture Region 6 which featured abalone hatchery and farming technologies.

Training. A 14-day special training course on Abalone Hatchery and Seed Production was conducted on 15-29 August 2006, in coordination with the Training & Information Division. A total of 16 participants from Zamboanga provincial government (10 participants), the academe (3 participants) and the private sector (3 participants) attended the course. On November 9-30, 2006, nine foreign participants and four local trainees attended another run of the same course. Eight of the foreign trainees SEAFDEC-Member Countries and two from Philippines were

funded by the Government of Japan-Trust Fund while the rest covered their costs of participation.

On-the-Job and Internship training are conducted at the Abalone Hatchery and Nursery Facility in coordination with the Training & Information Division. Students from nearby colleges and universities as well as private individuals have conducted their summer job training and internships at the Hatchery. They participated in the activities such as broodstock selection for spawning, egg incubation and hatching, larval rearing, diatom culture, cage fabrication for nursery and grow-out cultures, and packing abalones for transport. They are also given lectures by the research specialists on the research activities being done on abalone.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

4.1. Planning for the project and activities

Project/Activity Title	Duration	Remarks
Breeding: **Study 1**.a) Factors regulating spontaneous spawning in captive broodstock. (b) Synchrony of spontaneous group spawning in captive broodstock **Study 2.** Environmental manipulation to optimize egg fertilization & hatching **Study 3.** Determination of criteria for egg quality evaluation **Study 4.** Development of transport techniques for eggs and larvae **Study 5.** Effect of formulated diet on egg production, hatching and survival of metamorphosed larvae: A verification study	3 years 3 years 3 years 3 years 2 years	Studies are geared toward a more refined breeding and egg production techniques for captive abalone broodstock. Some environmental and bio-physical factors including feed manipulation that may regulate the spontaneous spawning will be looked into. Transport techniques for eggs and larvae will be developed that can encourage small private hatchery operators to venture into abalone seed production.
Larval Rearing **Study 1**. Evaluation of micro-particulate diet as replacement for diatoms **Study 2.** Optimum illumination & dissolved oxygen levels during larval settlement **Study 3.** Is larval mortality due to starvation or water quality malfunction? **Study 4.** Refinement of large-scale diatom production and techniques for its utilization as larval food	1 year 1.5 years 1.5 years 1.5 years	Studies on larval settlement and metamorphosis are aimed at increasing early juvenile production. Development of a micro-particulate diet can help provide alternative food source that aimed at improving survival of early juveniles.
Intermediate Nursery (Tanks & Cages) **Study 1**. Stocking density & size at transfer in nursery tanks and sea cages **Study 2**. Diet manipulation: formulated feed and/or seaweeds for juveniles **Study 3.** Food consumption and feeding behavior of juveniles at different culture environment	1.5 years 1.5 years	Studies on intermediate nursery and grow-out are geared towards increasing survival of juveniles and marketable size abalones through cost-effective stocks management techniques.

Grow out Culture (Sea Cages) **Study 1.** Stocking density, optimum cage surface-to-volume ratio, and Cage design (mesh cages or plastic barrels) **Study 2.** Feeding regimes using wild & cultured seaweeds	1.5 years 1.5 years	

4.2. Expected outcomes.

1. A more thorough understanding of the effects of environmental, biological, physical factors regulating spontaneous spawning in captive abalone broodstock. Results of these studies shall explain about the phenomenon of asynchronous spontaneous spawning among tank-held broodstock.
2. Improved spawning efficiency in terms of higher percentage successful spontaneous group spawning of tank-held broodstock, thus a corresponding increase in egg and trcochophore production
3. Increased percentage of egg hatching and survival of creeping veligers through improved water management during incubation.
4. Improved techniques on larval settlement and metamorphosis through proper feeding techniques using formulated micro-particulate diets in combination with diatoms.
5. A cost-effective nursery rearing techniques for land-based and sea cage nursery systems
6. A grow-out culture technology in floating sea cages utilizing indigenous materials and seaweed resources.

PROGRAM DOCUMENT

Program Category: Departmental Program
Program Title: Mud crab
Responsible Department: Aquaculture Department (AQD)
Total Duration: Five years (2006-2010)

1. INTRODUCTION

Mud crabs (*Scylla* spp). support one of the most valuable fisheries in the Indo-Pacific region. However, overexploitation of mud crabs and habitat losses have resulted in both reduced landings and smaller mean capture. The significant decrease highlights the need to manage the resources and develop commercially viable hatchery techniques. The basic hatchery-nursery protocol has been developed at SEAFDEC AQD. However, there is still a need to refine the existing technology to ensure economic viability. Nutrition, disease, and water quality are the three major areas that need to be investigated to improve larval performance in the hatchery.

Production of crabs in nursery and grow-out ponds and pens are dependent on fish by-catch. However, fish can be expensive and is not always available. Likewise, the use of fish as aquafeed reduces the available low cost protein needed by the local people. Therefore, the dependence on use of fish for crabs should be reduced by developing or improving existing formulated diets.

The second generation of *Scylla serrata* was obtained in 1998 at SEAFDEC/AQD. It shows that the life cycle of *S. serrata* can be completed in 9 months hence it is a good candidate species for domestication. Since all phases of crab culture (broodstock, hatchery, nursery and grow-out) are now being done, these can be integrated to produce domesticated broodstock. Domestication of crab is a prerequisite to selective breeding program, which allows for strict disease prevention and control, and present opportunities for improvement of farmed stock.

2. PROGRAM

2.1 Program Objectives

The long term objective of the program is to develop a technology for sustainable production of captive mud crab broodstocks and quality seeds. The specific objectives are to: (1) test the viability of concentrated microalgae for culture, rotifer feed and acceptability for crab and fish larvae after storage, (2) improve survival of *Scylla* spp. through refinement of broodstock management and hatchery rearing techniques, (3) improve survival of crab instar to juvenile stage through behavioral studies and culture strategies, (4) reduce the use of fish by catch in nursery and grow-out culture, and (5) pilot test and package the technology.

2.2 Program description

The program consists of four components: (1) natural food production which includes mass production of microalgae and testing of their viability for culture after storage and the use of rotifer feed and determination of its acceptability to crab and fish larvae, (2) seed production which includes studies on refinement of protocols for broodstock management and larviculture of *Scylla* spp., (3) nursery which focuses on verification trials such as provision of adequate nutrition using formulated diet and 3-dimensional shelters to reduce cannibalism, and (4) grow-out which focuses on the reduction of fish by catch as feed for crab culture in ponds and pens.

The activities are linked with the programs on Promotion of Sustainable Aquaculture in ASEAN Region and Stock Enhancement.

3. PROGRESS OF PROJECT ACTIVITIES (2006)

3.1 Cost-effective culture, harvesting and preservation techniques of green microalgae for crab and fish seed production

Four green microalgae, *Nannochlorum* sp., *Chlorella* sp. (SS56 strain, *Chlorella*-like algae from Dumangas), *C. vulgaris* and *C. sorokiniana*, were mass produced using open pond system, concentrated by electrolytic method and stored in either the refrigerator or freezer for various periods. Thereafter, the microalgae were cultured to determine their viability and fed to rotifers.

The four microalgal species were viable 1-4 months after storage. However, the freshwater microalgal species (*C. vulgaris* and *C. sorokiniana*) had better viability than the marine species (*Nannochlorum* sp. and *Chlorella* sp.). Higher population growth rate was attained at 5 ‰ for *C. vulgaris*, and 10 and 15 ‰ for *C. sorokiniana*. The rotifer population was higher in those grown in *C. vulgaris* and *C. sorokiniana* than *Nannochlorum* sp. and *Chlorella* sp.

3.2 Refinement of broodstock management and seed production techniques

While the basic hatchery procedure has been worked out, there's still a need to refine the protocol in order to make it more economically viable. Improvement of the culture systems was the focus of the studies on broodstock management and larviculture.

Broodstock

Adult mud crab *S. serrata* (505-820 g body weight 13.7-15.1 cm internal carapace width, ICW) from Capiz were held in either outdoor or indoor concrete tanks with sand substrate and fed fish, marine worms or mussel. Green microalgae were maintained in outdoor tanks. After three months, crabs held in outdoor tanks had better reproductive performance (latency period from ablation to spawning, duration of embryonic development, number of zoeae/hatching) than those in the indoor tanks.

Larvae

Larval performance of the mud crab *S. serrata* was compared using the following schemes: T1 - daily water change + *Nannochlorum* sp. at 50 $x10^3$ cells/ml (or control), T2 - water change every 5 d + *Nannochlorum* sp. at 50 $x10^3$ cells/ml, T3 - water change every 5 d + *Nannochlorum* sp. at 100 $x10^3$ cells/ml, T4 - recirculating water starting at $zoea_2$ + *Nannochlorum* sp. at 50 $x10^3$ cells/ml. The highest survival from $zoea_1$ to megalopae 4-5 was obtained in T3 (6.7% followed by T2 (5.3%) and T4 (1.6%). T1 had the lowest survival (1.6%). Larval stage index was similar in all treatments.

In another study, water was aged for 3 (3d) or 5 days (5d) after water treatment (15 ppm chlorination for 24 h and deactivation of chlorine with sodium thiosulfate) prior to use for larval rearing of *S. serrata* zoea to megalopa. Water used within 24 h after treatment served as the control (0d). Survival was comparable in 0d (5.24%) and 3d (5.21%), and lowest in 5d (2.58%). Larval stage index was comparable among treatments. Water temperature ranged from 27 to 30^0C. Ammonia levels from 1.03 to 1.65 ppm decreased to 0.14 - 0.89 ppm in all treatments after water change in the first week of culture. However, no definite pattern was observed among treatments in the second week until the end of the experiment. Nitrite was detected starting 13^{th} day of culture. There was no apparent trend in the bacterial counts in the rearing water.

A study was done to evaluate the application of microalgae which have been associated with green water culture. *Tetraselmis tele* (5-10 x10^3 cells/ml), *Chaetoceros calcitrans* (30-50 x10^3 cells/ml), *Skeletonema tropicum* (30-50 x10^3 cells/ml), and *Nannochlorum* sp. (100 x10^3 cells/ml) were added in the culture tank. Microbial profile of the rearing water was determined. After 16 days, average survival of $zoea_1$ to megalopa was highest in *T. tele* (23.31%) followed by *C. calcitrans* (15.14%), *Nannochlorum* sp. (8.91%) and *S. tropicum* (8.10%). Larval stage index showed that larvae in *T. tele* treatment reached the megalopa stage faster than the three treatments. Ammonia (0-0.05 ppm) and nitrite (0-0.15 ppm) were within the tolerable levels of the larvae.

Juveniles

Understanding the behavior among the three mud crab species, *S. serrata*, *S. tranquebarica*, and *S. olivacea* provides information for formulating future culture strategies and stock enhancement activities.

Interspecific aggression in mudcrabs. Differences in the agonistic behavior between the three *Scylla* spp. juveniles were determined. Displays were categorized into threat, attack, fight, defense, retreat, rest and bury. *S. olivacea* is the most aggressive of the three species spending significantly more time in threat ($P<0.05$). *S. tranquebarica* is the subordinate of the three species spending more time in defense and retreat displays ($P<0.05$).

Differences between hatchery-reared and wild mud crabs *S. serrata*. Morphological differences, color adaptation and burying behavior between the hatchery-reared (communal or solitary conditions) and wild *S. serrata* juveniles were assessed. The frequency and variation of morphological abnormalities in hatchery-reared (asymmetrical or slightly bent abdominal flap, abnormal pigmentation or slight depression on dorsal carapace) were higher than wild juveniles (extra lateral spines and abnormal pigmentation).

3.3 Production of mud crab S. serrata juveniles in different nursery systems

Hatchery-reared crab instar nursed in concrete tanks and net cages in earthen ponds were compared. Crab instar (12.6-14.6 mg body weight) were stocked at 30 ind/m^2 in tanks and net cages and fed mussel. After a month, the survival of crabs was higher in tanks (81%) than in net cages (57%). However, mean body weight and internal carapace width (ICW) was higher in crabs held in net cages (1.53 g body weight; 2.2 cm ICW) than in tanks (0.89 g; 1.73 cm ICW).

A follow-up study to address the preference of crab growers for larger size *S. serrata* juveniles (≥3 cm ICW) for stocking in ponds was determined. Crabs (1.3 g body weight; 1.8 cm ICW) previously cultured in net cages for a month were stocked in net cages, and in lined and unlined ponds at 5 ind/m^2. After a month, survival of crabs was highest in net cages (69%) followed by lined (54%) and lowest in unlined ponds (40%). Mean body weight and ICW were highest in unlined ponds (9.9 g body weight; 3.83 cm ICW) followed by lined ponds (8.57 g body weight; 3.48 cm ICW) and lowest in net cages (7.5 g body weight; 3.32 cm ICW).The abrupt change in salinity from 18 to 35 ppt in ponds could have affected survival and growth of crabs.

3.4 Pilot testing of mud crab hatchery technology

There has been a growing interest by private sector to adapt the hatchery technology; hence, SEAFDEC/AQD has extended assistance to hatchery owners. Two hatcheries were selected based on the background of the technicians who would handle the larviculture. The technicians had previous experience on shrimp larviculture and had undergone a-month training course on mud crab seed production at SEAFDEC/AQD.

Hatchery 1 (Initiao, Misamis Oriental) - In the initial run, the survival rate from zoea to megalopa was 2.5% and from megalopa to crab instar (ca. 1.0 cm ICW) was 59.0%. After more than two weeks, there was a reduction in the population due to cannibalism. Nursery facilities were not enough to thin out the population. Buyers of crablets were from Samar and Iloilo.

Hatchery 2- (Roxas City, Capiz) - The survival rate of the three runs ranged from 1.0 - 3.8% from zoea to megalopa and 21.0-46.4% from megalopa to crab instar (ca. 1.0 cm ICW). Megalopae and crab instar were nursed in net cages installed in brackishwater ponds until juvenile stage (>2 cm ICW) and then released in grow-out ponds adjacent to the hatchery site. The shortage of natural food due to collapse in culture and presence of luminescent bacteria at the zoea stage were the major problems encountered.

Selective harvesting of marketable size crabs has been started in the first batch of juveniles that were grown in ponds.

3.5 Mud crab *S. serrata* culture using formulated diet in brackishwater ponds

A low cost diet for mud crab was formulated to reduce the use of fish by catch. Hatchery-reared *S. serrata* juveniles with average body weight of 7.3 g (3.31 cm ICW) were stocked in two pond compartments at 0.3 ind/m^2 on October. Crabs are being fed fish alone or 50% fish and 50% formulated diet until they attain marketable size (≥500 g body weight).

3.6 Grow-out production of the mud crab *S. serrata* in mangrove pens

Hatchery-reared *S. serrata* with average body weight of 8.4 g were stocked in pens with mangroves at 0.50 crab/m^2 on September. Crabs are being fed mussel at 10% of body weight daily with the gradual introduction of formulated diet until 50% of the feed ration is composed of formulated diet.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Project/Activity Title	Duration	Remarks
1. Cost effective culture, harvesting and preservation techniques of green microalgae for crab and fish seed production	2005-2007	ongoing study
2. Refinement of broodstock management and seed production techniques	2005-2008	ongoing study
3. Domestication of mud crab	2007-2011	to be proposed
4. Pilot testing of mud crab hatchery technology	2007	ongoing
5. Verification of nursery technology for mud crab	2007	to be proposed
6. Mud crab *S. serrata* culture using formulated diet in brackishwater ponds	2007	ongoing, recently started
7. Comparison of hatchery-reared and wild mud crabs in ponds	2007-2008	to be proposed,
8. Grow out production of the mud crab *S. serrata* in mangrove pens	2007-2008	ongoing, recently started

4.1 Cost effective culture, harvesting and preservation techniques of green microalgae for crab and fish seed production

The next phase of the study involves testing of other preservation techniques and the feeding of rotifers with microalgae that have been cultured after preservation. Thereafter, the rotifers will be fed to crab or fish larvae. Samples of the microalgae and the rotifers fed with these microalgae will be taken for biochemical analyses.

4.2 Refinement of broodstock management and seed production techniques

Broodstock and larval diets that have been formulated in previous studies will be improved. Trials will also include the improvement/control of water quality and reduction of the use of antibiotics. Water parameters and microbial profile of the rearing water will be monitored in all the trials. Strategies to reduce cannibalism from megalopa to juveniles stage will be continued.

4.3 Domestication of mud crab

This new study's long term objective is to develop a husbandry technology for sustainable supply of good quality captive mud crab *S. serrata* broodstock. The specific objectives include the identification of potential sources of good quality adult mud crab, develop healthy broodstock from highly genetically variable wild stocks, and use of molecular genetic tools in the effective management and selective breeding of good quality mud crab.

4.4 Pilot testing of mud crab hatchery technology

Extension of the technology on *Scylla* spp. seed production to hatchery operators will continue.

4.5 Verification of nursery technology for mud crab

A series of verification trials such as provision of 3-dimensional shelters and adequate nutrition using formulated diet will be done to mitigate the high level of cannibalism that is typical of the post-larval culture of mud crabs in the nursery phase.

4.6 Mud crab *S. serrata* culture using formulated diet in brackishwater ponds

This is a continuing study which aims to evaluate the production and economic viability of mud crab in brackishwater ponds using formulated diet.

4.7 Comparison of hatchery-reared and wild in ponds

With recent progress in the development of hatchery systems for *Scylla* spp. there is growing interest in evaluation of the quality of hatchery-reared juveniles relative to wild seed crabs as currently used in aquaculture. This study will assess the performance of hatchery-reared in comparison with wild mud crab juveniles grown in ponds up to market size.

4.8 Grow-out production of the mud crab *S. serrata* in mangrove pens

This is a continuing study which aims to reduce the utilization of fish by using formulated diet in crab culture in mangrove pens

PROGRAM DOCUMENT

Program Category: Departmental Program
Program Title: Shrimp Program
Responsible Department: Aquaculture Department (AQD)
Total Duration: Five years (2006-2010)

1. INTRODUCTION

The shrimp industry in Southeast Asia is considered relatively advanced and well developed compared to that of other regions. Yet, the culture of native species, particularly *Penaeus monodon* has continued to rely totally on the use of wild-caught broodstock and spawners. Thus, when good quality natural broodstock and spawners became scarce due to both overexploitation and higher prevalence of diseases, the use of domesticated exotic species became attractive and irresistible. However, the relatively faster growth rate and larger size of *P. mondon* still makes it the most ideal species for culture.

Use of wild stock results in unpredictable production outcomes attributable to inconsistent quality of the source of nauplii. A breeding program where only those with beneficial heritable traits are selected for reproduction can improve the quality of broodstock and seed. Previous works in *Penaeus. vannamei* indicated that reproductive quality could be improved by selective breeding. However, before a breeding program can be started, a technology for the sustainable production of captive broodstock must first be developed.

The entry of *P. vannamei* into the country despite the existing ban reflects the need to augment the supply of good quality source of shrimp nauplii or look for alternative species. The culture and breeding of *Penaeus indicus* and *Penaeus merguiensis*, both white shrimp species indigenous to the Philippines, are worth investigating. Past experience on larval rearing and pond culture trials can be used as basis for future studies and for establishing a breeding program parallel to that planned for *P. monodon*.

2. PROGRAM

2.1 Objectives

The long term goal of the Shrimp Domestication Program is to develop a viable technology for production of captive spawners of native shrimp species, particularly *P. monodon, P. indicus*, and *P. merguiensis*, that can be genetically selected for desired heritable characteristics, particularly disease resistance or fast growth while maintaining or even improving favorable inherent traits. The specific objectives are the following: 1) to develop the technology to produce viable *P. monodon* and *P. indicus/P. merguiensis* broodstock in captivity and determine the economic viability of such activity; 2) to maintain family lines of the 3 species; 3) to refine techniques for broodstock management of *P. monodon* and *P. indicus/P. merguiensis;* and 4) to refine techniques and evaluate the commercial viability of *P. indicus* and *P. merguiensis* hatchery and grow-out culture.

2.2 Program Description

The shrimp domestication program consists of two main studies: 1) *P. monodon* broodstock development, which includes experiments aimed at developing a technology for the production of broodstock size (80 to 100g) shrimp and refining techniques for production of nauplii and postlarvae from captive broodstock; and 2) *P. indicus/P. merguiensis* broodstock development, which includes experiments aimed at improving nauplii production using captive broodstock,

refining techniques for larval rearing, and evaluating the economic viability of hatchery operations. Apart from the two main studies, the program also includes activities aimed at verifying the technologies developed, testing their viability and packaging these for commercialization.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

3.1 *P. monodon* broodstock development

Culture of marketable size *P. monodon* (30-50 g body weight) to broodstock size (80-100 g body weight) is being tested in outdoor concrete tanks with sand substrate. Males (36.4 g average body weight) and females (46.5 g body weight) that had been cultured in a farm in Bacolod City, Negros Occidental for five months were stocked in 40-ton tanks. After nine months, males attained an average weight of 67.9 g while females had 112 g body weight.

Another batch of *P. monodon* males (44.3 g average body weight) and females (49.9 g body weight) that had been cultured for five months in ponds in Sta Catalina, Negros Oriental attained an average body weight of 74.1 g for males and 83.9 g body weight for females after seven months in tanks.

Females from both batches attained ovarian maturity (Stage 1 to Stage 3) without eyestalk ablation after 4-5 months in tanks. All females were then subjected to eyestalk ablation; however, none has attained full ovarian maturity (Stage 4) to date.

3.2 *P. merguiensis/P. indicus* broodstock development

P. indicus

Wild caught *P. indicus* spawners (6.8 to 16.8 g body weight) collected from Negros Occidental were allowed to spawn in individual tanks. Eight out of 17 animals spawned viable eggs. Fecundity ranged from 8,000 to 26,000 nauplii/spawner. Nauplii from one spawner were divided equally into two groups and one was reared using Oxytetracycline and the other with Biodream probiotics. Faster growth was observed in all tanks reared with antibiotics. Postlarvae (PL10) from each spawner (family) were stocked separately in 10-ton outdoor concrete tanks and reared to 5-10 g body weight size and stocked in two ponds at Dumangas Brackishwater Station. Survival after 2.5 months was 83.4% and 91.4%. 3.4% and 91.4% and body weight ranged from 6-11g (male) and 16-25 g (female). These were stocked in half-ton tanks with or without sand substrate. After 20 days, a total of 934,000 nauplii have been produced from this experiment, with most of the spawnings coming from tanks without sand. Fecundity for this stock ranged from 20,000 to 150,000 nauplii per female. From the 8 original spawnings, only 3 families were developed.

Transport simulation tests were conducted to reduce or eliminate mortalities experienced .during transport of shrimp stocks. *P. indicus* juveniles (8-10g body weight) were used in simulated transport experiments. Two experiments were conducted. In the first trial (comparing different transport conditions), juveniles were placed in plastic-lined styrofoam boxes with either a) clear water provided with sand substrate; b) clear water without sand; or c) with water treated with blue food coloring. Each box was provided with a battery-operated aerator. Survival at the end of the 8h simulated transport and at 24h, 48h, and 72h after transport was similar (90 to 100% survival) in all conditions. The second trial was a factorial experiment where transport condition (with food coloring and no sand substrate, clear water with sand, clear water without sand) and packing/oxygenation method (packed in styrofoam boxes aeration from battery-operated aerators or packed in tied double plastic bags with oxygenated water) during 12h simulated transport. Survival immediately after (90-100%) and 72h after transport (82-90%) were similar

in all treatments.

P. merguiensis

P. merguiensis, produced from six wild spawners obtained from Negros Occidental, were reared to PL40 (1,500 individuals, 0.04 g average body weight) in the hatchery and stocked in a 40-ton outdoor concrete tank (1.5m depth) provided with sand bottom. The stocking density was reduced by about half every month. After four months, juveniles were seen in tanks, suggesting that animals (8-10g body weight) had spawned but the postlarvae were not noticed. After five months, body weights ranged from 6-15 g (males) and 11 to 22 g (females). These were used in experiments to test the effect of sand substrate in broodstock tanks.

Juveniles (2-3 g body weight) collected from the tanks were stocked in Dumangas Brackishwater Station ponds and Tigbauan Marine Station tanks. The stocks in the pond were harvested after a month due to the WSSV contamination in the Dumangas Brackishwater Station area.

Adults that had been previously separated by sex were stocked at a ratio of 1 female: 1 male in broodstock tanks with or without sand substrate. After two weeks, sampling showed that more matings occurred in tanks without sand substrate. A total of three mature broodstock were produced in this test, but only two spawned. A total of 70,000 nauplii have been produced. The fecundity observed for this stock ranged from 5,000 to 26,000 nauplii/spawner, while estimated fecundity for the original parental stock was 2,000 nauplii/ spawner.

P. merguiensis subadults (body weight ranging 4-6 g) were also collected from Panguil Bay. These were further grown in tanks and mated with stocks from Negros Occidental.

3.3 Intensive production of *Artemia* biomass in ponds as shrimp food

In the Philippines, private shrimp hatcheries prefer to use *Artemia* cyst as a more convenient natural food source. It is known to account for 50-70% of the hatcheries operational costs. This is due to high price of *Artemia* cysts in the world market. Studies have shown that shrimp, *P. japonicus* fed a diet of *Artemia* reared in ponds had better survival than those fed *Artemia* grown in laboratories under controlled conditions. It is likely that Artemia biomass will become increasingly more important as natural food in shrimp hatcheries in the Philippines; hence the study is being conducted to develop the commercial culture and harvesting of *Artemi*a biomass in ponds on a sustainable basis.

Tetraselmis sp. was cultured in 12-ton outdoor concrete tank. *Artemia* nauplii were stocked at 50 ind/l when the algae reached the peak density. Two runs were conducted using the Hudson Bay and Vietnam *Artemia* strains. Poor production of cysts and nauplii were brought about by bad weather conditions. Stocking of *Artemia* in tank was done as a preliminary activity prior to pond stocking.

3.4 Prawn modified-extensive culture using environment-friendly scheme

Experiences suggest that shrimp farming can be socially, environmentally and economically sustainable provided that appropriate management practices are adopted. Some of these practices are closed-recirculating system, environment-friendly schemes or to reduce stocking density. This verification study is being conducted to evaluate the impact on pond environment, growth, survival, production and economic performance of modified-extensive prawn culture using environment-friendly scheme fed SEAFDEC formulated diet.

The pond in Dumangas Brackishwater Station was prepared and readied for stocking prawn fry. Hatchery-bred prawn fry (PL18-20) from commercial hatchery had been analyzed in SEAFDEC Fish Health Section and recommended for stocking. Stocking of 5pcs/m^2 or 50,000 pieces was done on October 5, 2006.

3.5 Improvement and modification of culture techniques for *P. indicus* using SEAFDEC AQD's formulated shrimp diets in an environment-friendly scheme

In early 2000, SEAFDEC/AQD studied and verified a sound way of addressing the problem of disease outbreak through an environment-friendly probiotics.. The emergence of new species *P. indicus/merguiensis/vannamei* for culture as an alternative to popular *P. monodon* is envisioned by the Department to revive the dying shrimp industry. Hence, this applied research is being verified at the SEAFDEC Brackishwater Station by employing an environment-friendly scheme of raising *P. monodon*. This scheme utilizes milkfish and siganids as biomanipultors for the center drain and dead corners, respectively. The long-term objectives are: (i) to evaluate the efficiency of two SEAFDEC formulated shrimp diets; (ii) to validate the success of SEAFDEC environment-friendly scheme for the culture of shrimp; and (iii) to compare the efficiency of the best SEAFDEC formulated shrimp diet for commercial use..

Stocking and rearing of white shrimps (28 shrimps/m2 stocking density) was done in two pond units in Dumangas Brackishwater Station. These ponds were also used as sedimentation pre-treatment/reservoir ponds stocked with milkfish and siganids as biomanipulators. The same environment-friendly technology and schemes used in *P. monodon* grow-out culture were employed to compare the efficiency of the two SEAFDEC formulated shrimp diets for *P. monodon* and *P. indicus* as treatments. To date, shrimps at 48 and 61 days of culture consumed 23-36 kilograms of feed per day with an average body weight gain of 4.67 grams. With an estimated 70% survival, it is expected that biomass ranging from 700 to 800 kilograms will be harvested in late October or mid-November 2006. However, the stock was found to be positive for WSSV in an on and off manner. Close diagnostic analysis is being done by the Fish Health Section of Tigbauan Marine Station.

Eradication of unwanted species (gobies) was withheld to avoid further weakening of major stocks (shrimps) found to be afflicted with viral infection as well as to avoid stress of biomanipulators and disturbance of pond bottom during temporary transfer of fish.

4. PROPOSED ACTIVITIES FOR 2007

Project/Activity Title	Duration	Remarks
1. Genetic characterization of *P. monodon* broodstock	2006-2011	recently started (funded by the Govt of Japan Trust Fund)
2. Information exchange on status of *P. monodon* captive broodstock development in the Southeast Asian region and the impact of the introduction of *P. vannamei* in the region	2006-2008	recently started (funded by the Govt of Japan Trust Fund)
3. *P. monodon* broodstock development a. rearing trials (market to broodstock size) b. broodstock management trials c. development of family lines	2006-2011 2006-2008 2007-2008 2008-2011	ongoing (funded by the Govt of Japan Trust Fund)

5. *P. indicus/ P. merguiensis* broodstock development	2006-2010	ongoing
a. development of family lines	2007-2010	10% accomplished
b. refinement of broodstock management techniques	2006-2008	10% accomplished
c. refinement of larval rearing techniques	2006-2009	10% accomplished
d. economic assessment	2007-2008	

4.1 *P. monodon*

Genetic characterization of wild and existing captive broodstock will be done to be able to identify potential sources of good quality tiger shrimp broodstock that can serve as baseline population for future breeding programs.

The status of research on captive broodstock will be determined as a guide for the studies that need to be conducted at SEAFDEC/AQD. Experts within the region who are working on this area will be consulted to gather information on the experiences of ASEAN Member Countries on the culture of exotic species and on the use of captive broodstock.

Trials on growing 30-60 g animals to broodstock size ($\geq$100g) will be continued. The effect of rearing males and females separately on the survival and mating success will be assessed. These captive broodstock will be used in experiments aimed towards improvement of mating success, fertilization rate, and fecundity. Spermatophore transfer will be tested to improve the fertilization rate of eggs.

The genetic diversity of wild spawners from different areas of the region will be analyzed so that the source of spawners for the baseline population can be identified. These will be used for the breeding program that will later be pursued.

4.2 *P. indicus/P. merguiensis*

Females of one species (P. indicus or P. merguiensis) from one family will be mated with the male of another family and vice versa. Genetic characterization of both the parent stocks and offsprings will be conducted. Reproductive performance will be monitored. Larvae produced from this will be grown to postlarvae. Shooters will be selected and grown to broodstock size.

Refinement of broodstock management techniques to improve spawning frequency and fecundity will be pursued. This will include tests on artificial formulated and unprocessed feeds, and tests on different sex ratios.

Refinement of hatchery techniques will likewise be continued. Comparison of SEAFDEC-developed probiotics and different antibacterial commercial products will be done.

PROGRAM DOCUMENT

Program Category: Departmental Program
Program Title: Marine Fish
Responsible Department: Aquaculture Department (AQD)
Total Duration: Five Years (2006-2010)

1. INTRODUCTION

The Marine Fish Program intends to improve broodstock management and seed production technology for marine fishes such as the Asian sea bass, grouper, rabbitfish, milkfish and mangrove red snapper. The Program will also evaluate the commercial viability of single species or multi-species fish broodstock and hatchery system. Moreover, the Program will also verify, transfer and disseminate the grow-out culture technologies for the economically important marine fishes in the Philippines, and in other countries in the region.

At the end of the 5-year program, it is envisioned that broodstock management and seed production technologies for marine fishes such as the Asian sea bass, grouper, rabbitfish, milkfish and mangrove red snapper should have been refined, verified and transferred to the countries in the region. Moreover, the commercial viability of single species or multi-species fish broodstock and hatchery system should have been evaluated for eventual transfer of technology. A package technology on marine fish seed production technologies that can be adopted by small and medium entrepreneurs will be a major product of the program. An improved broodstock diet for marine fishes and test kits for fish egg and larval quality, and VNN diagnostics are also expected to be developed. More training programs on marine fish seed production will be conducted and are expected to benefit the Member Countries.

2. PROGRAM

2.1 Objectives

The objectives of the program are the following: (i) to develop, refine and package technologies for seed production, nursery and grow-out culture of marine fish; (ii) to test the economic feasibility of a single species and multi-species marine fish broodstock and seed production system; (iii) to develop and improve formulated diets for hatchery, nursery, grow-out and broodstock of marine fish, and (iv) to develop test kits that will determine the quality of fish eggs and larvae, and for easy diagnosis of VNN in fish.

2.2 Program description

The program consists of studies on the following: (i) breeding and seed production of 5 species of marine fish namely milkfish, rabbitfish, grouper, snapper and seabass, as well as of seahorses; (ii) the potential use of insulin-like growth factor II (IGF-II) mRNA expression as molecular marker for egg quality in fish; (iii) verification studies on the use of SEAFDEC AQD formulated grow-out diets for milkfish cultured in marine cages, for grouper and snapper cultured in ponds, and for sea bass also cultured in ponds; (iv) verification study on the use of a low grade metaldehyde to control snail population in milkfish grow-out culture ponds; and (v) production runs for milkfish fingerlings production in ponds, grow-out culture for milkfish, rabbitfish and grouper in brackishwater ponds, and grouper culture in floating net cages. The studies on fish seed production focused on the use of SEAFDEC AQD-formulated larval diets for milkfish, rabbitfish, grouper, red snapper and sea bass. The breeding and seed production of seahorse is in support of future stock enhancement activities.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Project/Activity Title	Duration	Remarks*
1. Verification studies on the seed production techniques of milkfish and rabbitfish (Nr-07-F2006T)	5 years	20%
2. Verification studies on the seed production techniques of high value marine fish species such as grouper, red snapper and sea bass. (Nr-08-F2006T)	5 years	20%
3. Population dynamics, breeding and seed production of seahorses (Br-05-F2005T)	5 years	20%
4. Insulin-like growth factor II (IGF-II) as molecular markers for egg quality in fish (Nr-02-F2004T)	3 years	
5. Verification study on the use of SEAFDEC AQD formulated diet for milkfish cultured in marine cages (5303-T-TV-M0106)	2 years	10%
6. Verification study of grow-out diets for grouper and red snapper grown in cages in ponds (5303-T-TV-G0406D)	2 years	5%
7. Verification study of grow-out diets for sea bass grown in ponds (5303-T-TV-SB106D)	2 years	5%
8. Verification study on the effect of metaldehyde to control snail population in milkfish grow-out culture ponds (5303-T-TV-MO306D)	2 years	5%
9. Milkfish fingerlings production in ponds (5500-T-TV-M0206D)	2 years	10%
10. Modified extensive grow-out culture of milkfish in brackishwater ponds (5500-T-TV-MO406D)	2 years	5%
11. Polyculture of milkfish and siganids in ponds (5500-T-TV-MS106D)	2 years	10%
12. Grow-out culture technique for the production of grouper *Epinephelus fuscoguttatus* in ponds (5500-T-TV-GO106D)	2 years	10%
13. Culture of Tiger grouper, *Epinephelus fuscoguttatus* in floating net cages. (5303-T-TV-GO2061)	2 years	10%
14. Culture of Humpback grouper, *Cromileptis altivelis* in floating net cages. (5303-T-TV-GO3061)	2 years	10%

***** - percent completion

3.1 Verification studies on the seed production techniques of milkfish and rabbitfish

The main objective of the study is to use extensively the larval diet for milkfish and rabbitfish formulated by SEAFDEC AQD in the larval rearing of these 2 fish species. The purpose is to reduce the use of natural food in the hatchery.

Milkfish

A total of 9 million eggs were spawned in July. About half of these eggs were bad eggs. Average fertilization rate (FR) and hatching rate (HR) were 37% and 67%, respectively. In August, 7 million eggs were produced. The number of good eggs was high at 6 million. Average FR was 85% and HR was 57%. During the larval rearing, AQD's milkfish larval diet was used starting on day 5.

Rabbitfish

Limited spawning activities were done for rabbitfish because of the limited number of larval rearing tanks available. Only 2.3 million eggs were produced during the period. All these eggs were produced by natural spawning. During the larval rearing, AQD's formulated diet was also used.

Production/Income

Excess milkfish eggs or larvae were sold to interested private fish hatcheries and milkfish fry were sold mainly to private fishpond operators. For milkfish eggs/larvae, about 5 million were sold and valued at PhP30,000.00[a]. For milkfish fry, 417,000 pieces were sold and valued at PhP91,900.00. The small number of rabbitfish fry produced was sold to private farmers. About PhPP33,000.00 worth of rabbitfish fry were sold to 3 private farmers in Panay.

3.2 Verification studies on the seed production techniques of high value marine fish species such as grouper, red snapper and sea bass.

The larval diet for grouper formulated by SEAFDEC AQD was used in the larval rearing of the three high value marine fish species (grouper, red snapper and sea bass). The purposes were to reduce the use of natural food in the hatchery and to supply the farmers, especially the nursery growers, of fry of these species that were already weaned to artificial diet.

Groupers

A total of 19 million eggs were produced in the month of July, 21 million eggs in August and 37 million eggs in September. Egg production in August and September was a mixture of both *E. fuscoguttatus* and *E. coioides.* Fertilization (15-81%) and hatching rates (15-90%) were rather low, and abnormal larvae from these batches of eggs were also high. The larval diet used was of 5 different sizes; with increasing size as the larvae grow.

Sea bass

Sea bass egg production was still by hormonal induction. Successful induced spawning was done in July and September. A total of 6 million eggs were produced during the 2 months. Fertilization rate (0.4-89%) and hatching rate (0-81%) were low. SEAFDEC AQD formulated diet was also used during the larval rearing especially in the latter stages of rearing.

Red snapper

Snapper egg production was very minimal because of the limited number of breeders. A total of 1.8 million eggs were spontaneously spawned during July. No spawning was observed during August and September.

[a] 50 Philippine Pesos (PhP) = 1 US Dollar

Production/Income

Grouper juveniles that were produced in the hatchery were either used in experimental grow-out activities in SEAFDEC AQD's Dumangas Brackishwater Station or sold to private farmers. About P 200,000.00 worth of grouper juveniles were sold to private farmers from June until October. In addition, some grouper eggs were also sold to interested private fish hatcheries. Most of the sea bass juveniles produced in the hatchery were used with SEAFDEC AQD's projects with the different Local Government Units in the country. The excess sea bass eggs and fry were also sold to private fish hatchery owners. About PhP216,000.00 worth of sea bass fry were sold to private farmers during the period.

3.3 Population dynamics, breeding and seed production of seahorses

Because seahorses from the natural environment are heavily exploited, efforts are underway to help rehabilitate the wild natural resource. One of the strategies seen to repopulate the natural stocks is by stock enhancement. This however, demands that a steady supply of seeds for restocking is always available. Hence, the development of the breeding and the seed production protocols for this species is necessary. Breeding activities were on-going.

Broodstock for 3 species of seahorses, namely *Hippocampus barbouri*, *H. kuda* and *H. comes* were acquired from Palawan in April 2006. A total of 290 *H. barbouri* (159 male and 131 female), 19 *H. kuda* (10 male and 9 female) and 22 *H. comes* were acquired. The average stretch height (cm) and weight (g) for *H. kuda* were 12 and 7, respectively, whereas, the average stretch height (cm) and weight (g) for *H comes* were 11 and 6, respectively. A total of 31 broodstock died due to the following maladies: pouch emphysema, flesh erosion disease (FED), internal gas bubble disease (IGBD), and combination of IGBD and FED. IGBD was observed to be the major cause of adult seahorse mortality.

H. comes broodstock produced a total of 8,013 juveniles from 36 spawning events. Pooled survival of juveniles was about 4%.

3.4 Insulin-like growth factor II (IGF-II) as molecular markers for egg quality in fish

The objective of the study was to evaluate if IGF-II gene could be used as a molecular marker for determining the quality in fish eggs and larvae. Egg samples of grouper, milkfish and rabbitfish at different stages of embryonic development, and sink eggs and newly-hatched larvae were collected and stored for RNA extraction.

Analysis of gene expression was done on the samples that were reverse transcribed to cDNA. Pfaffl formula was used to calculate for the relative expression ratio of IGF-II to β-actin. For rabbitfish, samples for high fertilization rate (>90%, n=5), for low fertilization rate (<90%, n=2) and for no hatching (n=2) were processed. All the samples were taken from spawns of rabbitfish broodstock fed with only one type of diet. Mean values showed that expression ratio is 1.88 in early embryo, 2.11 in late embryo and 2.06 in hatched larvae. In low fertilization rate samples, hatched larvae also exhibited high expression ratio (2.01) compared to early embryo (1.35) and late embryo (1.68). The mean relative expression ratio in no hatching samples at early embryo stage was 2.41.

For grouper, mean values for expression ratio in high fertilization rate samples was higher in late embryo (11.26) than in early embryo (8.43) or hatched larvae (1.7). In low fertilization rate samples, early embryo exhibited higher expression ratio (3.05) compared to late embryo (2.11) and hatched larvae (1.51). Mean IGF II relative expression ratio in sink eggs was 1.33 and 2.84 in high and low fertilization rate, respectively. The mean relative expression ratio in spawns that exhibited no hatching despite attaining early embryo stage was 1.86.

3.5 Use of SEAFDEC AQD formulated diet for milkfish cultured in marine cages

It is observed that the present SEAFDEC AQD formulation for milkfish grow-out diet was not good when given to milkfish grown in cages in open waters. The formulation needs to be improved to give a better performance when used in milkfish that are grown in full-strength seawater. Changes in the lipid content of the diet will be done.

This activity is a collaborative work between SEAFDEC AQD and a private fish cage operator. SEAFDEC AQD will improve the diet formulation and to be tested in the fish cages of the farmer collaborator. In this connection, a Memorandum of Agreement was signed between the Chief of SEAFDEC AQD and the private fish cage operator in Bolinao, Pangasinan (Northern Philippines) last September 2006. The activity has yet to be initiated.

3.6 Verification of Grouper/Snapper Grow-out diets in Cages in Pond

SEAFDEC AQD has likewise developed a practical diet for the grow-out culture of groupers and snappers. In this particular activity, the artificial diet will be tested in the culture of groupers and snappers in ponds. This activity was just started in October 2006. Pond preparation and the fabrication of cages 5 x 5 x 2 m and 10 x 10 x 2 m are on-going.

3.7 Verification of Seabass Grow-out diets in Ponds

This is a new activity to test the use of the practical diet developed for the grow-out culture of grouper for the culture of seabass in ponds. Together with the SEAFDEC AQD diet, a commercial diet and a polyculture of seabass with tilapia will be tested. In the latter case, the small-sized tilapia will serve as food for the seabass. Seabass fingerlings averaging 4 g in body weight and 4 cm in total length will be used at a stocking density of 5,000 pieces/ha. The pond is presently being prepared for this experiment.

3.8 Verification study on the effect of metaldehyde to control snail population in milkfish grow-out culture pond

In this new activity, the efficacy of a low-grade form and cheaper metaldehyde to control the snail population in brackishwater milkfish ponds will be tested. Initial snail population in the pond was assessed by quadrat method from 10 different sites of the pond. Initial average population showed 3910/m^2 live snails (89%) and 485/m^2 dead snails (11%). Initial snail population of the control pond will also be taken after all fish stocks have been transferred.

3.9 Milkfish fingerlings production in ponds

This new activity was thought of to make use of some unutilized ponds in Dumangas Brackishwater Station for the mass production of marketable size products. For this, nursery pond A was stocked with 30,000 pieces hatchery-bred milkfish fry (day 21) from SEAFDEC AQD last 27 September 2006. Nursery pond B was just stocked with 70,000 milkfish fry last 12 October 2006.

3.10 Modified extensive grow-out culture for milkfish in brackishwater ponds.

Two ponds will be used for milkfish grow-out production. Ponds are presently under preparation.

3.11 Polyculture of milkfish and rabbitfish in ponds

This new activity will test the polyculture of milkfish and rabbitfish in ponds. For this, a pond with an area of 0.8391 ha was dried, unwanted species eliminated and fertilized to grow lablab and lumut. Milkfish fingerlings with an average body weight of 20 g and rabbitfish fingerlings with an average body weight of 3.5 g were stocked at 2000 and 1000 pcs/ha, respectively last 8 August 2006. Bi-monthly fertilization was done to bolster the natural food production. After 60 days of culture, the average body weight of milkfish was 231.8 g and 8.0 g for rabbitfish.

3.12 Grow-out culture technique for the production of grouper *Epinephelus fuscoguttatus* in ponds

This new activity will test the effectivity of grouper culture in cages in ponds using SEAFDEC AQD diet.

The pond was prepared by drying and treating the soil with lime and ammonium sulfate to eradicate unwanted species. The pond was divided into 3 sections with bamboo slots to allow partial stocking. Juveniles (1294 pieces) harvested from the nursery were stocked in one section at a density of 0.5 individual/ m^2. SEAFDEC formulated feed was given at feeding rate of 5% body weight and frequency of feeding was 4x/day. Sampling at day17 in pond showed average body weight of 21.53g.

Nursery culture of the grouper (average body weight of 6 g) was done in 1 x 1 x 1 m, 2 x 3 x 1 m and 3 x 3 x 1 m net cages inside a bigger net cage at density of 150-200 pcs/m^3 for about 36 days until an average body weight of >15 g was reached. Fry were fed with SEAFDEC AQD formulated diet (46% protein) at 10% feeding rate and feeding frequency of 6 x/day. Sorting to minimize cannibalism was done every 5-7 days. However, due to some manpower problem, survival rate at nursery stage was only 33%.

On 28 September 2006, a second batch of grouper fry (5000 pieces) was stocked in 2 x 3 x 1 m, 3 x 4 x 1 m and 4 x 4 x 1 m net cages placed inside a bigger net cage to avoid crab invasion. Stocking density in cages was 130-150 individuals/m^3. The fry were fed SEAFDEC AQD formulated diet at 10% feed rate and feeding frequency of 6x/day.

3.13 Culture of Tiger grouper, *Epinephelus fuscoguttatus* in floating net cages.

In this new activity, the performance of grouper fed SEAFDEC AQD formulated diet in floating net cages was assessed. A total of 900 pieces tiger grouper with an initial average body weight of 77 g was stocked in a 5 x 5 x 3 m floating net cage in Igang Marine Substation. After 51 days of culture, the average body weight of the stock was 150.2 g. Performance parameters showed a feed conversion ratio (FCR) of 2.44, a specific growth rate (SGR) of 1.31 % BW d^{-1}, growth rate (GR) of 1.44 g day^{-1} and a survival of 91.55%. Sampling of stock was done every 30 days to minimize stress.

3.14 Culture of Humpback grouper, *Cromileptis altivelis* in floating net cages.

The performance of humpback grouper fed SEAFDEC AQD formulated diet in floating net cages was assessed. A total of 497 humpback grouper initially reared in nursery ponds in Dumangas Brackishwater Station was transferred to Igang Marine Sub-Station. The first batch, stocked in a 5 x 5 x 3 m floating net cage (174 pieces, initial body weight of 50 g.) is now completely weaned to feed on formulated diet. The remaining batch (323 pieces) is now weaned to feed on artificial diet by feeding the fish with a mix of fish by-catch and formulated diet and then gradually increasing the proportion of the latter. Performance indicators of the initial stock showed an average body weight of 62.5 g., a survival of 86.78 % at 42 days of culture, feed conversion ratio of 4.23, a specific growth rate of 0.53 % body weight d^{-1} and a growth rate of 0.3 g day^{-1}. Sampling of stocks is done every 30 days to minimize stress. The second batch of stock is yet to be sampled.

3.15 Other Activities

Training

In its continuing efforts to disseminate the technologies for the seed production of marine fish species in the country and in the region, SEAFDEC AQD offers a regular training course on Marine Fish Hatchery Operations. For 2006, the training course was conducted on 03 May to 16 June 2006. A total of 8 participants from 5 different countries attended the course. The participants came from Australia, Cambodia, Indonesia, Viet Nam and the Philippines. In addition, the Government of Viet Nam requested for a Special Training Program for Milkfish Hatchery Operation for their staff who are working in the Ministry of Fisheries' Research Institute for Aquaculture. Three of their technical staff came to SEAFDEC AQD for the said special training program from 29 May until 29 June 2006.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

4.1. On-going activities

All the activities initiated in 2006 will be continued in 2007.

4.2. New activities (pending submission of research proposal)

Some new studies/activities might be proposed for 2007. This includes activities that will look at the possibility of developing a mass propagation technique for mysids, a good natural food for the hatchery rearing of grouper and a good substitute for *Artemia* biomass. In relation to this, since mysids are presently collected in ponds in large quantities, a preservation technique may be developed for long storage of this zooplankton.

Cannibalism in carnivorous species is still a problem in the hatchery and nursery. At present, regular sorting of the stocks, separating the big individuals from the smaller fry, is the only way to reduce cannibalism in the hatchery and nursery. Understanding the 'physiology" behind this cannibalistic behavior may help us design strategies to minimize its effect in our culture systems.

Prolonging or extending the spawning season of milkfish, red snapper and seabass beyond their normal spawning season will also be a new activity for the coming years. For year 2007, efforts toward extending the spawning season of seabass will be initiated.

4.3 Training programs

The yearly regular training course for Marine Fish Hatchery Operations will be offered. This will give the trainees the necessary skills to operate a multi-species marine fish hatchery. In addition, non-formal training courses for nursery and grow-out cultures of marine fish species in ponds or in cages may be offered in response to requests for technical assistance.

PROGRAM DOCUMENT

Program Category: Departmental Program
Program Title: Small Holder Freshwater Aquaculture
Responsible Department: Aquaculture Department (AQD)
Total Duration: Five years (2006-2010)

1. INTRODUCTION

Freshwater fish production through aquaculture dominates farmed finfish production in many Asian countries including the Philippines. There is an increasing demand for food fish from freshwater aquaculture. Sustainable intensification of food production in aquaculture, particularly in marginalized rural communities is a key activity to improve self-sufficiency of these communities. Optimization of food production through aquaculture means increasing the output of a system per unit input.

The thrust of the Small-Holder Freshwater Aquaculture Program (SHFAP) being implemented by the Aquaculture Department (AQD) is in-line with the thrust of the SEAFDEC Program on Sustainable Fisheries for Food Security in the ASEAN Region. Under the Aquaculture Component of this Program the activities under the SHFAP are in line with both the "*development of technologies for sustainable aquaculture*" and with "*human capacity building for sustainable aquaculture*".

2. PROGRAM

2.1 Objectives

The objectives of the program are to: (1) refine seed production methods of selected freshwater commodities (e.g. giant freshwater prawn, catfish, carp, tilapia and milkfish); (2) develop grow-out production of giant freshwater prawn in lakes using cages; (3) improve production of both the hatchery and grow-out of the aforementioned freshwater commodities; (4) assess the social and economic impact of aquaculture in Laguna de Bay region; (5) verify and commercialization of freshwater aquaculture technologies; and (6) disseminate verified freshwater aquaculture technologies through publication of manuals, flyers and the conduct of seminars, workshops and hands on-training.

2.2 Program description

The Small Holder Freshwater Aquaculture Program consists of two major components: (i) Research and (ii) Information Dissemination. Some of the activities are in parallel with other existing programs of AQD; namely, the Promotion of Sustainable Aquaculture in the ASEAN Region under the Sub-Program Freshwater Aquaculture of Indigenous Species. Examples of these activities are the on-going researches on the cage culture of *Macrobrachium rosenbergii* and the fry to fingerling production of milkfish both in lake-based cages.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Project/Activity Title	Duration	Remarks
1) Research		
Growth and survival of Asian catfish fry reared in net cages with and without supplemental feeding in Laguna de Bay, Philippines	24 months	25% completed
Improvement of carcass traits in Nile tilapia (*Oreochromis* spp) through farm-based mass selection and interspecific hybridization	24 months	30% completed
Economic viability of pilot-scale operations for the production of freshwater fish seedstock or bioeconomics of multispecies freshwater fish hatchery operations		0 % completed; discontinued
Economic impacts of aquaculture development in Laguna lake	24 months	17% completed
Refinement of broodstock and hatchery management methods for the commercial production of freshwater prawn *Macrobrachium rosenbergii* seedstock I. Production of *M. rosenbergii* larvae tolerant to reduced salinities	24 months	28% completed
Refinement of broodstock and hatchery management methods for the commercial production of freshwater prawn *Macrobrachium rosenbergii* seedstock II. Bioeconomics of freshwater prawn hatchery production in different larval rearing system.	24 months	15% completed
Farming of the *Macrobrachium rosenbergii* in modular cages in Laguna de Bay	24 months	35% completed
Morphometric characterization and performance evaluation of *Macrobrachium rosenbergii* stocks and closely related species found in the Philippines I. Collection, identification, and validation of *Macrobrachium* samples II. Performance evaluation (Reproductive efficiency)	12 months	95% completed
Morphometric characterization and performance evaluation of different *Macrobrachium* strains and other commercially important freshwater prawns in the Philippines. III. Performance of different strains of *Macrobrachium rosenbergii* in grow-out culture in lake-based cages and ponds	24 months	75% completed
Genetic characterization of commercially important Philippine stocks of freshwater prawn, *Macrobrachium* sp., using DNA markers	24 months	35% completed
Production of milkfish *Chanos chanos* fingerlings from fry in small freshwater ponds and modular lake-based cages in Laguna de Bay, Philippines	24 months	0% completed
Refinement of broodstock and nursery technology for the commercial production of bighead carp *Aristichthys nobilis* (Richardson) fingerlings in cages in Laguna de Bay. 1. Reproductive performance and fry production of bighead carp on different feeding regime	24 months	20% completed

2) Training (Human Capacity Building)		
Aquaculture Training Modules (ATM's) for various freshwater commodities	2 weeks/ session	3 sessions conducted; 2nd session interrupted by typhoon; paying participants
Special Training Course on Freshwater Prawn Hatchery and Grow-out Operations	1 week	Funded by IRAP
On-the-Job Training for college students from fisheries schools	2 months/batch	3 batches from various fisheries colleges
On-the-Job Training for aquaculture technician	2 weeks	Conducted with ABCDEF, Inc.; Paying participant
On-site Hands-on Training on Tilapia Feed Formulation for Isabela Province Fish Farmers	2 days	Supported by funds from DOST through the LGU
3) Exhibits and Fairs		
3nd National Tilapia Congress	3 days	Paid by AQD
1st Cabuyao Agri Trade Fair	3 days	AQD participation sponsored by LGU
Techno Negosyo Fair	2 days	AQD participation sponsored by DOST
Agri-Aqua-Foodlink 2006	3 days	Paid by AQD

3.1 Research

3.1.1 Growth and survival of Asian catfish fry reared in net cages with and without supplemental feeding in Laguna de Bay, Philippines

The Asian catfish (*Clarias macrocephalus*) is an important but dwindling food fish in the Philippines. There is a need to establish a reliable induced breeding protocol and nursery techniques. This study is being conducted to develop commercially viable nursery techniques for *Clarias* species in lake-based facilities and an approach for stock enhancement program in Laguna lake

Growth of native catfish fry after 2 weeks of rearing in hapa net cages was highest in those stocked at 100 fry/cage and given artificial diet (SGR =12.44g/day; wt gain = 0.44 g) and in fish stocked at 200 fry/cage without supplemental diet (SGR = 12.13g/day; wt gain = 0.28g). Lowest growth was observed in those fish stocked at 100 fry/cage without supplemental feed (SGR = 8.07g/day; weight gain = 0.23g) but survival rate was higher (27%) than those stocked at 200fry/cage without supplemental feed. Survival rates were generally higher in catfish fry that received artificial diet (43% at 100fry/cage and 32% at 200 fry/cage) than in fish reared without supplemental feed (27% at 100fry/cage and 20% at 200fry/cage).

Problems encountered: Two consecutive feeding trials were pre-terminated due to effect of typhoon. The first feeding trial which lasted for 4 weeks obtained preliminary data on the growth and survival of catfish fry at Week 2 (1st sampling). However, the second sampling (Week 4) showed a drastic drop in the survival of the fish (0%). Fish mortality was strongly associated with the hit of strong winds and heavy waves brought about by typhoon several days prior to the second sampling. In the second feeding trial, similar incidence occurred as another typhoon hit the experimental area..There was also an incidence of mass mortality due to

infestation of parasite and bacteria. This incident had limited the production of native catfish fry for experimental use.

3.1.2 Improvement of carcass traits in Nile tilapia (Oreochromis spp) through farm-based mass selection and interspecific hybridization

The selection methods used to produce the genetically improved commercial stocks were complex (e.g. combined family selection and marker-assisted selection for Genetically improved farmed tilapia and Genomar Supreme tilapia, respectively). These commercially improved stocks are more expensive; hence, high seedstock cost indirectly poses constraints on the farmer as he tries to improve efficiency in his farm.
The selective breeding protocol has been adopted and the scheme is currently being followed. Selected and control lines from F1 generation were set up and are currently being spawned in tanks.

3.1.3 Economic viability of pilot-scale operations for the production of freshwater fish seedstock or bioeconomics of multispecies freshwater fish hatchery operations

Study was terminated. No funds were provided by the collaborating agency (ABCDEF) Inc.

3.1.4 Economic impacts of aquaculture development in Laguna lake

Rapid aquaculture development has occurred in Laguna Lake; the most widespread of which are pen and cage fish culture. It has always been assumed that aquaculture contributes significantly to the economic development in the provinces of Laguna and Rizal due to the presence of Laguna Lake. But to date such actual contributions from aquaculture have not yet been assessed. This study assesses the economic impacts of aquaculture development in Laguna Lake over time.

A questionnaire has been prepared, pre-tested and finalized for survey scheduled during the 4th quarter of 2006. A research assistant has been identified and commenced work. Continuous gathering of secondary data and information has been conducted in the institutional source. Project has been implemented as scheduled.

3.1.5 Refinement of broodstock and hatchery management methods for the commercial production of freshwater prawn Macrobrachium rosenbergii seedstock I. Production of M. rosenbergii larvae tolerant to reduced salinities

The main constraint in hatchery operations is the need to maintain a salinity of 12 ppt for larval rearing of freshwater prawn, *M. rosenbergii.* This requires either the transport of seawater to the hatchery or the use of artificial seawater. In both cases, saltwater use adds to the cost of seedstock production. This study is being conducted to develop *M. rosenbergii* seedstock tolerant to low salinity and/or freshwater and to reduce the cost of freshwater prawn seedstock production.

Several female breeders were spawned and batches of larvae were reared separately in 12 ppt and 6 ppt salinity levels. Postlarvae were harvested from the batches reared in 12ppt while the oldest stage of larvae which survived in 6ppt was stage IX in 6ppt. New protocols are currently being tried to improve and attain the study objectives.

3.1.6 Refinement of broodstock and hatchery management methods for the commercial production of freshwater prawn Macrobrachium rosenbergii seedstock II. Bioeconomics of freshwater prawn hatchery production in different larval rearing system

Preliminary results of the experiment showed that freshwater prawn *Macrobrachium rosenbergii* larvae reared in clear water has an average survival of 37.1% compared to larvae reared in green water. But in terms of development, larvae reared in green water took 25 days to reach the post larval stage compared to larvae reared in clear water , which took 30 days to become post larvae. Another run of the experiment is on going.

3.1.7 Farming of the Macrobrachium rosenbergii in modular cages in Laguna de Bay

Polyculture nursery trial of bighead carp *Aristichthys nobilis* (BHC) and *Macrobrachium rosenbergii* (FWP) was conducted in small experimental hapa net cages in the lake for two months. The following treatments were used: 40FWP+ 40BHC (40 individuals m-2 each of FWP PL's and BHC fry) 40FWP+80BHC (40 individuals m-2 FWP and 80 individuals m-2 BHC), 40FWP+120BHC (40 individuals m-2 FWP and 120 individuals m-2 BHC), 40FWP (40 individuals m-2 FWP only) and 120BHC (120 individuals m-2 BHC only). Fry mash feed was provided only for *A. nobilis* computed at 10% total body weight. *M. rosenbergii*, even in the monoculture treatment was not given any supplementary feed and relied only on available natural food. No significant differences in growth was observed for FWP in all treatments in the growth (3.1, 4.0, 3.5, 3.7 g for 40FWP+40BHC, 40FWP+80BHC, 40FWP+120BHC, and 40FWP, respectively). Neither was the survival of FWP influenced by the treatments (63, 73, 68, 75% for 40FWP+40BHC, 40FWP+80BHC, 40FWP+120BHC, and 40FWP, respectively). BHC survival was affected by the treatments with the highest to lowest survival in the following order: 52, 41, 30, 23% for 40FWP+ 40BHC, 40FWP+80BHC, 40FWP+120BHC, BHC only, respectively. No differences in mean weight was observed for BHC among all treatments (3.1, 7.8, 6.1, 7.7 g for 40FWP+40BHC, 40FWP+80BHC, 40FWP+120BHC, and 120BHC, respectively)

Remarks:
Water quality in the Lake was generally poor with very high turbidity values. Bighead carp survival was low because of ectoparasitic infestation (*Laernia* sp.) which resulted in overall poor survival of the juveniles. This trial will be terminated after another month and another trial will be conducted. Another polyculture experiment with red tilapia and a third experiment on the use of different types of commercial diets for grow-out of *M. rosenbergii* are on-going.

3.1.8 Morphometric characterization and performance evaluation of Macrobrachium rosenbergii stocks and closely related species found in the Philippines I. Collection, identification, and validation of Macrobrachium samples II. Performance evaluation (Reproductive efficiency)

Collection, identification and validation of *Macrobrachium* samples:
The identities of ethanol-preserved prawn samples from Abra River in Vigan, Layawan in Oroquieta (3), Pikit in Cotabato (9) and Lau-an in Antique were confirmed by crustacean taxonomist Dr. Daisy Wowor to be the following: VIGAN samples*: M. lepidactyloides*; LAYAWAN samples: M. lar and *M. jaroense* ; PIKIT samples: *M. mammillodactylus, M. weberi, M. australe, and M. jaroense*; ANTIQUE samples: *M. esculentum, M. latidactylus, M. jaroense M. horstii M. lar M. australe* and *M. lepidactyloides*

More samples (*M.rosenbergii* and non-rosenbergii species) shall be collected from Visayas and Mindanao. The proponent will also try to collect wild samples of *M. rosenbergii* from known

collecting areas in Mindoro for use as captive broodstock in the performance evaluation study as well as for taxonomic identity validation.

Recently, the survival of freshwater prawn larvae in the hatchery has improved and a notable number of postlarvae were produced because of the prevailing warm climate. These by-products will be sold to the municipal agriculturist from Pakil, Laguna for grow-out in the LGU demonstration farm.

3.1.9 Morphometric characterization and performance evaluation of different Macrobrachium strains and other commercially important freshwater prawns in the Philippines. III. Performance of different strains of Macrobrachium rosenbergii in grow-out culture in lake-based cages and ponds

Post Larvae of broodstock from Calumpit, Bulacan were stocked in 8 x 8 m2 cages in the lake on September 6 2006. First sampling was scheduled during first week of October. However a devastating typhoon hit the research station in late September that washed out all experimental cages.

3.1.10 Genetic characterization of commercially important Philippine stocks of freshwater prawn, *Macrobrachium* sp., using DNA markers

Using the DNAzol kit, genomic DNA were extracted from pleopods and muscle tissues of the first batch of wild (from Calumpit, Bulacan) and hatchery (from SEAFDEC/AQD) stocks of freshwater prawn *Macrobrachium rosenbergii*. Methods to PCR-amplify DNA from these samples are currently being optimized using primers 16SAR and 16SBR. It was not until recently that extracted DNA from tissues of some wild and hatchery stocks have been successfully amplified (based on confirmatory results from agarose gel electrophoresis) using modified amplification conditions (2min initial denaturation at 94˚C; 40 cycles of --1min denaturation at 94˚C, 30sec annealing at 45˚C, 90sec extension at 72˚C; final extension of 10 min at 72˚C). With these results, DNA amplification has been performed on some samples and an mtDNA sequencing run has been tried. However, based on the recent sequencing run, methods for cycle sequencing have to be optimized to enable the generation of reliable and accurate sequencing data. Alternative methods (use of ExTaq DNA in the amplification procedure or cloning the desired DNA region prior to automated DNA sequencing etc.) shall be tried to be able to obtain better results. A recent sequencing run using the other pair of primers flanking the COI or mitochondrial control region and following the usual sequencing protocol worked hence it is possible that either the 16SAR and 16SBR primers previously ordered are either of poor quality or the method for cycle sequencing for the 16S mitochondrial DNA region still needs to be optimized.

While the sequencing protocol is being optimized, the study proponents have started its work on another marker system (mitochondrial DNA-Restriction Fragment Length Polymorphism or mtDNA-RFLP), looking at mitochondrial DNA control region (COI) genetic variation in the same hatchery and wild stocks from Luzon. The method for COI mtDNA-RFLP marker analysis is already in place and can be readily adopted for use in screening the available prawn samples. Apart from the Luzon samples, the proponents shall include pleopods from freshwater prawn (*Macrobrachium rosenbergii*) samples collected from various sources in Visayas and Mindanao for inclusion in the mtDNA-RFLP analysis.

3.1.11 Production of milkfish Chanos chanos fingerlings from fry in small freshwater ponds and modular lake-based cages in Laguna de Bay, Philippines

Bamboos have been installed in the lake and cages have been fabricated in preparation for stocking of the milkfish fingerlings. However, a devastating typhoon hit the research station in late September that washed out all experimental cages. Apart from this, parasitic *Laernia* infestation in finfish stocked in the experimental area has delayed the stocking of milkfish. Milkfish stocks will be obtained either from AQD hatchery or commercial hatchery.

3.1.12 Refinement of broodstock and nursery technology for the commercial production of bighead carp Aristichthys nobilis (Richardson) fingerlings in cages in Laguna de Bay. 1. Reproductive performance and fry production of bighead carp on different feeding regime

Preliminary results during the first sampling showed that female bighead carp broodstock in treatment 1 (one month feeding before spawning) had an average 83.3 % gonadal maturity, followed by treatment 2 (2 months feeding before spawning) (73.3%), and treatment 3 (3 months feeding before spawning) (67.6%). The lowest percent gonadal maturity female bighead carp broodstock was in treatment 4 (no feeding); however, for male bighead carp broodstock percent gonadal maturity was highest in treatment 3 (96.5%), followed by treatment 2 (86.66%), and treatment 1 (79.99%). Lowest % gonadal maturity was obtained in treatment 4 (40.33%).

Remarks:
First run for induced spawning was scheduled on Sept.26, 2006. However, newly hatched fry produced from this spawning activity died due to power failure caused by typhoon.

3.2 Training (Human Capacity Building):

3.2.1 Aquaculture Training Modules (ATM's) for various freshwater commodities

The ATM training sessions were scheduled based on the convenience of the requesting parties. The trainees were mainly fish farmers interested in freshwater aquaculture. The trainees paid for their own training expenses.

3.2.2 Special Training Course on Freshwater Prawn Hatchery and Grow-out Operations

This training course was participated by trainees recommended by various local government units from different municipalities in the Philippines. The expenses were shouldered by the AQD. The training consisted of lectures and practical sessions.

3.2.3 On-the-Job Training for college students from fisheries schools

This is a regular service provided by the Binangonan Freshwater Station to assist local fishery schools in training their students on freshwater aquaculture operations. The students are assigned to different tasks (hatchery, nursery, grow-out, natural food, feed formulation) and their performances are assessed by their designated supervisors.

3.2.4 On-the-Job Training for aquaculture technician

This training is similar to the one for students, but the participants are aquaculture technicians. They cover their own training expenses.

3.2.5 On-site Hands-on Training on Tilapia Feed Formulation for Isabela Province Fish Farmers

The Department of Science and Technology (DOST), together with the Local Government Unit (LGU) of the Province of Isabela, requested resource persons from AQD Binangonan Freshwater Station (BFS) to train local fish farmers on Tilapia feed formulation. All expenses were paid by the DOST and the LGU. Resource persons from BFS traveled to Isabela for the on-site training.

3.3 Fairs and Exhibits

BFS participated in various fairs and exhibit to publicize various aquaculture technologies developed by AQD. Flyers and brochures were given away free. Books and manuals published by AQD were also sold during these activities.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Planning for the project and activities to be implemented in the year 2007 and the expected outcomes.

Project/Activity Title	Duration	Remarks
1. Research		
Projects described in previous section		To be continued for 2007
Screening of possible natural products from freshwater microalgae	24 months	New proposal; Long-term objective**:** To be able to identify species of freshwater microalgae potential for the production of natural products Short-term objectives: Mass produce various microalgae species in freshwater bodies; evaluate various natural products from freshwater microalgae
Testing the viability of algal beads immobilized in various matrices: Response to different environmental conditions	24 months	New proposal; Long-term objective Enable the long-term maintenance of microalgae with minimal cost Short-term objectives: Identify the optimal environmental conditions for the viability of immobilized microalgae
Integrated fisheries resource management (Rinconada Lakes, Philippines and NSW Australia)	36 months	New proposal in collaboration with BFAR (funded by ACIAR through BFAR); Objectives: Facilitate adoption by key stakeholders of management actions to improve management of the Rinconada Lakes in the Philippines; Facilitate improved fish cage management to increase economic return and reduce impacts on water quality in Lakes Buhi and Bato; Effectively manage water hyacinth infestations in Lakes Buhi, Bato and Baao-Bula; Document and package ecosystem based management findings and outcomes of this project for adoption.

2. Technology Verification/Commercialization		
Hatchery seed production of the native catfish *C. macrocephalus*	24 months	New proposal; Objectives: To provide seeds for LGU and NGO partners interested in grow-out of native catfish; To serve as catfish hatchery demonstration farms for Western Visayas; To provide technical assistance to fish farmers interested in catfish production
Advanced fingerling production for freshwater fish	24 months	New proposal; Long-term objectives: to ensure the continuous supply of advanced fingerling stocks of various freshwater species Short-term objectives: To refine techniques for the commercial production of advanced juveniles of various freshwater species to meet the demand for larger seedstock
3. Training (Human Capacity Building)		
Continue with training courses described in the previous section		
Publication of manuals on freshwater commodities		

PROGRAM DOCUMENT

Program Category: Departmental Program
Program Title: Strain Improvement of *Kappaphycus* and other Economically Important Seaweeds
Responsible Department: Aquaculture Department (AQD)
Total Duration: (2005-2009)

1. INTRODUCTION

The seaweed industry of the Philippines is the leading aquaculture industry in terms of production though ranks number three in export value. Despite several success stories of seaweed faming in the country, this was not spared from problems: (1) declining quality of harvested crop and poor quality of carrageenan due to use of inferior cultivar, (2) unstable production due to the persistent occurrence of 'ice-ice' disease plus the concomitant occurrence of the endophyte *Neosiphonia* and other harmful epiphytes, (3) poor and improper farming practices, and (4) poor post-harvest management. These problems result to a severe problem of the farmers in sourcing good quality cultivars that are free from 'ice-ice' and endophytes. Even in areas like Zamboanga peninsula and Sitangkai, Tawi-Tawi known to have abundant and diversified strains are not spared from cultivar shortage and inavailability.

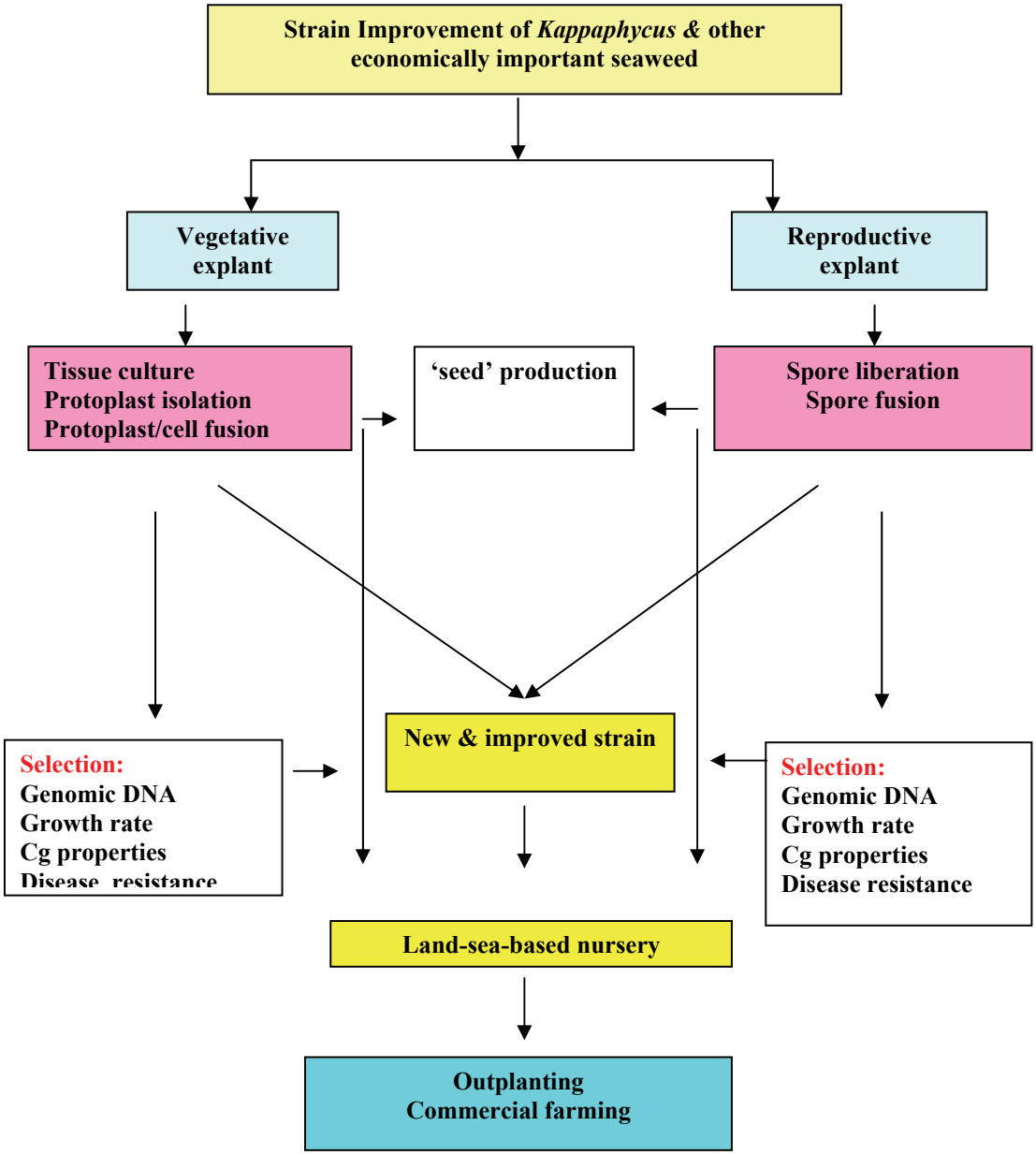
The commercial farming of the different strains of *Kappaphycus alvarezii* and *Eucheuma denticulatum* made use of vegetative thalli since its introduction in the early 70's. The repeated propagation of vegetative thalli of these seaweeds in the Philippines for more than 35 years has somehow brought inferior cultivars that are slow growing, susceptible to disease and harmful endophytes, low biomass production and poor carrageenan quality.

2. PROGRAM

The Seaweed Program is focused mainly on two carrageenophytes, *Kappaphycus* and *Eucheuma*, and one agarophyte, *Gracilaria.* The first two genera are the flagship of the seaweed industry of the Philippines, while the latter is still a developing industry. The Department embarks on *Strain Improvement* of *Kappaphycus*, *Eucheuma* and other economically important seaweed that use both the vegetative and reproductive explants (Figure 1) as mother plants. The vegetative explant area will employ tissue culture of callus cells, protoplast/cell isolates and fusants while the reproductive explant will utilize spore and spore fusion as sources of 'new' and 'improved' strain through selection process. *In vitro* growth and development, hatchery-rearing in land-sea based nursery of these young plants will be made. 'New' and 'improved' strains will be subjected to genomic DNA analysis, growth rate performance and carrageenan quality analysis. Only plants showing superior growth rate, carrageenan quality and disease resistance will be further propagated.

Another area of the Seaweed Program is on Bioremediation. *Gracilaria* and *Kapppahycus* will be used as biofilter in a semi-intensive shrimp pond culture and in fish cages, respectively. Earlier reports have shown the capacity of seaweeds to absorb excess nutrients in the water column. These seaweeds are agents in an environment-friendly aquaculture.

Figure 1



2.1 Objectives

1) To regenerate plantlets of *Kappaphycus*/*Eucheuma* from callus-like structure thru tissue culture and mutagenesis; protoplast/spore fusion, and rear the plantlets under laboratory and hatchery conditions;
2) To select regenerants with improved characteristics (fast growth, carrageenan quality and disease resistance);
3) To optimize the growth of regenerants under ambient conditions;
4) To establish a cultivars' nursery bank in order to provide a sustainable, accessible, and good quality cultivars to seaweed farmers;
5) To replicate the system of producing cultivars in key seaweed production areas of the country

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Vegetative Explant

3.1 Propagation of *Kappaphycus* plantlets from callus-like structures by tissue culture

Callus cells were released at the medullary layer with the use of ESS/2 + E3 antibiotic + plant growth regulator (PAA + zeatin). Cell division was both anticlinal and periclinal. Callus formation is in process.

3.2 Characterization of carrageenan properties and screening for disease resistance of farmed carrageenophytes

Thirty-two morphotypes/ecotypes of *Kappaphycus alvarezii* (28), *Kappaphycus* sp.(1) and *Eucheuma denticulatum* (3) were collected from different seaweed farms in the Philippines. Characterization of carrageenan properties of these cultivars has been completed. Parent stocks that will serve as starting materials for seedstock production have been chosen based on carrageenan qualities, and will be further subjected to infection and growth experiments to determine disease resistance traits and growth performance. The cultivars chosen were those collected from Guiuan (Eastern Samar), Tawi-tawi, Zamboanga, Barobo (Surigao), Bohol and Palawan.

Growth experiments in concrete tanks and growth chambers were also undertaken to identify which among the collected cultivars can be cultured in land-based facilities and to develop protocols for land-based seaweed culture. Initial results showed that *K. alvarezii* cultivars collected from *Panagatan Is*., Antique and *Eucheuma denticulatum* regardless of origin grow well in tanks and growth chambers. Other cultivars, particularly those with high gel strength, poorly grow and survive in tanks at the wet lab due to low (30 ppt) salinity levels in the past two months. Culture collections are maintained in growth chambers, tanks and in the phycology laboratory.

3.3 Molecular strategies to characterize and improve farmed carrageenan-producing marine macroalgae

Primer designing and optimization of DNA extraction have been undertaken. DNA from *K. alvarezii* cultivars collected from seaweed farms all over the country have been extracted and will be subjected to RFLP analysis (to determine genetic heterogeneity or homogeneity of different cultivars) as soon as the requested chemicals and supplies are delivered.

Spore Explant

3.4 Seed Production of Kappaphycus: *A. Protoplast* isolation and sporulation of *Kappaphycus*

No significant results from this study

3.5 Strain improvement and seedstock production through genetic manipulation

No significant results from this study

Project Activities

Project/Activity Title	Duration	Remarks
1. Propagation of *Kappaphycus* plantlets from callus-like structures by tissue culture	Jul – Dec 2006	Release of callus cells; formation of callus (5%)
2. Characterization of carrageenan properties and screening for disease resistance of farmed carrageenophytes	Oct 2005-Dec 2006	29 strains of *Kappaphycus* and 3 *Eucheuma* were characterized for their carrageenan quality (75%)
3. Molecular strategies to characterize and improve farmed carrageenan-producing marine macroalgae	Oct 2005-Dec 2006	0%
4. Seed Production of *Kappaphycus*: A. Protoplast isolation and sporulation of *Kappaphycus*	Jul – Dec 2006	Attempts to release protoplast & spore were made; isolated 16 species of *Vibrio* from 'ice-ice' infected thalli of *Kappaphycus* (3%)
5. Strain improvement and seedstock production through genetic manipulation	Oct 2005-Dec 2006	Attempts to liberate spore were made

1. There was a delayed arrival of procured laboratory chemicals and glass wares needed for the tissue culture, hence, the study was formally started in October. This study will be continued in 2007 and beyond.

2. One-time shot of collecting samples was not substantial to warrant the characterization of the *Kappaphycus* strains for their carrageenan quality and growth performance. The limited presence of the study leader (4x a month) is not sufficient to justify the conduct of a big program (3 studies) with a big budget. The hiring of a full-time research staff is more appropriate to conduct such a big program to have a better focus and supervision.

3. The study leader is also a visiting researcher and was not able to perform the expected activities. Again, the hiring of a full-time research staff is more appropriate to conduct such a critical study.

4. Initial results of seed production study of *Kappaphycus* are encouraging. This study will be continued in 2007 and beyond.

5. The study on genetic manipulation will be further reviewed considering the study leaders who will lead in the conduct of such study. A more experienced and bankable research staff is preferred to conduct such study.

In general, a review on the above-cited studies will be done based from the framework stated earlier. The hiring of visiting scientists outside Iloilo whose travel expenses are high will be discouraged. Such travel expense budget can be wisely utilized in the conduct of the experiment per se. A full-time research staff can do more and supervise better than a visiting scientist who travels miles and miles away.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Project/Activity Title	Duration	Remarks
1. Propagation of *Kappaphycus* plantlets from callus-like structures by tissue culture	Jan-Dec 2007	Plantlet regeneration from callus cells by tissue culture and mutagenesis; hatchery rearing of plantlets; selection of 'new' and 'improved plants; land-based nursery; outplanting
2. Seed Production of *Kappaphycus*: A. Protoplast isolation and sporulation of *Kappaphycus*	Jan-Dec 2007	Isolation and seed production of protoplasts and spores; genomic DNA of 'new' plants from protoplasts and spores; selection of 'new' and 'improved plant; hatchery rearing of 'new' plants; isolation of *Vibrio* from 'ice-ice' infected *Kappaphycus*;

PROGRAM DOCUMENT

Program Category: Departmental Program
Program Title: Aquatic Ecology
Responsible Department: Aquaculture Department (AQD)
Total Duration: 2007-2010

1. INTRODUCTION

The coastal resources of the country provide food and livelihood for fishing and farming communities. The socio-economic condition of the fishers, farmers and other stakeholders can be ameliorated through sustainable development and exploitation of coastal resources. However, aquaculture activities may result to coastal pollution if not regulated. The concept of environmental capacity is one of the strategies to prevent coastal pollution brought about by aquaculture activities. Environmental capacity refers to the ability of the environment to accommodate a particular activity or rate of activity without unacceptable impact. The results of this study and recommendations on proper protection and management of coastal resources can be implemented through effective governance.

Milkfish, grouper and other marine fish broodstocks are being maintained at Igang Marine Sub-station located in Igang Bay, Guimaras, Philippines for years. The mariculture park for grow-out culture of marine species in floating net cages is also starting to operate in that site. It is, therefore, necessary to set the maximum level of production in Igang Bay or and in other important aquaculture sites to prevent undesirable environmental impact for sustainable aquaculture.

2. PROGRAM

2.1 Objectives

The objectives of the Program are (a) to determine existing policies, institutions and ordinances to protect and ensure a sustainable aquaculture development in selected local government unit in Western Visayas, Philippines, (b) to recommend improvement in existing institutional arrangement in managing coastal resources in support of sustainable aquaculture in the selected local government units, (c) to demonstrate how environmental capacity can be determined in waters around Igang Marine Sub-station and other important aquaculture sites, and (d) to maintain good environmental condition of coastal areas and improve the condition of some degraded areas by growing seaweeds that absorb excess nutrients from the water.

2.2 Program description

The program includes studies on (a) Institutional arrangement in local governance in selected municipalities in Western Visayas, Philippines, (b) Determination of environmental capacity of Igang Bay and other aquaculture sites, and (c) other ecological studies for sustainable aquaculture. Technologies developed from other SEAFDEC/AQD programs will be adapted in the studies under this program. Results of nutrition studies from marine fish and crustacean programs will be considered in estimating the environmental capacity of the sites.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

No progress has been made since project is still in proposal stage. The project is for implementation in 2007.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

4.1. Planning for the project and activities

Project/Activity Title	Duration	Remarks
Institutional arrangements in local governance for sustainable aquaculture in selected provinces in the Philippines	2 years	New proposed project. Will tie up with institutional capacity development for sustainable aquaculture project of Training and Information Division
Environmental capacity of Igang Bay and other aquaculture sites	2 years	New proposed project. Recommendations based on results of the study will be submitted to the local government units for implementation

4.2. Expected Outputs:

- Policy analysis on existing institutional arrangement in aquaculture and coastal resource management in selected local government units
- Policy recommendation for effective local governance of coastal resources in support of sustainable aquaculture
- Set limit on the number of units of cages that can be installed in mariculture park
- Submit recommendations to local government units on the maximum area and aquaculture units that can be set up in certain site

Annex 5

SCRUTINY OF SEAFDEC PROGRAMS OF ACTIVITIES FOR THE YEAR 2006-2007:

PROGRAMS UNDER THE ASEAN-SEAFDEC FISHERIES CONSULTATIVE GROUP (FCG) MECHANISM

INTRODUCTION

The scrutiny of SEAFDEC programs of activities under the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) Mechanism for the year 2006-2007 composed of 1) existing programs as endorsed by the 8th Meeting of FCG and approved by the 38th Meeting of the Council, and 2) new proposed programs for the year 2007, which the detailed of their projects and activities are attached as **Appendix 1 to 2 of Annex 5** respectively.

PROGRAMS OF ACTIVITY UNDER ASEAN-SEAFDEC FISHERIES CONSULTATIVE GROUP (FCG) MECHANISM FOR THE YEAR 2006-2007

I. Existing Programs[a]

Programs	Lead ASEAN Country	Lead SEAFDEC Depts.	2006	2007
1. Regionalization of the Code of Conduct for Responsible Fisheries[1] ○ Component I: Formulation and Dissemination of the Regional Guidelines for Responsible Fisheries ○ Component II: Human Resource Development on the Support to the Implementation of the CCRF in the ASEAN Region - Fishing capacity in Southeast Asia - Integration of fisheries management into habitat management - Development or establishment of incentives or rewards for fishermen in promotion of environmentally sound and sustainable fisheries e.g. eco-labeling - Promotion of regional and sub-regional agreements on fisheries and aquatic/coastal environmental management - Fisheries/environmental management together with increasing of efforts to find a balance between large and small-scale fisheries in managing the fishing capacity - Integration of local knowledge and local organization in planning process	Indonesia	SEC	✓ ✓	- ✓
2. Assistance of Capacity Building in the Region to Address International Trade Related Issues[2]	Thailand	SEC	✓	✓
3. Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region (2006-2010)				

[1] The program is scheduled to end by the year 2006; however the activities under Component II of the program have been extended until the year 2007.
[2] The program was formerly referred to as 'Fish Trade and Environment'; the new title has been endorsed since 2005.

○ Component I: Fisheries Management				
3.1 Strengthening Small-scale Fisheries Management through the Promotion of Rights-based Fisheries and Co-management	Indonesia	SEC	✓	✓
3.2 Improvement of Fishery Statistics and Information for Planning and Management of Fisheries in the ASEAN Region	Thailand	SEC	✓	✓[b]
3.3 Responsible Fishing Technologies and Practices (Fishing in Harmony with Nature)	Thailand	TD	✓	✓
3.4 Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement	Thailand	TD	✓	✓[b]
3.5 Sustainable Utilization of Potential Fisheries Resources and Reduction of Post-harvest Losses	Thailand	TD	✓	✓
3.6 The Use of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region	Malaysia	MFRDMD	✓	✓[b]
3.7 Development of Integrated Inland Fisheries Management in ASEAN Countries	Malaysia	MFRDMD	✓	✓[b]
○ Component II: Aquaculture				
3.8 Development of Technologies for Sustainable Aquaculture	Philippines	AQD	✓	✓
3.9 Human Capacity Building for Sustainable Aquaculture	Philippines	AQD	✓	✓
○ Component III: Utilization of Fish and Fishery Products				
3.10 Quality Assurance Systems for Small and Medium-sized Fish Processing Establishments in ASEAN Member Countries	Singapore	MFRD	✓	✓
3.11 Utilization of Freshwater Fish in ASEAN Member Countries	Singapore	MFRD	✓	-[c]
3.12 Good Laboratory Quality Management in ASEAN Member Countries	Singapore	MFRD	✓	-[c]
4. Information Collection for Sustainable Pelagic Fisheries in the South China Sea (in collaboration with TD and MFRD)	Cambodia	MFRDMD	✓	-
5. Environmental Related Tasks in Southeast Asia (in collaboration with the Departments)[3]	Malaysia	SEC	✓	✓

[3] The program was formerly referred to 'Management of Fisheries and Utilization of Shark in Southeast Asia'(2002-2006 in Japan fiscal year), the new titled has been endorsed since 2005

6. Establishment of Disease Surveillance System of Aquatic Animals	Philippines	AQD	✓	✓
7. Chemical and Drug Residues in Fish and Fish Products in Southeast Asia	Singapore	MFRD	✓	✓
8. Research and Development (R&D) of Stock Enhancement for Species under International Concerns	Philippines	AQD	✓	✓
9. Research for Stock Enhancement of Sea Turtles (in collaboration with TD)[4]	Malaysia	MFRDMD		✓
10. Capacity Improvement of Fisheries Community for Fisheries Management and Alleviation of Poverty ○ Component I: Follow-up of the on-going projects ○ Component II: Extension of the project concept to other Member Countries ○ Component III: International Training Course on Coastal Fisheries Management for Fishery Managers	Thailand	TD	✓	✓
11. Human Resource Development (HRD) for Sustainable Development of Fisheries in Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA) Region (in collaboration with the Departments)[5]	-	SEC	✓	-

[a] The programs have been endorsed at the 8th Meeting of ASEAN-SEAFDEC FCG, 38th Meeting of SEAFDEC Council, and the 14th Meeting of ASWGFi.
[b] Some part of activities is on going and to be implemented in the year 2007 based on the availability of fund.
[c] The programs are deferred until funding is available.

[4] The program was formerly under component II of the program 'Research and Development (R&D) of Stock Enhancement for Species under International Concerns', in order to follow-up the progress initiatives on 'Conservation and Management of Sea Turtles in Southeast Asian Countries' in 2004. The program is proposed to entitle as appears in the table in the year 2007.
[5] The program started since 2005 but did not report under the ASEAN-SEAFDEC FCG mechanism. The program is expected to complete by early 2007.

II. Proposed New Programs for the Year 2007

Programs	Lead ASEAN Country	Lead SEAFDEC Depts.
12. SEAFDEC-Sida Project on Support to Tsunami Rehabilitation of Affected Countries in the ASEAN Region	TBD (*To be decided*)	SEC
13. Fisheries Resource Survey and Operational Plan for M.V. SEAFDEC 2	TBD	TD
14. Tagging Program for Economically Important Pelagic Species in the South China Sea and Andaman Sea (in collaboration with TD)	TBD	MFRDMD
15. Deep Sea Fisheries Resources Exploration in the Southeast Asia (in collaboration with MFRDMD)	TBD	TD

Appendix 1 of Annex 5

PROGRAM DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Regionalization of the Code of Conduct for Responsible Fisheries (RCCRF) in Southeast Asia
Lead Department: Secretariat in collaboration with all Departments
Duration: Component I: 1999-2006
Component II: 2003-2006

1. INTRODUCTION

Since the adoption of the Code of Conduct for Responsible Fisheries (CCRF) in 1995, SEAFDEC supports the formulation and implementation of the CCRF and upholds the general principles and standards provided therein. To fulfill this obligation and to introduce the CCRF in Southeast Asia, SEAFDEC, as a premier fisheries center in the region with a long-term commitment to sustainable development and management of the region's fisheries and coastal resources, has initiated a comprehensive program known as the Regionalization of the Code of Conduct for Responsible Fisheries. The need to regionalize the code is to examine, clarify and elaborate the generic articles of the CCRF by establishing a set of guidelines considering regional specificities (fisheries structure, ecosystem, cultural, social, economic factors, as well as other issues of importance in the region).

2. PROGRAM

2.1 Objectives

1. Develop a set of regional guidelines on CCRF clarifying actions to be undertaken by the Member Countries to effectively implement CCRF; and
2. Develop supporting activities/materials focusing on increasing human capacity for supporting the implementation of CCRF at the national level.

2.2 Program description

The program is composed of two components. Component I focuses on formulation and dissemination of the regional guidelines for responsible fisheries, through the consultation process with the Member Countries and international/regional/national experts. Component II was initiated through the technical cooperation with the Swedish Board of Fisheries with financial support from the Swedish International Development Cooperation Agency (Sida), program entitled "Human Resource Development on the Support to the Implementation of the CCRF in the ASEAN Region". Component II focuses on facilitation of the national implementation of the issues related to CCRF/RCCRF through appropriate human resources development activities with emphasis on how to enhance awareness and to promote activities for fisheries management.

3. ACTIVITIES IN THE YEAR 2006

Project/Activity Title	Duration	Progress/Remark
Component I Publication of Regional Guidelines for Responsible Fisheries in Southeast Asia "Supplementary Guidelines on Co-Management using Group User Rights, Fisheries Statistics, Indicators and Fisheries Refugia	Published in March 2006	Finished
Component II 1. Pilot Process in the representative set of countries (Cambodia, Indonesia, Thailand and Vietnam) 2. Synthesis of the lessons learned and results of the pilot process 3. Development of HRD supporting materials in the representative set of countries 4. Coordination among relevant projects/initiatives 5. Updating of regional database on HRD	 Jan to Aug Jan to Dec Jan to Dec -	 Finished To be published in early 2007 To be published in early 2007 Finished To be activated in early 2007
6. Organization of Preparatory Expert Meeting on Development of National/Regional Training Materials for HRD in Fisheries Management	July	Organized
7. Organization of Expert Meeting on Management of Fishing Capacity in Southeast Asia	September	Organized
8. Organization of the RTC on Management of Fishing Capacity and Human Resource Development in Support of Fisheries Management in Southeast Asia (Project-end Meeting)	September	Organized
9. Preparation of Project Final Report	November to date	To be submitted to SBF and Sida in March 2007

Project Activities: Component I

The major achievement under this program implemented during 2006 is the publication of the Regional Guidelines for Responsible Fisheries in Southeast Asia "Supplementary Guidelines on Co-Management using Group User Rights, Fisheries Statistics, Indicators and Fisheries Refugia. The book presents the guidelines into four subdivisions: *Co-management Using Group User Rights for Small-scale Fisheries*; *Use of Indicators for the Sustainable Development and Management of Capture Fisheries*; *Fishery Statistics for Capture Fisheries*; and *Use of Fisheries Refugia for Capture Fisheries Management*.

The first three issues are the results of the programs implemented by SEAFDEC, as identified among the priority issues stipulated in the Resolution and Plan of Action of the Millennium Conference held in 2001, while the guidelines for the Use of Fisheries Refugia for Capture Fisheries Management is a concept developed through the project "Reversing Environmental Degradation Trends in South China Sea and Gulf of Thailand" implemented by UNEP-GEF. Though each of the Guidelines has its own introductory parts, efforts are made to summarize the information for the user's of the book.

Considering various specificities including existing system and status of fisheries, social and economic situation and government policy on the way to support system varies from country to country, it was recommended to conduct the appropriate works to nationalize the issues contained in the guidelines to develop the most practical national system in each country. The conduct of National Consultation Meetings, inviting appropriate stakeholders to participate and

nationalizing the guidelines by initiating the translation of the relevant issues to national language, could be considered for future follow up actions to further promote the issues identified in the documents.

Project Activities: Component II

The emphasis of the program implementation is put on effort to identify various options to alleviate the problems caused by excessive levels of fishing capacity; to enhance awareness of the necessity of appropriate fisheries management to achieve sustainable development; to promote HRD activities on fisheries management with identified target groups; and to advise stakeholders on the mechanism of innovative fisheries management system. Program activities in 2006 included as appeared in above table.

Major achievement and output of the program, implemented under component II, until 2006 include:

- **Creating a HRD strategy for fisheries**: the project formulated and ASEAN-SEAFDEC Member Countries adopted their Strategy for HRD in Fisheries in the ASEAN Region in 2004. The "Strategy" is considered vital to clarify the role of HRD to effectively implement the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region and in line with that of scope and framework in supporting the promotion and implementation of the CCRF.

- **Creating plans and framework for HRD in fisheries management**: the project developed the plans and framework for HRD in fisheries management in 2004, through the ASEAN-SEAFDEC regional consultation process focusing on three thematic issues:
  - Management of Over Fishing Capacity
  - Strengthening of Local Fisheries Management
  - Integrating Fisheries Management into Habitat Management

- **Improving and better planning and management of fisheries**: based on recommendations defined by ASEAN-SEAFDEC Member Countries, one of the key challenge for future improvements of planning and management of coastal fisheries through capacity building and HRD programs is to package policy and technical advices and awareness building for policy makers/high level officials in fisheries management including management of fishing capacity.

- **Integrating social, environmental and legal aspects in the HRD process**: through the ASEAN-SEAFDEC regional consultation process, the project developed a key set of thematic indicators on integration of social, environmental, and legal aspects' in the process of awareness building and human resource development. With this regard, the project have since 2004 been in cooperation with the UNEP/GEF South China Sea Project and specifically with the fisheries component. The concept of *refugia*[7] has been introduced through the various project activities, and the project plans to support the establishment of refugia for the management of commercially important fish stocks and endanger species in the ASEAN-SEAFDEC region.

- **Assisting Member Countries in managing fishing capacity**: the project has actively supported the Member Countries in managing the fishing capacity and particularly provided technical assistance to formulate the practical steps to be taken towards the development of

[7] Fisheries refugia in Southeast Asia are commonly understood as "Spatially and geographically defined marine or coastal areas in which specific management measures are applied to sustain important species (fisheries resources) during critical stages of their lifecycle, for their sustainable use".

national HRD plans of programs/activities for management of fishing capacity. It was also stressed that management of fishing capacity and related HRD should be addressed within the context of fisheries management, thereby avoiding an "isolated" process that would be optimal in terms of identifying options for management of fishing capacity at all levels. During the expert meeting in August 2006, a set of key issues in managing fishing capacity was formulated.

- **Establishing a regional fisheries management information collection mechanism**: the project could be able to establish information collection through national focal points for each SEAFDEC Member Country on national/regional HRD programs/initiatives related to fisheries management. This could allow sharing their resources in developing human resources for all levels to support the promotion of the CCRF/RCCRF and also with the attempt indirectly to know the progress in each country on the issues related to their plan and framework for the issues related to management of fishing capacity.

- **Establishing a collaborative work among institutions concerned**: during the course of project implementation, active participation of the project staff in SEAFDEC and non-SEAFDEC relevant events/activities has been carried out to maintain the dialogue with the countries and collaborative projects/initiatives on the issue related to fisheries management (more in coastal small-scale issues) and management of fishing capacity.

- **Implementing and developing national and regional HRD training materials**: through the implementation of the pilot work (pilot process), the project has initiated national events (workshop and on-site training) with the aim to assist ASEAN countries in preparing and publishing national training materials using the regional guidelines of the fisheries management, also including translation of the training materials on the fisheries management of RCCRF to national languages for future formulation of the regional HRD training package for fisheries management.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

As the RCCRF program will be finished by December 2006, there is no activity under Component I for the year 2007. But the continued Swedish supported under **Component II: *Human Resource Development on the Support to the Implementation of the CCRF*** *in the ASEAN Region* are planned to implement as the sequence of previous initiatives as following description.

Focus and activities during 2007

Fisheries management, aquatic resources management and the importance to properly manage important coastal environments/habitats as well as maintaining protective geographical features, this, both in terms of aspects related to poverty reduction and to maintain a healthy and productive environment will continue to be core areas in working towards sustainability in fisheries and aquatic resources in Southeast Asia. Specific attention is needed on the management of fishing capacity (large and small-scale) to reverse environmental degradation trends and to integrate fisheries management into habitat management.

As mentioned above, the planned activities for the extension, or bridging year 2007 is built upon results achieved through Swedish supported, and other activities, incorporating elements of the recommendations provided at the Regional Technical Consultation, Phuket, Thailand, in October 2006, while at the same time move towards the implementation of activities under a new collaborative agreement between SEAFDEC and Sweden. To show how suggested activities fits into the perspective, or Logical Framework, of a new agreement between SEAFDEC and Sweden reference is made to the draft proposal for continued Swedish support

submitted earlier in 2006.

A general thrust in the process of implementation is to support trends among ASEAN-SEAFDEC Member Countries to come to agreements among countries on matters of importance to fisheries management, such as fishing capacity, conflicts, fish resources conservation areas, etc and in the medium to long term perspective support the establishment of a regional fisheries management body. Capacity building during 2007 for government staff at various levels and others will, primarily, be organised by involvement in activities or learning-by-doing rather than formal training sessions.

An activity plan for 2007 focuses on the Gulf of Thailand, the South China Sea and Sulu and Sulawesi Seas should be seen in the light of a priority of activities in the area of the Andaman Sea and Malacka Straits planned for under a post-tsunami related project. However, in addressing fishing capacity the whole region would be in focus. Continued co-ordination among regional, international and national organizations is to be maintained during the year 2007 with a base in the ASEAN Fisheries Consultative Group (FCG) framework.

In summary a number of important areas will continuously be addressed during the year and in the finalisation of the proposal for 2008 onwards, such as:

- Fishing capacity – in Southeast Asia, overcapacity is seen as the largest fisheries management problem
- The integration of fisheries management into habitat management
- Develop or establish incentives or rewards for fishermen, fishing crews and/or fishing villages as a whole in promotion of environmentally sound and sustainable fisheries
- Promote regional and sub-regional agreements on fisheries and aquatic/coastal environmental management
- The need for better fisheries/environmental management together with increased efforts to find a balance between large and small-scale fisheries in managing the fishing capacity
- Local knowledge and local organization: Traditional knowledge and local organizations could/should be more actively integrated in planning processes

During the extension or bridging year 2007, activities will be listed under a set of seven headlines. These headlines will in the forthcoming proposal be worked into expected outputs to which the results of activities are to be contributing. These headlines include: processes to promote establishment of regional fisheries management body; integration of fisheries into habitat management; incentives for environmental friendly fisheries/eco-labels; understand the size and structure of large-scale fisheries; systems to monitor and record coastal fisheries; local knowledge and safety at sea, and; project management and coordination. The headings and related activities are established with an aim to initiate or continue the promotion of:

1. A process supported to establish a regional fisheries management body in Southeast Asia supported among ASEAN-SEAFDEC Member Countries;
2. Capacity for the management of fisheries and important coastal habitats (refugia) and the protection against natural hazards built up and improved in Cambodia, Vietnam and Thailand with processes initiated in Sulu and Sulawesi Seas; and
3. Understanding provided on the size and structure of large-scale (or industrial) fisheries and capacity strengthened to monitor and record active fishing effort in coastal fisheries built up as basis for development of coordinated plans for management action on fishing capacity among ASEAN-SEAFDEC Member Countries and implemented (large and small scale).

The main emphasis during the year is, as stated earlier, to maintain the momentum of the achievements under the SEAFDEC-Sida collaborative project, promote continued and increased interest for regional and sub-regional cooperation, initiate and/or continue processes on establishment of refugia, initiate processes to monitor and record fishing capacity and provide

background information for habitat and fisheries management as well that of addressing fishing capacity (large and small-scale) through studies and consultations – and to finalise a proposal and framework for continued cooperation with Sweden from 2008, onwards.

Proposal for SEAFDEC continued cooperation with Sweden 2008 and onwards

SEAFDEC is expected to submit a proposal for "SEAFDEC continued cooperation with Sweden, 2008 and onwards". The basic document for the finalisation of such a proposal is the proposal submitted during 2006 on cooperation from 2007. This proposal has already been revised after a "pre-assessment" by the SBF, recommendations provided during the Regional Expert Meeting in Sihanoukville, July 2006, and the Regional Technical Consultation in Phuket in October 2006. Activities suggested during the extension/bridging year are aligned to the general thrust and objectives outlined in the earlier proposal. The proposal for 2008 and onwards will cover four or five years as indicated by Sida during a meeting in Stockholm in October 2006. Indicative levels of funding and amount of years to be covered will be provided by Sida.

SEAFDEC-Sida Cooperation for Extension/Bridging Year 2007

Proposed Activities and Schedule 2007 (12 months)

	M 1	M2	M 3	M4	M 5	M 6	M7	M 8	M 9	M 10	M 11	M 12
1. Promote Regional Fisheries Management Body												
1. Regional Consultations on common ASEAN-SEAFDEC approaches to mitigate problems within the fishing sector												
2. Recommendation on results from project activities to ASEAN and ASEAN-SEAFDEC Member Countries and to policy making mechanisms												
5. National legislation and institutional arrangements pertaining to management of the exploitation of fisheries and critical habitats												
6. Review international fisheries conventions and other conventions with a view to how they are implemented in ASEAN-SEAFDEC Member Countries												

	M 1	M2	M 3	M4	M 5	M 6	M7	M 8	M 9	M 10	M 11	M 12
2. Project Management and coordination												
Finalise proposal for 2008 onwards												
Project management												
Planning meetings (regional, Cam, Vie, Thai)												
Maintain regular coordination with UNEP/GEF, FAO, etc..												
Take part in other meetings for coordination												
Assess progress and report, reviews												
Annual Review meeting (Sida and/or SBF)												

	M 1	M2	M 3	M4	M 5	M 6	M7	M 8	M 9	M 10	M 11	M 12
3. Habitat and fisheries management												
1. Develop criteria to determine the national, sub-regional and trans-boundary significance of specific areas												
2. Define spatial boundaries for refugia development in Koh Kong, Kampot, Trat, Kien Giang, Quang Binh and Haiphong Provinces based on the regionally developed criteria												

3. Review fisheries and habitat management systems in the identified areas in Cambodia, Vietnam and Thailand												
4. Survey systems to protect important nursery grounds and spawning areas for at least Koh Kong, Kampot, Trat, Kien Giang, Quang Binh and Haiphong Provinces												
10. Initiate process to develop regional and national action plans to develop a regional system of refugia for maintenance of regionally important fish stocks												
12. Initiate process with Indonesia, Malaysia and the Philippines on the development of refugia in Sulu and Sulawesi Seas												

	M 1	M2	M 3	M4	M 5	M 6	M7	M 8	M 9	M 10	M 11	M 12
4. Incentive for sustainable fishing/Eco-labels												
1. Prepare for pilot activities on eco-labelling in three areas/sub-sectors												
2. Provide result and information to ASEAN-SEAFDEC Member Countries												
3. The role of governments on eco-labelling in a Southeast Asian Context												
4. Study on the practicability and value of eco-labelling and the readiness of the fisheries sub-sectors												
5. Active participation by ASEAN-SEAFDEC Member Countries in international fora on eco-labelling												

	M 1	M2	M 3	M4	M 5	M 6	M7	M 8	M 9	M 10	M 11	M 12
5. Size and structure large-scale fisheries												
1. Review available information on the size and structure of large-scale fisheries in ASEAN-SEAFDEC Member Countries												
2. Assess the status of large-scale fisheries over time relative to small-scale fisheries												
3 Initiate review, description and recommended revisions on MCS practices												
4. Initiate mapping and description of fishing areas for large-scale fisheries in the ASEAN region												
5. Available information on IUU by larger vessels and conflicts with small-scale fisheries												

8. Provide inputs on the management of large-scale fisheries to the ASEAN policy making mechanisms												

	M 1	M2	M 3	M4	M 5	M 6	M7	M 8	M 9	M 10	M 11	M 12
6. Monitor and record coastal fisheries												
1. Initiate staff capacity building in Koh Kong, Kampot, Trat, Kien Giang, Quang Binh and Haiphong Provinces to monitor and record active fishing capacity in coastal areas												
2. Initiate assessment of level and type of fishing capacity in coastal areas including IUU by large-scale vessels in the above identified provinces												
3 Review and recommend on practicalities of systems to monitor and record active fishing capacity												
4. Initiate drafting of plans to monitor and record active fishing capacity in Cambodia, Vietnam and Thailand												
6. Awareness raising on the need to provide alternative livelihoods to facilitate exit												
7. Promote further improvement, preparation and implementation of activity plans to manage fishing capacity												

	M 1	M2	M 3	M4	M 5	M 6	M7	M 8	M 9	M 10	M 11	M 12
7. Local knowledge and safety at sea												
1. Survey local knowledge and actions among ethnic groups and coastal communities in Cambodia, Vietnam, the Philippines and Thailand (desk studies and review of available information)												
5. Initiate process to improve or establish systems for registration of boats in Cambodia, Vietnam, the Philippines and Thailand												

PROGRAM DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Assistance of Capacity Building in the Region to Address International Trade Related Issues
Lead Department: The Secretariat
Lead Country: Thailand
Total Duration: 2004-2008
Proposed 2006 Budget: 45,000

1. INTRODUCTION

The program on Assistance of Capacity Building in the Region to Address International Trade Related Issues (formerly refers to 'Fish Trade and Environment') is in line with SEAFDEC's Strategic Plan on Fisheries to effectively safeguard its Member Countries' interests and welfare against unfair treatment, which may jeopardize the national or regional fisheries resources sustainability. This program has been fittingly identified to enhance and strengthen competitiveness, cooperation and joint approaches in addressing international as well as regional issues and problems affecting fish trade and the environment in Southeast Asia through the formulation of regional fisheries policies.

Through the program, the participation of ASEAN-SEAFDEC Member Countries particularly the fisheries-related government agencies has become active and visible particularly in the conduct of the preparatory and negotiation works at the country level to strengthen national policy including regional positions and requirements for the trade of fish and fishery products.

The significance of the program was initially collaborated in November 1999 when the SEAFDEC Preparatory Meeting on Issues of International Fish Trade and Environment was convened to discuss about pertinent issues on fish trade and environment in order to meet squarely the demands required of the upcoming WTO Ministerial Meeting in Seattle. During the 1999 Fish Trade Meeting, recommendations were formulated and adopted based on the issues and initiatives that have been discussed internationally that have so much bearing to the region's trade of fish and environment such as Sustainable Fisheries and Sustainable Fish Trade; the US Shrimp Embargo on some ASEAN-SEAFDEC Member Countries; Fisheries Subsidies; SPS; CITES; Eco-labelling; etc.

In spite of the failure of the 1999 WTO Ministerial Meeting in Seattle to provide an acceptable global trade framework including fisheries, SEAFDEC has always gone step ahead to continuously clarify its regional requirements for fish trade. Hence, in April 2001, the Regional Technical Consultation on Fish Trade in ASEAN Region was organized. This Meeting was convened as an integral part of the ASEAN-SEAFDEC Millennium Conference. Similarly, international issues affecting the region's fisheries and trade were threshed out and recommendations were formulated subsequently to aid ASEAN-SEAFDEC Member Countries in dealing with these international issues and initiatives.

2. PROGRAM

2.1 Objective:

The objectives of this project are as follows :

1) To review international issues related to fish trade and environment that may have potential impact to fisheries in the region.

2) To provide forum for the Member Countries to discuss and clarify approaches to ensure sustainable fish trade in the region in response to the up-coming international issue
3) To prepare policy option related to fish trade and environment to facilitate common position among ASEAN-SEAFDEC Member Countries to reflect fisheries situation in the region and safeguard their interest.

2.2 Program description:

The program has been formulated primarily to provide a forum for ASEAN-SEAFDEC Member Countries to discuss and exchange views based on the regional needs and also in response to international initiatives and other evolving fisheries situations that have serious implications to the region's trade of fish including the sustainability of the fisheries resources.

However, the inclusion of the Fish Trade Environment Program into the ASEAN-SEAFDEC Collaborative Projects was only realized in April 2000, two years after it has been identified as a critical program for Southeast Asian Member Countries. Its inclusion was formalized at the Special SOM-AMAF Meeting held in Brunei Darussalam and thereafter, it has been funded regularly by the Japanese Trust Fund Project to continuously and carefully review and discuss immediate and future plan of actions against anticipated external threats to the region's trade of fish and fishery products including the sustainability of fisheries resources and the environment.

3. PROGRESS ACTIVITIES IN THE YEAR 2006

Project Activities:

Project/Activity Title	Duration	Remarks
1. ASEAN-SEAFDEC Regional Technical Consultation on International Fish Trade Related Issues	February 2006	100% completed
2. Participation at the 10th Session of the FAO Sub-Committee on Fish Trade	June 2006	100% completed
3. ASEAN-SEAFDEC High Level Conference on the Impacts of the International Fisheries Related Issues	June 2006	100% completed
4. ASEAN-SEAFDEC Regional Technical Consultation on International Fisheries Related Issues	September 2006	100% completed

In 2006, the project organized the RTC on Fish Trade Related Issues from 20 to 22 February in Bangkok. The Consultation was held to review status and concerns on important fisheries issues including international fish trade, develop policy recommendations including common/coordinated positions, which could be used by the Member Countries when participating in relevant international fora as well as to identify improvement of the mechanism for formulation and implementation of policy recommendations and coordinated/common positions. The outcome of the consultation as well as other substantive international fish trade issues have been synthesized by the Secretariat and submitted to the 8th Meeting of ASEAN-SEAFDEC FCG and the 38th Meeting of SEAFDEC Council.

In June 2006, the ASEAN-SEAFDEC High Level Conference on the Impacts of the International Fisheries Related Issues has been taken place in Bangkok, Thailand. As the outcomes, the Conference came up with recommendations on formulation of 'Strategy and Mechanism for Minimizing Impact of International Fisheries Related Issues', as well as

coordination mechanism among the Member Countries, as the framework and working mechanism for SEAFDEC future activities in assisting Member Countries to tackle with international issues related to fisheries.

In September 2006, the Secretariat organized one-day meeting entitled 'ASEAN-SEAFDEC Regional Technical Consultation on International Fisheries Related Issues' on day of 18th. The Consultation was held with the main objectives to review priority fisheries issues discussed at international level and their status by focusing on the proposed moratorium on high sea bottom trawls under the framework of the United Nations General Assembly (UNGA) and commercially exploited aquatic species under CITES framework, and identify potential impacts on fisheries in the ASEAN and SEAFDEC Member Countries in order to develop recommendations for actions to address such impacts and formulate common/coordinated positions to be used as a basis for participation of the Member Countries in relevant international fora. Subsequently, the meeting has agreed on the 'Common Concerns and Proposed Coordinated Positions on the Propose Moratorium on High Sea Bottom Trawls under the Framework of UNGA. With regard the issue on commercially exploited aquatic species under CITES framework especially sea cucumbers, the meeting supported the conduct of regional study on sea cucumber fisheries, trade and utilization, as well as reaffirmed that the fisheries representative from the national government should plan an active role in CITES relevant fora.

The project also coordinated closely with other projects such as environmental related tasks in Southeast Asia (formerly refers to conservation and management of sea turtles in the ASEAN region and management of shark fisheries). The result of coordination was used as inputs for the participation of the Member Countries and SEAFDEC in relevant international fora.

At the international level, the project also formulated 'Executive Report of International Fish Trade Related Issues and Anti-fisheries Campaigns (2006)' which reviews of issues and common positions have been discussed. The report has been distributed to the Member Countries to support the Member Countries who participated in the relevant FAO technical consultations. In addition, the project was also able to assist the Member Countries to consolidate views and concerns during the 10th Session of FAO Sub-committee on Fish Trade to safeguard requirements and interests of the ASEAN region.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Planning for the project and activities (project/activity title and its short description) to be implemented in the year 2007 and the expected outcomes.

Project/Activity Title	Duration	Remarks
1. Regional Technical Consultation	January	RTC on International Fisheries Related Issues (moratorium on high sea bottom trawls, CITES and etc.)
2. In Depth Study on the Issues Identified by the RTC	Feb.-Nov.	In depth study on the issues follows up the outcome of RTC
3. Participation to FAO COFI	March	To dispatch representative(s) to the 27th Session of FAO COFI to support the Member Countries in line with the outcome of the above RTC

4. Participation to other Relevant Regional/International Forum	Feb.-May	Where appropriate, senior officials of SEAFDEC will participate in other relevant regional/international forum to promote regional coordinated positions and observe manner of global interest
5. Production of Promotional Brochure and materials for Support the Member Countries	June-Nov	Collected information inclusive of actions taken by SEAFDEC will be publicized

The mobilization of the International Trade Related Issues is flexible. Likewise, activities are carried out depending on the immediate requirements of the region including the degree of seriousness of the international and external threats posed to the region's fish trade and environment.

However, to follow-up the previous ASEAN-SEAFDEC Regional Fish Trade Meetings and safeguard the region's interests, an ASEAN-SEAFDEC Regional Technical Consultation on International Fisheries Related Issues is tentatively set either in January or February 2006. The Meeting aims primarily at reviewing progress, achievements and constraints encountered in the promotion of issues related to trade in the region such as moratorium on high sea bottom trawls, sea cucumbers, CITES CoP-14, and etc. as well as discussing the issues of international concern which will be raised at the next FAO COFI meeting in March 2007. The Meeting is envisaged to exchange views and information in order to prepare the Member Countries ready for the finalization of concerned issues at the next FAO COFI meeting.

In addition, the Secretariat will keep close monitoring of issues that are of interests/importance to the region or as instructed by the Council. Where appropriate, the project will promote activities to tackle the need arises.

PROGRAM DOCUMENT

THE SPECIAL 5-YEAR PROGRAM ON SUSTAINABLE FISHERIES FOR FOOD SECURITY IN THE ASEAN REGION (2006-2010)

BACKGROUND

Since 2000, the Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region was initiated and promoted through fisheries collaborative mechanism of ASEAN and SEAFDEC Member Countries in order to analyze fisheries problems and discuss issues of concern to the ASEAN region, as well as help formulate harmonized regional policies to ensure sustainable fisheries production and promote collaboration on the global initiatives.

At the 36th Meeting of SEAFDEC Council, SEAFDEC Secretariat was given directives to conduct a review of progress of implementation of the Resolution and Plan of Action in collaboration with the ASEAN Member Countries. During the review exercise, the Member Countries reported that the Resolution and Plan of Action does not only provide regional policy framework and priority actions to promote regional cooperation in sustainable development of fisheries but also a basis for strengthening the national policy and programs in achieving sustainable fisheries and food security.

The Member Countries also reported during the review exercise that much progress have been made in the implementation of the Resolution and Plan of Action, and expressed their appreciation to SEAFDEC and Japan for their support which could be further enhanced. However, there is still much to be done taking into account that the Resolution and Plan of Action have proved to be valid to current fisheries situation in the region and needs of the Member Countries, although there are different stages of fisheries development among the Member Countries. It was requested that the supports for present and future programs, from SEAFDEC to ASEAN in strengthening the implementation of the "Resolution and Plan of Action" would have to take this into consideration.

The current Special 5-year Program is considered a continuum of activities divided into three phases covering the period of 2000 to 2005 as follows:

1. *Preparatory Stage (2000-2001)*: A series of preparatory activities leading up to the organization of the Conference have been conducted by SEAFDEC in collaboration with ASEAN, FAO, DOF (Thailand) and ASEAN-SEAFDEC Member Countries. The activities included regional consultations, national seminars, etc.
2. *Conference Proper (19-24 November 2001)*: The Conference divided into technical and ministerial sessions was conducted in order to discuss fisheries related problems and identify ways and means to overcome the problems. The major outcomes of the Conference– Resolution and Plan of Action – are considered a regional fisheries policy and actions to be undertaken to promote sustainable fisheries development in the region.
3. *Follow-up Stage (2002-2005)*: In order to ensure proper actions to be taken in line with the Resolution and Plan of Action, follow-up program/projects are developed to assist ASEAN Member Countries in ensuring sustainable fisheries in the region.

As the current Special 5-year Program is approaching its final year in 2005, the Meeting of the ASEAN-SEAFDEC Regional Program Planning for the Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region (Planning Meeting) was organized to review implementation and achievements of the program covering the period from 2002-2005 and to formulate its future projects of the program from 2006-2010 to ensure continuous process of implementation of the Resolution and Plan of Action for the ASEAN Region by the Member

Countries.

OBJECTIVES

The Special 5-year Program was initiated with clear objective to support ASEAN Member Countries in implementing the priority issues "the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region" adopted at the Millennium Conference. With the aim to provide benefit to all ASEAN Member Countries, to minimize disparities and to achieve coordinated efforts toward sustainable fisheries, the program has the following specific objectives:

1. To analyze issues critical to ensure sustainable development of fisheries, recognizing its importance to food security for the ASEAN region;
2. To create a climate of cooperative and integrated efforts among ASEAN Member Countries to achieve sustainable fisheries; and
3. To promote capacity building of national institutions and human resources responsible for the promotion of sustainable fisheries in the ASEAN region.

PROGRAM PRINCIPLE

At the Regional Program Planning Meeting held in February 2005 in Bangkok, the Member Countries stressed on the need for continuation of the program in the future as the program is viewed as a regional collaborative effort in achieving sustainable fisheries in the region and a platform for closer partnership among the Member Countries particularly in safeguarding fisheries interests in international fora.

The program principle, as suggested by 27 Program Committee Meeting of SEAFDEC together with the recommendations made at the Program Planning Meeting, for formulation of the Special 5-year Program in 2006-2010 includes:

- Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region;
- Results of the Review Exercise of Progress of Implementation of the Resolution and Plan of Action;
- Statement for ASEAN-Japan Cooperation on Sustainable Fisheries through SEAFDEC particularly the Vision "to be a leader in sustainable tropical fisheries";
- Roadmap for Integration of Fisheries Sector under the ASEAN Framework Agreement for the Integration of Priority Sectors; and
- Directions for future promotion of the Code of Conduct for Responsible Fisheries and Regional Guidelines for Responsible Fisheries in the ASEAN Region.

PROGRAM STRUCTURE

Based on the inputs from ASEAN-SEAFDEC Member Countries during the Regional Program Planning Meeting held in February 2005 in Bangkok, the Meeting identified the following projects. There are three components, totally 12 projects, under the Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region from 2006-2010 as follows:

Component 1: Fisheries Management

- The Use of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region
- Development of Integrated Inland Fisheries Management in ASEAN Countries
- Improvement of Statistics and Information for Planning and Management of Fisheries the ASEAN Region

- Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement
- Strengthening Small-scale Fisheries Management through Promotion of Rights-based and Co-management Concepts
- Sustainable Utilization of Potential Fisheries Resources and Reduction of Post-harvest Losses
- Responsible Fishing Technologies and Practices

Component 2: Aquaculture
- Development of Technologies for Sustainable Aquaculture
- Human Capacity Building for Sustainable Aquaculture

Component 3: Fisheries Post-harvest
- Quality Assurance Systems for Small and Medium-sized Fish Processing Establishments in the ASEAN Region
- Good Laboratory Practices (GLP) and Methods Validation
- Utilization of Freshwater Fish

PROGRAM ADMINISTRATION

Through the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) mechanism, SEAFDEC Secretariat will be responsible for the overall program administration in coordination with the Departments. The program will be implemented in close collaboration with the "core countries" to achieve the identified objectives. In implementation of the program close cooperation with ASEAN Member Countries and other institutions/international organizations through technical assistance and staff exchange will be promoted.

FINANCIAL ARRANGEMENT

Cost-sharing policy among SEAFDEC, ASEAN Member Countries and collaborating regional/international organizations will be extensively promoted with the major contribution from the Government of Japan. SEAFDEC Secretariat is responsible for preparing consolidated financial requirement and reporting for submission to relevant bodies.

PROGRAM MONITORING AND EVALUATION

Program monitoring will be conducted annually by SEAFDEC Secretariat in coordination with the Departments from 2006 to 2010. At the end of the program period, the overall evaluation will be also conducted by the Secretariat in collaboration with the Departments and ASEAN Member Countries for submission to relevant bodies.

THE SPECIAL 5-YEAR PROGRAM ON SUSTAINABLE FISHERIES FOR FOOD SECURITY IN THE ASEAN REGION

COMPONENT I: FISHERIES MANAGEMENT

BACKGROUND AND RATIONALE

Concerns over the long-term sustainability of fisheries resources using appropriate management mechanisms is vital to ensuring stable fish supply and achieving food security and related benefits in the ASEAN region both now and in the future. Each country has applied their own policy, legal and institutional or regulation frameworks to manage their respective fisheries, these systems are generally based and increasing production levels. So that, there is a need to improve national fisheries management frameworks in order to accommodate the various requirements for sustainable fisheries development in the region.

In the absence of suitable stock assessment model for multi-species and multi-gear fisheries, the indicator-based management system has been recognized as one of the reliable and practical approaches for sustainable development and management of the capture fishery in this region. Based on the Resolution and Plan of Action adopted at the Millennium conference 2001 "Fish for the people" on Sustainable Fisheries for Food Security for the ASEAN Region, SEAFDEC in collaboration with Member Countries has initiated since the year 2002 and on the experiences from the pilot scale, the Regional Guideline on the Use of Indicators for Sustainable Development and Management of Capture Fisheries is now developing. Indicators could reflect the well being of the fishery resource, as well as broader ecological, social, economic and institutional objectives. When coupled with other management approaches such as right-based management, co-management, ecosystem-based approach, management of fishing capacity, the use of indicators has the potential to more effectively aid to control of exploitation level.

The priority issues on the necessity to improve fishery statistics and information systems as a tool for planning and management of fisheries was highlighted as an important prerequisite to tackle with the various problems toward the sustainable fisheries and food security. To achieve sustainable fisheries objectives, understanding and knowledge of fishery status, trend and prospectus are needed to be enhanced. These could be obtained through analysis of reliable and timely statistics and information, which will then be used for the formulation of sound fisheries policies and management strategies. To fulfill this goal, the fishery statistics is still form an important basis which required improvement of better national fishery statistical system in terms of quality, availability, reliability, accuracy and timeliness of statistics in line with the minimum requirements and the regionally standardized definitions and classifications for fishery statistics to facilitate regional compilation, analysis and data exchange.

In many areas, the introduction of man-made structures, including artificial reefs, aquaculture facilities, breakwaters, stationary nets and jetties are shown to enhance fishery resources. There are sufficient numbers of structures to have a significant and positive impact on ecosystem productivity. Recently, those structures are integrated into coastal zone management regimes as the resource enhancement tools. To optimize the results of such initiatives, careful impact assessment and planning procedures are required together with the immediate action to prevent further loss of habitat and damage to fish stocks. A range of effective community-level mechanisms must also be developed in order to assist fishers in restoring habitats and rebuild stocks. These mechanisms are likely to be specific to different stocks and habitats.

The regional guidelines of rights-based and co-management has been developing under the project "Towards Decentralized Management of Sustainable Fisheries in the ASEAN Region". This guideline covers several management issues, namely management of fishery resources, fishing licensing, Monitoring Control and Surveillance system for the local institution and co-management mechanism. Considering that management of small-scale fisheries may have to clarify various issues, which could lead to the sustainable management of the resources and improvement of small-scale fishers' livelihoods.

On the "Sustainable Utilization of Potential Fisheries Resources and Reduction of Post-harvest Losses", the Member Countries requirement for developing this program there are many interested issues were proposed as identification and exploitation of potential resources through development of appropriate technology particularly in untrawlable areas, sea mounts, and deep sea basins; development and capacity building for deep sea fisheries and maximization of catch utilization through reduction of post-harvest losses.

Solutions the problem of over-exploitation and habitat degradation in the region are both difficult and complex. The conflicting socio-economic problems associated with an increasing population and a need to maintain food security and people's livelihoods are significant. Under these circumstances, there is a lack of awareness of the need for selective fishing gear that has minimal impact on aquatic ecosystems. Despite increased emphasis on the sustainable harvest of fisheries resources, a lack of standardized research methodologies, particularly in gear selectivity research, coupled with difficulties associated with the design and introduction of effective selectivity devices in multi-species fisheries, makes overcoming these problems difficult. Greater collaboration and commitment are required from many countries to reduce the impact of illegal and destructive fishing gear and practices and the use of responsible fishing technologies and practices must be promoted to maintain the integrity of the aquatic environment and the sustainability of fisheries resources.

OBJECTIVES

This component highlights the need for innovative management for sustainable fisheries through consultation, demonstration and dissemination of relevant approaches. With the aim to provide to minimize disparities of the Member Countries and to achieve coordinated efforts toward sustainable fisheries, the program has the following proposed specific objectives:

- To create awareness and promote use of indicators for sustainable development and management of capture fishery in the ASEAN Region;
- To develop and promote appropriate approaches for management of inland fisheries in the region together with strengthening community participation in management inland fisheries resources;
- To improve better understanding and knowledge of fisheries and aquaculture in the region through effective management of reporting fishery statistics and information systems;
- To optimize the use of coastal fisheries resources through using of the appropriate resource enhancement tools.
- To promote rights-based and co-management regime in the regional.
- To develop capacity building for deep sea fishing particularly in untrawlable grounds, sea mounts, and deep sea basins for sustainable utilization of potential fisheries resources and reduction of post-harvest losses.
- To promote responsible fishing technology and practices through the introduction, demonstration, and training on fishing gear selectivity and devices in order to reduce the capture of immature/juvenile fishes of commercially important species and unwanted catch including endangered species.

There are 7 projects under this component. The summary of description of each project is shown in the following:

Strengthening Small-scale Fisheries Management through Promotion of Rights-based and Co-management

This project addresses the importance and need in strengthening management for small-scale fisheries. It is envisaged that the regional guidelines will form the basis to clarify strategies for the purpose. The project will tackle a number of issues are capacity building for management of small-scale fisheries including the application of co-management and rights-based fisheries, development/improvement of Monitoring Control and Surveillance, management of overcapacity in coastal areas, improvement of management measures and measurement of their impacts and Sustainable fisheries livelihoods. It is also envisaged that the outcomes of this project will improve fisheries management through the application of rights-based fishery and co-management principles.

Improvement of Fishery Statistics and Information for Planning and Management of Fisheries in the ASEAN Region

The primary aim of the project is to improve better understanding and knowledge of fisheries and aquaculture in the region as a basis for development planning and management through effective management of statistics and information systems and capacity building. To achieve sustainable fisheries objectives, the project will focus the issues and target outputs on fishery statistics that form an important foundation which required improvement of better national fishery statistical system in terms of quality, availability, reliability, accuracy and timeliness of statistics in line with the minimum requirements and the regionally standardized definitions and classifications for fishery statistics to facilitate regional compilation, analysis and data exchange, as well as ways and means to present information in user-friendly manner for management and decision-making.

Responsible Fishing Technologies and Practices (Fishing in Harmony with the Nature)

This project centers on the promotion of selective fishing gears and practices, particularly in coastal areas. It will be implemented in close collaboration with international and national organizations and agencies, including FAO/GEF, AMC, MI, and TUF. The project activities will focus on a review of the selective fishing gear and practices and the preparation of its demonstrations and experiments. Additionally, the outcome and experiences of the project together with issues of common interest related to the improvement of fishing technology and practices will be discussed and exchanged during regional consultations to disseminate the information for the region.

Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement

This project aims at promoting resource enhancement tools such as artificial reefs as well as some selected stationary fishing gears and aquaculture facilities. The habitat restoration and/or enhancement and establishment of exclusive fishing rights may be necessary prerequisites for any marine re-stocking exercises. The focused issues of this project is the development of designs/models for resource enhancement tools including artificial reefs, evaluation/assessment of impacts of resource enhancement tools with due consideration on socio-economic aspect, stock enhancement and re-stocking programs and conservation of endangered species.

Sustainable Utilization of Potential Fisheries Resources and Reduction of Post-harvest Losses

This project aims at addressing the important innovative fisheries management frameworks that must ensure sustainable utilization of potential fisheries resources and reduction of post-harvest losses in ASEAN member. This project will develop and promote the appropriate onboard fish handling technology, capacity building on human resources. Production of information packages of project will be the manuals for appropriate technology for deep sea fishing, and also manuals for onboard fishing handling technology and technical paper on "Investigation on the potential of under-utilized resources in Southeast Asian Region.

The Use of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region

This project aims at addressing the important innovative fisheries management frameworks to ensure stable fish supplies and food security for sustainable development and management of capture fisheries in the region. The pilot projects in wider scope from the previous phase will be conducted in the identified core countries. In addition, related research activities will be carried out to provide additional information to support the implementation of pilot projects. Training courses on the related issues will also be organized for relevant participants to ensure the success in the implementation of the pilot projects.

Development of Integrated Inland Fisheries Management in ASEAN Countries

The information on inland capture fisheries gathered and compiled during the first phase will be used to provide baseline information in formulating appropriate approaches in the management of inland fisheries resources. The project will be carried out with the involvement of community at respective pilot sites, the mobilization of experts from national research institutes and/or the core countries. The various training course for fishery trainers in the field of management of inland fisheries will be carried out under this project.

PROJECT DOCUMENT

Program Categories: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: Strengthening Small-scale Fisheries Management through the Promotion of Rights-based Fisheries and Co-management
Lead Department: SEAFDEC Secretariat
Lead Country:
Total Duration: 2006

1. INTRODUCTION

"The Regional Guidelines for Co-management Using Group User Rights for Small-scale Fisheries in the Southeast Asia" was developed under the Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region: Towards Decentralized Management of Sustainable Fisheries in the ASEAN Region. Basically, the guidelines were developed based on innovative concepts and approaches, rights-based fisheries and co-management, through a series of consultations with ASEAN-SEAFDEC Member Countries. The guidelines were finalized by the Member Countries at the end of the year 2005 to be published at the beginning of 2006.

In 2006 SEAFDEC secretariat will promote and enhance knowledge and understanding of ASEAN Member Countries on the Rights-based Fisheries and Co-management approaches for the improvement of the small-scale fisheries management system of their countries. The guidelines will be disseminated and used as a basis document for this promotion and implementation of all activities of this project. Follow up with RTC on Rights-based Fisheries and Co-management Systems for Small-scale Fisheries, Jakarta, July 2005, SEAFDEC Member Countries are encouraged to conduct appropriate national consultation to enhance awareness, review existing projects and experiences on small-scale fisheries management and to investigate the applicability of the regional guidelines. Currently, there are two Member Countries interested to get support from SEAFDEC to promote rights-based fisheries and co-management in their respective countries, namely Vietnam and Thailand.

At the Vietnamese national workshop organized on 10-13 May 2006 in Hai Phong City, Vietnam, the Ministry of Fisheries (MOFI) stressed out it was interested to get SEAFDEC support in developing national co-management guidelines in line with the *SEAFDEC Regional Guidelines for Co-management Using Group User Rights for Small-scale Fisheries in Southeast Asia*. Therefore, in collaboration with MOFI, a set of activities was planned: an on-site training on co-management and on SEAFDEC co-management regional guidelines, and a workshop to finalize the national guidelines.

In case of Thailand, Thai DoF has requested technical support from SEAFDEC for establishment of a local fisher institution in a Bang Saphan Bay Coastal Fisheries Management (CFM) Pilot Project. There are three main activities which have been planned to get support form SEAFDEC: firstly, a training course for 20 fisher's leaders of the Bay; secondly, three meetings of nine fisher groups' members and election of bay-wide committee; and thirdly activities to strengthen the committee to be able to manage fisheries activities in the Bay.

According to above situation, within this project fiscal year, Secretariat propose to support Vietnam MOFI and Thai DoF to improve their coastal fisheries management situation through implementing innovative approaches: rights-based fisheries and co-management along line with the content of SEAFDEC Regional Guidelines. Due to different situations of the two countries and their requirements, the Secretariat team will use different approaches to introduce and verify the

regional guidelines in these two countries. For Thailand, the Secretariat will provide technical input for establishment and strengthening a local fisher institution for a DoF CFM pilot project in Bang Saphan Bay. The project expects that this institution and involved local government authorities could show up the evidence of the needs and important of rights-based fisheries and co-management in managing coastal fisheries. Moreover, the project also expects that the movement and success at the local initiatives will provide significant impact to the national fishery policy and legal framework. The experiences and lessons learned from this case will reinforce the message of the regional guidelines. In case of Vietnam, the Secretariat will assist to facilitate the national policy toward rights-based fisheries and co-management and to prepare national co-management guidelines by providing technical support in a national consultation, a training course and a workshop.

2. PROJECT

2.1 Objectives

In strengthening management for small-scale fisheries, it is envisaged that the regional guidelines will form the basis to clarify strategies for this purpose. The project is therefore proposed with the following specific objectives:

1) The regional guidelines on "Co-management Using Group User Rights for Small-scale Fisheries in the ASEAN Member Countries" will be promoted and clarified with responsible management institutions in the Member Countries through various kinds of activity;
2) The regional guidelines on "Co-management Using Group User Rights for Small-scale Fisheries in the ASEAN Member Countries" will be verified through case study process in some selected Member Countries for the improvement on applicability of the guidelines in the ASEAN region.
3) The human capacity on rights-based fisheries and co-management of fishery management institutions at all levels: community, local and central government, is enhanced; and

2.2 Project Description

Component 1: Mainstream rights-based fisheries and co-management approaches

Incorporate experiences of Japanese coastal fisheries management into the implementation of rights-based fisheries and co-management in SEAFDEC Member Countries: A study trip to Japan for 2 project counterparts of Thailand and Vietnam will be organize. The objectives of this study trip are 1) to gain knowledge on Japanese coastal fisheries management system: rights-based fisheries and co-management 2) to understand the local Japanese institutional arrangement (fisheries cooperative): objectives, roles and responsibilities and 3) to observe the activities of the Japanese fisheries cooperatives.

Component 2: Case Study Process (On-site activities)

Activity 2.1 Thailand case, Establishment and Strengthening of a local fisher institution for the implementation of co-management and rights-based fisheries:

The secretariat project team will provide technical support for the establishment and strengthening of a local fisher institution in Bang Saphan Bay: a pilot project of Thai DoF. Training for fisher groups' leaders, consultation process with the fisher groups' members, as well as election for the bay-wide committee will be conducted by Thai DoF with collaboration of SEAFDEC and CHARM Project (Coastal Habitat and Aquatic Resource Management Project implemented by EU and Thai DoF). The concept of rights based fisheries and co-management will be provided in every activities. Local institutions will be strengthened and equipped with knowledge, skill and positive attitude to manage the Bang Saphan bay for sustainable utilization

of fisheries resources and management of fisheries activities.

Activity 2.2 Vietnam case, Facilitation of National Policy toward the Rights-based and Co-management of ASEAN-SEAFDEC Member Countries:

The Secretariat project team will provide technical supports on the rights-based fisheries and co-management approaches, especially core elements of the SEAFDEC regional co-management guideline to facilitate the national policy of Vietnam at their national consultations. A training course for related fisheries officers/managers to enhance awareness and knowledge on rights-based and co-management approaches, with particularly focus on the regional guidelines will be organized. Moreover, the team will also assist Vietnamese government to formulate a national co-management guidelines based on the regional guidelines and incorporate with the national fisheries context.

2.3 Component 3: Promotion of rights-based and co-management approaches

Activity 3.1 Promotion on Rights-based fisheries and Co-management approaches
The Secretariat will publish and disseminate the regional guidelines including others necessary supplementary documents to fishery management institutions of the Member Countries and related organizations.

Activity 3.2 Coordination with other organizations/ projects
Coordination with other organizations (MRC, WorldFish Center, FAO, etc.)/ projects (SEAFDEC-Sida, SEAFDEC/TD, CHARM, etc. on the concepts of the rights-based fisheries and co-management issues will be done through various kinds of activities, in order to share experiences and knowledge for the effectiveness of over all implementation of the project activities. The core elements of the rights based fisheries and co-management approaches, contents of the guidelines as well as the progress of the case study process will be promoted through related and attended meetings, workshops and training courses.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Project/Activity Title	Duration	Remarks
1. National Workshop on Toward Decentralized Management for Sustainable of Sustainable Fisheries in the Region, Laos	10/2005	Achievement of the activities are explained under the table
2. : To provide technical support for Thai DoF on the Fisher Groups' Leaders Training of CBFM Bang Saphan Bay Pilot Project	6/2006	
3. To provide technical support for Thai DoF on Bay-wide committee establishment of CBFM Bang Saphan Bay Pilot Project	7/2006	
4. To study on the coastal fisheries management system Japanese system: policy and legal framework, roles and functions of fisheries cooperative in coastal fisheries management system (rights-based fisheries and co-management),	10/2006	

5. To organize a Training Workshop on Co-management Using Group User Rights for Small-scale Fisheries in Vietnam	10/2006	
6. To organize a National Workshop on Agenda 21 for Fisheries Sector on the formulation of the Co-management Policy"	12/2006	

The Regional Guidelines for "Co-management Using Group User Rights for Small-scale Fisheries in the Southeast Asia" has been translated into three languages: Laos, Thai and Vietnam. At present there are three SEAFDEC Member Countries have been coordinate and working with SEAFDEC under this project as following detail.

Laos: organizing a national workshop on Toward Decentralized Management for Sustainable of Sustainable Fisheries in the Region: Conduct of Studies for preparation of the Regional Guidelines for decentralization & Rights-based Fisheries, October 2005, to discuss and providing comments on the regional co-management guidelines.

Thailand: providing technical support, base on the content of the regional co-management guidelines, for Bang Saphan Coastal Fisheries Management Project, through a training course for local leaders and three workshops at the community level.

Vietnam: providing technical support, base on the content of the regional co-management guidelines, for fisheries officers at provincial and policy maker level through a training workshop and a national workshop. Assisting MoFi to develop a National Guidelines on Co-management Using Group User Rights and the guidelines will be finalized at a national workshop which will be organized by the end of this year.

The involvement of these three countries is under cost sharing scheme. SEAFDEC has tried to support the Member Countries according to their interests, at the same time, we also encourage Member Countries to be more responsible for the budget.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Considering the unclear financial situation, proposed activities for the year 2007 are uncertain at the moment. In principle, the project will continue to provide policy and technical advice, subject to availability of funds, to the Member Countries who are interested in adopting co-management using group user-rights for small-scale fisheries. It is envisaged that the on-going process in Vietnam, Thailand and Lao PDR will be closely monitored and where appropriate, technical support from the project will be extended. As for other countries, technical support could be provided upon requests. The project also intends to maintain dialogues with partner organizations in mainstreaming concept and application of co-management with emphasis on the application of group user-rights for small-scale fisheries.

PROJECT DOCUMENT

Program Categories: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: Improvement of Statistics and Information for Planning and Management of Fisheries in the ASEAN Region
Lead Department: Secretariat
Lead Country: Thailand
Total Duration: 2006-2010

1. INTRODUCTION

Fishery statistics is widely accepted as a tool to provide a basis and being crucial to the determination of national fisheries policies, the formulation of national management frameworks and actions or even as a basis for understanding the status and condition of fisheries resources. However, current national fishery statistical systems of ASEAN Member Countries are not effectively implemented.

To continue providing assistance to the ASEAN Member Countries in the implementation of the Resolution and Plan of Action adopted at the Millennium Conference in 2001, the priority issues on the necessity to improve fishery statistics and information systems as a tool for planning and management of fisheries is required as an important basis and prerequisite to tackle with the various problems toward the sustainable fisheries and food security.

This project was proposed based upon Resolutions 3, 4 and 7, the Plan of Action A9, A10 and A11 as well as relevant conclusions and recommendations endorsed by the Conference, which highlighted important issues in the improvement of fishery statistics.

To achieve sustainable fisheries objectives, understanding and knowledge of fisheries industries particularly their status, trend and prospectus need to be enhanced. This is obtained through analysis of reliable and timely statistics and information, which will then be used a basis for the formulation of sound fisheries policies and management strategies. To fulfill this goal, it is generally noted that fishery statistics is still form an important foundation which required improvement of better national fishery statistical system in terms of quality, availability, reliability, accuracy and timeliness of statistics in line with the minimum requirements and the regionally standardized definitions and classifications for fishery statistics to facilitate regional compilation, analysis and data exchange, as well as ways and means to present information in user-friendly manner for management and decision-making.

2. PROJECT

2.1 Objectives

The overall objective of the project objective is to improve better understanding and knowledge of fisheries and aquaculture in the region as a basis for development planning and management through effective management of statistics and information systems and capacity building. The specific objectives are to: 1) develop strategies and initiatives to support improvement on the use of fishery statistics, data and information for management and planning of fisheries and aquaculture; and 2) promote statistics and information sharing and usage among the Member Countries through compilation of the Fishery Statistical Bulletin for the Southeast Asian Region.

2.2 Project Description

The project will support the Member Countries in achieving sustainable fisheries objectives based on sound fisheries policies and management strategies that will be derived from quality statistics, data and information. The project aimed to improvement of better usage and linkages of fishery statistics, data and information at national level in terms of quality, availability, reliability, accuracy and timeliness of statistics and other data and information in line with the minimum requirements and the regionally standardized definitions and classifications for fishery statistics to facilitate regional compilation, analysis and data exchange, as well as ways and means to present information in user-friendly manner for management and decision-making.

The project have the linkage with other projects related to data and information in fisheries by providing guidelines and HRD for sustainable national fishery statistical systems to support development and management planning and actions as well as effective usage of statistics, data and information. In addition, the project introduces the use of statistical data to understand status and trend of fisheries and provides linkages and coordination between routine and non-routine data collection.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Project/Activity Title	Duration	Remarks
1. Development of guidelines and standards		
1.1 Development of regional guidelines on fishery statistics in the ASEAN Region - Finalize the draft and published the Supplementary Guidelines for Fisheries Management: Regional Guidelines for Fishery Statistics	Jan.– March 2006	Completed, The Regional Guidelines for Fishery Statistics was published as part of the Supplementary Guidelines on Co-Management Using Group User Rights, Fishery Statistics, Indicators and Fisheries Refugia in March 2006
1.2 Development of minimum requirement on fishery statistics and harmonization of standard definitions and classification for fishery statistics in Southeast Asia - Revise the framework particularly the Classifications and Definitions under the new framework of the Fishery Statistical Bulletin of Southeast Asia and circulate the revised version to the Member Countries for Comment	Jan-Dec. 2006	80% The final draft of the Framework is under preparation to accommodate comments from the Member Countries

2. Streamline reporting of fishery statistics from the Member Countries to FAO and SEAFDEC:		
2.1 *Streamline reporting of fishery statistics from the Member Countries to FAO and SEAFDEC through harmonized questionnaires* - Based on the new SEAFDEC bulletin framework; SEAFDEC will seek for further harmonization of the questionnaires with those of FAO in order to avoid duplication of effort of Member Countries in providing data, and to fasten the compilation process.	Jan-Dec. 2006	70% The preparation of questionnaire of SEAFDEC to be streamlined with FAO is going on
3. Capacity Development		
3.1 *Regional Expert Meeting on fishery statistics and information to identify important/ priority areas and issues for future actions* - With the concern to improving quality of statistics, data and information and maximizing the usage for planning and management of fisheries in the ASEAN Region based on various projects/programs and initiatives developed and implementing in the region, the Expert Meeting was conducted from 20-22 November 2006 in Bangkok. The Meeting aimed to discuss and exchange view and experience among the experts and come up with priority issues, directions and recommendations as well as future actions to promote better collection and maximizing the usage of fishery statistics, data and information for planning and management of fisheries. In addition, the outcomes will be use as basis for formulation of the project/program in relation to fisheries data and information for future funding support.	20-22 November 2006	Completed
4. Information Dissemination		
4.1 Annual compilation of regional fishery statistical bulletin for the Southeast Asian region focusing on data required for supporting development planning and management of fisheries	Jan.-Dec.	Completed

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Project/Activity Title	Duration	Remarks
1. Improvement of Framework and Standard for Fishery Statistics in Southeast Asia		
1.1 Development of minimum requirement on fishery statistics and harmonization of standard definitions and classification for fishery statistics in Southeast Asia - Revise the framework particularly the Classifications and Definitions under the new framework of the Fishery Statistical Bulletin of Southeast Asia.	Jan-Feb. 2007	Finalize and publish the new Framework of SEAFDEC Fishery Statistical Bulletin of Southeast Asia

1.2 Streamline reporting of fishery statistics from the Member Countries to FAO and SEAFDEC - Based on the new SEAFDEC bulletin framework; SEAFDEC will seek for further harmonization of the questionnaires with those of FAO in order to avoid duplication of effort of Member Countries in providing data, and to fasten the compilation process. It is planned that the draft questionnaire from SEAFDEC will be discussed with FAO for harmonization in March 2007, and be possibly proposed to discuss at the next CWP22 Meeting. It is expected that the new questionnaire would be used for the statistics of 2006 and onwards. - *Regional Workshop on Fishery Statistics Reporting to SEAFDEC and FAO* - To ensure the understanding on the new framework of SEAFDEC Bulletin as a framework to facilitate long-term improvement of fishery statistics at the national level as well as the minimum requirement targets as a basic data set to facilitate timely provision of quality fishery statistics compiled at regional level, the Regional Workshop on Fishery Statistics Reporting will be conducted. In addition, under the new framework, the streamline reporting of fishery statistics to FAO and SEAFDEC will be developed through the harmonized questionnaires between SEAFDEC and FAO. To facilitate the Member Countries in providing statistics to FAO and SEAFDEC through the new harmonized questionnaire, the focal point from each Member Countries will be trained for data reporting at this workshop.	Jan-March 2007	To prepare and finalize the harmonized questionnaire of SEAFDEC and FAO In collaboration with FAO
2. Improvement of Quality Fishery Statistics for Planning and Management in Southeast Asia		
2.1 Implementation of the Regional Guidelines for Fishery Statistics in Southeast Asia - To continue supporting the Member Countries in improving quality of fishery statistics for planning and management, implementation of the Regional Guidelines with specific directions will be conducted based on the needs and requirement of the Member Countries. However, the activities that will be implemented will be subjected to availability of fund.	May-Aug. 2007	
2.2 Improvement of Quality Fishery Statistics for Planning and Management of Fisheries - Based on the priority areas and future directions/actions in improving quality and better usage of statistics, data and information to support planning and management of fisheries as the outcomes from the Expert Meeting organized in 2006, related activities will be initiated to support the Member Countries at the Regional Level. However, the activities that will be implemented will be subjected to availability of fund.	May-Dec. 2007	

3. Information Dissemination		
3.1 Management of web-based knowledge and information related to fisheries in the region - To improve better understanding and knowledge of fisheries and aquaculture in the region as a basis for development planning and management, development and management of web-based knowledge and information related to fisheries in the region will be implemented through SEAFDEC homepage.	Jan.-Dec. 2007	
3.2 Annual compilation of regional fishery statistical bulletin for the Southeast Asian region focusing on data required for supporting development planning and management of fisheries - The compilation of regional fishery statistical bulletin for the Southeast Asian region focusing on data required for supporting development planning and management of fisheries will be implemented annually based on the agreed minimum requirement and the regionally standardized definitions and classifications for fishery statistics. This will facilitate information exchange and comparability of fishery statistics in the region.	Jan.-Dec. 2007	

PROJECT DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: Responsible Fishing Technologies and Practices (Fishing in Harmony with Nature)
Lead Department: Training Department
Lead Country: Indonesia
Duration: Since 2006

1. INTRODUCTION

The current status of many fishery resources in the Southeast Asian region is of serious concern. A growing national and international demand for fish and fishery products has led to the continued development and adoption of modern fishing technologies, including new and improved boat design, fishing gear and deck equipment. Overall, fisheries production in the ASEAN region has increased during the past decade, although in some regions, localized depletion of fisheries resources has resulted in reduced landings or catch compositions that comprise mainly of the smaller and less valuable species. Significant contributors to the problem of deteriorating fisheries resources are over-exploitation practices and non-selective fishing gear. The impact of these is devastating, and ineffective management plans and law enforcement have, to date, failed to reduce these fishing pressures. Additionally, contributions to resource deterioration include excessive fishing effort, over-capacity and non-fisheries related impacts like the destruction of estuarine habitats, housing developments and water pollution.

Solutions to the problem of over-exploitation and habitat degradation in the region are both difficult and complex. The conflicting socio-economic problems associated with an increasing population and a need to maintain food security and people's livelihoods are significant. Under these circumstances, there is a lack of appreciation and awareness of the need for selective fishing gear that has minimal impact on aquatic ecosystems. Despite increased emphasis on the sustainable harvesting of fisheries and their resources, a lack of standardized research methodologies, particularly in gear selectivity research, coupled with the difficulties associated with the design and introduction of effective selectivity devices in multi-species fisheries, makes overcoming these problems difficult.

Greater collaboration and commitment are required from ASEAN Member countries to reduce the impact of illegal and destructive fishing gear and practices and the use of responsible fishing technologies and practices must be promoted to maintain the integrity of the aquatic environment and the sustainability of fisheries resources.

2. PROJECT

2.1 Objectives

1) To promote responsible fishing technologies and practices through the introduction, demonstration, and training in fishing gear selectivity and devices at experimental sites to reduce the capture of immature/juvenile fishes of commercially important species and by-catch including endangered species
2) To conduct a study on the Interaction between the threatened species of international concern and fisheries through the existing information in the region, and to promote this subject to fishers in the region for a better understanding of how important threatened species of international concern are,

3) To collect and compile information on Fishing Gear and Methods for Marine and Inland Capture Fisheries in the Region as basic information for gear improvement to reduce by-catch,
4) To review and study on ecosystem effects of fishing including the effect of lure light fishing and to develop guidelines for the reduction of unwanted catch and lure light fishing
5) To produce and distribute information and training packages on responsible fishing technologies and practices to ASEAN Member Countries.

2.2 Project Description

Since the year 2006 the project was transferred from the Special 5-year program to the Japanese Trust Fund III Program. Project's activities were adjusted base on the recommendations from the 28th PCM and the 38th CM. TD will manage and coordinate all project activities as a responsible SEAFDEC Department for this project. Collaborative arrangements with TUMSAT, Kagoshima University, AMC, FAO and other organizations will be made through the implementation of existing projects and this will include staff exchanges and the dispatch of experts.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

3.1 Research and promotion for responsible fishing technologies and practices in the region

1.1 Research and Promotion on By-catch Reduction Devices

TD continued to provide technical supports for the promotion on the use of JTEDs in Southeast Asia such as the pilot projects of JTEDs Adoption in Calbayog City, the Philippines, and the demonstrations on the use of JTEDs in Indonesia.

Furthermore TD also extended technical supports on the selective fishing devices as JTEDs to countries outside region through the demonstration and experiment on the use of JTEDs in Gulf region during the Third meeting of the Project International Steering Committee (PISC) of GEF/UNEP/FAO in Bandar Abbas, Iran, 26-27 April 2006.

1.2 Regional Workshop on the implementation of TEDs and JTEDs for reduction of by-catch in Southeast Asia

The Regional Workshop on the implementation of TEDs and JTEDs for reduction of by-catch in Southeast Asia was held during 2-5 October 2006 at the Training Department. 19 participants were from SEAFDEC Member Countries namely, Brunei Darussalam, Cambodia, Indonesia, Myanmar, the Philippines, Thailand and Vietnam, representatives from Kagoshima University, Bogor Agricultural University, and SEAFDEC Secretariat, TD, and MFRDMD. The workshop was conducted with the purpose to evaluate the implementation of TEDs and JTEDs among ASEAN countries, the participants also took this opportunity to discuss the encountered constraints and future plan for further promotion of selective fishing practices to fishers in each country.

3.2 Interaction between the Threatened Species of International Concern and Fisheries

2.1 Information collection and analysis on the capture of Sea Turtle from trawl and other fisheries

To assess the implementation of the Turtle Excluder Devices which have been promoted to Southeast Asian Countries since the year 1998, TD in collaboration with national agencies conducted surveys for evaluation on the use of TEDs in Thailand, Indonesia, and Malaysia. The surveys used a questionnaire which consists of 3 main parts: 1) Fishing operation, 2) Interaction between fishing operation and sea turtle, and 3) TEDs using, impact and attitude. The collected data in Thailand and Indonesia is under analysis process. The data collection in Malaysia is on going.

Furthermore the Sea Turtle Recapture Data in Thailand was analyzed and used as supplementary information of the study in Thailand.

2.2 Participating the International Symposium or Conference for information exchange

In order to exchange and collect information for further improvement and development as well as to present SEAFDEC activities related to responsible fishing and practices which were conducted in Southeast Asian countries to international forum, TD staff participated in the international meeting as following:

- The Fourth Meeting for the Signatory States on the MOU on Conservation and Management and their Habitats in the Indian Ocean and South East Asia (IOSEA) Muscat, Sultanate of Oman, 10 – 15 March 2006
- The ICES Symposium on Fishing Technology in the 21st Century: Integrating Fishing and Ecosystem Conservation, Boston, Massachusetts, 30 October – 3 November 2006 (FAO Sponsor)
- Investigating options to improve by-catch reduction in tropical prawn fisheries: a workshop for fishers, Crains, Australia, 21-22 November 2006

3.3 Compilation of Fishing Gear and Methods for Marine and Inland Capture Fisheries in the Region

The 2nd fishing gear survey was conducted in Myanmar in May 2006 in order to gather more samples along the upper coastal line of Myanmar. The collected data is under analysis stage. The publication will be published in early 2007.

The final drafts of Monograph of Fishing gear and Methods in Brunei Darussalam and Monograph of Fishing gear and Methods in Cambodia was finalized and will be published by the end of 2006.

3.4 Study/promotion on fishing that affects ecosystems

The study on Luring light fishing was carried out in Rayong Province and Chumporn Province. The experiments on the light intensity and its efficiency for fishing of 3 kinds of luring light namely Incandescent 500 W, High-pressure mercury lamp 250 W, and Fluorescent 40 W were carried out onboard fishing vessels in order to determine the optimum luring light intensity for anchovy fishing and squid fishing Further more the study on effected fish behavior from the light will be carry out in test tank by the end of 2006.

In additional to the study on luring fishing, TD also carried out a study on wind energy propulsion through an additional sail installation on local fishing boat. Sail mast structure and installed sail shape on a local medium fishing boat were designed. The strength consideration of mast in holding a sail was completely calculated to endure forces under a fluctuating wind thrust condition while sailing. The new model of the mast structure was modified to be foldable for user-friendly application and fishing operation unobstructed by the structure, to be light weight but adequate strength and to be conserving stability of the ship during sailing in the open sea. Cost that is a crucial parameter was controlled as the lowest by using local materials. Besides fuel oil consumption was calculated to estimate and decide a breakeven point of the investment.

3.5 Production and dissemination of information packages

Through the year 2006, promotional materials aimed to disseminate information and raise awareness on responsible fishing and practices were produced as following:

- Video on Seminar-Orientation and Demonstration on the JTED Pilot Project in Calbayog City, Samar,the Philippines
- Video on The 2nd Demonstration and Experiments of the JTEDs in Vietnam
- Video on "Introduction of Semi - curve Rigid Sorting grid JTEDs (Construction and Installation)"
- The 2nd version of Cartoon Book "Story of Tanu" (Color version)
- Research paper on "Study on Juvenile and Trash Excluder Devices (JTEDs) in Cambodia
- Research paper on "Study on Juvenile and Trash Excluder Devices (JTEDs) in Myanmar
- Research paper on "The Promotion of Responsible Trawl Fishing Practices in Southeast Asia through the Introduction of JTEDs"

Project Activities

Project/Activity Title	Duration	Remarks
1. Research and Promotion for Responsible Fishing Technologies and Practices in the region		
• Research and Promotion on By-catch Reduction Devices (BRD)	Jan-Dec	Completed
• Regional Workshop on the implementation of BRDs for reduction of by-catch in Member Countries	2-5 October	Completed
2. Interaction between the Threatened Species of International Concern and Fisheries		
• Information collection and analysis on the capture of Sea Turtle from trawl and other fisheries	Jan-Dec	90% (The activity on "Information collection and analysis on the capture from pelagic and bottom longline fisheries" was moved to conduct under the JTF IV: Research for Stock Enhancement of Sea Turtles)

• Participating the International Symposium or Conference for information exchange	March, Oct, and Nov	Completed
• Workshop for analysis and evaluation	Postponed to conduct in March 2007	The Workshop will be co-organized by SEAFDEC and FAO
3. Compilation of Fishing Gear and Methods for Marine and Inland Capture Fisheries in the Region		
• Information collection on Fishing Gear and Methods in Member Countries :Myanmar,	Jan-Dec	80%
• Publications of Monograph of Fishing Gear and Methods in Brunei Darussalam, Cambodia	Jan-Dec	95%
4. Study/promotion on Fishing that Affects Ecosystems		
• A case study on the Impact of luring light fishing of anchovy to other habitats/ecosystems	Jan-Dec	75% Remaining activity is the experiment in test tank
• Study on Wind energy	Jan-Dec	Completed
5. Production and dissemination of information packages	Jan-Dec	90%

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Project/Activity Title	Duration	Remarks
1. Research and promotion of Responsible Fishing Technologies and Practices in the Region		
• Assessment of JTEDs implementation in Southeast Asia	Jul-Dec	
• Promotion on the Use of JTEDs for Malaysia, Myanmar, and Indonesia through Demonstration and Experiment	Jan-Dec	
• Promotion on the use of JTEDs for SEAFDEC Member Countries through study tour program to SEAFDEC/TD and the Adopted JTEDs site in the Philippines	Jan-Dec	
2. Interaction between the threatened Species of International Concerns and Fisheries		
• Workshop on Interaction between Sea turtle and fisheries (In collaboration with FAO)	March	In collaborations with FAO
• Information Collection on Interaction of Sea Turtle and fisheries in Purse seine and other gears	Jan-Dec	
• Participating of International Meeting	Jan-Dec	

3. Compilation of Fishing Gear and Methods for Marine and Inland Capture Fisheries in the Region		
• Monograph of Fishing gear and method in Myanmar	Jan-Jun	Printing of Publication
• Monograph of Fishing gear and method in Indonesia	May-Dec	Surveys and information collection
4. Study/Assessment of Impact of Fishing Technologies to the environment		
• Impact of luring light Fishery	Jan-Dec	Phrase 2: Assessment of impact of light fishing and Continual research study
• Trawl Fisheries and Code of Practices for Responsible Trawl Fishery	Jan-Dec	Code of Practices for Responsible Trawl Fishery
• Study on Wind energy	Jan-Dec	
5. Production and dissemination of information package	Jan-Dec	

PROJECT DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement
Lead Department: Training Department
Lead Country:
Duration: Since 2006

1. INTRODUCTION

The quality of coastal and inshore ecosystems has deteriorated significantly as a result of continued and increasing human activities. These areas are critical to a broad range of aquatic organisms during their life cycles including spawning, nursery areas and feeding zones and many of these species are of economic importance. The areas serve as important sources of recruitment to, and the sustainability of, commercial fisheries. It is suggested that the productivity of these ecosystems can be enhanced through human intervention leading to improved livelihoods for coastal communities.

In many areas, the introduction of man-made structures, including artificial reefs, aquaculture facilities, breakwaters, stationary nets and jetties are shown to enhance local populations of aquatic organisms, provided that there are sufficient numbers of structures to have a significant and positive impact on ecosystem productivity and that they are integrated into coastal zone management regimes. These structures can enhance fisheries resources. To optimize the results of such initiatives, careful impact assessment and planning procedures are required.

Re-stocking may be an effective component in the enhancement of marine resources in inshore waters. Juveniles and seeds produced by hatcheries or collected from the wild in other areas are removed rapidly from the ecosystem by destructive fishing gears such as push nets or small-mesh trawl nets. Furthermore, in order to retain the released stocks within the immediate vicinity and minimize losses through out-migration, suitable habitat must be available to them. Therefore, habitat restoration and/or enhancement and establishment of exclusive fishing rights may be necessary prerequisites for any marine re-stocking exercises.

Immediate action is required to prevent further loss of habitat and damage to fish stocks. A range of effective community-level mechanisms must be developed to assist fishers to restore habitats and rebuild stocks. These mechanisms are likely to be specific to different stocks and habitats. Habitat creation and the establishment of artificial reefs, the use of fish attraction devices and predator removal all have potential in the region.

2. PROJECT

2.1 Objectives

1) To optimize the use of fishing ground through resource enhancement programs;
2) To enhance the fisheries resources by resource enhancement tools;
3) To assess the feasibility, environmental and socio-economical impact of resource enhancement tools;
4) To develop and design the appropriate resource enhancement tools/models;

5) To evaluate the impact of the fisheries resources enhancement by re-stocking programs; and
6) To develop human resources for the implementation of resource enhancement programs.

2.2 Project Description

TD will be the responsible SEAFDEC Department for this project and will manage and coordinate all project activities. Other ASEAN Member Countries which have been identified as core countries will be involved in implementing the relevant project activities on a cost-sharing basis to develop Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement program and to conduct pilot projects to implement the program in their respective countries.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

3.1 Experiments/Regional Workshop on the suitable designs/models of the resource enhancement tools in collaboration with the Member Countries including its evaluation and promotion.

In order to promote the rehabilitation of fisheries resources and habitats/fishing ground through resources enhancement tools, TD was designed second version of permanent fish aggregating device so call "Fish Enhancing Device (FEDs)". The new device could be using in both coastal and off shore water. SEAFDEC/TD in cooperation program between Integrated Coastal Resource management at Prathew district, Chumphon province (ICRM-PD) and Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement for habitat and fishing ground development for resources enhancement was conducted a designed and performance experiment test in Chumporn . The installation of 10 unit s of FEDs were carried out at Phrathew district Chumphon province on 29 June 2006. The installation areas are located around artificial reefs installation site. The investigation of FEDs condition after two months installation were conducted on 29 August 2006. Inspection performed by check position of FEDs by GPS and observation on the growth up of marine organism and fish aggregated around FEDs by under-water photography. There are marine growth attached on the PE appendix and found many fishes around FEDs. Local Administrative Authority (Ao Bo Tor) of Prathew district propose to support to install additional 60 unit of FED by the end of 2006 to 2007. Department of Marine and Coastal Resources of Thailand are on the process on propose to making an installation of FEDs in coastal of Andaman sea by starting on 2007 by departmental budget. Deep water FEDs testing and demonstration for installation will be conduct in Kalibo, Panay island, the Philippines around November to December 2006.

3.2 Workshop/seminar on resource enhancement tools including artificial design and construction.

The activity are conducted on apparel with the implementation process of activities 3.1. The consultation on the resources enhancement tools with agencies concern were performed.

3.3 Development of fisheries resources conservation and enhancing through marine ranching/re-stocking and evaluation of the impact.

TD conducted a consultation with local institute (Burapha University) for implementing on sea horse ranching methodologies. Local sea horse species, *Hippocampus kuda*, dominant in delta of Bangprakong river, Cholburu province are the target species using for this experiment. The appropriated size, area and releasing technique are under consideration among the project working group

3.4 Ecosystem valuation: Sea-grass, mangroves, corals, soft-bottom, rivers, reservoirs, wetlands, etc.

The activities are under consultative arrangement on the appropriate issue, area, scope and methodology of the evaluation process.

3.5 Information dissemination on rehabilitation of fisheries resources and habitats/fishing grounds for public awareness

The promotional materials aimed to disseminate information and technical discrimination on rehabilitation of fisheries resources and habitats/fishing grounds for public awareness is on the process of publishing on "Artificial Reefs in Thailand". The paper reviews the concept and objectives for installation of artificial reefs; the nature and importance of the ecosystem in the natural and artificial reef areas; the economic and social values for fishers living around artificial reefs as case study in Thailand.

Project Activities

Project/Activity Title	Duration	Remark
1. Experiments/Regional Workshop on the suitable designs/models of the resource enhancement tools in collaboration with the Member Countries including its evaluation and promotion	Apr. – Dec.	80%
2. Workshop/seminar on resource enhancement tools including artificial design and construction.	Oct. – Dec.	60% on-going
3. Development of fisheries resources conservation and enhancing through marine ranching/re-stocking and evaluation of the impact.		50%
3.1 Conservation of endangered species (dugong, whale shark, dolphin, etc.)	Apr. – Dec.	On consultative with Department concern
3.2 Sea ranching of selected species (sea cucumber, giant clam, sea horse, spiny lobster, abalone, etc.)	Jan. – Jun.	On consultative with local institute for sea horse ranching methodologies
3.3 Restocking of indigenous species (freshwater species, shrimp, etc.)	Jul. – Dec.	On consultative with Department concern
3.4 Marine Protected Areas	Apr. – Dec.	postpone activity
4. Ecosystem evaluation: Sea-grass, mangroves, corals, soft-bottom, rivers, reservoirs, wetlands, etc.	Apr. – Dec.	On consultative with Department concern
5. Capacity Building on Rehabilitation of Fisheries Resources & Habitats/Fishing Grounds to Fisheries Officer of Member Countries		Activity propose to conduct from 2007 to 2009
6. Information dissemination on rehabilitation of fisheries resources and habitats/fishing grounds for public awareness	Jan. – Dec.	90%

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Program Title	Project/Activity Title	Duration	Remarks
Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement	1. Experiments/Regional Workshop on the suitable designs/models of the resource enhancement tools in collaboration with the Member Countries including its evaluation and promotion.	Jan. – Dec.	
	2. Workshop/seminar on resource enhancement tools including artificial design and construction.	Oct. – Dec.	
	3. Development of fisheries resources conservation and enhancing through fish refugia/re-stocking and evaluation of the impact.	Jan. – Dec.	
	4. Ecosystem evaluation: Sea-grass, mangroves, corals, soft-bottom, rivers, reservoirs, wetlands, etc.	Apr. – Dec.	
	5. Capacity building on rehabilitation of fisheries resources & habitats/Fishing grounds to fisheries officers of Member Countries 5.1 Training course on fish refugia 5.2 Training course on ecosystem evaluation 5.3 Training course on resources assessment in artificial reef (existing man-made structures) and reef areas 5.4 Information and literatures compilations and materials preparation for the training courses	Apr. – Dec.	
	6. Information dissemination on rehabilitation of fisheries resources and habitats/fishing grounds for public awareness	Jan. – Dec.	

PROJECT DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: Sustainable Utilization of Potential Fisheries Resources and Reduction of Post-harvest Losses
Lead Department: TD
Lead Country:
Duration: 2006-2008

1. INTRODUCTION

Regarding fisheries resources in Southeast Asian Region is currently heavily exploited. Most of these fisheries resources were harvested in the coastal zone or offshore area where the depth of waters lesser than 100m. Consideration for the geo-topographic features in the region found that more than 50% of the sea area is classified as deep sea and most of our fishers in the region have not utilized yet. It is expected that many potential resources such as in the untrawlable areas, sea mounts, and deep sea basins are existing in the many seas in the Southeast Asian region. This is why SEAFDEC/TD proposed to identify these potential resources in cooperation with Member Countries. The activities will be conducted/ developed together with development of appropriate technology.

In addition, to maximize the utilization of resources as well as to reduce the post harvest losses, developing of the appropriate fish handling technology is one of the important issues to support the sustainable utilization of potential. As it was found that onboard fish handling and preservation techniques are main problems in many Member Countries which need to be developed. In Member Countries, there are different designs of fishing boat and different fish handing technologies, SEAFDEC will look for appropriate and low cost technology for fishermen to solve the problem of fish freshness/quality. Technology transfer to Member Countries will be one of the activities.

2. PROJECT

2.1 Objectives

1) To investigate the potential of under-utilized fisheries resources and promote their exploitation in a precautionary manner based upon analysis of the best available scientific information through development of appropriate technology.
2) To develop and promote capacity building for deep sea fishing in off shore areas particularly in untrawlable grounds, sea mounts, and deep sea basins.
3) To promote the maximum utilization of catch through better onboard fish handling to increase fish supply and improve economic return
4) To develop and promote capacity building for onboard fish handling technology and methods

2.2 Project Description

Understanding of the potential of under-utilized fisheries resources and promote their exploitation in a precautionary manner in Member Countries through the collaborative research program among SEAFDEC and member country will be focused/developed based on the utilization of MV SEAFDEC2 under the cost-shared policy. The preliminary results from these collaborative surveys included new findings on the potential resources will be reported to

individual concerned country. At the regional point of views. Further step of the program is technology transferring of the appropriate fishing technology for harvesting of the under-utilized fisheries resources to SEAFDEC Member Countries, together with the technology transfer on the appropriate onboard fish handling technology in order to reduce the post harvest losses and improving the fish quality and food safety.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Project 1:	Duration	Remarks
1.1 Workshops/Consultation/Visit for Data/ Information Collection		(80%)
1) Consultations on the survey plan using MV SEAFDEC2 have been conducted with RCCF/Indonesia, BFAR/ the Philippines, DOF/ Brunei Darussalam, Malaysia and RIMF/Vietnam. The aims are to formulate the fisheries resources survey plan in line with the Regional fisheries resources output.	Jan.- Oct.	Completed.
2) Participation of the International symposium such as "Conference on the Tsunami Impacts on the ecosystem and marine resources"	April	Completed
3) Consultation visit to Myanmar on the formulation of the fisheries resources survey plan using MV SEAFDEC2 (Oct 2007)	Nov.	Completed
4) Regional Workshop on the Potential Resources in the Southeast Asia based on the survey Results from MV SEAFDEC2 (scheduled on December 06)	Dec.	(On Scheduled)
1.2 Supporting of Actual Survey, Data Collection and Data Analysis		(90%)
1) Data collection on board MV SEAFDEC2 have been conducted in the EEZ of Brunei Darussalam, Indonesia, Malaysia, the Philippines, Vietnam,	Jan.-Nov.	Completed
2) Training on Identification of larval fishes for potential countries on resources survey, such as the Philippines, but lack of human resources to work on data analysis. The 1st training was conducted in collaboration with BFAR/The Philippines	Oct.	Completed (Ph Only)
3) Analysis of Nutrients and Larval fishes from samples collected will be used as Regional Output	Sept.- Dec.	On-going
4) Data collection on board National Research vessels: MV DA-BFAR, the Philippines (October 06)	Oct.	Completed

1.3 Production of information packages		(60%)
1) Developing of Pelagic resources database based on pelagic longline gear	Jan.-Dec.	On-going
2) Developing of Demersal resources database based on bottom trawl, fish and lobster trap and Bottom vertical longline gears	Jan.- Dec.	On-going
3) Published the Preliminary Report on the Large Pelagic Fisheries Resources Survey in the Andaman Sea	Oct.	Completed
4) Preparation for the final draft on the Preliminary results of the Fisheries Resources Survey in Cambodia	Oct.-Dec.	On-Going
5) Review works on the Relative Abundance and Distribution of the Larval fishes in the South China Sea for identification/consideration of the establishment of the Fishery Refugia Sites	Oct.-Nov. Feb 07	Completed On-going
6) Produce the Book on Economically important demersal species on the Continental shelf slopes in the SEA Region		
7) Produce the book on Economically important pelagic species in the SEA region	Feb 07	On-going

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Planning for the project and activities (project/activity title and its short description) to be implemented in the year 2007 and the expected outcomes.

Activities	Duration	Remarks
1.1 Workshops/ Consultation/ Visit for Data/ Information Collection		
1) Consultation visit for Research Planning of MV SEAFDEC2/ Myanmar, Camobodia, Indonesia, Malaysia, Vietnam		
2) Participation on Relevant International for a		
3) Inhouse worskhop for Regional data preparation & analysis		
1.2 Supporting of Actual Survey, Data Collection and Data Analysis		
1) Data Collection by MV SEAFDEC2 and National Research vessel		
2) Analysis of fish larvae, nutrients and others	Jan-Dec	
3) Develop/ modify of fishing gear and methods for data collection		
1.3 Develop and promote fish handling and preservation technology		
1) Observation program on new technology of Japanese on board fish handling and preservation technology		
2) Develop the appropriated technology for fish handling and preservation in cooperation with Japanese company		
3) Promotion of on-board fish handling to fishermen and gov. officers in cooperation with members		

1.4 Information Dissemination 1) Publications on related subjects (4-5 publications) • Guide book for fish handling at Sea • Guide book for under-utilized resources in the Region • Guide book for responsible fishing technology in the Region • Guide book for deep-sea species in the Southeast Asian region 2) Preparatory work on drafting the final report		

PROJECT DOCUMENT

Program Categories: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on of Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: The Use of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region
Lead Department: MFRDMD
Project Duration: 2006-2010

1. INTRODUCTION

The first phase of the project (Identification of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region) has been accomplished at the end of the year 2005. In this phase countries that had implemented the pilot projects have gained the experiences in identification of indicators for sustainable development and management of the capture fisheries. The main out put is the adopted Regional Guidelines on the Use of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region. The knowledge and experience gain from the pilot projects have taken as the main inputs of the Guidelines. The follow-up actions are necessary in order to ensure that these beneficial experiences are successfully transferred and implemented in the large scale.

2. PROJECT

2.1 Objectives

1) To promote the use of indicators for sustainable development and management of capture fisheries in ASEAN region.
2) To enhance capacity building in application of indicators for sustainable development and management of capture fisheries in ASEAN region.
3) To evaluate the applicable of the Regional Guidelines on use of indicators for Sustainable Development and Management of Capture Fisheries in ASEAN region

2.2 Project Description

The Resolution and Plan of Action on Sustainable Fisheries for Food Security in the ASEAN Region has recognized indicators as one of the reliable and practical approaches for sustainable development and management of capture fisheries in this region. SEAFDEC in collaboration with some Member Countries had initiated the pilot projects to identify some appropriate indicators, in 2002 to 2005. Based on the experiences in the pilot scales, the Regional Guideline on the Use of Indicators for Sustainable Development and Management of Capture Fisheries has been developed.

In order to ensure that the use of indicators is successfully implemented to support the management of capture fisheries in this region, the follow-up actions to apply the guideline should be promoted through dissemination of this guideline to the users. The users should also been supervised and trained in implementing the guideline especially at the larger scale. Inline with the need of the International Plan of Action on the Management of Fishing Capacity, special focusing will be given on development and application of indicators for management of fishing capacity.

3. PROGRESS

Due to budget constraint, only the following activity could be implemented in 2006:

Project/Activity Title	Duration	Remarks
A publication on "Regional Guidelines on the use of Indicators for the Sustainable Development and Management of Capture Fisheries in Southeast Asia"	March 2006	Published in "Regional Guidelines for Responsible Fisheries in Southeast Asia: Supplementary Guidelines on Co-management using group for user rights, fishery statistics, indicators and fisheries refugia.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

If budget is available, the following activities are to be conducted in 2007.

Project/Activity Title	Duration	Remarks
1. A Regional Technical Consultation on the use of indicators in management of fishing capacity in ASEAN countries is proposed to be conducted in Kuala Lumpur.	3 days in May 2007	Estimated cost: USD 30,000
2. Pilot Projects on the use of indicators in management of fishing capacity is proposed to be conducted in 7 ASEAN countries.	From July 2007 onwards until 2010	On cost-sharing basis with participating countries
3. A pilot project on the use of indicators in management of fishing capacity in a selected sub-regional areas, to be proposed *	From October 2008 onwards until 2009	Potential sub-regional areas: Gulf of Thailand/Strait of Malacca Estimated cost USD 30,000

* The pilot project is proposed under a new Trust Fund.

PROJECT DOCUMENT

Program Categories: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: Development of Integrated Inland Fisheries Management in ASEAN Countries
Lead Department: SEAFDEC-MFRDMD
Total Duration: 2006-2010

1. INTRODUCTION

Preventing further decline of fishes in the inland ecosystem is fundamental to sustainable development as fish and fishing are of central importance to the lives and culture of many people who depend entirely on inland ecosystem as source of animal protein. The overriding threat to future of inland ecosystems is the impact of water management schemes for improving navigation, drainage of wetlands for flood control, construction of dams for hydroelectricity, irrigation channels for agriculture and the establishment of inter-basin connections and water transfer. Even though these changes have improved transportation, provided flood control and hydropower, and boosted agricultural output but sad to say that inland fisheries has becoming less importance in enhancing the economic well being of the country's population.

To date, there has been little effective dialogue between the fisheries sector and other agencies that are involved in sharing this inland water source and also the need to stress the importance of integrated approach in managing this limited resource. A key to optimizing benefits gained from inland water ecosystem is to promote effective dialogue and consultation between all those involved in water management as well as the users that depend on this limited resource to sustain their livelihood. In such dialogues, the importance of fisheries will be fully understood, the biology of selected certain species taken into account, and mitigation and management of impacts are regularly monitored and improved. Thus more concerted efforts are needed to manage the inland water ecosystem in an integrated approach that would benefit all users. This is a challenge to managers and users of the resources in formulating measures to contain the situation as well as sustaining the inland fisheries resources.

2. PROJECT

2.1 Objectives

1) To develop appropriate approaches in management of inland fisheries
2) To develop guideline for formulating more pragmatic management plan in sustainable utilization of inland fisheries resources
3) To strengthen community participation in management and conservation of inland fisheries resources

2.2 Project Description

The following activities are proposed:

1 Development of guideline for formulating management plan of inland fisheries:

- Establish Core Working Group Core Working Group composed of representatives from SEAFDEC-MFRDMD, TD, and ASEAN Member Countries and from other International/ Regional Organizations dealing with Inland Fisheries such as FAO, MRC, WFC and NACA.

- This Core Working Group will draft guideline for formulating management plan of inland fisheries

2. Implementation of Pilot Projects in participating countries
   - Educate local stakeholders at selected sites through regular national consultation/ seminar/ workshop/ meetings/ dialogues with clear explanation of objectives, implementation strategies and expected output of the projects. Full cooperation from the local community is to be promoted in the management and conservation of inland fisheries resources.
   - Establish frequent dialogues among the stakeholders and other user agencies.
   - The choice of the pilot sites is to be decided by the community. The local community is empowered to protect and manage the fisheries resources in their rivers or other small water bodies.
   - The local stakeholders together with staff of DoF and other relevant agencies that deal with the ecosystem will formulate suitable fisheries management plan at the respective pilot sites.

3. Human Resource Development
   Capacity building of MFRDMD staff and ASEAN Member Countries will be developed and strengthened through:
   - Training on data handling
   - Training of Trainers on Fisheries Management of Inland Fisheries
   - Attachment training at relevant competent regional/ international organizations

4. Publication and Dissemination of Information
   - Publications on guideline for formulating management plan of Inland Fisheries
   - Dissemination of pamphlets for public awareness program

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Due to budget constraint, most of the proposed above activities could not be implemented. However, a pilot project to compile information and data to develop an integrated approach in managing fisheries resources of inland ecosystem was initiated in Peninsular Malaysia by the Department of Fisheries in collaboration with SEAFDEC-MFRDMD and other related agencies. The project is solely supported under the Ninth Malaysia Plan: Program - Conservation of Habitat Ecosystem and Biological Diversity.

Project/Activity Title	Duration	Remarks
A. Implementation of Pilot Project in participating countries: Malaysia		100% National Budget
a. Merbok River and mangrove estuary	Apr-Dec 2006	50% completed
1. Information and data compilation: Capture Fisheries, aquaculture and other activities	Apr - Dec	80% completed

2. GIS mapping of study area	**Jul - Dec**	**40% completed** Using satellite image of 2006 to develop GIS maps. GIS maps of the study area showing: a. Location of brackish water pond and cage culture activities with water quality parameters b. Location of capture fisheries activities by gear type c. Urban and land-use area
3. Data entry and strengthening of database development	**May - Dec**	A database that was developed during the first phase of the Inland project was used as platform to enter data for this area.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

If budget is available, the following activities are to be conducted in 2007 at regional level.

Project/Activity Title	Duration	Remarks
1. Development of guideline for formulating management plan	4 days meeting	Expert Meeting to develop guideline for formulating management plan in Kuala Terengganu. To use example as developed by Malaysia through the implementation of pilot project.
2. Implementation of Pilot Projects in participating countries		Due to budget constraint, the use of National budget to those interested participating Member Countries is highly appreciatedo. Pilot project in Malaysia to continue under the support of DoFM. The study sites will be extended to lake and reservoir so as to develop management plan for the area.

3. Human Resource Development: Training course on Fisheries Management	Jul - Aug 2007 (45 days)	Organized by Department of Fisheries Malaysia under the Malaysian Technical Cooperation Program. Interested Member Countries to apply under this program.

Expected Outcomes:

1. More pragmatic strategic plans in promoting an integrated approach in managing the inland fisheries resources.
2. Draft Guideline on formulating management plan
3. Enhanced knowledge of fisheries officer on fisheries management

THE SPECIAL 5-YEAR PROGRAM ON SUSTAINABLE FISHERIES FOR FOOD SECURITY IN THE ASEAN REGION (2006-2010)

COMPONENT II: AQUACULTURE

SUMMARY

The Aquaculture Component of the Special Five year Program on Sustainable Fisheries for Food Security in ASEAN Region was implemented during 2002-2005 in response to recommendations made during the ASEAN-SEAFDEC Conference on Sustainable Fisheries during the Third Millennium: Fish for the People in Bangkok, Thailand in November 2001. The implementation of the activities under Aquaculture Component was a success; however, Member Countries also identified the need for addressing some research and technology gaps. Thus, the Planning Workshop for the Special Five-Year Program (Aquaculture Component):2006-2010 was convened from 30 November to 2 December 2005 in Thailand and this resulted in development of plan of actions that would respond to the concerns of the ASEAN countries in sustainable aquaculture development (i.e. freshwater aquaculture of the indigenous species; integrated aquaculture system; coastal aquaculture and mariculture; and captive broodstock development. The plan of action for 2006-2010 was endorsed for implementation under the FCG collaborative mechanism during the 28th Program Committee meeting in Thailand in 2005 and was approved for implementation by the SEAFDEC Council during its 38th Meeting in April 2006. Following this, AQD, in collaboration with Member Countries, has implemented the two projects since 2006; namely: (i) Development of Technologies for Sustainable Aquaculture; and (ii) Human Capacity Building for Sustainable Aquaculture. The activities under these projects focus on: (i) freshwater aquaculture of indigenous species; (ii) integrated aquaculture system; (iii) coastal aquaculture and mariculture; and (iv) captive broodstock development and seed production.

Significant milestones have been achieved in the implementation of the above-mentioned two projects. During 2006, the collaborative study on giant freshwater prawn, *Macrobrachium rosenbergii* was actively pursued in selected ASEAN countries (Indonesia, Thailand and Philippines) and these are now in various stages of genetic improvement program aimed at improving the seed stock. With regard to study on marine prawn, initial work on genetic characterization has been done to assess the potential source of good quality *Penaeus monodon* broodstock and subsequently improve their maturation. As part of the activity to promote seed production of commercially important aquatic species in the coastal areas and transfer the viable technologies, preliminary data on economics of grouper seed production in Indonesia were gathered. Initiatives have also been made in the transfer of viable technologies (i.e. seed production and grow-out culture techniques for abalone, marine fishes) through organization of training programs and publication of manuals in different languages. These also facilitated the packaging and sharing of the successful experiences between institutions or countries in the region on viable aquaculture technologies.

The projects on "Development of Technologies for Sustainable Aquaculture" and "Human Capacity Building for Sustainable Aquaculture" will be continued in 2007. However, these projects will be merged and activities will be implemented under a new project entitled 'Development of Technologies and Human Capacity Building for Sustainable Aquaculture'. The activity components under this project will remain the same as in 2006; however, research for next year will provide more focus on addressing gaps in areas of present needs (e.g. development of improved quality seeds and captive broodstock for the priority species, and improvement of husbandry protocols in the hatchery). Programs to enhance the capacity of countries in the region on seed production and grow-out culture techniques of commercially important species (e.g. abalone, marine fishes) will also be continued.

The following sections summarize the progress of project activities during 2006 and planned activities for 2007.

1. Development of Technologies for Sustainable Aquaculture

The main objective of the project is to address regionally relevant technology needs for sustainable aquaculture in the areas of broodstock development, genetic improvement, seed production, and culture systems of various priority species for aquaculture, through research and verification. The activities focus on the following:

1.1. Freshwater Aquaculture of Indigenous Species

This activity intends to address various concerns identified for the priority species during the February 2005 Planning Meeting. In order to shorten the research processes, countries that have common interest in specific species have been grouped to conduct the collaborative research on such species. Countries that have the developed technology for such identified species serve as source for technical assistance.

During 2006, the collaborative study on the genetic improvement and seed production of giant freshwater prawn, *M. rosenbergii* was initiated. The objective is to improve the genetic quality and seed production technology to produce good quality seedstocks. The participating countries are Indonesia, Thailand and the Philippines. The progress of activities in each country is described below:

Indonesia: Two studies are on-going: (i) collection of wild stock from Sulawesi to construct a base population for GI Macro II and another potential population such as those from Kalimantan, Indonesia; and (ii) Evaluation and characterization of GI Macro II, Sulawesi and Kalimantan strains using molecular marker. Numerous breeders originating from wild population were collected and several pair matings were conducted as part of preparations for establishing a base population to initiate selective breeding. Regarding characterization using molecular marker, DNA extraction and amplification of mtDNA have been tried.

Thailand: Studies focus on (i) Selective breeding to improve growth; and (ii) Use of allozyme marker to detect genetic variation and growth performance. With regard to selective breeding experiment, nine crosses were reared in three environments for eight months. Results after 4 months showed that heterogeneity in body lengths and weights of these crosses ranged between 0.28-10.14% and 2.77-15.47%, respectively. The AAGRDI and FARM stocks were paired and induced spawned to initiate the P_0 generation of the selection experiment in Burirum and Uttaradit Fisheries Test and Research Centers. Parent prawns were also pooled and kept for further genetic diversity analysis. To support the sub-activity on Selective Breeding of the Freshwater Prawn, *Macrobrachium* samples for the genetic variation detection using allozyme marker were taken from the parental stocks from each area.

Philippines: Morphometric characterization and performance evaluation of different *Macrobrachium* strains and other commercially important freshwater prawns are in progress. Wild samples were collected (Vigan,Oroquieta, Cotabato, and Antique) and taxonomically screened and identified. An experiment that aims to evaluate the reproductive efficiency of *Macrobrachium* stocks at different levels was also initiated; however this was terminated prematurely due to damage caused by typhoon. The performance of different strains of *Macrobrachium rosenbergi*i in grow-out culture in lake-based cages and ponds is also being assessed. First sampling was done during the first week of October. Apart from these studies, genetic characterization of *M. rosenbergii* in ASEAN countries is in-progress. The first batch of wild and hatchery stocks of freshwater prawn from Luzon, Philippines was collected and methods to PCR-amplify DNA from these samples are currently being optimized using primers 16SAR and 16SBR. Pleopods from freshwater prawn (*Macrobrachium rosenbergii*) samples

collected from various sources in Visayas and Mindanao will be included in the mtDNA-RFLP analysis.

1.2. Integrated aquaculture systems

This activity makes use of the packaged successful experiences from other institutions or countries on the integration of aquaculture with the farming of rice and other crops in the agricultural systems in the region.
For 2006, the activity focused on translation of AQD's Manual on Tilapia Farming in Ponds and cages into languages in Indonesia and Myanmar (see also in section 2 of this document).

1.3. Coastal Aquaculture and Mariculture

This focuses on promoting the coastal areas in the region where a range of commercially important aquatic species could be cultured (for example, mud crab, abalone, marine fishes, etc.). Technologies on small-scale mariculture including offshore cages that are already developed in some countries will be verified in countries where such technology may be appropriate.

(a) *Grouper seed production*. As part of the initial activity to promote grouper seed production in the ASEAN region, economic analysis on grouper seed production in Indonesia was initiated. The objective is to describe the development of the small-scale backyard hatcheries and their economic structure and benefit to the farmers and local community in Bali. In 2006, field survey was carried out in cooperation with Gondol Research Institute for Mariculture and preliminary results were obtained.

(b) *Mud crab seed production and grow-out*. The Planning workshop in December 2005 had reported the availability of a Vietnamese Manual on Mud crab and was recommended for translation into English and later into major languages in the region. The activity has been initiated.
(c) *Seed production and grow-out culture of abalone*. The training was held in November 2006

(d) *Milkfish/siganid seed production and grow-out culture*. The training on hatchery and nursery of marine fishes (milkfish included) was conducted during 3 May to 16 June 2006 in AQD (see Section 2 of this document).

1.4. Captive Broodstock Development

One constraint in aquaculture development is the inconsistent and seasonal supply of quality seeds, especially for species such as grouper, milkfish, rabbitfish, shrimps, sea bass, mud crab, etc. Hence, to address this, the activity focuses on one of the factors that would assure the consistent supply of quality seeds for aquaculture, the development of captive broodstock for the priority species.

(a) Development of specific pathogen free shrimp (*P. monodon, P. vannamei*) broodstock.
(b) Genetic characterization of *P. monodon* broodstock. This involves two sub-activities: Genetic characterization of broodstock and Improvement of maturation of pond-reared *P. monodon* broodstock. Samples were collected from several areas in the Philippines to initiate genetic characterization. With regard to other study, stocks were procured from shrimp farms in Visayas (Philippines), reared separately to broodstock size, and mated.

Plans for 2007:

1. Freshwater Aquaculture of Indigenous Species. The focus of the activity will be on Genetic Improvement of *Macrobrachium rosenbergii*

1.1 Improvement for better seed production traits and grow-out characteristics. The studies will involve the following studies: (i) Evaluation of performance of different strain of *M. rosenbergii* in grow-out culture in lake-based cages and in ponds; and (ii) Genetic characterization of commercially important Philippine stocks of freshwater prawn, *Macrobrachium sp*., using DNA markers

2. Coastal Aquaculture and Mariculture

2.1 Development of strategies to extend the spawning season of sea bass (*Lates calcarifer*) under captivity

3. Captive Broodstock Development and Seed Production

3.1 Development of Specific Pathogen Free (SPF) shrimp (*P. monodon, P. vannamei*) broodstock. This will include the following activities: (i) Identification of potential sources of good quality tiger shrimp broodstock and development of healthy broodstock from highly genetically variable wild stocks; and (ii) Effective management and selective breeding of good quality tiger shrimp (*P. monodon*) with molecular genetic tools (marker-based data).

3.2 Domestication of Mud Crab *Scylla serrata*
In order to develop a husbandry technology for the sustainable supply of good quality captive broodstock of the mud crab *S. serrata*, the following two studies will be implemented: (i) Genetic characterization of *Scylla* spp. broodstock; and (ii) Domestication of mud crab

2. Human Capacity Building for Sustainable Aquaculture

The Regional Planning Meeting in 2005 identified the following issues on human capacity building that need to be addressed: (i) production and dissemination of manuals and handbooks; (ii) training of technical staff to enable national governments to independently implement sustainable aquaculture in respective countries; (iii) study visits of selected farmers to countries with developed technologies to expose them on recent developments in aquaculture; and (iv) farm demonstration on viable aquaculture technologies and systems. In response to these needs, the project 'Human capacity Building for Sustainable Aquaculture' was conceived as a part of the Special Five-Year Program for implementation during 2006-2010. The project focuses on the following: (i) implementation of holistic training program for technical persons from the region on sustainable aquaculture from broodstock management and seed production to environment-friendly aquaculture including feeds and feeding management as well as disease management; (ii) development of training program for fish farmers that will put emphasis on practical sessions to include farm visits to countries with developed technologies; (iii) intensification of production and dissemination of manuals and handbooks on various aquaculture technologies; and (iv) promotion of the development of good farm practices for the various priority species.

The following are the highlights of activities during 2006:

2.1. Production of manuals and handbooks. The objective is to publish state of the art technology compilations to hasten the transfer of the technologies to the countries that need such technologies. This also serves as protocol in verifying and demonstrating the technologies available for transfer to farmers.
(i) Manual on Tilapia Farming in Ponds and Cages. The AQD version has already been

translated to Bahasa Melayu (Indonesia) and Burmese language (Myanmar). Concerning the latter, the draft has been sent to AQD for review.
(ii) Manual on Mud Crab Culture. The Vietnamese Manual on Mud Crab culture (developed by the Government of Vietnam) is being translated into English version.

2.2. Training of technical staff. This involves training conducted on site or formal training in AQD in the Philippines. It also includes attachment training in specific countries where the technologies needed have already been well-developed. The training program covers the whole aspect of aquaculture development from broodstock management, seed production to grow-out culture in ponds, cages or in small-farm reservoirs, or in offshore cages.
(i) International training on seed production and culture of abalone. The training was held in November 2006.
(ii) International training on milkfish seed production and grow-out culture. Training course on Marine Fish Hatchery Operations (milkfish included) was conducted on 3 May to 16 June 2006 in AQD. Four Participants from Vietnam, Philippines, Indonesia and Cambodia were funded through the Program on the Promotion of Sustainable Aquaculture in the ASEAN Region. Three other technicians from Vietnam joined the practical part of the session and completed the special training program conducted during 29 May to 29 June 2006. Their participation was funded partly by the Program.
(iii) Technical assistance for siganid hatchery operations (Vietnam, Myanmar). This activity has not yet been undertaken.

2.3. Information exchange on status of *P. monodon* captive broodstock development in the region and the possible impact of the introduction of *P. vannamei* in the region. The activity has just started; hence no substantial result yet.

Plans for 2007:

i. Publication of Manual on Grow-out of *M. rosenbergii* in ponds and lake-based cages
ii. Training course on marine fish hatchery. This aims to provide participants with technical knowledge and skills on the spawning and larval rearing of marine fishes, such as milkfish, grouper, snapper, seabass and rabbit fish and enable them to operate a fish hatchery or a multi-species hatchery.
iii. Training course on abalone hatchery. The objective is to provide participants with technical knowledge and skills on seed production and grow-out culture of abalone to enable them to operate hatchery, nursery or grow-out farm of abalone.

PROJECT DOCUMENT

Program Categories: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: Development of Technologies for Sustainable Aquaculture
Lead Department: Aquaculture Department (AQD)
Lead Country: SEAFDEC Member Countries
Total Duration: 2006-2010

1. INTRODUCTION

The continuing population growth, the decline in marine fish catch, and the widespread poverty in the rural areas of the ASEAN region make it imperative that sustainable aquaculture be promoted to ensure food security and generate livelihood for the fisherfolk in the region. Recognizing this need, the Ministers of the ASEAN-SEAFDEC Member Countries responsible for fisheries declared in the Resolution, which they adopted in November 2001, that: "aquaculture production be increased in a sustainable and environment-friendly manner by ensuring a stable supply of quality seeds and feeds, effectively controlling aquatic diseases, promoting good farm management, and transferring appropriate technology." This declaration has been clearly specified and spelled out in details in the accompanying Plan of Action on Sustainable Fisheries for Food Security in the ASEAN Region, which the Ministers also adopted in November 2001.

An initial evaluation of the outcome of the Aquaculture Component of the Special Five-year Program, implemented from 2002 to 2005, was done during the Regional Planning Meeting for the Special Five-year Program in February 2005. During the Regional Planning Meeting, the Member Countries considered the implementation of the Aquaculture Component a success. However, the Member Countries also identified specific areas that require further development. Some Member Countries that have ongoing activities on research and technology development for aquaculture still expressed the need for some aspects of aquaculture that should be further developed.

The Planning Workshop for the Special Five-Year Program (Aquaculture Component) 2006-2010 was conducted by AQD in Bangkok, Thailand from 30 November to 2 December 2005 in order to: develop a five-year plan of action for 2006-2010 that would address the various concerns in sustainable aquaculture development (i.e., freshwater aquaculture of indigenous species; integrated aquaculture system; coastal aquaculture and mariculture; and captive broodstock development). The Workshop participants representing the ASEAN-SEAFDEC Member Countries confirmed and prioritized the activities considering the limited budget for the program.

The output of the Planning Workshop was endorsed for implementation under the FCG collaborative mechanism during the 28th Meeting of the SEAFDEC Program Committee in Bangkok, Thailand in December 2005. The priority activities for 2006 were approved for implementation by the SEAFDEC Council during its 38th Meeting in Brunei Darussalam in April 2006. Specifically, the activities for 2006 were re-prioritized and the budget re-adjusted to correspond to the approved budget allocation for 2006.

Specifically, during the February 2005 Regional Planning Meeting, the Member Countries raised the following issues that need to be addressed: (1) consistent supply of quality seeds for various priority aquatic commodities to support the aquaculture industry in respective countries; (2) access to developed captive broodstock technology for important aquatic commodities; (3)

environment-friendly culture technologies that promote socio-economic development and rural livelihood while optimizing the utilization of resources and inputs; (4) ecologically sound farm management; (5) conservation of ecosystems and biodiversity; (6) development of low fish meal, cost-efficient and environment-friendly aquafeeds; (7) diagnosis and control of aquatic diseases; and (8) monitoring and surveillance of occurrence of aquatic diseases. Although initial efforts have been made to address certain regional aquaculture issues during the implementation of the Special Five-Year Program from 2002 to 2005, there is a need to continue the activities that have been started in order to address the aforementioned concerns.

2. PROJECT

The program is intended to address regionally relevant technology needs for sustainable aquaculture in the areas of broodstock development, genetic improvement, seed production, and culture systems of various priority species for aquaculture, through research and human capacity building.

2.1 Objectives

Specifically, the Program aims to:

1) Establish consistent supply of quality seeds through the establishment and promotion of captive broodstock of selected species and refinement of larval rearing techniques;
2) Promote ecologically sound aquaculture farm management by refining existing grow-out systems with the aim of increasing production, environmental sustainability and satisfying international trade standards;
3) Establish database on nutrient requirement of priority species and nutrient composition and digestibility of feed ingredients in order to develop cost-efficient feeds utilizing locally available materials that are low in fish meal and environment-friendly;
4) Develop the human resource in the region in sustainable aquaculture through training, farm demonstration, production of training materials like manuals and handbooks, and mobilization of experts within the region.

2.2 Project Description

From the outcome of the February 2005 Regional Planning Meeting for the Special Five-Year Program, which were confirmed during the Planning Workshop for the Special Five-Year Program (2006-2010): Aquaculture Component held in Bangkok, Thailand, 30 November-2 December 2005, it was decided that AQD would implement the following activities from 2006 to 2010 as part of the Program on the Promotion of Sustainable Aquaculture in the ASEAN Region under the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) collaborative mechanism: (i) Development of Technologies for Sustainable Aquaculture; and (ii) Human Capacity Building for Sustainable Aquaculture. The focus of the activities has been on the following: (i) freshwater aquaculture of indigenous species; (ii) Integrated aquaculture system; (iii) coastal aquaculture and mariculture; and (iv) captive broodstock development and seed production.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project/Activity Title	Duration	Remarks
Freshwater Aquaculture of Indigenous Species	All year around	40 % accomplishment
Integrated Aquaculture System	No activity	No activity
Coastal Aquaculture and Mariculture	All year around	50 % accomplishment
Captive Broodstock Development and Seed Production	All year around	20 % accomplishment

3.1. Freshwater Aquaculture of Indigenous Species

The collaborative study on the genetic improvement and seed production of giant freshwater prawn, *Macrobrachium rosenbergii,* has been implemented since May 2006. Under this collaboration, Indonesia implements two activities: (1) Collection of wild stock from Sulawesi to construct a base population for genetically improved *Macrobrachium* (GI Macro) II, and another potential populations such as those from Kalimantan; and (2) Evaluation and characterization of GI Macro, Sulawesi and Kalimantan strains using molecular markers.

The corresponding Project Agreement for the implementation of these activities at the Research Institute of Freshwater Aquaculture in Bogor, Indonesia, has been signed and the necessary budget allocation has already been remitted.

Thailand also implements two activities: (1) Selective breeding to improve growth; and (2) Use of allozyme marker to detect genetic variation and growth performance. These activities are being conducted at the Pathumthani-based Aquatic Animal Genetics Research and Development Institute (AAGRDI) of the Department of Fisheries of Thailand. The corresponding Project Agreement for the implementation of these activities has been signed and the necessary budget allocation has already been remitted.
Coordinated by AQD, the activities in the Philippines have been grouped into: (1) Evaluation and characterization of freshwater prawn using molecular markers; and (2) Domestication and selective breeding. These activities are being conducted at AQD's Binangonan Freshwater Station in collaboration with the Philippine Bureau of Fisheries and Aquatic Resources (BFAR) as well as the Mindanao State University in Naawan, Misamis Oriental in northern Mindanao, Philippines.

Moreover, an activity on the genetic characterization of *M. rosenbergii* in the ASEAN countries has been implemented at AQD's Binangonan Freshwater Station since May 2006.

3.1.1. Genetic Improvement of M. rosenbergii

(i) Collection of wild stock from Sulawesi to construct a base population for GI Macro II and another potential population such as those from Kalimantan (Indonesia)
Up to now, numerous breeders of giant freshwater prawn originated from wild population have been collected. Those populations are from Sulawesi, Kalimantan, Sumatera, Java, India and GI Macro I. In order to prepare the materials to be used in constructing a base population for selection activity to obtain GI Macro II, several pair mating of *M. rosenbergii* have been conducted in aquarium with recirculation systems.
After getting the offspring from all of varieties/combinations, they will be compared in earthen ponds, and then calculated for their heterogeneities at commercial size (30 g/individual). Results of this activity will be used as starting point to decide which varieties will be used as materials in constructing a base population for the following selection activity.

(ii) Evaluation and characterization of GI Macro II, Sulawesi and Kalimantan strains using

molecular marker (Indonesia)
Recently, DNA extraction has been conducted using standard phenol-chloroform methods. Amplification of mitochondrial (mt) DNA was tried using 16S ribosomal RNA primer; however, the result is not clear. Next amplification of mtDNA regions will be conducted using CO-I primers and then followed by restriction enzyme digestion.

(iii) Selective Breeding of the Freshwater Prawn (Thailand)
Nine crosses were reared under three environments for the period of eight months. Identical experimental procedure (i.e. stocking density, feeding regime and measurement schedules) was used in all crosses.

The stocking density was 10 prawns/m^2. Results obtained after 4 months illustrated that heterogeneity in body lengths and weights of these crosses ranged between 0.28-10.14% and 2.77-15.47%, respectively. In the AAGRDI environment, the WILDxAAGRDI cross showed the best result which was statistically significant (P<0.05). In the Uttaradit Fisheries Test and Research Center, the FARMxAAGRDI showed to be the statistically significant (P<0.05) best cross. In the Burirum Fisheries Test and Research Center, the AAGRDIxFARM showed to be the statistically significant best cross. In the Chumphon Fisheries Test and Research Center, the FARMxAAGRDI showed to be the statistical significant best cross.

The AAGRDI and FARM stocks were paired and induced spawned to initiate the P_0 generation of the selection experiment in Burirum and Uttaradit Fisheries Test and Research Centers. Induced spawning was conducted at the AAGRDI. Twenty pairs of each stock were spawned to initiate 20 full-sib families.

Macrobrachium larvae were reared separately by families until age of 45 days and then these were transferred to the Burirum and Uttaradit Fisheries Test and Research Center. The parent prawns were pooled and kept for further genetic diversity analysis.

(iv) Use of allozyme marker to detect genetic variation (Thailand)
To support the sub-activity on Selective Breeding of the Freshwater Prawn (item iii above), the *Macrobrachium* samples for the genetic variation detection using allozyme marker were taken from the following parental stocks from each area:

Area	*Male*	x	*Female*
Uttaradit	Farm	x	AAGRDI
Buriram	AAGRDI	x	Farm
Chumphon	Farm	x	AAGRDI

About 30 pleopod samples (15 males & 15 females) from each of the parental stocks of Uttaradit and Buriram have already been taken and stored at -40 ºC for further analysis of genetic variation using allozyme markers. Results of the allozyme markers based genetic variation will be reported later.

(v) Morphometric characterization and performance evaluation of different *Macrobrachium* strains and other commercially important freshwater prawns:

Collection, identification and validation of *Macrobrachium* samples (Philippines). The identities of ethanol-preserved prawn samples from Abra River in Vigan, Layawan in Oroquieta, Pikit in Cotabato, and Lau-an in Antique were confirmed by crustacean taxonomist Dr. Daisy Wowor to be the following: VIGAN samples: *M. lepidactyloides*; LAYAWAN samples: *M. lar* and *M. jaroense*; PIKIT samples: *M. mammillodactylus*, *M. weberi, M. australe,* and *M. jaroense;* ANTIQUE samples: *M. esculentum, M. latidactylus, M. jaroense, M. horstii, M. lar M. australe* and *M. lepidactyloides.*

More samples (*M. rosenbergii* and non-*rosenbergii* species) shall be collected from Visayas and Mindanao. The proponent will also try to collect wild samples of *M. rosenbergii* from known collecting areas in Mindoro for use as captive broodstock in the performance evaluation study as well as for taxonomic identity validation.

Reproduction efficiency of two *Macrobrachium* stocks at different protein levels (Philippines). In late October 2005, breeding sets of hatchery (BFAR) and wild (CAL from Calumpit, Bulacan) strains of *Macrobrachium rosenbergii* were stocked in 18 lake-based net cages at 1 male:5 females.

The reproductive performance of the breeders from the two strains (fed high and low protein diets), should have been compared for a year until October 2006; however, the study was terminated prematurely due to damages caused by recent typhoon Milenyo. Data from this lake-based study shall be incorporated with those from an earlier study comparing the reproductive efficiency of the same two strains stocked in concrete tanks. The tank-based run has recently been terminated after a year of monitoring. The influence of hatchery system (land-based vs. lake-based) on the reproductive performance of the two stocks will be determined.

Recently, the survival of freshwater prawn larvae in the hatchery has improved and a notable number of postlarvae were produced because of the prevailing warm climate. These by-products will be sold to the municipal agriculturist from Pakil, Laguna for grow-out culture in the LGU demonstration farm.

The postlarvae produced from this study were grown in cages and tanks. Later they were used for grow-out and breeding experiments. Seedstock produced in excess of what was utilized in research experiments were sold to fishfarmers in Rizal and Laguna; however, production income was very minimal.

(vi) Morphometric characterization and performance evaluation of different *Macrobrachium* strains and other commercially important freshwater prawns:

Performance of different strains of *Macrobrachium rosenbergi*i in grow-out culture in lake-based cages and ponds (Philippines). Post larvae of broodstock from Calumpit, Bulacan were stocked in 8 x 8 m^2 cages in the lake on 6 September 2006. First sampling was done during the first week of October.

(vii). Genetic characterization of *M. rosenbergii* in the ASEAN countries (Philippines)

Using the DNAzol kit, genomic DNA were extracted from pleopods and muscle tissues of the first batch of wild (from Calumpit, Bulacan) and hatchery (from SEAFDEC/AQD) stocks of FW prawn *Macrobrachium rosenbergii*. Methods to PCR-amplify DNA from these samples are currently being optimized using primers 16SAR and 16SBR. It was not until recently that extracted DNA from tissues of some wild and hatchery stocks have been successfully amplified (based on confirmatory results from agarose gel electrophoresis) using modified amplification conditions. With these results, DNA amplification has been performed on some samples and an mtDNA sequencing run has been tried.

However, based on the recent sequencing run, methods for cycle sequencing have to be optimized to enable the generation of reliable and accurate sequencing data. Alternative methods (use of ExTaq DNA in the amplification procedure or cloning the desired DNA region prior to automated DNA sequencing etc.) shall be tried to be able to obtain better results. A recent sequencing run using the other pair of primers flanking the COI or mitochondrial control region and following the usual sequencing protocol worked hence it is possible that either the 16SAR and 16SBR primers previously ordered are either of poor quality or the method for cycle sequencing for the 16S mitochondrial DNA region still needs to be optimized.

While the sequencing protocol is being optimized, the study proponents have started its work on another marker system (mitochondrial DNA-Restriction Fragment Length Polymorphism or

mtDNA-RFLP), looking at mitochondrial DNA control region (COI) genetic variation in the same hatchery and wild stocks from Luzon.

The method for COI mtDNA-RFLP marker analysis is already in place and can be readily adopted for use in screening the available prawn samples. Apart from the Luzon samples, the proponents shall include pleopods from freshwater prawn (*Macrobrachium rosenbergii*) samples collected from various sources in Visayas and Mindanao for inclusion in the mtDNA-RFLP analysis.

3.2. Integrated Aquaculture System

3.2.1. Rice-Fish Aquaculture

No activity

3.3. Coastal Aquaculture and Mariculture

3.3.1. Grouper seed production

Economic analysis on grouper seed production (Indonesia)
After the transmittal of funds for this activity, the Directorate General of Aquaculture of Indonesia commissioned *Dr. Ketut Sugama* to serve as Leader of this activity.
Preparation of survey materials: Guide questions for informants (hatchery operators, managers and technicians) were prepared.
Field Survey: First survey was carried out from 19 to 23 August 2006, in cooperation with researchers of the Gondol Research Institute for Mariculture (GRIM).
Preliminary Results: There are two types of grouper hatcheries in Gondol-Bali: complete and partial. Backyard hatchery is a partial hatchery (BH), designed to hatch and rear fertilized eggs until they are sold as fingerlings. Complete hatcheries (CH), on the other hand perform broodstock maintenance, maturation, spawning, live feed culture, fry production and marketing. BH buys fertilized eggs from CH.

In the initial stage of the seed production technology dissemination, only GRIM has a complete hatchery, distributing eggs for small farmer. With the increase of the demand and high price of the grouper seed, at present, there are four CH for grouper in Gondol area and one in Situbondo East Java.

The prototype BH as transferred to the small farmers consists of two roofed 10 m^3 larval rearing tanks and its associated phytoplankton and rotifer culture tanks. The inside of the larval rearing tanks was usually painted light blue. The prototype BH also evolved into a medium-scale or even large scale for producing milkfish and grouper seeds. In BH, one larval raring tank is counted as half (0.5) unit in the survey, with the prototype BH counted as one unit with two larval raring tanks.

Based on our observation there are about 150-250 units of BH in Gondol area near GRIM. About 28 units of these hatcheries grow humpback grouper (*Cromileptes altivelis*), tiger grouper (*Epinephelus fuscoguttatus*), and coral trout (*Plectrophomus leopardus*), and has also started milkfish (*Chanos chanos*) fry production.Unlike milkfish fry production which has a rearing period of 19-22 days and may have 8-10 runs per year, grouper fry production takes 60-70 days with a maximum of 3 runs per year. In most cases the decision to grow grouper seed is based on market demand and prices. During the survey we noticed that the predominant species cultured in Gondol area is coral trout (*Plectrophomus leopardus*). The selling prices of grouper seed in farm gate are as follows:

Table: 1. The prices of grouper seed, selling prices designated by size (cm)

Species	Selling Size (cm)	Price/cm (US$)
Humpback grouper	3-5	0.08
Tiger Grouper	2-5	0.05
Coral trout	3-6	0.15

*1 US$ = 9,500 Rupiah

The adoption of the seed production technology for grouper generated four distinct groups in the supply chain in the grouper fingerling industry in Gondol area.

Eggs Supply: At present, GRIM is the source of fertilized eggs for coral trout. For the humpback and tiger grouper, there are four other hatcheries in addition to GRIM that supply fertilized eggs to the farmers. Two of these are located in the Gondol area, one in Negara (West Bali) and other one in Situbondo (East Java). GRIM sells eggs at 1.0 Rupiah/egg (US$ 10.5 per 100,000 eggs) for tiger and humpback grouper and at 1.5 Rupiah/egg (US$ 15.8 per 100,000 eggs) for coral trout. For the fertilized eggs produced by GRIM, priority was given to the hatchery surrounding GRIM at a maximum of 100,000 eggs per farmer.

Hatchery: Hatcheries buy fertilized eggs and rear the larvae to about 2-6 cm in length for 50-70 days. This size is suitable for transport but not for grow-out culture stocking, particularly in floating net cages.

Nursery: Only two farmers grow the juveniles until stocking size of around 8-10 cm from 3-4 cm in length, because it is costly to grow grouper seeds for longer period.

Broker: Most of the seeds produced by BH and nursery are sold trough local brokers. The brokers have the export linkage and absorb some of the market risks.

Employment in Backyard Hatchery: Most BH employs a minimum of two workers, who are usually paid 20% of net sales. Some hatchery operators provide food and lodging for their workers. Some workers are paid fixed monthly salary, from US$ 50-75 (450.000-700.000 Rupiah). Workers usually have junior and senior high school education, and many of them come from areas outside Bali.

The Role of Women in Backyard Hatchery: Women are also involved in grouper hatchery operations. They are being employed as temporary workers for size-grading of grouper seeds during hatchery production cycle. Based on experience, women are very good at size-grading and counting seeds for packing and transporting. Each woman worker is paid about US$ 5.0 (40,000-45, 000 Rupiah)/day for her job in the hatcheries.

Backyard Hatchery Operations: Among the 13 farms surveyed in 19-23 August 2006, not all produced grouper seeds. Most of BH produced a combination of humpback grouper *(Cromoleptes altivelis),* tiger grouper *(Epinephelus fuscoguttatus)*, coral trout grouper *(Plectrophomus leopardus)* and milkfish *(Chanos chanos)*.

Rearing Technology: Of the 13 farms surveyed, majority of farmers applies the initial stocking density of fertilized eggs into larvae tanks (10 m^3) which was 100.000 eggs, and harvests juveniles (60 days old) for *C. altivelis* and *E. fuscoguttatus* ranging from 5,000-12,000 fingerlings/10m^3 (survival 5-12%), while for *P. leopardus* ranged from 1,500-3,000 fingerlings/10m^3 (survival 1.5-3%).

Operating expenses: Majority of the BH surveyed provides either a total operating expenditure per tank or per year making it a bit difficult to define the costs. The operating expenses, cost structure, output and profitability will be analyzed after all the data needed have been collated and completed for the final report.

3.3.2. Mud crab seed production and grow-out

No activity

3.3.3. Seed production and grow-out culture of abalone
No activity

3.3.4. Milkfish seed production and grow-out culture
No activity

3.3.5. Siganid seed production and grow-out culture
No activity

3.4. Captive Broodstock Development and Seed Production

3.4.1. Development of specific pathogen free (SPF) shrimp (P. monodon, P. vannamei) broodstock
(i) Genetic characterization of *P. monodon* broodstock
(a) Genetic characterization of *P. monodon* broodstock
Penaeus monodon samples were collected from several areas in the Philippines for DNA extraction and following genetic characterization.
(b) *Penaeus monodon* broodstock development: Studies on improvement of maturation of pond-reared
Market size (30-50g) *Penaeus monodon* were procured from shrimp farms in the Visayas areas in the Philippines. Disease infection was checked before stocking. Procured shrimps were reared outdoor tanks until they reached broodstock size (80-100g). Females attained ovarian maturity without eyestalk ablation. All females were then subjected to eyestalk ablation, however, none has attained full ovarian maturity.
(ii) Information exchange on status of *P. monodon* captive broodstock development in the region and the possible impact of the introduction of *P. vannamei* in the region.
The study has just started during the third quarter of 2006. No substantial result was obtained so far.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

The following is the list of activities approved for 2006-2010, prioritized during the December 2005 Planning Workshop, endorsed for implementation by the SEAFDEC Program Committee during its 28th Meeting in December 2005, and subsequently approved by the SEAFDEC Council at its 38th Meeting in Brunei Darussalam in April 2006, However, not all activities will be implemented in 2007 because of the limited budget. Some more time is required to finalize the activities in 2007. Starting 2007, this project "Development of Technologies for Sustainable Aquaculture" will be merged with the project "Human Capacity Building for Sustainable Aquaculture" and will operate as a new project entitled "**Development of Technologies and Human Capacity Building for Sustainable Aquaculture**".

List of activities (2007-2010)
Activity 1: Freshwater Aquaculture of Indigenous Species
1.1 Genetic Improvement of *Macrobrachium rosenbergii*
  (1) Improvement for better seed production traits and grow-out characteristics
  (2) Publication of Manual on Grow-out of *M. rosenbergii* in ponds and lake-based cages
  (3) Genetic Characterization of *M. rosenbergii* in the ASEAN countries
  (4) Publication of Manual on Protocols for Genetic Improvement of *M. rosenbergii*
1.2 Genetic Characterization of *Pangasius* spp. in Member Countries
  (1) Genetic characterization of *Pangasius* spp. in Member Countries
  (2) Publication of Manual on Broodstock Development of *Pangasius boucourti*
  (3) Information exchange on progress of genetic characterization, broodstock development and seed production of *Pangasius* spp.

1.3 Other Indigenous Freshwater Fish Species
   (1) Information exchange on priority indigenous species being worked on in the Member Countries

Activity 2: Integrated Aquaculture System

2.1 Rice-Fish Aquaculture
   (1) Economic study on rice-fingerling production system
   (2) Pesticide analysis on fish from rice-fish systems

2.2 Culture Technologies for Tilapia
   (1) Translation of Tilapia Manuals of AQD to different languages in the region (Khmer, Lao, Vietnamese, Thai)
   (2) Training on tilapia hatchery and grow-out for technical staff and extension officers (on-site)

Activity 3: Coastal Aquaculture and Mariculture

3.1 Grouper Seed Production
   (1) Training on grouper (*Cromileptes altivelis*) seed production in Indonesia
   (2) Information exchange on grouper seed production and broodstock development

3.2 Mud Crab Seed Production and Grow-out Culture (including fattening and soft-shell culture)
   (1) Translation of the Mud Crab Manual into the different languages in the region (Bahasa Melayu, Burmese, Khmer, Thai, Filipino)
   (2) Attachment training for representatives from ASEAN countries on mud crab aquaculture in RIA3, Vietnam

3.3 Seed Production and Grow-out Culture of Abalone
   (1) Training on seed production of abalone
   (2) Site visit to commercial grow-out abalone farms in Thailand

3.4 Milkfish Seed Production and Grow-out Culture
   (1) Training at AQD on hatchery and nursery of marine fishes (including milkfish)
   (2) Technical assistance for establishment of milkfish hatchery in Vietnam, Malaysia and Thailand
   (3) Pilot demonstration for grow-out culture of milkfish in Vietnam, Malaysia and Thailand

3.5 Siganid Seed Production and Grow-out Culture
   (1) Training at AQD on hatchery and nursery of marine fishes (including siganids)
   (2) Technical assistance for siganid hatchery starting with Vietnam and Myanmar
   (3) Pilot demonstration for grow-out culture of siganids in Vietnam

3.6 Seaweeds
   (1) Improvement of seaweeds strain (*Eucheuma* spp., *Kappaphycus* spp.)

3.7 Feeds and Nutrition for Small-scale Aquaculture
   (2) Establishment of database on nutritional requirements of commercially important aquaculture species
   (3) Establishment of database on composition of ingredients for aquaculture feeds

3.8 Seed Production and Grow-out of Cobia (*Rachycentron canadum*)
   (1) Information exchange on status of cobia culture in the region

3.9 Mariculture Park (Marine Aqua-Industrial Park)
   (1) Study visit of ASEAN representatives to Mariculture Parks in the Philippines

Activity 4: Captive Broodstock Development and Seed Production

4.1 Development of Specific Pathogen Free (SPF) Shrimp (*P. monodon, P. vannamei*) Broodstock
   (1) Genetic characterization of *P. monodon* broodstock
   (2) Information exchange on status of *P. monodon* captive broodstock development in the region and the possible impact of the introduction of *P. vannamei* in the region

4.2 Marine Fishes Broodstock Development
   (1) Information exchange on marine fish (e.g., siganids, grouper, milkfish) broodstock development in the region (including transport and handling)

The following activities have been identified for implementation in 2007:

Project/Activity Title	Duration	Remarks
Genetic Improvement of *Macrobrachium rosenbergii*	All year around	
Publication of Manual on Grow-out of *M. rosenbergii* in ponds and lake-based cages	January to August 2007	
Development of strategies to extend the spawning season of sea bass (*Lates calcarifer*) under captivity	All year around	
Training course on marine fish hatchery	May-June 2007	
Training course on abalone hatchery	November-December 2007	
Development of Specific Pathogen Free (SPF) shrimp (*P. monodon, P. vannamei*) broodstock	All year around	
Domestication of Mud Crab	All year around	

1. Freshwater Aquaculture of Indigenous Species

1.1 Genetic Improvement of *Macrobrachium rosenbergii*

(1) Improvement for better seed production traits and grow-out characteristics

(a) Performance of different strain of *M. rosenbergii* in grow-out culture in lake-based cages and in ponds

- To determine suitable local stocks of *M. rosenbergii* for culture in lake and freshwater ponds

(b) Genetic characterization of commercially important Philippine stocks of freshwater prawn, *Macrobrachium sp*., using DNA markers

- To genetically characterize existing hatchery-bred and wild *M. rosenbergii* stocks as well as other closely related indigenous *Macrobrachium* species;
- To determine and compare the genetic diversity of the various freshwater prawn stocks that could serve as a baseline data for biodiversity conservation or for a genetic program that will enhance growth and other economically important traits in the *Macrobrachium* sp.

(2) Publication of Manual on Grow-out of *M. rosenbergii* in ponds and lake-based cages

Expected outcomes

- Suitable local stocks of *M. rosenbergii* for culture in lake and freshwater ponds
- Genetically characterized *Macrobrachium* species strain
- Manual on Grow-out of *M. rosenbergii* in ponds and lake-based cages

2. Coastal Aquaculture and Mariculture

2.2 Development of strategies to extend the spawning season of sea bass (*Lates calcarifer*) under captivity

In the Philippines, the natural spawning season for seabass starts in March and ends in October. This duration coincides with the warmer months of the year where water temperature will not go below 33^{o}C. During the months of November until February where the water temperature can go below 28^{o}C, seabass do not spawn. This indicates that temperature is probably one of the major factors that regulate spawning in this species.

The main objective of the study is to determine whether the low water temperature during the months of November until February is the cause of the non-spawning of seabass during this time of the year. Experimental study with the control of water temperature will be conducted.

2.3 Training course on marine fish hatchery

The course aims to provide participants with technical knowledge and skills on the spawning and larval rearing of marine fishes, such as milkfish, grouper, snapper, seabass and rabbit fish and enable them to operate a fish hatchery or a multi-species hatchery.

2.4 Training course on abalone hatchery

The course aims to provide participants with technical knowledge and skills on seed production and grow-out culture of abalone to enable them to operate hatchery, nursery or grow-out farm of abalone.

Expected outcomes

- Strategies to extend the spawning season of sea bass
- Well-trained technicians for marine fishes and abalone hatchery

4. Captive Broodstock Development and Seed Production

3.1 Development of Specific Pathogen Free (SPF) shrimp (*P. monodon, P. vannamei*) broodstock

(1) Identification of potential sources of good quality tiger shrimp broodstock and development of healthy broodstock from highly genetically variable wild stocks

(2) Effective management and selective breeding of good quality tiger shrimp (*P. monodon*) with molecular genetic tools (marker-based data)

3.2 Domestication of Mud Crab *Scylla serrata*

In order to develop a husbandry technology for the sustainable supply of good quality captive broodstock of the mud crab *S. serrata*, the following two studies will be implemented.

(1) Genetic Characterization of *Scylla* spp. Broodstock

(a) To generate baseline information on the genetic diversity of mud crab species from various sources; and

(b) To monitor genetic changes and minimize inbreeding in succeeding generations of selectively-bred mud crab stocks.

(2) Domestication of Mud Crab

(a) To develop a protocol for producing spawners (egg-carrying crabs) from captive mud crab;

(b) To improve husbandry protocols in the hatchery by introducing biosecure protocols in larval rearing and broodstock maintenance;

(c) To improve reproductive performance of pond-reared spawners; and

(d) To maintain family lines.

Expected outcomes

- Healthy broodstock of tiger shrimp
- Effective management and selective breeding of good quality tiger shrimp
- Baseline information on the genetic diversity of mud crab species
- Protocol for producing spawners (egg-carrying crabs) from captive mud crab
- Improved husbandry protocols in the mud crab hatchery

PROJECT DOCUMENT

Program Categories: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: Human Capacity Building for Sustainable Aquaculture
Lead Department: Aquaculture Department (AQD)
Lead Country: SEAFDEC Member Countries
Total Duration: 2006-2010

1. INTRODUCTION

The continuing population growth, the decline in marine fish catch, and the widespread poverty in the rural areas of the ASEAN region make it imperative that sustainable aquaculture be promoted to ensure food security and generate livelihood for the fisherfolk in the region. Recognizing this need, the Ministers of the ASEAN-SEAFDEC Member Countries responsible for fisheries declared in the Resolution, which they adopted in November 2001, that: "aquaculture production be increased in a sustainable and environment-friendly manner by ensuring a stable supply of quality seeds and feeds, effectively controlling aquatic diseases, promoting good farm management, and transferring appropriate technology." This declaration has been clearly specified and spelled out in details in the accompanying Plan of Action on Sustainable Fisheries for Food Security in the ASEAN Region, which the Ministers also adopted in November 2001.

An initial evaluation of the outcome of the Aquaculture Component of the Special Five-year Program, implemented from 2002 to 2005, was done during the Regional Planning Meeting for the Special Five-year Program in February 2005. During the Regional Planning Meeting, the Member Countries considered the implementation of the Aquaculture Component a success. However, the Member Countries also identified specific areas that require further development. Some Member Countries that have ongoing activities on research and technology development for aquaculture still expressed the need for some aspects of aquaculture that should be further developed.

The Planning Workshop for the Special Five-Year Program (Aquaculture Component) 2006-2010 was conducted by AQD in Bangkok, Thailand from 30 November to 2 December 2005 in order to: develop a five-year plan of action for 2006-2010 that would address the various concerns in sustainable aquaculture development (i.e., freshwater aquaculture of indigenous species; integrated aquaculture system; coastal aquaculture and mariculture; and captive broodstock development). The Workshop participants representing the ASEAN-SEAFDEC Member Countries confirmed and prioritized the activities considering the limited budget for the program.

The output of the Planning Workshop was endorsed for implementation under the FCG collaborative mechanism during the 28th Meeting of the SEAFDEC Program Committee in Bangkok, Thailand in December 2005. The priority activities for 2006 were approved for implementation by the SEAFDEC Council during its 38th Meeting in Brunei Darussalam in April 2006. Specifically, the activities for 2006 were re-prioritized and the budget re-adjusted to correspond to the approved budget allocation for 2006.

Specifically, during the February 2005 Regional Planning Meeting, the Member Countries raised the following issues that need to be addressed: (1) consistent supply of quality seeds for various priority aquatic commodities to support the aquaculture industry in respective countries; (2) access to developed captive broodstock technology for important aquatic commodities; (3)

environment-friendly culture technologies that promote socio-economic development and rural livelihood while optimizing the utilization of resources and inputs; (4) ecologically sound farm management; (5) conservation of ecosystems and biodiversity; (6) development of low fish meal, cost-efficient and environment-friendly aquafeeds; (7) diagnosis and control of aquatic diseases; and (8) monitoring and surveillance of occurrence of aquatic diseases. Although initial efforts have been made to address certain regional aquaculture issues during the implementation of the Special Five-Year Program from 2002 to 2005, there is a need to continue the activities that have been started in order to address the aforementioned concerns.

2. PROGRAM

The program is intended to address regionally relevant technology needs for sustainable aquaculture in the areas of broodstock development, genetic improvement, seed production, and culture systems of various priority species for aquaculture, through research and human capacity building.

2.1 Objectives

Specifically, the Program aims to:

5) Establish consistent supply of quality seeds through the establishment and promotion of captive broodstock of selected species and refinement of larval rearing techniques;
6) Promote ecologically sound aquaculture farm management by refining existing grow-out systems with the aim of increasing production, environmental sustainability and satisfying international trade standards;
7) Establish database on nutrient requirement of priority species and nutrient composition and digestibility of feed ingredients in order to develop cost-efficient feeds utilizing locally available materials that are low in fish meal and environment-friendly;
8) Develop the human resource in the region in sustainable aquaculture through training, farm demonstration, production of training materials like manuals and handbooks, and mobilization of experts within the region.

2.2 Program description

From the outcome of the February 2005 Regional Planning Meeting for the Special Five-Year Program, which were confirmed during the Planning Workshop for the Special Five-Year Program (2006-2010): Aquaculture Component held in Bangkok, Thailand, 30 November-2 December 2005, it was decided that AQD would implement the following activities from 2006 to 2010 as part of the Program on the Promotion of Sustainable Aquaculture in the ASEAN Region under the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) collaborative mechanism: (i) Development of Technologies for Sustainable Aquaculture; and (ii) Human Capacity Building for Sustainable Aquaculture. The focus of the activities has been on the following: (i) freshwater aquaculture of indigenous species; (ii) Integrated aquaculture system; (iii) coastal aquaculture and mariculture; and (iv) captive broodstock development and seed production.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project/Activity Title	Duration	Remarks
3.1 Freshwater Aquaculture of Indigenous Species	No activity	No activity
3.2 Integrated Aquaculture System	All year around	80 % accomplishment

3.3 Coastal Aquaculture and Mariculture	All year around	60 % accomplishment
3.4 Captive Broodstock Development and Seed Production	No activity	No activity

3.1 Freshwater Aquaculture of Indigenous Species
No activity

3.2. Integrated Aquaculture System
3.2.1. Rice-Fish Aquaculture
Translation of AQD's Manual on Tilapia Farming in Ponds and Cages into different languages in the region:
Bahasa Melayu (Indonesia). The translated version was already published by the Directorate General of Aquaculture of Indonesia.
Burmese Language (Myanmar). Draft of the translated version of the manual was sent to AQD.

3.3. Coastal Aquaculture and Mariculture
3.3.1. Grouper seed production
No activity

3.3.2. Mud crab seed production and grow-out
Translation of Vietnamese Manual on Mud Crab Culture into English (*Vietnam*)
Translation of the Vietnamese Manual on Mud Crab Culture into English has already been initiated. No progress has been submitted so far.

3.3.3. Seed production and grow-out culture of abalone
Training at AQD on seed production and culture of abalone (ASEAN countries)
The training was held from 9 November to 1 December 2006.

3.3.4. Milkfish seed production and grow-out culture
3.3.5. Siganid seed production and grow-out culture
Training at AQD on hatchery and nursery of marine fishes to include study visit to milkfish facilities in the Philippines (ASEAN countries)
Four participants in the training conducted at AQD from 3 May to 16 June 2006 were funded through the Program on the Promotion of Sustainable Aquaculture in the ASEAN Region. The trainees were: *Nguyen Thi Thu Hang*, Vietnam; *Myleen L. Magistrado*, Philippines; *Sapta Anjar Indah Marantika*, Indonesia; and *Khin Saravut*, Cambodia.

While the training was going on, additional three technicians from Vietnam joined the practical part of the session and stayed on until after the training. Ms. Nguyen Thi Thu Hang, from the Research Institute of Aquaculture (RIA) 3 of Vietnam, who attended the training from the beginning was joined later by *Mr. Tran Kim Dong* from RIA 2, *Mr. Nguyen Xuan Toan* from RIA 2, and *Mr. Nguyen Huu Hung* from RIA 3, from 29 May until 29 June 2006. The expenses of the remaining three trainees were funded partly by the Program and partly by the Ministry of Fisheries of Vietnam on cost-sharing basis.
Technical assistance for siganid hatchery operations (Vietnam, Myanmar)
This activity has not yet been undertaken.

3.4. Captive Broodstock Development and Seed Production
3.4.1. Development of specific pathogen free (SPF) shrimp (P. monodon, P. vannamei) broodstock
No activity.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Starting 2007 this project "Human Capacity Building for Sustainable Aquaculture" will be merged with the project "Development of Technologies for Sustainable Aquaculture" and will be implemented as a new project entitled "**Development of Technologies and Human Capacity Building for Sustainable Aquaculture**". The proposed activities for the year 2007 are shown under the new title.

THE SPECIAL 5-YEAR PROGRAM ON SUSTAINABLE FISHERIES FOR FOOD SECURITY IN THE ASEAN REGION (2006-2010)

COMPONENT III: UTILIZATION OF FISH AND FISHERY PRODUCTS

Under the Special 5-year Program (2006-2010), MFRD will execute Component 3 on Utilization of Fish and Fishery Products. Under this program component, MFRD has proposed to implement three projects, namely:

1. Quality Assurance Systems for Small and Medium-sized Fish Processing Establishments in ASEAN member countries.
2. Utilization of Freshwater Fish in ASEAN member countries.
3. Good Laboratory Quality Management in ASEAN member countries.

The project 1 is a new proposal based on feedback from member countries and stakeholders. It serves to address the difficulty faced by the majority of Small and Medium-sized Fish Processing Establishments in ASEAN member countries to implement quality assurance systems to meet safety and quality requirements. The projects 2 and 3 are extensions of the two projects carried out in the first Special 5-year Program.

However due to lack of budget, Project 2 on Utilization of Freshwater Fish in ASEAN member countries was cancelled.

For project 1 on Quality Assurance Systems for Small and Medium-sized Fish Processing Establishments in ASEAN member countries, due to the lack of budget, the MFRD was not able to conduct any activities except for a Planning Meeting which was held on 30-31 Mar 2006 under the ASEAN Roadmap Measure No. 40 initiative using national budgets of individual ASEAN member countries. Singapore hosted the Planning Meeting as Lead Country for the ASEAN Roadmap Measure No. 40.

For project 3 on Good Laboratory Quality Management in ASEAN member countries, due to the lack of budget, the MFRD was only able to conduct only 4 activities under the project.

MFRD has proposed to conduct projects 2 and 3 under new Japanese Trust Fund programs from 2007-2011.

PROJECT DOCUMENT

Program Categories: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: Quality Assurance Systems for Small and Medium-sized Fish Processing Establishments in ASEAN member countries
Lead Department: Marine Fisheries Research Department (MFRD)
Lead Country: Singapore
Total Duration: 2006-2010

1. INTRODUCTION

Many small and medium-sized fish processing establishments (SME) in ASEAN member countries find it difficult to implement quality assurance systems due to economic and technical constraints. They comprised largely of pre-processing establishments which produce semi-processed raw materials for main processing establishments and traditional products processing establishments. The project will develop quality assurance systems for these SME that incorporate GMP and SSOP as a first step towards the implementation of HACCP and help them meet safety and quality assurance requirements.

The project is proposed based on the following resolution and plan of action as endorsed at the Millennium Conference:

Resolution 14: Improve post-harvest technologies to ensure fish quality assurance and safety management systems which are appropriate for small and medium-sized enterprises in the region, taking into account the importance of traditional fish products and food security requirements.

Plan of Action C4: Develop and apply fish quality and safety management systems that ensure food safety and support the competitive position of ASEAN fish products on world markets through the implementation, validation and verification of Hazard Analysis and Critical Control Point (HACCP) based systems and improved laboratory practices, and adapting quality and safety management systems so that they may be applied to small and medium enterprises in the ASEAN region.

The project is also in line with the measure nos. 40 and 44 of the Roadmap for Integration of Fisheries Sector under the ASEAN Framework Agreement for the Integration of Priority Sectors.

2. PROJECT

2.1 Objectives

1) To develop GMP/SSOP programs for Small and Medium-sized Fish Processing Establishments (SME) in ASEAN member countries.
2) To promote the implementation of GMP/SSOP programs in Small and Medium-sized Fish Processing Enterprises (SME) thereby assuring quality and safety of fish products in ASEAN member countries.

2.2 Project Description

The project involves the development and implementation of GMP/SSOP programs for SME (pre-processing and traditional fish products) through pilot projects with commercial co-

operants in participating ASEAN member countries. Training courses involving regional expertise will be conducted to build up capacity in ASEAN member countries for GMP/SSOP implementation. Manuals on GMP/SSOP implementation will also be prepared and distributed to member countries to assist them to conduct national training programs.

The expected outputs for the project include GMP/SSOP programs for SME, publication of Manuals on GMP/SSOP to promote implementation in SME, conduct of pilot projects on GMP/SSOP implementation in SME, training courses on GMP/SSOP implementation, and End-of-Activity Workshops.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Project/Activity Title	Duration	Remarks
Activity 1: Regional Planning Workshop	Mar 2006 (2 days)	Not implemented due to lack of budget. However a Planning Meeting was conducted and hosted by Singapore on 30-31 Mar 2006 under the ASEAN Roadmap Measure No.40 initiative using individual country's national budget. The Meeting was attended by the ASEAN FPHT Network country coordinators of Brunei Darussalam, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. Cambodia, Lao PDR and Indonesia were unable to attend the Meeting.
Activity 2: GMP/SSOP programs for PPE Sub-Activity 2.1: Development of GMP/SSOP programs	Apr-Dec 2006	Not implemented due to lack of budget.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Project/Activity Title	Duration	Remarks
Activity 1: Regional Planning Workshop	Feb/Mar 2007 (2/3 days)	Proposed project to be implemented under new Japanese Trust Fund Program (2007-2011)
Activity 2: GMP/SSOP programs for PPE Sub-Activity 2.1: Development of GMP/SSOP programs	Apr-Dec 2007	Proposed project to be implemented under new Japanese Trust Fund Program (2007-2011)

PROJECT DOCUMENT

Program Categories: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: Utilization of Freshwater Fish in ASEAN Member Countries
Lead Department: Marine Fisheries Research Department (MFRD)
Lead Country Singapore and Thailand
Total Duration: 2006-2010

1. INTRODUCTION

Freshwater fish is an important fisheries resource in many ASEAN member countries where it serves as a major source of animal protein especially for the marginalized and poorer segments of the population thereby contributing to food security in these countries. Freshwater fish is also an important source of raw materials for processing into a variety of traditional fish products in the ASEAN member countries. However, information on these freshwater fish products are not readily available as either they are not published or are published in the local language. ASEAN member countries can assist each other to better utilize their freshwater fish resources through the exchange of such information.

Freshwater fish products as with other traditional products in the ASEAN region are largely processed by household producers and small and medium-sized establishments which are usually family-owned operations with little mechanization. Upgrading of processing and packaging technology for the freshwater fish products will help to improve their quality and safety with the possibility of commercialization.

The project is proposed based on the following resolution and plan of action as endorsed at the Millenium Conference:

Resolution 11: Promote the maximum utilization of catch, including the reduction of discards and post-harvest losses to increase fish supply and improve economic returns.

Plan of Action C1: To introduce and provide support for the development of technologies to optimise the utilization of catch and reduce post-harvest losses, wastes and discards in industrial and small-scale fisheries and processing operations through improved processing facilities, on-board and on-shore handling, storage and distribution of fish and fishery products.

Plan of Action C2: Promote the production and preserve the diversity of traditional fish products by assisting producers to secure stable supplies of quality raw materials, to meet food safety requirements and to improve product identity, nutritive value and marketing.

2. PROJECT

2.1 Objectives

1) To compile information and data on freshwater fish products to assist in establishing national strategies for utilization of freshwater fish resources
2) To assist in upgrading processing and packaging technology for freshwater fish products

2.2 Project Description

The project will comprise of two components i.e. a survey to compile information and data (product types, raw materials utilized, production volume, processing and packaging technology involved, etc) on freshwater fish products in ASEAN member countries, and pilot processing studies on selected freshwater fish products to upgrade processing and packaging technology which will be conducted with regional expertise. Component 1: Survey on freshwater fish products will be implemented from 2006-2007 followed by Component 2: Upgrading processing and packaging technology for freshwater fish products from 2008-2010.

The expected outputs for the project include a Handbook on inventory of freshwater fish products, pilot processing studies and End-of-Activity Workshops.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Project/Activity Title	Duration	Remarks
Activity 1: Survey on freshwater fish products		
Sub-Activity 1.1: Regional Planning Workshop	Mar 2006	Not implemented due to lack of budget
Sub-Activity 1.2: Conduct of survey	Jan- Dec 2006	Not implemented due to lack of budget

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Project/Activity Title	Duration	Remarks
No activities proposed in 2007 due to lack of budget		

PROJECT DOCUMENT

Program Categories: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Special 5-year Program on Sustainable Fisheries for Food Security in the ASEAN Region
Project Title: Good Laboratory Quality Management in ASEAN Member Countries
Lead Department Marine Fisheries Research Department (MFRD)
Lead Country Singapore
Total Duration: 2006-2010

1. INTRODUCTION

The harmonization of analytical methods through a network of lead laboratories in the various ASEAN member countries will enhance ASEAN as a coordinated fish-exporting bloc to importing countries such as Canada, USA, Japan and EU. This will help facilitate trade in fish and fish products within and without the ASEAN region. It will then be the onus of the ASEAN member governments to ensure that the methodologies in the other fish inspection laboratories in their respective countries are aligned with their lead laboratory. This project aims to enhance the credibility of the various fish inspection testing laboratories in the ASEAN member countries, and enable them to achieve equivalent results through their national governments support to attain ISO 17025 accreditation and participation in inter-laboratory proficiency testing programs.

The project is proposed based on the following resolution and plan of action as endorsed at the Millennium Conference:

Resolution 15: Strengthen the joint ASEAN approaches and positions on international trade in fish and fishery products indigenous to the region by harmonizing standards, criteria and guidelines; and

Plan of Action C4: Develop and apply fish quality and safety management systems that ensure food safety and support the competitive position of ASEAN fish products on world markets through the implementation, validation and verification of Hazard Analysis and Critical Control Point (HACCP) based systems and improved laboratory practices, and adapting quality and safety management systems so that they may be applied to small and medium enterprises in the ASEAN region.

Plan of Action D1: Strengthen ASEAN trade policy on fish and fishery products through regional collaboration by harmonizing product standards and sanitary measures with international standards wherever appropriate, working towards harmonised guidelines for fish inspection and quality control systems among ASEAN Member Countries, strengthening fish inspection and quality control systems with regard to food safety and exchanging information on risk analysis

Recommendation in Technical Report: To develop a regional inter-laboratory proficiency-testing program

Based on the above Resolution, Plan of Action and Recommendations, the following work program is proposed:

This project on Good Laboratory Quality Management includes the establishment of good laboratory management practices in lead regional laboratories, the validation of analytical methods for fish and fish products, the establishment of measurement of uncertainties and

inter-laboratory proficiency testing programs amongst the fish inspection and technology laboratories in ASEAN.

The project will comprise of five components:
a) Networking of lead laboratories in ASEAN
b) Implementing good laboratory practices in lead laboratories in the region
c) Validation of laboratory test procedures and
d) Establishment of Measurement of Uncertainties
e) Regional Inter-laboratory Proficiency Testing

All the components, although separate in focus, are interconnected. All laboratories in the region (and in particular those certifying products for export) need to meet laboratory quality assurance requirements found in ISO 17025. This project is designed to assist laboratories in the region to meet this standard. It would also investigate the possibility of developing a regional inter-laboratory proficiency-testing program. In addition to meeting quality assurance requirements, there should also be a validation of laboratory analytical procedures to ensure equivalency of results. Many laboratories use their own methods or procedures adopted from another country, which may not have been validated against recognized international procedures such as AOAC. This program is designed to improve aspects of laboratory practices in the region.

In the first Special 5-year Program, a network of lead fisheries post-harvest laboratories in ASEAN has been established through the ASEAN Network of Fisheries Post-Harvest Technology Centres for regional collaboration on the program items. Most of the lead laboratories in ASEAN member countries are in various stages of preparation of their laboratory Quality Management Manual and validation of methods. One regional inter-laboratory proficiency testing on heavy metal was also conducted. This project is proposed to be continued into the next 5 years to enable most laboratories to achieve ISO 17025 accreditation and to validate as many of their methods as possible. In this new phase of the project, two additional aspects have been added, namely the establishment of Measurement of Uncertainties for the laboratory test methods (a requirement for ISO17025 accreditation) and training on internal auditing of the laboratory quality system as well as technical performance.

2. PROGRAM

2.1 Objectives

1) To strengthen the network of lead laboratories in ASEAN member countries,
2) To implement good laboratory practices in lead laboratories in the region,
3) To validate laboratory test methods and establish their measurement of uncertainties,
4) To conduct inter-laboratory proficiency testing for lead laboratories in the region, and
5) To train laboratory personnel in good laboratory practices and internal auditing, and methods validation and measurement of uncertainties.

2.2 Program Description

This program is made up of 7 activities as follows:

Activity 1: Workshop on Methods Validation and Measurement of Uncertainties
This 5-day Workshop comprises two training sessions back-to-back. The first is on Methods Validation which aims to train laboratory personnel to validate the methods used in their laboratory which they would like to accredit under ISO 17025, and to calculate the Limit of Detection and Limit of Quantification for each method. The second is on the Measurement of

Uncertainties where laboratory personnel are trained to calculate the Measurement of Uncertainties for the methods they wish to submit for ISO 17025 accreditation. Technical expertise from SEAFDEC member countries may be identified to assist in conducting the Workshop on a cost-sharing basis. The Workshop may be held in various member countries.

Activity 2: Workshop on Good Laboratory Practices and Internal Auditing
This 5-day Workshop comprises two training sessions back-to-back. The first is on Good Laboratory Practices which aims to enable laboratory personnel to understand the requirements of good laboratory practices for compliance with ISO 17025. The second is on Internal Auditing of a laboratory where laboratory personnel are trained to conduct internal audit of their laboratory based on ISO 17025 requirements. Technical expertise from SEAFDEC member countries may be identified to assist in conducting the Workshop on a cost-sharing basis. The Workshop may be held in various member countries.

Activity 3: Implementation of good laboratory practices in lead laboratories
This activity aims to assist lead laboratories in the ASEAN member countries to prepare their Laboratory Management Manual and to implement good laboratory practices in their laboratories. MFRD will assist the laboratories in reviewing the laboratories' Laboratory Management Manuals and provide consultation on the implementation of good laboratory practices. This activity is a follow-up commitment by lead laboratories after the Workshop on Good Laboratory Practices.

Activity 4: Validation of laboratory methods and calculation of Measurement of Uncertainties by lead laboratories
This activity aims to assist lead laboratories in their methods validation and calculation of the methods' measurement of uncertainties. MFRD will assist in reviewing the methods validation and calculation of measurement of uncertainties conducted by the laboratories and make recommendations where necessary. This activity is also a follow-up commitment by lead laboratories after the Workshop on Methods Validation and Measurement of Uncertainties. MFRD staff will visit lead laboratories to review their laboratory practices and set up and provide advice.

Activity 5: Validation of MFRD laboratory methods
As MFRD has many methods established by Japanese experts over the years, MFRD is continually validating these methods and calculating their measurement of uncertainties. Only when these are completed then can the methods be accredited under ISO 17025.

Activity 6: Regional Inter-laboratory Proficiency Testing
MFRD will conduct a regional inter-laboratory proficiency testing exercise annually on certain test methods. The objective is to enable regional lead laboratories test the competency of their staff performing the various tests and to check if their methods produce accurate results. In addition, the laboratories that pass the testing have methods that produce same results and are thus harmonized where those methods are concerned. All lead laboratories in the region will be invited to participate.

Activity 7: Compilation of Manual of Validated Methods used by ASEAN lead laboratories
At the end of this project in 2010, MFRD will compile validated methods used by ASEAN lead laboratories and validated under this project. The publication will be distributed to all member countries.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

The Activity 1 "Workshop on Methods Validation and Measurement of Uncertainties" which will alternate with Activity 2 "Workshop on Good Laboratory Practices and Internal Auditing" was not conducted due to lack of budget.

For Activities 3 and 4 on "Implementation of good laboratory practices in lead laboratories" and "Validation of laboratory methods and calculation of Measurement of Uncertainties by lead laboratories", MFRD sent questionnaires to participants of the 4 Regional Workshops on Good Laboratory Quality Management Practices and Methods Validation in Southeast Asia conducted by MFRD under the first Special 5-Year Program, requesting the status of their implementation of good laboratory practices, the ISO 17025 accreditation status, the extend of methods validation and measurement of uncertainties conducted in their laboratories. MFRD compiled this status report submitted by the ASEAN lead laboratories thereafter.

In Activity 5 "Validation of MFRD laboratory methods", after the renewal assessment conducted on 6 April 2006, SAC-SINGLAS Council Committee for Laboratory Accreditation has approved the continuation and upgrading of Chemistry laboratory in MFRD to ISO/IEC 17025:2005 on 26 June 2006. The 5 methods accredited are, Total Arsenic, Total Cadmium, Total Mercury, Total Lead and Moisture. The validity of the certificate is from 30 May 2006 to 15 July 2008. Under the ISO/IEC 17025 accreditation requirements, MFRD has successfully completed the Measurement Uncertainty for Arsenic analysis.

Under Activity 6 "Regional Inter-laboratory Proficiency Testing", MFRD participated in the Inter-Laboratory Proficiency Testing under the Food Analysis Performance Assessment Scheme (FAPAS) for the determination of total arsenic, cadmium and lead for the period of 15 March to 4 May 2006 and moisture, ash, total fat and nitrogen for the period of 28 April to 9 June 2006. The proficiency tests was successfully conducted and completed. In addition, under the auspices of Japanese Trust Fund IV "Project on Research and Analysis of Chemical Residues and Contamination in Fish, Fish Products and the Environment such as Fishing Ground and Aquaculture Field", MFRD requested all the participating countries, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand and Vietnam, to participate in the free inter-laboratory proficiency testing for histamine conducted by Canadian Food Inspection Agency (CFIA).

Project Activities

Project/Activity Title	Duration	Remarks
Activity 1: Workshop on Methods Validation and Measurement of Uncertainties	-	Not implemented due to lack of budget
Activity 2: Workshop on Good Laboratory Practices and Internal Auditing	-	Not implemented due to lack of budget
Activity 3: Implementation of good laboratory practices in lead laboratories	Jan – Dec 06	50%
Activity 4: Validation of laboratory methods and calculation of Measurement of Uncertainties by lead laboratories	Jan – Dec 06	50%
Activity 5: Validation of MFRD laboratory methods	Jan – Dec 06	100%
Activity 6: Regional Inter-laboratory Proficiency Testing	Jan – Dec 06	100%
Activity 7: Compilation of Manual of Validated Methods used by ASEAN lead laboratories	-	To be done at end of project in 2010

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

MFRD is proposing to execute this project under a new Japanese Trust Fund Program (2007-2011). The following activities will be conducted:

Activity 1: Workshop on Methods Validation
This 3-day Workshop aims to train laboratory personnel to validate the methods used in their laboratory which they would like to accredit under ISO 17025, and to calculate the Limit of Detection and Limit of Quantification for each method. Technical expertise from SEAFDEC member countries may be identified to assist in conducting the Workshop on a cost-sharing basis. The Workshop may be held in various member countries. This activity would be conducted in 2007, 2009 and 2011.

Activity 2: Workshop on Measurement of Uncertainties
The 3-day Workshop aims to train laboratory personnel to calculate the Measurement of Uncertainties for the methods which they wish to submit for ISO 17025 accreditation. Technical expertise from SEAFDEC member countries may be identified to assist in conducting the Workshop on a cost-sharing basis. The Workshop may be held in various member countries. This activity would be conducted in 2008 and 2010.

Activity 3: Implementation of good laboratory practices in lead laboratories
This activity aims to assist lead laboratories in the ASEAN member countries to prepare their Laboratory Management Manual and to implement good laboratory practices in their laboratories. MFRD will assist the laboratories in reviewing the laboratories' Laboratory Management Manuals and provide consultation on the implementation of good laboratory practices where necessary. This activity is a follow-up commitment by lead laboratories after the previously conducted Workshop on Good Laboratory Practices (2002 - 2005) and Workshop on Methods Validation and Measurement of Uncertainty. This activity would be conducted from 2007 to 2011.

Activity 4: Validation of laboratory methods and establishment of Measurement of Uncertainties by lead laboratories
This activity aims to assist lead laboratories in their methods validation and establishing the measurement of uncertainties. MFRD will assist in reviewing the methods validation and calculation of measurement of uncertainties conducted by the laboratories and make recommendations where necessary. This activity is also a follow-up commitment by lead laboratories after the Workshop on Methods Validation and Measurement of Uncertainties. This activity would be conducted from 2007 to 2011.

Activity 5: Inter-laboratory Proficiency Testing
MFRD will source for the inter-laboratory proficiency testing available (such as FAPAS and CFIA) and inform the lead laboratories to participate the exercise annually on certain test methods such as heavy metals, pesticide residue, histamine and antibiotics. MFRD will collate the results of the proficiency testing from the lead laboratories. The objective is to enable regional lead laboratories to test the competency of their staff performance on the various tests and to check if their test methods produce accurate results. In addition, the laboratories that pass the testing have methods that produce same results are thus harmonized where those methods are concerned. All lead laboratories in the region will be invited to participate. This activity would be conducted from 2007 to 2011.

Activity 6: Compilation of Manual of Validated Methods used by ASEAN lead laboratories
At the end of this project, MFRD will compile validated methods used by ASEAN lead laboratories and validated under this project. The publication will be distributed to all member countries. This activity would be conducted in 2011.

Project/Activity Title	Duration	Remarks
Activity 1: Workshop on Methods Validation	Quarter 3 in 2007, 2009 and 2011	3-day Workshop (alternate year between Activity 1 and 2).
Activity 2: Workshop on Measurement of Uncertainties	Quarter 3 in 2008 and 2010	3- day Workshop (alternate year between Activity 1 and 2).
Activity 3: Implementation of good laboratory practices in lead regional laboratories	Jan – Dec 2007 to 2011	Lead laboratories to implement good laboratory practices.
Activity 4: Validation of laboratory methods and establishment of Measurement of Uncertainties by lead laboratories	Jan – Dec 2007 to 2011	Lead laboratories to validate laboratory methods and establish measurement of uncertainties after attending Workshops under Activity 1 and 2.
Activity 5: Inter-laboratory proficiency testing	Quarter 2 in 2007 to 2011	MFRD to inform lead laboratories to participate in proficiency test and collate results.
Activity 6: Compilation of Manual of Validated Methods used by ASEAN lead laboratories	Quarter 3 in 2011	MFRD to compile, publish and distribute manual to lead laboratories.

PROGRAM DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Information collection for sustainable pelagic fisheries in the South China Sea
Lead Department: Marine Fishery Resources Development and Management Department (MFRDMD)
Lead Country: Cambodia
Duration: 2002-2006

1. INTRODUCTION

Complete information on pelagic fish resources contributes to their proper management, appropriate exploitation and maximum utilization of its resources in the South China Sea. For realization the sustainable exploitation of pelagic fisheries in the region, SEAFDEC has started a program "Information Collection for Sustainable Pelagic Fisheries in the South China Sea" from 2002 to 2006 to clarify actual status of operation and catches of the purse seine fisheries. In addition, the project aims to clarify biological characteristics of pelagic fish resources caught by purse seine fishery and maximize the utilization of catches for pelagic fishes.

The activities include observation of fishing operation and catches at selected sampling sites through consultation visits, identification of fishing grounds by Vessel Tracking System using the Black Box Onboard (BBO), assessment of targeted fish stocks by land survey, reproductive biology and population dynamics of mackerels and roundscads through monthly sampling and data collected, and identification of stock/population on selected species of mackerels and roundscads using DNA analyses and morphometric measurements. The project activity on maximizing utilization of pelagic fishes include observation of processing facilities at landing sites, data analysis to identify processing technology for product development, regional training course in fish processing and packaging and pilot projects with collaborating countries.

2. PROGRAM

2.1 Objectives

The general objectives for this program are as follows:
1) To clarify actual status of operation and catches of purse seine fishery in the South China Sea,
2) To clarify biological characteristics of pelagic fishes in the South China Sea,
3) To examine existence of under-exploited resources in purse seine fishery,
4) To determine maximizing utilization of catches in purse seine fishery

2.2 Program description

The program comprises three components:
1) Component I: Meetings/workshops/trainings for effective program implementation (MFRDMD, TD and MFRD)
2) Component II: Survey on status of operation and catches of purse seine fishery, including fish biological studies (TD, MFRDMD)
3) Component III: Determination on maximizing of pelagic fish resources utilization (MFRD)

Participating Countries: Brunei Darussalam, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam (8 Countries)

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project/Activity Title	Duration	Remarks
Component I: Meetings/workshops/trainings for effective program implementation		
Activity 1: Technical group meeting	Jan 2006	100% completed The meeting was held in Kuala Terengganu, Malaysia and attended by representative of participating member countries. It is one of the follow-up actions from the 4th TCM of small pelagic fisheries in Jakarta. Standard format for national and regional terminal reports was finalized during the meeting.
Activity II: Regional conference on small pelagic fisheries and its management	Nov 2006	95% completed The conference was organized by MFRDMD in collaboration with TD and MFRD. It was held in Siem Reap Cambodia from 21-23 November 2006. All participating member countries have attended the conference together with observers from TD and Malaysia. Reports for both national and regional findings will be published in early 2007.
Component II: Survey on status of operation and catches of purse seine fishery, including fish biological studies		
Activity I: Regular data collection and analysis by Member Countries	Jan - Nov 2006	100% completed Data analysis was carried out by all participating member countries based on revised raw data. National terminal reports were submitted to MFRDMD and presented in the regional conference on small pelagic fisheries and its management.
Activity II: Identification of Fishing Grounds	Jan - Nov 2006	90 % completed A draft report was presented at the Pelagic Conference in Seam Reap, Cambodia. The final report will be completed at the end of December 2006.
Activity III: Population structure of mackerels and roundscad in the South China Sea	Jan - Nov 2006	100 % completed Data was analyzed based on regional interest. For analysis, the South China Sea area was divided into four sub-areas: Northern, the Gulf of Thailand, Middle and Southern part. Some findings were presented in the regional conference on pelagic in November 2006.

Activity IV: a) Identification of stock/ population on selected species	Jan - Nov 2006	90 % completed Sequencing on 70 DNA samples had completed. The report was presented in the regional conference on pelagic. A technical report will be published. 95% completed
b) Analysis on morphometric measurement of *Rastrelliger kanagurta* and *Decapterus marudsi* using SPSS	Jan - Nov 2006	Analysis on morphometric measurements using SPSS software had completed. The results were presented in the regional conference on pelagic.
Activity V: Remote sensing application for fisheries	Jan - Nov 2006	80% completed The oceanographic conditions of the SCS has been studied using the satellite images. The analyses had been done for the monthly satellite images in 2005. The study had indicate the possible upwelling areas based on the surface wind stress conditions. Based on the landing of pelagic fish in the study area, it was found that there is high CPUE of fish in the upwelling areas as well as high concentration of chlorophyll. Further data collection especially on monthly CPUE of pelagic need to be collected to strengthen the information on detecting fishing ground in the SCS.
Component III: Determination on maximizing of pelagic fish resources utilization		
Activity 1: Publication of processing manual	Jan - Jul 2006	100 % completed The processing manual on Maximizing Utilization of Pelagic Fish Resources was completed and published in July 2006. 500 copies of the publication was printed and distributed to SEAFDEC member countries. The four pilot projects drafted their own sections of the manual and submitted them to MFRD for editing and compilation into the final publication. The manual contains the processing methods and shelf-life studies for a total of 20 value-added products developed by the four pilot projects utilizing the target pelagic fish species. They include 9 comminuted products, 4 dried products, 1 each of fermented and smoked product and 5 other products.

Activity 2: End-of-Activity Seminar	Aug 2006	100% completed The End-of-Activity Seminar was successfully conducted from 2 - 3 Aug 2006 in Singapore to present and demonstrate the outcomes of the four pilot projects conducted in Singapore (MFRD), Malaysia, Philippines and Thailand from 2004 - 2005. Eighteen participants, both from government and private sectors, from SEAFDEC member countries attended the seminar. During the seminar the project coordinators for the four pilot projects conducted presentations and practical demonstrations on the processing of some of the pelagic fish products developed. The participants were also invited to have hands-on participation. At the end of the Seminar, there was a product display session, which allow the participants to see and to taste (and give comments) on the products developed. The processing manual on Maximizing Utilization of Pelagic Fish Resources was also distributed to all the participants at the seminar.

Briefly explain major achievements of projects and activities conducted in the year 2006, as well as constraints, recommendations for future implementation.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Project/Activity Title	Duration	Remarks
1. Tagging program for economically important pelagic species in the South China Sea and Andaman Sea	2007-2010	Proposed by MFRDMD (in collaboration with TD) This program was proposed to reveal movement and migration routes of targeted pelagic fishes in the Southeast Asian waters, to reveal growth patterns of pelagic fishes and to estimate the stock parameters of *F* and *M* using monthly recapture data (if possible)

2. Regional Supporting Program on the Deep Sea Fisheries Resources Exploration in the Southeast Asia	2007-2010	Proposed by SEAFDEC / TD-CFTD (In Collaboration with MFRDMD). This program is aimed to investigate the deep sea resources in collaboration with the SEAFDEC member countries using MV SEAFDEC2 under the cost-shared policy, topography fishing grounds feature by using side-scan sonar for mapping, to support the national resources survey using national research vessel by advising member countries on improving of fishing gear and methods for deep sea fish samplings and to provide human resources development particularly on species identification and data analysis.

PROGRAM DOCUMENT

Program Categories: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Environmental Related Tasks in Southeast Asia
Lead Department: The Secretariat in collaboration with MFRD and MFRDMD
Lead Country: Thailand and Malaysia
Total Duration: 2002-2006 (Japan's fiscal year)

1. INTRODUCTION

1.1 Managing sharks fisheries

Considering the discussion on the conservation and management of sharks, and a symbolic species of shark, the great white shark, some species were listed in Appendix II of CITES, the ASEAN-SEAFDEC Member Countries recognize these problems on shark fisheries and their management, and are aware of the international requirement to urgently reconcile such problems in line with the "International Plan of Action for Conservation and Management of Shark (IPOA-Shark)". In 20005, the Member Countries agreed to establish their respective National Plan of Action on Sharks (NPOA-Shark) in line with the International Plan of Action for the Conservation and Management, to be supported by best scientific evidence. In addition the regional study and other initiatives on shark have been published, the proceedings of the shark study entitled "Shark production, Utilization and Management in the ASEAN", has been disseminated in March 2006.

1.2 Understanding sea cucumbers fisheries

Sea cucumber in commercial species have been taken into account as a critical issue; especially the families Holothuriidae and Stichopodidae, most of which the product supporting the international market demand. The issue has become the most popular in the international community, particularly at the Convention on International Trade in Endanger Species (CITES) CoP13 held in Bangkok (2004). The concern was made that the sea cucumbers in commercial species should included into CITES Appendices, which may give the negative impact on sea cucumber fisheries to the ASEAN and SEAFDEC Member Countries. To follow up the international initiatives, SEAFDEC has organized regional consultations in order to provide the current situation of the issue at CITES. First gathering was at the Preparatory Meeting on Environmental Related Tasks, held in Bangkok, Thailand, in October 2005. The outcomes of the meeting had submitted to the 8th Meeting of ASEAN- SEAFDEC FCG and the 38th Meeting of SEAFDEC Council held in April 2006 in Brunei Darussalam. Those meeting strongly agreed that the conduct of a regional comprehensive study on existing available data and information on sea cucumbers should be launched, and the management of sea cucumber resources should be the purview of the national fisheries competent agency.

2. PROGRAM

2.1 Objectives

The objectives of this project are:

1) To assist Member Countries by monitoring the issues on sharks and sea cucumbers at international level especially CITES;
2) To mobilize expert consultation on addressing the development of future action plan and policy recommendation on sea cucumbers management & conservation based on the outcome of the previous study;

3) To assist Member Countries by providing necessary information on Sea Cucumber fisheries in the Southeast Asian Region at the CITES COP14 in June 2007;
4) To continuously publicize the effort of this region in studying sea cucumbers.

2.2 Program Description

2.2.1 Managing sharks fisheries

Currently, there are several countries such as Brunei, Malaysia, Myanmar, Indonesia, Thailand, have finished a draft NPOA-sharks, while the rest are still developing stage of NPOA formulation. In order to maintain the momentum of conservation and management of sharks, SEAFDEC will monitor the progress development of NPOA-sharks and facilitate on technical guidance for the Member Countries. As far as the proposed shark listing species under CITES has being raised by several countries, SEAFDEC will also pay attention on the issue at the international level and when appropriate informing the Member Countries.

2.2.2 Understanding sea cucumbers fisheries

Concerning with the Sea Cucumber Fisheries, the issue of sea cucumber was pending for discussion from the CITES COP-13 to COP-14 due to unavailability of a discussion document on biological and trade status of sea cucumbers. In ASEAN Region, sea cucumbers nonetheless have clearly represented an important fisheries; lack of attention to the management of these species; and their fisheries status is unknown. Along this line the Member Countries, at the ASEAN-SEAFDEC Regional Technical Consultation on International Fisheries Related Issues on 18 September 2006, in Phuket, Thailand, reaffirmed the directions provided by the Council at the 38th Meeting and support the conduct of egional study on sea cucumbers fisheries, utilization and trade in Southeast Asian Region. It is expected to proceed in December 2006 by the national expert of each country. Meanwhile, the national expert will be mobilized as a regional expert group on sea cucumbers fisheries for planning and coordination work on status, resources utilization, management and trade in order to assess possibility in the development of country's initiative or action plan and policy recommendation

Accordingly, SEAFDEC led by the Secretariat organized the ASEAN-SEAFDEC Regional Technical Consultation on International Fisheries Related Issues on 18 September 2006, taken place in Phuket, Thailand, and once again, the consultation reaffirmed the directions provided by the ASEAN and SEAFDEC Member Countries and the SEAFDEC Council. The regional study on sea cucumbers fisheries, utilization and trade in Southeast Asian Region is expected to proceed in December 2006. The study will be conducted by the national expert of each country and based on the available data and information in the country. Meanwhile, the national expert will be mobilized as a regional expert group on sea cucumbers for planning and coordination work on status, resources utilization, management and trade in order to assess possibility in the development of country's initiative or action plan and policy recommendation. . The desk study expectedly could equip the Member Countries in their preparation on the upcoming COP-14 in year 2007.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Project/Activity Title	Duration	Remarks
1. Conduct regional study on information collection of sea cucumber fisheries, utilization, and trade in Southeast Asia	December 06	In progress
2. Establish the regional expert group on sea cucumber fisheries	December 06	In progress
3. Support the Member Countries in Participation at the 4th Meeting of AEG-CITES	December 06	100%
4. Production of Promotional Brochure and Materials for Support the Member Countries	Jan-Dec 06	100%

As mentioned earlier at the ASEAN-SEAFDEC Regional Technical Consultation on International Fisheries Related Issues on 18 September 2006, taken place in Phuket, Thailand (activity organized under the project Assistance Capacity Building on International Fish Trade Related Issues), the Member Countries were informed of the overview of the progress and initiatives that have been conducted by FAO and CITES. As a consequence, the Member Countries agreed to conduct regional study on information collection of sea cucumber fisheries, utilization, and trade in Southeast Asia. The Secretariat has developed a Concept Framework for the Regional Study and expected to proceed in December 2006. Along this line, the Regional Expert Group on Sea Cucumber Fisheries will be established to synthesize the outcome of regional study and develop policy recommendations to deal with the issue on conservation and management of sea cucumber in the region. The outcomes of development initiatives will be submitted to the 39th Meeting of SEAFDEC Council.

SEAFDEC also supported the fisheries representative from the Member Countries to participate in the 4th Meeting of ASEAN Expert Group on CITES held in Manila, the Philippines from 28 to 30 December 2006, which composed of Cambodia, Indonesia and Singapore. The senior official of SEAFDEC also attended the meeting to provide the view on ASEAN-SEAFDEC Collaboration on CITES Issues Affecting Fisheries. All the efforts towards the issues under the project have been published and disseminated through SEAFDEC publications.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Project/Activity Title	Duration	Remarks
1. Monitoring Progress of Development NPOA-sharks and Regional Study on Sea Cucumbers	2007	Vietnam, the Philippines, Cambodia
2. Regional Expert Meeting on Sea Cucumbers	February	
3. Regional Synthesis on Sea Cucumbers	Feb.-Apr.	
4. Participation to other Relevant Regional/International Fora • CITES CoP14 • Activity concerning AQD's project on Stock Enhancement for Threatened Species of International Concern • Other international meetings	May-Sep.	
5. Production of Promotional Brochure and Materials for Support the Member Countries	Feb.-Nov.	

In February 2007, the Secretariat will organize the Regional Expert Consultation on Sea Cumber Fisheries and Management, the outcomes of the meeting including the regional synthesis on sea cucumber study will be submitted to the 39th Meeting of SEAFDEC Council and the 15th Meeting of the ASWGFi for their consideration and support. In addition, the regional activities are planed to exhibit at the CITES CoP14 in June 2007.

SEAFDEC shall keep close monitoring of issues that are interests/importance to the region or instructed by the Council. Where appropriate, senior official of SEAFDEC will participate in other relevant regional /international forum to promote regional standing and observe manner of global interest. Tentative schedule of the regional and international events which will be attended by the Secretariat staff are as follows:

- Activity concerning AQD's project on Stock Enhancement for Threatened Species of International Concern;
- Activity concerning CITES CoP14, representatives from SEAFDEC will participate the meeting and also exhibit the regional study/activities on commercially exploited species under the interest of CITES
- Relevant international meetings

PROGRAM DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Establishment of Fish Disease Surveillance System
Lead Department: Aquaculture Department (AQD)
Lead Country: Philippines
Total Duration: Five Years (2004-2008)
Proposed 2006 Budget: US$143,000

1. INTRODUCTION

In the last two decades, aquaculture in Southeast Asia grew rapidly and contributed to the increase of food supply and well-being of the people in ASEAN region. However, due to careless health management, large number of infectious diseases emerged and the diseases are threatening sustainable aquaculture.

"The Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region" adopted by the ASEAN-SEAFDEC Senior Officials as a result of the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security in the New Millennium: "Fish for the People", held in Thailand in November 2001, has the following items related to fish-health issues for aquaculture in the region:

a. Reduce the risks of negative environmental impacts, loss of biodiversity, and disease transfer by regulating the introduction and transfer of aquatic organisms in accordance with the Regional Guidelines on the Responsible Movement of Live Aquatic Animals and Plants; and
b. Improve capabilities in the diagnosis and control of fish diseases within the region by developing technology and techniques for disease identification, reliable field-side diagnostics and harmonized diagnostic procedures, and establishing regional and international referral systems, including designation of reference laboratories and timely access to disease control experts within the region.

To counter the disease problems and to implement the above-mentioned two items of the Plan of Action, the Government of Japan funded SEAFDEC for a regional fish disease project entitled "Development of Fish Disease Inspection Methodologies for Artificially-Bred Seeds" from 2000 to 2004. The project focus was on development of diagnostic methods of important viral diseases of aquatic animals in the region. Researches on the development of standardized diagnostic methods, husbandry methods for disease control and a monitoring method for residual chemicals in aquaculture products were conducted and the outputs were disseminated to ASEAN countries. Thus, the project has paved the way for the development of the disease control and surveillance system for the region.

Various infectious diseases due to viruses, bacteria and parasites often cause high mortalities of aquatic animals cultured in the region and still give a serious impact on aquaculture production. Moreover, new diseases are emerging due to the introduction of new aquaculture species to the region. Thus, taking necessary measures against those infectious diseases is an urgent and important issue to aquaculture in the region. The most urgent issue to be tackled for the development of healthy and wholesome aquaculture is to establish the network of resources and facilities for fish health diagnosis and human capacity building in the region. Therefore, the Aquaculture Department (AQD) of the SEAFDEC has proposed to extend the former project as a renewed project entitled "Development of Fish Disease Surveillance System" for five years from 2004 to 2008.

Despite regional and international agreements and precautionary measures on transboundary movement of exotic fish and shrimps, alien species are introduced for aquaculture and disease problems continue to spread. These prove laxity in implementation of existing laws and regulations, absence of political will among concerned government agencies, or unbalanced prioritization between preservation of biodiversity and the economic gains promised by aquaculture of exotic species. Given that exotic species, and in some cases their diseases have been introduced into some parts of Southeast Asia, it is important to conduct surveillance and monitoring to know which areas are free of specific diseases. Information gathered by both passive and active surveillance will become important tools in managing aquaculture of native and exotic species.

2. PROGRAM

2.1 Objectives

The objective of the program is to develop a surveillance system for diseases of aquatic animals in Southeast Asia through establishment of the network of resources and facilities for fish health diagnosis and human capacity building.

2.2 Program Description

This program consists of 4 components: (1) Research and Development (R & D) on refinement of diagnostic methods and development of new prevention methods for aquatic animal diseases, (2) Surveillance for important viral diseases of fish and shrimps in the region, and mobile clinics, (3) Distance-learning course (e-learning) on "Principles of Health Management in Aquaculture", and Hands-on Training (4) Annual progress and plan meeting and international workshop on fish disease surveillance in the region**.**

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Project/Activity Title	Duration	Remarks (% completion)
Research and Development (R & D) on refinement of diagnostic methods and development of new prevention methods for aquatic animal diseases	All year around	80
Surveillance for important viral diseases of fish and shrimps in the region, and mobile clinics	All year around	80
E-learning	September 2006 – January 2007	40
Annual progress and plan meeting	March 2006	100

(a) Research and Development (R & D) on refinement of diagnostic methods and development of new prevention methods for aquatic animal diseases

This program component aims to refine established diagnostic methods for viral diseases of aquatic animals, and to develop new prevention methods for fish diseases in the region. For example, AQD will try to develop immunological prevention methods for white spot syndrome, husbandry technique of grouper broodstocks, with eggs, larvae and food fish screening for viral nervous necrosis (VNN), and prevention mechanisms of polyculture technique and probiotics.

(i) Refinement of Diagnostic Methods of Aquatic Animal Diseases

Infectious Hypodermal and Haematopoietic Necrosis Virus (IHHNV), Yellow Head Virus (YHV), Gill Associated Virus (GAV) and Taura Syndrome Virus (TSV) infections were examined in the 7 sampling sites in the Philippines (Capiz, Negros Occidental, Bohol, Quezon, Palawan, Misamis Occidental and Surigao del Sur) during the dry and wet seasons. Analyses of the samples taken during the dry season showed that GAV had the highest total prevalence of 25.5%. Total percent prevalence for IHHNV infection was 17.4%. YHV infection had the total prevalence of 1.4%. TSV showed 0% prevalence at all sites examined. Initial results of viral detection on the samples taken during wet season showed that the total prevalence for IHHNV infection was 11%. Prevalence of GAV infection were 10% for Negros Occidental, Bohol and Quezon; Capiz (50%), Misamis Occidental (40%), and Palawan (15%). YHV prevalence were 0% in Capiz, Negros Occidental, Bohol, Quezon, Palawan and Misamis. TSV also had a 0% prevalence in Capiz, Bohol, Quezon and Palawan.

Surveys for the estimated pathogens of giant freshwater prawn viral diseases, *Macrobrachium rosenbergii* nodavrus (MrNV) and extra small virus (XSV) were conducted in Central Thailand during June – October 2006. The prawn larvae were sampled and detected for both viruses using RT-PCR technique. Twenty-three specimens out of the total of 92 specimens or 25% were recorded as RT-PCR positive for MrNV while 2/92 specimens (2.2%) were positive for XSV. Only 7/92 specimens or 7.6% were found positive for both MrNV and XSV. The difference in gross clinical signs between positive and negative prawns was not obvious.

Green mussels (*Perna viridis*) were sampled from four coastal provinces in Thailand to determine the presence of the parasitic fauna. Unidentified turballarians were occasionally found on gill of the samples from the Gulf of Thailand and Andaman Sea. Intensity of turbellaria was very low. Gangarine was also seen in gill filament and connective tissues but no obvious tissue damage presented in tissue sections. No Marteiria infection (OIE notifiable diseases) was observed in all samples from four sampling sites even though it has been reported in oyster around there in the previous study.

Tilapias were sampled from 16 farms in Thailand and investigate for the abnormality and disease incidence. There were several species of internal and external parasites that affect tilapias. They did not severely damage the fish but enhanced stress and induced the secondary infection caused by other pathogens. There were also several bacteria isolated from diseased fish sample. *Streptococus agalactiae* appeared to be the most virulent pathogen caused high mortality in tilapia farms. Besides, there were *Vibrio cholerae* and *Plesimonas shigelloides*.

(ii) Development of New Prevention Methods for Fish and Shrimp Diseases

Screening of different broodstocks for the presence of VNN using PCR was conducted last year and the result revealed that 25-56% of the broodstocks were VNN-positive after nested PCR. VNN-positive broodstocks were separated from VNN-negative and their eggs and larvae were screened and monitored for possible transmission of the virus. Eggs from VNN-positive grouper broodstocks turned out to be positive also for VNN and resulted to a very low survival (1.0 - 7.5%) after 19 - 46 days. Continued screening of the milkfish and snapper broodstocks were done last March and the result revealed that 57% and 83% of milkfish and snapper broodstocks were VNN-positive, respectively.

Monthly sampling of different species of wild finfish caught in Panay Gulf was being done for 12 months starting September 2005 until August 2006 to determine the prevalence of VNN. A total of 18 species of marine finfish were collected for the whole year. Results revealed that all species were positive for VNN but at a relatively lower prevalence compared to the trash fish samples collected from Iloilo Fish Port and screened last year.

Tiger shrimps given immunostimulants had better immune responses and survival after WSSV challenge than those without immunostimulants. Shrimps were injected with the formalin-killed WSSV vaccine. Thereafter, the shrimps were experimentally infected with WSSV. The results are being analyzed.

(b) Surveillance for important viral diseases of fish and shrimps in the region, and mobile clinics

In this component, through the communication with national laboratories, AQD aims to establish a network of surveillance system in the region and play the role of a resource and/or reference laboratory for diagnosis of fish and shrimp viral diseases. These surveillance activities will be coordinated with "mobile clinics," in which SEAFDEC-AQD Surveillance Team will make an on-site diagnosis and also assist in setting up a fish disease diagnostic capability/facility of SEAFDEC member countries.

AQD Shrimp Team

Trips for active surveillance were conducted in several areas in Philippines. Monitoring of crustacean stocks at AQD are being conducted together with collation of passive data from the Diagnostic Service laboratory. Species included in the monitoring are mud crabs, *Penaeus monodon*, *P. indicus*, *P. merguiensis*, *P. vannamei* and the freshwater prawn *Macrobrachium rosenbergii*. Among the *P. vannamei* stocks from BFAR-accredited farms, several episodes of white spot infection have been documented. Higher prevalence was consistently observed in native species of shrimp compared with *P. vannamei*.

During a trip to Cambodia the country's lack of capability in fish health in both staff and laboratory facilities was highlighted. In view of this, the incorporation of an on-site training in the project was proposed for Cambodia and Myanmar.

A flyer that outlines techniques for fixation of shrimp and other crustacean samples, as well as methods for sending them to a diagnostic laboratory is ready for printing and distribution.

AQD Fish Team

Tissue samples of koi, common, grass and silver carp were collected from Cambodia, Myanmar, Philippines and Southern Vietnam in January to February 2006. The fish samples were found free of systemic bacterial infection and no significant parasitic infestations of the gills were observed. These specimens were processed and assayed for KHV, GCHDV and SVCV by cell culture, by pathogenicity test on naïve common carp and by PCR. Results showed that the tissue filtrates of all fish samples did not cause cytopathic effects on inoculated cell cultures. The pathogenicity tests did not also indicate the presence of pathogenic virus. One step and nested PCR tests for SVCV and GCHDV of all fish samples showed negative results. One step and nested PCR tests for KHV yielded negative results for fish samples from Myanmar but results for the other countries were inconsistent and are currently being verified.

In addition, mobile clinic services were conducted for epizootics of tilapia (*Oreochromis niloticus*), *Anabas* sp. and rohu in four farms in Myanmar in January 2006. Results indicated the presence of bacterial infection among tilapia with no significant parasitic infestation. Viral assays by cell culture did not detect the presence of virus in E-11 cells. Tilapia cells for virus isolation are not available.

(c) E-learning on "Principles of Health Management in Aquaculture"

AQD has established a distance-learning course (e-learning) on "Principles of Health Management in Aquaculture" where knowledge and skills in fish health management are

imparted to learners through a CD-ROM and internet-based discussion boards. AQD aims to develop these training programs as a training package for aquaculture health management, implement this to increase the diagnostic capability of SEAFDEC member countries, and support the establishment of a surveillance network.
The e-learning course opened last September 4, 2006 with 16 participants; 10, with fellowship and 6, private.

(d) Annual progress and plan meeting

The activity aims to review the progress of research studies for each year under the project and to discuss research plans and project scheme for next year.
The Annual Progress and Planning Meeting was conducted by the AQD in Tigbauan, Iloilo, Philippines on 2 March 2006. The Meeting was attended by 15 participants comprising the study leaders from Thailand (AHHRI), Indonesia (FHRL) and the Philippines (AQD) as well as representatives from the National Research Institute of Aquaculture (NRIA), SEAFDEC Secretariat and the SEAFDEC AQD. The objective was fully accomplished.

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Project/Activity Title	Duration	Remarks
Research and Development (R & D) on development of new prevention methods for aquatic animal diseases	All year around	
Surveillance for important viral diseases of fish and shrimps in the region, and mobile clinics	All year around	
Hands-on training	November 2007	
International workshop on fish disease surveillance in the region and Annual progress and planning meeting	December 2007	
Text book for Aquatic Animal Health	January – March 2007	

(a) Research and Development (R & D) on development of new prevention methods for aquatic animal diseases

Development of control methods for viral nervous necrosis (VNN) of marine fish

To establish a management strategy to maintain a virus-free stocks of the economically important fishes. A method for disinfection of VNN-positive eggs using ozone and other possible disinfectants will be established. Also, vaccination to enhance fish immune system will be carried out using DNA vaccine.

Development of immunological preventive methods for shrimp. Immunostimulation and vaccination strategies for WSSV prevention

The study aims to develop immunoprophylactic methods of WSSV prevention in shrimp. Shrimps will be "vaccinated" with antigens consisting of whole inactivated virus or recombinant viral envelope protein. Challenge experiments will be conducted in which mortality will be monitored. For field studies, the immunostimulants/vaccines will be delivered by immersion upon stocking and orally through the diet after shrimps have been stocked in the ponds. Postlarvae will be screened for WSSV by a two-step nested PCR. Pond preparation, water management, feeding and stock management practices in the farm will be followed. The presence of WSSV in the plankton and shrimp samples will be monitored regularly. Growth, survival, and production records in the farm will be used to evaluate the prophylactic treatments.

Epidemiology of the white spot syndrome virus (WSSV) in different shrimp (Penaeus monodon) culture techniques in the Philippines

To identify pond level risk factors and develop white spot shrimp virus (WSSV) prevention and management strategies through epidemiological approach. For year 2007, a longitudinal study will be conducted from stocking to harvest to identify the risk factors associated with WSSV in shrimp ponds and natural mangrove habitat in the Philippines. Different water and soil chemical parameters, clinical signs and presence of WSSV and bacterial count in shrimp, small crustaceans, arthropods, polychaetes, biofilms and other organisms and in feeds fed to the shrimp will be recorded monthly and during periods of disease outbreak in selected farms in the Philippines. Samples from a mangrove habitat will be taken monthly for one year.

Pilot Testing of the "Indigenous Probiotic" in Grow-out Shrimp Ponds

Using probiotic is one effective way to control bacterial flora in pond for aquaculture. To test the efficiency of the "indigenous probiotic" in preventing the outbreak luminous Vibiosis in grow-out ponds. Mass production of the "indigenous probiotic" will be conducted. Then actual experiment will consist of 3 replicate ponds with the "indigenous probiotic" treatment and 3 replicate ponds without the "indigenous probiotic" as controls will be prepared. Virus-free postlarvae of *P. monodon* will be exposed to the "indigenous probiotic" from harvest in the hatchery and stocked in with regular reseeding of the "indigenous probiotic". Regular sampling for weight and survival, health assessment, physico-chemical parameters and bacterial counts and profile will be conducted.

Haemorrhage disease on cultured freshwater catfish (*Pangasianodon hypopthalmus) in Mekong Delta*

Freshwater catfish is the main product in Mekong Delta. The disease is the cause of mass mortality in cultured freshwater catfish; however, there are few public reports on haemorrhage disease of this species. Therefore, study on the pathogen causing haemorrhage disease in cultured freshwater catfish will be conducted in Vietnam by observation of gross clinical sign, bacterial isolation and identification, viral isolation and identification, and experimental tests with identified pathogens.

Envisaged outcomes

New prevention methods (e.g., PCR screening of hatchery-reared fish broodstocks for VNN and vaccines for WSSV for shrimps) will be developed. A management strategy to reduce the occurrence of shrimp diseases will be developed.

(b) Surveillance for important viral diseases of fish and shrimps in the region, and mobile clinics

Monitoring and surveillance of transboundary pathogens in cultured shrimps and freshwater prawn by AQD Shrimp Team

This study will survey actively the disease status of cultured shrimps and prawn in selected Southeast Asian countries, specifically for diseases notifiable to the OIE like WSSV, TSV and significant emerging diseases, and will appraise the extent of infection to support management decisions regarding movement of shrimps and prawns for aquaculture. Information gathered in this surveillance activity will be disseminated through the various training and dissemination activities of the Fish Disease Program.

Surveys of giant freshwater prawn viral diseases in Thailand

A survey of *Macrobrachium rosenbergii* nodavirus (*Mr*NV) and extra small virus (XSV) that cause the white muscle disease (WMD) of giant freshwater prawn will be conducted using postlarvae collected in freshwater to understand the spread of the viruses and to understand the disease conditions of the prawns infected the two viruses. The viruses found during the surveys will be molecularly compared with other known MrNV and XSV. The risk factors will be accessed to prevent the disease spread.

Survey of viral diseases of Pacific white shrimp, Litopenaeus vannamei, in Indonesia
A survey of TSV and other shrimp viral pathogens in Pacific white shrimp will be conducted in Indonesia.

Surveillance of Emerging Fish Viral Pathogens in some Southeast Asian Countries

The presence of KHV, GCHDV and SVCV will be monitored through *in-situ* samplings of affected fish during outbreaks and of carrier fish. Fish samples will be conducted in the Philippines, Lao PDR, Myanmar, Cambodia and Vietnam with the assistance of former trainees or with collaborating scientists. Detection of viral pathogens will, likewise, be conducted through pathogenicity/cohabitation experiments. Viral presence in collected samples will be further confirmed using PCR, RT-PCR or other sensitive molecular tests. In addition, enhancement of technical expertise through hands-on training of cooperating staff and in-situ demonstration of virological techniques will be made during sampling visits. In addition, in-situ training on Fish Health will be offered for Fish Health workers in Myanmar. Likewise, strengthening of virus laboratory facilities through provision of cell cultures and standard protocols will be pursued. Emergency mobile clinics will be initiated during outbreaks of fish diseases to assist Fish Health workers in said SEAFDEC member countries.

Envisaged outcomes

Outcomes of this activity include: 1) targeted surveillance system for specific diseases involving countries that need it most; 2) trained personnel with enhanced capability for diagnosis, surveillance and reporting of important diseases of fish and shrimps; 3) documents and reports to support claims of "freedom from specific diseases"; 4) disease reports that will feed into existing passive surveillance systems like those of the OIE; 5) reliable disease survey reports that can serve as case reports to study patterns of spread and degree of infection in target species; 6) a regionally-recognized reference laboratory for specific diseases; and 7) scientific papers on targeted survey results.

(c) Hands-on training

Hands-on Training on Advanced Diagnostic Techniques for Important Disease of Fish and Crustaceans

The advanced training course consists of DNA-based diagnostic methods and other important diagnostic techniques for shrimp and fish diseases. At the end of the training course, the participants from 10 SEAFDEC member countries gave sufficient skills to act as national trainers or core persons in the diagnosis of viral diseases in their respective countries.

Envisaged outcomes

This activity "Hands-on Training on Advanced Diagnostic Techniques for Important Diseases of Fish and Crustaceans" will produce the following outcomes: 1) high trained staff for advanced diagnostic techniques to respond to the needs for disease surveillance and health diagnosis of various species of cultured aquatic animals; 2) dissemination of required skills and

techniques for disease surveillance and health diagnosis of various species of cultured aquatic animals; and 3) development of expertise for prospective building-up of national capability

(d) Annual progress and planning meeting, and international workshop on fish disease surveillance in the region

Annual Progress and Plan Meeting

Annual Progress and Plan Meeting will be held to review the progress of research studies for 2007 and to discuss research plans and project scheme for 2008. All study leaders who work under the project will attend this annual meeting. An external evaluator from Japan will also be invited to the meeting.

International Workshop

An international workshop will be held in 2007 to review the present status and problems on fish and shrimp diseases in SEAFDEC member countries, to discuss output of the project with the member countries, and also to discuss an efficient collaboration with the member countries and other organizations such as OIE (Office International des Epizooties) and FAO (Food and Agriculture Organization of the United Nations) to develop quarantine and surveillance systems for fish and shrimp diseases in Southeast Asia.

Envisaged outcomes

Progress Reports of 2007 will be issued in June of 2008 as part of output of Annual Progress and Plan Meeting. Workshop Proceedings will be published based on papers presented at the workshop (also see below).

(e) Dissemination of project outputs

(i) Publication of Manuals, Terminal Report, and Workshop Proceedings as Outputs of Research and Development

(ii) Text book for Aquatic Animal Health will be published in 2007.

Envisaged outcomes

A Text book, Terminal Report, and Workshop Proceedings will be published and distributed to SEAFDEC member countries to disseminate the outputs of the project.

PROGRAM DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Research and Analysis of Chemical Residues and Contamination in Fish, Fish Products and the Environment such as Fishing Ground and Aquaculture Field
Lead Department: MFRD in collaboration with AQD
Lead Country: Singapore
Duration: 2004-2008

1. INTRODUCTION

In view of the prevalence of the presence of chemical contaminants and drug residues in seafood products and the serious implications to trade and human health, there is a need to gain an understanding of current levels of such chemical and drug residues in fish and fish products, as well as building up the capacity for detection of these residues in the region. Only with this science-based knowledge and capability, then can respective countries take appropriate actions to manage the safety of such fish and fishery products. Thus this project is proposed and it is envisaged that the information obtained will be valuable to policy makers, technologists and scientists as well as extension and regulatory personnel in the fisheries sector. In addition, this project would also allow SEAFDEC to fulfill part of the recommendations and plan of actions from the Millennium Conference as well as the last Meeting on Fish Trade and the Environment in Bangkok in the area of drug residue in the shrimp and aquaculture industry.

2. PROGRAM

2.1 Objectives

1) To obtain an understanding of levels of chemical contaminants in marine and freshwater aquaculture fish and fish products and their environment in Southeast Asia.
2) To transfer technology in chemical contaminant testing in the region through setting up of methodologies and human resource training.
3) To obtain an understanding of the retention of antibiotics in body and the rate of discharge from aquacultured marine fish and prawns in order to ascertain appropriate withdrawal periods.

2.2 Program Description

This program is made up of five components as follows:

Component 1: Survey of Heavy Metals in Marine and Aquaculture Fish and Fish Products in Southeast Asia (Project 3)

There are two activities under this component, namely Activity 1.1 "Regional survey of heavy metals in fish and fish products and their environment" and Activity 1.2 "On-site training on heavy metals ". In Activity 1.1, regional survey on heavy metals (cadmium, lead and total mercury) in fish and fish products and their environment will be conducted in SEAFDEC member countries. Various participating regional laboratories will conduct a survey each in their respective countries. Fish and fish products from species, which are bottom dwellers, filter feeders and far ranging pelagics, will be targeted. Samples will be drawn from fish and fish products as well as their environment (such as mud sediment and water samples) and will be sent to Marine Fisheries Research Department as well as local laboratories where the project is conducted for analysis. The results of the survey will be deposited in the database of the Fish and Fish Products Safety Information Network. In addition, to ensure the accuracy and comparability of the different methods used by member countries, member countries are to

participate in the Inter-laboratory Proficiency Testing for the test methods. In Activity 1.2, MFRD aims to assist in the upgrading of regional laboratory personnel skills in conducting heavy metals analysis using Atomic Absorption Spectrometry (AAS) through a series of on-site training at project sites where the analytical equipment is available for conducting the training. On-site training will be conducted for 10-15 laboratory officers in that member country.

Component 2: Survey of Pesticide and PCB Residues in Fish and Fish Products and Their Environment (Project 4)

There are two activities under this component, namely Activity 2.1 "On-site training on pesticide residue analysis" and Activity 2.2 "Regional survey of pesticide residues in fish and fish products and their environment". Activity 2.1 serves to upgrade the regional laboratory staff in conducting pesticide residue analysis using Gas Chromatography Mass Spectrometry (GC-MS) and to facilitate the execution of the survey under Activity 2.2. The training will be carried out in two ways. Firstly, MFRD with the assistance of an expert from Japan will conduct a regional training course in pesticide residues analysis in MFRD for the participating SEAFDEC member countries. Subsequently, on-site training will be initiated at project sites where the analytical equipment is available for conducting the training. On-site training will be conducted for 6-10 laboratory officers in that member country. In Activity 2.2, regional survey on the pesticide residues (organochlorines) in fish and fish products and their environment will be conducted in SEAFDEC member countries. Various participating regional laboratories will conduct a survey each in their respective countries. Fish and fish products from species, which are bottom dwellers, filter feeders and far ranging pelagics, will be targeted. Samples will be drawn from fish and fish products as well as their environment (such as mud sediment and water samples) and will be sent to Marine Fisheries Research Department as well as local laboratories where the project is conducted for analysis. Dried products from both marine and freshwater species, as well as fish and fishery products that are dried or from inland and estuarine waters and rivers will also be targeted. The results of the survey will be deposited in the database of the Fish and Fish Products Safety Information Network.

Component 3: Survey of Histamine Levels in Fish and Fish Products in Southeast Asia (Project 5)

There are two activities under this component, namely, Activity 3.1 "Regional survey of histamine in fish and fish products" and Activity 3.2 "On-site training on histamine". In Activity 3.1, a regional survey on the naturally occurring toxin, histamine, in fish and fish products will be conducted in SEAFDEC member countries. Various participating regional laboratories will conduct a survey each in their respective countries. Fish and fish products made from scombroid species will be especially targeted. The results of the activities will be deposited in the database of the Fish and Fish Products Safety Information Network. In addition, to ensure the accuracy and comparability of the different methods used by member countries, member countries are to participate in the Canadian Food Inspection Agency (CFIA) Inter-laboratory Proficiency Testing for Histamine. In Activity 3.2, MFRD with assistance from a trainer from Department of Fisheries (DOF), Thailand will conduct on-site training courses for 6-10 laboratory personnel in member countries on histamine analysis using fluorometric and HPLC method. The objective is to upgrade the technical capability in histamine testing in the region and facilitate the execution of Activity 3.1.

Component 4: Study on the Withdrawal Period of Antibiotics Used in Aquaculture Shrimps and Fish (Project 6)

There are two activities under this component namely, Activity 4.1 "Study on the withdrawal period of antibiotics used in aquaculture shrimps and fish" and Activity 4.2 "Regional training course in seafood safety for laboratory personnel". In Activity 4.1, a collaborative study with AQD on the levels of these antibiotics in aquaculture products will be conducted. The study will

attempt to determine the appropriate withdrawal period for each drug and the residues levels remaining in the aquaculture products. A survey of the level of antibiotics residues in fish and fish products will be conducted on a regional basis. In 2005, MFRD and AQD will gather information on the administering of antibiotics and survey the composition of the feed in farms. Questionnaires will be disseminated to all member countries to understand the background of the application of antibiotics in aquaculture farming activities. Presence of antibiotic residues in aquaculture fish products is a concern because of its negative impact in increasing consumers' threshold to the effects of antibiotics against infections. Antibiotics are added to animal feed to boost the immunity of the fish and prawns in an enclosed, intensive aquaculture system. Thus the speed at which fish and prawns discharge these drugs from their living bodies will give scientists an idea of a safe withdrawal period for the drugs. This could then be used as guidelines for farmers to effectively manage their fish and prawns during farming. Recommendations of appropriate time periods based on the results of this study will enable farmers to know when to stop the administration of these drugs to the fish and prawns, in order to ensure the absence of drug (antibiotic) residues in the harvested fish and prawns. This project will be conducted by AQD in Philippines.

The activity 4.2 was initiated after the 1st Planning Meeting for Japanese Trust Fund IV Projects held on 14-16 December 2004 in Singapore. The Meeting agreed that there is a need to train the laboratory personnel on the analysis of antibiotics especially the detection of prohibited drugs such as chloramphenicol and nitrofuran used in aquaculture farms. The training is essential for those analyses that require sophiscated instruments such as the Liquid Chromatography Tandem Mass Spectrometry (LC-MS-MS) for detection and determination. Through this regional training course, member countries can share experience and their methods to analyze certain drugs. This will facilitate the study on the withdrawal period of antibiotics used in aquaculture shrimps and fish.

Component 5: Survey on Chloramphenicol (CAP) and Nitrofuran (NF) in Southeast Asian Fish and Fish Products (Project 7)

This component will commence with the survey on chloramphenicol and nitrofuran in 2005. A survey on the levels of chloramphenicol and nitrofuran will be conducted on fish and fish products from the region. Various participating regional laboratories will conduct a survey each in their respective countries. Two targeted species has been identified, namely, marine aquaculture shrimps (*Penaeus monodon, Penaeus vannamei*) and aquaculture freshwater shrimps (giant king prawns) for the survey. For 2007-2008 participating member countries will decide on the range on antibiotics of importance to the industry to survey on subsequently.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

MFRD has conducted 3 on-site training courses (Activity 1.2, 2.1 and 3.2) under this program. The details of the training courses are as listed.

The Activity 1.2 "On-site training on heavy metals" was successfully conducted in National Fisheries Quality Assurance & Veterinary Directorate (NAFIQAVED) Branch IV in Ho Chi Minh, Vietnam from 28 August to 1 September 2006. A total of 11 participants from Vietnam provincial laboratories (NAFIQAVED Branches) attended this training course. 2 MFRD staff were the trainers for this course. The methods used for the training were MFRD's in-house methods. In the course review, the participants expressed that the training was very beneficial to their work.

The Activity 3.2 "On-site training on histamine"was successfully conducted in Philippines from 25 to 29 September 2006. An officer from FIQD Thailand lead the on-site training on the fluorometric method for histamine analysis and 2 MFRD staff lead the HPLC method of analysis. A total of 12 participants from Philippines provincial laboratories (BFAR Branches)

attended this training course. In the course review, the participants expressed that the training was very beneficial to their work.

The Activity 2.1 "On-site training on pesticide residue analysis" was successfully conducted in Pusat Kawalan Kualiti Ikan (PKKI), Subang, Selangor, Malaysia from 27 November to 1 December 2006. A total of 12 participants from Malaysia provincial laboratories attended this training course. 2 MFRD staff were the trainers for this course. The multi-residue method used for the training was MFRD's in-house method. In the course review, the participants expressed that the training was very beneficial to their work.

The participating countries surveyed on the following species of fish and fish products as listed in Table 1 for the surveys on heavy metals, pesticide residue, histamine, chloramphenicol and nitrofuran under Activities 1.1, 2.2, 3.1 and 5.1 respectively.

Table 1. Species of fish and fish products surveyed by participating member countries from January to December 2006.

Activity	Species	Participating countries
1.1: Regional survey of heavy metals in fish and fish products and their environment	• Fresh Tuna • Frozen Tuna • Canned Tuna • Slipper Lobster	Cambodia, Indonesia, Malaysia, Myanmar, Thailand, Vietnam and MFRD
2.2: Regional survey of pesticide residues in fish and fish products and their environment	• Aquacultured Tiger Prawn (*Penaeus monodon*) *(from at least 1 aquaculture farm) • Tilapia • Milkfish	Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam, AQD and MFRD
3.1: Regional survey of histamine in fish and fish products	• Frozen Skipjack Tuna • Frozen Longtail Tuna • Canned Tuna • Sardine	Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam and MFRD
5.1: Survey of chloramphenicol and nitrofuran in Southeast Asian fish and fish products	• Wild caught Tiger Prawn (*Penaeus monodon*) • Aquacultured Tiger Prawn (*Penaeus monodon*) (2 aquiculture sites) • Tiger Prawn (*Penaeus monodon*) before export	Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam, AQD and MFRD

The Activity 4.1 "Study on the withdrawal period of antibiotics used in aquaculture shrimps and fish", questionnaires to identify the different antibiotics currently being used in aquaculture were sent to coordinators of the 10 ASEAN member countries for dissemination to farmers and feed manufacturers.

In Brunei, 12 out of 12 fish farmers surveyed do not use antibiotics. Farmers in Brunei apply lime (10/12), fertilizer (1/12), teaseed (3/12), zeolite (2/12), multivitamins (2/12), and probiotics (7/12). There is no feed manufacturer in Brunei.

In Thailand, 1 out of 6 fish farmers surveyed use oxytetracycline at 3-5 g/kg feed for 5-7 days and sulfatrimethoprim at 3-5 g/kg feed for 5-7 days as prophylactic measures against bacterial diseases. A 30-day withdrawal period is being observed for both drugs. Beside antibiotics, the farm also applied chlorine, povidone iodine and lime during pond preparation. None of the 6 feed manufacturers surveyed in Thailand incorporate antibiotics in their product.

In the Philippines, 1 out of 10 farmers surveyed use antibiotic but was unable to furnish what type of antibiotic. 2 out of 2 feed manufacturer surveyed do not incorporate antibiotics in their product.

The experimental set-up to determine the withdrawal period for nitrofurazone and chloramphenicol in shrimp is in progress.

Project Activities

Project/Activity Title	Duration	Remarks
Component 1: Survey of Heavy Metals in Marine and Aquaculture Fish and Fish Products in Southeast Asia		
Activity 1.1: Regional survey of heavy metals in fish and fish products and their environment	Jan - Dec 06	75% accomplished
Activity 1.2: On-site training on heavy metals	28 Aug - 1 Sept 06	100% accomplished
Component 2: Survey of Pesticide and PCB Residues in Fish and Fish Products and Their Environment		
Activity 2.1: On-site training on pesticide residue analysis	27 Nov – 1 Dec 06	100% accomplished
Activity 2.2: Regional survey of pesticide residues in fish and fish products and their environment	Jan - Dec 06	75% accomplished
Component 3: Survey of Histamine Levels in Fish and Fish Products in Southeast Asia		
Activity 3.1: Regional survey of histamine in fish and fish products	Jan - Dec 06	75% accomplished
Activity 3.2: On-site training on histamine	25 –29 Sept 06	100% accomplished
Component 4: Study on the Withdrawal Period of Antibiotics Used in Aquaculture Shrimps and Fish (Project 6)		
Activity 4.1: Study on the withdrawal period of antibiotics used in aquaculture shrimps and fish	Jan - Dec 06	100% accomplished
Activity 4.2: Regional training course in seafood safety for laboratory personnel	-	Not conducted due to budgetary constraint.
Component 5: Survey on Chloramphenicol (CAP) and Nitrofuran (NF) in Southeast Asian Fish and Fish Products (Project 7)		
Activity 5.1: Survey of chloramphenicol and nitrofuran in Southeast Asian fish and fish products	Jan - Dec 06	75% accomplished

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Project/Activity Title	Duration	Remarks
Component 1: Survey of Heavy Metals in Marine and Aquaculture Fish and Fish Products in Southeast Asia		
Activity 1.1: Regional survey of heavy metals in fish and fish products and their environment	Jan - Dec 07	To continue or extend the survey for the species identified in Table 2.
Activity 1.2: On-site training on heavy metals	-	To be reviewed in JTF IV Mid-term Review Meeting

Component 2: Survey of Pesticide and PCB Residues in Fish and Fish Products and Their Environment		
Activity 2.1: On-site training on pesticide residue analysis	-	To be reviewed in JTF IV Mid-term Review Meeting
Activity 2.2: Regional survey of pesticide residues in fish and fish products and their environment	Jan - Dec 07	To continue or extend the survey for the species identified in Table 2.
Component 3: Survey of Histamine Levels in Fish and Fish Products in Southeast Asia		
Activity 3.1: Regional survey of histamine in fish and fish products	Jan - Dec 07	To continue or extend the survey for the species identified in Table 2.
Activity 3.2: On-site training on histamine	-	To be reviewed in JTF IV Mid-term Review Meeting
Component 4: Study on the Withdrawal Period of Antibiotics Used in Aquaculture Shrimps and Fish (Project 6)		
Activity 4.1: Study on the withdrawal period of antibiotics used in aquaculture shrimps and fish	Jan - Dec 07	Continue study on withdrawal period for nitrofurazone and chloramphenicol in shrimp
Activity 4.2: Regional training course in seafood safety for laboratory personnel	*July 07*	*Pending implementation (depend on budget allocation)*
Component 5: Survey on Chloramphenicol (CAP) and Nitrofuran (NF) in Southeast Asian Fish and Fish Products (Project 7)		
Activity 5.1: Survey of chloramphenicol and nitrofuran in Southeast Asian fish and fish products	Jan - Dec 07	To continue or extend the survey for the species identified in Table 2.
JTF IV Mid-term Review Meeting (NEW)	25 – 27 Apr 07	3-day meeting for all Key Project Leaders in Singapore

MFRD continues to review all proposals submitted by participating member countries and encourage the participating countries to continue or extend to survey some common species identified (see Table 2). This is to ensure that baseline of the chemical contaminants and naturally occurring toxin in the fish and fish products is established. In addition, understanding that different countries would use different analytical methods in the survey, MFRD has requested all the participating countries to participate in the free inter-laboratory proficiency testing for histamine conducted by Canadian Food Inspection Agency (CFIA) and encouraged them to participate in the inter-proficiency testing for other test methods such as heavy metals, pesticide residue and drug residue. This will ensure the countries get comparable and accurate results even though they are using different methods.

All participating countries will submit a quarterly progress report to MFRD. For the survey results, key project leader of the respective activity will seek approval from their council directors before they submit to MFRD for compilation. The results will be made available at the Fish and Fish Products Safety Information Website (www.fishsafetyinfo.com).

MFRD will host the JTF IV Mid-term Review Meeting on 25 to 27 April 2007 in Singapore. It is envisaged that all key project leaders will be invited to attend this 3-day meeting. The meeting will report the progress of the project since the implementation in 2004, discuss the need for on-site training courses, identify the key area training and host countries for regional training courses, and deliberate the future plans for the project. Thus, all on-site training courses will not be conducted in 2007.

For Activity 4.1 "Study on the withdrawal period of antibiotics used in aquaculture shrimps and fish", the experiment to determine the withdrawal period for nitrofurazone and chloramphenicol in shrimp would be continued.

Table 2. Detail for regional surveys and study (Activities 1.1, 2.2, 3.1, 4.1 and 5.1) to be executed by participating member countries from January to December 2007.

Activity	Target Analysis	Species	Work plan	Participating countries
1.1: Regional survey of heavy metals in fish and fish products and their environment	Cadmium, Lead and Total Mercury	**Marine/Freshwater/Brackish Aquacultured** **1. Finfish** Sea bass, Grouper, Tilapia, Milkfish, Snappers (?), Pangasius sp., Common carp, Rohu (Labeo rohita), Channa micropeltis, Channa Striata, Clarias sp. **2. Mollusk** Anadara granosa, Green mussels (Perna veridis), Clam, Oysters, Scallop, Abalone **3. Crustaceans** Tiger Prawns, *Penaeus vanamei*, Giant Freshwater Prawns, Mudcrab **Marine/Freshwater Captured** **1. Predators** Marine: Swordfish (minimum size: >30kg), Marlin, Yellow-fin (minimum size: >25kg)/ Tonggol / Skipjack (Whole fish) Tuna, Spanish / Spotted Mackerels (~ 2-3 kg), Freshwater: Goby, Snakehead **2. Finfish** Marine: Grouper, Treadfin (Ikan Kurau), Sea Bass, Red Snapper Freshwater: Trey Riel (Henicohenchuis siamensis), Trey Proul (Cyprinus microlepus), Trey Kes (Notoptorus notoptorus) (Cambodia) Cirrhinus microlepis, Channa striata, Puntius gonionothus, Morulius chryphekadion,	Encourage to participate in Inter-laboratory Proficiency Testing for Cadmium, Lead and Total Mercury	Cambodia, Indonesia, Malaysia, Myanmar, Thailand, Vietnam and MFRD

		Notopterus notopterus (Laos), Butterfish (Myanmar), Pangasius sp. **3. Mollusk** Wild: Baby clam, soft shell clam (*Paphia undulata),* Oyster, Abalone **4. Crustaceans** Tiger Prawns, Lobsters, *Penaeus vannamei*, Swimming / Mud Crab, Slipper Lobsters (Crayfish) **5. Cephalopods (squids)** Octopus, Cuttlefish, Sephia, Loligo sp. **6. Others** Jellyfish		
2.2: Regional survey of pesticide residues in fish and fish products and their environment	Organochlorines	• Aquacultured Tiger Prawn (*Penaeus monodon*) *(from at least 1 aquaculture farm) • Tilapia • Milkfish	Encourage to participate in Inter-laboratory Proficiency Testing for Pesticide Residue Organochlorines	Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam, AQD and MFRD
3.1: Regional survey of histamine in fish and fish products	Histamine	• Scombroid Species (swordfish, marlin) • Dried and canned tuna • Dried and canned mackerel • Dried anchovies • Canned sardines • Fish sauce • Scad (fresh/smoked) • Hilsa (Terubok) • Smoked skipjack • Frozen tuna loins • Frozen skipjack and longtail tuna	Participate in CFIA 2007 Inter-laboratory Proficiency Testing for Histamine	Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam and MFRD
4.1: Study on the withdrawal period of antibiotics used in aquaculture shrimps and fish	Nitrofurazone and Chloramphenicol	Shrimp	-	AQD
5.1: Survey of chloramphenicol and nitrofuran in Southeast Asian fish and fish products	Chloramphenicol and Nitrofuran	• Marine aquacultured shrimps (Penaeus monodon, Penaeus vannamei) • Aquacultured freshwater shrimps (Giant King Prawns) The types of samples would be fresh raw products at fish farms, fresh raw products on receipt at processing establishment and final export products (chilled/fresh/frozen/processed) .	Encourage to participate in Inter-laboratory Proficiency Testing for Chloramphenicol and Nitrofuran	Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam, AQD and MFRD

Note:

1. The identified species are of commercial value / species that are commonly consumed by the majority of population or the lower income group.
2. The participating countries might not survey all species identified but focus on species important to their country.

PROGRAM DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title:Research and Development (R&D) of Stock Enhancement for Species Under International Concern
Program Component: Component I-Stock Enhancement for Threatened Species of International Concern
Lead Department: Aquaculture Department (AQD)
Lead Country: Philippines
Total Duration: Five Years (2005-2009)
Proposed 2006 Budget: US$51,000

1. INTRODUCTION

Many species of marine animals are now considered threatened or endangered, because populations have been depleted by fishing, hunting, and collecting for food and trade. Among these threatened species are the sea horses, giant clams, top shell, corals, sea cucumbers, whales and dolphins, marine turtles, sharks and rays, etc. The capture, collection, trade, and utilization of these species have been regulated under the Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES) and/or other international and national mechanisms.

Heightened public interest in environment protection and resource conservation has become an important factor in fisheries development around the world; particularly, in policy formulation for and within the fisheries sector. Public opinion has sometimes exerted unreasonable pressure and restrictions on the fishing and fish farming industries. The Southeast Asian region has a highly diverse marine fauna and flora, many of which have been traditionally used for human food and commerce. Thus, the region is easily targeted by environment-oriented groups, especially those from developed western countries that do not share the same level of dependence on marine life.

In view of above, it is necessary for the fisheries and aquaculture sectors in Southeast Asia, including research and development organizations like SEAFDEC, to address the environmental concerns raised by international public, particularly with regard to threatened or endangered species. Thus, SEAFDEC will undertake the Program on Stock Enhancement for Threatened Species of International Concern. As preparatory activity of the Program, a workshop was convened in 2005 to identify threatened species for stock enhancement and assess the existing hatchery and stock enhancement technologies for the identified species.

2. PROGRAM

2.1 Objectives

The objectives of the Program are to: (1) review past and present stock enhancement programs to conserve threatened species in Southeast Asia: (2) develop ecologically sound strategies for stock enhancement including hatchery production and release of genetically diverse and disease-free juveniles; (3) encourage participation of local communities in stock enhancement; (4) develop methods and criteria for monitoring and evaluation of stock enhancement and conservation success; and (5) transfer the stock enhancement technologies and social strategies to the countries in the region.

2.2 Program Description

The Component I of this program focuses on depleted species for which hatchery technologies have already been developed. This may later include other species for which hatchery technology will still be developed.

The Program includes the following activities: (1) Regional Workshop to review the status of stock enhancement in Southeast Asia, identify threatened species, and assess the existing technologies for such species; (2) Research on strategies for sea ranching and stock enhancement; (3) Verification of developed and established technologies; and (4) Training and information dissemination on stock enhancement.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Project/Activity Title	Duration	Remarks
Research and Development on Strategies of Sea Ranching and Stock Enhancement	All year around	% of completion – 70%
Verification of developed and established technologies	Not implemented in 2006	Not implemented in 2006
Training and information dissemination	All year around	RTC proceedings was published in September 2006

3.1 Research and Development on Strategies of Sea Ranching and Stock Enhancement

(a) Seed production of identified species

In order to obtain sufficient amount of good quality seeds of seahorse aimed for stock enhancement, several species of seahorse broodstocks were obtained from Visayas and Palawan areas in the Philippines. These wild broodstocks spawned in the AQD hatchery.
Plans for seed production of sea cucumber have been discussed between Research Institute of Aquaculture No.3 (RIA3) of Vietnam and SEAFDEC AQD.

(b) Development of release strategies for suitable species

Juvenile abalones were released in Sagay Marine Reserve (SMR) located in the northern part of Negros Occidental in the Philippines to find out the better method for higher survival of abalones.

Behavioral studies of abalone on the avoidance of predators were conducted to asses the effectiveness of conditioning of abalones for higher survival. Also, the impact of color tagging, developed by SEAFDEC AQD, on the survival of abalone was studied. More experiments are required to obtain conclusive results.
The first batch of giant clam, *Triducna gigas,* was stocked in cages in Carbin Reef, Sagay Marine Reserve in March 2006. This was followed by the stocking in August 2006 in Kawit Reef, Malalison Island. The survival and growth of clams were monitored monthly to evaluate the methods.

(c) Assessment of potential sites for stock enhancement

An interview on the fisheries of abalone was conducted in Sagay Marine Reserve (SMR) in September 2006.
SMR was chosen for the release site for abalone and giant clam, and Malalison island in Antique, Philippines was chosen for stocking site for giant clam. The criteria were environmental factors and ecosystems of the site (wild population of the target species, availability of the food, abundance of predators, etc.), conservation/protection of the site and easiness of the accesses from AQD.
Stocking sites suitable for seahorses and sea cucumber are still under considerations.

3.2 Verification of developed and established technologies

Not implemented in 2006.

3.3. Training and information dissemination

Training course for stock enhancement of threatened species planed in 2006 was canceled due to insufficient budget.

A manual for stock enhancement of giant clam is now under preparation and will be published by the end of this year. Publication of two manuals, "Breeding technology for two species of catfish (*Clarias macrocephalus* and *Pangasianodon gigas*)", and "Breeding technology for Asian Arowana (*Scleropages formosus*)" was canceled due to insufficient budget.

The Proceedings of the Regional Technical Consultation was published in September 2006.

4. PROPOSED FUTURE ACTIVITIES

Project/Activity Title	Duration	Remarks
Research and Development on Strategies of Sea Ranching and Stock Enhancement	All year around	Researches on seahorse, abalone, giant clam, sea cucumber and socio-economic study

4.1 Research and Development on Strategies of Sea Ranching and Stock Enhancement

(a) Seahorse

In order to obtain sufficient amount of good quality seeds aimed for stock enhancement, existing breeding techniques developed by AQD will be improved. Management and feeding scheme for all stages will be refined to reduce cost of natural food organisms and explore possible replacement using artificial diets. Stocking sites suitable for seahorses will be assessed. To monitor the fate of released stock, tagging techniques will be developed by incorporating chemicals into the diet as in mollusks or using coded tags inserted into the skin or abdominal cavity of seahorses. Monitoring will be done every 2 months.

(b) Humphead wrasse (Cheilinus undulatus)

The humphead, or Napoleon wrasse, *Cheilinus undulates,* is one of the largest and the most valuable reef fish, and considered threatened and listed in Appendix II of CITES in 2004. The breeding and artificial seed production technology of this species have not yet established, therefore SEAFDEC AQD will start studies on seed production of humphead wrasse from 2007.

(b) Abalone

- Survey of wild stock of abalone and availability of seaweed species;
- Development of appropriate release strategies (i.e. suitable size, stocking density or season) for stock enhancement and sea ranching of abalone *Haliotis asinina;*
- Monitoring of growth performance and survival of abalone after release in their natural environment;
- Development of proper harvest or recapture techniques (ie. size, quantity or management techniques) that will sustain the enhanced fishery; and
- Methodology for pre-release conditioning of abalone will be studied.

(d) Giant clam

The first batch of *T. gigas* was stocked in cages in Carbin Reef, Sagay Marine Reserve in March 2006. This was followed by the stocking in August 2006 in Kawit Reef, Malalison Island. Another batch will be released in Igang Marine Station of AQD. This study aims to compare growth rates and survival of clams grown in these three different sites. The following studies will be conducted:

- Monitoring of growth and survival of *T. gigas* stocked in cages in three different sites;
- Monitoring of temperature, salinity, turbidity, nutrients in the three sites stocked with *T. gigas*;
- Comparison of the three habitats based on water parameters obtained; and
- Correlation of water parameters with growth and survival of *T. gigas*.

(e) Sea cucumber

Studies on development of seed production method aimed for stock enhancement will be implemented in Vietnam (RIA3) and SEAFDEC AQD.

(f) Angelwing clam (*Pholas orientalis)*

The angelwing clam *Pholas orientalis*, a deep burrowing bivalve commonly found in the tidal flats of Southeast Asia, is one of the most expensive and sought after bivalve in the Philippines. This high demand led to indiscriminate harvesting resulting in the depletion of natural stocks. To produce and complete the life cycle of angelwing clams in captivity and to rehabilitate depleted stocks through release of hatchery produced juveniles, the following studies will be implemented in 2007.

- Survey of sites for possible sources of *P. orientalis* broodstock and also possible sites for release;
- Development of technology for seed production of *P. orientalis* in the hatchery;
- Completion of life cycle of *P. orientalis* in captivity; and
- Identification of appropriate size-at-release of *P. orientalis* for stock enhancement purposes.

(g) Socio-economic study

The success of stock enhancement activities depends on its cost-effectiveness and the efficiency of allocation of economic and social gains to intended beneficiaries and stakeholders. To establish accountability and facilitate formulation of fisheries management policies, including identification of access rights among stakeholders, information on its cost-effectiveness and overall economic and social gains is essential.

The objectives of this study are to determine the costs of and benefits from stock enhancement activities being conducted in SMR located in the northern part of Negros Occidental in the Philippines; and assess the efficiency of allocation of economic and social gains to intended beneficiaries and stakeholders. To achieve this goal, the following studies are planned:

- Characterization of the cost structure of stock enhancement initiatives at various scales and modes as applied by AQD and collaborators;
- Determination of the typologies of benefits from stock enhancement;
- Assessment of stakeholders directly and immediately benefiting from stock enhancement initiative of AQD and collaborators;
- Evaluation of the nature of participation of coastal communities in stock enhancement and determination of measures to compensate for such types of investments;
- Identification of policy implications, especially on access rights to stock-enhanced fisheries, that are acceptable to most stakeholders; and
- Identification of socioeconomic indicators and strategies for promoting responsible practices for managing enhanced stocks.

4.2 Training and information dissemination

Activities such as organization of training courses or information dissemination (i.e. publication of manuals) will not be implemented under this program in 2007. However, some of the activities related to the objectives of this program (e.g. training course of abalone hatchery) will be implemented under other Trust Fund Program "Promotion of Sustainable Aquaculture in the ASEAN Region".

PROGRAM DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Research for Stock Enhancement of Sea Turtles
(The program was formerly under Component II of the program 'Research and Development of Stock Enhancement for Species under International Concerns)
Lead Department: MFRDMD in collaboration with TD
Lead Country: Malaysia
Total Duration: 2004 - 2008

1. INTRODUCTION

Six of seven species of living sea turtles in the world are commonly found in the Southeast Asian waters. The six species are leatherback (*Dermochelys coriacea*), green turtle (*Chelonia mydas*), olive ridley (*Lepidochelys olivacea*), hawksbill (*Eretmochelys imbricata*), loggerhead (*Caretta caretta*) and flatback turtle (*Natator depressus*). In view of the importance to maintain the sea turtle biodiversity, the Southeast Asian water is the most suitable area to conserve and enhance sea turtle population.

Sea turtles are highly migratory and most probably share the waters of the Southeast Asian region. Within the region, conservation in one country may be jeopardized by harmful activities in another country. Thus proper management based on scientific evidence is highly needed to conserve and enhance these valuable species in the future. Regional cooperation among the member countries in conserving sea turtles is also vital to ensure their survivals for future generation.

2. PROGRAM

2.1 Objectives

The objectives of this program are:

1) To determine the stock/population of sea turtles in the Southeast Asian region
2) To provide a guideline for genetic study of sea turtle management in the region
3) To determine migration pattern of sea turtles and location of foraging habitats
4) To determine reproductive biology and growth rates of sea turtles

2.2 Program Description

Understanding the sea turtles stock or how the stock relates to each other is crucial for a proper regional management of marine reptiles. Molecular biological study on DNA fingerprint for identification of stock/population of sea turtles in the Southeast Asian countries is highly recommended.

Successful conservation of sea turtles requires an adequate understanding of their temporal and spatial distribution, migratory patterns and habitat utilization. For decades, the main tool used to gain insight of sea turtles was flipper tagging and considerable ecological information could be derived from tagging studies. These include geographical range and migratory path, breeding and inter-nesting frequencies, longevity beyond the time when first tagged, growth rates, population size etc. In many cases, a commitment to years of systematic tagging may be necessary to achieve certain objectives.

Head-starting is another way of ensuring that sea turtles hatchlings have better chance of surviving until maturity size. This can be achieved by nursing the hatchlings until they are strong enough to be released into the open sea. Higher survival of hatchlings will increase the sea turtle population.

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Project/Activity Title	Duration	Remarks
Project 1: DNA Study		
Activity 1: Identification of the Stock/Population of Sea Turtles in the Southeast Asian Region	**2005-2008**	**50 % completed**
a) Collection of 30 tissues of green turtles was conducted from selected rockeries in participating member countries.		• Distribution of the Standard Operating Procedure (SOP) for collection of tissue samples.
b) DNA extraction and PCR amplification were performed on tissue samples		
Activity 2: Detection of multiple paternities from estimation of stock size of male sea turtles in a pilot nesting beach	**2005-2007**	**50% completed**
a) Collection of 150 tissue samples of green turtle hatchlings was conducted from five different mothers during early nesting season.		
b) DNA extraction and PCR amplification were performed on 30 samples		
Activity 3: Preliminary study on cloning sea turtle	**2005-2006**	
a) A symposium on the cloning of sea turtles was conducted from 13 to 14 March 2006. Possible methodologies and techniques for the cloning study were discussed and compiled.		• Attendance of relevant persons in Malaysia. • Compiled information on cloning activities
b) A conceptual framework on cloning of sea turtles was prepared and published.		• Produce a booklet: Master Plan on Cloning of Sea Turtles
Project 2: Sea turtle tagging and satellite telemetry		
Activity 1: Tagging of sea turtles	**2005-2008**	**50 % completed**
a) Tagging activities using Inconel tags in member countries: Malaysia (3 sites): 1,047 green turtles tagged; 250 hawksbill turtles tagged; 250 recoveries of green turtles; 6 recoveries of hawksbill turtles Cambodia: 5 green turtles tagged; 1 hawksbill turtle tagged		
b) Tagging activities using PIT Tags at Mak Kepit, Malaysia: 58 Green turtles tagged; 5 recoveries of green turtles, In 2003 - 21 green turtles tagged with one recovery		

c) Distribution of tagging posters to member countries: 100 posters (Brunei Darussalam, Cambodia, Sarawak, Sabah); 200 posters (Indonesia, Peninsular Malaysia, Myanmar, Philippines, Thailand, Vietnam).		
Activity 2: Satellite telemetry study on sea turtles	**2005-2008**	**40 % completed**
a) A hawksbill turtle with a satellite transmitter was released at Pulau Upeh, Malacca, Malaysia on 16 June 2006. The turtle stayed in Malacca waters until 10 July 2006 and later moved southward towards Johore on 17 July 2006. The turtle was observed at the southern part of Bentan Island in Indonesia and stayed there until now.		
b) A green turtle with a satellite transmitter was released at Pulau Sangalaki, Derawan Archipelago, Indonesia on 15 September 2006. At present, the turtle moved northward towards Sabah and Philippines.		
Project 3: Head-starting study	**2005 - 2006**	
a) Information on head-starting studies .of sea turtles through scientific papers, available online service of journals and personal communication was compiled and reviewed.		**100% completed**
b) Final review of the paper is undertaken.		**40% completed**
Project 4: Interaction between sea turtles and fisheries		
Activity 1: A research survey on information collection on sea turtle interaction with fishing operation in Southeast Asia	**2005-2008**	**70% completed**
a) Data collection on the sea turtle mortality during fishing operations in Vietnam, Indonesia had been consulted through on-site Training.		
b) Data collection on the sea turtle mortality during fishing operations in Thailand, Malaysia and the Philippines had been conducted through questionnaires.		
c) Evaluation and publication on the impact of fishing activities to the sea turtle mortality in the Region have been conducted.		
Activity 2: A comparative study on the efficiency of the circle hook and J-hook in pelagic and bottom trawls.	**2005-2008**	**70% completed**
a) Comparative studies on the efficiency of the circle hook and J-hook in pelagic longlines have been conducted on-board MV SEAFDEC2 in: Andaman Sea (Jan-Feb 2006), Brunei Darussalam waters (May 2006).		

b) Promotion on the use of circle hook in pelagic longline fisheries has been implemented in cooperation with BFAR in the Philippines (March 2006) and RCCF in Indonesia through on-site training (July 2006). In addition, the Guideline for Responsible Pelagic Longline Fisheries has been introduced to fishermen and fishing boat owners to reduce sea-turtle by-catch.		
c) Media and poster to promote responsible pelagic longline fisheries and to provide basic information on sea-turtle and avoidance of incidental catch were produced and distributed to member countries.		
d) Comparative studies on efficiency of circle hook and J-hook in pelagic longline was conducted on-board MV SEAFDEC2 in the Philippines (October 2006).		

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Project/Activity Title	**Duration**	**Remarks**
Project 1: Second Regional Technical Meeting		
a) The meeting will be held at Kuala Lumpur in May/June 2007. The objective is to collect information and evaluate progress of the Trust Fund IV program activities. Responsible Research officer from participating member countries will be invited as well as 2/3 resource persons. Responsible research officers and project leaders on each activity will present their findings.	**2007**	Technical papers as well as information papers will be published in proceedings.
Project 2. DNA Studies		
Activity 1: Identification of the Stock/Population of Sea Turtles in the Southeast Asian Region	**2005-2008**	
a) Tissue samples of Hawksbill turtles at selected rookeries in the region will be collected.		Results on stock identification of green turtles will be published
b) PCR amplifications and sequencing analysis of DNA samples of green turtles will be conducted.		
Activity 2: Detection of Multiple Paternities for Estimation of Stock Size of Male Sea Turtles in a Pilot Nesting Beach	**2005-2008**	
a) PCR amplification on 150 DNA samples of green turtle hatchlings will be conducted.		Results on multiple paternities of male green turtles at Mak Kepit rookery will be published.

Project 3: Sea Turtle Tagging and Satellite Telemetry		
Activity 1: Tagging of Sea Turtles	**2005-2008**	
a) Tagging activities with Inconel and PIT tags will be conducted in participating member countries. Information on number of turtles tagged and their recoveries will be gathered.		Report on information of species which had been tagged, number of turtles tagged and number of recovery will be published.
Activity 2: Satellite Telemetry Study of Sea Turtles	**2005-2008**	
a) Satellite telemetry studies on hawksbill turtle will be conducted in Malaysia and Green turtle in Vietnam		A report on migration route of sea turtles in the Southeast Asian region will be published.
Project 4: Interaction between sea turtles and fisheries		
Activity 1: Information on Sea Turtle Interaction with Fishing Operation in Southeast Asia will be compiled.4.1	**Jan-Nov 2007**	
a) Work on sea turtle mortality from fishing operations in Indonesia, the Philippines and Myanmar will be reviewed.		
b) Relevant International fora will be participated		
Activity 2: A Comparative Study on the Efficiency of the Circle Hook and the J-hook in Pelagic and Bottom Longlines	**May-July 2007**	
a) Workshop for fishermen on Circle Hook in Malaysia		
b) Workshop for fishermen on Circle Hook in Thailand		
c) Experiment on efficiency of circle hook		
Activity 3: Information Dissemination	**June-Nov 2007**	
a) Results on Efficiency of Circle Hook for Longlines will be disseminated		
b) Poster on promotion of reduction of by-catch sea turtle will be published.		

PROGRAM DOCUMENT

Program categories: Program under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Capacity Improvement of Fisheries Community for Fisheries Management and Alleviation of Poverty
Responsible Department: The Training Department (TD)
Total Duration: 5 years (2004 – 2008)
Approved 2006 Budget: USD 100,000

1. INTRODUCTION

The main aims of the program are to achieve the sustainable community-based coastal fishery resources management and the alleviation of poverty in coastal communities including the particular target of women's groups. As an implication of Locally Based Coastal Fishery Resource Management projects implemented in Thailand and Malaysia until the end of December 2004, it was confirmed that capacity building of human resource should place greater emphasis on ensuring the progress of sustainable coastal resource management. The project deploys pragmatic and practical activities to stimulate and encourage people's participation and the capacity building of people to become involved in coastal resource management and community development. The people's participation is the initial empowerment to contribute to the institution of a local management body to vigorously lead community development and coastal resource management. The local management body takes the function of establishing local businesses to gradually create job opportunities both inside and outside the fisheries sectors of the community. In addition, the local management body also leads to the encouragement of people's participation and the creation of activities in resource management to strengthen people's awareness on managing the resources.

The proposed program has 3 main components. Component-1 plans to conduct the follow-up and the strengthening of people's capacity building and participation in the two on-going projects under the TF-I; i.e. ICRM-PD (ex-project LBCFM-PD) in Thailand as a sub-component 1: Project 1 and ICRM-PL (the ex-project LBCRM-PL) as a sub-component 2: Project 2 as their 2nd phases. The former project activity and the impact were evaluated in 2004, and based upon the outcome of the evaluation the project action plan was reformulated as phase II to meet the new requirements for the follow-up stages of the basic project concept from 2005 under the financial arrangement of TF-IV. The main emphasis in the phase II ICRM-PD was placed on institutional and human capacity strengthening in the core fishermen groups throughout the remaining project term, while the one in the 2nd phase of ICRM-PL has been put on human capacity building in the deployment of integrated coastal resources management centered on the demarcated zone for community fisheries to be established by DOF Malaysia. The project ICRM-PD has been achieving expected goals toward the end of 2006 as scheduled and the phase-out process is on the right track. Given such a progress of the project status, it is proposed to terminate the project operation in December 2006 as originally planned with some minor follow-up activity in 2007.

The Component 2 is the implementation stage of the component 1 concept in other member countries. The project document formulation was completed for the similar project in Cambodia entitled "Integrated Coastal Resources Management in Sihanoukville (ICRM-SV)" in July 2005 but the actual project initiation had been dragging until November 2005 when the project formally commenced its activity as the 3rd sister project with an occasion of the project opening ceremony. As such, the project commencement was delayed for 5 months behind the schedule and also some collaborative project input by the Japanese Embassy which constituted a vital integrated part of the project implementation was delayed for 10 months. Under these circumstances, it is proposed to extend the project tenure for another one year until the end of 2008 from the originally planned in December 2007.

As a Component 3, the regional training courses for fishery managers and extension officers were proposed. The role of the fishery managers are provide information to decision maker on formulating and transforming policy into management plans. Extension officers are deal with communities in community development and CBRM. There are vital and the capacity building is urgently called for. More emphasis in this training courses are placed on problem-and-solution analysis and the practical application at the project site level, making best use of experiences and knowledge gained through the ongoing collaborative project operations.

2. PROGRAM

2.1. Component 1: Follow-up of the on-going projects

2.1.1. Project 1: Integrated Coastal Resources Management in Pathew District (ICRM-PD) = LBCFM-PD Phase II (Thailand)

2.1.1.1. Objectives

1) To develop capacity building of local human resource to empower them to manage and sustain coastal resources and community development vigorously.
2) To develop people's participation on a voluntary basis to be more systematic and empowered through whatever type of local management body institution that proactively strengthens community development and resource management.
3) To encourage people's participation to create job opportunities and establish local businesses to increase accessible sources of income to alleviate community poverty and develop the economic scale of the community

2.1.1.2. Project description

The Training Department and DOF, Thailand agreed that the LBCFM-PD project phase II (2005-2006) as ICRM-PD placed greater emphasis on the people's capacity building and participation to strengthen and lead existing activities, which were the outcome of the project in phase I. The strengthening of people's participation was arranged through the provision of training courses and extension programs with special topics and requested expertise like group cooperative management, group book accounting, recording and management and profit distribution and allocating incentives to people's group members. These are a combination of basic knowledge and skill development and requirements. These developed skills and knowledge can contribute to the local people in the sustainability of their own community activities and local businesses.

In the original project framework, it was envisaged that the newly created sub-district administrative organization called "Ao.Bo.To." was to take charge of the function of CBFRM, but it was found through two and a half years' project operation that they were not a type of organization which could enter into such a duty with interests. It was considered so critical thinking in terms of project effectiveness and sustainability that the project basic approach was rectified. In 2005 and 2006, the major project effort was centered to organization of the core fishermen's group and the building up of their managerial and functional institutional capacity.
As the result, the Pakklong Fishermen's Group (PFG) upheld by seven sub-groups was established in March 2005 and further it was legally registered with the authorities concerned in December 2005. The PFG has been empowered with various functions and activities pursued by their own motivation, and it is very optimistic that they will further strengthen their institutional managerial capacity with continued support by DOF Thailand.

It was envisaged from the outset that the involvement in the physical project operation by SEAFDEC/TD would be gradually reduced as time passed and simultaneously the counterpart

organization of the DOF Thailand; i.e. Chumporn Marine Fisheries Research and Development Center (CMDEC), would take over the leading role of the project operation step by step. Toward the end of the project in 2006, it was further envisaged to transfer the project management capacity to the newly born Pakklong Fishermen's Group (PFG) to maintain the sustainable coastal resources and community development in the area with continued supports from relevant authorities like CMDEC, Chumphon Marine Coastal Resources Research Center (MCR), Chumphon Fisheries Office and other district and sub-district administration offices. It is the eternal goal of the project.

2.1.1.3. Progress of activities in the year 2006

As aforementioned, the major emphasis in activity in 2006 was placed on human and institutional capacity building for the newly organized Phakklong Fishermen's Group. The detailed project progress is dealt at length in the first and the second biannual project progress reports. (Note: the rate of accomplishment of planned activity is expressed by percent in brackets.)

Activity 1: Monitoring survey (100%)
- Most physical activities on regular marine biological and oceanographic surveys have been already handed over to the local counterpart institutes; i.e. Chumphon Marine Fisheries Research and Development Center (CMDEC) and Chumphon Marine and Coastal Resources Research Center (MCR) remaining the work of compilation and publication of the data with SEAFDEC/TD.
- The particular subject survey on fishing ground and gear has been regularly conducted by the TD team.

Activity 2: Encourage and extend the CBRM concept (70%)
- In a bid to further strengthen the Crab Bank operation, the study tour to Japan was made to learn the more scientific approach. As the result, the new system incorporating the Japanese system commenced as a trial in October.
- Embodiment of the PFG is further realized. The request of registration with the draft By-law was submitted to the Provincial Cooperative Office (PCO) and approved in December 2005. Some supplemental Internal Laws has been drafted and submitted for approval to the PCO in 2006.
- The supplemental Internal Law to govern the credit scheme within the PFG was formulated and submit to PCO in may 2006. This was formally approved in October 2006 and under this legal entity the own credit scheme commenced on 2nd November 2006. - There has been a live argument among fishers on extension of the current zoning demarcation line. In the wake of repeated meetings on this issue among fishers within the mandatory of PFG, it was concluded that no further expansion would be appropriate at this stage as no proper means to control and manage coastal resources is ensured.
- The aquaculture zoning arrangement is still pending subject to finalization of the Sea Food Bank scheme of DOF.
- Establishment of the Local Enforcement Unit is under way. The training course for voluntary groups in fisheries enforcement activity is conducted.

Activity 3: Encourage local business (85%)
- Various training courses and study tours were conducted in a bid to improve the quality of products and looking into possibilities to initiate new local businesses.
- In village No.1: diversification of the products was further promoted in collaboration with the Fisheries Technology Development Division (FTDD) of DOF with almost 10 varieties of product. They also obtained the certificate of Good Manufacturing Practice (GMP) issued by the Ministry of Health. In a bid to improve a book-keeping and an accounting system with more transparency, an part-time accountant was employed. As the result, this group was awarded the good practice of accounting from the Chumphon Provincial Office.

- In village No. 4, they are maintaining small business like dry flower making, local patty cooking etc. for special occasions like weddings and funerals with 8 active members as most of members are fully engaged in rubber plantation. In addition, they opened up a small community retail shop under the financial auspicious of Developing Village/Community Efficiency (SML) of the Ministry of Interior.
- In village No. 6, they have expanded varieties of their products for like clothes, shirts, T-shirts and handkerchiefs. They underwent a training course for sewing in a bid to initiate producing final products for themselves expecting some additional value of the products.
- Aimed at promoting eco-tourism, the Home Stay Group (HSG) was formed with 20 members in the village No.6 and the training courses were carried out including study tour to Surat Thani and the business management course. The PFG envisaged expanding this possibility to village No.1 as the mainline of the business.
- The second experiment on Babylonia shell culturing conducted to look into the possibility of commercial application to the fishing community as a side business. As the result, it was found that a small scale operation would not be economically viable, but need substantial investment.
- The experiment on swimming crab culturing was conducted by CMDEC but the result was not promising.
- The comparative experiment on feeding cage-cultured fish, mainly for grouper and sea bass, has been continued by CMDEC. The result will be evaluated in 2007.

Activity 4 : Enhance human resources capacity building and participation (100%)

- All through the project activities, the main emphasis is placed on human resources and institutional capacity building especially in organization and embodiment of the PFG in 2006. To do that, numbers of effort were exerted through;
  - Study tours to Japan to study the FCA structures and functions and to Trad Province
  - Coordination for registration of the group with the relevant authorities to obtain legal entity
  - Organizing fishers workshops in a bid to increase awareness and participation to the group activity
  - Taking-off of credit scheme.
- The local seminar entitled “Concept for Coastal Fisheries management” was held in August to which 78 participants concerning the coastal fisheries management and community development in the project operational area were present. The main purpose of this seminar lay in restoring the useful data and information obtained through the research work to the stakeholders and also reporting and disseminating the current activities pursued by the project among stakeholders.

Activity 5 : Rehabilitate and enhance coastal resources (50%)

- Installation of 10 sets of Fish Enhancement Devices (FEDs) with improved and reinforced design and structure was jointly conducted in association with SDI-4 to test its durability as the project planned to install 60 units of these with the financial assistance by AoBoTo. As the result, it was found that 4 units were removed by illegal trawlers and 1 was relocated within 2 months. On this ground, some protecting measures will be taken.
- As the regular program, 1.5 million of Tiger prawn seed were released.
- A mangrove reforestation program was jointly organized by Ao.Bo.To and PFG with the school students and teachers in the project area. In this occasion, 1,000 mangrove trees were planted.

Activity 6: Committee meetings (75%)

The 9th and 10th project Implementing Committees (IC) meetings were summoned in May and August respectively. The 11th IC meeting is to be held in December.

The 3rd Steering Committee meeting was held in January.

2.1.1.4. Proposed future activities

In fact, the project is bound to be terminated in December 2006 as initially scheduled and the activity in 2007 is confined to just follow-up works as listed below.

Activity 1**:** Compilation and publication of reports
- Several research works will be concluded in 2006 and the results are analyzed and compiled in 2007 for publication
- The project final report is compiled and published.

Activity 2**:** Continued activity
- Extension services for 6 months
- Participations to SC and IC meetings for one year
- Participation to the local seminar
- Other occasion as deemed necessary

Activity 3**:** Regional seminar
- A regional seminar is organized to review the impact resulted by the project operation among SEAFDEC member countries.
- The seminar report is compiled and published.

2.1.2. Project 2: Integrated Coastal Resources Management in Pulau Langkawi (ICRM-PL) = LBCRM-PL Phase II (Malaysia)

2.1.2.1. Objectives

1) To develop capacity building of local human resources to empower them to manage and sustain coastal resources and community development vigorously.
2) To develop people's participation on a voluntary basis to be more systematic and empowered through whatever type of local management body institution to proactively strengthen community development and resource management
3) To encourage people's participation in creating job opportunities and establish local businesses to increase accessible sources of income to alleviate community poverty and develop the economic scale of the community

2.1.2.2. Project description

Toward the termination of the first phase of the project under the TF-1 in December 2004, the project ICRM-PL had been running very effectively in producing some tangible outputs until the day of 26 December 2004 when the devastating tsunami assaulted the project operational area, leaving very tragic damages behind. Most fishing boats and fishing gear were destroyed or lost, and the fish landing facilities were ruined. Many fishermen's houses collapsed. The Malaysian authorities together with NGOs and foreign aid organizations immediately started the rehabilitation of the tsunami stricken fisheries sector, and thanks to these efforts extensively exerted in 2005 and 2006 it has more or less reactivated some fishing activities. This unexpected natural calamity caused the project great changes and delays in approach and progress. The project work-plan in 2005 revised drastically so as to meet the acute requirement of the fishing sector and the project tenure was extended for one more year until the end of 2007 to offset the retardation of planned activity. In 2006, some rehabilitation related activities were continued along with the development work originally envisaged.

2.1.2.3. Progress

The major emphasis in activity in 2006 was placed on reactivation of the project activities, particularly establishment of the zoning demarcation and its fishery management plan. The

detailed project progress is dealt at length in the first and the second biannual project progress reports in 2006. (Note: the rate of accomplishment of planned activity is expressed by percent in brackets.)

Activity 1 : Monitoring survey (80%)
- The data collection of fish landing was reactivated in August 2005 and since then it has been regularly continued. The obtained one year's data was analyzed and compiled.
- The marine resources survey was resumed in August 2005. Since then, the surveys have been repeated at 3-4 month intervals. The data obtained for the last one year is analyzed and compiled.
- The mid-term socio-economic monitoring survey was conducted. The data and information was analyzed and under compilation.

Activity 2: Encourage and extend the CBRM concept (70%)
- The Fishery Resources Management Committee (FRMC) was established in July 2005 within the structure of KEN and since then the FRMC meetings were repeatedly held to discuss the content of the proposed fishery management plan (FMP). The advance draft of FMP was prepared in the wake of the technical consultation in the fishers workshop in March and it was further refined by many pertinent sectors including the legal advisors. This draft is submitted to the Stakeholders' Consultation to be held in November in Alore for finalization.
- An attempt of establishing the Local Enforcement Unit is remote for the time being as the Fisheries Enforcement Unit of DOF was transferred to the newly organized body called "Marin Enforcement Body".
- An effort to establish the crab bank system similar with the one in Chumphon was made. Acquiring a suitable space was proposed to LADA.

Activity 3 : Encourage local businesses (70%)
- Diversification of snack types of products was made into 3 kinds.
- Construction of the second cottage scale fish processing yards under the auspices of Japanese Grass-routes Assistance for Tsunami Disaster (JGATD) is under way.
- The training course in computerize bookkeeping and accounting was conducted. All transactions are recorded with the computerized accounting system.

Activity 4 : Enhance human resources capacity building and participation (90%)
- Various training courses and fishermen workshops were conducted, e.g. the computerized bookkeeping and accounting system, alternative local business in Langkawi, formulation of fishery management plan, defining the zoning demarcation.

Activity 5 : Fishing gear technology improvement (30%)
- As the outcome of the Fishermen's Workshop held in November 2005, it was found that fishermen had not adopted any introduced fishing methods although they appreciated these advanced effects for some reasons. Under such circumstances, it was decided at the 3rd SC meeting held that this activity line should be put in the lower priority except training in wooden boat repairing technology in use of FRP materials

Activity 6 : Rehabilitate and enhance coastal resources (80%)
- The installation of 10 units of AR was made by LKIM consistent with the locations where the pre-installation marine biological survey which was conducted by the joint team of SEAFDEC/TD and DOF Malaysia in November 2005 recommended.
- The installation of 10 units of FED was envisaged according to the original work schedule. However, it was postponed pending clarification of its durability in the trial in Chumphon.

Activity 7: Project evaluation (0%)
- The project mid-term evaluation was to be conducted in August 2006. But no appropriate outsource consultant could not be identified within the limited budget.

Activity 8 : Committee meetings (75%)
- The 7th and 8th ICC meetings were held in April and November respectively..
- The 4th SC meeting was summoned in March.

2.1.2.4. Proposed future activities

All project activities are so designed as to meet the implication that the project operation would be terminated toward the end of 2007 according to the project implementation schedule.

Activity 1: Monitoring surveys
- Collection of daily fish landing data and its analysis and compilation
- Conducting regular marine resources survey and its analysis and compilation
- Impact surveys by installation of ARs and FEDs and its analysis and compilation
- Publication of the monitoring socio-economic survey

Activity 2: Encourage and extend the CBRM concept
- Finalize formulation of the FMP and submit to the relevant authorities through regular channels
- Coordinate and expedite approval and promulgation of the Ministerial ordinance of the FMP and demarcated zoning arrangement among the parties concerned
- Dissemination of the FMP among beneficiaries and its implementation
- Coordinate and expedite establishment of the local enforcement unit (LEU)
- Take relevant steps for realization if decided to be established
- Organize and make the crab bank scheme function, if all arrangements are ready.

Activity 3**:** Encourage local business
- Diversification and standardization of products produced by the women's group in use of the new processing yard
- Marketing promotion for newly developed products produced by the women's group
- Improvement of management skills for cottage scale industries and group activities
- Exchange views and experience through the women's group network in Langkawi
- Seek a possibility to enter into other alternative fishery related businesses; e.g. like aquaculture and eco-tourism
- Resume the boat and engine repair and maintenance workshop once the premises which is under construction by the fund of JGATD is completed.

Activity 4**:** Enhance human resource capacity building and participation
- A fishermen workshop on FMP
- A local seminar to restore the data and information gained through research work and discuss project impacts
- Identify and design community environmental development work and its implementation

Activity 5**:** Fishing gear technology improvement
- Follow-up training course in wooden boat repairing with FRP materials
- Follow-up training course in selected fishing gear as required; e.g. Babylonia shell fishing

Activity 6**:** Rehabilitate and enhance coastal resources
- Installation of 10 sets of FED followed by monitoring marine biological impact survey
- Installation of ARs by LKIM in combination with the above FEDs followed by monitoring marine biological impact survey

Activity 7: Project evaluation
- Conduct the terminal project evaluation by an outsource consultant and the result is published in both English and Bahasa Malay.

Activity 8**:** Project management meetings
- The 5th Steering Committee (SC) meeting is summoned in January.
- Project Implementation Committee (IC) meetings are held every four months.

2.2. Component 2: Extension of the project concept to other member countries

2.2.1. Project 3: Integrated Coastal Resources Management in Sihanoukville (ICRM-SV) in Cambodia

2.2.1.1. Objectives

1. To develop capacity building of local human resources to empower them to manage and sustain coastal resources and community development vigorously
2. To develop people's participation on a voluntary basis to be more systematic and empowered through whatever type of local management body institution to proactively strengthen community development and resource management
3. To encourage people's participation to create job opportunities and establish local businesses to increase accessible sources of income to alleviate community poverty and develop the economic scale of the community

2.2.1.2. Project description

Since inception of the project operation of LBCFM-PD and LBCRM-PL in Thailand and Malaysia respectively under TF-I, a few other member counties have proposed to commence similar CBFRM projects in their own countries within the collaboration framework with SEAFDEC. Dissemination of the CBFRM concept in the region is the overall project goal and it should be encouraged in line with this orientation.

Four member countries in addition to Thailand and Malaysia had officially expressed their interest to initiate the similar projects under the collaborative project arrangement before 2005, i.e. Indonesia, Brunei Darussalam, Cambodia and Myanmar. Among these countries, Cambodia was selected as the 3rd country to start up the project. The SEAFDEC/TD eventually conducted the preliminary survey in June 2004 and a suitable site for the CBFRM project was identified in Sihanoukville among a few sites proposed by DOF Cambodia. The plan to initiate the project in Cambodia from 2005 was submitted to the 27th PCM and it was endorsed. The baseline soci-economic survey was conducted in early 2005, and based on the findings the project document was formulated and finalized in July 2005. However, the actual project commencement had been dragging on until November 2005 mainly due to the delayed administrative arrangement of the Steering Committee meeting.

2.2.1.3. Progress

The major activity in this term lay in building up the foundation of the project framework, consolidating mutual working relationships in the provincial as well as the district levels and encouraging all stakeholders to participate in the project operation. The detailed project progress is dealt at length in the first and the second biannual project progress reports in 2006.
(Note: the rate of accomplishment of planned activity is expressed by percent in brackets.)

Activity 1 : Baseline / monitoring survey (100%)
- The localized fish landing data collection system was established and it has been functioning.

Activity 2 : Encourage CBFRM (60%)
- The study on common practices with regard to community level fishery resources management was made through repeated fishers' workshop.
- The drafts of Community Area Fisheries Management Plan (CAFMP), Internal Law (IL), By-Law (BL) and Map of Community Fishing Area (MCFA) were prepared with positive participation by stakeholders.
- The above documents were disseminated among stakeholders through repeated general fishers' assemblies.
- The Local Enforcement Unit (LEU) was embodied with commencement of the regular patrolling activities by voluntary participation among Community Fisheries members.

Activity 3 : Encourage local business (80%)
- Four women's groups were organized in respective village.
- Potential local businesses were identified through the workshops; the first challenge would be mushroom production.
- The training course in production of mushroom was conducted for 16 members of women's group in Battambang.
- The facilities for mushroom production were constructed in each village and necessary production equipment and materials were procured.
- The commercial scale production commenced in July. (The women's groups' endeavour should be commended.)
- The simple bookkeeping and accounting training course was conducted for women's groups
- The mud-crab culturing group was organized.
- The training course for mud-crab culturing was conducted.
- The fund for culturing mud-crab was eventually allocated by the Japanese Embassy in October as the collaborative financial support to the project: the delayed approval with 10 months behind the schedule.
- Construction of the mud-crab culturing ponds commenced.
- Culturing mud-crab starts in December.

Activity 4 : Enhance human resources capacity and participation (100%)
- The structure of Prey Nup II Community Fisheries (PN2CF) was reorganized.
- The study tour to learn the project operation and the group management was to Chumphon. The fishers' workshop was conducted so as to disseminate findings and outcomes from the study tour.
- The 2-day local seminar is held for all stakeholders to review the project status and progress and also to demonstrate the outcomes of the project to concerning agencies.
- Various training courses and workshop were made in a bid to develop the institutional capacity of PN2CF.

Activity 5 : Rehabilitate and enhance coastal resources (0%)
- No activity has been initiated as the proposal on installation of FEDs was not favoured by the fishing community and also against the Fisheries Law in Cambodia.

Activity 6 : Fishing / fish handling technology improvement (30%)
- The planned activity in this line was proposed at the fisheries workshop in the wake of preliminary fishing gear and fish handling survey. As the result, this activity was placed in the lower priority and no activity was made.

Activity 7 : Project management meeting (75%)
- The 2nd Steering Committee meeting and the 2nd and 3rd Implementation Coordination Committee meetings were summoned.

2.2.1.4. Proposed future activity

The project activity began in 2006 in full swing with formulation of the fishery management plan, mushroom production by the women's group etc. The further deployment is expected in 2007 in the same lines of activity. A part of the Activity 3: Promotion of local business, mad-crab culturing in particular, is jointly executed with the Grassroots/Human Security Fund of the Japanese Embassy.

Activity 1: Baseline / monitoring survey
- Continue the regular fish landing data collection
- Analyze and compile the result of 2006

Activity 2**:** Encourage and extend locally-based fishery resources management
- Submit the proposed Community Fisheries Area Agreement (CFAA) along with CFAMP, BL, IL and MCFA to DOF through relevant authorities for approval
- Coordination for expediting approval of the above documents
- Formation of Community Fisheries Coordination Committee (CFCC)
- Practical application of CFAMP in close consultation with CFCC\
- Strengthening the capacity and capability of local enforcement activity

Activity 3**:** Promotion of local business
- Continue mushroom production with emphasis on commercially viable management
- Expansion of the operational scale of mushroom production
- Identify other potential local businesses
- Continue mud-crab culturing
- Commence tilapia culturing in use of the mud-crab ponds
- Training in bookkeeping and accounting practices for fish culturing

Activity 4**:** Enhance human resources capacity and participation
- Any data and information obtained through the survey are disseminated to the stakeholders through the local workshop.
- Conduct workshops aimed at increasing awareness on implementation of CFAMP
- Various training course and study tour aimed at enhance human and institutional capacity of PN3CF are conducted.
- Identify and implement relevant volunteer works for community development and environmental improvement
- Publication of reports manuals and PR materials

Activity 5**:** Rehabilitate and enhance coastal resources
- Study on establishment of conservation area including a study tour
- Prepare the proposal

Activity 6**:** Fishing / fish handling technology improvement
- Study on improvement needs in fishing and fish handling technologies
- Prepare the proposal if found necessary

Activity 7**:** Project management meetings
- A Steering Committee (SC) meeting is summoned once a year at minimum.
- Project Implementation Committee (IC) meetings are held every 4 months.

Activity 8**:** Project evaluation
- The project mid-term evaluation is taken place in middle 2006.

2.3. Component 3: International Training Course on Coastal Fisheries Management for Fishery Managers

Courses Arrangement

2.3.1. Objectives

1) To extend the knowledge, skills and attitude of coastal fisheries managers at the central level and fishery officers at field level in the concept of sustainable coastal resources utilization and management
2) To introduce and share knowledge/experience of SEAFDEC with collaboration of national DOF pilot projects in ICRM-PD, ICRM-PL and ICRM-SV in Thailand Malaysia and Cambodia respectively as well as Set net project in Rayong province, and other Coastal fishery management projects which are organized by DOF of Thailand and other fishery agencies, to the region.

2.3.2. Project description

One of the main reasons for the lack of success in modern fisheries management approach is the top-down approach which leaves fishing communities completely out of the decision-making process and builds up barriers between the fisheries administrations and the fishing communities. As a result, problems faced by the fishing communities do not get solved by the governmental institutions, which instead may lose their effectiveness to deal with the present situation. From the Millenium conference in 2001, two new approaches for coastal resource management were set forth. These innovative approaches were introduced as decentralization or co-management and rights based fisheries management. To successfully implement these new approaches it is essential to strengthen the capacity of the key players, government agencies and local fishermen, as well as provide the appropriate training to the fishery managers at the central level and extension officers at the field levels. Training as a means of human resource development is the objective of this project. Two levels of training courses will be conducted under this component.

2.3.3. Progress

In the year 2006, Two Training courses were conducted to transfer knowledge to SEAFDEC member countries and interested people as follows.

<u>The International training course on Coastal Fisheries Management for Fishery Managers</u>

The course was conducted between 16th –30th May 2006 for 26 participants from ten different countries, namely: Brunei Darussalam, Cambodia, Indonesia, Japan, Lao PDR, Myanmar, the Philippines, Sri Lanka, Thailand and Vietnam. This course aimed to assist the Managers to practice in acquiring and analyzing information from several pilot projects in coastal fisheries management for Policy formulation, and to design coastal fishery management plans that suit their local conditions. The Training was composed of two main parts; there was a part for lectures and another part for pilot project introduction including field trips on a Set-net Project in Rayong Province, Integrated Coastal Resource Management in Chumporn Province, and Community Based Fisheries Management in Prachub Kirikan Province. During the lecture session, participants refreshed their knowledge on Responsible Fisheries Aspects in Southeast Asia, a Characteristic of Coastal Fisheries Resource and Management, the Right-based and Co-management systems in Japan. For the session on pilot projects introduction and field trips, the participants were introduced to the background and some other important information of each pilot project, the visits to the pilot projects were made after that. During the visits and observation, participants worked as groups for active research on each project, all information was interpreted and used as cases studied. At the end of the course, a presentation on Management Plans for three pilot projects by four groups of participants proved that the participants were able to meet with the course expectations and the course objectives.

Participants believed that the knowledge and experience they gained can be used and applied to their project management plans in their home countries.

International Training Course in Coastal Fisheries Management and Extension Methodology

The course was held on 22th August -21th September 2006. 27 participants from thirteen different countries, namely: Brunei Darussalam, Cambodia, Indonesia, Japan, Lao PDR, Malaysia, Maldives, Myanmar, the Philippines, Sri Lanka, Thailand, Timor Leste and Vietnam. The course focuses on modern principles and concepts of coastal fisheries and resources management; The need to change fisheries management towards co-management, involving local communities and applying eco-system principles to fisheries management; Small-scale fishery problems and constraints; Facilitation, mediation and conflict resolution skills, Extension concepts, methodologies and implementation; Study/field trips to fishing villages and media centres; Practical involvement and presentation of extension media. After completed, the participants understood modern principles and concepts of coastal fisheries resource Management, extension concepts and methodologies. During field trip to ICRM project in Chumporn Province, participants are trained to use the active extension tools and methods such as semi-interview, mapping, seasonal calendar, historical timeline, Venn's diagram, problem and preference ranking in gathering the ground situation and present problems to the communities leading directly to problem solving. Trust that all knowledge and experience gained from the course can be used and applied to their job in their home countries.

2.3.4. Proposed future activities

Activity 1: Two-week Regional Training Course on Coastal Fisheries Management for Fishery Managers of SEAFDEC's member countries. (6 -20 March l 2007)

Objectives of the course:

1) To extend knowledge and experience of the fishery managers of SEAFDEC's member countries on sustainable coastal resource utilization and management
2) To introduce the practicable methods and approaches in coastal resource management in different conditions
3) To introduce and share experiences of the SEAFDEC/TD's and DOF Thailand pilot projects to the region
4) To strengthen practical in competence in planning and implementing the applicable coastal fishery management plans.

Course content:

The training course will be conducted in English. Subjects dealing with coastal fisheries management concept, approaches and case studies.

The course will includes lectures, group discussion, and the pilot projects and case study visits. The elements of the course will consist of;

- Overview of Coastal Fisheries Management in ASEAN,
- Responsible Fisheries aspects in Southeast Asia,
- Characteristic of Coastal Fisheries Resource and Management,
- Rights-base and co-management for coastal fisheries management,
- Integrated Coastal Resource Management : ICRM-PD, ICRM-PL and ICRM-SV in Thailand, Malaysia and Cambodia respectively
- Community-based Fisheries Management (CBFM) pilot project, Prachub Kirikran project

Activity 2: Four-week Regional Training Course on Coastal Fisheries Management and Extension Methodology for Extension Officers of SEAFDEC's member countries. (21 August - 20 September 2007)

Objectives of the course:

1) To extend the knowledge and skills of extension officers of SEAFDEC member countries in the following areas:
   - Coastal resource management
   - Participatory approach for co-management of fishery resources
   - Extension concept, methodology and participatory research method (PRA)
   - Managerial and conflict resolution skill for managing fishery resources and local organization
   - Communication and extension media production.

2) To introduce and share experience of the SEAFDEC with collaboration of national DOF pilot projects in ICRM-PD, Chumporn province, Thailand, ICRM-PL, Lankawi, Malaysia and ICRM-SV, Sihanoukville, Cambodia.

Contents of the course:

I: Innovative approaches to coastal fisheries management,
II: Fishery extension concept, methodology for participatory management approach
III: Essential skill for participatory research and management
IV: Media production and communication process for extension work

PROGRAM DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism (Supported by ASEAN Foundation)
Program Title:Human Resource Development (HRD) for Sustainable Development of Fisheries in Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA) Region
Lead Department: Secretariat in collaboration with the Departments
Lead Country: Brunei, Indonesia, Malaysia, the Philippines
Total Duration: 24 months (March 2005 to February 2007)
Proposed 2006 Budget: US$241,201

1. INTRODUCTION

Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA) is regarded as less economic development area due to their isolated locations from the capital city of each country, despite being rich in natural resources. Considering the target areas are islands and surrounded by oceans, fisheries can be one of the potential sector to promote various economic activities especially for small and medium scale enterprises (SMEs). SEAFDEC with the support of ASEAN Foundation has initiated this project, which comprises three main areas for human resource development (HRD); marine capture fisheries (sea-based), aquaculture and post-harvest technology (land-based). It is envisaged that after the training, government staffs could gradually develop their skills and interpret appropriate fisheries information when formulating activities for SMEs and promote future sustainable fisheries development to meet their national priorities.

2. PROGRAM

2.1 Objectives

The project objectives are:

1) To enhance human resource capacity of the concerned staff in the project areas in order to develop appropriate supporting mechanism and capacity for the future promotional activities on the sustainable fisheries SMEs development programs, and

2) To exchange experiences among the target countries in planning and conduct of HRD activities as a basis for future intra-regional collaboration in sustainable development of fisheries particularly for SMEs.

2.2 Program Description

Considering the needs of the target countries and major sub-sectors of fisheries, human resources development activities can be mainly categorized into marine capture fisheries (sea-based) activities and aquaculture and post-harvest (land-based) activities.

2.2.1 Marine Capture Fisheries: This project aims to develop capacity building of human resource on fisheries resources research and survey, which mainly focus on marine resources particularly on off shore, un-trawlable grounds; continental shelf slope areas and restricted areas in terms of investigating the entire fish stock and appropriate fishing technology for harvesting. Since Brunei Darussalam do not have large potential on the capture fisheries, in view of the regional (BIMP-EAGA)/national strategic aspects, marine capture fisheries component will not be conducted.

2.2.2 Aquaculture: A series of in-situ Participatory Workshops shall be conducted in the identified localities of the BIMP-EAGA region. Target participants are front-line fisheries or agriculture officers assigned to promote and assist in aquaculture development at the local level. The participants shall then present their respective area reports for group discussion. Based upon the inputs of the resource persons, their area reports and the discussions to follow the participants shall be asked to prepare a proposal for implementation. At the end of the workshop each participant is expected to being home specific plans for implementation in their respective areas.

2.2.3 Post-harvest Technology: The HRD activities will be comprised of Train-the-Trainers Workshop and Training Course on Fish Quality Preservation and Safety (HACCP). The resource materials for the HRD activities will be based on training materials already developed by MFRD, namely, the "Training Manual on Fish Quality Preservation" and "Training Courses on HACCP Competencies".

3. PROGRESS ACTIVITIES IN THE YEAR 2006

Project Activities:

Project/Activity Title	Duration	Remarks
1) Marine Capture Fisheries - HRD in Western Kalimantan, Indonesia - HRD in West Coast of Sabah, Malaysia - HRD in East Coast of Palawan Islands, the Philippines		100% completed in 2005
2) Aquaculture - Training Workshop for Responsible Aquaculture for Fisheries Officers from the Bureau of Fisheries and Aquatic Resources and Local Government Units in six regions of Mindanao and the province of Palawan, the Philippines - Workshop on Responsible Mariculture Development for Extension Officers of the province of Singkawang City of West Kalimantan, Indonesia - Training Workshop for Responsible Aquaculture for Fisheries Officers from the BFAR and Local Government Units in six regions of Mindanao and the province of Palawan, the Philippines - Workshop on Responsible Mariculture Development for Extension Officers of the province of Singkawang City of West Kalimantan, Indonesia	January 2006 March 2006 May 2006 September 2006	100% completed
3) Post-harvest Technology - 1st Train-the-Trainer Workshop on Fish Quality Preservation and Safety (HACCP), Davao City, the Philippines - 1st Train-the-Trainer Workshop on Fish Quality Preservation and Safety (HACCP), Pontianak, West Kalimantan, Indonesia - 2nd Training Course on Fish Quality Preservation and Safety (HACCP) in Kota Kinabalu, Sabah, Malaysia - 2nd Training Course on Fish Quality Preservation and Safety (HACCP), Indonesia - 2nd Training Course on Fish Quality Preservation and Safety (HACCP), Philippines	February 2006 March 2006 April 2006 August 2006 September 2006	100% completed

4) Regional Workshop on HRD for Sustainable Development of Fisheries in BIMP-EAGA Region	November 2006	100% completed

At the end of the project, the Regional Workshop on HRD for sustainable development of Fisheries in BIMP-EAGA Region had been organized from 8 to 10 November 2006 in Brunei Darussalam, to review the outcomes and achievements of each HRD activity area. The beneficiary countries expressed that training activities in three main areas have effected on in-country coordination with the concerned agencies and built awareness for the sub-regional official on the importance of HRD as an essential part of overall development planning of fisheries. It was also stated that the activities were useful and extend the knowledge and skill of participants.

The suggestion has been made that for sustaining HRD initiatives, there is a need for regional policy framework and supporting systems including partnership and networking among local governments and other community-based organizations. Another important output of the project is the 'directions and consideration for Future HRD on Sustainable Fisheries in the BIMP-EAGA region' particularly in support of fisheries SMEs.

Appendix 2 of Annex 5

PROGRAM DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism (Supported by Swedish International Development Cooperation Agency)
Program Title: SEAFDEC-Sida Project on Support to Tsunami Rehabilitation of Affected Countries in the ASEAN Region
Lead Department: Secretariat in collaboration with the Departments
Prospect Funding Agency: Swedish International Development Cooperation Agency (Sida)
Duration: 2007

1. INTRODUCTION

During the Seventh Meeting of the ASEAN-SEAFDEC Fisheries Consultative Group (FCG), Hanoi, Vietnam, 4 April 2005 and the Thirty-Seventh Meeting of the Council of SEAFDEC, Hanoi, Vietnam, 5 – 8 April, 2005 the 'ASEAN-SEAFDEC Plan of Action on Its Regional Cooperation for the Rehabilitation and Restoration of Fisheries in ASEAN Tsunami Affected Areas' were discussed and endorsed based on recommendations provided by the Informal Consultation on SEAFDEC Supports to Fisheries Relief Program for the Tsunami Affected Countries of ASEAN in Hanoi, Vietnam on 3 April 2005. The Plan of Action has also been endorsed by the ASEAN Ministers of Agriculture and Forestry (AMAF).

The FCG and Council Meetings, respectively, also endorsed the priority areas for SEAFDEC assistance as identified by the tsunami affected Member Countries. These priority areas are recommended to accommodate common areas of required assistance into existing programs of activity within the available resources or develop them into a new program to appeal to donors for funding supports. The common areas are:

- Assessment of impacts on fisheries resources and eco-system,
- Policy and technical advise on national fisheries rehabilitation policy and action plan, and
- Awareness and capacity building including technical training to support rehabilitation activities and safety at sea.

The Eight Meeting of FCG and the Thirty-Eighth Council Meetings held in Brunei in April 2006, endorsed and expressed appreciation on/to the support from Sida to the tsunami rehabilitation activities, and agreed that sustainable approach should be used in dealing with tsunami rehabilitation, and capacity building activities should be applicable not only for affected countries but for all ASEAN countries.

The Goal and Immediate Objective of the program that has been discussed with, and submitted to, Sida included the support continued rehabilitation and restoration of fisheries and livelihoods of fisher-folk in ASEAN Tsunami affected countries. More specifically the aim is to build up/rebuild capacity for the management of fisheries and important coastal habitats, based on the active involvement of coastal communities including integration of traditional practices and rights-based fisheries in support of poverty alleviation.

Project Summary

Countries:	ASEAN-SEAFDEC Tsunami Affected Countries (Indonesia, Malaysia, Myanmar and Thailand)
Project Area:	The Andaman Sea Region
Sectors:	Aquatic Resources/fisheries, coastal environment and livelihoods
Project Title:	SEAFDEC Activities in Follow up to the Tsunami
Executing Agency:	Southeast Asian Fisheries Development Center

Key Collaborators:	FAO and other CONSRN members (NACA, WorldFish Centre and BOBP-IGO), and ADB in Banda Ache
Keystone:	1) Restoration and rehabilitation of the coastal importance resources and habitats for sustainable fisheries management and to a better management of fishing capacity through project implementation and coordination among international, regional and institutions at various level, and 2) Utilization of available local knowledge and practices to establish/develop a simple early warning system and response packages to the natural disaster.
Duration:	Three years
Starting date:	from early 2007 (proposed)
National partners:	Key institution are mainly aquatic resources/fisheries, coastal resources management authorities and local NGO's
National inputs:	Mainly in kind

2. PROJECT DESCRIPTION

Fishing and aquaculture households and coastal communities in the region were especially hard hit by the tsunami in December 2004. The impacts caused the death of fisher-folk as well as loss of fishing and aquaculture assets and related onshore infrastructure, both of which have reduced the ability of households to earn income and sustain livelihoods. This has also directly hit the pre-tsunami most vulnerable groups (poor fisher-folk communities, single headed households, illegal migrant workers, and others).

Large efforts have been made by agencies, groups of people, NGO's and international organizations in support of rehabilitation and restoration. During consultations by SEAFDEC with organizations, such as FAO and other CONSRN members and a field visit to Banda Ache, Indonesia, in April 2006, it was made known that important aspects to address include:

- Maintain and restore habitats and coastal features of importance for mitigation against natural hazards and of importance for sustainable fisheries
- Keep monitoring and manage fisheries capacity (reports indicates that there have been an increase in fishing capacity in some areas through the number of boats, gear, etc being provided)

In the process of implementation the basic strategy is to build upon expressed needs and in the wake of the tsunami, to improve management of fisheries, fishing capacity and to better manage costal environments, including coastal restoration as needed, as a protection against future hazards while at the same time provide an important element to the sustainability of the fisheries by securing important habitats. Capacity will be built to better involve – and listen to – villagers in affected areas.

The general approach to be taken is to pay attention to the interface in moving from restoration and rehabilitation to longer–term management responses. Co-ordination among regional, international and local organizations is another pillar of the project strategy. The task of restoration and rehabilitation involves the co-operation of a range of agencies and institutions at various levels. This includes institutions that are concerned with environment and conservation issues, as well as those mandated to consider the production and sustainable use of the natural resources and fisheries in the affected countries.

In the process of implementation four main aspects that have been highlighted in various *fora* will be addressed and incorporated in the process:

- The vulnerability of poorer coastal communities to natural hazards and the risk of them being (further) marginalized during the restoration process.
- Fishing capacity – concerns have been raised that in the process of restoration and rehabilitation there seems to be a risk of a potential increase in fishing capacity compared to before the tsunami.
- Maintaining geographical features in the coastal areas, recognizing the importance of features (mangroves, corals, dunes, etc.) in the coastal areas for protection against natural hazards needs to be assessed. As some of these areas are also important habitats to maintain fish productivity plans for their management and conservation should be developed with a view on sustainable fisheries management.
- Local knowledge and local organization: Several reports have pointed at the way in which certain coastal communities, based on their traditional knowledge, were facing less damage than other communities.

The immediate objective is, in the wake of the tsunami, to build up/rebuild capacity for the management of fisheries, fisheries capacity and important coastal habitats in selected areas. Results are to be delivered in four main categories:

1. Management options provided for the sustainable management of fisheries and habitats of importance for fish reproduction and protection against future natural hazards (introduction of the refugia concept).
2. Management of fishing capacity in the post-tsunami rehabilitation addressed.
3. Policy advice, technical advice and awareness raising on fisheries rehabilitation, sustainable fisheries and sustainable development provided.
4. A training programme for safety-at-sea and rescue at sea is initiated and partly implemented through training (of trainers).

Activities have been identified to support achievement of expected results, including activities of regional as well as national nature. Among general regional activities work will be done to develop criteria to identify important areas, identification of areas (refugia) for special management, synthesis and analysis of fisheries situation, establish priorities for restoration and maintenance of geographical features, establish management regimes for identified areas and in various related fields advises will be provided together with attempts to raise the awareness on the need for better management.

With a specific focus on fishing capacity surveys will be done on the actual numbers, sizes, seaworthiness, etc of boats available after the restoration stage and in conjunction an action plan will be developed to address over-capacity and the need to manage fishing effort. In terms of safety-at-sea and sea rescue a training programme will be developed and training for trainers will be provided with a focus on how to deal with natural hazards including integration, as applicable, of local knowledge and responses.

With a more national focus activities will be implemented that would include surveys of local knowledge and actions among ethnic groups and coastal communities in terms of responses to natural hazards and following that providing means of making local knowledge and practices available as input to processes to work out simple early warning system and response packages. In preparing and development of habitat and fisheries management activities will be done to review fisheries management systems in selected areas, to establish system to protect important nursery grounds and spawning areas in areas identified as critical habitats, to provide information on fish stocks conservation and sustainable fisheries practices (including efforts to mitigate effects of future natural disasters), to provide information on the importance to maintain coastal features (mangroves, sandy beaches, coral reefs, etc) and to develop and establish management regimes for the identified areas.

SEAFDEC-Sida Project on Activities in Follow up to the Tsunami

Proposed First Year (2007) Activities

	M 1	M 2	M 3	M 4	M 5	M 6	M 7	M 8	M 9	M 10	M 11	M 12
Project management												
Inception meetings (regional, Banda Aceh, Thai)												
Regional to first output:												
Develop criteria for significance of specific areas												
Prepare a regional synthesis on state of Andaman fisheries												
Fish stock conservation and sustainable fisheries practices												
Priorities for management of significant areas												
Priorities for rest and maintenance of geographical features												
Criteria and indicators for fish stock cons and protection	Y2											
Priorities and areas to develop a regional system of refugia	Y2											
Management regimes for identified areas	Y2											
Organize training sessions				----	----	----	----	---	---	----	----	----

PROGRAM DOCUMENT

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Fisheries Resources Survey and Operational Plan for MV SEAFDEC2
Lead Department: Training Department (TD)
Lead Country:
Duration: Since 2004

1. INTRODUCTION

Government of Japan gave a Fisheries Research and Training Vessel names MV SEAFDEC-2 to SEAFDEC/Training Department under the Japan's Grant Aid Scheme for Eligible Countries since March 2004. The vessel have been utilized by the Grant Aid Eligible Countries and other SEAFDEC member countries in order to conduct coastal fishery stock surveys while providing training in fishing and catch handling operations to. To achieve these activities and to ensure that main benefit of the MV SEAFDEC 2 is given to SEAFDEC member countries, therefore Eligible countries and operational committee was set up. Due to budget constraints in 2006 the meeting of Eligible Countries and Operation Committee is ceased, however utilization of MV SEAFDEC2 for the national fisheries resources program requested by member countries are maintained.

2. PROGRAM

2.1 Objectives

1) To support SEAFDEC member countries on the National Fisheries Resources Survey by utilizing the MV SEAFDEC2 under the Cost-Shared Policy,
2) To consult and advice to SEAFDEC member countries on the use of MV SEAFDEC2,
3) To compile the results and new findings from the national survey for re-analysis at the regional level
4) To endorse the 2007 tentative plan for utilization of MV SEAFDEC2 requested by SEAFDEC member countries

3. PROGRESS OF ACTIVITIES IN THE YEAR 2006

Project Activities

Review of Activities and achievements on Marine resource research survey by M.V.SEAFDEC2 in the year 2006 appear as **Appendix 2-1**.

National Research Program for 2006 (adjusted)

No.	Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Country	Remarks
1	Fisheries resources survey in Andaman sea (Longline & Trap)				M V SEADEC2 on DOCKING									Thai	PLL, BVL,Trap
2	Pelagic Fisheries resources survey in West Penisular, Malaysia													Malaysia	Acoustic Survey
3	Fishery Oceano, Marine Envi. & biology survey													Brunei Darussalam	TLL, BVL, Trap, Bottom trawl
4	Stock Assessment, SCS Area , 12 day at sea													Indonesia	High Opening Bottom Trawl, squid jigging
5	Colla. Fisheries resources survey in NE Palawan													Philippine	, BVL, PLL, fish pot,
6	Fisheries resources survey in the continental slope													Vietnam	Trap, BVL

4. PROPOSED ACTIVITIES FOR THE YEAR 2007

Tentative National Research Program for 2007 (Adjusted)

No.	Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Country	Remarks
1	Demersal Resources Status in Ayeyarwady Coastal Area and Gulf of Mottama													Myanmar	Bottom Trawl
2	Fisheries resources survey in Andaman sea (Longline & Trap)	#												Thailand	PLL, BVL,Trap
3	Colla. Fisheries resources survey in Southern Sulu sea									#				Philippine	Bottom trawl, BVL, PLL, fish pot,
4	Fishery resource survey, Pelagic Species													Cambodia	Bottom Trawl
5	Fishery resource survey, nothern part of Malaca Straits													Indonesia	Bottom Trawl
	PRR 6100 DATA COLLECTION	Collborative Work with Member Countries Based on Country Interest												MFRDMD	Oceanography issues

Appendix 2-1 of Annex 5

REVIEW OF ACTIVITIES AND ACHIEVEMENTS ON MARINE RESOURCE RESEARCH SURVEY BY M.V.SEAFDEC2 YEAR 2006

1. Summary of Work Activities and Achievements

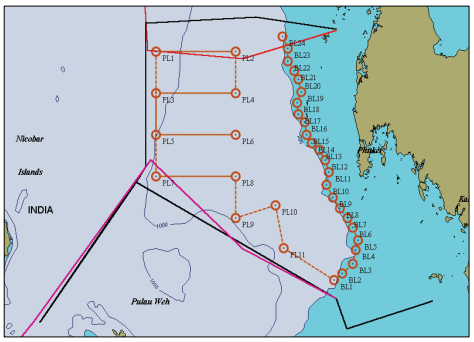
With regards to difference requirement of each SEAFDEC member countries that focus on the difference details and period of resource survey, SEAFDEC/TD had arranged the utilization of M.V.SEAFDEC2 year 2006 under the result from the meeting of Eligible Committee and Operational Committee of utilization of M.V. SEAFDEC2 in Bangkok held in Bangkok y October24-25 2005. Cruise plan of M.V. SEAFDEC2, in year 2006, were separated into six research cruises i.e., 1) Andaman Sea, Thailand: Cruise No.17-1/2006, 2) West Coast of Malaysia Peninsular, Malaysia: Cruise No.18-2/2006, 3) Zone 2, 3 and 4 of Brunei Waters, Brunei Darussalam: Cruise No.19-3/2006, 4) Natuna Utara and Anambus archipelago of Kalimantan: Cruise No.20-4/2006, 5) Sulu Sea, the Philippines Cruise No.21-5/2006 and 6) South China Sea, Vietnam waters: Cruise No. 22-6/2006 Total days of duties, both navigation and research programs were 173 days.

Under the unpredictable circumstance of the sea conditions during the shipboard research survey in each particular area, therefore the cruise schedule of training program was slightly changed from the original plan as. However, the program/activities were not changed from the aspects of the Marine Resource Research Survey original plan. The detailed Nationals Resources Research Surveys conducted by MV SEAFDEC2 year 2006 was reported as follows:

1.1 Andaman Sea, Thailand

Based on the bottom topographic features of the Andaman Sea which is narrow continental shelf and rocky bottom characteristic, Almost of the fishing area is untrawlable ground, therefore the marine resources survey on specific fishing gears suitable for untrawlable fishing ground is selected to conducted was as follows:

- Cruise objectives: To carry out the Thailand national resource research survey



1) Data collection and fishing samplings using pelagic longline, bottom vertical longline and Deep sea traps for the analysis of distribution, composition and relative abundance of demersal fishery resources in untrawlable ground.
2) To collect Physical Oceanographic data by using ICTD, TSG-Fluorometer.*
3) To collect Biological sample, plankton and marine larvae, by using Plankton and larvae net

- Activities of Shipboard Resource Research Survey was started from 12 January to 21 February 2006
- Achievement: 11 Pelagic longline operations, 15 Bottom vertical longline operation and 10 Deep sea trap operations and 18 oceanographic survey and plankton-larval sampling stations covering Andaman Sea in the Thailand Waters. (see Table 1.)

*ICTD Integrated Conductivity Temperature and Depth Sensor
TSG: Thermosalinograph with Fluorometer

Table 1: Partial details of the Marine Resources Research Survey in the Andaman Sea, Thailand.

Station No.	Date dd:mm:yy	Time hh:mm	Position		Oceanographic instruments				
			Latitude	Longitude	Bongo-net	ICTD	TSG	Sechi disc	Color
1	19/01/06	12:35	08°11'.53 N	096°43'.21 E	✔	✔	✔	✔	✔
2	20/01/06	08:00	08°08'.42 N	095°59'.33 E	✔	✔	✔	✔	✔
3	20/01/06	19:35	08°44'.72 N	095°45'.14 E	✔	✔	✔	✔	✔
4	23/01/06	15:00	09°14'.85 N	095°45'.34 E	✔	✔	✔	✔	✔
5	24/01/06	17:03	08°44'.68 N	096°45'.46 E	✔	✔	✔	✔	✔
6	28/01/06	07:15	07°56'.18 N	097°55'.81 E	✔	✔	x	✔	✔
7	29/01/07	08:00	07°35'.48 N	097°39'.84 E	✔	✔	✔	✔	✔
8	30/01/08	07:30	07°19'.92 N	098°04'.38 E	✔	✔	✔	✔	✔
9	30/01/ 06	17:05	07°08'.52 N	098°12'.69 E	✔	✔	✔	a	✔
10	1/02/06	07:00	06°53'.61 N	098°14'.95 E	✔	✔	✔	x	x
11	2/02/06	10:57	06°37'.44 N	098°05'.59 E	✔	✔	✔	✔	✔
12	5/02/06	13:00	08°08'.33 N	097°42'.73 E	✔	✔	✔	✔	✔
13	8/02/06	07:30	09°05'.42 N	096°34'.46 E	✔	✔	✔	✔	✔
14	9/02/06	07:50	08°18'.38 N	096°25'.44 E	✔	✔	✔	✔	✔
15	10/02/06	07:50	07°45'.34 N	095°50'.94 E	✔	✔	✔	✔	✔
16	11/02/06	07:45	07°37'.34 N	096°31'.10 E	✔	✔	✔	✔	✔
17	11/02/06	18:22	07°15'.43 N	096°45'.16 E	✔	✔	✔	✔	✔
18	13/02/06	07:45	07°00'.83 N	097°21'.13 E	✔	✔	✔	x	x
19	16/02/06	14:10	08°22'.30 N	097°35'.46 E	✔	✔	✔	✔	✔
20	17/02/06	12:00	08°22'.30 N	097°35.37 E	✔	✔	✔	✔	✔
21	17/02/06	14:50	08°47'.28 N	097°33'.34 E	✔	✔	✔	✔	✔

Oceanographic survey

Pelagic longline

Station No.	Date dd/mm/yy	Time hh/mm	Position		Number of Hook	Total catch	
			Latitude	Longitude		Number	Weight (kg)
1	19/01/06	0400-1545	08°12'.80 N	095°46'.00E	615	14	378.6
2	20-21/01/06	0400-0610	08°39'.90 N	095°44'.80 E	610	6	22.0
3	22-23/01/06	1730-1123	08°37'.80 N	095°44'.60 E	598	13	405.8
4	23-24/01/06	1735-1022	09°05'.60 N	095°45'.40 E	574	6	140.3
5	24-25/01/06	1800-0845	08°44'.10 N	096°44'.50 E	403	6	126.5
6	8/02/06	0408-1456	09°14'.40 N	096°44'.80 E	600	5	26.3
7	9/02/06	0400-1540	08°19'.43 N	096°40'.10 E	581	14	130.5
8	10/02/06	0432-1455	07°45'.50 N	095°42'.10 E	596	2	46.0
9	11/02/06	0433-1505	07°47'.10 N	096°41'.50 E	614	6	219.8
10	11/02/06	0431-1506	07°20'.10 N	096°35'.40 E	614	6	118.0
11	13/02/06	0434-1203	06°53'.90 N	097°12'.20 E	600	4	20.0

Bottom vertical longline

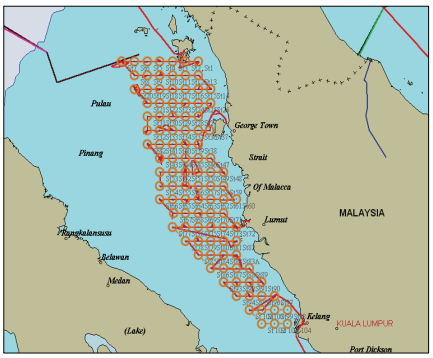
Station No.	Date dd/mm/yy	Time hh/mm	Position		Number of Hook	Total catch	
			Latitude	Longitude		Number	Weight (kg)
1	28/01/06	0538-1027	08°46'.70 N	097°32'.00 E	540	23	11.31
2	29/01/06	0541-1016	07°36'.30 N	097°59'.90 E	720	61	59.2
3	30/01/06	0535-1010	07°21'.30 N	098°04'.40 E	720	114	147.21
4	31/01/06	0535-1043	07°07'.60 N	098°13'.40 E	540	14	21.2
5		1318-1740	06°57'.60 N	098°15'.40 E	540	12	13.5

6	1/02/06	0537-1045	06°52'.90 N	098°15'.80 E	540	58	48.4
7		1405-1738	06°43'.00 N	098°08'.00 E	540	57	115.62
8	2/02/06	0640-1045	06°35'.80 N	098°06'.30 E	540	37	30.65
9		1415-1647	06°34'.60 N	098°05'.40 E	540	33	32.15
10	5/02/06	0529-0830	08°04'.70 N	097°47'.20 E	720	25	37.5
11		0532-1040	08°10'.30 N	097°41'.30 E	576	33	46.7
12	16/02/06	0540-1108	08°14'.10 N	097°37'.20 E	720	93	97.11
13		1320-1750	08°24'.30 N	097°34'.40 E	720	32	45.22
14	17/02/06	0540-1039	08°30'.30 N	097°32'.60 E	540	15	18.76
15	18/02/06	0538-1027	08°46'.70 N	097°32'.00 E	630	39	73

Deep sea trap

Station No.	Date dd/mm/yy	Time hh/mm	Position		Number of Trap	Total catch	
			Latitude	Longitude		Number	Weight (kg)
1	27-28/01/06	1605-1225	07°56'.10 N	097°53'.60 E	8	84	45.02
2	28-29/01/06	1536-1238	07°39'.90 N	097°58'.40 E	8	31	40.99
3	29-30/01/06	1733-1238	07°21'.80 N	098°04'.00 E	5	21	20.33
4	30-31/01/06	1623-0903	07°08'.10 N	098°13'.20 E	4	23	8.54
5	31/01-1/02/06	1844-0908	06°53'.70 N	098°15'.60 E	4	53	38.73
6	1-2/02/06	1909-0930	06°35'.70 N	098°05'.80 E	4	40	21.09
7	5-6/02/06	1405-0853	08°09'.50 N	097°41'.50 E	4	47	18.20
8	15-16/02/06	2005-0917	08°15'.90 N	097°36'.70 E	4	22	6.60
9	16-17/02/06	1913-0911	08°31'.70 N	097°32'.60 E	4	8	3.14
10	17-18/02/06	1607-0912	08°48'.20 N	097°32'.20 E	4	1	0.8

1.2 West Coast of Malaysia Peninsular, Malaysia



In the West Coast of Malaysia Peninsular that included the entrance of Malacca strait, Malaysia Waters, bottom topographic features, where shallower than 100 m depth, is trawlable ground, therefore the specific research activities in this area was as follows:

- Cruise objectives: To carry out the Malaysia national resource research survey

1) Data collection and fishing samplings using high opening-bottom trawl for analysis of distribution, composition and relative abundance of demersal-pelagic resources fishery resources.
2) To collect Physical Oceanographic data by using ICTD, TSG-Fluorometer.*
3) To collect Biological sample, plankton and marine larvae, by using Plankton and larvae net
4) To collect sediment and marine benthos sample for heavy metal analysis by Sediment Bottom Sampler
5) To collect data of stock assessment by Hydro-acoustic equipment, Scientific Echo sounder.

- Activities of Shipboard Resource Research Survey was started from 21 February – 20 March 2006
- Achievement: 23 stations of oceanographic data collection, plankton-larval and sediment-benthos sampling stations and 24 stations of trawl fishing operations were conducted. 81 Hydro-acoustic tracks have been completely recorded by scientific echo sounder during the resource survey (see Table 2.)

*ICTD Integrated Conductivity Temperature and Depth Sensor
TSG: Thermosalinograph with Fluorometer

Table 2: Partial details of Marine resource research survey in the West Coast of Malaysia Peninsula.

Oceanographic survey

Station No.	Date dd:mm:yy	Time hh:mm	Position		Oceanographic instruments				
			Latitude	Longitude	Bongo-net	ICTD	TSG	Sechi disc	Color
1	24/2/2006	07:00	06°89.08N	099_59.18 E	✔	✔	✔	x	x
2	24/2/2006	13:53	06°10.13 N	099_29.21 E	✔	✔	✔	✔	✔
3	25/2/2006	07:10	06°10.09 N	098_59.01 E	✔	✔	✔	x	x
4	26/2/2006	06:30	05°49.98 N	100_09.31 E	✔	✔	✔	x	x
5	26/2/2006	13:03	05°50.11 N	099_39.17 E	✔	✔	✔	✔	✔
6	27/2/2006	06:42	05°50.11 N	099_09.60 E	✔	✔	✔	x	x
7	28/2/2006	07:00	05°30.37 N	099_59.44 E	✔	✔	✔	x	x
8	28/2/2006	13:55	05°29.95 N	099_29.05 E	✔	✔	✔	x	x
9	3/3/2006	08:40	05°10.32 N	099_49.01 E	✔	✔	✔	✔	✔
10	3/3/2006	17:26	05°10.01 N	099_19.32 E	✔	✔	✔	✔	✔
11	4/3/2006	16:30	04°49.69 N	100_18.12 E	✔	✔	✔	✔	✔
12	5/3/2006	08:37	04°50.11 N	099_49.21 E	✔	✔	✔	x	x
13	6/3/2006	13:49	04°29.97 N	100_26.81 E	✔	✔	✔	x	x
14	6/3/2006	18:00	04°29.98 N	099_59.10 E	✔	✔	✔	✔	✔
15	7/3/2006	12:14	04°30.00 N	099_29.11 E	✔	✔	✔	✔	✔
16	8/3/2006	12:21	04°09.84 N	100_29.26 E	✔	✔	✔	✔	✔
17	10/3/2006	9:40	04°09.91 N	100_09.29 E	✔	✔	✔	✔	✔
18	10/3/2006	14:44	04°10.09 N	100_49.14 E	✔	✔	✔	✔	✔
19	11/3/2006	16:11	03°49.96 N	100_09.37 E	✔	✔	✔	✔	✔
20	12/3/2006	7:00	03°49.68 N	100_27.16 E	✔	✔	✔	x	x
21	12/3/2006	16:10	03°29.51 N	100_49.39 E	✔	✔	✔	✔	✔
22	13/3/2006	8:34	03°30.03 N	100_29.07 E	✔	✔	✔	✔	✔
23	14/3/2006	7:09	03°10.21 N	100_49.61 E	✔	✔	✔	x	x

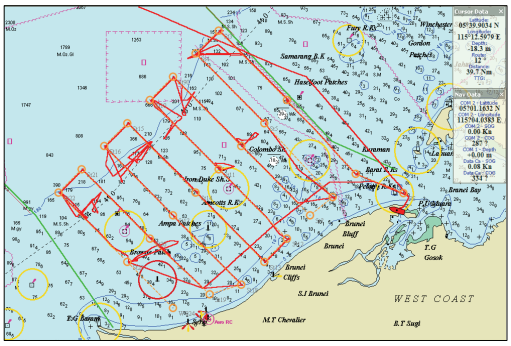
Bottom trawl survey

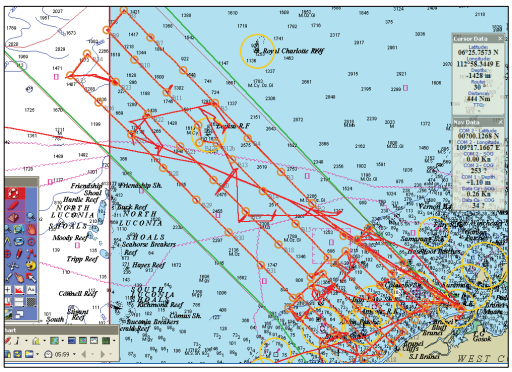
Station No.	Date dd/mm/yy	Time hh/mm	Position		Total catch	Remark
			Latitude	Longitude	Weight (kg)	
1	24/2/2006	17:34-18:08	06°09'.40 N	099°17'.60 E	4.26	
2	25/2/2006	12:26-12:56	05°59'.30 N	099°17'.70 E	37.84 kg	
3		15:05-1535	06°00'.40 N	099°30'.00 E	26.96	
4	26/2/2006	0937-1007	05°51'.00 N	099°59'.60 E	52.17	30 minute
5		1602-1632	05°49'.50 N	099°28'.10 E	35.8	
6	27/2/2006	1024-1054	05°40'.00 N	099°17'.40 E	40.64	
7		1510-1540	05°39'.00 N	099°48'.70 E	35.07	
8	28/2/2006	1134-1204	05° 32'.20 N	099° 38'.80 E	71.34	
9		1805-1835	05° 18'.90 N	099° 18'.50 E	35.07	
10	3/03/2006	1103-1133	05° 11'.41 N	099° 48'.45 E	24.83	
11		1604-1634	05° 08'.40 N	099° 20'.00 E	91.38	
12	4/03/2006	0749-0830	05° 00'.10 N	099° 29'.00 E	31.0	
13		1145-1215	05° 02'.37 N	099° 49'.01 E	11.66	
14	5/03/2006	1045-1115	04° 53'.81 N	099° 48'.36	15.46	
15		1530-1600	04° 41'.40 N	099° 30'.50 E	14.72	
16	6/03/2006	0747-0837	04° 39'.70 N	099° 50'.60 E	55.12	
17	7/03/2006	0856-0922	04° 28'.90 N	099° 49'.60 E	4.2	
18		1518-1600	04° 19'.20 N	099° 38'.80 E	35.28	
19	8/03/2006	0748-0818	04° 18'.78 N	100° 00'.80 E	24.87	
20	10/03/2006	1124-1154	04° 11'.22 N	100° 10'.22 E	2.99	
21		1610-1630	04° 10'.70 N	099° 48'.40 E	19.40	
22	11/03/2006	1109-1139	04° 01'.42 N	099° 58'.20 E	14.32	

23	13/03/2006	1025	03° 29'.37 N	100° 28'.91 E	14.12	
24		1545-1615	03° 22'.30 N	100° 37'.80 E	14.52	

1.3 Zone 2, 3 and 4 of Brunei Waters, Brunei Darussalam

The marine resource research survey in Brunei waters is composed by 2 main targeted resources i.e., demersal resources in zone II, III and pelagic resources in zone IV The demersal resources in Zone 2-3 is specific to the depth 100-150 m, beyond the efficiency of Brunei trawlers. The pelagic resource survey is specific targeted on the large pelagic resources e.g. tunas, marlin sword fish etc in Palawan through, Brunei Darussalam EEZ. The specific research activity in this area was as follows:





- Cruise objectives: To carry out the Brunei Darussalam national research survey

1) Data collection and fishing samplings using high opening-bottom trawl for analysis of distribution, composition and relative abundance of demersal resources fishery resources in non-harvested trawl fishing ground in Zone 2-3 depth 100-150 m.

Data collection and fishing samplings using pelagic longline for analysis of distribution, composition and relative abundance of pelagic resources in Zone 4

2) To collect Physical Oceanographic data by using ICTD, TSG-Fluorometer.*
3) To collect Biological sample, plankton and marine larvae, by using Plankton and larvae net.
4) To collect sediment and marine benthos sample for heavy metal analysis by Sediment Bottom Sampler
5) To collect data of stock assessment by Hydro-acoustic equipment, Scientific Echo sounder.

- Activities of Shipboard Resource Research Survey was started from 29 May – 26 June 2006
- Achievement: 23 stations in zone II, III and 15 stations in zone IV were conducted oceanographic data collection. 7 stations of bottom trawl fishing operations and 6 pelagic longline fishing operations were conducted during survey. 64 Hydro-acoustic tracks have been completely recorded by scientific echo sounder during the resource survey (see Table 3.)

*ICTD Integrated Conductivity Temperature and Depth Sensor
TSG: Thermosalinograph with Fluorometer

Table 3: Partial details of the Marine resource research survey in the Zone 2, 3 and 4, Brunei Darussalam Waters.

Oceanographic survey Zone II and III

Station	Date	Time	Position		Oceanographic instruments						
No.	dd:mm:yy	hh:mm	Latitude	Longitude	ICTD	TSG	Grab	FL net	Bongo	Sechi D.	Color
1	3/6/2006	10:10	05°08'.94 N	114°55'.12 E	✔	✔	✔	✔	✔	✔	✔
2		13:55	05°24'.71 N	114°40'.00 E	✔	✔	✔	✔	✔	✔	✔
3		17:05	05°40'.00 N	114°25'.18 E	✔	✔	X	✔	✔	✔	✔
4	4/6/2006	09:20	05°34'.94 N	114°19'.99 E	✔	✔	X	✔	✔	✔	✔
5		12:16	05°20'.43 N	114°34'.78 E	✔	✔	✔	✔	✔	✔	✔
6		15:34	05°03'.85 N	114°50'.34 E	✔	✔	✔	✔	✔	✔	✔
7		17:11	05°02'.81 N	114°42'.36 E	✔	✔	✔	✔	✔	✔	✔
8	5/6/2006	05:46	05°15'.29 N	114°30'.45 E	✔	✔	✔	✔	✔	x	x
9		09:00	05°30'.02 N	114°15'.04 E	✔	✔	X	✔	✔	✔	✔
10		14:25	05°24'.85 N	114°10'.18 E	✔	✔	X	✔	✔	✔	✔
11	6/6/2006	05:46	05°09'.99 N	114°25'.34 E	✔	✔	✔	✔	✔	x	x
12		08:58	04°54'.81 N	114°40'.15 E	✔	✔	✔	✔	✔	✔	✔
13		10:36	04°49'.92 N	114°35'.01 E	✔	✔	✔	✔	✔	✔	✔
14		13:41	05°05'.03 N	114°20'.22 E	✔	✔	✔	✔	✔	✔	✔
15		16:43	05°20'.17 N	114°05'.11 E	✔	x	X	✔	✔	✔	✔
16	7/6/2006	11:26	05°15'.10 N	114°00'.26 E	✔	✔	X	✔	✔	✔	✔
17		14:35	04°59'.90 N	114°15'.23 E	✔	✔	✔	✔	✔	✔	✔
18		17:45	04°44'.97 N	114°30'.13 E	✔	✔	✔	✔	✔	✔	✔
19	9/6/2006	08:42	04°44'.22 N	114°21'.62 E	✔	x	✔	✔	✔	✔	✔
20	8/6/2006	05:45	04°54'.97 N	114°10'.22 E	✔	✔	✔	✔	✔	x	x
21		08:48	05°10'.07 N	113°55'.14 E	✔	✔	X	✔	✔	✔	✔
22		10:35	05°04'.91 N	113°50'.07 E	✔	✔	x	✔	✔	✔	✔
23	9/6/2006	05:50	04°50'.30 N	114°06'.16 E	✔	✔	✔	✔	✔	x	x

Oceanographic survey Zone IV

Station	Date	Time	Position		Oceanographic instruments					
No.	dd:mm:yy	hh:mm	Latitude	Longitude	ICTD	TSG	FL net	Bongo	Sechi.	Color
1	11/6/2006	13:28	05°36'.46 N	114°14'.24 E	✔	✔	✔	✔	✔	✔
2		18:18	06°03'.23 N	113°48'.18 E	✔	✔	✔	✔	x	x
3	12/6/2006	05:49	06°34'.24 N	113°17'.83 E	✔	✔	✔	✔	x	x
4		10:54	07°02'.56 N	112°49'.99 E	✔	✔	✔	✔	✔	✔
5		15:03	07°05'.67 N	112°30'.91 E	✔	✔	✔	✔	✔	✔
6	13/6/2006	05:45	06°38'.67 N	112°57'.06 E	✔	✔	✔	✔	-	-
7		11:18	06°09'.57 N	113°25'.70 E	✔	✔	✔	✔	✔	✔
8		16:20	05°41'.47 N	113°53'.51 E	✔	✔	✔	✔	✔	✔
9	14/6/2006	05:42	05°18'.47 N	114°00.16 E	✔	✔	✔	✔	x	x
10		10:51	05°47'.82 N	113°31'.47 E	✔	✔	✔	✔	✔	✔
11		15:51	06°15'.41 N	113°03'.10 E	✔	✔	✔	✔	✔	✔
12	15/6/2006	05:43	06°20'.43 N	112°41'.54 E	✔	✔	✔	✔	x	x
13		10:50	05°51'.90 N	113°10'.19 E	✔	✔	✔	✔	✔	✔
14		15:51	05°23'.61 N	113°38'.42 E	✔	✔	✔	✔	✔	✔
15	19/6/2006	09:04	06°43'.23 N	112°35'.02 E	✔	x	✔	✔	✔	✔

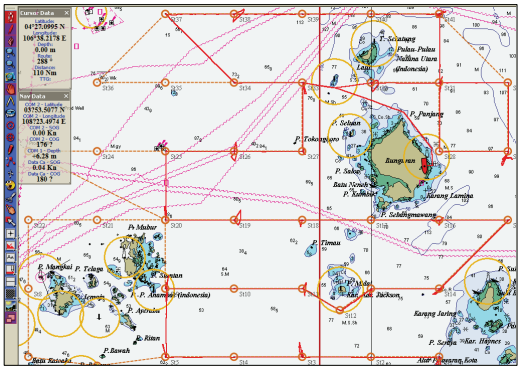
Trawl fishing

Station No.	Date dd/mm/yy	Time hh:mm	Position		Total catch	Remark
			Latitude	Longitude	Weight (kg)	
1	4/6/2006	06:42-07:42	05°35.06 N	114°25.56 E	172.35	
2	5/6/2006	11:20-12:20	05°25.30 N	114°18.65 E	161.98	
3		16:44-1744	05°16.78 N	114°12.92 E	168.56	
4	7/6/2006	05:58-0658	05°15.11 N	114°09.53 E	95.62	
5		08:58-0958	05°11.07 N	114°05.75 E	65.55	
6	8/6/2006	13:09-1409	05°04.12 N	113°58.77 E	179.4	
7		15:55-1655	05°02.85 N	113°56.85 E	92.55	

Pelagic longline

Station No.	Date dd/mm/yy	Time hh/mm	Position		Number of Hook	Total catch	
			Latitude	Longitude		Number	Weight (kg)
1	19/6/2006	04:30-19:38	06°46.55 N	112°26.04 E	322	12	60.3
2	20/6/2006	04:00-19:25	06°28.16 N	112°46.54 E	620	12	100.3
3	21/6/2006	04:00-18:20	06°33.97 N	113°17.07 E	600	21	58.9
4	22/06/2006	04:00-16:48	05°54.42 N	113°18.01 E	600	24	75.3
5	23/06/2006	04:00-17:45	05°42.96 N	113°28.72 E	600	16	90.4
6	24/06/2006	04:00-15:15	05°45.42 N	113°56.83 E	600	24	64.8

1.4 Natuna Utara and Anambus archipelago of Kalimantan, Indonesia Waters



The marine resource research survey in Indonesia waters is targeted for demersal resources around Natuna Utara and Anambus archipelago. Automatic squid jigging was an option for demonstrating during conducted resource survey. Even though the bottom topographic features of the Natuna Utara and Anambus archipelago was trawlable ground but it is found difficult with unsettle sea current condition and strong gale by Southwest monsoon. The specific research activity in this area was as follows:

- Cruise objectives: To carry out the Malaysia national resource research survey

1) Data collection and fishing samplings using high opening-bottom trawl for analysis of distribution, composition and relative abundance of demersal resources fishery resources in the trawlable fishing ground in the area around Natuna Utara and Anambus Archipelago, Indonesia Waters

2) To collect Physical Oceanographic data by using ICTD, TSG-Fluorometer.*

3) To collect Biological sample, plankton and marine larvae, by using Plankton and larvae net.

4) To collect data of stock assessment by Hydro-acoustic equipment, Scientific Echo sounder.

- Activities of Shipboard Resource Research Survey was started from 28 June – 13 July 2006
- Achievement: 30 stations were conducted oceanographic data collection. 12 Trawl fishing operations and 4 squid jigging operations were conducted during survey. 33 Hydro-acoustic tracks have been completely recorded by scientific echo sounder during the resource survey (see Table 4.)

*ICTD Integrated Conductivity Temperature and Depth Sensor
TSG: Thermosalinograph with Fluorometer

Table 4: Partial details of the Marine resource research survey in Natuna Utara and Anambus archipelago, Indonesia Waters

Oceanographic Survey

Station No.	Date dd:mm:yy	Time hh:mm	Position		Oceanographic instruments				
			Latitude	Longitude	ICTD	TSG	Bongo	Sechi D.	Color
1	2/07/2006	10:40	2°30.09 N	108°30.10 E	✔	✔	✔	✔	✔
2		16:35	2°29.83 N	107°59.90 E	✔	✔	✔	✔	✔
3	3/07/2006	05:44	2°30.05 N	107°30.10 E	✔	✔	✔	-	-
4		13;50	2°29.92 N	108°30.10 E	✔	✔	✔	✔	✔
5	4/07/2006	05:45	3°00.22 N	106°30.28 E	✔	✔	✔	-	-
6		11:54	2°59.99 N	107°00.46 E	✔	✔	✔	✔	✔
7		15:29	2°59.95 N	107°30.30 E	✔	✔	✔	✔	✔
8	5/07/2006	05:42	3°00.08 N	108°00.27 E	✔	✔	✔	-	-
9		09:28	2°59.95 N	108°30.39 E	✔	✔	✔	✔	✔
10		16:40	3°30.02 N	109°00.44 E	✔	✔	✔	✔	✔
11	6/07/2006	05;39	3°29.94 N	109°30.10 E	✔	✔	✔	-	-
12		10:59	3°30.00 N	108°00.15 E	✔	✔	✔	✔	✔
13		14:35	3°29.96 N	107°30.14 E	✔	✔	✔	✔	✔
14	7/07/2006	05:40	3°29.88 N	107°00.15 E	✔	✔	✔	-	-
15		09:23	3°30.08 N	106°30.10 E	✔	✔	✔	✔	✔
16		16:00	4°00.01 N	106°30.40 E	✔	✔	✔	✔	✔
17	8/07/2006	05:45	4°00.01 N	106°30.40 E	✔	✔	✔	-	-
18		09:40	3°59.90 N	107°30.40 E	-	✔	✔	✔	✔
19		15:00	4°30.69 N	107°30.32 E	✔	✔	✔	✔	✔
20	9/07/2006	05:44	4°29.78 N	107°59.80 E	✔	✔	✔	-	-
21		09:20	4°29.87 N	108°30.40 E	✔	✔	✔	✔	✔
22		15:22	3°59.80 N	108°30.20 E	✔	✔	✔	✔	✔
23	10/07/2006	05:57	3°59.81 N	109°00.09 E	✔	✔	✔	-	-
24		12:01	4°30.11 N	109°00.28 E	✔	✔	✔	✔	✔
25	11/07/2006	05:43	5°00.01 N	108°30.16 E	✔	✔	✔	-	-
26		11:54	5°00.00 N	108°00.00 E	-	✔	✔	✔	✔
27		16:14	4°59.94 N	107°30.00 E	-	✔	✔	✔	✔
28	12/07/2006	05:43	4°59.89 N	106°59.85 E	✔	✔	✔	-	-
29		09:40	5°00.10 N	106°29.98 E	-	✔	✔	✔	✔
30		15:45	4°59.98 N	107°30.37 E	-	✔	-	✔	✔

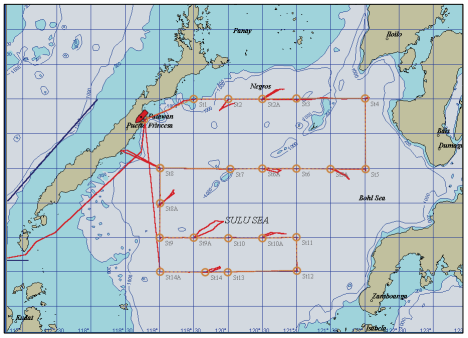
Trawl fishing

Station No.	Date dd/mm/yy	Time hh/mm	Position		Total catch	Remark
			Latitude	Longitude	Weight (kg)	
1	2/07/2006	11:33-12:33	02° 28.87 N	108° 29.83 E	32.99	
2	3/07/2006	14:40-15:40	02° 31.30 N	106° 29.90 E	91.71	
3	4/07/2006	07:00-08:00	02° 58.10 N	106° 30.60 E	129.00	
4		10:32-11:28	02° 59.67 N	108° 30.77 E	260.00	
5	5/07/2006	16:35-17:35	02° 58.10 N	107° 31.10 E	134.92	
6	6/07/2006	06:50-07:10	03° 29.90 N	108° 30.70 E	250.87	
7		15:39-15;40	03° 28.20 N	107° 29.00 E	-	Cancelled
8	7/07/2006	10:23-11:48	03° 28.20 N	107° 29.00 E	190.92	
9	8/07/2006	15:55-16:55	04° 29.05 N	107° 30.66 E	87.22	
10	9/07/2006	10:32-11:48	4° 28.15 N	108° 30.53 E	126.45	
11	10/07/2006	06:43-07:43	03° 58.00 N	108° 59.20 E	28	
12	10/07/2006	07:26-07:57	05° 00.45 N	108° 30.67 E	26.7	

Squid jigging

Station No.	Date dd/mm/yy	Time hh/mm	Position		Number of machine	Total catch	
			Latitude	Longitude		Number	Weight (g)
1	2/07/06	20:00-23:30	02°30'.40 N	107°29'.50 E	2	1	110
2	6/07/06	20:50-22:00	03°28'.30 N	107°02'.10 E	2	2	550
3	7/07/06	21:00-23:00	03°56'.80 N	107°00'.60 E	2	-	-
4	9/07/06	20:50-22:30	03°56'.90 N	108°58'.20 E	2	-	-

1.5 Sulu Sea, the Philippines



The marine resource research survey in The Philippine waters is conducted in Sulu Sea together with DA BFAR, Research Vessel of BFAR/Philippine. Main targeted survey was pelagic resources. The pelagic resource survey is specific targeted on the large pelagic resources e.g. tunas, marlin, sword fish, etc and small pelagic resources i.e. oceanic squid, in Sulu Sea. The specific research activity in this area was as follows:

- Cruise objectives: To carry out the Philippines national resource research survey

1) Data collection and fishing samplings using pelagic longline for analysis of distribution, composition and relative abundance of pelagic resources in Sulu Sea

2) To collect Physical Oceanographic data by using ICTD, TSG-Fluorometer.*

3) To collect Biological sample, plankton and marine larvae, by using Plankton and larvae net.

4) To collect data of stock assessment by Hydro-acoustic equipment, Scientific Echo sounder.

- Activities of Shipboard Resource Research Survey was started from 27 September to 19 October 2006
- Achievement: 6 pelagic longline operations, 8 squid jigging operation and 16 oceanographic survey and plankton-larval sampling stations covering Sulu Sea area in the Philippines waters (see table 5.)

*ICTD Integrated Conductivity Temperature and Depth Sensor
TSG: Thermosalinograph with Fluorometer

Table 5: Partial details of the Marine resource research survey in Sulu Sea, The Philippines waters.

Oceanographic Survey

Station No.	Date dd:mm:yy	Time hh:mm	Position		Oceanographic instruments					
			Latitude	Longitude	ICTD	TSG	Vandon	Bongo	Sechi.	Color
1	5/10/2006	13:41	09°59'.95 N	119°30'.00 E	✔	✔	✔	✔	a	✔
2	6/10/2007	11:53	10°00'.04 N	120°00'.07 E	✔	✔	✔	✔	✔	✔
3	7/10/2007	10:51	09°59'.97 N	120°30".10 E	✔	✔	✔	✔	✔	✔
4	7/10/2007	15:20	09°59'.46 N	120°59.94 E	✔	✔	✔	✔	✔	✔
5	8/10/2007	05:55	10°00'.49 N	122°00'.11 E	✔	✔	✔	✔	x	x
6	8/10/2007	13:44	08°59'.26 N	122°00'.26 E	✔	✔	✔	✔	✔	✔
7	9/10/2007	13:19	08°59'.82 N	120°59'.92 E	✔	✔	✔	✔	✔	✔
8	10/10/2007	12:36	08°59'.47 N	120°01'.89 E	✔	✔	✔	✔	✔	✔
9	12/10/2006	11:12	08°59'.97 N	119°00'.52 E	✔	✔	✔	✔	✔	✔
10	13/10/2006	13:37	07°59'.73 N	118°59'.90 E	✔	✔	✔	✔	✔	✔

11	13/10/2006	20:37	08°06'.95 N	119°46'.64 E	✔	✔	✔	x	x	x
12	14/10/2006	14:22	07°59'.86 N	120°00'.17 E	✔	✔	✔	✔	✔	✔
13	15/10/2006	12:00	08°80'.79 N	121°00'.10 E	✔	✔	✔	✔	✔	✔
14	15/10/2006	16:03	07°31'.03 N	121°00'.36 E	✔	✔	✔	✔	✔	✔
15	16/10/2006	07:30	07°33'.73 N	119°53'.07 E	✔	✔	✔	✔	✔	✔
16	16/10/2006	17:05	07°30'.13 N	119°25'.01 E	✔	✔	✔	✔	✔	✔

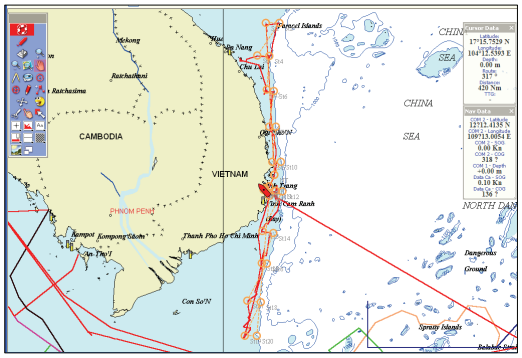
Pelagic longline

Station No.	Date dd/mm/yy	Time hh/mm	Position		Number of Hook	Total catch	
			Latitude	Longitude		Number	Weight (kg)
1	5-6/10/2006	19:03-10:25	09°59'.60 N	120°01'.10E	600	39	357.3
2	6-7/10/2006	18:03-10:35	10°00'.30 N	120°30'.80E	575	35	191.9
3	8-9/10/2006	18:10-09:15	08°59'.50 N	121°30'.30E	600	33	172.3
4	9-10/10/2006	17:50-08:53	08°59'.70 N	120°30'.50 E	627	49	160.1
5	12-13/10/2006	17:45-09:57	08°29'.70 N	119°00'.50 E	595	35	123.43
6	13-14/10/2006	18:04-10:15	08°00'.10 N	119°30'.30 E	591	89	146.0
7	14-15/10/2006	18:28-08:30	08°00'.60 N	120°30'.50 E	500	67	127
8	16/10/2006	04:30-15:04	07°29'.60 N	119°40'.80E	500	8	106.8

Squid Jigging

Station No.	Date dd/mm/yy	Time hh/mm	Position		Number of machine	Total catch	
			Latitude	Longitude		Number	Weight (g)
1	6/10/2006	21:40-24:00	10°08'.80 N	120°45'.90 E	2	4	790
2	8/10/2006	21:00-24:00	10°08'.80 N	120°45'.90 E	2	23	5050
3	9/10/2006	21:00-24:00	08°56'.01 N	120°43'.85 E	4	21	2691
4	12/10/2006	21:00-24:00	08°38'.78 N	119°12'.27 E	4	8	1770
5	13/10/2006	21:00-24:00	08°38'.78 N	119°12'.27 E	2	1	30
6	14/10/2006	21:00-24:00	08°04'.05 N	120°43'.30 E	2	4	430

1.6 South China Sea, Vietnam waters



The marine resource research survey in South China Sea, Vietnam waters is targeted for demersal resources in untrawlable area. The area of continental slope as depth is more than 100 m. bottom vertical longline and deep sea pot operations was conducted during resource survey. The survey was disturbed by unsettle condition from Tropical typhoon and strong northeast monsoon and operation both fish sampling and oceanographic data collection found difficult under unsettle weather condition. The specific research activity in this area was as follows:

- Cruise objectives: To carry out the Vietnam national research survey

1) Data collection and fishing samplings using bottom vertical longline and deep sea pot for analysis of distribution, composition and relative abundance of demersal resources fishery resources in untrawlable fishing ground.

2) To collect Physical Oceanographic data by using ICTD, TSG-Fluorometer.*

3) To collect Biological sample, plankton and marine larvae, by using Plankton and larvae net.

- Activities of Shipboard Resource Research Survey was started from 19 October – 18 November 2006

- Achievement: All 16 stations of oceanographic data collection were conducted. For Training sediment samplings, there were 2 operations for sediment collection by Smith-Mcintyre and 1 operation using gravity Core sampler. For fishing operation training, with regards to the types of bottom mostly were rocky areas, therefore only 1 bottom trawl was conducted. In addition, 11 Bottom vertical longline, 6 fish trap were operated for fish samplings training. (see Table 6).

*ICTD Integrated Conductivity Temperature and Depth Sensor
TSG: Thermosalinograph with Fluorometer

Table 6: Partial details of the Marine resource research survey in South China Sea, Vietnam waters.

Oceanographic survey

Station No.	Date dd:mm:yy	Time hh:mm	Position		Oceanographic instruments					
			Latitude	Longitude	ICTD	T/D	TSG	Bongo	Sechi.	Color
1	24/10/06	1535	16°50'.83 N	109°17'.06 E	✔	✔	✔	✔	✔	✔
2	25/10/06	1400	16°53'.62 N	109°36'.83 E	x	✔	✔	x	x	x
3	26/10/06	1500	15°57'.37 N	109°21'.52 E	x	✔	✔	x	x	x
4	28/10/06	1448	15°43'.45 N	109°03'.46 E	x	✔	✔	✔	✔	✔
5	29/10/06	0750	15°00'.33 N	109°17'.57 E	x	✔	✔	✔	✔	✔
6	29/10/06	1307	14°54'.11 N	109°26'.90 E	✔	x	✔	✔	✔	✔
7	30/10/06	0941	13°54'.91 N	109°23'.86 E	x	✔	✔	✔	✔	✔
8	30/10/06	1643	13°40'.03 N	109°31'.34 E	x	✔	✔	✔	x	x
9	31/10/06	0816	12°56'.19 N	109°34'.08 E	x	✔	✔	x	x	x
10	6/11/06	0752	12°07'.23 N	109°31'.99 E	✔	✔	✔	✔	✔	✔
11	6/11/06	1111	11°49'.44 N	109°39'.28 E	x	✔	✔	✔	✔	✔
12	7/11/06	0802	10°59'.90 N	109°09'.18 E	✔	x	✔	✔	✔	✔
13	7/11/06	1246	10°54'.91 N	109°23'.44 E	✔	✔	✔	✔	x	x
14	8/11/06	0950	10°12'.93 N	109°10'.19 E	✔	x	✔	✔	✔	✔
15	8/11/06	1237	10°04'.97 N	109°08'.62 E	✔	x	✔	✔	✔	✔
16	9/11/06	0804	09°12'.71 N	108°59'.86 E	✔	x	✔	✔	✔	✔
17	9/11/06	1220	09°02'.80 N	108°46'.55 E	✔	✔	✔	✔	✔	✔
18	10/11/06	0800	08°12'.06 N	108°49'.01 E	✔	✔	✔	✔	x	x
19	10/11/06	1220	07°59'.84 N	108°39'.52 E	✔	✔	✔	✔	✔	✔

Bottom Vertical Longline

Station No.	Date dd/mm/yy	Time hh/mm	Position		Number of Hook	Total catch	
			Latitude	Longitude		Number	Weight (kg)
1	24-25/10/06	1404-1747	16°51'.43 N	109°16'.59 E	720	30	18.27
2	25/10/06	1045-1638	16°54'.70 N	109°36'.50 E	540	12	9.4
3	26/10/06	0545-1258	15°58'.60 N	109°19'.80 E	630	5	1.1
4	28/10/06	1200-1658	15°44'.95 N	109°02'.07 E	540	16	6.8
5	29/10/06	0453-0950	15°01'.50 N	109°16'.50 E	530	6	3.1
6		1217-1518	14°55'.10 N	109°26'.50 E	540	2	1
7	30/10/06	0445-0930	13°58'.30 N	109°23'.50 E	540	17	6.1
8		1153-1634	13°45'.78 N	109°30'.30 E	540	2	0.5
9	31/10/06	0442-0800	12°58'.10 N	109°33'.80 E	540	15	12.5
10	05/11/06	1028-0800	12°07'.71 N	109°31'.60 E	540	6	2.65
11	06/11/06	1250-1536	11°41'.08 N	109°37'.60 E	360	1	0.3
12	07/11/06	0430-1000	11°00'.20N	109°09'.80 E	540	7	2.6
13		1145-1536	10°57'.48N	109°24'.89 E	540	0	0
14	08/11/06	0430-0940	10°18'.84N	109°11'.97 E	540	13	2.9
15		1152-1655	10°06'.20N	109°08'.90E	540	1	0.8

16	09/11/06	0430-1030	09°13'.78N	108°59'.10E	540	13	12.5
17		1143-1638	09°03'.40N	108°47'.10E	360	14	9.15
18	10/11/06	0424-0940	08°14'.14N	108°48'.36E	450	11	13.8
19		1140-1715	08°00'.60N	108°39'.80 E	450	19	9.5

Deep sea trap

Station No.	Date dd/mm/yy	Time hh/mm	Position		Number of Trap	Total catch	
			Latitude	Longitude		Number	Weight (kg)
1	24-25/10/06	1455-0645	16°52'.60 N	109°16'.80 E	80	63	6.38
2	25-26/10/06	1128-1812	16°55'.47 N	109°36'.90 E	80	0	0
3	26/10/06	0630	15°58'.80 N	109°21'.20 E	65	0	0
4	05/11/06	1005	12°09'.12 N	109°32'.41 E	50	0	0

PROJECT CONCEPT NOTE

(Converted from Power Point Presentation)

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Tagging Program for Economically Important Pelagic Species in the South China Sea and Andaman Sea
Lead Department: MFRDMD
Lead Country: To be identified
Duration: 2007-2011

1. BACKGROUND

- Quite crucial information of "migratory shared stock" for stock assessment and fisheries management (SEAFDEC Seminar 1981)
- No plan of research subject on migratory patterns for small pelagic fishes in the South China Sea in the JTF II project from 2001-2006
- Fragmentary research results on migration of Indian mackerels (*Rastrelliger*) in the Gulf of Thailand by DoF, Thailand, and the Andaman Sea by DoFs, Thailand and Malaysia
- Proposal for implementation of a tagging program in the concerning sea area in the Technical Group Meeting of JTF II project held in 16-19 January 2006 at MFRDMD

2. OBJECTIVES

1) To identify movement habit and migratory routes of the target small pelagic fishes in the South China Sea and Andaman Sea
2) To identify subpopulation(s)
3) To estimate some growth parameters
4) To estimate stock parameters of F and M on the basis of monthly recapture data (if possible)

3. TENTATIVE PROGRAM PLAN

1st Year

- Formulation of the program plan in the 1st Core Expert Meeting
- Demonstration of tagging in Thailand by attendance of the member countries
- On-site training of tagging in each member country (method & data analysis)
- Poster making and publicity
- Development of a database for release and recapture tagged fish

2nd Year

- Implementation of tagging activity in each participating member country
- Data compilation (tagging and oceanography condition)
- 2nd Core Expert Meeting (movement, short-term growth, recapture rate etc)

3rd Year

- Implementation of tagging activity in each participating member country
- Data compilation (tagging and oceanography condition)
- 3rd Core Expert Meeting (movement, short-term growth, recapture rate etc)

4th Year

- Implementation of tagging activity in each participating member country
- Data compilation (tagging and oceanography condition)
- 4th Core Expert Meeting (movement, short-term growth, recapture rate etc)

5th Year

- Data compilation and analysis
- Interdepartmental Meeting
- RTC (movement, migration, growth, biological parameters, stock assessment)
- Terminal report

PROJECT CONCEPT NOTE

(Converted from Power Point Presentation)

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Deep Sea Fisheries Resources Exploration in the Southeast Asia
Lead Department: TD in collaboration with MFRDMD
Lead Country: To be identified
Duration: 2007-2011

1. BACKGROUND

- Refer to Report of the ASEAN-SEAFDEC Regional Technical Consultation on International Fisheries Related Issues held on 18 September 2006, Phuket, Thailand, *Recommended* to "Investigate of deep-sea resources in Southeast Asia in order to determine status of such resources to provide scientific basis for future formulation of management policy and interventions measures".
- Deep sea fisheries resource in the Southeast Asian region is one of the important challenge issues that it is believed that the resources are under-exploited resources and the last, that still existing in the region. Consideration of geography feature in the region, more than 50% of the sea surface area are the deep sea where the depth of water more than 200m.
- It is clear that Research Vessel for deep sea survey seems to be one of the main factors that many countries in region facing, modification of fishing operation on those vessels may necessary.
- To do these, SEAFDEC/TD proposed the Regional Supporting Program on Deep Sea Fisheries Resources Exploration in the Southeast Asian Waters

2. PROGRAM OBJECTIVES AND TASKS

- To investigate the deep sea fisheries resources in collaboration with the SEAFDEC member countries through using of MV SEAFDEC2 under the cost-shared policy
- Information Collection of biological and Physical parameters
- To support the national resources survey using national research vessel by advice member countries on the improving of fishing gear and methods for deep sea fish samplings
- To provide the human resources development on samplings/harvesting of deep sea fisheries resources, Identification of deep sea fishes and larval fishes:
- Taxonomy and Development of appropriated/ responsible fishing gear and methods

3. MAIN ACTIVITIES of PROGRAM

- Activity 1: Supporting of Actual Deep Sea Fisheries Resources Survey
- Activity 2: Biological and Physical Information of Deep Sea Resources
- Activity 3: Development/improvement/ Modification of the appropriated deep sea fish samplings technology
- Activity 4: HRD Program on Deep Sea Research and Sampling
- Activity 5: Information Dissemination

4. PROPOSED ACTIVITIES IN 2007

Program/Project/Activities	2007											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Act.1: Supporting of Deep Sea Fisheries Resources Survey												
1.1 Review on Deep Sea Resources in the SEA waters	■	■	■	■								
1.2 Technical Consultation Meeting on National Plan					■							
1.3 Consultation Visit						■	■	■	■			
1.4 Supporting of Actual Survey and data collection and experiments for deep sea gear testing	■	■	■	■	■	■	■	■	■	■	■	■
Act.2: Biological and Physical Information of Deep Sea Resources												
2.1 Reviewed work on Deep sea fishes speciesand their biology	■	■	■	■	■	■	■	■	■			
2.2 Reviewed work on distribution of deep sea fish species based on available information	■	■	■	■	■	■	■	■	■			
Act.3: Development/Improvement/ Modification of appropriated deep sea fish samplings Technology												
3.1 Reviewed work on Deep Sea fish samplings technology	■	■	■	■								
3.2 Develop Deep sea samplings gears												
• **Bottom Longline**	■	■	■	■								
• **Collapsible Trap** *for Deep Sea Shrimp*					■	■	■	■				
• **Giant Cast Net** *for Purpleback Flying Squid*			■	■	■	■	■	■	■	■	■	■
3.3 Develop Sampling gears for Larval fish				■	■	■	■	■	■			
Act.4: HRD Program on deep sea Research and Samplings												
4.1 Training Program/Onsite Training for Developing of responsible deep sea fish samplings/gears/ Taxonomy of fish												
Act.5: Information Dissemination												
5.1 Publications										■	■	■
5.2 HRD Training Package												
• *Manuals for Deep Sea Samplings Gears*								■	■	■		
Manuals for Deep Sea fishes biology and texonomy								■	■	■	■	
• *Manuals for use and construction of Bongo net*					■	■	■	■				

Annex 6

STATEMENT

By Mr. Simon Funge Smith
FAO Regional Office of Asia and the Pacific (FAO/RAP)

Mr. Chairman, distinguished delegates.
Ladies and gentlemen.

FAO has enjoyed another productive year of collaboration with SEAFDEC in several areas of common interest. Some highlights of this are the:

- Participation of SEAFDEC in the APFIC Regional Consultative Forum Meeting and the follow on 29th Session of the Asia-Pacific Fishery Commission.
- Joint organization of a Session on fisheries at the forthcoming PEMSEA Congress in Hainan, December 2006.
- SEAFDEC will be a deputy chair at the forthcoming Meeting of regional fisheries bodies in Rome, organized by FAO following the committee on Fisheries Meeting.
- Ongoing collaboration of SEAFDEC Secretariat in a number of FAO regional projects

FAO and SEAFDEC have common goals in our support to member countries in improving and strengthening the management of fisheries and aquaculture for the benefit of the member countries and in particular the rural and coastal peoples which depend upon them. At the recent 29th Session of APFIC, the member countries agreed that the next biennial workplan would focus particularly on the issues of reduction of fishing capacity and the trade, quality and safety issues in fisheries and aquaculture products (including certification and labelling). We are pleased to note in the working papers provided that SEAFDEC is similarly intending to address these important areas though its proposed work programme and we would like to seek to collaborate closely in these areas.

Fisheries statistics and information have always been an area where FAO and SEAFDEC have collaborated closely together, FAO recognizes the importance of quality information in support of fishery management and the need to develop information which supports effective management. We are particularly pleased to read of the recommendations for the long term policy towards establishing a regional and sub-regional fisheries management body. This is an area where FAO works hard with member countries to encourage the establishment of such bodies and we will be pleased to seek ways to collaborate closely with this new initiative.

In conclusion, we would like to congratulate SEAFDEC on its excellent achievements over the past year and sincerely hope that SEAFDEC will continue to collaborate closely with FAO and APFIC in these important areas of interest to our member countries.

Thank you Mr. Chairman

Annex 7

PIPELINE PROGRAMS[1]

Programs	Lead SEAFDEC Depts.
1. Community Fisheries – Strengthening Organization of Communities for Sustainable Livelihoods in Coastal Areas	Secretariat
2. Human Resource Development (HRD) on Poverty Alleviation and Food Security by Fisheries Intervention in the ASEAN Region	Secretariat
3. Promotion of "One Village, One Fisheries Products (FOVOP)" System to Improve the Livelihood for the Fisheries Communities in ASEAN Region	Secretariat
4. Rehabilitation of Fisheries Resources and Habitats/Fishing Grounds through Resource Enhancement	TD
5. Transboundary Collaborative Arrangement Supporting Aquatic Resources and Habitat Management for Sustainable Fisheries	TD
6. Genetic Improvement of Commercially Important Aquaculture Species for Food Security	AQD
7. Institutional Capacity Development on Sustainable Aquaculture	AQD
8. Use of Indicators for the Management of Fishing Capacity of ASEAN Countries	MFRDMD

[1] The programs are in the process of discussion and coordination with the donors.

PROJECT CONCEPT NOTE

Program Title: Community Fisheries – Strengthening Organization of Communities for Sustainable Livelihoods in Coastal Areas
Prospect Funding Agency: Islamic Development Bank (IDB)
Duration: 3 Years

Background and Rationale

The coastal areas in Southeast Asia provide environmental services and means of livelihood to the coastal dwellers. Due to degradation of coastal resources and conflicts over the multiple resource use, livelihoods of coastal communities have been further threatened. This calls for a need to strengthen community organization and capacity building to support better development and management of coastal resources to ensure sustainable livelihoods of coastal communities.

Goal

Sustainable development and exploitation of coastal resources and amelioration of the socioeconomic condition of the Muslim fishers and farmers and other stakeholders by empowering them through strengthen community organization to become efficient resource managers and prudent resource users through enhancement of their knowledge and skills in fisheries, aquaculture and aquatic resources management.

Target Beneficiaries and Countries

Target beneficiaries are selected Muslim fisheries communities, village and local government extension workers, development workers, and small-scale fishers and fish farmers in Brunei Darussalam, Indonesia and Malaysia with involvement of representatives from the Philippines and Thailand who are working in support of Muslim communities in their respective countries

Project Assumption

Policies and institutions should have firm foundation in the community and local levels of fisheries governance to ensure effective co-management arrangements between the local government and the Muslim community and effective transfer and adoption of responsible fisheries and aquaculture technologies and practices.

Project Strategy

Building capacities of target beneficiaries on participatory, inter-disciplinary and community-based strategies in community organization and capacity building as well as the transfer and adoption of knowledge-based coastal resources management and responsible fisheries and aquaculture technologies and practices

Project Components

1. Community organization and institutional capacity building of fisheries communities including social preparation and empowerment of communities and co-management in coastal fisheries and aquaculture
2. Capacity building and training for extension workers and fisheries communities in
   a. Coastal resource management, and
   b. Sustainable fisheries and aquaculture practices
      - Responsible fishing techniques including community-operated fishing gear i.e. set nets
      - Fisheries Enhancement Devices (FEDs)
      - Mariculture of selected species (sea bass, grouper, milkfish etc)
      - Seaweeds and mollusks farming
      - Community fisheries post-harvest and processing

PROJECT CONCEPT NOTE

Program Title: Human Resource Development (HRD) on Poverty Alleviation and Food Security by Fisheries Intervention in the ASEAN Region
Prospect Funding Agency: ASEAN Foundation
Duration: 2 Years

1. PROJECT OBJECTIVES

To enhance human capacity of both relevant fisheries government agencies and selected rural fishery communities by virtue of development of regional policy on the poverty alleviation by the fisheries intervention, so as to alleviate the identified poverty status covering the areas of co-management, responsible fishing practices, backyard fishery post-harvest and processing, rural aquaculture and inland fisheries development.

1) Support of requirements on poverty alleviation by fisheries intervention through mobilizing of regional experiences and information exchange in ASEAN region.
2) Identification of prioritized HRD programs on thematic areas based on the regional, national and local needs.
3) Implementation of the appropriate HRD activities to mitigate the rural poor by the fisheries intervention.

2. PROJECT DESCRIPTION

The project will comprise the following activities:

1) First Regional Technical Consultation on Fisheries Human Resources Development (HRD) for Poverty Alleviation

The consultation will be conducted to 1) develop the regional policy on the role of fisheries for the poverty alleviation reflecting the analysis on the respective national problems; 2) identify the technical issues, which will be critical for the poverty alleviation with envisaging practical problems in the specific areas; 3) clarify the role of small and medium-scale enterprises (SMEs) with respect to the poverty alleviation of the rural poor, and 4) identify the five project sites for the implementation of appropriate on-site HRD activities. In order to identify the five project sites, one policy maker and one technical staff who are responsible for the extension work of the central government as well as the relevant NGOs, academic institutions of the ASEAN Member Countries will be invited to the three days RTC.

2) Human Resources Development (HRD) Activities on Thematic Areas

Based on the outcomes of the RTC above, HRD activities in respective technical areas will be conducted in five different sites mobilizing technical experiences and facilities of SEAFDEC Departments. The five technical areas will be proposed as follows:

1) Local/indigenous institution and co-management: *Secretariat*
2) Responsible fishing technologies: *Training Department*
3) Backyard fishery post-harvest technology: *Marine Fisheries Research Department*
4) Rural aquaculture: *Aquaculture Department*
5) Inland fisheries development: *Marine Fishery Resources Development and Management Department*

A 10-day individual HRD activity will be conducted at respective Departments. The government official, who is responsible for the extension work of ASEAN Member Countries and representative from the fishery community, will be invited for the HRD activities. The envisaged activities will be to further identify the specific requirements of the HRD issues in

each respective site in collaborative manner (involvement of SEAFDEC, central and provincial government of the respective sites).

Based on the outcomes of discussion, the staff of the Secretariat in collaboration with ASEAN Member Countries will prepare the appropriate HRD materials to be used in the on-site HRD activities.

3) On-site Human Resources Development (HRD) Activities

HRD Activities at five specific sites as identified at the 1st RTC will be conducted by mobilizing regional expertise both SEAFDEC side and also from the Member Countries. This will enable the Member Countries to be involved in the implementation of on-site activities. The on-site HRD activities for marine coastal fisheries will be proposed at three sites, to include two sites for Tsunami affected areas (Aceh, Indonesia and Andaman coast of Thailand, which are the most affected areas from tsunami in the ASEAN region), while two sites will be for inland fisheries . The following are the required steps to implement the project activities.

i.) Identification of specific local indigenous institution for the sites.
ii.) Identification of the types and manners of HRD activities.
iii.) Identification of the appropriate numbers of beneficiaries.
iv.) Collaboration mechanism with the host governments.
v.) Finalization of the Terms of Reference of the staff involved both for national and regional technical staff.
vi.) Coordination mechanism among the five thematic HRD activities.

4) Second Regional Technical Consultation on Fisheries Human Resources Development (HRD) for Poverty Alleviation

The Consultation will be organized to evaluate the project activities, identify the follow up activities to be conducted with respect to the poverty alleviation by fisheries intervention. Considering the existing regional policy frameworks and priority actions in fisheries and HRD particularly the "Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region" adopted in 2001 and the "Strategy for Human Resource Development in Fisheries in the ASEAN Region", adopted in 2004, the Consultation is expected to strengthen these policy directions on fisheries for poverty alleviation. One policy maker and one technical staff who are responsible for the extension work of the central government as well as the relevant NGOs, academic institutions of the ASEAN Member Countries will be invited to the three days RTC. The proceedings of RTC will be used as basis for the project final report.

3. EXPECTED OUTPUTS

After the whole process of project activities, it is expected that regional policy for poverty alleviation will be developed, including enhancement of fisheries officials, who responsible for extension work particularly at local community and fishers capacity as well as strengthening of national and local government cooperation. It is also envisaged that the effective implementation of the HRD activities on thematic issues at the local level will be the key to develop the cooperation mechanism within the ASEAN Member Countries.

4. PROGRESS AND ACHIEVEMENTS

The Secretariat received remarks on the project proposal from ASEAN Foundation in July 2006; however, there are some areas need a clarification before adjusting the proposal. In November 2006, the Secretariat sough clarification from the program officers of ASEAN Foundation in order to enhance understanding of both sides. It is expected after submission of accommodated remarks project proposal to ASEAN Foundation, if there is no more comments, within one month the project can be launched.

PROJECT CONCEPT NOTE

Program Title: Promotion of "One Village, One Fisheries Products (FOVOP)" System to Improve the Livelihood for the Fisheries Communities in ASEAN Region
Prospect Funding Agency: ASEAN Foundation
Duration: 2 Years

1. PROJECT OBJECTIVES

In order to improve fisheries livelihood through motivation of the potential people in the fishing communities in ASEAN Member Countries through introduction and promotion of "One Village, One Fisheries Product (FOVOP)", the project would focus on the following detailed objectives through various HRD activities.

1) To enhance the awareness on the gender and development in the fishing communities, especially to clarify the role and function of women's group for the development of small-scale economic activities in the community level.
2) To develop the regional strategy on the development and promotion of "One Village, One Fisheries Product (FOVOP)" especially the policy to support these activities through the government services,
3) To evaluate the needs and problem areas on the introduction and development of "One Village, One Fisheries Product (FOVOP)"in each ASEAN Member Country
4) To identify the regional mechanism requirement to support the promotional work on "One Village, One Fisheries Product (FOVOP)"

2. PROJECT DESCRIPTION

The project will comprise the following activities:

1) 1st Regional Technical Consultation (RTC) on "One Village, One Fisheries Product (FOVOP)"

The government officers from each ASEAN Member Countries will be invited to participate in the Consultation with the aim to discuss on the project objectives, regional policy on the issues and manner for the implementation of the planned activities. The RTC will also finalize type of activities, identification of beneficiaries, expected outputs, timing and venues of respective activities and responsibilities of parties concerned.

2) Development of the Materials for Training and Awareness Building

2-1) HRD Supporting Materials

To facilitate on various HRD activities, the following materials will be prepared by regional experts and SEAFDEC Secretariat:

- Draft strategy and guidelines for the promotion of FOVOP in ASEAN region including institution buildings of the women's group in the fishing community. Special emphasis will be given to the needs of HRD activities to motivate community people to take appropriate leading role for the FOVOP movement
- Draft strategy and guidelines for the support of government agencies on the promotion of FOVOP
- Draft guidelines for the mobilization of the micro-credit in rural areas.

2-2) Draft Guidelines on the Identification of the FOVOP Product

In addition to the above materials promotional guidelines on the Identification of the FOVOP Product will be prepared with the emphasis given to strategy, supporting mechanism, gender and development and not on technical training to produce identified fisheries product. The Guideline will be prepared by the Secretariat and experts in order to evaluate the potential in respective communities on the introduction of FOVOP movement.

3) 1st HRD Workshop on Identification and of Potential and Problem Areas for the Promotion of FOVOP in ASEAN Region

HRD workshop will be organized to discuss on the implementation of the case studies using the HRD Materials and Guidelines prepared by regional experts and SEAFDEC Secretariat. The central and national government officers (excluding Brunei Darussalam and Singapore) will be invited to exchange views and experiences on the issues. It is envisaged that through the exchange of experience on the issues in the region in the Workshop, the level of awareness on the issues will be greatly enhanced among the participants.

4) Case Studies on the Promotion of FOVOP in ASEAN Region

The case study will be conducted as local consultation meeting with the representative of the identified women's group using local languages and materials. More detailed and localized potential and problem areas will be identified through the exchange of experiences of the participants. This is also to verify the applicability of the HRD materials.

5) Revision of HRD Materials

The responsible officer of the central government will revise the regional HRD materials including strategies and guidelines accommodating the findings through the local consultation meeting, and then the Secretariat will revise the regional HRD materials (including Strategies and guidelines) so as to reflect the outcomes of the case studies.

6) 2nd/final HRD Workshop on Identification and of Potential and Problem Areas for the Promotion of FOVOP in ASEAN Region

The final HRD Workshop will be organized by participation of four government officers both central and local government (excluding Brunei Darussalam and Singapore). Through reviewing of revised HRD materials and exchanging the experiences of the participants, it is envisaged that regional strategies and guidelines will be finalized as enumerated below:

i.) Regional Strategy and Guidelines for the promotion of FOVOP in ASEAN Region.
ii.) Regional Strategy and Guidelines for the Support of Government Agencies on the Promotion of FOVOP
iii.) Regional Guidelines for the Mobilization of the Micro-Credit in Rural areas.
iv.) Regional Guidelines on the Identification of the FOVOP Products

As SEAFDEC is considered as technical competence agency in various disciplines of fisheries, the workshop will further discuss on the development of regional network to promote FOVOP in the ASEAN Region which SEAFDEC can act as a core function linking with the respective national networks.

3. EXPECTED OUTPUTS

Awareness building on how the Fisheries OVOP (FOVOP) can provide impact on the following issues, will be greatly enhanced through the successful project implementation

1) Improvement of fisheries livelihood,

2) Impact on the over-capacity.
3) Gender and development in the fishing community
4) Active participation of women's group on the community based business activities.

Further, the sequence of regional strategies and guidelines will be clarified and understood among the various stakeholders in the region. After the project complete, it is also proposed that SEAFDEC will continue to act as a promoter of FOVOP in collaboration with the Regional network on the promotion of FOVOP in ASEAN by utilizing of regional knowledge and experiences on FOVOP developed by the project to further improve livelihood of fishing community using FOVOP methodologies in the follow-up phase.

4. PROGRESS

A project proposal has been submitted to the Board of Trustee of ASEAN Foundation. A first broad remark has been informed to the Secretariat; however, the ASEAN Foundation is asking for the full appraisal in term of technical input from the ASEAN Secretariat. It is expected to inform of the outcome to the Secretariat by the end of 2006.

PROJECT CONCEPT NOTE

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Rehabilitation of Fisheries Resources and Habitats/fishing Grounds through Resource Enhancement
Prospect Funding Agency: Japanese Trust Fund
Lead Department: TD
Duration: *(Funding Support for the program for 2008 has yet been finalized,*

(Description of the program can be refer to the program document in 2006)

PROJECT CONCEPT NOTE

Program Title: Wetland Alliance Program (WAP)
Component: Transboundary collaborative arrangement supporting aquatic resources and habitat management for sustainable fisheries
Sites: Kampot, Cambodia and Kien Giang, Vietnam
Lead Department: Training Department
Prospect Funding Agency: Swedish International Development Cooperation Agency (Sida)
Duration: 2007-2009

INTRODUCTION

"Wetland Alliance" is a regional program addressing local capacity building for sustainable wetlands management by supporting a process of regional collaboration to strengthen local level capacity for sustainable poverty-focused wetlands management. With the prospect funding from the Swedish International Development Cooperation Agency (Sida), the program has been developed based on complementary strengths of four core partners – Asian Institute of Technology (AIT), Coastal Resources Institute of Prince Songkhla University (CORIN), WorldFish Center, and World Wide Fund for Nature (WWF).

To complement aquatic resources and habitat management at the local level particularly in Kampot, Cambodia and Kien Giang, Vietnam, the component on transbundary collaborative arrangement was identified as part of the WAP. Considering existing collaborative framework among Cambodia, Vietnam and SEAFDEC, SEAFDEC Training Department was invited to assist the development process in transboundary collaborative arrangement. Below is the proposed logical framework and supporting plan that was developed through informal consultation process. Upon the confirmation by the prospect donor and WAP core partners, the three-year proposed activities are expected to launch in early 2007.

Narrative Summary	Objectively Verifiable Indicators (OVIs)	Means of Verification	Risks and Assumptions
Goal			
Improved sustainability of wetlands, livelihoods and food security for the poor in the Mekong Region.			
Purpose			
Strengthen the capacity of local change agents to support sustainable wetlands management for the benefit of the poor			

Outputs			
Output 1. Technical skills and competencies of local change agents developed.	By June 2009, six joint capacity building activities on common approaches for aquatic resources and habitat management for sustainable fisheries for the two target sites are conducted. A total of 120 local change agents (10 persons for each site and each activity) are involved in the activities where skills and competencies are exchanged and enhanced. By December 2007, communication and dialogues of local change agents of the two target sites are exchanged twice a month and continued to expand by 50% by the end of 2009.	Activity-end evaluations Review and evaluation of the transboundary collaborative arrangement and plan	Development of technical skills and competencies of local change agents in each local area of the two countries can complement each other and is appreciated. Different levels of readiness and existing competencies of local areas of the two countries may delay process of exchanging technical skills and competencies.
Output 2. Improved communication that supports participatory development and fosters information exchange and dialogue.	On half-yearly basis from 2007 to 2009, representatives from the two sites particularly the local level participate in a joint events and discuss on common issues on management of aquatic resources and coastal habitats. By June 2007, mechanisms for transboundary collaboration are elaborated and agreed by the two sites. By June 2009, local authorities of the two sites identify and determine supports to continue transboundary collaborative mechanisms in the long term.	Half-yearly joint events are conducted, which each site takes turn in hosting the event. Transboundary collaborative mechanisms	Support from the central and local governments in transboundary collaboration at the local level is crucial. Transboundary collaboration for management of aquatic resources and coastal habitats should be formulated based on the broader collaboration between Kampot, Cambodia and Kien Giang, Vietnam as well as other transboundary initiatives to ensure complementarity.

Output 3. Capacities and systems developed for accessing and disseminating knowledge on wetlands and aquatic resources relevant to local needs.	By March 2007, roles and responsibilities and systems for information exchange of agencies of the two target sites are established. Information exchange for aquatic resources and habitat management for responsible fisheries between the two target sites is made at least once a month. Information exchanged will be used by 10% of local change agents for their day-to-day work activities by the end of 2007 and will be expanded to 50% by the end of 2009. By June 2007, bi-lingual publications/handbooks of 2 common priority approaches for aquatic resources and habitat management for sustainable fisheries are developed. And by the end of 2009, 50% of local change agents of the two target sites use the publications/handbooks as a reference for day-to-day work.	Roles and responsibilities and system designs for information exchange Review and evaluation of the transboundary collaborative arrangement and plan	Capacity development plan and systems developed for accessing and disseminating knowledge on aquatic resources and habitat management relevant to local needs are in place. Collaborative arrangement and activities developed for the two target sites are meant to complement each local plan and systems.
Output 4. Networks promoting trust and cooperation between partners established.	By March 2007 a transboundary collaborative arrangement and plan between the two target sites will be developed, agreed and signed by both sides. By the end of 2009, more than 80% of identified activities are achieved and the transboundary collaborative arrangement is translated into long-term cooperation.	A transboundary collaborative agreement and plan signed by the two target sites. Review and evaluation of the transboundary collaborative arrangement and plan	Initiatives and involvement of local change agents and support for central level agencies are important. Willingness to share and active dialogues between the two target sites are prerequisites to mutual trust and effective networking.

Output 5. Strengthened systems and mechanisms of administration and management that are conducive to and support relevant forms of participatory development at the local level.	By December 2007, common management plan and measures are jointly developed with active participation of local change agents of the two target sites. By the end of 2009, more than 80% of common management plan and measures are taken	Common management plan and measures developed Review and evaluation of the transboundary collaborative arrangement and plan	Collaborative activities between the two target sites should be driven by the local agencies with central level agencies act as facilitators/supporters.
Output 6. Improved responsiveness to institutional and environmental changes.	By June 2007, common management plan and measures as well as the joint MCS framework are established. By August 2009, common management plan and measures as well as the joint MCS framework help reducing # of conflict cases in fisheries by 20% of those assessed before 2007.	Common management plan and measures developed and a joint MCS framework established Base line information on status of coastal habitats and aquatic resources utilization as well as related conflicts.	Regular review and dialogues within each local agency and between local agencies of the two target sites need to be conducted
Output 7. An alliance of regional institutions sharing and promoting a common framework for local level capacity building in dialogue and cooperation with other regional organizations and institutions.	By March 2007 a transboundary collaborative arrangement and plan between the two target sites will be developed, agreed and signed by both sides. By the end of 2009, more than 80% of identified activities are achieved and the transboundary collaborative arrangement is translated into long-term cooperation. And/or the transboundary collaborative arrangement is recognized as a model for dialogue and cooperation.	A transboundary collaborative agreement and plan signed by the two target sites. Review and evaluation of the transboundary collaborative arrangement and plan	

WAP Workplan Summary (2007-2009)

Activity Title, ID#, Description and Scheduling	Anticipated Achievements with Date		Budget (US$)		Linkages with Outputs No.						
			Field Support	Local Support	1	2	3	4	5	6	7
Develop and finalize transboundary collaborative arrangement (ID#01) Conduct an inception meeting to be attended by representatives of the two sites together with their respective central authorities in order to develop and finalize a transboundary collaborative arrangement between the two target sites for aquatic resources and habitat management for sustainable fisheries. The collaborative arrangement includes roles and responsibilities of concerned parties (both at central and local levels), collaborative program of activities i.e. information exchange, identification of common problems and concerns as well as common mitigation measures, exchange of expertise and joint capacity building on common management measures.	An inception meeting held to finalize and agree on the transboundary collaborative arrangement and mechanisms between the two target sites as well as the collaborative committee established.	31/03/07	2,500	7,500		X	X	X	X		X
Conduct collaborative capacity building for common management planning and implementation (ID#02) Develop and conduct collaborative capacity building for local change agents of the two target sites on common management planning and implementation including information gathering and analysis. The capacity building activities are conducted six times during the period of three years by rotation of the activity's venue between the two target sites.	A total of six collaborative capacity building activities conducted with active participation of two target sites (two activities each year for three consecutive years) Skills and competencies of local change agents exchanged and enhanced	30/06/09	18,000	42,000	X	X	X	X			X

Formulate and implement a joint monitoring, control and surveillance (MCS) framework (ID#03) Formulate and implement a joint MCS framework to complement MCS activities of each target sites.	A joint MCS framework formulated and implemented	31/12/07	3,000	12,000	X	X		X	X	X	X
Develop and disseminate bi-lingual publications/handbooks for common approaches for aquatic resources and habitat management for sustainable fisheries (ID#04) Develop and disseminate bi-lingual publications/handbooks for common approaches for aquatic resources and habitat management for sustainable fisheries based on knowledge and experience of the two target sites to be used as reference for local change agents of the two target sites.	Bi-lingual publications/handbooks of 2 common priority approaches for aquatic resources and habitat management for sustainable fisheries developed and disseminated to target groups of the two target sites	30/06/07	1,000	4,000	X	X	X		X	X	
Review and evaluation of the common management plan (ID#05) Review and evaluate the common management plan and the joint MCS framework to identify its strengthens and weaknesses for future improvement.	The common management plan reviewed and evaluated The joint MCS framework implemented and evaluated	30/08/09	1,500	4,500			X	X	X		X
Review and evaluation of the transboundary collaborative arrangement for long-term cooperation and national supports (ID#06) Review and evaluate the transboundary collaborative arrangement to identify its strengths and weaknesses. The result of such an evaluation will provide a basis for establishment of long-term cooperation and identification of national policy supports.	The transboundary collaborative arrangement reviewed and evaluated Recommendations for long-term cooperation developed and national policy supports identified	31/10/09	1,500	4,500		X		X	X	X	X
		Sub-total	27,500	74,500							
		Total		**102,000**							
		Agency cost (10%)		10,200							
		Grand total		**112,200**							

PROJECT CONCEPT NOTE

(Converted from Power Point Presentation)

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Genetic Improvement of Commercially Important Aquaculture Species for Food Security
Prospect Funding Agency: Japanese Trust Fund
Lead Department: AQD
Lead Country: To be identified

BACKGROUND

- Human population is vastly increasing.
- Food production is hardly expected to increase as parallel to the population.
- Total fish catch is decreasing and more demand for aquaculture
- However, aquaculture remains primitive stage compared to animal husbandry.
- In many aquaculture species, wild populations are still used for broodstocks or seeds.
- Therefore, breeding or genetic improvement for good productivity and cost efficiency, or domestication of aquatic animals is very important.

OBJECTIVES

To produce improved strains of some important aquaculture species which have good characteristics, such as high growth rate, high food efficiency, tolerance to diseases, easiness to produce (not aggressive) etc. by selective breeding or any other methods for genetic improvement.

TARGET SPECIES

- Tilapia and other finfish,
- Tiger shrimp,
- Giant freshwater prawn,
- Mud crab,
- Tropical abalone,
- Seaweed and,
- Other species

METHODOLOGY

1) Assessment of status of studies on genetics of commercially important aquaculture stocks
2) Genetic improvement
- Genetic characterization of wild population
- Genetic markers linked with desirable characteristics such as high growth rate or tolerance to diseases will be identified.
- Genetic improvement will be performed using genetic markers as references.
3) Dissemination of improved strains/genetic improvement techniques

ENVISAGED OUTCOMES

- New improved strains of several aquatic animal species suitable for aquaculture.
- Viable techniques for genetic improvement.

PROJECT CONCEPT NOTE
(*Converted from Power Point Presentation*)

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Institutional Capacity Development for Sustainable Aquaculture
Prospect Funding Agency: Japanese Trust Fund
Lead Department: AQD
Lead Country: To be identified

1. RATIONALE

There is a need to protect, manage and develop the coastal resources of antique to ensure their sustainability in providing food and livelihood to the municipality's coastal dwellers.

2. GOAL

Sustainable development and exploitation of coastal resources and amelioration of the socioeconomic condition of the fishers and farmers and other stakeholders; empowering them to become efficient resources managers and prudent resource users through enhancement of their knowledge and skills in aquaculture and coastal resources management.

3. PROJECT STRATEGY

Building capacities of target beneficiaries on participatory, inter-disciplinary and community-based strategies in the transfer and adoption of scientifically tested and appropriate aquaculture and stack enhancement technologies.

4. PROJECT COMPONENTS

1. Capacity building through training, farm demonstration and learning-by-doing approaches – LGU officers, extension and development workers, teachers, students, fishers etc in the areas of aquaculture, stock enhancement, resource assessment, and institutional arrangements;
2. Participatory research and technology transfer (impact assessment of techno-biological, socioeconomic, institutional analysis;
3. Social preparation and empowerment of the community members.

5. PARTNERS

LGUs, NGOs, POs, schools, Resource Management councils etc.

PROJECT CONCEPT NOTE
(*Converted from Power Point Presentation*)

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Use of Indicators for the Management of Fishing Capacity of ASEAN Countries
Prospect Funding Agency: Japanese Trust Fund
Lead Department: MFRDMD
Lead Country: Malaysia

1. RATIONALE

"States should take measures to prevent or eliminate excess fishing capacity and should ensure that levels of fishing effort are commensurate with the sustainable use of fishery resources as a means of ensuring the effectiveness of conservation and management measures." (Article 7.1.8: Code of Conduct for Responsible Fisheries (CCRF), 1995)

"State should develop, implement and monitor national plan of action for management of fishing capacity, taking into account, inter alia, the effect of different resource management systems on fishing capacity." (Article 19: International Plan of Action (IPOA)-Fishing Capacity, 1999)

"Review the issue of excess fishing capacity at the national level and recommend where appropriate, measure to improve the registration of fishing vessels, introduction of rights-based fisheries and the reduction in the number of fishing boats and level of fishing effort using government incentives" (Plan of Action on Sustainable Fisheries, SEAFDEC)

2. REGIONAL COMMON UNDERSTANDING ON INDICATORS:

A practical tool to support management of fisheries. 'Indicators' provides information on status and trend of fisheries (STF) and resources, which can support the decision making process.

Questionnaire:

No.	Proposed Project Title	*Rank
1.	Information Gathering of the Deep Sea Resources in the ASEAN Countries	
2.	Fisheries Oceanographic Events Relate Affecting the Distribution and Migration of Pelagic School in ASEAN Countries	
3.	Establishment of Repository Center for Marine Fish in ASEAN Countries	
4.	Use of Indicators for the Management of Fishing Capacity of ASEAN Countries	
5.	Development of Integrated Inland Fisheries Management in ASEAN Countries	

*Rank: 1 - Very Priority, 2 - Priority, 3 - Fair, 4 - Less Priority, 5 - Least Priority

Result of Questionnaire:

The questionnaire had been circulated to 9 Member Countries (excluding Singapore and Japan) and 7 Member Countries have responded.

No.	Proposed Project Title	*Rank
1.	Information Gathering of the Deep Sea Resources in the ASEAN Countries	3

2.	Fisheries Oceanographic Events Relate Affecting the Distribution and Migration of Pelagic School in ASEAN Countries	4
3.	Establishment of Repository Center for Marine Fish in ASEAN Countries	5
4.	Use of Indicators for the Management of Fishing Capacity of ASEAN Countries	1*
5.	Development of Integrated Inland Fisheries Management in ASEAN Countries	2

*3 Member Countries give score 1 (very priority), 3 Member Countries give score 2 (priority) and 1 Member Countries give score 3 (Fair) to the project no. 4

3. OBJECTIVES

To promote the sustainable development and management of capture fisheries in ASEAN region, through:

1. The application of indicators in management of fishing capacity in ASEAN region.
2. To enhance capacity building in application of indicators for management of fishing capacity in ASEAN region.
3. To address issues and new challenges in managing fishing capacity at national and regional level.
4. To assist member country in formulating and adopting the National Plan of Action for Management of Fishing Capacity.

4. PROPOSED PROJECT ACTIVITIES

1. Meetings, RTCs, Workshop
2. Implement pilot project at national level and in selected sub-regional areas
3. Research activities
4. Information dissemination

5. ENVISAGE OUTCOME

- More pragmatic strategic plans and training modules in promoting the use of indicators in management of fishing capacity in ASEAN region.
- Strengthening of capacity building on the use of indicators in fishery management
- Application of Indicators in the national management framework of some member countries
- National Plan of Action for Management of Fishing capacity of some member countries
- Plan of Action for Management of Fishing capacity in selected sub-regional areas

The survey has indicated that use of indicators for the management of fishing capacity received the highest score. This reflect the need of member countries, and thus it should be given great consideration for the new trust fund.

Way Forward: Member countries could now show the commitment such as by establishment of policy, mechanism and capacity building at the national level.

Annex 8

OVERVIEW OF THE FRAMEWORK, BUDGET SCALE, AND WORK PLAN OF THE SEAFDEC JAPANESE TRUST FUND PROJECTS

(Converted from Power Point Presentation)

1. REVIEW OF CURRENT PROGRAMS FOR THE YEAR 2006

- Trust Fund I（1999-2004→ 2006）
- Trust Fund II （2002-2008→ 2012: *Fisheries Agency of Japan is requesting the extension of project period*）
- Trust Fund III （2003-2007）
- Trust Fund IV （2004-2009）

2. CURRENT PROGRAMS IN 2006

Trust Fund I

- Strengthening Small-Scale Fisheries Management through the Promotion of Right-based Fisheries and Co-management (SEC → under FCG Programs)
- Follow-up Activities and Improvement of the Set-Net Fishing Technology Transfer for Sustainable Coastal Fisheries Management (TD)
- Promotion of Sustainable Aquaculture in the ASEAN Region (AQD → under FCG Programs)

Trust Fund II

- Information Collection for Sustainable Pelagic Fisheries in the South China Sea (MFRDMD, TD, MFRD → under FCG Programs)
- Sustainable Utilization of Potential Fisheries Resources & Reduction of Post-harvest Losses (TD→ under FCG Programs)
- Information Collection for Economical Important Species: as Surimi Materials (TD)
- Resources Research of Shared Stocks in Southeast Asia Waters (TD)

Trust Fund III

- Environmental Related Task in Southeast Region (SEC, MFRD, TD→ under FCG Programs)
- Publication of the Special Publication Fish for the People (SEC)
- Collection of Information about International Support in the Region (TD)

Trust Fund IV

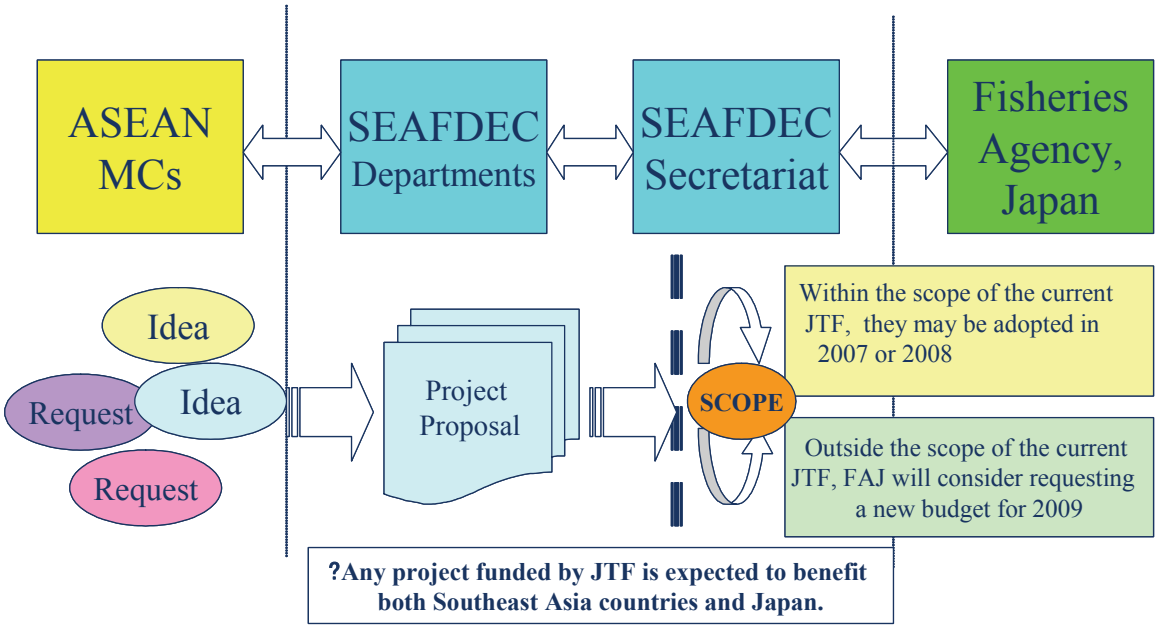
- Research and Development (R&D) of Stock Enhancement for Species under International Concerns (AQD, MFRDMD, TD → under FCG Programs)
- Development of Fish Surveillance System (AQD → under FCG Programs)
- Research and Analysis of Chemical Residues and Contamination in Fish, Fish Products and in Environment such as Fishing Ground and Aquaculture Field (MFRD→ under FCG Programs)
- Capacity Improvement of Fisheries Community for Fisheries Management and Alleviation of Poverty (TD, SEC→ under FCG Programs)
- Assistance of Capacity Building in the Region to Address International Trade Related Issues (SEC→ under FCG Programs)

3. PROPOSED PLAN FOR THE YEAR 2007

Background-- Reflect ASEAN Member Countries' requests

- Japanese Commitment to consider how to better reflect ASEAN MCs' requests *on the JTF Projects (Refer* to the Official Letter of Council Director for Japan dated 19/05/2006)
- Distribution of Informal Paper for information on JTF Projects to SEAFDEC (*Refer to SEAFDEC Secretariat Letter of Trust Fund Manager dated 21/06/2006, Our Ref.:DCA060621*)
- SEAFDEC Secretariat requested All Departments for submission based on ASEAN Member Countries' have requested in October 2006 at the SEAFDEC Department Chiefs' Meeting (*Refer to SEAFDEC Secretariat Letter of DSG dated 18/08/2006 Our ref.:DDA060818*)

Proposal & Adoption of New Projects



Relation between Japanese Budget Year and SEAFDEC Implementing Year

SEAFDEC	Japan		Status
Implementing Year	Budget Year	Requesting Year	
2006*1	2005*2	2004*2	Fixed
2007	2006	2005	Fixed
2008	2007	2006	On-going
2009	2008	2007	Future
2010	…	…	
:	:	:	
*1 Calendar Year - January to December			
*2 Fiscal Year - April to March			

Estimated Budget Scale for 2007

Budget for Projects (*Excluding consultancy cost and agency fee*)

Trust Fund No.	2006 Thousand $	2007 (Proposed) Thousand $
I	(165)[a]	-
II	357	405
III	174	(140) [a]
IV	588	497+(125) [a]
Total	1,284	1,167

[a] Unspent fund

Proposed Plan of Trust Fund II

- Tagging Program for economically important pelagic species in the South China Sea and Andaman Sea (MFRDMD, TD→ under FCG Programs) - New Program
- Sustainable Utilization of Potential Fisheries Resources & Reduction of Post-harvest Losses (TD→ under FCG Programs)
- Information Collection for Economical Important Species: as Surimi Materials (TD)
- Deep Sea Fisheries Resources Exploration in the Southeast Asia (TD, MFRDMD) - New Program
- Resources Research of Shared Stocks in Southeast Asia Waters (TD)
- Chemical and Drug Residue in Fish and Fish Products and their Environment (MFRD→ under FCG Programs)
- Quality Assurance Systems for Small and Medium-sized Fish Processing Establishments in ASEAN Member Countries (MFRD→ under FCG Programs) – New Program

Proposed Plan of Trust Fund III

- Environmental Related Task in Southeast Region (SEC, MFRD, TD→ under FCG Programs)
- Publication of the Special Publication Fish for the People (SEC)
- Collection of Information about International Support in the Region (TD)

Proposed Plan of Trust Fund IV

- Research and Development (R&D) of Stock Enhancement for Species under International Concerns (AQD, MFRDMD, TD→ under FCG Programs)
- Development of Fish Surveillance System (AQD→ under FCG Programs)
- Promotion of Sustainable Aquaculture in the ASEAN Region (AQD→ under FCG Programs)
- Fishing Community Development Program: Capacity Improvement of Fisheries Community for Fisheries Management and Alleviation of Poverty (TD, SEC→ under FCG Programs)
- Assistance of Capacity Building in the Region to Address International Trade Related Issues (SEC)

4. CONCLUSION

- In 2007, JTF will keep the almost same scale as that of 2006
- JTF will support 10 Programs under ASEAN-SEAFDEC FCG Mechanism in 2007
- JTF will continue to make efforts to better reflect ASEAN Member Countries requests in 2007 and onwards

Annex 9

INFORMATION COLLECTION OF ECONOMICALLY IMPORTANT SPECIES AS SURIMI MATERIALS

Program Category: Programs under the ASEAN-SEAFDEC FCG Mechanism
Program Title: Information Collection of Economically Important Species as Surimi Materials
Component I: Development of Demersal Fishery Resources Living in Un-trawlable Fishing Ground in the Southeast Asia Region
Lead Department: TD in collaboration with MFRD and MFRDMD

1. PROGRAM OBJECTIVES

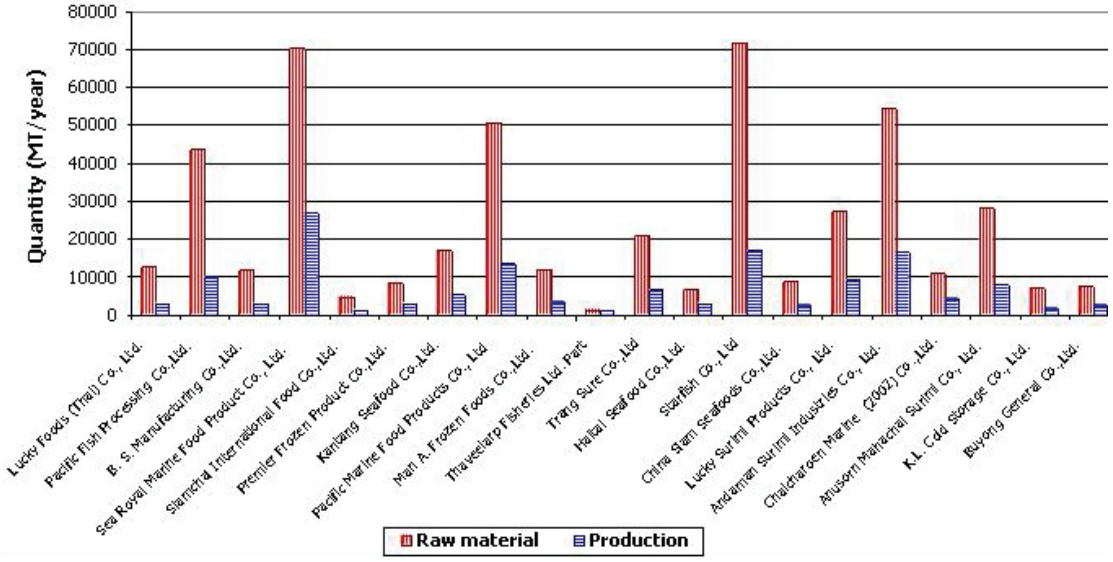
1. To investigate on the **Status of Surimi Industry** in the Southeast Asian Region in relation to the **Status Of Fisheries Resources** of some economically important species as surimi raw materials by following activities:
   - To clarify the market demand, and distribution channel of surimi product in the member countries and in Southeast Asia
   - To clarify the sources/fishing areas of Surimi Raw species supply to Surimi Industry,
   - To evaluate the status of fisheries resources of Surimi Raw Materials Species existing in the Region,
2. To investigate the POTENTIAL FISHERIES RESOURCES as Raw materials species existing in the Region, such as un-trawlable grounds and continental shelf slopes.

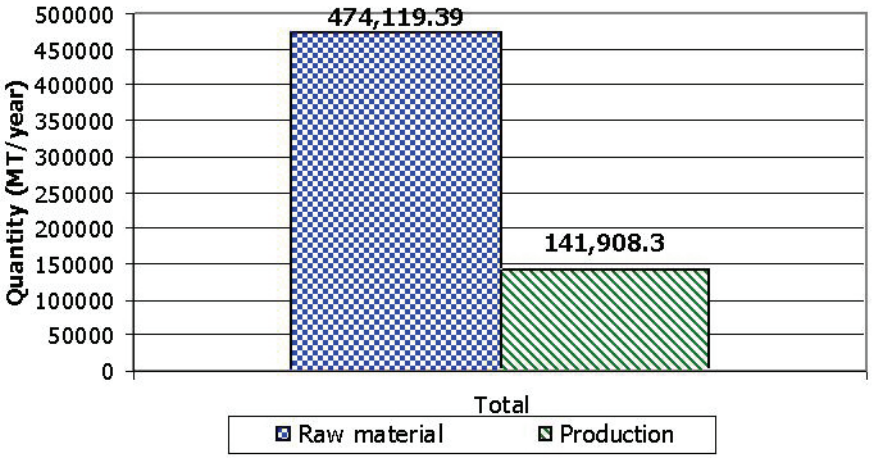
2. MAIN ACTIVITIES AND PROGRESS OF 2006

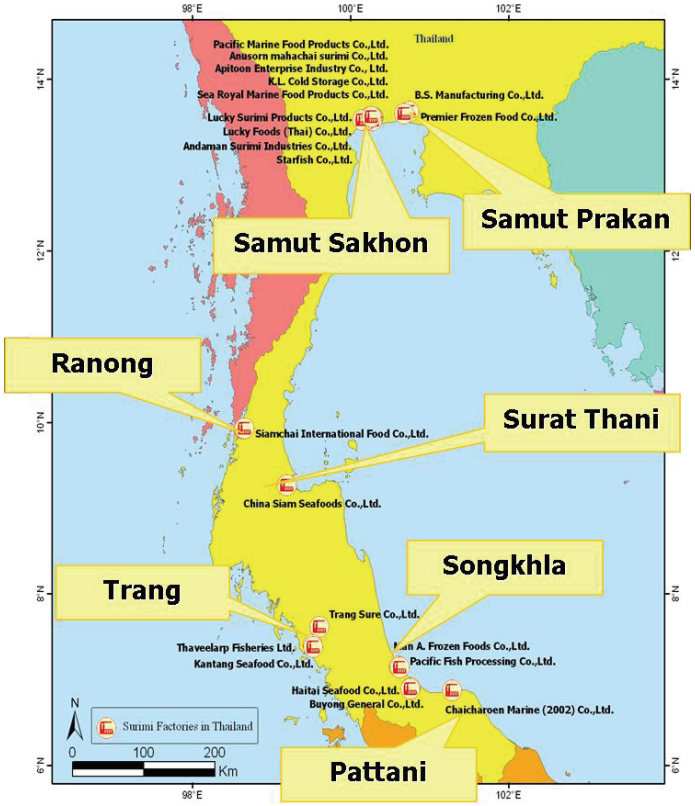
1. Data Collection on Status of Surimi Industry and Marketing have been conducted in Thailand, Indonesia, Myanmar and Vietnam through consultation visit to relevant surimi plants and questionnaires
2. Preliminary Analysis on the Status of surimi Industry in relation to fisheries resources in particular
3. To evaluate the Constraints faced by Surimi plants

2.1 Preliminary Results…Thailand

Since 1983 till Present, 21 plants







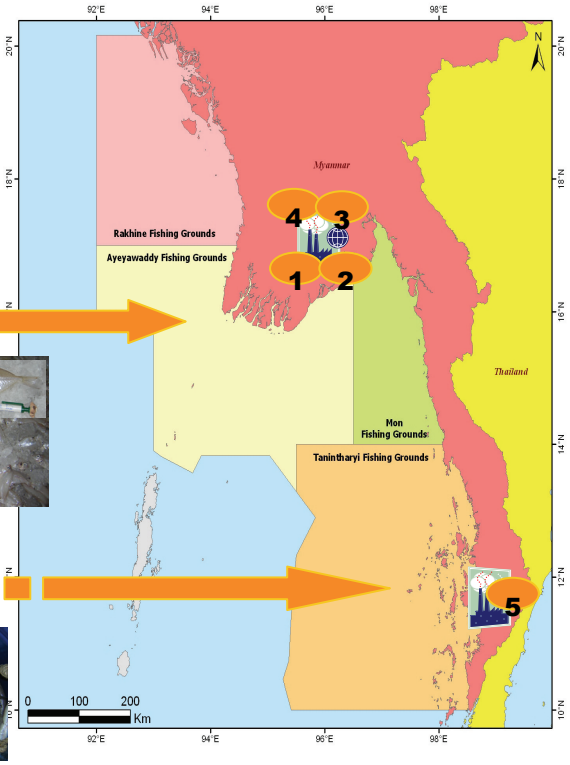
2.2 Preliminary Results……Myanmar

Surimi Plants in Myanmar

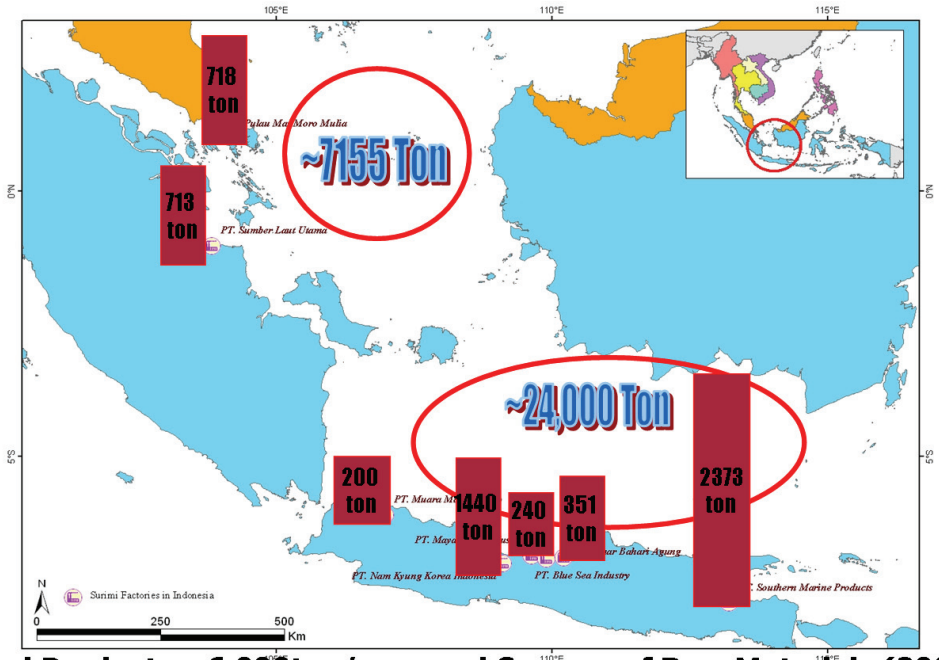
- Pyilonechantha Trading Co.,Ltd (1994)
- General Light Co.,Ltd. (2001)
- Pearl Sea Co.,Ltd. (2003)
- Min Zar Ni Co., Ltd. (2003)
- ASK (2004)

Estimated quantity of
Supply Raw Fishes 5000 MT/year

Estimated quantity of
Supply Raw Fishes 4300 MT/year



2.3 Preliminary Results……Indonesia

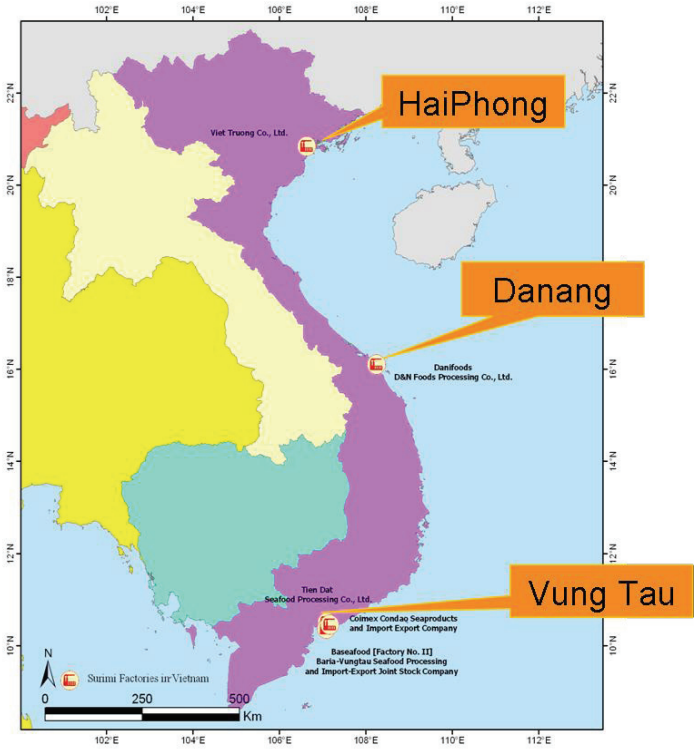


Surimi Products ~6,000ton/year and Sources of Raw Materials (2005)

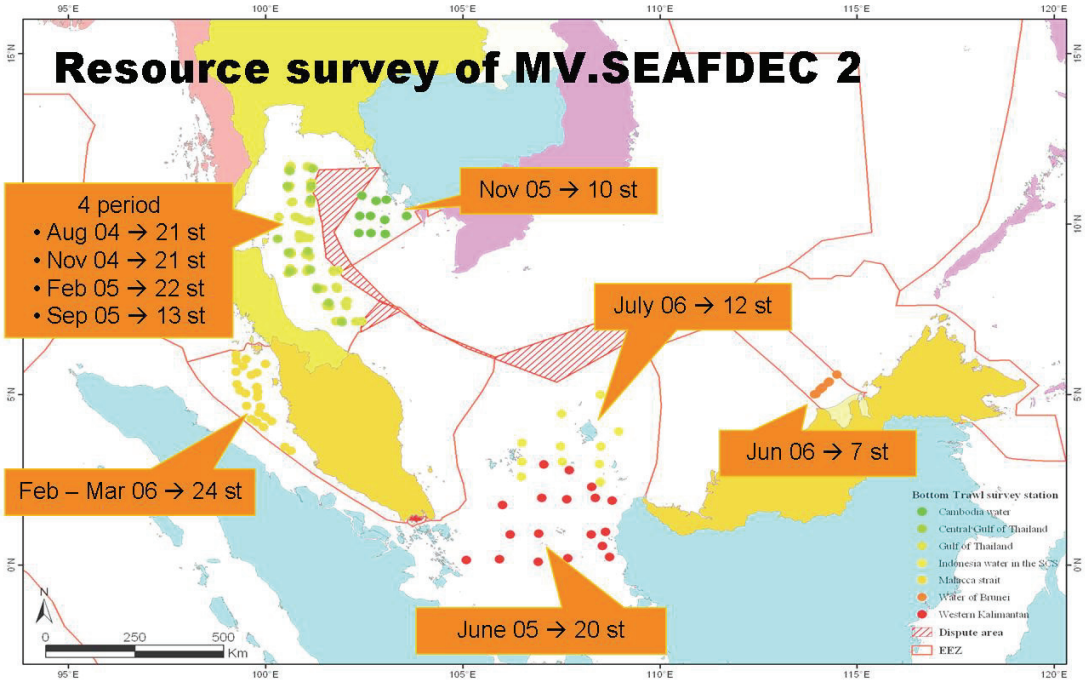
2.4 Preliminary Results……Vietnam

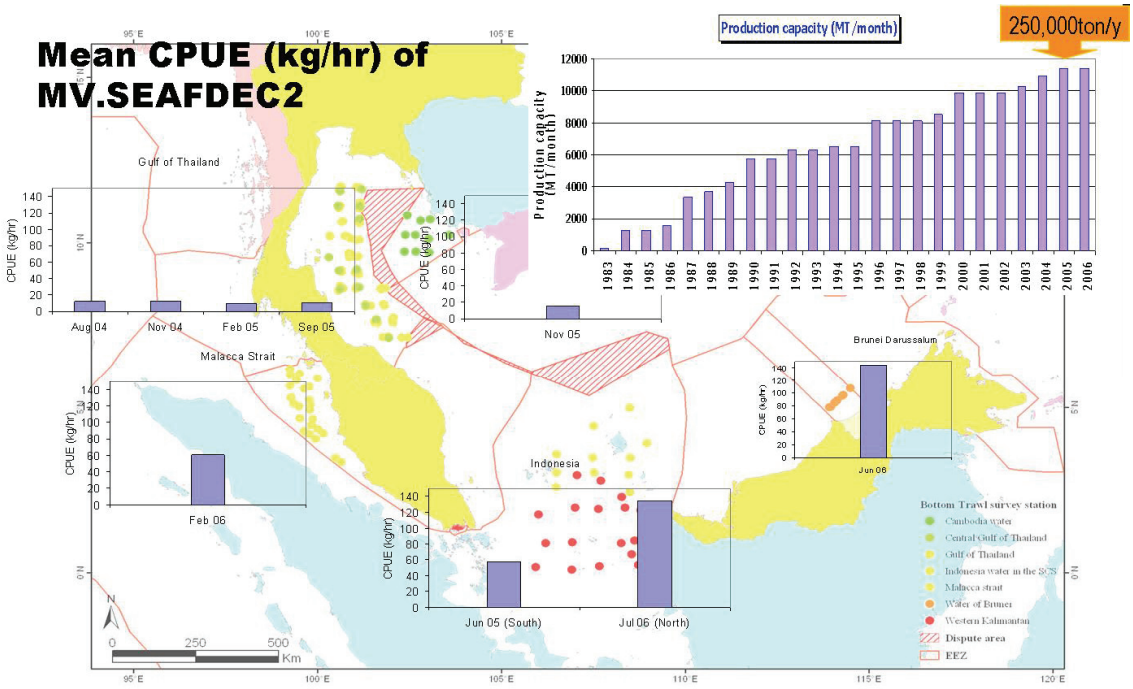
A total of 11 SURIMI PLANTS are in VIETNAM

NEEDs FOR more Information Input in cooperation with Core expert for Vietnam



2.5 Preliminary Results on Status of Fisheries Resources





3. PROPOSED ACTIVITY OF 2007

1. Continue to investigate on the STATUS OF SURIMI INDUSTRY in Malaysia, Vietnam
2. Continue to investigate the POTENTIAL FISHERIES RESOURCES as Raw materials species existing in the Region, such as trawlable and un-trawlable grounds and continental shelf slopes.
3. 3rd Core Expert Meeting for progress of the study and finalize the final report

Final Report "Status of Surimi Industry in Southeast Asia"

- Introduction
- Introduction to surimi industry in Southeast Asia
- Current status of surimi industry in Southeast Asia (detail will give by country, prepare by SEAFDEC/TD with close consultation with country)
  - no of surimi plant & location and capacity
  - fish species used in surimi industry
  - Catch Area of fish species used
  - Quantity of raw material/year
  - Surimi production
  - Export& import, List of import & export country
- Resource Status of fish species use for Surimi production (regional level , prepare by SEAFDEC/TD)
  - Trend of resource
  - CPUE of Trawler (trend)
  - Research on new species for surimi production in term of resource and technology (possibility & problem)
- New finding from resources survey
  - Potential area
- Challenges and recommendation for surimi industry in Southeast Asia (Input from regional conference)

Annex 10

CLOSING ADDRESS

By Dr. Siri Ekmaharaj, SEAFDEC Secretary General

Myself as Chairman of the meeting, I appreciate very much for your efforts and hard working of all of you during our past two days.

As has been mentioned during the opening remark, that 20th Meeting of Program Committee is the starting point of change in program exercises. The programs under ASEAN-SEAFDEC FCG mechanism which mainly supported by JTF will be the most important of the main stream for the discussion. However, as this is the first year of the PCM that could have a chance in reviewing and scrutinizing of these Trust Fund projects. In criticism, my opinion, it is very good and important even some donor to the implementation Departments may confuse the Member Countries and it has taken quite longer that I expected. I promise that for the future or next PCM, the pre-discussion of the annual review between the donors and the Departments will be organized before the PCM and the Member Countries will have more chance to scrutinize of the new proposals for the benefit of the region as a whole.

Now the coming out results of this Meeting leads to some points of our expectation. But still we have lots of homework to do. It may be a hard work but if we try more effort, with closely and friendly cooperating, the ultimate goal can be achieved.

Finally, I like to thank all of your contribution and SEAFDEC Program Committee, Department Chiefs and Secretariat Staff, for some of you may leave before the FCG meeting. I hope you will have a good journey and pleasant back home.