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INDICATORS FOR IMPROVED FISHERIES MANAGEMENT IN THE ASEAN REGION

Proceedings of the Second Regional Technical Consultation on the Use of Indicators for the Sustainable Development and Management of Capture Fisheries in the ASEAN Region

9- 11 March 2004
Kuala Lumpur, Malaysia

Phaik-Ean Chee (Editor)

Marine Fishery Development and Management Department (MFRDMD)
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21080 Kuala Terengganu, Malaysia

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October 2004

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FOREWORD

I am pleased to see that the project on *The Identification of Indicators for the Sustainable Development and Management of Capture Fisheries the ASEAN Region* led by SEAFDEC-MFRDMD has progressed well following the outcome of this Second Regional Technical Consultation (RTC). Such a consultation provides the avenue for the Regional Project Coordinator and Project Technical Officers to report on the progress of the overall project and the pilot projects respectively, and participants to agree upon the future directions for project implementation.

It is the goal of SEAFDEC-MFRDMD to provide advice to the fisheries managers of the Southeast Asian countries on marine fishery resources research and management, and I believe that the Second RTC has provided Member Countries the regional forum for cooperation and consultation.

I hope that these proceedings will serve as a record and guideline for managers and planners to further improve their management of the fisheries resources in the region. It is most important, as every one has realized that the resources in the region need to be managed together and in a holistic and ecosystem approach.

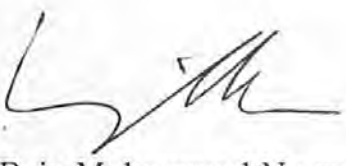
SEAFDEC-MFRDMD will continue to strive to provide the scientific basis for the proper development and management of the fishery resources in the region, and in the near future it will propose projects that will complement this *Indicators Project* for consideration.

It is our fervent hope that the seas of our region will continue to support us and our future generation of the food that we all need. This could only be realized by our present will and determination to manage the resources with full commitment.

Finally I would like to thank all the participants and observers for their contribution towards the success of the consultation, and the SEAFDEC Secretariat particularly the Special Advisor, Dr. Yasuhisa Kato and the Policy Working Group team led by Mr. Suriyan Vichitlekarn, for providing the support and guidance in the project. I thank the meeting secretariat for the smooth organizing of the meeting. I also wish to take this opportunity to thank the outgoing Project Regional Coordinator, Ms. Chee Phaik Ean who has been transferred to Fisheries Research Institute, Penang, for her dedication in implementing the project so far. I will personally take measures to replace her with a person of similar capability and calibre so that the outcome of the project could be met in time.

Last but not least, I must thank Mr. Haji Ibrahim bin Saleh, the SEAFDEC Alternate Council Director for Malaysia and also Deputy Director General of Fisheries Malaysia, for being present during the consultation and for enlightening the participants on some pertinent issues.

Thank you.



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INFORMATION PAPERS
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SECOND REGIONAL TECHNICAL CONSULTATION ON THE USE OF INDICATORS FOR THE SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF CAPTURE FISHERIES IN THE ASEAN REGION 9-11 MARCH 2004, KUALA LUMPUR, MALAYSIA

INFORMATION NOTES FOR PARTICIPANTS

1. Meeting Venue

The meeting will be held at Ballroom 1, Lobby Level,
Hotel Grand Maya
138 Jalan Ampang
50450 Kuala Lumpur
Tel: 603-27118866
Fax: 603-27118601
e-mail: grand maya@grand maya.com.my
Website: www.grandmaya.com.my

2. Arrival Arrangements

Participants will be met at KLIA for pick up to the Hotel Grand Maya, Kuala Lumpur, upon arrival. If you fail to meet MFRDMD SEAFDEC staff for pick up, please proceed to purchase a taxi coupon from the designated booth at KLIA and take a taxi to Hotel Grand Maya.

3. Entry Formalities

All people entering Malaysia must possess valid passports or internationally recognized travel documents. Visas are not required for citizens of ASEAN countries who hold valid official passports.

4. Hotel Accommodation

Rooms for participants are booked at the Hotel Grand Maya, No. 138 Jalan Ampang, Kuala Lumpur.

5. Contact Person

Should participants have any additional needs with regards to administrative matters, please contact:

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6. Registration

Registration of participants and observers will begin at 8.00am on 9 March 2004. Registration will take place in the foyer outside Ballroom 1 (the Meeting Venue), Lobby Level, Hotel Grand Maya. The Opening of the Consultation will be at 9.00am on 9 March 2004.

7. Welcome Dinner

A Welcome Dinner has been scheduled for 8.00pm on 9 March 2004.

8. Free Time

On 11 March 2004, participants will be free from 1030-1230. Lunch will be served at the hotel as usual from 1230-1430.

The Adoption of recommendations and work plans will begin at 1430 on 11 March 2004.

PROSPECTUS

SECOND REGIONAL TECHNICAL CONSULTATION ON THE USE OF INDICATORS FOR THE SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF CAPTURE FISHERIES IN THE ASEAN REGION 9-11 MARCH 2004, KUALA LUMPUR, MALAYSIA

Background

The "Identification of Indicators for Sustainable Development and Management of Capture Fisheries" is one of the projects formulated under the Special 5-Year Programme of SEAFDEC to support ASEAN Member Countries in the implementation of the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region adopted at the Millennium Conference held in November 2001. The use of indicators of sustainability is a tool to monitor and control the development of fisheries in ASEAN and would be developed and used by relevant national management authorities. This regional project is organized with the main objective to support and improve fisheries management through the use of a range of suitable indicators and a more "bottom-up" approach.

The First Regional Technical Consultation was held from 16-18 September 2002. This Second Regional Technical Consultation is aimed at discussing, reviewing and evaluating the progress achieved by countries that are implementing pilot projects on the use of indicators.

The Philippines started a pilot project on the ringnet fishery in Danao, Cebu, in December 2002. Currently pilot projects are on-going in Brunei Darussalam, Malaysia and Thailand where the trawl fishery is being studied. In Indonesia, a small-scale demersal fishery is being studied. These four countries started their pilot projects in 2003. The start of pilot projects in countries was a bit slower than anticipated because this had to depend on the financial procedures at the national levels. Nevertheless the pilot projects that had been started are now making headway. Collection of data for the selected fisheries places emphasis on stakeholder involvement and the use of existing available data.

Basing on the outcomes from these studies, regional guidelines on the use of indicators for improved development and management of capture fisheries will be proposed. These guidelines will be formulated to promote the use of indicators to interpret and understand status and trends of fisheries to support fisheries management without aiming to replace conventional stock assessment.

Objectives

1. To present and discuss the achievements made in the implementation of pilot projects on the use of indicators in selected fisheries in ASEAN SEAFDEC countries.
2. To make proposals for improved fisheries management by using indicators.
3. To formulate the plan of action for 2004 / 2005.
4. To present and discuss the procedures for the identification and selection of indicators for the sustainable development and management of capture fisheries.
5. To prepare the draft regional guidelines on the use of indicators for improved fisheries management.

Time and Venue

This Regional Technical Consultation will be organized by MFRDMD, SEAFDEC. The Consultation will be held in Kuala Lumpur, Malaysia, from 9-11 March 2004. A total of 20 technical staff members from ASEAN Member Countries are expected to participate in this Consultation together with representatives from other institutions, regional and international organizations.

SECOND REGIONAL TECHNICAL CONSULTATION ON THE USE OF INDICATORS FOR THE SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF CAPTURE FISHERIES IN THE ASEAN REGION

PROPOSED AGENDA

9 March 2004	**Opening of Consultation**	
	0800-0845	Registration of participants
	0845-0900	Arrival of guests and participants
	0900-0915	Welcome address by Chief MFRDMD
	0915-0930	Adoption of Agenda for Consultation
	SESSION I: STATUS OF PILOT PROJECT IMPLEMENTATION	
	0930-1000	Overview of Achievement of Special 5-Year Program: Fisheries Management (by SEAFDEC Secretariat)
	1000-1045	Coffee break and Photography session
	1045-1100	Overview of pilot project implementation (by MFRDMD)
	1100-1230	Progress of pilot project implementation in Brunei Darussalam, Indonesia and Malaysia (by Countries)
	1230-1430	Lunch
	1430-1530	Progress of pilot project implementation in the Philippines and Thailand (by Countries)
	1530-1600	Coffee break
	1600-1630	Discussion
	1630-1700	Presentation on use of indicators in Vietnam by ALMRV
	2000-2230	Welcome dinner
10 March 2004	**SESSION II: THE USE OF INDICATORS IN FISHERIES MANAGEMENT**	
	0900-0930	Presentation on use of indicators in Vietnam by ALMRV
	0930-1000	Presentation by Dr. Derek Staples, FAO/RAP
	1000-1030	Coffee break
	1030-1100	Presentation by Dr. Yasuhisa Kato, SEAFDEC Secretariat
	1100-1130	Locally-Based Community Fisheries Management Project (by SEAFDEC TD)
	1130-1200	Improvement in the use of indicators, possible collaboration and HRD (by Secretariat)
	1200-1230	Discussion
	1230-1430	Lunch
	1430-1530	Presentation of work plans from 2004 / 2005 by Brunei Darussalam, Indonesia, Malaysia, the Philippines, Thailand and MFRDMD (by Countries and MFRDMD)
	1530-1600	Coffee break
	SESSION III: DRAFT GUIDELINES ON THE USE OF INDICATORS FOR IMPROVED FISHERIES MANAGEMENT	
	1600-1700	Working Group discussion to prepare a framework for the Draft Guidelines on the Use of Indicators for Improved Fisheries Management.
11 March 2004	0900-1000	Presentation of framework for Draft Guidelines on the Use of Indicators for Improved Fisheries Management (by Working Groups)
	1000-1030	Discussion
	1030-1100	Coffee break
	1100-1230	Free
	1230-1430	Lunch
	1430-1530	Adoption of recommendations, work plans and proposed framework for the Draft Guidelines on the Use of Indicators for Improved Fisheries Management.
	1530-1600	Close of Consultation
	1600-1630	Coffee

SECOND REGIONAL TECHNICAL CONSULTATION ON THE USE OF INDICATORS FOR THE SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF CAPTURE FISHERIES IN THE ASEAN REGION 9-11 MARCH 2004, KUALA LUMPUR, MALAYSIA

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WP03: Progress of pilot project implementation: Brunei Darussalam
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WP05: Progress of pilot project implementation: Malaysia
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WP07: Progress of pilot project implementation: Thailand
WP08: Presentation on use of indicators in Vietnam: ALMRV
WP09: Presentation: Dr. Derek Staples, FAO/RAP
WP10: Presentation: Dr. Yasuhisa Kato, SEAFDEC Secretariat
WP11: Locally-Based Community Fisheries Management Project: SEAFDEC TD
WP12: Improvement in the use of indicators, possible collaboration and HRD: SEAFDEC Secretariat
WP13: Work plans 2004 / 2005: Brunei Darussalam
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Second Regional Technical Consultation on the Use of Indicators for the SustainableDevelopment and Management Of Capture Fisheries in the ASEAN Region 9-11 March 2004, Kuala Lumpur, Malaysia

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WORKING PAPERS
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OVERALL FRAMEWORK AND LINKAGES AMONG SEAFDEC FISHERIES MANAGEMENT RELATED PROGRAMS/INITIATIVES

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Fisheries Management in the ASEAN Region

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. Although ASEAN Member Countries have their own policy, legal and institutional or regulatory frameworks to manage their respective fisheries, these systems are generally based on short-term objectives and increasing production levels, rather than the long-term comprehensive and sustainable management of fisheries. Therefore, there is a need to improve national fisheries management frameworks in order to accommodate the various requirements for sustainable fisheries development in the region. Since fisheries regulation and conflicts among resource users are usually locally based problems, and the need for more timely implementation of management measures and actions has been identified, the decentralization of selected functions and responsibilities to appropriate local institutions is proposed. This concept can be considered a policy option for inclusion into the national fisheries management framework.

Another important policy option is the replacement of open access regimes with limited access regimes and the provision of fishing rights. It is clear that management measures and regulations are currently not effectively implemented in open access fisheries of the region, and this is a major contributor to over-exploitation and environmental degradation. The implementation of fishing rights compliments the concept of decentralized fisheries management, as well as co-management with local institutions and resource users. This important issue will also need to be accommodated into the innovative fisheries management framework.

The optimized harvesting of fisheries resources requires that an effective management regime is in place to prevent levels of fishing capacity and effort from exceeding that required to maintain sustainable yields. Part of innovative options to the region includes regulation and control of fishing capacity and fishing effort. In this regard, the use of vessel numbers as a proxy for fishing capacity is viewed as a first step towards the control of fishing effort, and is a proposed indicator of sustainable development for fisheries in the region. The effectiveness of the above-mentioned options requires the effective and timely analysis of fisheries data and the application of close monitoring systems to provide appropriate feedback and assist the decision-making process. To date, the utility of fisheries statistics has been limited mainly due to problems associated with the collection and analysis of fisheries data. This has hampered the development of appropriate policies and clear management objectives.

To enhance the productivity of fisheries resources in inshore waters, particularly those that have been degraded due to human intervention, the replenishment of these resources should be considered. A comprehensive program for the restoration and enhancement of coastal habitats together with appropriate management systems is discussed as an option to increase fisheries production levels.

The use of illegal and destructive fishing gears and practices is a serious threat to fisheries resources and the aquatic environment. There is a need to eliminate these practices and redirect or remove this fishing effort from the fishery, and appropriate management measures together with promotional work to use responsible fishing gears and practices are discussed. The options for maintaining and enhancing the resource base through appropriate management actions including habitat rehabilitation are considered for fisheries in the region.

ASEAN Member Countries must make greater progress toward the full and sustainable utilization of the region's fisheries resources. Overcoming the problems highlighted here is a step in the right direction, and only then will it be possible to increase production from sustainable fisheries resources and provide 'fish for the people' for both present and future generations.

SEAFDEC Initiatives Related to Fisheries Management and Future Challenges

The development and establishment of sustainable fisheries systems particularly in coastal areas is rapidly emerging as the focused area of fisheries management concerns in the ASEAN region. This is reflected in the recently adopted ASEAN-vision ***"To be the leader in sustainable tropical fisheries for the people"*** as the typical tropical fisheries in the ASEAN region is small scale and takes place mostly in coastal areas.

Currently, most of the ASEAN member countries have developed a fisheries management policy and mechanism, which are generally applicable to all sectors of the fisheries and similar to those developed in the developed countries. However, the small scale/coastal fisheries are quite specific and unique to the ASEAN region which may have different requirements, including socio-economic situation and unavailability of financial and technical resources compared with the industrial fisheries sector. Besides, small-scale coastal fisheries is a dominant or major sector of the fisheries in the region. If the national fisheries management policy and mechanisms remain as they are, the implementation of sustainable management of fisheries will not be appropriately focused and may result in ineffective enforcement of the management measures for the particular sub-sector.

The ASEAN-SEAFDEC Millennium Conference on Fish for the People held in 2001 highlighted the socio-economic/cultural importance of the effective management of fisheries for regional food security from the point of view of the regions long-term objective for food and livelihood security. The Millennium Conference also pointed out the importance to create separate management policy and mechanism at the national level in addition to the current policy which are not focused on the coastal fisheries. The Resolution and Plan of Action on Contribution of Sustainable Fisheries for Food Security for the ASEAN Region adopted at the Millennium Conference provide a policy framework and priority action to investigate two issues: 1) decentralization of management authority to the institutions which are physically close to the resources users, and 2) terminate the current "open access" regime for alleviating local conflicts and effective implementation of coastal fisheries management, by providing the appropriate kinds of " fishing right" to the appropriate institutions as a direction to elaborate appropriate management policy and mechanism for coastal fisheries.

SEAFDEC as a regional inter-governmental organization and ASEAN's partner in realizing the above ASEAN vision and directions for change, for many years has been one of the leading agencies in promoting sustainable coastal and small-scale fisheries in the region through

numerous programs and projects. Currently SEAFDEC Secretariat and the four SEAFDEC departments are actively involved in various programs, projects and initiatives (Annex 1 - Summary Information and Linkages of SEAFDEC Fisheries Management (CFM) Related Programs) - all of which aim at promoting sustainable fisheries systems in coastal areas. The various activities carried out within these programs, projects and initiatives workshops, training courses, resource surveys, consultations, *etc.* often have similar or even the same objectives and target groups, generally aiming at improving and building human capacity for fisheries management.

To increase the effectiveness of these activities and help these projects to inspire innovative and appropriate management approaches for small-scale fisheries management in the region, ***it is crucial, to identify the linkages between them and place them in a common framework for the promotion of such fisheries management systems***. This will then help ensuring impacts of SEAFDEC programs and initiatives to sustainability of coastal fisheries and livelihoods of small-scale coastal fishermen.

Summary Information and Linkages of SEAFDEC Fisheries Management (CFM) Related Programs (As of January 2004)

Programs	Contribution to Overall CFM	Linkages with RES[1]	Linkages with POA[2]	SEAFDEC Lead Departments
1. Regionalization of the Code of Conduct for Responsible Fisheries	Encourage investigation on the application of the CCRF in regional fisheries context through a series of regional consultation. Provides general principles, framework and guidelines for implementation of overall fisheries management. Acts as the core program to coordinate all CFM related programs. Supports HRD particularly fishery managers to be able to apply concepts and appropriate management actions to ensure sustainable fisheries.	**RES-1** (CCRF) **RES-2** (Harmonized fisheries policy and plan) **RES-3** (HRD and stakeholder involvement) **RES-15** (Common ASEAN positions) **RES-16** (Safeguard ASEAN interests)	**POA-A1** (Innovative fisheries management) **POA-A5** (Fishing capacity) **POA-A9 & A10** (Fishery statistics) **POA-E1** (Guidelines/standards) **POA-E2** (Safeguard ASEAN interests)	Secretariat
2. Fish Trade and Environment (Fisheries Subsidies)	Provides guidelines for the use of government subsidies in fisheries to ensure sustainable development and management of fisheries.	**RES-2** (Harmonized fisheries policy and plan) **RES-15** (Common ASEAN positions) **RES-16** (Safeguard ASEAN interests)	**POA-A5** (Fishing capacity) **POA-B9** (Aquaculture for rural development) **POA-D2** (Fisheries subsidies) **POA-E1** (Guidelines/standards) **POA-E2** (Safeguard ASEAN interests)	Secretariat
3. Coastal Resource Management	Provides comprehensive practical experience and strategies in effective introduction and adoption of CFM at local level through implementation of pilot cases. Investigates potential community fishing gear such as set net for sustainable use of coastal fishery resources.	**RES-3** (HRD and stakeholder involvement) **RES-5** (Delegation of management functions) **RES-6** (Right-based fisheries)	**POA-A1** (Innovative fisheries management) **POA-A2** (Stakeholder consultation) **POA-A5** (Fishing capacity) **POA-B1** (Aquaculture zoning) **POA-B9** (Aquaculture for rural development) **POA-D2** (Fisheries subsidies)	TD

[1] & [2] RES/POA refers to the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region adopted at the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security in the New Millennium: "Fish for the People", held in November 2001, Bangkok, Thailand.

RES/POA refers to the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region adopted at the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security in the New Millennium: "Fish for the People", held in November 2001, Bangkok, Thailand.

4. Toward Decentralized Management for Sustainable Fisheries in the ASEAN Region	Provides approaches for innovative fisheries management focusing on introduction of decentralized management and right-based fisheries as well as guidelines on institutional arrangement and strategies to ensuresustainable fisheries under limited access regime of management.	**RES-3** (HRD and stakeholder involvement) **RES-5** (Delegation of management functions) **RES-6** (Right-based fisheries)	**POA-A1** (Innovative fisheries management) **POA-A2** (Stakeholder consultation) **POA-B1** (Aquaculture policy and regulatory frameworks) **POA-E1** (Guidelines/standards)	Secretariat
5. Improvement of Fishery Statistical Systems and Mechanisms	Provides guidelines and HRD for sustainable national fishery statistical systems to support development and management planning and actions as well as effective usage of statistics. Introduces the use of statistical data to understand status and trend of fisheries. Provides linkages and coordination between routine and non-routine data collection.	**RES-3** (HRD and stakeholder involvement) **RES-4** (Technical disparity) **RES-5** (Delegation of management functions) **RES-7** (Fishery statistics) **RES-16** (Safeguard ASEAN interests)	**POA-A9 & A10** (Fishery statistics) **POA-E1** (Guidelines/standards) **POA-E2** (Safeguard ASEAN interests)	Secre90tariat
6. Responsible Fishing Technologies and Practices	Helps changing fishers attitudes towards responsible fishing, provides guidelines for alternative fishing devices/practices towards responsible/selective concepts to reduce discards and mitigate illegal and destructive fishing gears and practices.	**RES-2** (Harmonized fisheries policy and plan) **RES-3** (HRD and stakeholder involvement) **RES-4** (Technical disparity) **RES-11** (Maximizing utilization of catch)	**POA-A3** (Responsible fishing) **POA-C1** (Maximizing utilization of catch) **POA-E1** (Guidelines/standards)	TD
7. Resource Enhancement	Provides practical and effective tools/strategies to enhance coastal resources for the long-term benefits of small-scale coastal fisheries with particular emphasis on involvement of local community.	**RES-3** (HRD and stakeholder involvement) **RES-5** (Delegation of management functions) **RES-6** (Right-based fisheries) **RES-9** (Resource enhancement)	**POA-A2** (Stakeholder consultation) **POA-A4** (Resource enhancement) **POA-A3** (Responsible fishing) **POA-E1** (Guidelines/standards)	TD
8. Identification of Indicators for Sustainable Development and Management of Capture Fisheries in the ASEAN Region	Provides a practical and effective tool for management planning and actions particularly applicable for tropical multi-fisheries, which are easily understood by fishery managers, fishers and other stakeholders to ensure their cooperation and compliance. Also provides a tool to tackle with the excessive fishing capacity. Provides close linkages between statistical data and information and their usage.	**RES-3** (HRD and stakeholder involvement) **RES-5** (Delegation of management functions) **RES-7** (Fishery statistics)	**POA-A1** (Innovative fisheries management) **POA-A5** (Fishing capacity) **POA-A6** (Indicators) **POA-A9 & A10** (Fishery statistics) **POA-E1** (Guidelines/standards)	MFRDMD

9. Harvesting of Under-exploited Resources	Provides insights on potential resources that can be sustainably utilized to reduce excessive fishing capacity in coastal areas. Providestechniques to reduce post-harvest losses particularly focusing on fish handling at sea and at landing sites.	**RES-2** (Harmonized fisheries policy and plan) **RES-4** (Technical disparity)	**POA-A3** (Responsible fishing) **POA-A7** (Under-utilized resources) **POA-C1** (Maximizing utilization of catch)	TD
10. Digitized Atlas	Provides a comprehensive mapbased information system using information technology and development of databases, which could be used to facilitate research and development of CFM as well as to publicize initiatives and seriousness of the ASEAN Member Countries in ensuring sustainable fisheries.	**RES-2** (Harmonized fisheries policy and plan) **RES-7** (Fishery statistics)	**POA-A9 & A10** (Fishery statistics) **POA-E1** (Guidelines/standards)	Secretariat
11. Special Publication on Fish for the People (Center-wide Information supported by Japanese Trust Fund)	Provides an effective publicity tool using layman language that is easily understood by policy makers, research and interested public to clarify common regional directions and strategies to ensure sustainable development and management of fisheries particularly in coastal areas as well as to publicize initiatives and seriousness of the ASEAN Member Countries on the issue.	**RES-2** (Harmonized fisheries policy and plan) **RES-4** (Technical disparity) **RES-15** (Common ASEAN positions) **RES-16** (Safeguard ASEAN interests)	**POA-E2** (Safeguard ASEAN interests)	Secretariat

THE USE OF INDICATORS FOR THE SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF CAPTURE FISHERIES IN THE ASEAN REGION: AN OVERVIEW

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Introduction

The "Identification of Indicators for Sustainable Development and Management of Capture Fisheries" is one of the projects formulated under the Special 5-Year Program of SEAFDEC to support ASEAN Member Countries in the implementation of the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region adopted at the Millennium Conference held in November 2001. The use of indicators of sustainability is a tool to monitor and control the development and management of fisheries in ASEAN and would be developed and used by relevant national management authorities. This was endorsed by the National Coordinators Meeting held in Bangkok, Thailand, from 17-19 June 2002.

First Regional Technical Consultation

This First Regional Technical Consultation (RTC) was organized from 16-18 September 2002 with the objectives outlined below to support fisheries management through the use of a range of suitable indicators.

1. To present and discuss the proposal for the introduction of the use of indicators in the ASEAN region.
2. To identify and test simple and practical indicators as management tools that can be used in ASEAN Member Countries through pilot projects in interested countries
3. To identify suitable sites for the implementation of pilot projects.

At this RTC five pilot projects were accepted for implementation in SEAFDEC Member countries. These included:

Proposal 1: *Trawl fishery in Brunei*

1. A pilot project for the trawl fishery in Zones 2 and 3 off Brunei Darussalam was proposed to cover the coastal areas between 3-45 nautical miles.
2. Information on species and size composition will be collected besides additional information on trash and squids.
3. Collection of data will be focused on regular port sampling and onboard sampling if required.
4. The project will be carried out soon after some consultation with the team members.

Proposal 2: *Trawl fishery in waters of the northwest coast of Peninsular Malaysia, and based on fishing vessels of less than 70 GRT*

1. A progress meeting to identify various indicators to be used in the study was recommended.
2. The use of a standardized format in monitoring the indicators was proposed.

***Proposal 3**: "Mini" purse seine fishery in the northern part of Central Java Sea, Indonesia*

1. A project at landing sites in Pekalongan District had been initiated before 1995 but was stopped because of budget constraints.
2. Due to the problems and issues that arose and the impact of fisheries to food security, data and information of the present status of this fishery should be studied.
3. It is proposed that the above-mentioned project be continued in 2003 and 2004 with focus on the "mini" purse seine of the northern part of the Java Sea, and using several indicators such as CPUE, biological parameters of the fishes *etc.*
4. The meeting recommends that the use of CPUE as an indicator should be stated clearly in the pilot project proposal.
5. The use of the term "down stream activities" should be clarified.
6. The objective of the study, the duration of the project to be implemented and the budget requirements need to be clearly stated.

***Proposal 4**: Ringnet fishery in Camotes Sea, Philippines*

1. Due to acute budget constraints, the Philippines may need to seek financial assistance from SEAFDEC for the initial implementation of pilot project in 2003. Further discussion is needed with MFRDMD.

***Proposal 5**: The Tam Giang Lagoon fishery, Hue Province, Vietnam*

1. The fishery in this area has been considered as the pilot project because it covers a small area (about 100 hectares), thus it is easy to be implemented.
2. The long-term objectives of the projects are to decrease the poverty level and to improve the quality of living.
3. The meeting agreed that sex ratio is an important indicator for the fishery since women contribute very significantly to this fishery.
4. Conflict management training is vital and should be used as a management tool for this fishery.

General Recommendations Adopted

1. The meeting recommends that all pilot projects on the use of indicators that are proposed be implemented. Countries that have not proposed any pilot studies now are encouraged to do so.
2. It is strongly recommended that stakeholders be involved in the implementation of pilot projects.
3. SEAFDEC will collaborate with member countries in the implementation of pilot projects on the use of indicators.
4. It is recommended that countries actively support the implementation of pilot project on the use of indicators.
5. It is recommended that countries maintain a close interaction and develop a network to facilitate information exchange and communication. SEAFDEC MFRDMD will interact closely with the Technical Officers for the pilot projects as well as with the National Coordinators of the respective countries.
6. It is recommended that regional seminars be held to discuss the use of indicators for fisheries management and the progress of pilot projects implemented. For 2003, a regional seminar is proposed for the third quarter.

7. It is recommended that standard methodologies for data collection related to the use of indicators of change in composition and selection of indicator species be prepared for the region.
8. Collaboration with FAO in the use of indicators for the development and management of capture fisheries should be strengthened.

Progress of Project Implementation: 2002-2003

Pilot projects on the use of indicators for the sustainable development and management of capture fisheries were started in five countries.

The Philippines started the project on the ringnet fishery operating from Danao City, Cebu, in December 2002. This pilot project focuses on the small pelagic fishery. Resource and biological indicators have been selected. Existing data on this fishery are being compiled and new data are being collected under a regular sampling program that was started.

Malaysia started a pilot project in early 2003, focusing on the trawl fishery (covering vessels of <40 GRT) in the States of Kedah and Perlis on the north-west coast of Peninsular Malaysia. Indicators selected are fleet, socio-economic and environmental indicators and these have been agreed upon following a series of meetings, discussions and workshops with stakeholders.

Thailand started a pilot study on the trawl fishery in Pran Buri, Prachuab Khiri Khan District. A meeting with stakeholders was held in July 2003. Currently, stakeholders including fishers, are actively involved in this project. Existing data are being compiled and new data are being collected through a regular sampling program. Selected indicators include resource, fleet, economic and social indicators.

Brunei Darussalam is studying the use of indicators for the management of the trawl fishery beginning September 2003. Existing data on the fishery selected are being compiled while regular sampling programs have been planned.

Indonesia initiated a study on a traditional demersal fishery in Pekalongan, Central Java, beginning July 2003. Existing data on the fishery selected are being compiled while regular sampling programs have been planned.

Vietnam will not implement the pilot project proposed at the First RTC.

Conclusion

This Second RTC is planned to review and monitor the overall progress of the project and to make proposals for improvement. This RTC also aims to propose a framework for preparing the draft regional guidelines on the use of indicators for improved fisheries management.

PILOT PROJECT* ON THE USE OF INDICATORS FOR THE SUSTAINABLE DEVELOPMENT IN CAPTURE FISHERIES WITH FOCUS ON THE DEMERSAL TRAWL FISHERY OF BRUNEI DARUSSALAM

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Introduction

The fisheries sector plays an important role in the economy of the country. The fisheries of Brunei Darussalam contributes about 0.12% in the GDP and is targeting a greater contribution by optimizing its annual potential of about 21,000 tonnes with the value of B$ 112 million. In this project, the demersal trawl fishery is chosen for the indicators study, although a number of sectors (not only trawlers) are also involved in the study of indicators of sustainable development.

The demersal fishing ground of Brunei Darussalam is one of the smallest in the region. This area is further decreased by the presence of the oil structures and reef areas sharing the entire continental shelf. The trawlers generally operate in Zones 2 and 3 of the fishing zones set by the Department of Fisheries. Zone 2 covers an area from 3 nautical miles from the coastline up to 20 nm while Zone 3 extends from 20nm to 45nm from the shoreline. The trawlable area covers about 4,600 km2 or about 12% of the total water area of EEZ. At present there are 18 trawlers operating in Zone 2 and 3 trawlers in Zone 3. They are using otter trawl nets with the vessel engine capacities of between 180-350 hp and between 350 400 hp in Zone 2 and 3 respectively. In 2002, the Department of Fisheries enforced the use of cod end of mesh size of 51mm for all trawlers, with the aim to reduce bycatch by at least 18%. The trawling labour force, of about 105 crew members, is dominated by the foreigners mainly from Indonesia, Malaysia and the Philippines.

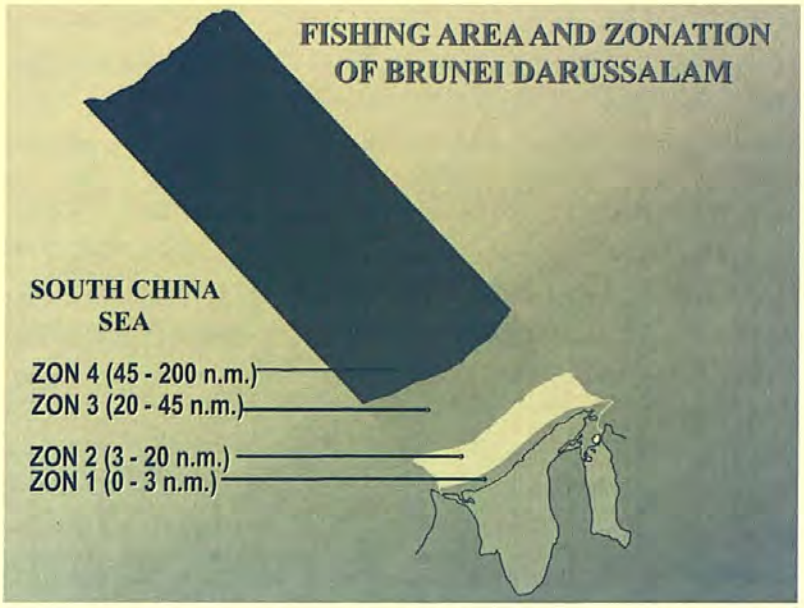

Figure 1: Fishing Zones of Brunei Darussalam

The Trawl Fishery

Species Caught

The species caught by the trawlers are generally demersal but due to the development of the gear, they catch some pelagics as well. Overall the catch is dominated by small and unmarketable species such as leiognathids and juvenile fishes that are usually discarded at sea. About 30% of the total catch from trawlers consists of various species of leiognathids. Other species groups include Mullidae, Nemipteridae, Sciaenidae, Carangidae, Synodontidae, Ariidae, Gerreidae and many others in smaller percentages.

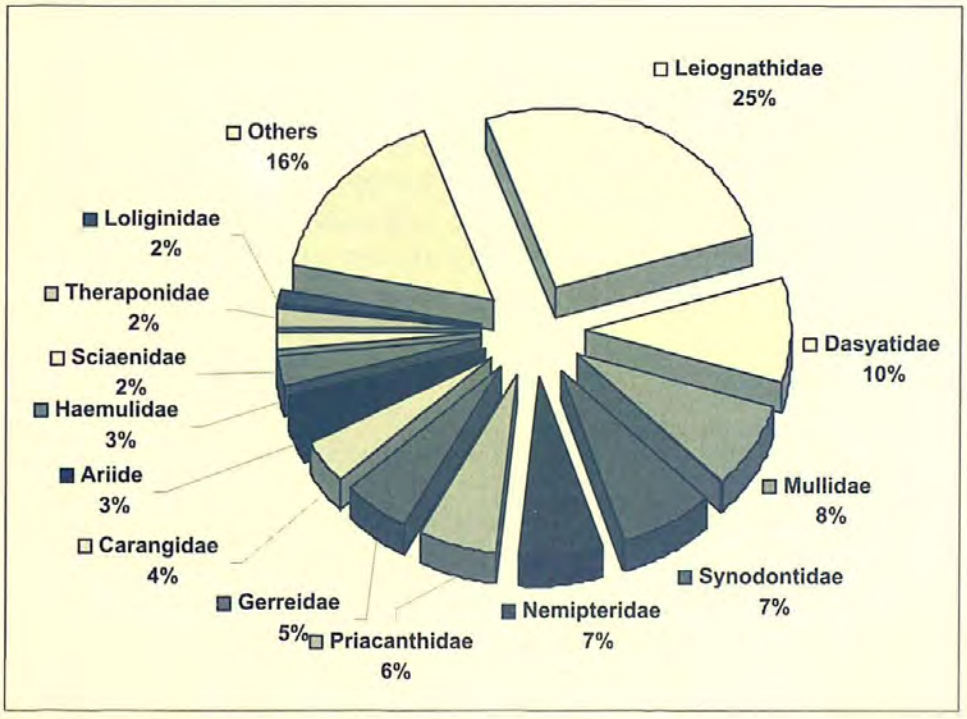

Figure 2: Catch composition of landings of commercial trawlers in Muara

Status of Fishery

Recently the performance of commercial trawlers was observed to be way below expectations with the annual fish production of only 2,788 tonnes in 2003 versus the estimated trawl Maximum Sustainable Yield (MSY) of about 3,500 tonnes. The catch per unit effort (CPUE) from the trawlers had shown a continuous decline causing an alarm not only to the operators but also to the consumers and the authorities.

Table 1 shows the CPUE had declined steadily since 1995 from 1.12 tonnes/day to 0.64 tonnes/day in 2001 and further declined to 0.57 tonnes/day in 2003. It was also found that the fishing effort in terms of the number of days and number of trawlers increased but yielded less catch in the previous years.

Table 1: Annual CPUE of commercial trawlers from 1993 to 2003

Year	Number of trawlers	Production (mt)	Effort (days)	CPUE (mt/day)
1993	16	2,845.0	2,300	1.24
1994	17	2,975.4	3,177	0.94
1995	17	3,295.5	2,931	1.12
1996	23	3,822.8	4,016	0.95
1997	24	4,229.8	4,471	0.95
1998	22	4,104.8	4,735	0.87
1999	23	3,009.4	4,775	0.63
2000	23	3,366.9	4,653	0.72
2001	25	3,587.6	5,645	0.64
2002	25	2,720.0	4,358	0.65
2003	18	2,788.0	4894	0.57

Investigation showed that some indicator species of overexploitation are showing up such as the decrease in some species such as the pomfrets, croakers, lizardfishes *etc*.

Steps had been taken to overcome the situation by imposing the moratorium on the issuance licenses for commercial trawlers starting from the year 2001. During the period of the moratorium, there will be no increase in trawl licenses from the present number (quota) and any licenses revoked will not be replaced/offered to the new comers. Similarly, the Department of Fisheries will conduct close monitoring of the performance of the trawlers and continuous stock assessment through resource surveys are being carried out. In order to enhance the resources and create alternative fishing grounds to the fishermen, the Department of Fisheries has been actively deploying a number of artificial reefs since 1985.

Pilot Project Implementation

The project was started in September 2003 where the project team was firstly formed to carry out the study. The project proposal was refined by focusing on the important aspects of the pilot study such as the identification of possible indicators of sustainable development from the trawl fishery and how it will be used. Due to the late implementation, the project is scheduled to be completed by September 2004. The main objective of the pilot project is to achieve sustainable development in capture fisheries using indicators as a tool that provides information on the condition and status of fisheries resources.

Fisheries Management Plan

To start with, the fisheries management plan has been formulated as a directive approach to this project involving the Department and also the stakeholders who play a vital role in capture fisheries.

The goal of marine captfisheries in Brunei Darussalam is to develop the marine fisheries towards the maximum economic yield. This goal is to be achieved through the formulation and implementation of the management strategies to increase the productivity, resource sustainability and equal share among the fishers. In general the objectives of the management are: -

- Increase the marine resource productivity through resource enhancement programs;
- To promote the usage of the selective fishing gears and environmentally friendly gears in minimizing the wastage of under-size fish;
- To fully exploit the marine resources up to 21,000 tonnes and at sustainable level;
- To protect the nursery and breeding grounds through the establishment of marine protected areas; and
- To promote equal share of marine resources between the small-scale and the commercial fisheries.

Currently, some measures to mitigate the decline in the production and losses to trawl fishing operations are being undertaken by the Department of Fisheries. These includes the limited number of licenses to the trawl fishery, mesh size regulations, zonation for fishing grounds and encouraging the trawlers to shift to pelagic fishing such as purse seine and long line operations. On top of that, the law enforcement capabilities of the Department have been strengthened to prevent the exploitation of the resources by illegal fishing practices.

Before meeting with the stakeholders, the indicators for the sustainable development were first identified and selected.

Generally, the fishing operation data, which are used as indicators, are recorded in the logbook distributed to all commercial fishing vessels and to be submitted monthly to the Department. The collection of the catch data, which includes the length and species composition, is done during regular port sampling and onboard sampling as required. To fill up the information gap, new data are proposed to be collected which include:

(i) Net return indicators
- Profit-rent
- Net return/investment

(ii) Investment indicators
- Market and replacement values
- Depreciation
- Fleet age composition

(iii) Catch structure indicators
- Number of spawners

The fisheries management plan including the identified indicators was then discussed with the stakeholders in order to get their response and most of all, to encourage the active participation in developing the capture fisheries towards the maximum economic yield. It was also emphasized to seek cooperation from the stakeholders to provide the information requested such as production, the revenue, expenditure and so forth to be used as indicators in trawl fishery. The stakeholders were selected by fishing gear, in this case the trawl and by fishing zone. Out of 18 stakeholders from Zone 2 who were invited, only nine responded while all the three stakeholders from Zone 3 attended. A total of 12 stakeholders participated at the meeting. The proposed indicators were discussed and the following are indicators being accepted by the stakeholders.

Table 2: The list of proposed indicators agreed/disagreed by the stakeholders

Proposed indicators	Indicators agreed/disagreed
1. Harvest indicators	
1.1 Landings or catch	/
1.2 CPUE	/
1.3 Value of landings	/
2. Fishing effort indicators	
2.1 Number of fishing boats	/
2.2 Fishing time (operational days)	/
2.3 Number of fishers	/
3. Harvest capacity indicators	
3.1 Gross tonnage and Horse power	/
4. Net return indicators	
4.1 profit-rent	X
4.2 net return/investment	X
5. Catch structure	
5.1 Catch composition	/
5.2 length or size composition	X
5.3 Number of species	/

It was found most stakeholders were reluctant to furnish the information on the profit-rent and net return/investment due to confidentiality, while collecting data on length and species composition consume time and additional manpower. However after the consultation, most stakeholders agreed to reveal the information regarded as confidential through personal interviews while in collecting the length and species composition, the staff of the Department will be dispatched for this purpose. From time to time basic training will be conducted for the crew. Generally, the stakeholders agreed to cooperate in data collection. Moreover submission of monthly logbooks is compulsory for all the commercial fishing vessels.

Results

Generally, the trend of the trawl fishery for the past of five years can be seen from the Table 1 covering the production (tonnes), effort (number of days) as well as the CPUE. However since the pilot project is still being conducted, preliminary results or finding have not been reached. In view of this, we have some shortcomings on how to go about the pilot project primarily in the absence of a concrete guideline to follow. Thus we resorted on looking for references from FAO for guidance. The data collected is analyzed using the designed database, however, the quality and timeliness of recorded data need to be improved. This could be sorted out through frequent meetings with the stakeholders to seek their commitment and support for the Department's program.

Constraints

In implementing the pilot project some of the constraints encountered are as follows: -

- There were constraints for the technical staff to go onboard for data collection as in the case of length and species composition due to other commitments. Often, the data collected have to be left to the crew causing some data to be doubly recorded.
- Since the pilot project has been delayed for quite sometime, the meeting with the stakeholders had to be conducted in an *ad hoc* manner, resulting in misconception and misunderstanding to the whole objective of this project. This also resulted in less response in the provision of additional information upon requested.
- Lack of knowledge and guidelines on the usage of the indicators for management purposes among the technical staff.

Proposed Solutions

In rectifying the above constraints, the following are the solutions: -

- Establish a proper mechanism for collection and analysis of data. The importance of indicators need to be clarified not only to the technical staff but also to the stakeholders involved;
- Provide intensive training and consultation on the use of indicators for the management purposes; and
- Promote active participation of the stakeholders in supporting the project, through road shows, consultation and so forth.

Conclusion

- The project is still on going, hence the results of the analysis are just preliminary
- The project requires more time to analyse the data as required.

*** Appendix 1:** Project Information

Technical Project Officer	:	Dy. Ranimah Hj A. Wahab
Project Team Members	:	Hjh Noorizan Hj Abd. Karim
		Idris Hj Abd. Hamid
		Mr. El A. Cinco
		Mohammad bin Mail
Date of project initiation	:	September, 2003
Planned project duration	:	One (1) year

INDICATORS FOR SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF THE DEMERSAL AND SHRIMP FISHERIES IN NORTH COAST OF CENTRAL JAVA WITH SPECIAL REFERENCE TO PEKALONGAN AND ITS ADJACENT WATERS

Duto Nugroho[1], Dyah Retnowati[2], Suherman Banon Atmadjaand[3] Dian Oktavianil[2]

Introduction

The marine fisheries sector has played a significant role in the development of Indonesia. The national geographical condition of the Java Sea with an area of approximately 440.000 sq. km (Figure 1) shows that the bio-ecological conditions, physically influenced by two monsoonal regimes, is related to the environmental changes as part of an internal body process. The long-term climate changes and the internal oscillation which are related to the precipitation rates as an impact of *El-Nino* events also plays a significant role in the area (Sadhotomo and Durand 1997; Potier, 1998). There are several estuaries of rivers along the coast indicating the potential area of shrimping grounds.

Generally, the bottom substrate in the Java Sea is muddy and sandy. This typical bottom substrate indicates good fishing grounds for trawl operations that exploit the demersal fish and shrimp resources. Slip mouths (*Leiognathus* spp.) are the dominant species in the catch of the north coast of central Java where the area had been exploited intensively since 1970's by trawlers (Losse and Dwiponggo, 1977). The main fishing grounds for shrimps are located along the coast of central Java at the water depth of 10-40m The estimated inshore area with water depth less than 20m was 4700 nm^2 while the off shore area was 13.500 nm^2 approximately (Dwipongo, 1982). However, the Presidential Decree No. 39/80 had banned the trawl fishery since 1980.

Fishing gear, particularly those categorized as traditional ones, had been modified to increase their productivity. Modifications were made to the design, construction and fishing operation mainly to the gear *arad* and *cantrang* (Danish seine) and trammel nets to exploit shrimps and some other demersal fishes with high economic value.

The demersal fish and shrimp stocks tended to be exploited heavily since 1975 (Dwiponggo, 1978). The "*bagan siapi-api*" trawler played a significant role in the fishery. Martosubroto (1982) concluded that the exploitation was still under the MSY estimated at 85.000 90.500 tonnes. An analysis done in 1997 showed that the exploitation rate was beyond the maximum sustainable yield (Badrudin *et al.*, 1997). This information needs to be re-evaluated through observations that are more intensive and by using multidisciplinary indicators. A pilot study on the use of indicators started in May 2003. Hopefully, the output from this study will contribute to the better understanding of the status of the demersal fisheries. The study will be conducted with the cooperation of the stakeholders and the local government and the results will be discussed and presented to them. This study will provide the baseline for fisheries management purposes in the local area. The selected area for the pilot study is Jambean and Wonokerto to the west of Pekalongan in central Java.

[1]*Research Center for Capture Fisheries. Agency for Marine and Fisheries Research*
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[3]*Research Institute for Marine Fisheries*

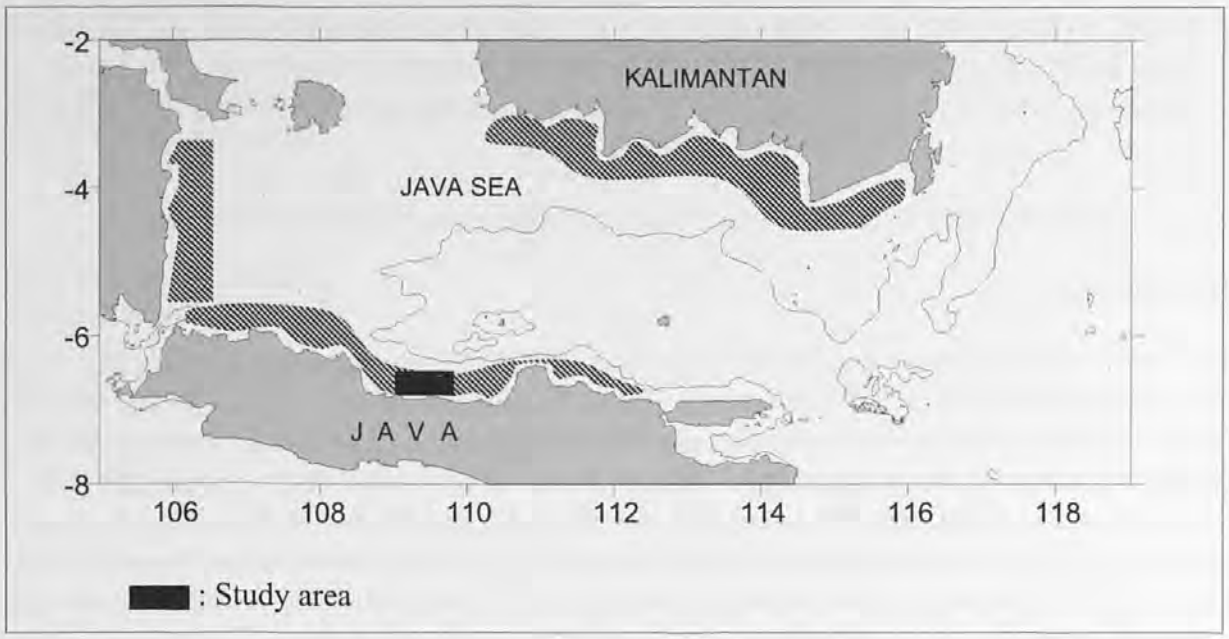

Figure 1: The fishing ground of the "Danish Seine" fisheries in the Java Sea

The justifications for the selected site and fishery for the pilot study were:

- Several specific areas with specific fisheries in the country were proposed to the central fisheries administrator. These included the Arafura Sea and Malacca Strait with trawl fishery, Bali Strait with the ring net sardine fishery, Java Sea with the scad ring net fishery and Tomini Bay with the scad ring net and skipjack pole and line fishery. However the high cost for implementing the indicator pilot project was a major constraint although historical fisheries and research data were available.
- So, the north coast of central Java was selected as an appropriate and cost-effective site location. The aim is to study the exploitation of the demersal and shrimp fishery by the small-scale fishing boats (under 30 GT).
- Based on the distribution of the number of fishing boats by gear from the whole province around the Java Sea, the north coast of central Java is the appropriate pilot study area (Figure 2).
- Observations through interviewing several fishers at the landing sites showed that some historical data were available.
- The fishing effort is high but this is not well documented. The licensing system is fully under the control of the local authority.
- There is a general tendency that these types of fisheries are already hopeless and in an uncontrollable situation. These fisheries are multi-gear and there is seasonal movement of the fishing vessels to and from the main fishing grounds.
- The government would like to increase the standard of living of those involved, but proper fisheries management plans should be in place with appropriate milestones indicated.

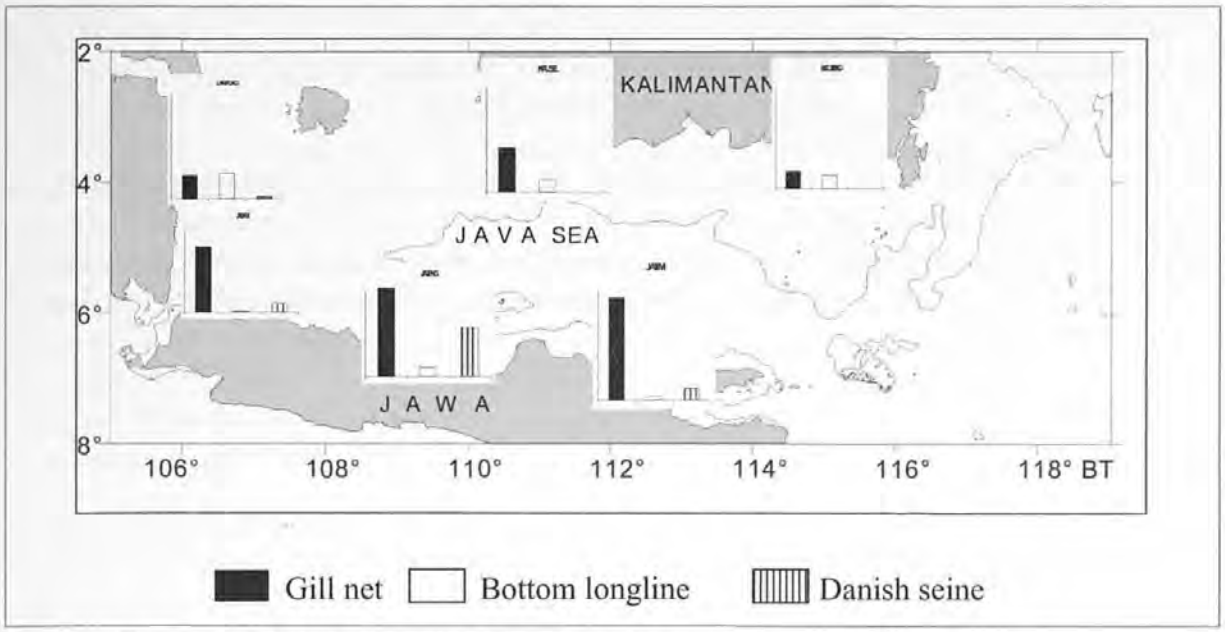

Figure 2: Distribution of fishing boats by main demersal fishing gear

The project started in May 2003 with national funding. The following activities were planned for implementation on a monthly basis.

- Collecting and evaluating representative fisheries data.
- Collecting and reviewing all information and existing research data available.
- Collecting biological data (*in situ* catch composition, bio-reproduction)
- Collecting catch-effort data (*in situ*) including the actual fishing effort
- Collecting existing data on the share system.
- Studying the licensing system in detail
- Studying the dynamics of fishing boats - in and out movement
- Doing experimental fishing with Juvenile and Trash Fish Excluder Devices (JTED)

List of Persons Involved

Subhat Nurhakim Dr.	(Director RCCF-AMFR)
Parlin Tambunan	(Director of Fish Resource, DGCF)
Duto Nugroho	(Principal Investigator, Researcher, RCCF)
Dyah Retnowati	(Officer, Sub Directorate of Statistics, DFR, DGCF)
Suherman B. Atmadja	(Principal Researcher, RIMF)
Rusmadji Rustam	(Sr. Fisheries Biologist, AAAT)
Dian Oktaviani	(Jr. Biologist, RCCF)
Ria Fauziah	(Jr. Biologist. RCCF)
Natsir	(Jr. Fisheries Biologist, RIMF)
Sarjono	(Fisheries Economics, AAAT)
Planning division	(Officer, Central Java Fisheries Service)
Turhadi	(Officer, Pekalongan National Fishing Port)
Planning division	(Officer, Pekalongan Fisheries Service)
Head of Resort	(Officer, Wonokerto Fisheries Resort Service)
Sodikin	(Fisher, Wonokerto)
Darsono	(Fisher, Wonokerto)
Marzuki	(Fisher, Jambean)
Supono	(Fisher, Jambean)
Zaenal Arifin	(Field Technician, CDFT, DGCF)

Zaenal Abidin	(Field Technician, CDFT, DGCF)
Sariman	(Field Technician, CDFT, DGCF)
Endon	(Field Technician, CDFT, DGCF)

This preliminary report deals with the progress based on general information of the activities collected during the period from May to December 2003. This study will continue until the end of 2005. The expected output is to obtain an example that can be used for a local fishery by the local management authority. The results should be treated as only preliminary because further analysis is still needed.

Fishery Status

The Fish Resources

The demersal fish resources in the coastal areas are important to the communities and coastal fishers in the north coast of Java. This can be seen through the presence of a large number of small size fishing boats and small scale fishing gear and the high fishing effort. The active fishing gear dominating the area is the *cantrang* or *arad* which is trawl- like but are classified as the Danish seine.

Previous studies showed that the species composition before the trawl ban in 1979 were dominated by the pony fishes (*Leiognathus* spp.) with of catch rates of about 30% in the standard trawl (Dwiponggo and Badrudin, 1980). However, in the next seven years i.e. until 1986, the composition increased to 60% (Badrudin, 1987). The estimated stock density determined by the swept area method in 1986 was around 6.2 tonnes/sq km. (Badrudin, 1988). The structure and community analysis of the demersal fishes before and after trawl ban (up to 1986), indicated a recovery of the quality of fish and an increase in the biomass of the large food fish such as *Lutjanus* sp., *Lactarius lactarius*, *Eleutheronema tetradactylum*, *Muraena* sp. but with uncertainties for the shrimp stocks (Sadhotomo, 1991). Atmadja *et al.*, (2003) stated that in the depth of 20 to 50m, the composition in weight shifted slightly compared with the existing data that had been collected on 1976. At present Leiognathidae is a dominant group of species followed by Nemiptridae, Priacanthidae and Synodontidae (Figure 3).

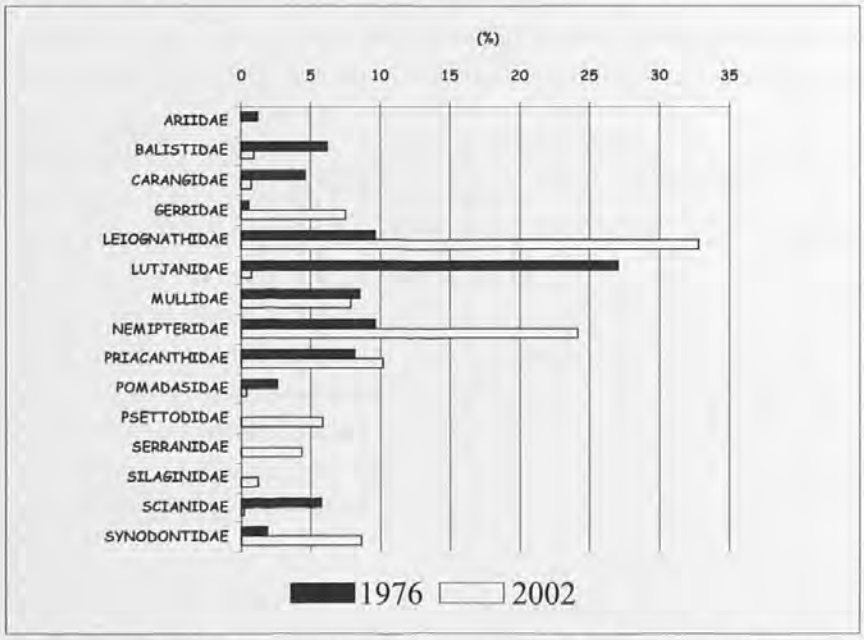

Figure 3: The catch composition of demersal fish between 1976 and 2002

Based on the local statistical data, there are some difficulties to understand the level of fishing effort really in the area. A quick analysis showed that the fishing gear is dominated by the "*payang*" or surface seine for catching small pelagic fish, followed by the beach seine and trammel net. There are missing or unclear information on the number of *arad* and *cantrang* as the main fishing gear exploiting the coastal demersal fish resources.

After explaining and discussing the importance of such baseline information for evaluating fisheries to the local officer, the level of the actual effort is better understood. The data were not missing but since there was no column in the official data form for the landing records of *cantrang*, the number of this gear, was recorded under *payang*. These data had to be extracted manually from the raw data sheets. The a*rad* was not recorded because this gear requires low investment and gives low profit levels.

A quick analysis of the monthly production by fishing gear showed that *payang* (which is representing *cantrang*) played a dominant role in the total landing. The production by month in 2003 is shown in Figure 4. The trends of monthly landings by groups of fish including their average price for 1997 to 2002 in Wonokerto were also determined and shown in the Appendices 1 and 2.

To solve this problem, an approximation was applied to determine the range of the number of existing *arad* and *cantrang* in the area, and completed by conducting regular census in the study site.

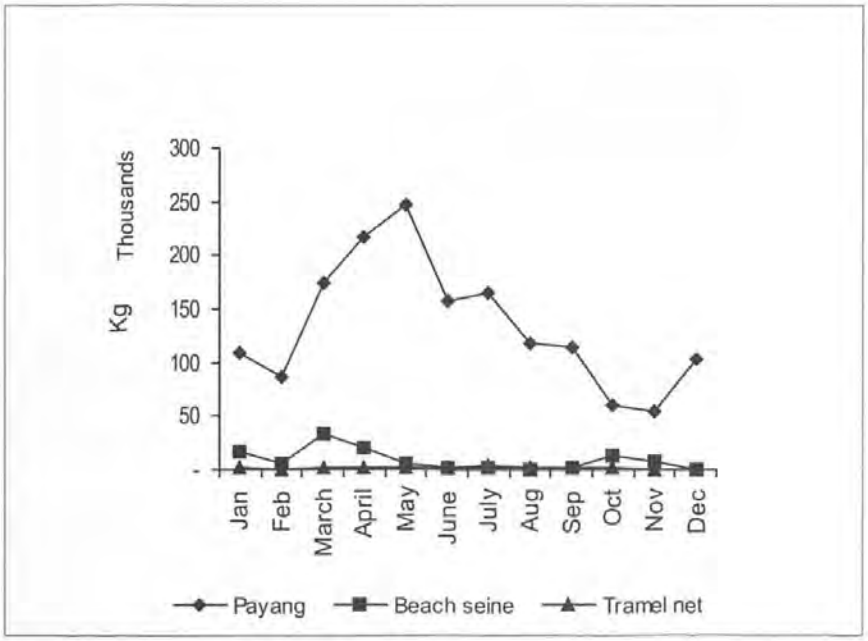

Figure 4: Monthly catch by fishing gear in Wonokerto, 2003

The catch composition derived from 24 samples of *arad* landings at the Jambean auction place showed that shrimps contributed 2-3% of the total catch. Lizardfish (*Saurida* spp.) and squid temporally played a dominant role as shown in Figures 5 and 6.

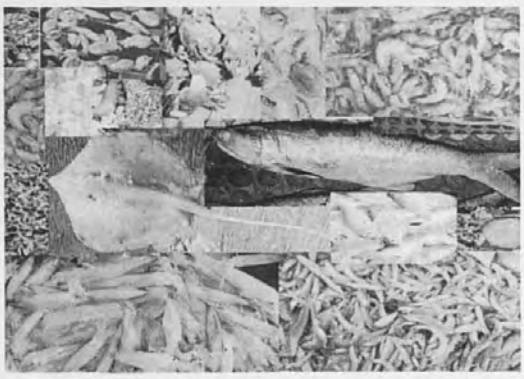

Figure 5: Catch composition of *arad*

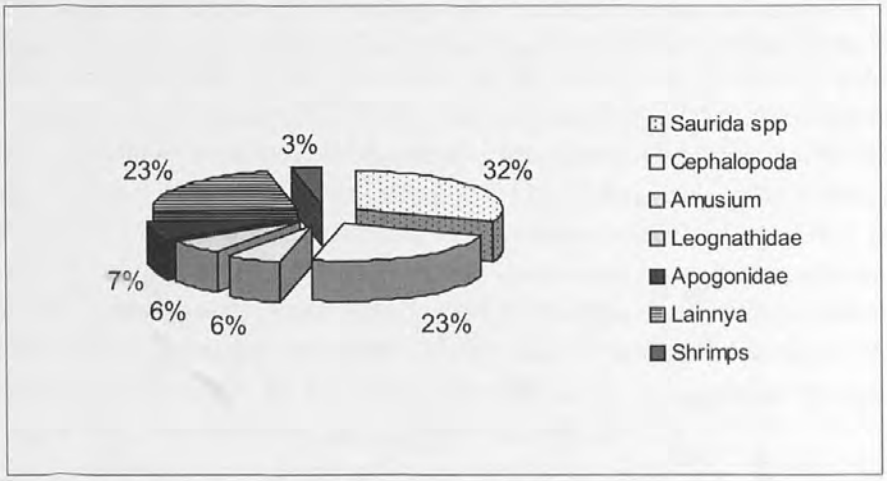

Figure 6: Catch composition of a*rad* with meshes of 0.75 inches

Observations on the catch composition of *cantrang* based on several landings *in situ* in September/October 2003 showed that *Nemipterus japonicus* and *Saurida* sp. were the dominant species (Table 1). The overall catch composition is still being analyzed.

Table 1: Catch composition by *cantrang* in Wonokerto

Family/Species	Wonokerto %
Fish	
Dasyatidae	2.00
Ariidae	3.20
Leiognathus splendens	9.81
Lutjanidae	1.39
Muraenesox sp	0.11
Nemipterus japonicus	13.94
Psettodes erumei	2.94
Priacanthus macracanthus	3.73
Pentaprion longimanus	1.51
Serranidae	2.44
Saurida longimanus	4.89
Saurida micropectoralis	11.01
Saurida undusquamis	2.85
Sciaenidae	1.30
Soleidae	5.05
Trichyuridae	1.09
Upeneus sulphureus	4.83
Others	22.18
Non-Fish	
Squid and cuttle	3.50
Shrimps	0.85

Fishing Effort

The dimensions of small scale fishing boats locally called *payang* and *sopek*, are LOA 8.6310.87m, breadth 2.823.11m and depth 0.55-0.90m. Interviews with fishers clearly showed that the boats were multi-gear and related to the fishing seasons. The general dimensions of the fishing boats are presented in Table 2.

Table 2: Geometrical dimensions of *arad and cantrang* by location

Location	LOA (m)		B (m)		Draft (m)		HP	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Pekalongan	10.87	0.73	3.11	0.10	0.90	0.23	49.37	29.83
Jambean	8.63	0.15	2.82	0.25	0.55	0.17	22.50	5.20
Kendal	9.44	2.32	3.23	0.65	1.26	0.27		

The long-term effect of the trawl ban had given a higher probability of success to coastal and traditional fishing fleets to catch shrimps and some large important and economical demersal species. Several types of fishing boats were modified after the fishers found a relatively cheap "*gardan*" in 1987 that is very powerful for towing and hauling the net of *cantrang*, together with the otterboards and sinkers. Using boats with an engine power of 33 HP and at a towing speed of

around 1-3 knots, an average of less than four hauls during the day were made and this showed the low productivity of this gear.

Modifications were made by the fishers because they were easily done at a relatively low cost of investment and maintenance facilities were available in the neighboring area. The target species are shrimps and some demersal fish of high economic value such as catfish (*Arius* spp.), red snapper (*Lutjanus sanguineus*) and pomfrets (*Pampus* spp.).

However, on the operational scale, the authority found some difficulties with this type of fishery due to its operation. The gears are categorized as trawl-like and these are not allowed under presidential decree No. 39/80. As the number of *arad/cantrang* increased with time, the issue of decreasing shrimp resources emerged as a source of conflict with the legal gear, the trammel net. This situation called for a need to study the relationship between the *arad/cantrang* fishery and the demersal fish resource availability. The towing technique used differentiates the *arad* and *cantrang*. The a*rad* is operated by anchoring the boat, then towing the net. The *cantrang* is operated just like a trawler, but has a smaller net and the boat used has a lower engine power.

The specifications of the *cantrang* net is roughly as follows. The length is approximately 26.7m; the wing is 11.75m with a mesh size of 2.5 - 3.5 inches. The bunt is 11.6m with 1.25 - 2 inches mesh, and a codend of 2.5m long and mesh size of 0.75 - 1 inch. Some used otterboards of 70 x 36 inches complete with a chain of 8kg.

Evaluation of Existing Effort

A fishing fleet census (made through 10 sampling trips) in the selected area with a total number of 140 fishing boats showed that during a period of two months, from July-August 2003, only 30 to 45 % of the boats were actively fishing (Figure 7). The rest stayed inshore due to several reasons. The main reason was that the catch would not able to cover the operating cost. This "myopic decision" showed that fishing that started during a period of high shrimp prices and a low price of fuel in 1998 led to profit orientation. These boats became idle when the price of shrimps was 40% lower and the fuel price rose almost 300% higher. The change in fishing effort was a boom and bust that is commonly occurring in the capture fisheries of the north coast of Java.

Data were collected from the fishers. As an example, a fisher Sodikin, who has records was selected. It was shown that during the period September/October 2003, the number of trips per month was 12, with average of 36 hours fishing and 4-5 hauls per trip. The average catch per trip showed that the economic species was dominated by squid/cuttlefish of around 10% of the catch but with a 70% contribution to the total price. A quick analysis of the sharing system indicated that at an average operation cost of Rp. 250.000, (following a share system of 50% for boat and gear owner, and 50% for the fishers), the net income was around Rp. 150.000 per boat (with two crew members) per trip. The share for the crew was 50% of the net income or Rp. 37.500 per trip. The helmsman earned 20% extra from the owner's share.

In some cases, the owner of the *arad / cantrang* would leave their own gear and work as a crew member on a short term contract in the ring net fishery (boats more than 100 GRT) which operates further off their fishing area (Makassar Strait or Natuna Sea). Some also work as contract crew in the fishnet fishery (trawlers of more than 150 GRT) that operate for a certain time in the Natuna Sea or Arafura Sea. These were the reasons to explain the idle boats.

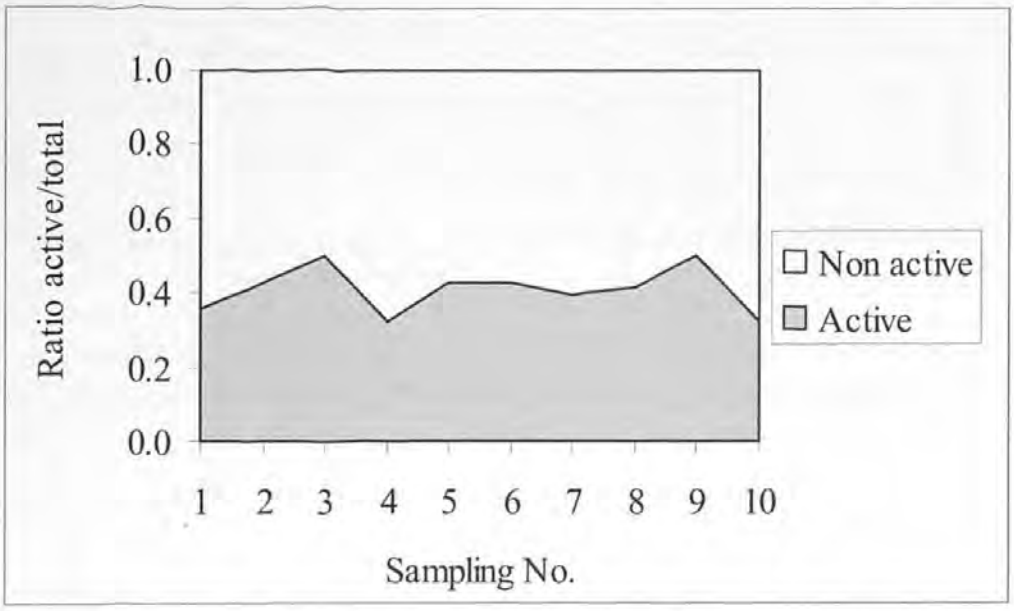

Figure 7: Ratio of active to total number of *arad* by sampling

Miscellaneous Data and Information

During regular observations in the year 2003, some data and information were collected and they are still under analysis. These were:

- Length frequency as a tool to evaluate the decreasing on average length within a decade
- Sexual Maturity as an indicator because most of the catch were in immature stage
- Experimental JTED as a tool to enhance fishers understanding of the optimum mesh size to reduce the catch of small and non-economic fish due the importance on survival and ecological balance
- Yield by fishers (catch and economic value Figures 8 and 9)
- Demography of fishers (age, education structure)
- Introduction to concept that quality is better than quantity of fish being landed

Conclusions

- The data being collected still need to be evaluated to see how far the output can be designed as an outcome to be accepted by local stakeholders as indicators to develop their resource sustainability
- Continuous observation of the modifications to fishing boats will be done in the year 2004 to propose a strategy to obtain reliable data cost-effectively
- Statistical data are most powerful and can be used by stakeholders to do self-assessments on the state of the fish resources by their own community. These data can also be shown to the communities to enable them to understand the state of the resources

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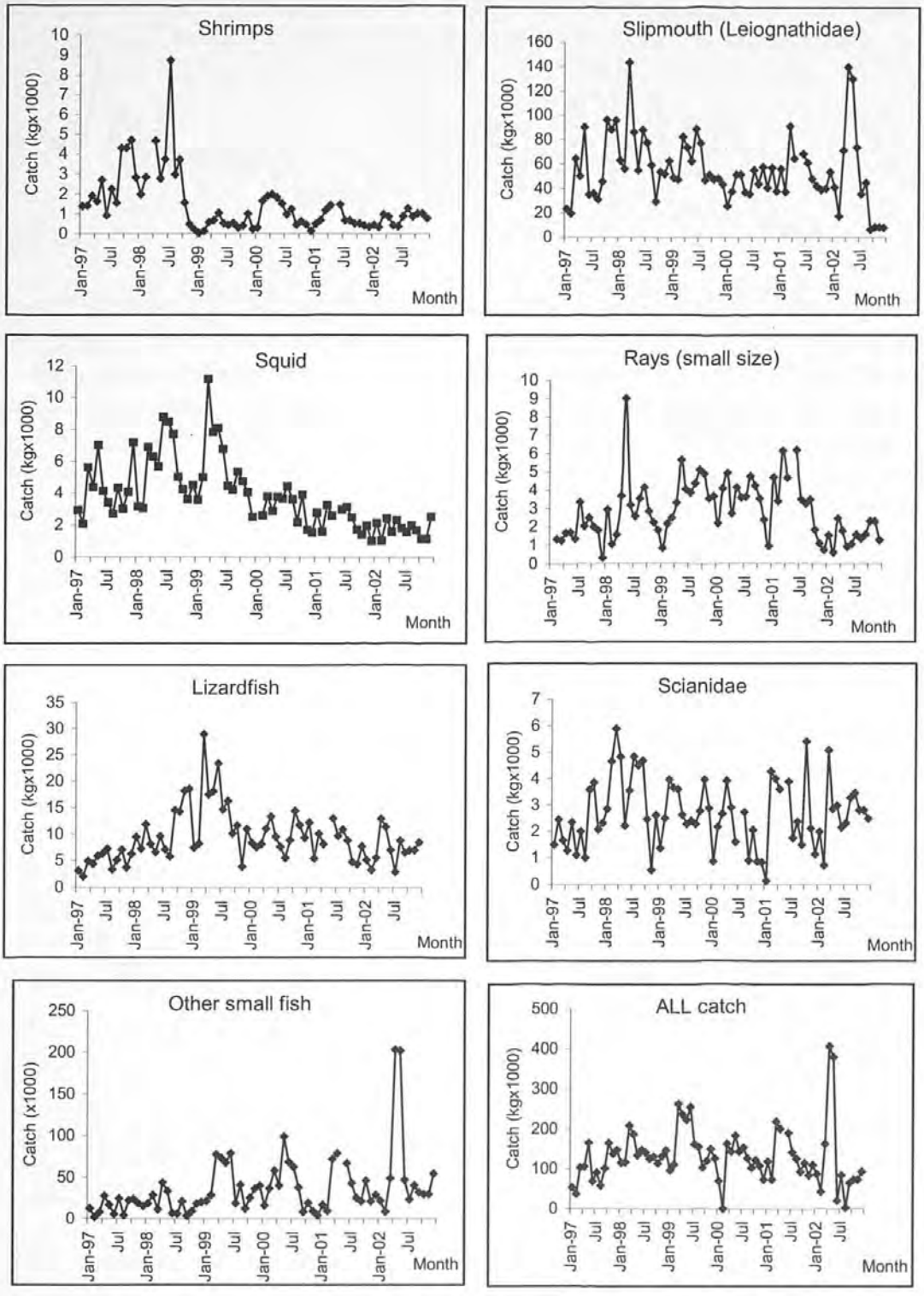

Figure 8: Monthly changes of the total catch by group of species in Wonokerto for 1997-2002

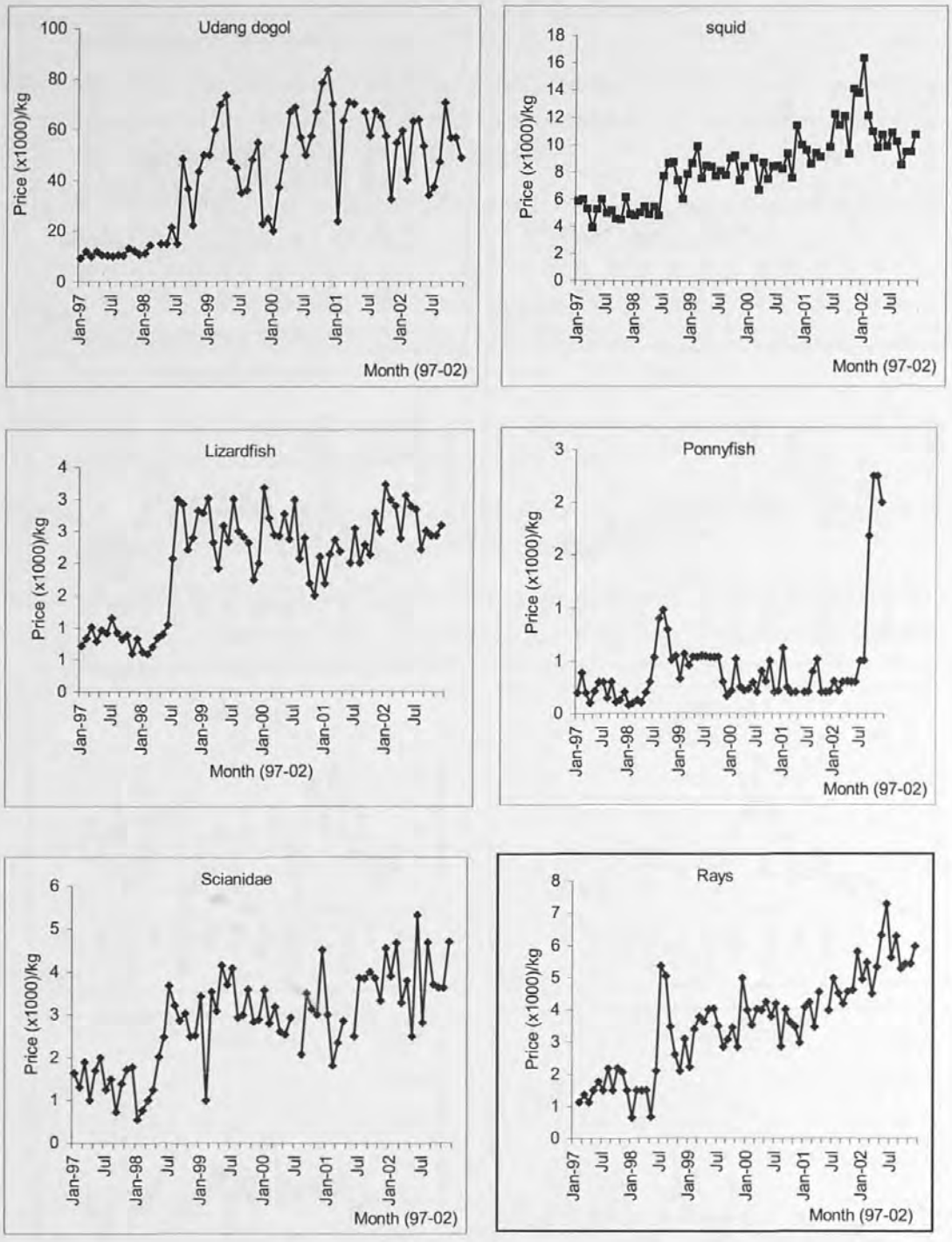

Figure 9: Monthly changes of the average price by group of species in Wonokerto for 1997-2002

PILOT PROJECT ON THE USE OF INDICATORS FOR THE SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF ZONE B TRAWLERS IN THE STATES OF KEDAH AND PERLIS, MALAYSIA*

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Fisheries Research Institute
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Introduction

The trawl is the main gear that contributed substantially towards the total marine production on the West Coast of Peninsular Malaysia since 1971 (Figure 1). Before 1970, trawl contributions to the total marine landings were less than 30%. From 1970 to 1985, the trawl fishery had developed rapidly and contributed 40 to 50% of the total marine landings on this coast. In the subsequent years until now, the contribution has been more than 60% and the trawl remains the most important gear in terms of landings. Perlis and Kedah the focus area of this study, are located in the northern-most part of the west coast (Figure 2). These States contributed 121,000 mt or 25% of the total landings of the west coast of Peninsular in 2001 (Table 1). Landing composition and its trends are given in Table 2. As shown, the highest landings of demersal, pelagic and anchovy were recorded during 1980 to 1984, while the highest landings of prawn, cephalopod and shellfish were in 1992. In general, the present total landings are much lower than the peak value at 286,000 mt which were recorded in 1982.

About 57,433 mt or 47% of the marine landings in Kedah and Perlis came from 717 licensed trawlers, which were manned by 2,956 fishers in 2001 (Table 3). Among the trawlers, Zone B trawlers (about 20 GRT and 20 HP) are the most dominant in Perlis and Kedah representing 67% and 83% (Table 4) of the total trawlers, respectively. Analysis undertaken by the Fisheries Research Institute in partnership with Worldfish Center showed that with the rapid expansion of trawl fishing in the 1970's, the demersal fish resources in coastal areas of Perlis and Kedah have been reduced to as low as 8% (<50 m depth) and 38% (50 91 m depth). The reduction is based on the amount present in the survey in 1997 compared to 1972.

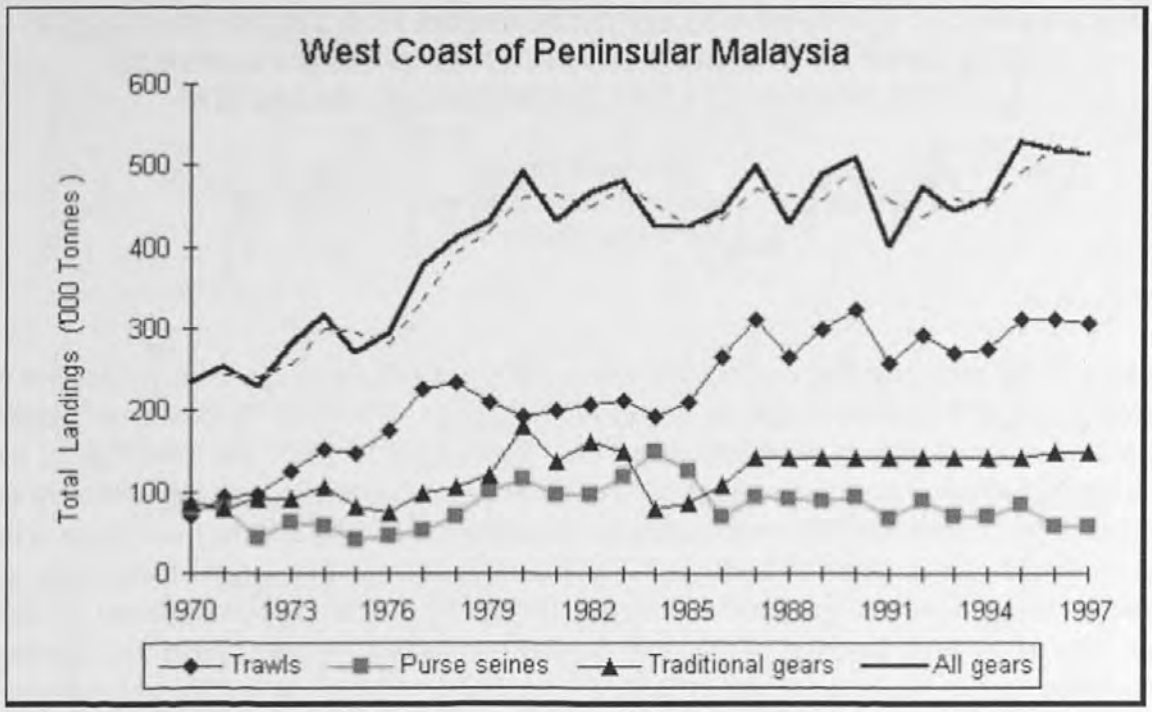

Figure 1: Trend of marine landings by type of gear on the west coast of Peninsular Malaysia

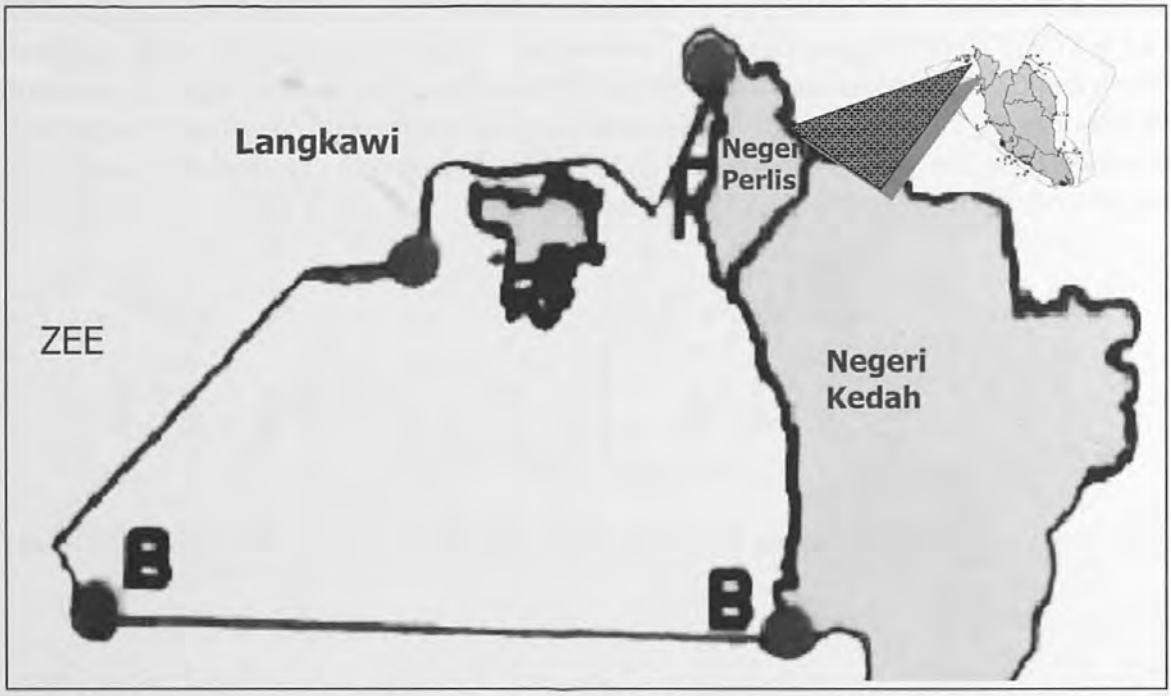

Figure 2: Map showing the States of Perlis and Kedah on the northern part of the west coast of Peninsular Malaysia

Table 1: Contribution of trawl landings in the States of Kedah and Perlis to the total landings for the States and for the country in 2001

	Total landings (mt)	Trawl landings in Kedah & Perlis		
		Landings (mt)	% to State	% to National
Perlis	48,790	18,273	37	4
Kedah	72,210	39,160	54	6
West Coast Peninsular	489,026	296,735	-	61
Malaysia	1,231,289	675,957	-	54

Table 2: Marine landings by type of catches in the States of Kedah and Perlis from 1968 to 2000

	Landings (x 1000 mt)						
	Demersal	Pelagic	Anchovy	Prawn	Cephalopod	Shellfish	Total
1968	9.50	34.64	2.49	.72	.30	.22	57.07
1970	9.89	16.50	6.33	.77	.38	.25	43.65
1972	23.96	12.68	4.48	1.80	.73	.01	66.91
1974	28.14	16.50	5.74	4.26	1.52	.00	82.77
1976	29.31	15.13	6.48	6.05	3.75	1.11	87.41
1978	41.02	18.33	7.30	9.34	4.89	.13	117.15
1980	92.76	49.27	20.61	10.02	5.94	2.31	267.74
1982	87.68	58.87	34.03	13.25	6.29	4.58	286.11
1984	49.22	70.99	21.54	6.12	4.56	3.59	200.71
1986	51.77	37.80	11.82	4.71	5.53	1.73	159.59
1988	36.34	45.71	17.96	8.03	4.76	.70	145.08
1990	50.72	45.15	16.56	9.19	7.62	3.38	175.71
1992	44.05	37.49	11.52	15.47	8.12	6.58	159.15
1994	41.47	44.51	10.25	5.99	4.26	2.84	146.52
1996	51.76	37.80	11.82	4.71	5.53	1.73	159.59
1998	36.34	45.71	17.96	8.03	4.76	.70	145.08
2000	58.55	48.01	8.81	9.06	7.01	2.37	185.35

Table 3: Number of licensed fishing gear and number of fishers working on licensed fishing vessels in the States of Kedah and Perlis in 2001

	Licensed Fishing Gear			Fishers on Licensed vessels		
	Total	Trawl	%	Total	Trawl	%
Perlis	553	231	42	5,127	1,173	23
Kedah	1,249	486	39	5,331	1,783	33
West Coast P.M.	12,966	3,039	23	31,242	9,177	29
Malaysia	31,681	6,064	19	84,496	23,567	28

Table 4: Number of licensed Zone B trawlers in the States of Kedah and Perlis in 2001

State	Licensed Trawlers		
	Total	Zone B (20 GRT)	% to total
Perlis	231	155	67
Kedah	486	405	83

This pilot study on development of indicator/s for the sustainable development and management of fisheries is focused on Zone B trawlers which are allowed to operate only in the area outside 12 nm from the coast off the States of Perlis and Kedah.

Pilot Project Implementation

Planned Activities for 2002 - 2003

1. The project started in January 2003 with the implementation of several activities under the planning stage. The activities included preparation of the project proposal, assessment of the status of the fisheries resources in the study area and preparation for paper presentation. Two major milestones in this stage are the conduct of Expert Consultation Conference and the formation of National Steering Committee for management of coastal fisheries in the country.
   a. The Expert Consultation Conference on fisheries management was conducted in collaboration with WorldFish Center and was held from 11 12 March 2003 in Kuala Lumpur. This conference was attended by 61 participants representing various government agencies, universities and NGOs. Among the key conclusions are there is excess capacity in the coastal waters and there is an urgent need to implement comprehensive action programs to reduce fishing capacity and rehabilitation of the resource. The use of indicator/s for management was strongly encouraged by the conference.
   b. The National Steering Committee on Management of Coastal Fisheries in the country was formed as one of the suggested immediate actions, during the conference. The Committee comprises representatives from FDAM (Fisheries Development Authority of Malaysia), MIMA (Malaysian Institute of Maritime Affair), WorldFish Center and MoA and chaired by Deputy Director General of the Department of Fisheries Malaysia (DOF). The task of the committee is to oversee activities implemented towards the management of coastal fisheries, including the indicator project.

2. The Core-group Meeting on the use of indicators was conducted from 23-26 June 2003 to prepare the scope, framework, criteria, objectives, potential indicators and reference points for Zone B trawl fisheries in Kedah and Perlis. The 20 members of the group comprised both researchers and managers from DOF.

3. The National Expert Meeting to review the proposed indicators identified by the Core-group was held from 15-16 July 2003. The experts included researchers, managers and officials from various agencies related to fisheries in the Kedah and Perlis. The meeting finalized the scope, framework, criteria, objectives, potential indicators and reference points for trawl fisheries in Kedah and Perlis. The output was presented at the first Stakeholders Consultative Workshop.

4. The First Stakeholders Consultative Workshop was held from 25-26 August 2003. About 60 persons participated in the workshop. Half this number comprised stakeholders. The Workshop finalized the potential indicators and agreed to update information for the all the selected potential indicators to be presented during the Second Stakeholders Consultative Workshop before testing the "best" ones.

5. A socio-economic survey on Zone B trawl fishermen in Kedah and Perlis was conducted jointly with FDAM from December 2003 - February 2004. A total of 443 respondents were interviewed based on a wide spectrum of questions from status of social standing, income, understanding on fisheries management, *etc.*

6. An environment and resource survey in the Zone B (12-30 nm) off Perlis and Kedah was done using commercial trawlers in February 2004.

Preparation of Draft Management Plan for Pilot Project
Current management measures under Department of Fisheries Malaysia as a sole management authority in the country.

1. Laws and regulations
   The introduction of the trawl in the sixties led to the formulation of Fisheries Act 1963. The Act provided a comprehensive legal framework to manage the fisheries in Malaysian waters. It was replaced by the Fisheries Act 1985 which is the most recent Act implemented to develop, conserve and control marine fishing and marine fisheries resources. This Act incorporates the topic of the Exclusive Economic Zone so as to be consistent with relevant provisions in the 1982 Law of the Sea. The objective of this of this Act is to provide for better conservation, management and development of fisheries in Malaysia.

   The Fisheries Act 1985 provides the minister of Agriculture with powers to make regulations for the management and conservation of marine resources. A number of fisheries regulations that have been made include among others are the following:
   a. Fisheries (maritime) Regulations 1967
      This regulation provides the procedure for the application of licences for different types of fishing appliances, fees, deposits and conditions attached to such licenses.
   b. Establishment of Marine Park and Marine Reserves Order 1994
      The waters around at least 48 islands in the Malaysian fisheries waters have been gazetted as Marine Parks. Fishing and collection of fish and other aquatic animals in these gazetted areas are prohibited.
   c. Fisheries (Prohibition of Methods of Fishing) Regulations 1980
      This regulation prohibits unsustainable fishing practices such as bombing of fish, use of poisons and electric fishing, pair trawl, beam trawl and drift gill nets of more than 10 inches for catching rays.

2. Licensing
   The license for fishing, for both the vessel and the gear, is used as a mechanism to limit entry into fishing. Presently there are 1,248 fishing vessels and fishing gears licensed in Kedah and there are 576 licensed fishing vessels and fishing gears in Perlis. Under the existing policy, there will be no new licenses to be issued for coastal fishing. There are several controls imposed on licensing, these include;

i). Ownership pattern
ii). Change of ownership
iii). Owner operators are not allow to own more than one vessel.
iv). Transfer/movement between base/state
v). Size of vessel built
vi). Engine capacity
vii). Renewal of license
viii). Fishermen registration

3. Zoning of fishing areas
The zoning of fishing areas is used as management measure to prevent conflicts between the traditional and commercial fishermen and in order to protect the breeding grounds. The zoning is as follows:
   i). Zone A Waters 5 miles from the coast for vessels operating traditional gear and these vessels are free to fish in all zones.
   ii). Zone B Waters 5 miles from the coast for trawlers and purse seiners of the size <40 GRT.
   iii). Zone C waters of > 12 miles from the coast for trawlers/purse seiners of the size 40 to <70 GRT
   iv). Zone C2 waters of > 30 miles from the coast for trawlers/purse seiners of the size > 70 GRT.

4. Protected/Prohibited areas
Sensitive areas especially coral areas are normally gazetted as marine parks. Among the prohibited activities in marine parks are fishing, spear gun fishing, collection of corals, shell and other marine organisms, collected of sand, dead coral/shell, Littering and polluting, Anchoring and boating over coral areas and constructing or erecting any building or other structure.

5. Prohibition of certain fishing gears/activities
Basically all gears/activities destructive to fish and habitat are prohibited. This also include environmentally not friendly gears such as push net, pair trawl, use of explosive, electricity and Moro ami.

6. Rehabilitation of habitat
Habitat rehabilitation is mostly targeting on producing artificial reef to make the ecosystem more productive.

Objectives for Management
The long term management objective for trawl fishery in the coastal area is to sustain the production at the present level. This is important in order to meet the national obligation on ensuring enough supply of fish in the future. This can be achieved through optimizing fishing capacity to match sustainable use of the stock.

Current State of Stakeholder Involvement
Management of fisheries is the responsibility of the Department of Fisheries. However, the stakeholders are consulted from time to time on management issues and the mitigation measures taken.

Photo 1: The 1st. National Stakeholders Workshop for the development of indicators for the sustainable development and management of trawl fisheries in Zone-B off the states of Kedah and Perlis, 26-27 August 2003

Conclusions

Faced with increasing pressure in coastal land development, environmental deterioration and over-exploitation of natural resources, it is inevitable that management of the fisheries sector will be a challenging task. From this pilot project perspective, the use of indicators together with development of management plan would of course be inevitable. The successful in identifying the right indicators for sustainable development and management, particularly in this very important coastal area will facilitate Department in playing her very vital role in ensuring there are fishes for future generations.

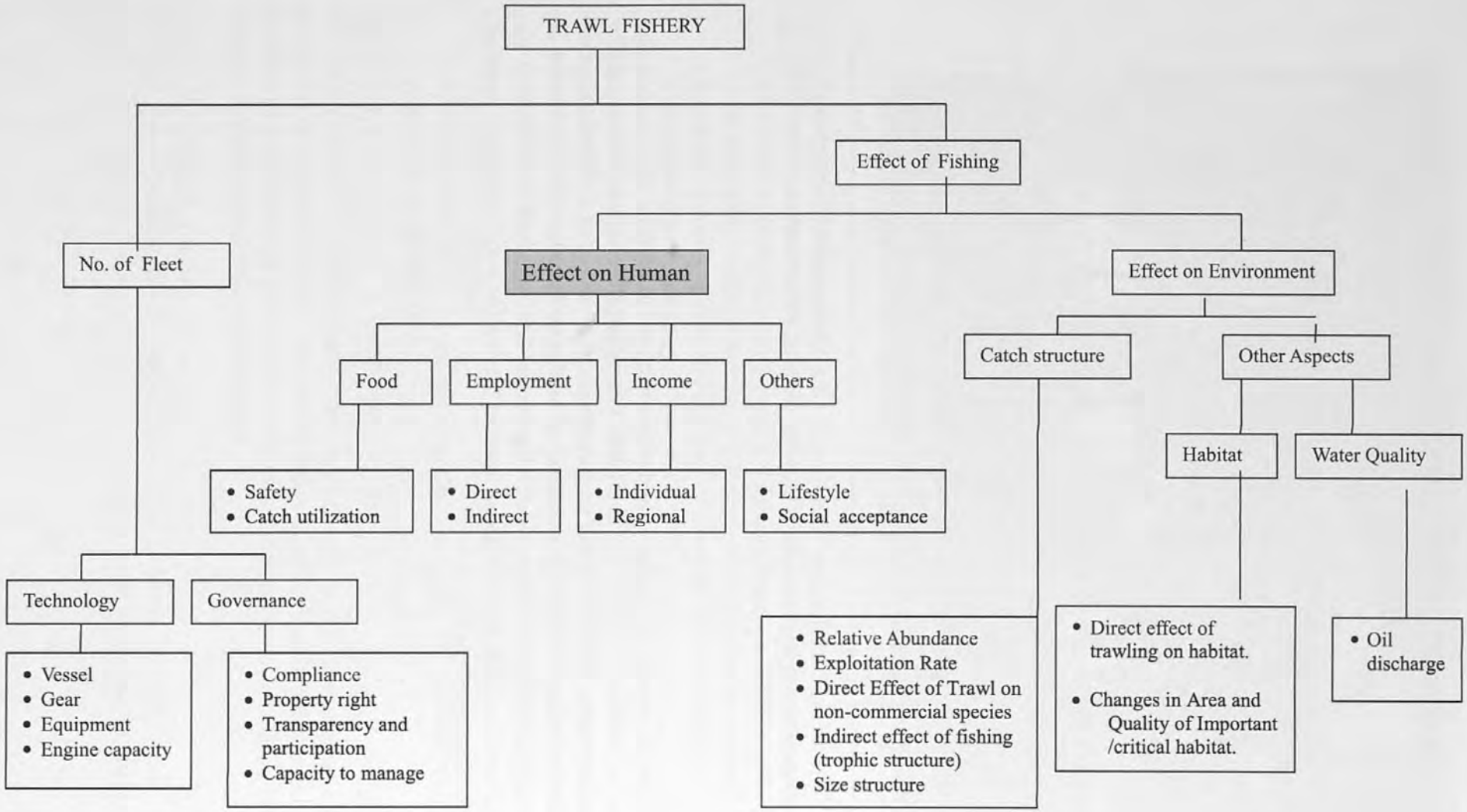

Figure 3: Trawler fleet and components for the effect of trawl fishery on human and on environment

Appendix 1

Selected indicators for fisheries management - List of proposed indicators presented to the stakeholders

a). Fleet/fishing capacity component.

Indicators	Meaning (C/T)[1]	Expected effect on fishing	Potential reference point (C/T)[2]	Exclusiveness (Yes/No/ NR)	Measurable (+) / data requirement
1. Number of vessel	C	Yes	Optimum Effort (T)	NR	+
2. Size of vessel (GRT)	C	Yes	Optimum Effort (T)	NR	+
3. Engine capacity (HP)	C	Yes	Optimum Effort (T)	NR	+
4. Number of fishing time (days/year)	C	Yes	Optimum Effort (T)	NR	+
5. Number of Crew	C	Yes	Maximum No. of crew	-	+
6. Age of vessel	C	Yes	C	No	+
7. Number of gear	C	Yes	Optimum effort	No	+
8. Type of gear a. Shrimp b. Fish	T	Yes	Optimum effort	No	No. of shrimp & fish gear require
9. Echo-sounder	C	Yes	No. of vessel	NR	+
10. Global Positioning Sy stem	C	Yes	No. of vessel	NR	+
11. Type of engine a. Recondition b. Marine	T	Yes	-	No	Require
12. Engine capacity (HP)	C	Yes	No	No	+
13. Number of illegal (Vessel)	C	Yes	Ratio No. of Operation: No. License, 1:1	No	+
14. Number of illegal (Gear)	C	Yes		No	Require data no. of illegal gear
15. Number of encroachment	T	Yes	-	No	No. of encroachment, arrested, offences recorded
16. Effective communication between stakeholder	C	Yes	No record of conflict	No	-
17. Transparency of fisheries management	C	Yes	Less no. of illegal activities	No	Require data
18. Involvement of major stakeholder in fisheries management	C	Yes	Less no. of illegal activities	No	Require data No. of meetings/stakeholder
19. Resources availability at all level (Human)	C	Yes	-	No	+
20. Resources availability at all level (Asset)	C	Yes	-	No	+

[1]C= Common Sense, [1]T=Theoretical basis, [2]C=Comparative, [2]T=Theoretical

b). List of socio-economic indicators that might be effected by trawl fishery in Zone-B off the states of Kedah and Perlis

Indicators	Meaning (C/T)	Expected effe ct of fishing	Reference point	Exclusiveness	Measurability (P=Priority)
Objective: Improve the socio -economic well being		**Criteria: Individual income**			
1. B/C ratio for vessel	C	Subject to stock situation	e1	Yes	Require data (P)
2. Production cost	C	Subject to stock situation	< average price of catch	Yes	Require data (P)
3. Owner income	C	Subject to stock situation	> poverty level	Yes	Require data (P)
4. Owner cum skipper income	C	Subject to stock situat ion	> poverty level	Yes	Require data (P)
5. Skipper income	C	Subject to stock situation	> poverty level	Yes	Require data (P)
6. Crew income	C	Subject to stock situation	> poverty level	Yes	Require data (P)
7. Share of fishing income to total income: ⌜ Owner ⌜ Owner cum skipper ⌜ Skipper ⌜ Crew	C	Subject to stock situation	>50%	No	Require data (P)
Objective: Improve the socio -economic well being		**Criteria: Regional contribution**			
1. Contribution of focus group landings to focus area landings in terms of quantity	C	Subject to stock situation	>30% (to be improved using past trend)	Yes	+ (P)
2. Contribution of focus group landings to focus area landings in terms of value	C	Subject to stock situation	>30% (to be improved using past trend)	Yes	+ (P)
3. Contribution of focus group landings to the west coast trawlers landings in terms of quantity	C	Subject to stock situation	>30% (to be improved using past trend)	Yes	+ (P)
Objective: Improve the socio -economic well being		**Criteria: Direct employment**			
1. No. of people employed	C	Subject to stock situation	Past 5 years trend	Yes	+ (P)
2. % of local to total no. of fishermen	C	Subject to stock situation	100%	Yes	+ (P)
Objective: Improve the socio -economic well being		**Criteria: Social standing**			
1. % of fishermen who own houses	C	-	e50%	No	Require data (P)
2. % of fishermen who own land	C	-	e50%	No	Require data (P)
3. % of fishermen who own vehicles	C	-	e20%	No	Require data (P)
4. Literacy rate of fishermen	C	-	100%	No	Require data (P)

5. % of fishermen who attained at least SRP education	C	-	e20%	No	Require data (P)
6. % of graduate children from fishing family	C	-	e10%	No	Require data (P)
7. % of fishermen with saving/investment	C	-	e50%	No	Require data (P)
8. % of fishermen who take loan related to fishing	C	-	-	Yes	Require data (P)
9. % of fishermen who are able to fully repay their fishing loan installments	C	-	e50%	No	Require data (P)
10. Average household income per member ⌜ Owner ⌜ Owner cum skipper ⌜ Skipper ⌜ Crew	C	-	Above poverty level	No	Require data (P)
Objective: Impro ve social capital		**Criteria: Social acceptability**			
1. Zone B trawlers by the non -trawlers community in the same area	C	-	e50%	Yes	Require data
2. Illegal trawlers by licensed Zone B trawlers	C	-	e50%	Yes	Require data (P)
3. Illegal trawlers by non -trawlers community in the same trawlers	C	-	e50%	Yes	Require data
4. % of fishermen who are members of Fishermen Association	C	-	100%	Yes	Require data (P)

c). List of resources and environmental indicators that might be effected by trawl fishery in Zone-B off the states of Kedah and Perlis

Indicators (1)	Meaning (C/T)(2)	Expected Effect of Fishing (3)	Potential Reference Point (4)	Exclusiveness (Yes/No)(5)	Measurability (+)/ Data required (6)
Objective 1: To maint ain biodiversity					
1. Catch Composition	C	To be determined	First Survey Data in area ⌜	-	+
2. Indicator Species	C	Increase	⌜	No	+
3. Total Biomass/ Abundance	T/C	Decrease	T	No	+
Objective 2: To reduce overfishing and over capacity in the study area.					
4. Catch per unit effort	C	Decrease	⌜	No	+
5. Exploitation Rate (E)	T	Increase	⌜ (0.5)	Yes	+
Objective 3: To maintain a healthy fish stock					
6. Size Spectrum	T	Fewer Large Fish -less total biomass	⌜	-	+
Objective 4: To reduce the non commercial component o f the catch					
7. Percentage of Non -Commercial/ Unmarketable spp in the catch	C	Increase	⌜	Yes	+, additional length frequency data
Objective 5: To maintain the structure of food web.					
8. Mean Trophic Level	T	Decrease	⌜	-	Diet of all species & their prey
Objective 6: To reduce the effect of trawling on the quality & quantity of benthos, substrate, critical habitat					
9. Change in Benthos Composition and Abundance	C	Decrease	⌜	No	- benthos composition
10. Change in Bottom Characteristics	C	-	⌜	No	Long series o f bottom profiles

Note : (2) C = Common Sense T= Theoritical Basis (4) ⌜ = Comparative Data T= Theoretical

Appendix 2

List of proposed and accepted indicators by the stakeholders and their agreement to contribute in data collection

a). Fleet/Fishing capacity component

No.	Objective	Indicator	Reference Point	Data required	Data Supplier
1	To sustain fishing capability to the level that produces sustainable fisheries development.	1. Number of Zone-B Trawlers	Number of Zone-B Trawler in the present year (2003)	Number of licensed Zone-B trawler	Management Div. DoF
		2. Trawler size (GRT)	Trawler size in 2003	GRT of licensed trawlers	DoF state offices
		3. Engine capacity (HP)	Trawlers HP in 2003	HP of licensed trawlers	DoF state offices
		4. Number of haul per trip	Number of haul per trip in 2003	Number of haul per trip	Zone-B Trawler operators
2	To increase acceptance to fisheries rules and regulations among the zone-B trawlers.	1. Number of unlicensed vessels	Zero	Number of unlicensed vessels	DoF and Fishermen Association
		2. Number of Zone-B trawlers violating license conditions	10% of the total number of Zone-B trawlers	Number of Zone-B trawlers violating license conditions	DoF enforcement unit
		3. Acceptance of existing management regulations by the Zone-B trawlers.	100%	Number of Zone-B trawlers violating management regulations	DoF
		4. Number of enforcement exercises conducted in Zone-B area	16 days per months	Number of enforcement exercise	DoF enforcement unit.

b). Socio-economic indicators

No.	Objective	Indicator	Reference Point	Data required	Data Supplier
1.	Improve the socio-economic well being Individual income	1. B/C ration for vessel	=> 1	Survey	Joint survey DoF & Fishermen Association (FA)
		2. Average production cost	< Average value of the catch	Survey	Joint survey DoF & FA
		3. Owner income	> National poverty level	Survey	Joint survey DoF & FA
		4. Owner cum skipper income	> National poverty level	Survey	Joint survey DoF & FA
		5. Skipper income	> National poverty level	Survey	Joint survey DoF & FA
		6. Crew income	> National poverty level	Survey	Joint survey DoF & FA
		7. Share of fishing income to total income: - Owner - Owner cum skipper - Skipper - Crew	> 50%	Survey	Joint survey DoF & FA
2.	Improve the socio-economic well being Regional contribution	1. Contribution of focus group landings to focus area landings in terms of quantity	> average of the past 5 years	Annual Statistics	DoF
		2. Contribution of focus group landings to focus area landings in terms of value	> average of the past 5 years	Annual Statistics	DoF
		3. Contribution of focus group landings to the west coast trawlers landings in terms of quantity	> average of the past 5 years	Annual Statistics	DoF

3.	Improve the socio-economic well being Direct employment	1. No. of people employed	Average for the past 5 years	Annual Statistics	DoF
		2. No. of Zone-B trawl fishermen to total no. of fishermen in the area	> 30%	Annual Statistics	DoF
4.	Improve the socio-economic well being Social standing	1. % of fishermen who take loan related to fishing	-	Survey data	DoF & FA
		2. % of fishermen who are able to repay their fishing loan installment according to schedule	50%	Survey data	DoF & FA
		3. Household per capita income per member: - Owner - Owner cum skipper - Skipper - Crew	> national poverty level	Survey data	DoF & FA
5.	Improve the socio-economic well being Social standing	1. % of fishermen who own houses	=> 50%	Survey data	DoF & FA
		2. % of fishermen who own land	=> 50%	Survey data	DoF & FA
		3. % of fishermen who own vehicles	=> 20%	Survey data	DoF & FA
		4. Literacy rate of fishermen	100%	Survey data	DoF & FA
		5. % of fishermen who attained at least SRP education	=> 20%	Survey data	DoF & FA

		6. % of graduate children from fishing family	> 10%	Survey data	DoF & FA
		7. % of fishermen with saving/investment	=> 20%	Survey data	DoF & FA
6.	Improve the socio-economic well being Social acceptability	1. Zone B trawlers by the non-trawlers community in the same area	> 50%	Survey data	DoF & FA
		2. Illegal trawlers by licensed Zone B trawlers	> 50%	Survey data	DoF & FA
		3. Illegal trawlers by non - trawlers community in the same trawlers	> 50%	Survey data	DoF & FA
		4. % of Zone-B trawl fishermen who are willingly move to other fishing zones.	> 50%	Survey data	DoF & FA
		5. % of fishermen who are members of Fishermen Association	> 100%	Survey data	DoF & FA

a). Resources and environmental indicators

No.	Objective	Indicator	Reference Point	Data required	Data Supplier
1	To maintain biodiversity.	1. Catch Composition	Catch composition of: - the 1st survey conducted in the area & - the commercial landing at the early stage of trawl fishing	- Total catch (weight) - Catch composition (weight)	DoF Surveys FA records
		2. Indicator Species			
		3. Total Biomass/ Abundance	- Total biomass and density of the 1st survey in the area	- Total catch and trawl log	DoF survey
2	To reduce over fishing & over capacity in the study area.	1. Catch per unit effort(CPUE)	CPUE of the 1st survey in the study area	Catch & effort	DoF survey
		2. Exploitation rate (e)	E <= 0.5	CPUE, biomass, M	DoF survey
3.	To maintain a health fish stock	1. Average size of fish	Average size of fish during the 1st survey conducted in the area	Size of fish	DoF survey Commercial landing (FA)
4.	To reduce non commercial component of the catch	1. Percentage of trash fish in the catch	% of trash of the 1st survey	Total & trash catch	DoF survey
5.	To maintain the structure of food web	1. Trophic level	Trophic level obtained from the 1st survey conducted in the area.	Survey data	DoF survey
6.	To reduce the effect of trawling on the quality & quality of benthos, substrate and critical habitat	1. Changes in benthos composition and abundance	Benthos composition and abundance of the earlier study in the area	Benthos data	DoF survey
		2. Changes in bottom characteristics	Bottom characteristics obtained in the earlier study	Particle size	DoF survey

*** Appendix 1:** Project Information

Name of National Technical Project Officer: Mr. Abu Talib b. Ahmad

Other project team members: Mr. Ahmad Saktian b. Langgang (Fleet/Fishing Capacity)
Mr. Sallehuddin b. Jamon (Resource)
Ms. Lim Chai Fong (Socio-economy)
Mr. Ahmad Adnan b. Nuruddin (Socio-economy/Database)
Ms. Halimah bt. Mohamed (DataBase)

Date of project initiation: March 2003

Planned project duration: 3 years (2003 -2005)

THE USE OF CPUE, MEAN SIZE AND SIZE OF SPAWNERS AS INDICATORS FOR THE MANAGEMENT OF RINGNET FISHERIES IN CAMOTES SEA

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Introduction

The Philippine fisheries, in general, are already showing signs of resource depletion due to the excessive and uncontrolled fishing exploitation and environmental degradation. Camotes Sea, the study area, is one of the traditional fishing grounds known to be abundant in pelagic species. However, in the past study of Jabat & Dalzell (1988) they indicated that some of the small pelagics caught by the ringnet fishery were showing high exploitation rates.

The first resource assessment activity in the Camotes Sea was conducted in 1983-1990 under the Regional Stock Assessment Program (RSAP), a joint project of the Philippine Council for Agriculture and Resource Research and Development (PCARRD) and the Bureau of Fisheries and Aquatic Resources (BFAR). In 1996, BFAR implemented the National Stock Assessment Program (NSAP), a continuing activity as mandated in Republic Act 8550 (Fisheries Code of 1998).

The availability of catch and effort data as well as length measurements collected for the past several years were considered in choosing the ringnet fishery in Camotes Sea as the pilot project site. The data gathered for twenty years will be used to estimate the catch per unit effort (CPUE) and mean size of fish to assess whether these parameters are useful indicators in order to come up with a good management scheme for the ringnet fisheries in Camotes Sea. Moreover, the cooperation and support of the Regional Office, Local Government Units and stakeholders are also considered as they have shown their cooperation and support in previous studies conducted in the area.

For this study, CPUE, mean size of fish and size of spawners are the indicators chosen in the management of the ringnet fisheries in Camotes Sea. These indicators will serve as ready tools for describing the state of a fishery, for assessing the trends regarding sustainable development objectives and also as basis for decision-making. These can be used as an alternative to the classic empirical stock assessment models, which was designed for temperate zone rather than in tropical zones where the fisheries are more complex due to multi-species and multi-fleet fisheries.

This study was implemented with funding and technical support from SEAFDEC MFRDMD. SEAFDEC Secretariat also supported this project during the stakeholder consultation held in Cebu City by sending an expert to present and discuss indicators for fisheries management together with the expert from the MFRDMD who also presented a paper on indicators.

Description of Fishing Ground (Study Area/Monitoring Site)

Camotes Sea (Figure 1) is located approximately at longitudes 124° to 125°E and latitudes 10° to 11°N. The area is bounded on the north by Visayan Sea, on the east by Leyte, on the south by Danajon Bank and Bohol, and on the west by Cebu. At its center is Camotes Islands. It covers a total area of 10,900 km^2 with the deep offshelf water of 9,500 km^2 and depths of 10-800 meters. The southern portion along the northern coast of Bohol has a shelf covering of about 1,400 km^2 including Danajon Bank with depth ranging from 14m to 700m.

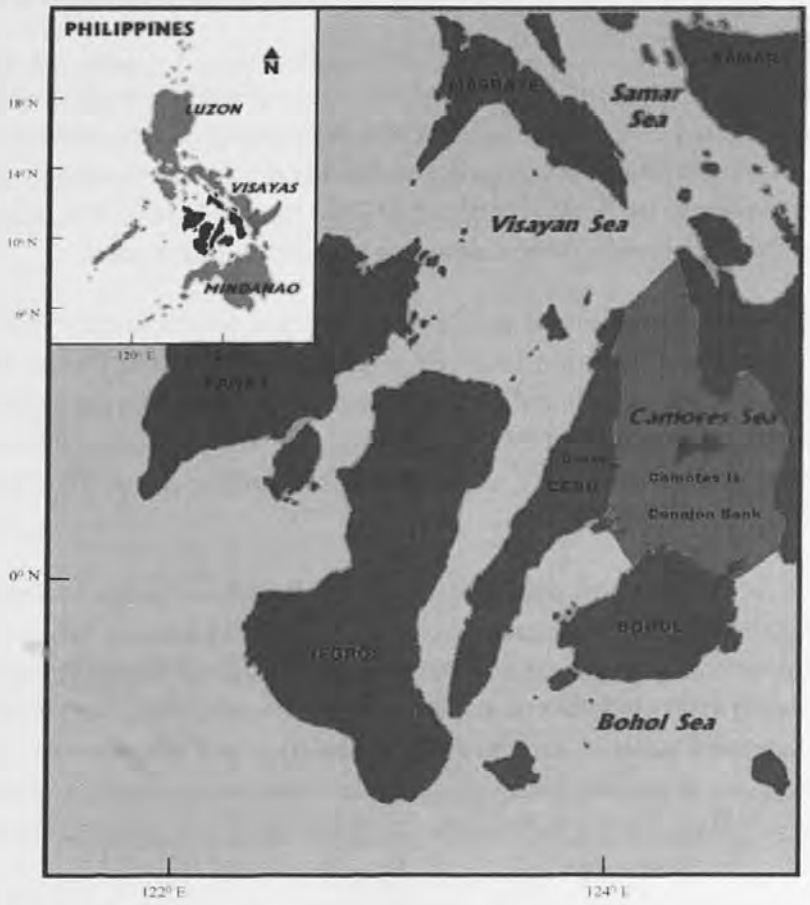

Figure 1: Map of Cebu showing the location of Camotes Sea

The Danao Ringnet Fishery

The ringnet is a kind of surrounding net with a bunt at the center and where hauling is done manually by pulling simultaneously both sides of the net (Figure 2). The operation of ringnet is usually done in conjunction with a Fish Aggregating Device (FAD) locally known as "payao" that are lighted at night, or by scouting for schools of fish. The "mother" boats remain in the fishing grounds for several days and their catches are transported to the landing centers by carrier vessels.

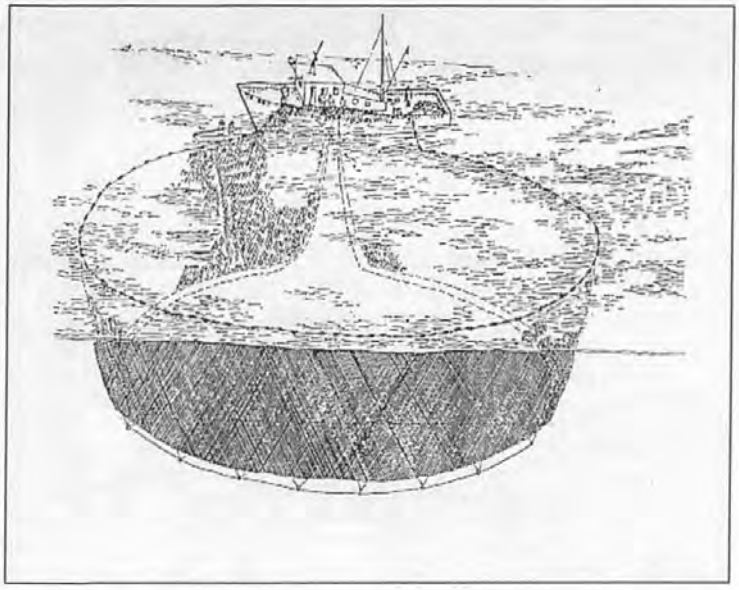

Figure 2: Operation of the ringnet in the Philippines

The ringnet fishery in the Philippines is classified into municipal and commercial types (Figure 3) depending on the attraction techniques, size of boat, and target species as shown in the diagram. The municipal type is operated by boats less than 3 GT that are either motorized or non-motorized. The commercial type use boats of more than 3 GT. The commercial fishing boats by law are generally restricted to fish inside the 15 km municipal waters except if allowed by the municipality to enter the area of 10 to 15 km.

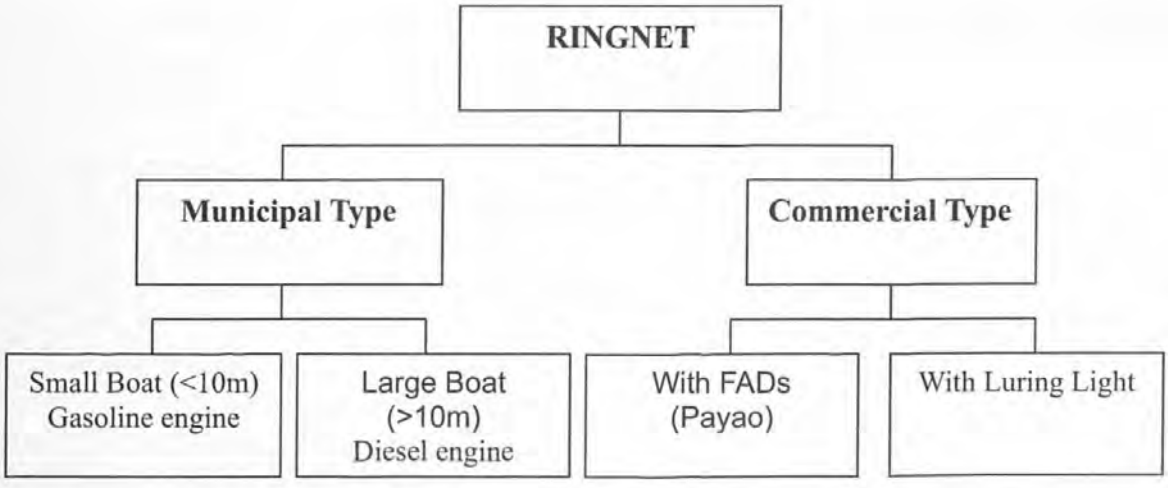

Figure 3: Classification of ringnet in the Philippines
Source: Dickson et al., 2003

The number of ringnets in the country has increased significantly from 1975-1986 (Table 1). The Danao ringnet boats are considered the commercial type and Table 2 shows the number of Danao ringnet boats operating in the Camotes Sea from 1983-2003.

Table 1: Number of ringnetters exploiting small pelagics in the Philippines, 1975-1986

Year	Ringnets
1975 *	58
1976	58
1977	61
1978	150
1979	143
1980	158
1981	222
1982	269
1983	310
1984	394
1985	418
1986	404

Source: Dalzell et. al., 1991
* No available ringnet data before 1975

Table 2: Number of Danao ringnet boats operating in Camotes Sea, 1983-2003

Year	Ringnets
1983-1987	10
1998	52
1999	31
2000	21
2001	18
2002	26
2003	35

Source: (1983-1987) Jabat & Dalzell, 1988
(1998-2003) NSAP-Region VII

There are four types of fishing gears operating in Camotes Sea that land their catch in Danao fish landing centers namely, ringnet, purse seine, gillnet and hook & line. Of these four, the ringnet contributed the highest catch of about 93% (Figure 4).

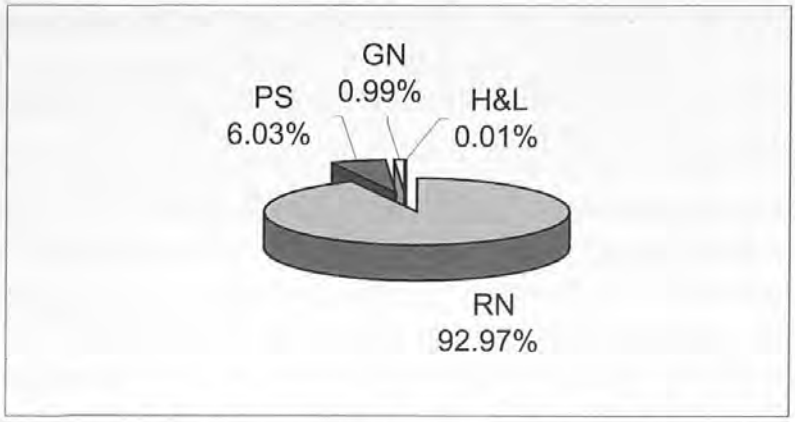

Figure 4. Catch percentage by gear in Camotes Sea, 1998-2002

Based from the latest NSAP survey (Year 2003), a total of 35 ringnet boats that are operating in Camotes Sea landed their catch in Danao City. The length of the ringnet boats ranges from 14.03 m to 64.0 m (=21.56 m). The gross tonnage (GT) ranges from 6.34 33.67 GT, (=19.31 GT). All the boats are powered by diesel engine with horsepower ranging from 45 to 310 hp (=141.86 hp) and the average number of crew per boat is 25. The ringnet gear varies in size with length and depth ranging from 180 m to 600 m (=316.86m) and 60 m to 195 m (=110.29 m), respectively. The mesh size of the ringnet bunt or bag varies from 1.79 cm 2.77 cm (=2.12 cm).

Objectives

It is the intention of this project to know the state of the ringnet fishery in Camotes Sea and its adjacent waters for fisheries management using the proposed indicators namely, CPUE, mean size and size of spawners.

A. Long Range:
   1. To determine the status and trend of fisheries as basis for sustainable management of the ringnet fishery.
   2. To develop a biological and economic database.
   3. To provide scientific information for formulating Fisheries Management Plan.

B. Short Range:
   1. To determine the top ten species composition, CPUE and changes in number of species of the ringnet fishery in Camotes Sea.
   2. To identify the size of spawners and the percentage of spawners in the ringnet catch of commercially dominant pelagic species.
   3. To determine the changes in mean length of species from ringnet catch.

Methodology

Both primary and secondary data were collected for this study. The primary data are catch and effort, length and weight measurements by species, sex and gonadal maturity by species while the secondary data are the historical catch and effort data, and length measurements by species. Data from 1983-1990 were taken from the result of the RSAP; data from 1996-1997 were taken from the BFAR Project on the Assessment of Major Pelagic Resouces in Camotes Sea; and from 1998-2003 were taken from the NSAP data.

The same fish landing sites of the NSAP were selected for this project. The two landings sites are Barangay Looc and Sitio Tabok-Looc both in Danao City. Ringnet landings were monitored every after two days regardless of Saturdays, Sundays and Holidays for a total of 10-11 sampling days a month in each landing site. A one-year data (January-December 2003) of the ring nets were collected. The fishermen or crew depositing the catch were interviewed on the location of the fishing operation, the number of hours actually spent fishing and other important information. The total weight of boat catch was recorded by first counting the total number of boxes/containers with fish then multiplied by 50 kgs (weight capacity of the container) to give the catch weight in kilograms. The species composition and weight composition was determined by sampling from several different boxes in the catch. Usually the catches were already pre-sorted into genera or species groups such as bullet tunas, roundscads, big-eyed scads, moonfish, *etc*. This facilitated sorting and identification of individual species. The sample was sorted further to species and then weighed, and the length measurements of the selected commercially important species were taken to the nearest 0.1 cm.

Emphasis on this study will focus on the nine commercially and dominant species namely, roundscads (*Decapterus macrosoma, D. tabl* and *D. kurroides),* mackerels (*Rastrelliger kanagurta* and *R. faughni),* big-eye scads (*Selar crumenophthalmus),* frigate tuna (*Auxis thazard),* bullet tuna (*Auxis rochei)* and moonfish (*Mene maculata).*

From the sample data, the monthly total landed catches were raised to total monthly catch weights by species.

Sex and gonad maturity determination of the nine selected species were collected for one year. Specimens of the nine selected species were dissected and their sex and gonad maturity were determined, following the recently grouped 5 stages of sex and maturity classification, which was modified based from the standard 8-stage maturity scale (Heicke-Naier's Sexual Maturity Determination).

Estimation of Indicators

Three indicators namely, CPUE, mean length by species, and size of spawners were selected for this study that can be used in the management of the ringnet fisheries.

CPUE will be estimated using the formula:

CPUE = Catch/ Effort (monthly = **kg/hr,** annual = **m.t./hr)**

Fishing effort was measured in terms of hours actually spent fishing that is, the time spent from setting up to hauling the net. Ringnet boats make an average two hauls per day, usually between 0300 0500 hours.

The Mean Length of the sample was computed using the defined formula:

Length Frequency x Midlength / Total Number of Frequencies

The determination of fish maturity was based from the five maturity stages of gonads. The size of the different stages particularly the spawners (Stage IV) and percentage of spawners in the catch by species were taken.

Species Composition and Dominance

The ringnet is a gear usually designed for catching pelagic species but just as the pelagic fishes are caught substantially by the trawl, the demersal fishes are also caught by ringnet but in very minimal quantities. It was unusual, however, for the two demersal species (*Cubiceps whiteleggii* and *Apogon septemstriatus)* to be included in the top ten dominant species in 1985-1990 and 1998-1999 (Table 3).

The annual top ten species caught by ringnet from 1983-2003 is given in Table 3. A slight change in species composition and dominance was observed. Some species were dominant in a certain year only but went down in rank or were no longer included in the top ten. *Auxis rochei* (bullet tuna) was constantly included in the top ten species and it remained on top from 1988 to 1990 except in 1989 where it was not even included among the top ten species. *Decapterus tabl* was the top contributor in 2003 but was not even observed in the previous years from 1983 to 2001. Probably, the enumerators might have misidentified this species. The other species that constantly remained in the top ten are S*elar crumenophthalmus* (big eye scad) and *Rastrelliger faughni* (mackerel).

Jabat & Dalzell (1988) reported that the Danao ringnet fishery was directed towards the catch of a single species since *A. rochei* (bullet tuna) remained the top dominant species from 1983 1987. *A. rochei* was caught in large quantities (almost 60% of the catch) as compared to the other species. However, a shift in the ranking of species dominance was observed starting 1998. Belga *et. al.*, on the other hand, showed a different ranking of the top ten species. From 1998-2002, *Decapterus kuroides* (roundscad) was the largest contributor (22.4%) followed by *D. macrosoma* (roundscad) and *R. faughni* (mackerel), each sharing about 17% of the total catch. The once top two species, *A. rochei* and S. *crumenophthalmus* went down to ranks 5 and 4, respectively. In spite of this, when combining the catches from 1983-2003 (Table 4), *A. rochei* (bullet tuna) still remained the highest contributor at 28% followed by S. *crumenophthalmus* (big eye scad), which contributed 13%. The rest of the catch was a variety of pelagic fish species, a few demersal species and invertebrates.

Table 3: Annual changes of species dominance (percentage) caught by ringnets in Camotes Sea, 1983-2003

	Species composition	1983 %		Species composition	1984 %
1	*Auxis rochei*	74.6	1	*Auxis rochei*	46.5
2	*Selar crumenophthalmus*	7.3	2	*Selar crumenophthalmus*	16.5
3	*Decapterus macrosoma*	6.3	3	*Decapterus russelli*	16.1
4	*Decapterus russelli*	3.6	4	*Mene maculara*	4.1
5	*Auxis thazard*	1.5	5	*Decapterus maruadsi*	1.8
6	*Rastrelliger brachysoma*	1.5	6	*Rastrelliger kanagurta*	1.4
7	*Caranx ferdau*	1.2	7	*Rastrelliger brachysoma*	1.0
8	*Rastrelliger faughni*	0.8	8	*Rastrelliger faughni*	0.9
9	*Decapterus maruadsi*	0.7	9	*Decapterus macrosoma*	0.8
10	*Rastrelliger kanagurta*	0.6	10	*Sardinella longiceps*	0.7
	Species composition	**1985 %**		**Species composition**	**1986 %**
1	*Auxis rochei*	64.6	1	*Auxis rochei*	43.8
2	*Decapterus russelli*	7.8	2	*Selar crumenophthalmus*	13.3
3	*Selar crumenophthalmus*	5.8	3	*Decapterus macrosoma*	9.6
4	*Decapterus maruadsi*	3.2	4	*Decapterus russelli*	7.0
5	*Rastrelliger kanagurta*	2.4	5	*Rastrelliger kanagurta*	4.4
6	*Katsuwonus pelamis*	1.6	6	*Mene maculara*	3.3
7	*Decapterus macrosoma*	1.3	7	*Rastrelliger faughni*	3.0
8	*Apogon septemstriatus*	0.6	8	*Auxis thazard*	2.7
9	*Mene maculara*	0.5	9	*Apogon septemstriatus*	2.2
10	*Rastrelliger faughni*	0.5	10	*Euthynnus affinis*	1.9
	Species composition	**1987 %**		**Species composition**	**1988 %**
1	*Auxis rochei*	63.8	1	*Auxis rochei*	51.5
2	*Decapterus russelli*	12.2	2	*Selar crumenophthalmus*	14.1
3	*Decapterus macrosoma*	5.3	3	*Rastrelliger faughni*	7.7
4	*Selar crumenophthalmus*	5.3	4	*Decapterus russelli*	4.9
5	*Decapterus kurroides*	2.1	5	*Decapterus kurroides*	3.9
6	*Rastrelliger faughni*	2.1	6	*Mene maculata*	3.5
7	*Apogon septemstriatus*	1.6	7	*Selaroides leptolepis*	2.9
8	*Sardinella sirm*	1.5	8	*Decapterus macrosoma*	2.5
9	*Decapterus maruadsi*	0.9	9	*Caranx sexfasciatus*	2.3
10	*Rastrelliger kanagurta*	0.7	10	*Apogon septemstriatus*	1.3
	Species composition	**1989 %**		**Species composition**	**1990 %**
1	*Mene maculata*	13.1	1	*Auxis rochei*	33.7
2	*Selar crumenophthalmus*	12.7	2	*Decapterus russelli*	23.7
3	*Rastrelliger faughni*	7.5	3	*Selar crumenophthalmus*	22.3
4	*Selaroides leptolepis*	2.9	4	*Rastrelliger faughni*	5.6
5	*Katsuwonus pelamis*	1.1	5	*Auxis thazard*	5.0
6	*Thunnus albacares*	0.9	6	*Mene maculata*	3.1
7	*Megalaspis cordyla*	0.2	7	*Apogon septemstriatus*	2.3
8	*Loligo sp.*	0.2	8	*Decapterus macrosoma*	1.3
9	*Sardinella fimbriata*	0.1	9	*Sardinella fimbriata*	1.2
10	*Sardinella sirm*	0.1	10	*Decapterus kurroides*	0.5

	Species composition	1996 %		Species composition	1997 %
1	*Selar crumenophthalmus*	15.7	1	*Decapterus kurroides*	21.6
2	*Auxis rochei*	12.6	2	*Selar crumenophthalmus*	21.1
3	*Sardinella longiceps*	11.5	3	*Auxis rochei*	12.6
4	*Mene maculata*	10.5	4	*Auxis thazard*	10.1
5	*Auxis thazard*	9.3	5	*Decapterus macrosoma*	8.1
6	*Rastrelliger faughni*	9.1	6	*Rastrelliger faughni*	6.4
7	*Decapterus kurroides*	7.0	7	*Sardinella longiceps*	6.3
8	*Decapterus macrosoma*	5.4	8	*Mene maculata*	3.6
9	*Rastrelliger kanagurta*	4.1	9	*Rastrelliger. kanagurta*	1.5
10	*Decapterus russelli*	3.0	10	*Katsuwonus pelamis*	1.2
	Species composition	**1998** %		**Species composition**	**1999** %
1	*Selar crumenophthalmus*	25.5	1	*Rastrelliger faughni*	26.7
2	*Auxis rochei*	19.8	2	*Selar crumenophthalmus*	21.1
3	*Decapterus kurroides*	16.6	3	*Decapterus kurroides*	16.4
4	*Rastrelliger faughni*	8.7	4	*Decapterus macrosoma*	7.0
5	*Decapterus macrosoma*	7.2	5	*Mene maculata*	7.0
6	*Auxis thazard*	5.7	6	*Auxis rochei*	6.2
7	*Cubiceps whiteleggii*	3.5	7	*Auxis thazard*	6.2
8	*Sardinella longiceps*	3.3	8	*Sardinella longiceps*	2.3
9	*Mene maculata*	2.0	9	*Cubiceps whitelegii*	0.9
10	*Euthynnus affinis*	1.2	10	*Katsuwonus pelamis*	0.9
	Species composition	**2000** %		**Species composition**	**2001** %
1	*Rastrelliger faughni*	24.1	1	*Decapterus macrosoma*	30.2
2	*Decapterus kurroides*	17.8	2	*Decapterus kurroides*	23.0
3	*Selar crumenophthalmus*	15.2	3	*Rastrelliger faughni*	18.7
4	*Decapterus macrosoma*	13.9	4	*Mene maculata*	9.4
5	*Mene maculata*	10.1	5	*Auxis thazard*	8.8
6	*Auxis thazard*	7.3	6	*Selar crumenophthalmus*	4.7
7	*Auxis rochei*	5.1	7	*Rastrelliger kanagurta*	1.4
8	*Katsuwonus pelamis*	1.8	8	*Sardinella sirm*	0.7
9	*Rastrelliger kanagurta*	1.2	9	*Auxis rochei*	0.6
10	*Euthynus affinis*	0.7	10	*Katsuwonus pelamis*	0.4
	Species composition	**2002** %		**Species composition**	**2003** %
1	*Decapterus kurroides*	38.3	1	*Decapterus tabl*	33.0
2	*Decapterus macrosoma*	25.1	2	*Decapterus macrosoma*	20.1
3	*Auxis rochei*	9.9	3	*Rastrelliger faughni*	11.0
4	*Mene maculata*	9.0	4	*Auxis rochei*	8.5
5	*Auxis thazard*	8.2	5	*Selar crumenopthalmus*	6.3
6	*Rastrelliger faughni*	3.1	6	*Decapterus kurroides*	5.9
7	*Selar crumenophthalmus*	2.4	7	*Mene maculata*	4.7
8	*Decapterus tabl*	1.2	8	*Auxis thazard*	3.8
9	*Rastrelliger kanagurta*	0.7	9	*Decapterus maruadsi*	2.0
10	*Selaroides leptolepis*	0.5	10	*Sardinella longiceps*	0.9

Table 4: Top ten species composition (percentage) by weight caught by ringnet in Camotes Sea, 1983-2003

	Species composition*	Mean %
1	*Auxis rochei*	28.4
2	*Selar crumenophthalmus*	13.1
3	*Decapterus kurroides*	9.5
4	*Decapterus macrosoma*	9.0
5	*Rastrelliger faughni*	8.5
6	*Decapterus russelli*	4.9
7	*Mene maculata*	4.7
8	*Auxis thazard*	4.3
9	*Decapterus tabl*	2.6
10	*Rastrelliger kanagurta*	1.1

* (no data from 1991-1995)

Figure 5 shows the annual catch production and number of boats that landed their catch. The mean catch of ringnets was very high in 1988 and 1998 because of the high catch of *Auxis rochei* (bullet tuna) with a noticeable increase also of the number of ringnet boats that landed in the same year. The mean catch went down after 1998 but was still high when compared with the past years (1983-1990). This can be explained by the increased number of Danao ringnetters that operated in the Camotes Sea.

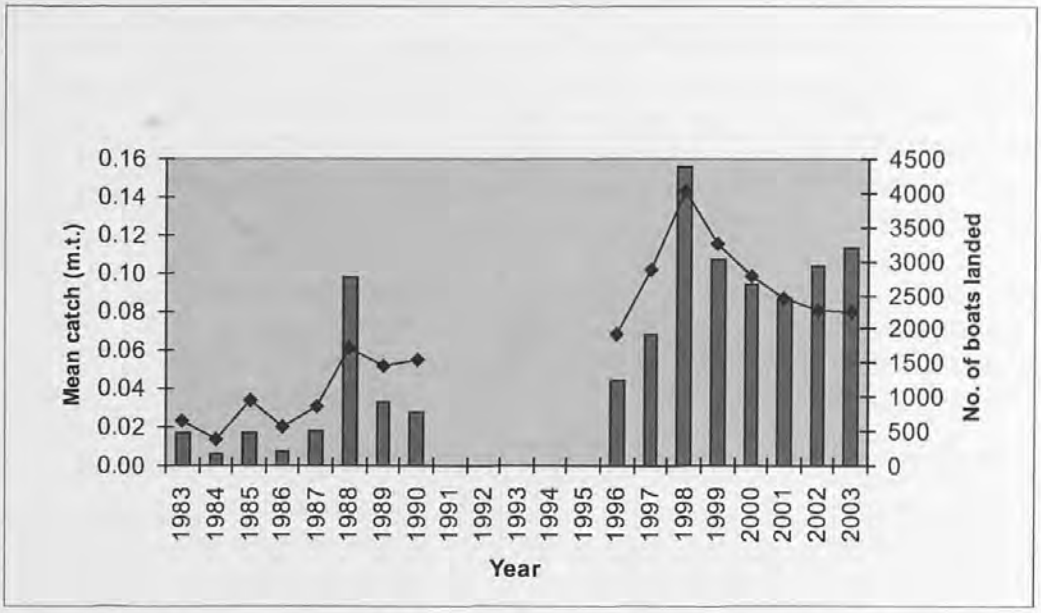

Figure 5. Annual mean catch of ringnet and boats that operated in Camotes Sea, 1983-2003

CPUE and Seasonality

The mean CPUE in this instance is expressed in km/hr (monthly) and mt/hr (annual). It is apparent in Fig. 6 that the ringnet fishery in Camtoes Sea in 2003 was highly seasonal. The catch rate was high in January at 2384 kg/hr but went down to 722 kg/hr in February and went up again in March to 1614 kg/hr. After March, the catch rate was very low; it increased very slightly only in December to 888 kg/hr.

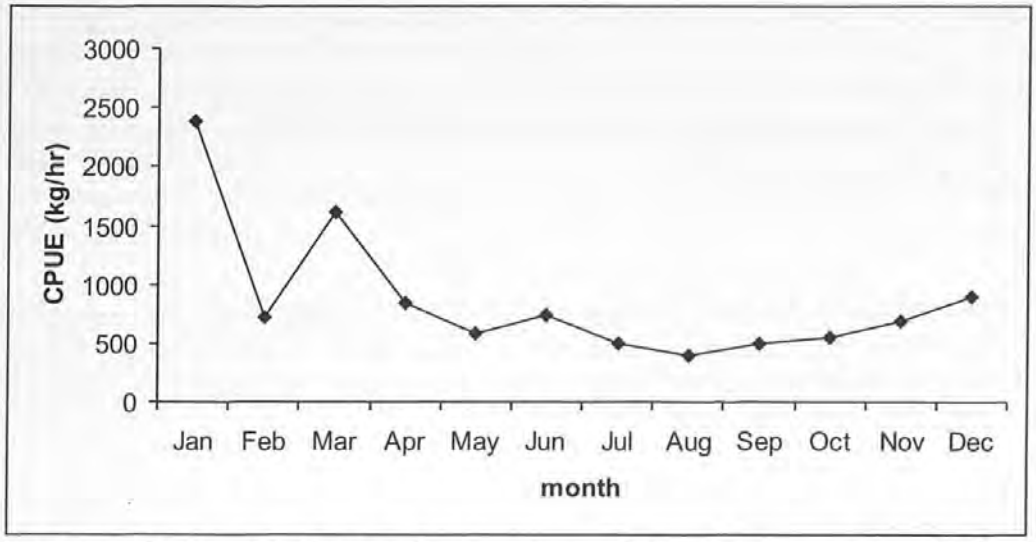

Figure 6: Monthly CPUE of Danao ringnet fishery in Camotes Sea, 2003

A varied seasonality was observed for the Danao ringnet fishery in Camotes Sea based from previous studies. The mean CPUE (kg/hr) from 1983-1987 was highest in June and then the fishery declined steadily until after January (Jabat & Dalzell, 1988). Based on the record of NSAP, CPUE (kg/hr) was high in April in 1998 and 1999, in October in 2000, March in 2001, and April, August & November in 2002 (Belga *et al.*).

Pilot Project Implementation

The project started in January 2003. Under the planning stage, the activities included preparation of the project proposal, gathering of information on the proposed study area and review of existing data. Two consultation meetings were conducted at separate times and venues to introduce the proposed indicator project. The first consultation meeting was held on 11 December 2002 and was attended by the Local Government Units, BFAR staff and other stakeholders. Since many of the ringnet fishing operators and stakeholders were not able to attend the first consultation meeting, a second local consultation meeting was scheduled in January 2003 and fishing boat operators, fisherfolk and stakeholders attended it this time. Indicators like, CPUE, mean size and size of spawners were presented and were accepted by the stakeholders. Training of enumerators on data collection, especially in the collection of biological data was also conducted in December 2002.

Draft Management Plan for Pilot Project

So far, a draft management plan for this project could not be developed yet until such time when the data are all collated, process and analysed. Data verification should also be done to determine the accuracy and reliability of the data collected.

Constraints in the Implementation of Pilot Project an Proposed Solutions

There were no significant problems encountered during the implementation of this project. Problems encountered were minor in nature and could easily be solved.

Conclusion

Processing of the data is not complete, so no definite conclusions could be drawn at present. However, we are recommending the continuation of the data collection at least for another year to validate the present data collected.

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TRAWL FISHERY AT PRAN BURI, PRACHUAB KIRI KHAN PROVINCE THAILAND: A PILOT PROJECT ON THE USE OF INDICATORS AS A MANAGEMENT TOOL IN FISHERIES MANAGEMENT *

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Introduction

The Prachuap Khiri Khan Province of Thailand is located in the middle of the Malay Peninsular and its coast faces to the East on the Gulf of Thailand. The provincial population in 1998 was 473,335. The GPP (Gross Provincial Products) of this province at current market prices was 29,554 million Baht in 1996, and ranks 15th among the 76 provinces in the country. GPP per capita of the province was 57,786 Baht. The main industry is agriculture and fishery. Crops, livestock, forestry, and agricultural processing products contributed 4,650 million Baht (16% of total GPP in the Province), while the fishery sector contributed 2,811 million Baht (10%). The working population in 1998 was 242,093, among which 122,075, or almost half, work in the primary industry. An average household monthly income in the province was 10,017 Baht in 1998. Income from agriculture and farming was 7,411 Baht. Though there is no available data for fisher household income, since fisher households are classified as agricultural, these data on average incomes suggest a level of fisher income (SEAFDEC, 2000).

Prachuap Khiri Khan Province comprises 8 districts (or *amphoe*). Pran Buri is located in the northernmost area of the province. The population of Pran Buri was 72,027 in 1999.

Description of Fishery

Importance and Production

In the Gulf of Thailand, the major marine capture fisheries consist of large scale and small scale fisheries. The total landings in 1998 was 2.4 million tonnes which 64 % (1.53 million tonnes) was from the Gulf of Thailand and 36 % (0.86 million tonnes) was from the Andaman Sea. Among the large scale fishing gear, fish production of about 55 % came from the otterboard trawl fisheries. Otter board trawl is one of the most widespread and the most important gear in term of production and the number of fishing boats. Otter board trawlers of over all length (OBT LOA) <14m is an important gear for catching shrimp. This type of fishing contributes greatly to local food security. Their fishing grounds are mostly within 3 km from shore and nets have a cod-end mesh size of 2.0cm. The fisheries are operated by the poorest fishers using their own family labor as well as hired labor from other regions of Thailand. Due to the decline of resource, the fishers have been forced to extend their operation hours as well as reduce their net mesh size for their survival. Without having proper management, this fishery may have destroyed the resources. Furthermore, the fishers may not profit from their fishing operations.

Current Management Measures

The Department of Fisheries of Thailand has established regulations to prohibit fishing by trawlers and push netters within a distance of 3,000m from the shoreline and within a perimeter of 400m of any stationary gear.

As an outcome of the National Seminar held by the Department of Fisheries in 1999, the fishers from trawl fisheries agreed to enlarge the cod-end mesh size of shrimp trawlers (OBT LOA <14m) from 2.0cm to 2.5cm. The Department of Fisheries has to conduct a set of experiments and show the loss and gain from the fisheries after the enlargement of the mesh sizes. The regulatory measures for the optimum mesh size used will be proposed for further consideration of the higher rank policy makers.

Reasons for Selecting Fishing Site and Fishing Gear
The otter board trawler (OBT LOA) <14m is selected within the selected site at Pran Buri district. The small sized otter board trawlers in this area are usually operated by local fishers and/or hired labor from other regions of Thailand. Fishers in this area earn the lowest income when compared to fishers of other areas. Moreover, some trawlers sometimes operate illegally within the area 3km from shore. Almost of the fishers at the project site are willing to give a good cooperation. Thus, it is more convenient and a good outcome from the pilot project can be expected that will facilitate better management of the fisheries in this area.

Geographical Distribution
Otter board trawlers of over all length <14m at Pran Buri are operated in the shallow sea between latitude 12° 25 N and latitude 12° 45 N and in a depth of water of about 20m.

Fishing Gear and Methods
A trawl net made from polyethylene 380 d/9 with mesh size 2.5cm and another with a cod-end mesh of 2.0cm and made from polyethylene 380 d/12 will be used. The head rope is 24-29m and ground rope 26-30m. The ground rope is weighted by chain. The otter board is rectangular and made from wood. Three or four fishers will take part in the fishing operations. A small shrimp trawler with LOA less than 14m will be hired for a series of experiments using enlarged cod-end mesh sizes. The fishing operations will be conducted during night time.

Pilot Project Implementation

Part I. Survey the project area and review the basic knowledge of the selected study area.
Part II. Hold a Consultation Meeting with the stakeholders (fishers, processors, local authorities and local government officers) to inform them and explain the objectives and purpose of the pilot project to them as well as to discuss their problems.
Part III. Collect data from otter board trawlers by sampling on a monthly basis from April to December 2003 to study the present fishery status and trend.
Part IV. Conduct an experimental study on the use of enlarged mesh sizes proposed as a new condition or as an alternative condition. In this study an otter board trawler will be hired and nets with cod-end mesh sizes of 2.0, 2.5 and 3.0cm will be used. The mesh size of the cover net used for these experiments will be 1.5cm.
Part V. Hold a Concluding Meeting with the stakeholders to report them the outcome of the study and present to them the proposed management plan. Finalize the report to submit to SEAFDEC.

Expected Outcome for the Pilot Project
The fishers will know the present fishery situation from several indicators and may help to take action for the management of fisheries in their area. The selected site will have a management plan to manage the small shrimp trawl fishery. The stakeholders in the area may help to solve the problems in that area. If the pilot project is successful, it will be used as a case study for other areas for sustainable fishery management.

Part I and Part II Activities (Survey and Consultation Meeting)

Following the Resolution and Plan of Action from the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security in the New Millenium, SEAFDEC (Southeast Asian Fisheries Development Center) has cooperated with Department of Fisheries Thailand to start a pilot project on the use of indicators as a tool in fisheries management. The otter board trawl fishery in Pran Buri, Prachuap Khiri Khan was selected for the pilot project. This project aims to enhance awareness of stakeholders and increase participation of fishers, stakeholders and communities in sustainable fisheries. Stakeholders will be encouraged to play a role and cooperate in the determination of appropriate indicators for use in management towards sustainable fisheries. Also at present, decentralization of fisheries management in particular towards responsible fisheries, is now becoming a main policy as mentioned in the constitution, 2540 (AC.1997). Therefore this pilot project places emphasis on encouraging fishers and other stakeholders to participate, criticize, raise problems and propose solutions for more efficient, effective and sustainable resource management.

Objectives of the Meeting

1. To brainstorm, share experiences among stakeholders (fishermen, private sector, government officer, community leader etc.)
2. To announce and show perspective view of project to fishermen and other stakeholder in details.
3. To call for cooperation between fishermen and other stakeholder in running project.

Participants and Instructors

Participants	3 July 2003	4 July 2003
Government officers from DOF	17	14
Officers from SEAFDEC	2	-
OBT fishermen at Pran Buri	33	32
Local Government Unit (LGU)	5	
Middleman	2	3
Instructors		
Government officers from DOF	2	-
Officers from SEAFDEC/MFRDMD	1	1
Total	62	50

Meeting Venue

1. Pattara yacht club
2. Project area

Date

3rd - 4th July 2003

Conclusions and Recommendations

At the meeting, the SEAFDEC National Coordinator for Thailand, Mr.Somsak Chullasorn, presented the background of the Indicators Project in Thailand and the SEAFDEC Regional Project Leader for the Indicators Project, Ms. Phaik-Ean Chee, presented the status of the pilot projects that are being implemented in other member countries. Dr. Mala Supongpan from SEAFDEC Secretariat presented a paper on the use of indicators for fisheries management. She

also mentioned that indicators will be very useful for fisheries management in the pilot project area. These indicators will provide a ready tool for describing the state of fishery resources and fishery activities. After that, the project team brainstormed, identified and proposed indicators that can be used as suitable management tools. The project team selected 11 indicators which could be separated into three groups. These are:

1. Resource indicator
   - -Catch per unit effort (CPUE)
   - -Catch composition of good and trash fish
   - -Number of species caught
   - -Average size of fish
   - -Size of mature fish, shrimps and *Sepia* spp.

2. Fleet
   - -Fishing time
   - -Fishing power

3. Economic and social indicators
   - -Income per unit effort
   - -Cost
   - -Profit of fishers
   - -Price index

The panel accepted the above indicators proposed. Then the project team identified information and data required for collection and explained the method for the enlarging cod-end mesh size from 0.6 inches to one and 1.2 inches for the experimental survey. The project team started to collect the data in the project site on August 2003 and the first experiment using the enlarged cod-end mesh size was conducted in September 2003.

Data Collecting Procedure

1. Record catch data, fishing effort, size, price of fish
2. Categorize fish caught
3. Identify fish species
4. Measure of the length and weigh the fish
5. Collect specimens to study the reproductive biology of target species
6. Interview fishers to compile general information on the fishery, fishing grounds, fishing methods, marketing of fish and price of fish.

A routine survey of the local small shrimp trawlers will be conducted monthly at Pran Buri fishing piers. Samples will be taken from fish landings and interviews with skippers will be conducted at the fishing pier.

The fish caught by the sampled shrimp trawlers and from the experimental study will be sorted out into food fish category (fish and shrimp) and trash fish category (small size commercial fish of economic importance and true trash fish). The species identification of both categories will be done and the price of fish species will also be recorded. The sizes of fish caught will be measured by species and separated by mesh sizes.

Analysis of Data

Analyses of the catches, catch composition, number of species caught, average fish size, size of mature fish will be determined.

Existing Data in 1997 and New Data in 2003
Initial data collected are summarized in the table below.

Table 1: Summary of some data on indicators compiled for the pilot project

Year	1997	2003
Fishing effort (hr/day)	10	13.40
Target species	Shrimp	Shrimp
CPUE (kg/hr)	21.949	19.540
CPUE of commercial fish with economic value (kg/hr)	13.290	13.046
Commercial fish with economic value : Trash fish (%)	61:39	67:33
CPUE of trash fish (kg/hr)	8.659	6.493
Small size commercial fish with economic fish : True trash (%)	35 : 65	32:68
Return (Baht/day)	2,522.23	
Total Cost (Baht/day)	2,607.23	
Profit	-84.98	

Constraints and Solutions

- Variation of Data Year by Year
  Data on indicators for analysis should be time series data. However data collected in the past years were different from the present since conditions were different. It was therefore difficult to compare data and develop them for the indicator pilot project. E.g. in 1997, fishers had not graded their group of trash fish. They sold by a flat price of 1.25 baht/kg. Since 2002, fishers have sorted their catch and sold by two groups, trash fish and miscellaneous fish with prices of 1 baht/kg and 3.5-4 baht/kg respectively.

- No Control Over the Landing Site
  Selection of the project site requires to careful consideration. After the start of the sampling program, the data collector found that parts of catches had been sorted and sold or processed by the fishers themselves before discharging at the landing site of pilot project. Complete data could not be collected and data analysis could be inaccurate.

- Unable to Maintain the Standard Measurement and Classification
  Although the national guidelines on the classification and measurement of catch had been agreed upon, in practice, it was found to be different from the guidelines in certain years. This caused difficulties to follow-up activities. E.g. in 1997, the classification was focused only at the genus level but in 2002 it was changed to the species level. The absolute comparison between catches in 1997 and 2002 was only possible at the genus level. This could not allow the recognition of endangered marine species.

- Alteration of the National Standard for Catch Measurement and Classification
  Some acceptable international standards for catch classification have not been harmonized with the national standard. Data collected in the past, following the national standard for catch classification, could not be compared with the present data collected which are based on the international standards for catch classification. In the past, the Thai national standard measurement for shrimp total length was from the rostrum to the telson. Following the introduction of a standard measurement by FAO, measurement of shrimp total length was changed to middle of eye to telson.

- Error in Catch Data from Sea Trial
  Error in data collected from the sea trial is one of the problems that may affect the analysis. Through practical experience, there tends to be discrepancies in the data due to the massive amount of catch data. If the collector of these data is not experienced enough, errors cannot be detected and this will affect the accuracy of the analysis. Although experienced scientists are able to detect errors in the catch data, they still need to take time to carefully check data. However owing to the problem of the insufficient number of scientists, a longer time is required for data analyses resulting in delays in reporting.

Solutions
To enhance good and accurate data collection, collectors have to report in detail on the real time conditions together with the catch data. Any comparison of time series data should be conducted with caution.

The landing site selected for sampling should be where fishers discharge their whole catch.

It is recommended to harmonise the standard of measurement classification to the national guideline of catch measurement classification. Every detail for alteration the national guideline of catch measurement classification must be clarified the impact of usage data before the agreement.
The collector should restrictively maintain data gathering process under standard of catch measurement and classification.

Develop the skills and experience of the people related to the field. To reduce mistakes in data management (Collection and analysis) staff development programs should be established not only to increase number of staff but also to introduce the regional standardization of catch measurement and classification and to improve catch data for use internationally.

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*** Appendix 1:** Project Information

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Project team: Ms. Jintana Jindalikit
Ms. Piyawan Maila-iad
Ms. Anyanee Yamrungrue
Ms. Saowamol Puteeka
Ms. Nipa Kulanujaree

Data of project initiation: July 2003
Planned project duration: from July 2003-April 2004

INDICATORS MADE BASED ON MONITORING OF VIETNAMESE COMMERCIAL MARINE FISHERY

Nguyen Thi Dieu Thuy and Karl Johan Staehr
Assessment of the Living Marine Resources in Viet Nam
Ministry of Fisheries
Viet Nam

Introduction

In order to improve the ability of providing fishery multidisciplinary management advice, fleet performance indicators were selected as a tool. For this purpose, we had built the data collecting system for marine commercial fishery in 11 pilot coastal provinces since 1996. Later in 1998, this system was expanded to all 28 coastal provinces, which are sorted into four management areas, in coordination with the administrative areas of Viet Nam: North, Center, Southeast and Southwest. The commercial catches are monitored by sampling the catch of different fleets at the landing places. For the time being, there are 34 enumerators sampling 42 different fleets at 62 landing places of 28 provinces. The information recorded are: vessel parameters, fishing trip details (trip duration, fishing ground, fishing depth, gears used, fishing effort, catch composition, variable cost of the trip (like fuel, ice, salary of crew), fish prices, value (see Interview form in appendix 1). Until the end of 2003, more than 200,000 interview forms were collected.

The definition of the fleet was made based on the main gear used and horsepower group of the boat. The main gears used are:

1. Trawl; divided into single trawl (including otter trawl and beam trawl) and pair-trawl
2. Purse seine; divided into anchovy purse seine (small mesh size used) and other purse seine (large mesh size used).
3. Gillnet; divided into trammel net, drift net and bottom gillnet.
4. Line; separated into squid hand line, fish hand line and long line.
5. Lift net
6. Stick-held falling net.
7. Others.

Horsepower groups are:

1. <20 HP
2. 20-89 HP (20-45HP & 46-89 HP for trawl)
3. 90-140 HP
4. >140 HP (141-300 and >300 HP for trawl)

The non-motorized group is not included because of the considerable uncertainties regarding the size of the fleet. For example, vessel A belongs to fleet Otter trawl 46-89HP if it uses otter trawl gear and its capacity is in the interval 46-89HP.

At the end of each year, the sampling plan for the next year is made at the enumerator workshop. The principles for selecting sampled fleets in each province are:

- Fleets who contribute the main landing to the landing of the province.
- Select the landing sites where main fleets and main landing of the province landed.
- Try to follow the fleets sampled in previous year unless the fleets go out of the fishery or change the main gear totally.

In each province, at least 20 forms should be collected for each fleet in each month. Interviews must cover the catch of the whole trip. If there is not enough information for the catch of the whole trip, the interview should be dropped. For further reference, the sampling plan for 2004 is given in Appendix 2.

Data collected were encoded into a database which has been developed in Access. This database is divided into two parts: input database and output database. Input database stores all the raw information in the interview forms, output database stores all the standard queries and interfaces to get output data which are indicators. Up to now, the possible indicators have pointed out from this source of data are:

* Fleet level
    1. Mean daily catch rate (kg/day)
    2. Mean standard catch rate
    3. Mean active days per month
    4. Mean trip duration
    5. Mean turnover per trip
    6. Mean cost per trip
    7. Mean turnover per day
    8. Mean cost per day
    9. Catch composition
    10. Turnover composition

* Fish group level
    1. Mean daily catch rate (kg/day)
    2. Standard catch rate

The calculations are distributed on
    Nation level
    Regional level (4 regions)
    Provincial level (28 coastal provinces)
    Fish groups (18 Ecological groups)
    Fleet types
    Monthly basis

This is the list of indicator we have made so far for our work. This list can be added for further analyses. The variation of fish group price is one of the indicators considered.

Methods

A. At Fleet Level

1. Mean daily catch rate (kg/day)

Catch Per Unit of Effort (CPUE) of trip *t* is:

$$CPUE_t = \frac{C_t(kg)}{E_t(kg)}$$

where $CPUE_t$: CPUE of trip *t*
C_t: Catch of Trip t
E_t: Fishing effort of trip t

Mean CPUE of fleet F in province P (or area A) in month *i* of year *j*:

$$\text{Mean CPUE}_{ij} = \frac{\sum_{t=1}^{n} CPUE_t}{n} \quad (n \geq 5)$$

Where

n number of observations (total number of trips interviewed of fleet F from province P (or area A) in month *i* of year *j)*

2. Mean standard catch rate

Standardized catch rate is catch rate classified by gear as follows:

Otter trawl, pair trawl, beam trawl	Catch per hour of fishing (kg/hour)
Purse seine, lift net, stick held falling net	Catch per fishing operation (kg/operation)
Driftnet, stationary net, trammel net	Catch per km net (kg/km)
Long line	Catch per 100 hooks (kg/100 hooks)
Fish hand line, squid hand line	Catch per line (kg/line)

Standardized CPUE of trip t:

$$\text{Standardized CPUE}_t = \frac{C_t(kg)}{E_t(unit)}$$

where Standardized $CPUE_t$: Standardized CPUE of trip *t*

C_t: Catch of Trip t

E_t: Fishing effort of trip t

unit: See above

Mean standardized CPUE of fleet F in province P (or area A) in month *i* of year *j*:

$$\text{Mean standardized CPUE}_{ij} = \frac{\sum_{t=1}^{n} Standardized\ CPUE_t}{n} \quad (n \geq 5)$$

Where

n number of observations (total number of trips interviewed of fleet F from province P (or area A) in month *i* of year *j*)

3. Mean active days per month

This indicator describes the mean active days per month of fleet, by measuring the total number of days away from harbour for fishing purpose in a month

Mean active day per month of fleet F of province P (or area A) in month *i* of year *j*:

$$\text{ActiveDay}_{ij} = \frac{\sum_{t=1}^{n} AD_t}{n} \quad (n \geq 5)$$

Where

AD_t Active days of the last month derived from interview of trip t

n number of observations (total number of interviews with Active days of the last month information of fleet F from province P (or area A) in month *i* of year *j*)

4. Mean trip duration

The mean trip duration is the length of the fishing trip measured in days (including days with no fishing activity such as steaming days).

Mean trip duration of fleet F of province P (or area A) in month *i* of year *j*:

$$\text{MeanTripDuration}_{ij} = \frac{\sum_{t=1}^{n} D_t}{n} \quad (n \geq 5)$$

Where

D_t Length of trip t (day)

n number of observations (total number of trips interviewed of fleet F from province P (or area A) in month *i* of year *j*)

5. Mean cost per trip

This is the variable cost inluding ice, fuel, provision, bait, fees and taxes related to the fishing trip.

Cost of trip t:

$$\text{Cost}_{Tript} = \text{Cost}_{\text{Ice}} + \text{Cost}_{\text{Fuel}} + \text{Cost}_{\text{Food}} + \text{Cost}_{\text{Salary}} + \ldots.$$

Cost per trip from fleet F of province P in month *i* of year *j*:

$$\text{MeanCostPerTrip}_{\text{month}\,ij} = \frac{\sum_{t=1}^{n} Cost_t}{n} \quad (n \geq 5)$$

Where

n number of observations (total number of trips interviewed with cost information of fleet F from province P (or area A) in month *i* of year *j*)

6. Mean turnover per trip

This is calculated as the total value of the trip's total catch. This amount is not the revenue of the trip. In some cases the prices of one or a few fish groups are missing. In these cases a price of the fish group, derived from other interviews of the same fleet in the same month and the same province (or area), is included.

Income per trip of fleet F of province P (or area A) in month *i* of year *j*:

$$\text{IncomePerTrip}_{ij} = \frac{\sum_{t=1}^{n} Income_t}{n} \quad (n \geq 5)$$

Where

Income_t Income of trip t

n number of observations (total number of trips interviewed with income information of fleet F from province P (or area A) in month *i* of year *j*)

7. Mean cost per day

This is the variable cost calculated on daily basis

Cost per day of trip t:

$$Cost_t = Cost_{Ice} + Cost_{Fuel} + Cost_{Food} + Cost_{Salary} + ...$$

$$CostperDay_t = \frac{Cost_{Tript}}{E_t(day)}$$

Cost per day from fleet F of province P in month *i* of year *j*:

$$MeanCostPerDay_{ij} = \frac{\sum_{t=1}^{n} Cost\,per\,Day_t}{n} \quad (n \geq 5)$$

Where

n number of observations (total number of trips interviewed with cost information of fleet F from province P (or area A) in month *i* of year *j*)

8. Mean turnover per day

Income per day of trip t is defined as total income of trip t divided by number of fishing days of trip t:

$$IncomeperDay_t = \frac{Income_{Tript}}{E_t(day)}$$

Average income per day of fleet F from province P (or area A) in month *i* of year *j* is:

$$IncomePerDay_{ij} = \frac{\sum_{t=1}^{n} Income\,per\,Day_t}{n} \quad (n \geq 5)$$

Where

n number of observations (total number of trips interviewed with income information of fleet F from province P (or area A) in month *i* of year *j*)

9. Catch composition

This indicator describes the catch composition by percentages of fish groups in the monthly catches of fleets

Percentage of group A in the catches of fleet F from province P in month *i* of year *j*:

$$PercentageOfGroupA_{ij} = \frac{\sum_{t=1}^{m} C_{At}}{\sum_{t=1}^{n} C_t} \quad (n \geq 5)$$

Where

C_{At} Catch of fish group A in trip *t*

C_t Catch of trip *t*

m total number of trips interviewed of fleet F from province P in month *i* of year *j*, which have group A in their catches

n total number of trips interviewed of fleet F from province P in month *i* of year *j*

10. Turnover composition

This indicator describes the proportion of turnover by percentages of fish groups in the monthly catches of fleets

Percentage of group A in the total value of fleet F from province P in month *i* of year *j*:

$$\text{PercentageOf GroupA}_{ij} = \frac{\sum_{t=1}^{m} V_{At}}{\sum_{t=1}^{n} V_t} \quad (n \geq 5)$$

Where

V_{At} Value of fish group A in trip *t*

V_t Value of trip *t*

m total number of trips interviewed of fleet F from province P in month *i* of year *j*, which have group A in their catches

n total number of trips interviewed of fleet F from province P in month *i* of year *j*

B. At Fish Group Level

1. Daily catch rate (kg/day)

CPUE of fish group *A* in trip *t* is:

$$\text{CPUE}_{At} = \frac{C_{At}(kg)}{E_t(day)}$$, where

CPUE_{At}: CPUE of fish group *A* in trip *t*

C_{At}: Catch of fish group A in Trip t

E_t: Fishing effort of trip t

Mean CPUE of group A in the catch of fleet F from province P (or area A) in month *i* of year *j*:

$$\text{Mean CPUE}_{\text{GroupAinMonth } ij} = \frac{\sum_{t=1}^{n} CPUE_{At}}{n} \quad (n \geq 5)$$

where

CPUE_{At}:CPUE of fish group *A* in trip *t*

n number of observations (total number of trips interviewed of fleet F from province P (or area A) in month *i* of year *j)*, which have group A in their catches

2. Standard catch rate

Standardized CPUE of fish group A in trip t:

$$\text{Standardized CPUE}_{At} = \frac{C_{At}(kg)}{E_t(unit)}$$

where Standardized CPUE_{At}: Standardized CPUE of fish group A in trip *t*

C_{At}: Catch of fish group A in trip t

E_t: Fishing effort of trip t

unit: See II.A.2.

Mean standardized CPUE of group A in the catches of fleet F from province P (or area A) in month *i* of year *j*:

$$\text{Mean standardized CPUE}_{\text{GroupAmonth } ij} = \frac{\sum_{t=1}^{n} Standardized\ CPUE_{At}}{n} \quad (n \geq 5)$$

Where

Standardized $CPUE_{At}$: Standardized CPUE of fish group A in trip *t*

n number of observations (total number of trips interviewed of fleet F from province P (or area A) in month *i* of year *j*),which have group A in their catches

Results

The following three examples are given to show how the time series on indicators from the monitoring of commercial catches can be used to describe the changes in performance of a given fleet.

The following three fleets were chosen as examples:

- Otter trawl 46-89 HP in Ben Tre Province
- Squid hand line 46-89 HP in Ben Tre province
- Otter trawl 20-45 HP in Khanh Hoa

The mean standard catch rate, mean catch rate per day, mean trip duration, mean active day and mean turnover per day for the total catch together with catch composition, proportion of turnover and mean standard catch rate by ecological groups are shown in Figures 1 to 11.

To give an impression of changes over time, a regression analysis was made for each indicator. The regression line is shown on each graph (Figures 1 to 11) together with the slope and intercept. If too few data are available in a time series, a regression analysis will not be made. To decide if the slopes of the regression lines are significantly different from 0, the P values of the 95% confidence interval were calculated and shown on the figures. As a rule of thumb, the slope is statistically different from 0 if the P value is below 0.05.

Otter trawl 46-89 HP in Ben Tre

Data from monitoring of the otter trawl 46-89 HP in Ben Tre for the period from August 2000 to January 2003 were available for analysis. Graphs on the time series of the indicators for the fleet otter trawl 46-89 HP are shown in Figures 1 to 4.

In Tables 1 and 2 an overview of the trends over time are given for the indicators on the total catch and by ecological groups respectively.

Table 1: Trends in indicators on total catch for Otter trawl 46-89 HP in Ben Tre

Mean Standard catch rate Kg/hour	Mean Catch rate per day Kg/day	Mean trip duration Day	Mean active day per month Day	Mean turnover per day 1000 VND
++	++	+	Too short time period	+

-- Significant decrease
- Insignificant decrease
+ Insignificant increase
++ Significant increase

Table 2: Trends in indicators on ecological groups for Otter trawl 46-89 HP in Ben Tre

Ecological group	Catch composition (%)	Proportion of turnover (%)	Mean standard catch rate (kg/hour)
Shrimp	-- seasonality	--	-
Trash fish	+	++	+
Mixed fish	++	++	++
Crabs	+	+	+
Cephalopods	-	-	+
Cuttle fish	+	++	++
Squid	++ seasonality	++	++
Octopus	Too few data seasonality	Too few data	Too few data
Demersal fish	+	+	++
Coral fish	Too few data seasonality	Too few data	Too few data seasonality
Ray	Rare in catch	Rare in catch	Rare in catch

-- Significant decrease
- Insignificant decrease
+ Insignificant increase
++ Significant increase

From Table 1 and Figure 1 it can be seen that the mean standard catch rate (kg/hour) and mean catch rate per day has increased significantly for the otter trawler 46-89 HP in Ben Tre over the time period. The mean trip duration has been quite stable over the same period at a level with an average of 9-10 days. During the same period the mean turnover per day has had an insignificant increase.

For an explanation in the trends over time for the total catch, the indicators by ecological groups had to be examined (Figures 2 to 4). From Table 2 and Figure 2 it can be seen that the percentage in the catch composition has decreased significantly for shrimp but has increased significantly for mixed fish and squid. Other ecological groups only showed insignificant changes in percentage in catch over the time period. For the mean standard catch rate by ecological groups (Figure 4) there had been significant increases in mean kg/hour for mixed fish, cuttlefish, squid

and demersal fish. From Figure 3 it can be seen that proportion of turnover by ecological groups decreased significantly for shrimp but increased significantly for trash fish, mixed fish, cuttlefish and squid.

Based on this the changes in the trends for indicators of the total catch for otter trawl 46-89 HP fleet in Ben Tre could be due to a change in the ecological groups targeted in this fleet from shrimp to mixed fish, cuttlefish, squid and demersal fish. This change could either be due to a change of gear or due to a change in fishing ground. From a management point of view it should be investigated if this change in the fishery by the fleet is due to a decline in the shrimp resources or a decline in the market demand and thereby in the turnover possible by targeting shrimp.

Squid hand line 46-89 HP in Ben Tre
Data from monitoring of the squid hand line 46-89 HP in Ben Tre for the period from August 2000 to February 2003 were available for analysis. The time series data of the indictors for the fleet squid hand line 46-89 HP are shown in Figures 5 to 7.

In Tables 3 and 4, the trends over time are given for indicators of the total catch and by ecological groups respectively.

Table 3: Trends in indicators of total catch for Squid hand line 46-89 HP in Ben Tre

Mean Standard catch rate (kg/day/person)	Mean Catch rate per day (kg/day)	Mean trip duration (days)	Mean active days per month (days)	Mean turnover per day (1000 VND)
-	-	+	Too short time period	-

Table 4: Trends in indicators on ecological groups for Squid hand line 46-89 HP in Ben Tre

Ecological group	Catch composition (%)	Proportion of turnover (%)	Mean standard catch rate (kg/day/person)
Squid	+ Seasonality	+	0
Large pelagic	Seasonality	Rare in catch	Rare in catch
Cephalopod	Seasonality	Rare in catch	Rare in catch

0 No change
-- Significant decrease
- Insignificant decrease
+ Insignificant increase
++ Significant increase

From Table 3 and Figure 5 it can be seen that the mean standard catch rate (kg/day/person) and mean catch rate per day decreased insignificantly for squid hand line 46-89 HP over the time period. High variation in the monthly mean catch rate could be seen for both indicators, but there was no clear seasonality. The mean trip duration was quite stable at a level of 19-20 days. During the same period the mean turnover showed monthly variations corresponding to the variations seen in the mean catch rate. The mean turnover showed an insignificant decrease over the time period.

For a deeper understanding of the development over time for the total catch indicators, the indicators by ecological groups had to be examined (Figures 6 and 7).

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From Table 4 and Figure 6 it can be seen that squid was the major part of the catches for all month. For some moths large pelagics and cephalopods contributed up to 50% of the catches, but these large pelagics and cephalopods had not been seen in the catches since the beginning of 2002. This is the reason for the insignificant increase for squid in the catch composition and proportion of turnover.

Either the squid hand line 46-85 HP fleet had changed its fishing pattern from targeting large pelagics for periods of the year or the resources of large pelagics had declined in the operation area. For management purposes, this has to be investigated based through other means e.g. scientific resource surveys.

Otter trawl 20-45 HP in Khanh Hoa

Data from monitoring of the otter trawl 20-45 HP in Khanh Hoa for the period October 1996 to December 2002 were available for analysis. Time series for the indicators of the fleet of the otter trawl 20-45 HP are shown in Figures 8 to 11.

In Tables 5 and 6, the trends over time are given for indicators of the total catch and by ecological groups respectively.

Table 5: Trends in indicators on total catch for Otter trawl 20-45 HP in Khanh Hoa

Mean Standard catch rate (kg/hour)	Mean Catch rate per day (kg/day)	Mean trip duration (days)	Mean active day per month (days)	Mean turnover per day (1000 VND)
--	--	0	--	++

0 No change
-- Significant decrease
- Insignificant decrease
+ Insignificant increase
++ Significant increase

From Table 5 and Figure 8 it can be seen that mean standard catch rate (kg/hour) and mean catch rate per day decreased significantly for the otter trawl 20-45 HP fleet in Khanh Hoa over the time period. The mean trip duration was quite stable over the same period at a level around 1 day. During the same period the mean turnover per day increased significantly.
To be able to explain the trends over time for the total catch indicators, an examination of the indicators by ecological groups was conducted (Figures 9 to 11).

Table 6: Trends in indicators on ecological groups for Otter trawl 20-45 HP in Khanh Hoa

Ecological group	Catch composition (%)	Proportion of turnover (%)	Mean standard catch rate (kg/hr)	Mean price (VND/kg)
Cephalopods	++	++	++	--
Demersal fish	-	--	+	-
Small pelagics	-	-	0	
Mixed fish	++	++	+	+
Anchovy	Too few data	Too few data	Too few data	
Trash fish	+	-	--	++
Coral fish	++	+	Too few data	-
Octopus	+	-	Too few data	
Crabs	0	++	--	++
Squid	0	0	+	+
Cuttlefish	+	+	Too few data	++
Shrimp	-	+	-	++

0 No change
-- Significant decrease
- Insignificant decrease
+ Insignificant increase
++ Significant increase

From Table 6 and Figure 9 it can be seen that the percentage in the catch composition increased significantly for cephalopods, mixed fish and coral fish. For the rest of the ecological groups, no or only insignificant changes were seen over the time period.

For the mean standard catch rate cephalopods showed a significant increase whereas trash fish and crabs showed a significant decrease. For the rest of the ecological groups found in the catches, no or insignificant changes were seen.

The significant increase in the mean turnover of the total catch despite a significant decrease in the mean standard catch per day can be explained only by the significant increase in the prices (VND/kg) for some of the ecological groups as trash fish, crabs, cuttlefish and shrimp.From a management point of view further investigations should be made on trash fish as this ecological group contributed approximately 45% of the catch (Figure 9). It has to be investigated if the significant decrease in mean standard catch rate of trash fish is due to over- fishing forced by a demand and high prices on the market.

Discussion

The regression analysis on pressure indicators from the monitoring of commercial catches only has the aim to give a first impression of the time trends for a given indicator. No single pressure indicator gives a full description for the performance of a fleet. By combining information from more indicators a picture of the performance of a fleet can be seen. This picture can lead to a situation of alarm and closer inspections of data have to be taken. To come to a detailed understanding of the situation for a fishery based on which a management decision can be taken the above mentioned analysis has to be combined with analyses of fleet indicators, e.g. number of vessels, and state indicator for the resources from scientific resource surveys.

If management tools have been introduced to regulate a fishery the pressure indicators from the monitoring of the commercial fishery can be used to give a first impression if the regulation has had the intended effect on the fishery. But also here these analyses have to be combined with analyses of the state indicators on the resources to give a full picture of the result.

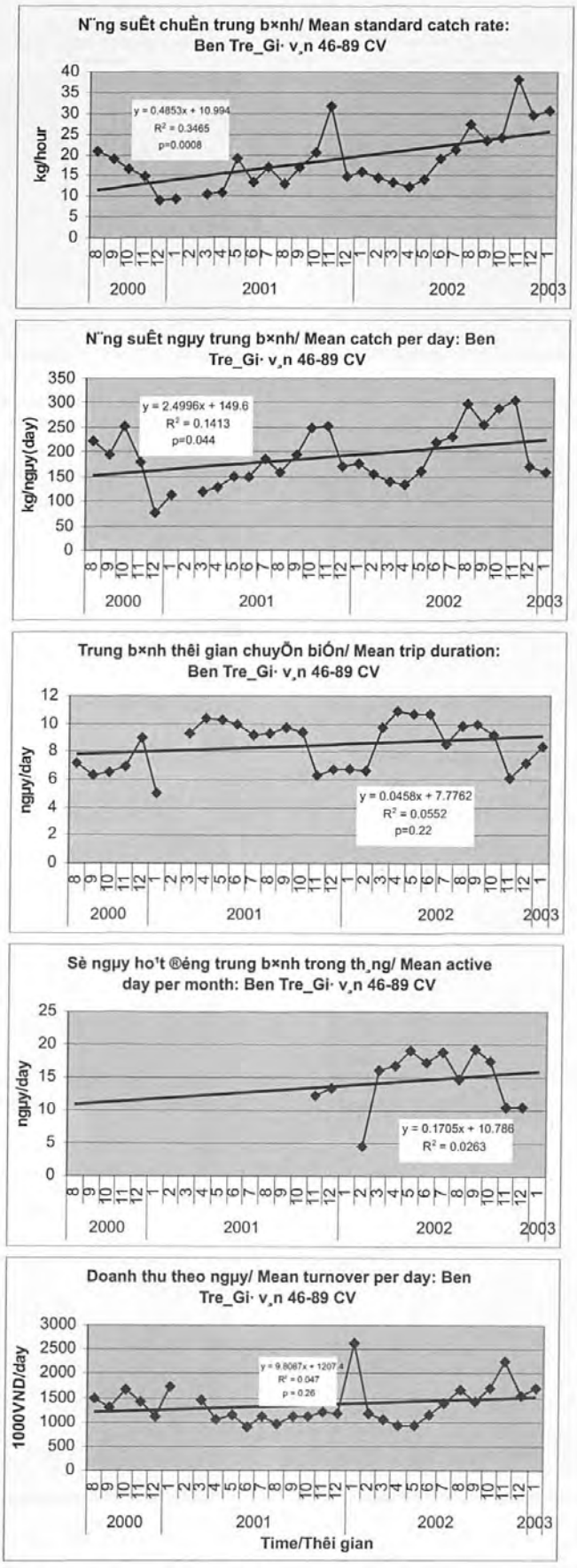


Figure 1: General indicators on total catch for Otter trawl 46-89 HP in Ben Tre

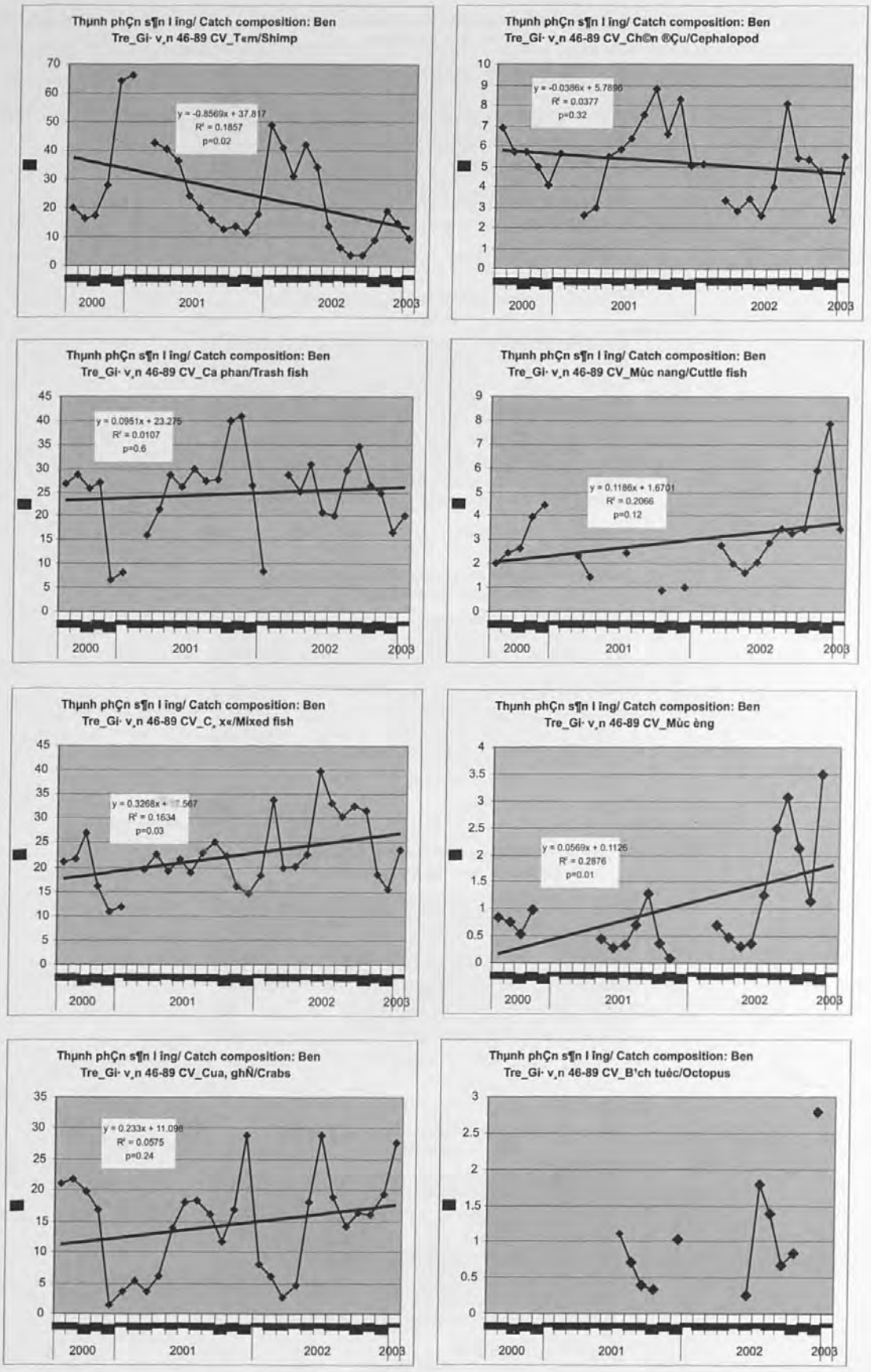
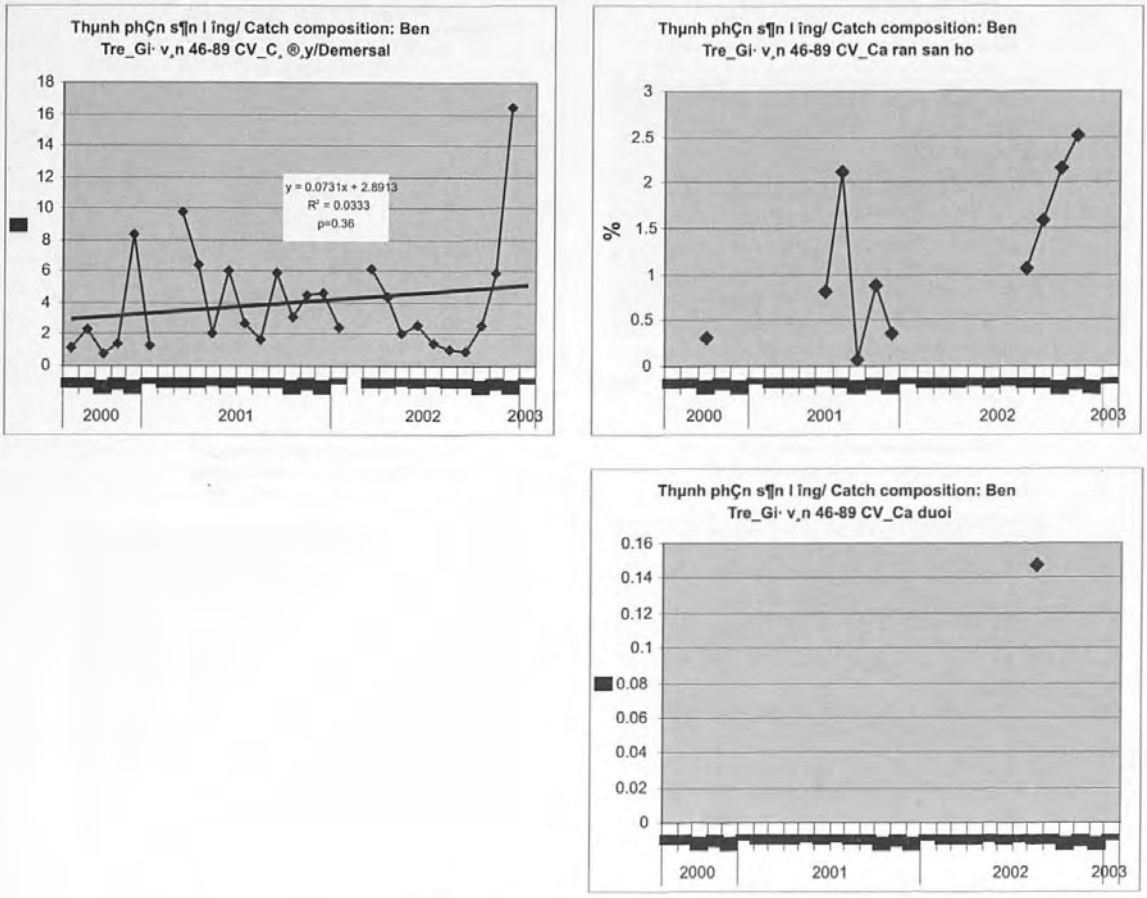


Figure 2: Indicator on catch composition by ecological groups for Otter trawl 46-89 HP in Ben Tre



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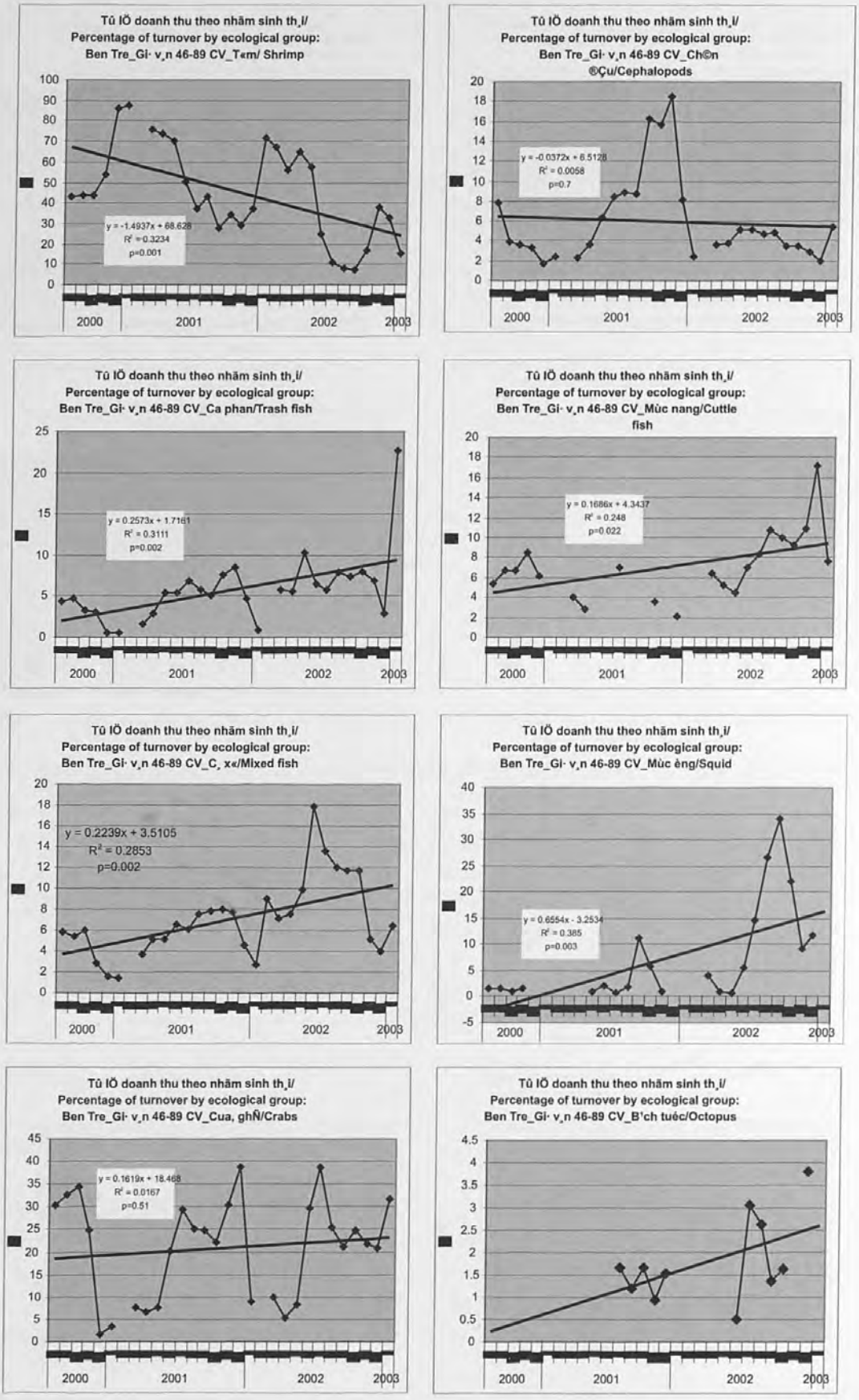
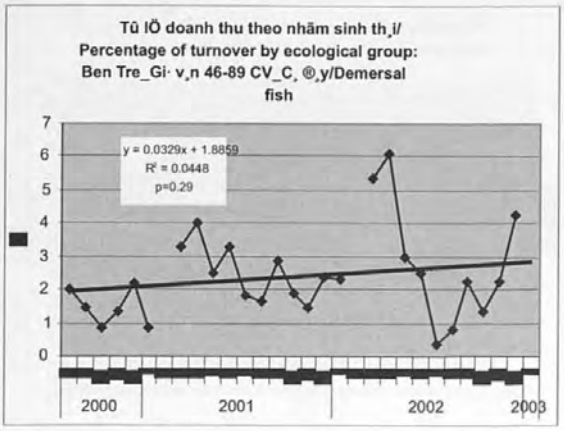
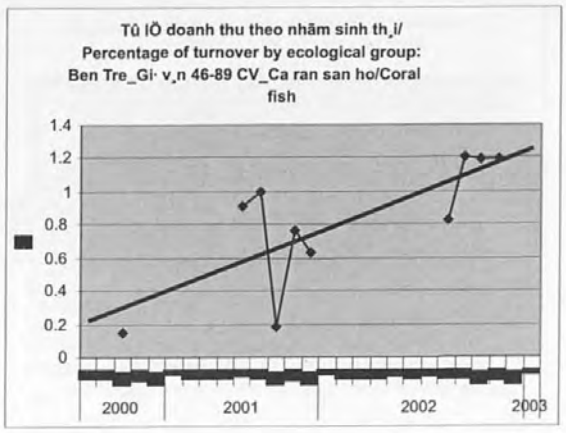
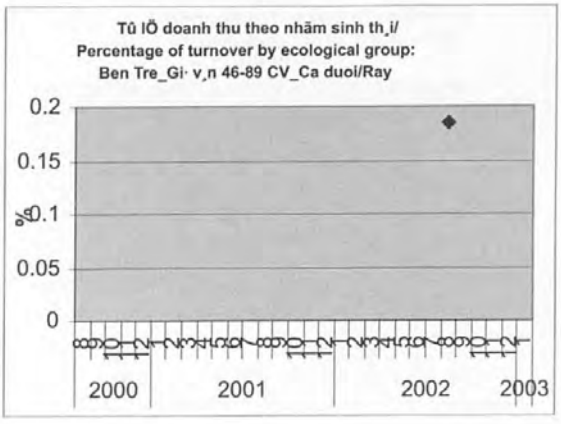


Figure 3: Indicator on proportion of turnover by ecological groups for Otter trawl 46-89 HP in Ben Tre







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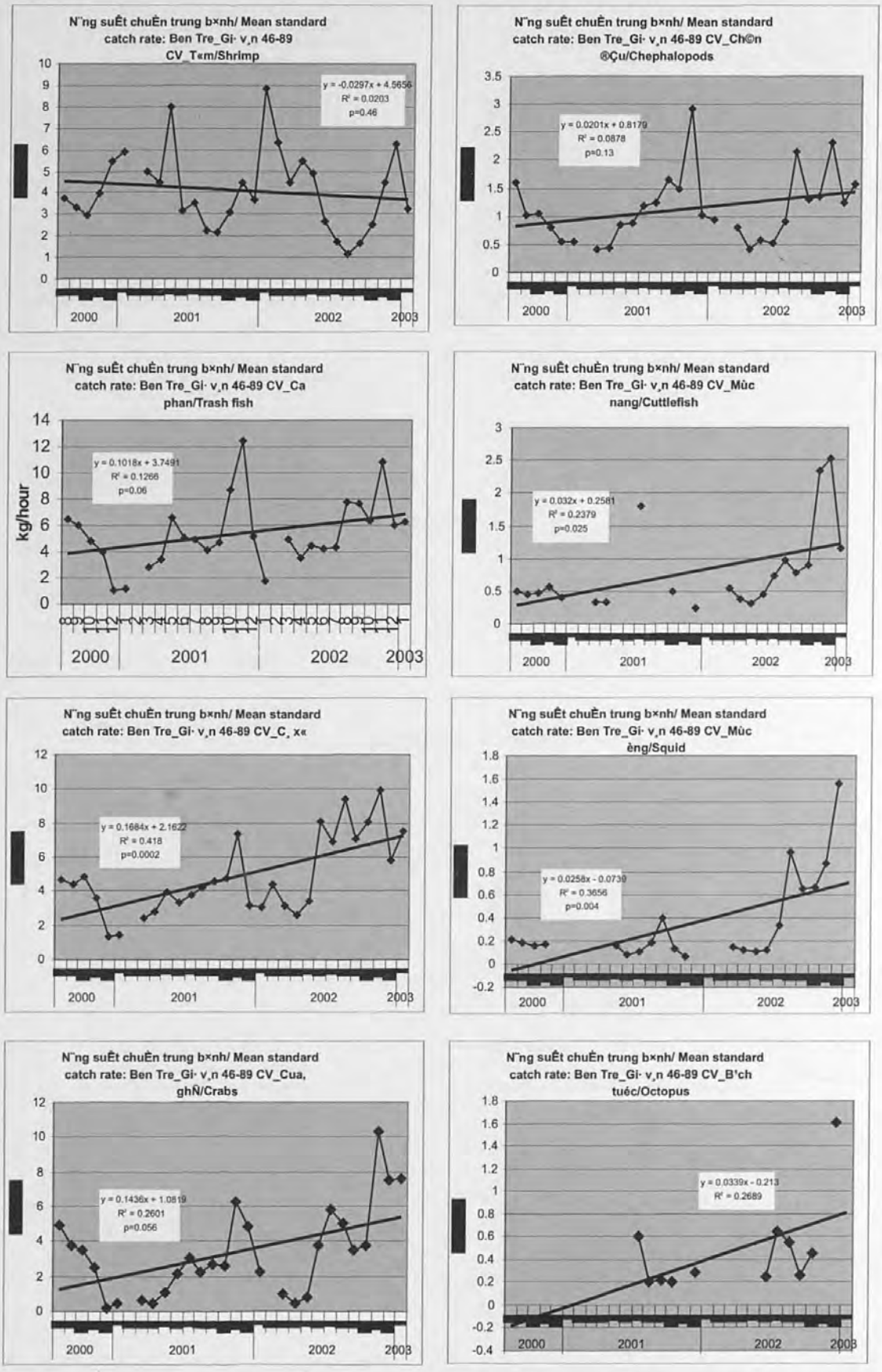
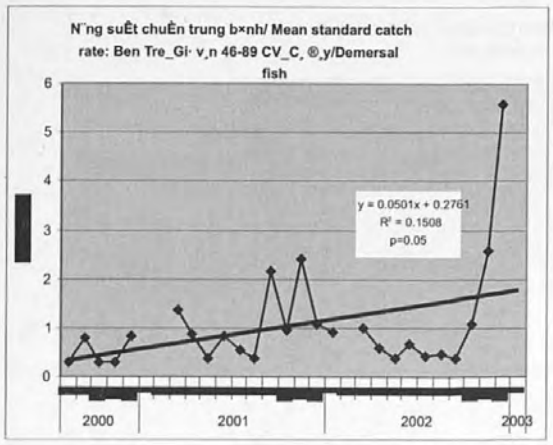
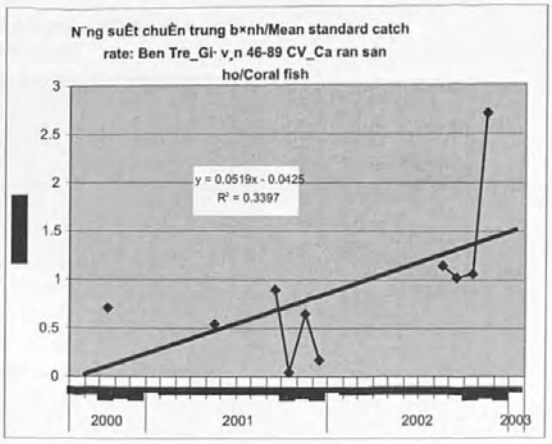
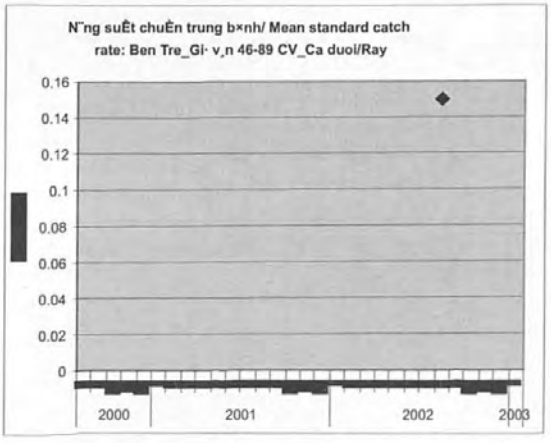


Figure 4: Indicator on mean standard catch rate by ecological groups for Otter trawl 46-89 HP in Ben Tre







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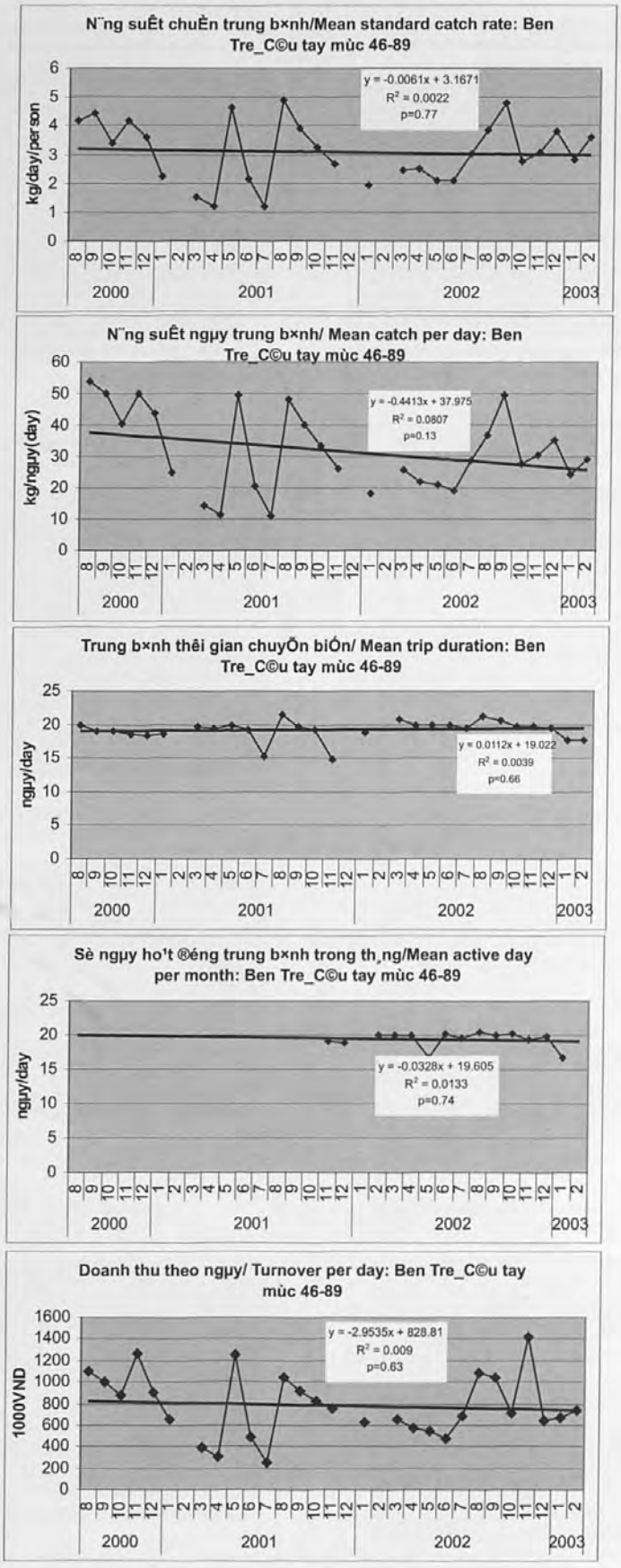


Figure 5: General indicators on total catch for Squid hand line 46-89 HP in Ben Tre

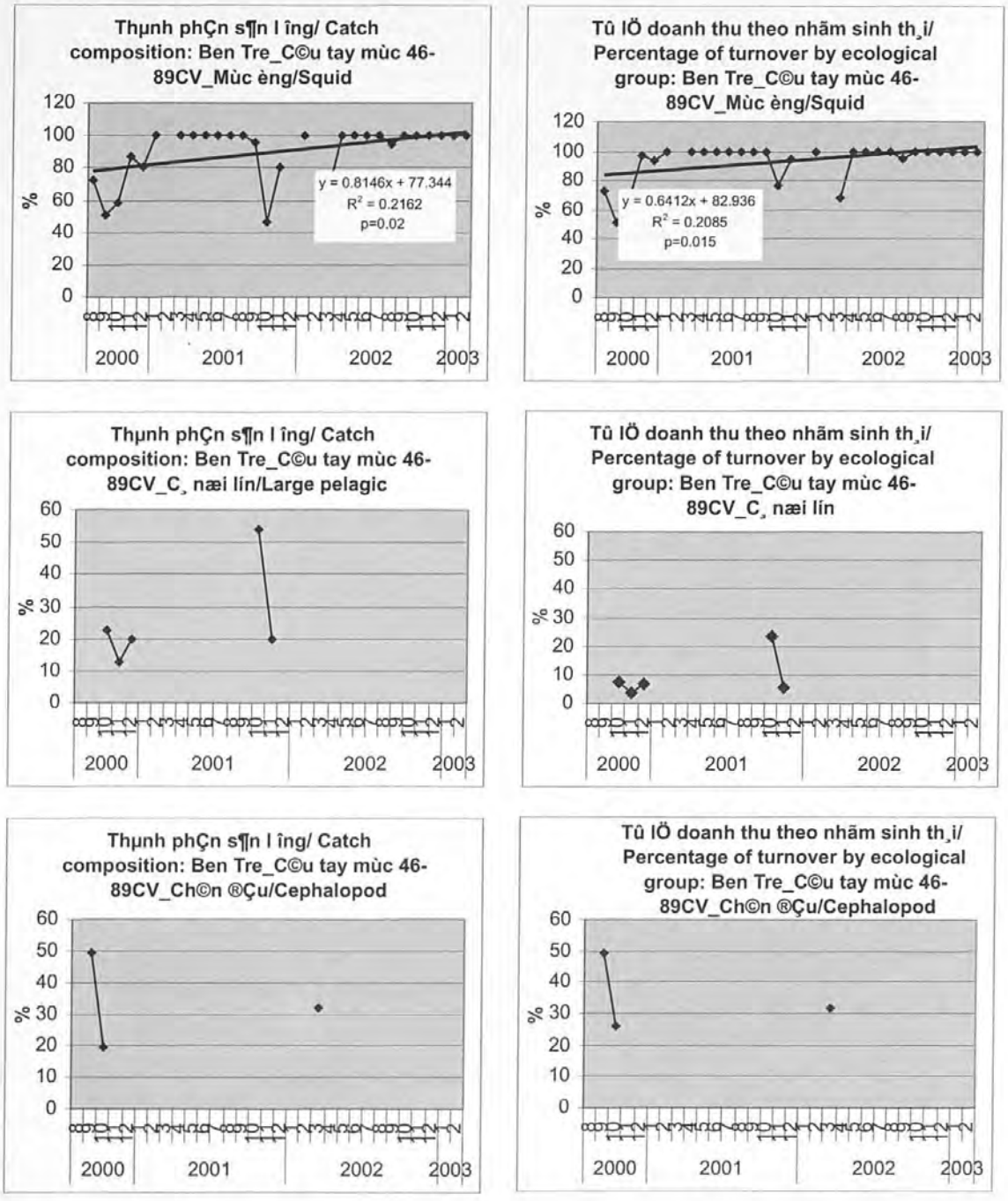


Figure 6: Indicator on catch composition and proportion of turnover by ecological groups for Squid hand line 46-89 HP in Ben Tre

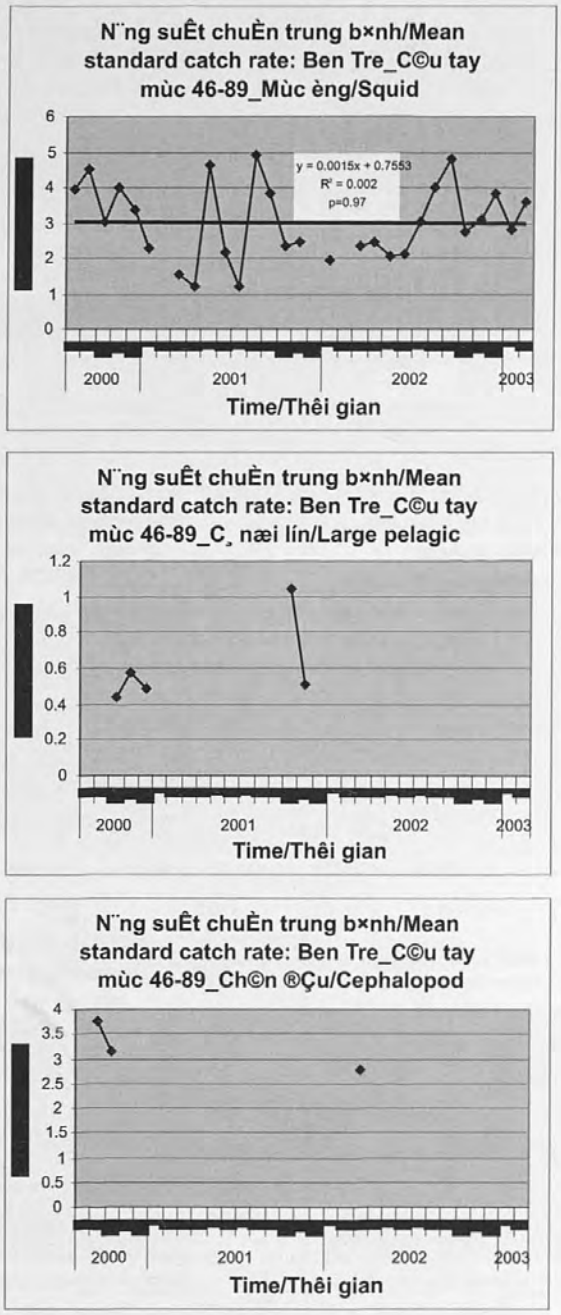


Figure 7: Indicator on mean standard catch rate by ecological groups for Squid hand line 46-89 HP in Ben Tre

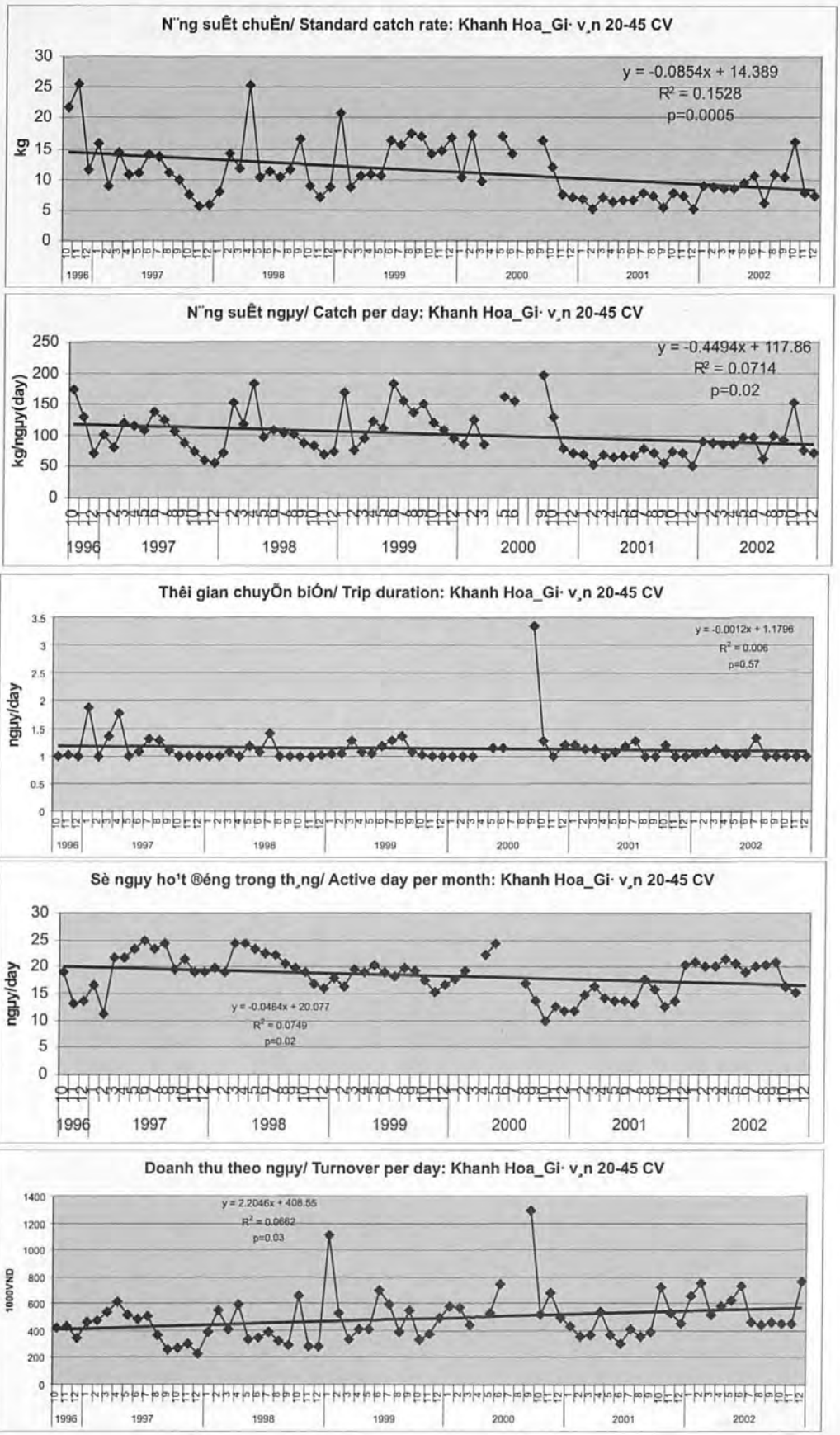


Figure 8: General indicators on total catch for Otter trawl 20-45 HP in Khanh Hoa

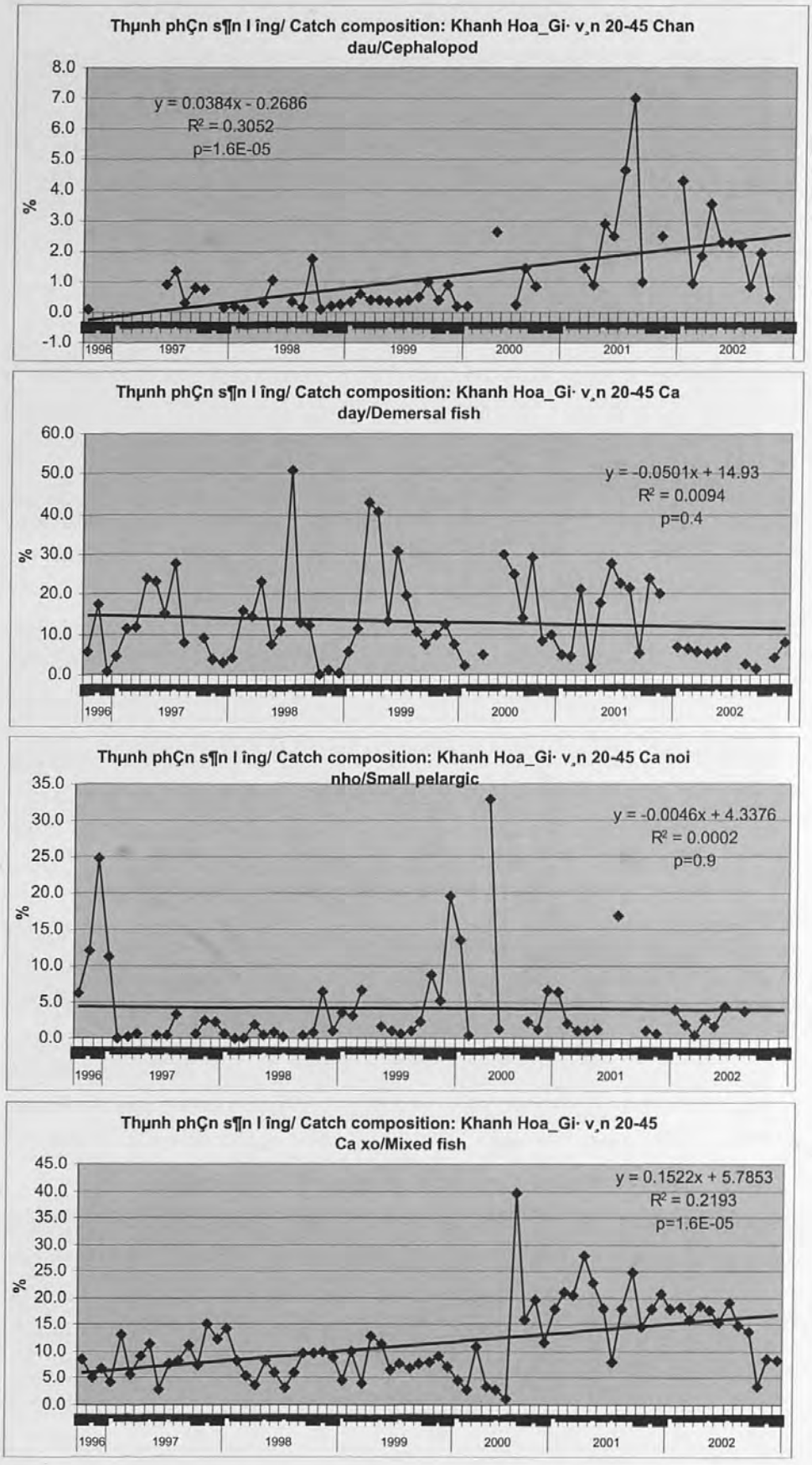
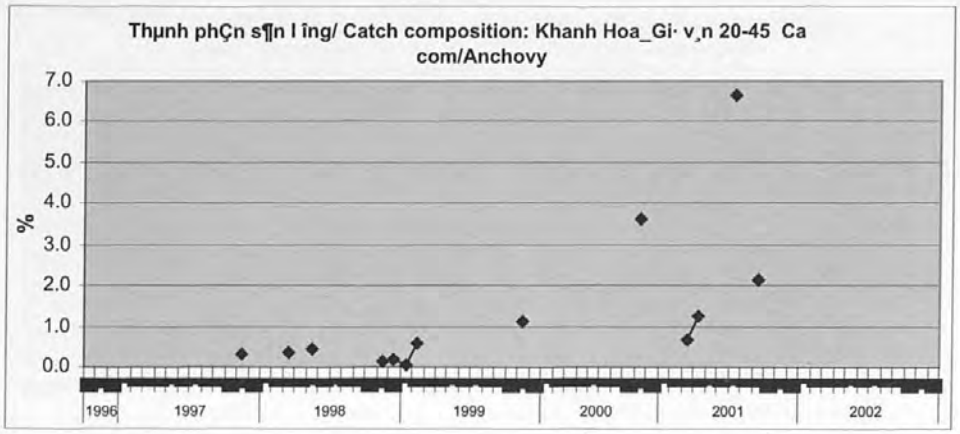
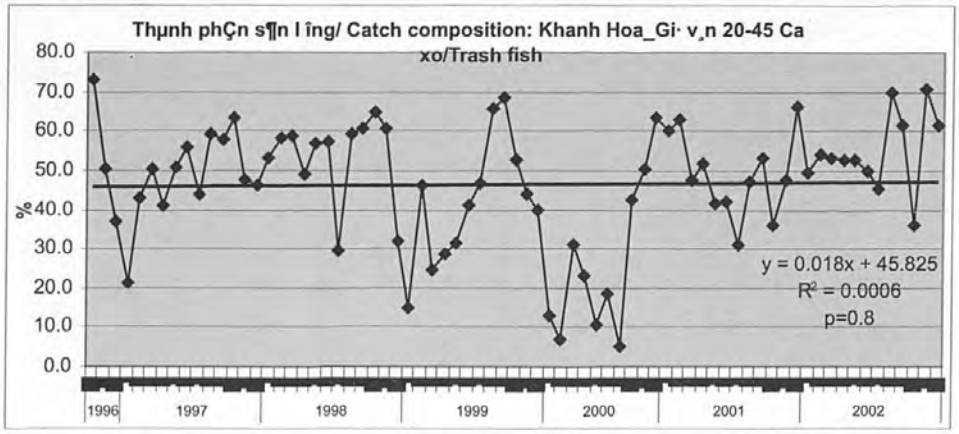
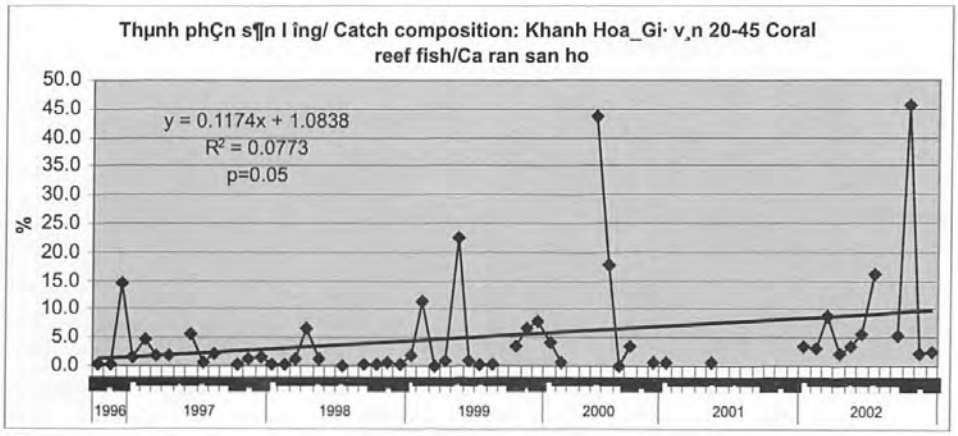
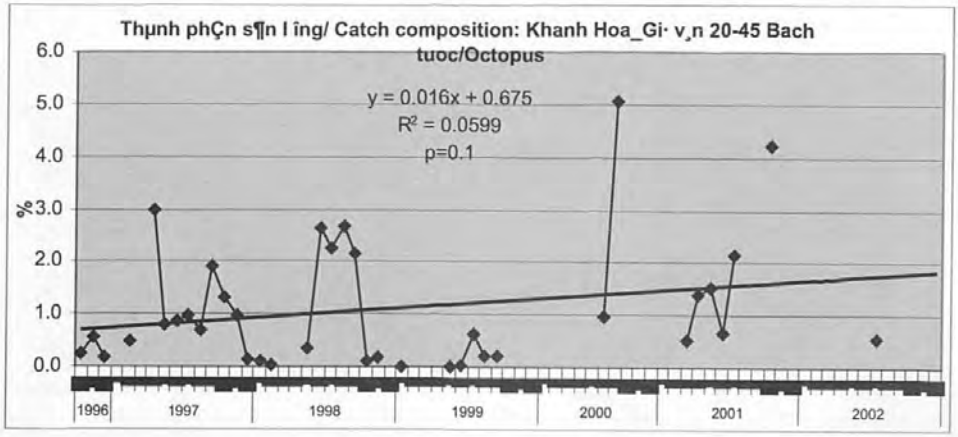


Figure 9: Indicator on catch composition by ecological groups for Otter trawl 20-45 HP in Khanh Hoa









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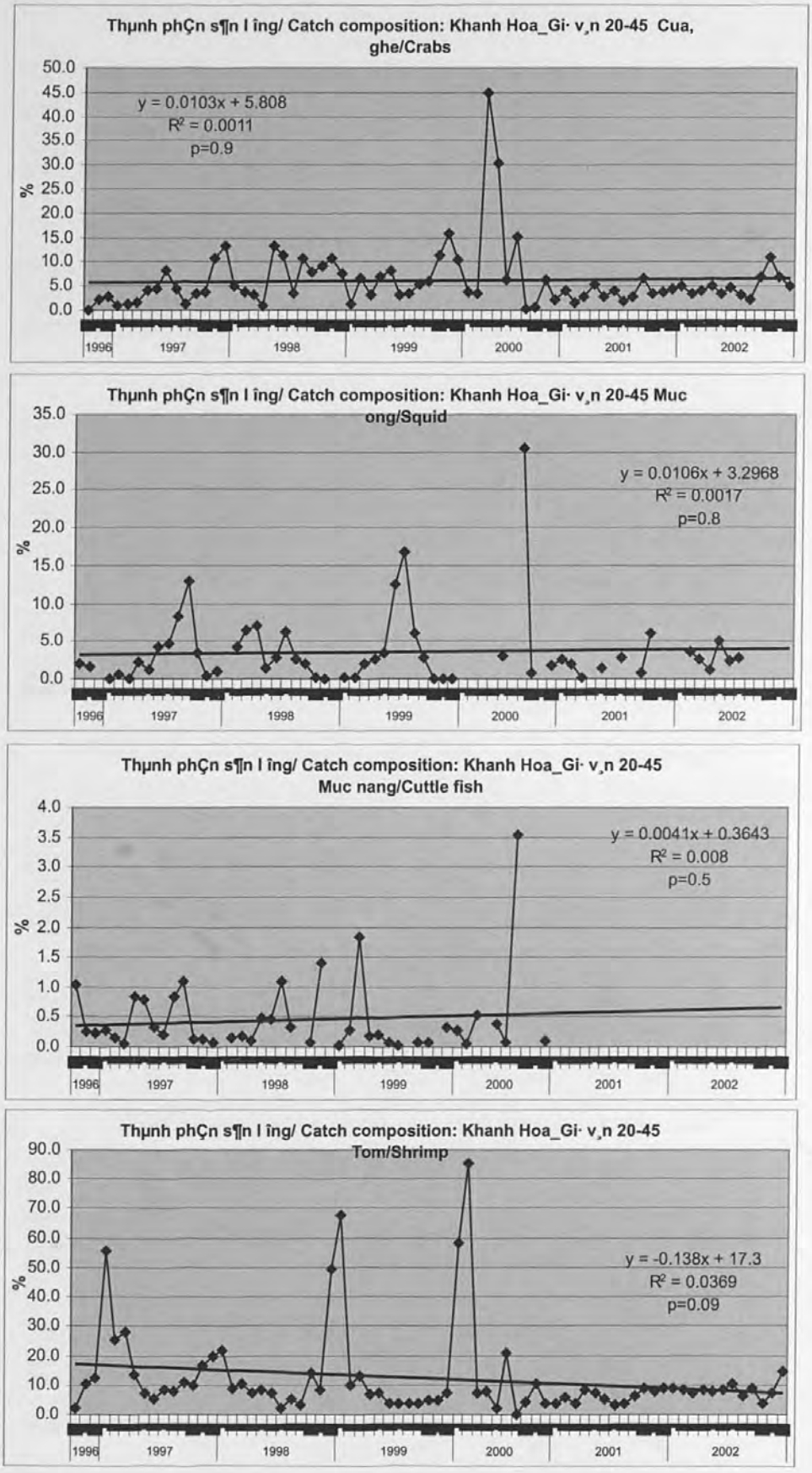

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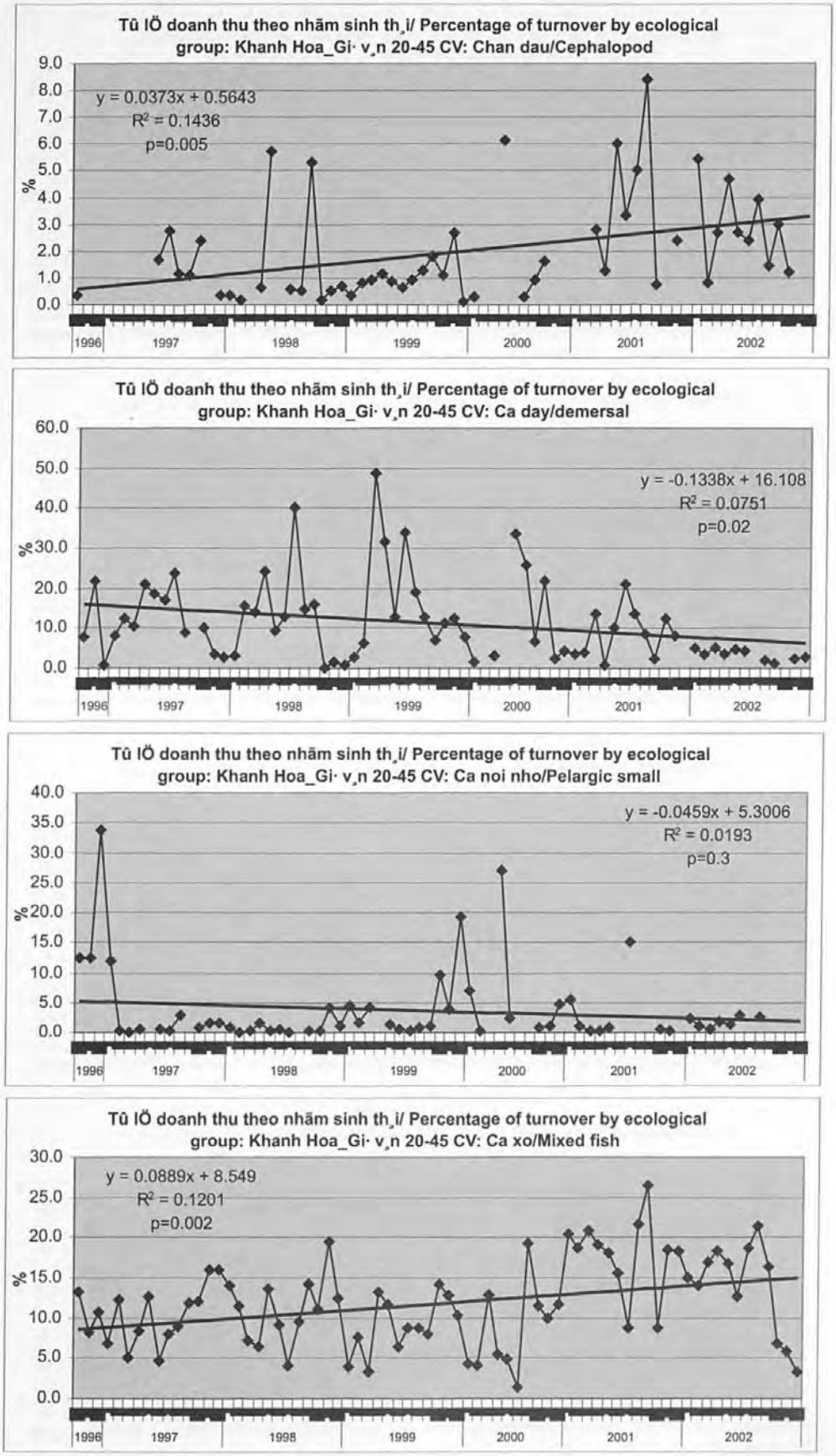
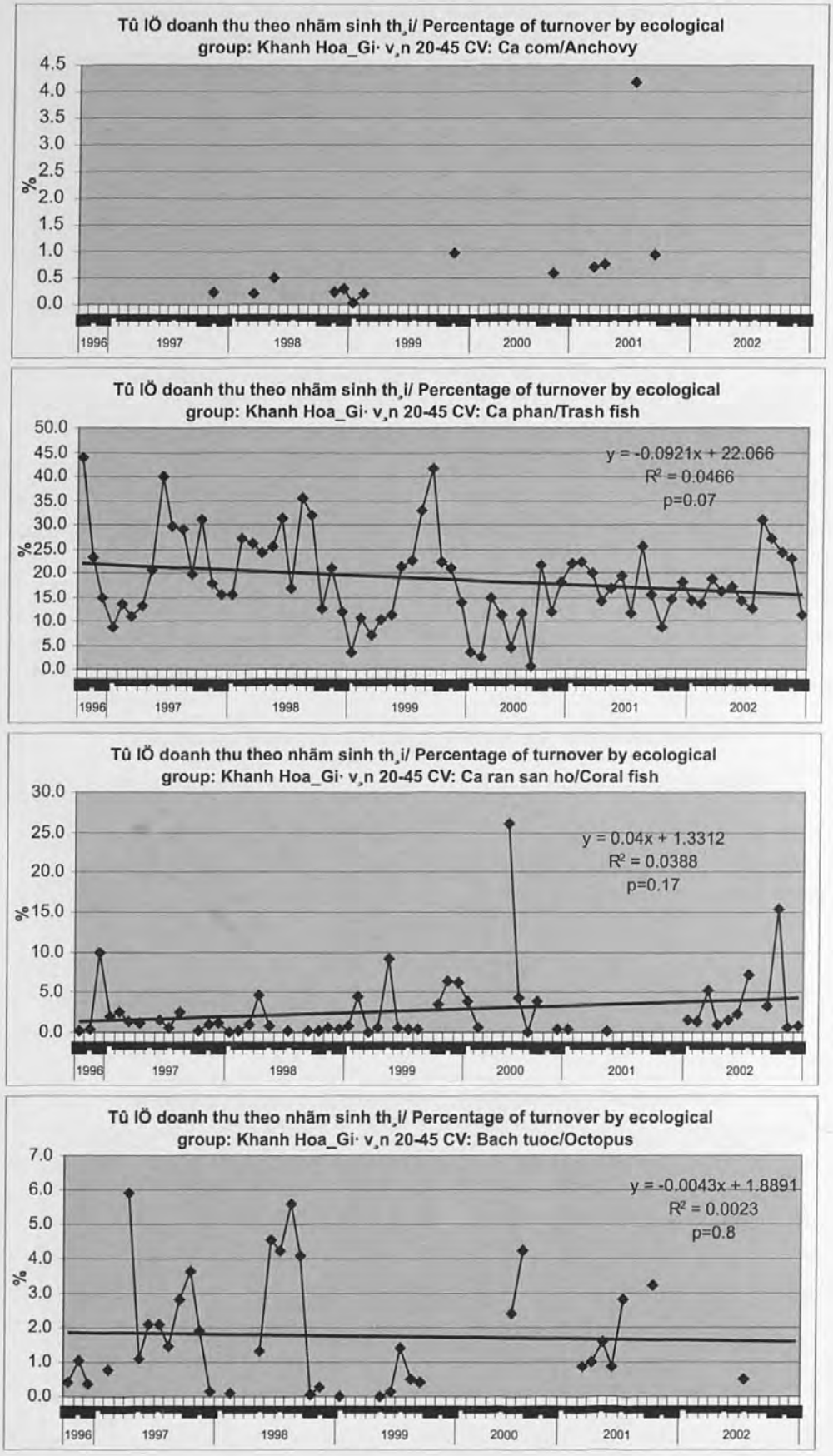


Figure 10: Indicator on proportion of turnover by ecological groups for Otter trawl 20-45 HP in Khanh Hoa



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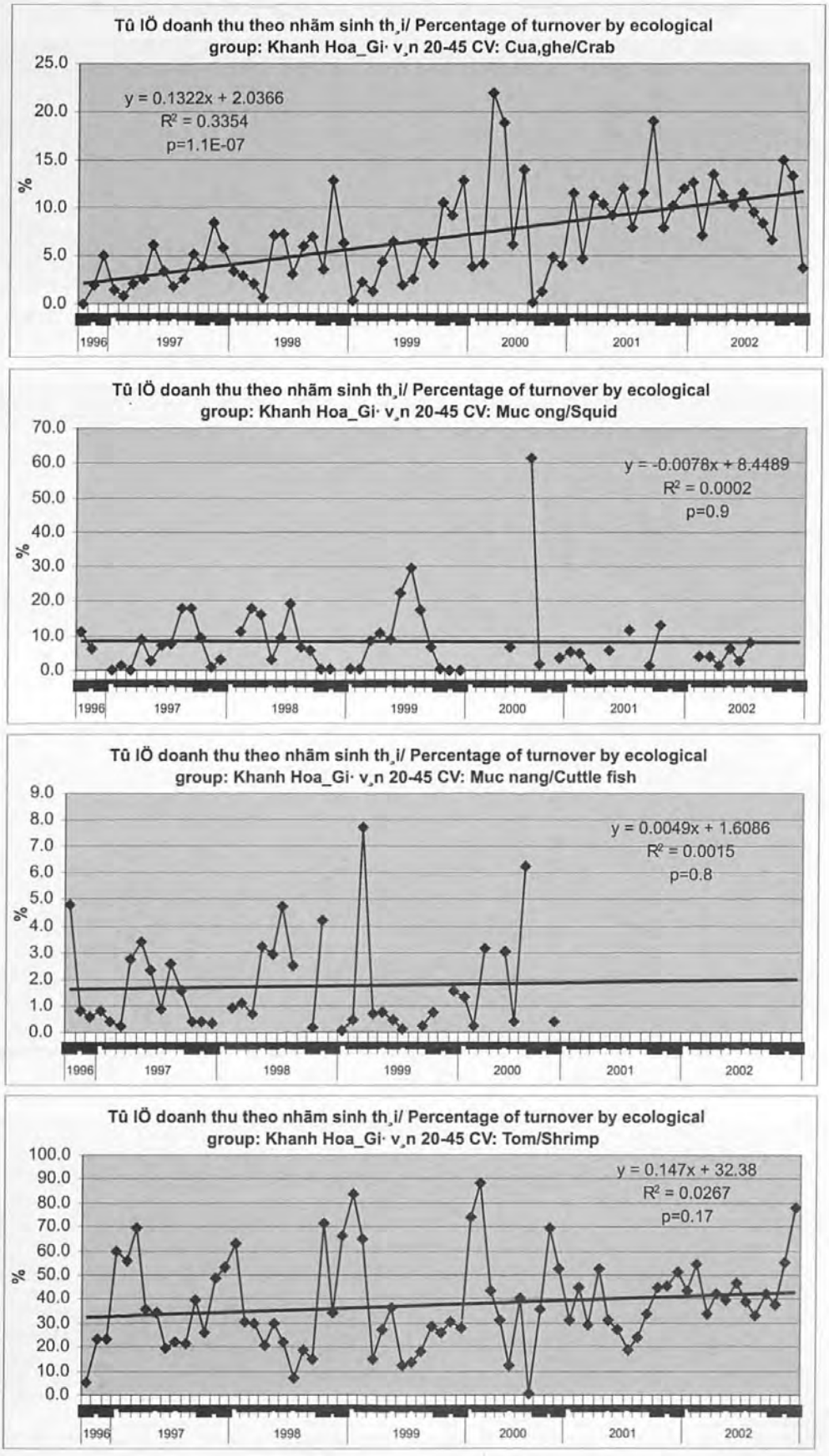

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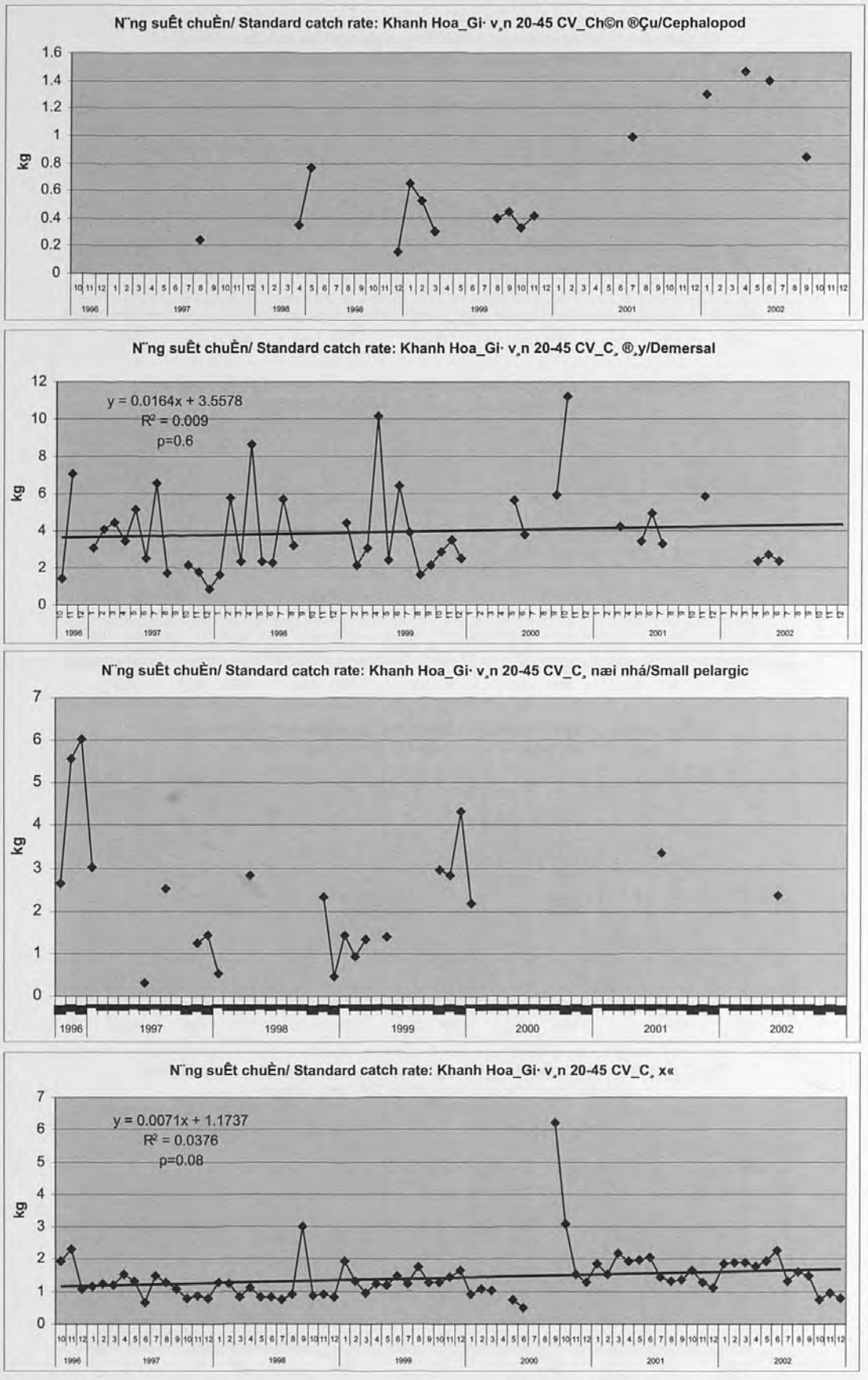
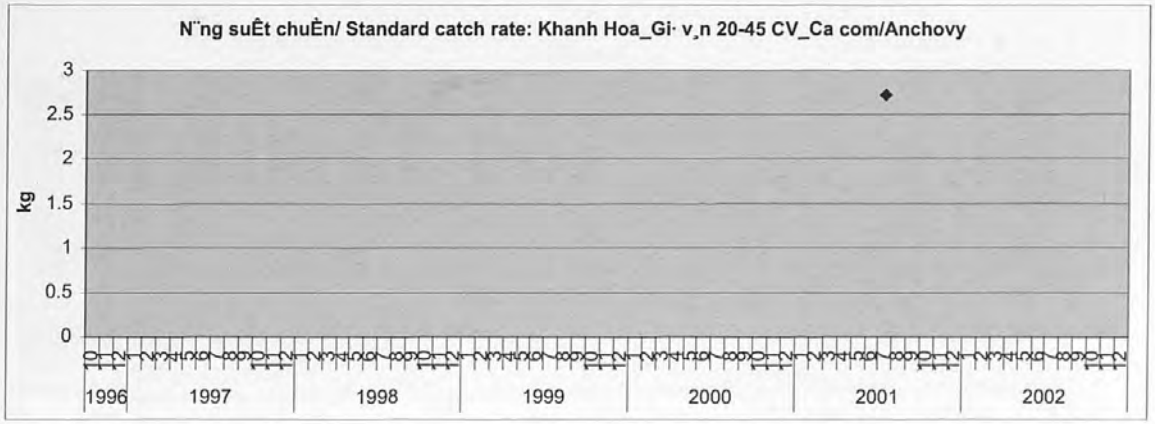
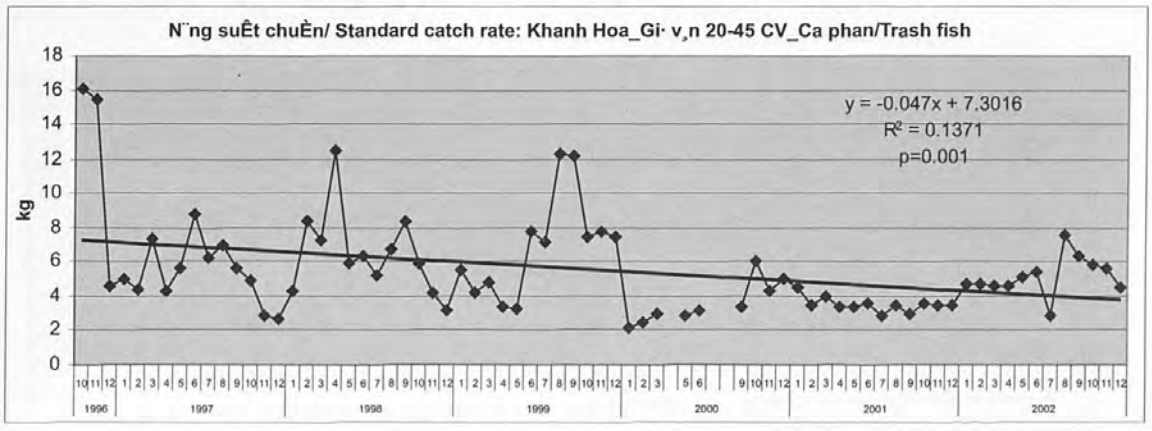
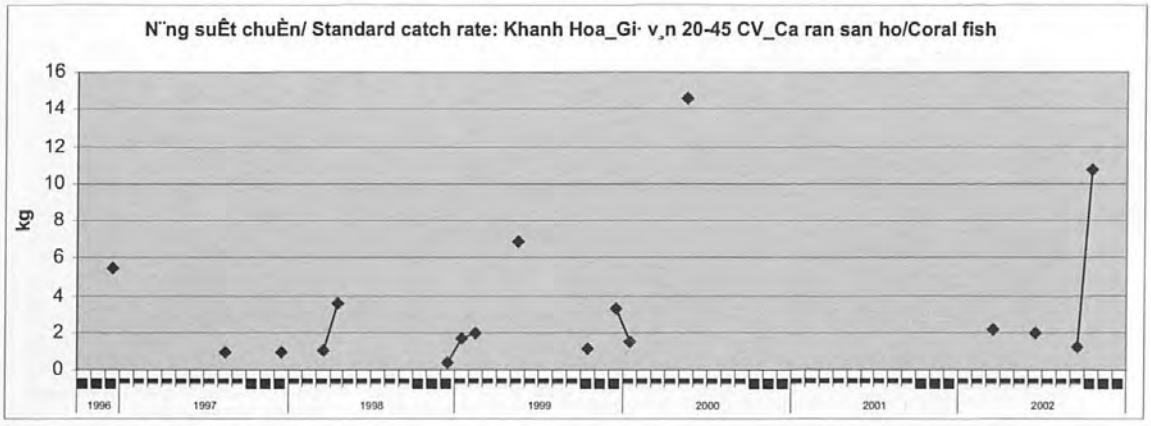
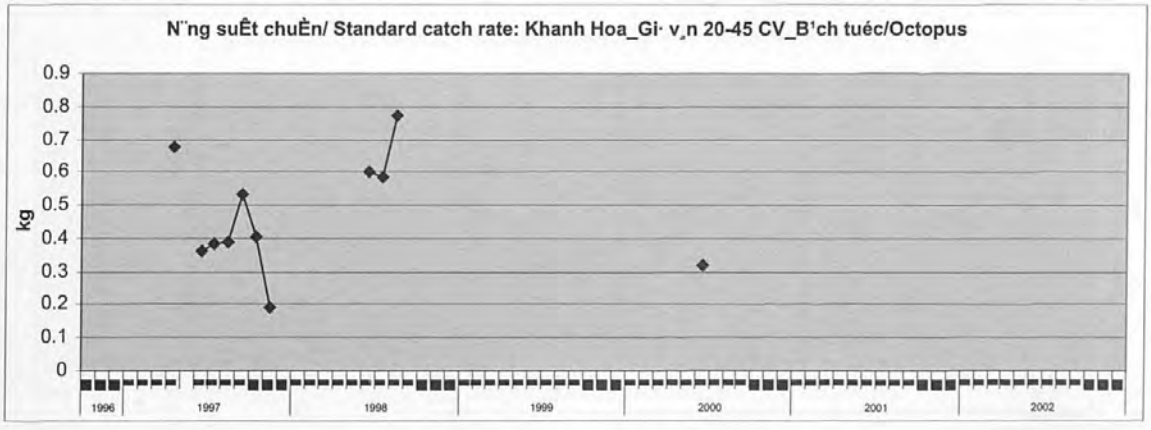


Figure 11: Indicator on mean standard catch rate (kg/hour) by ecological groups for Otter trawl 20-45 HP in Khanh Hoa









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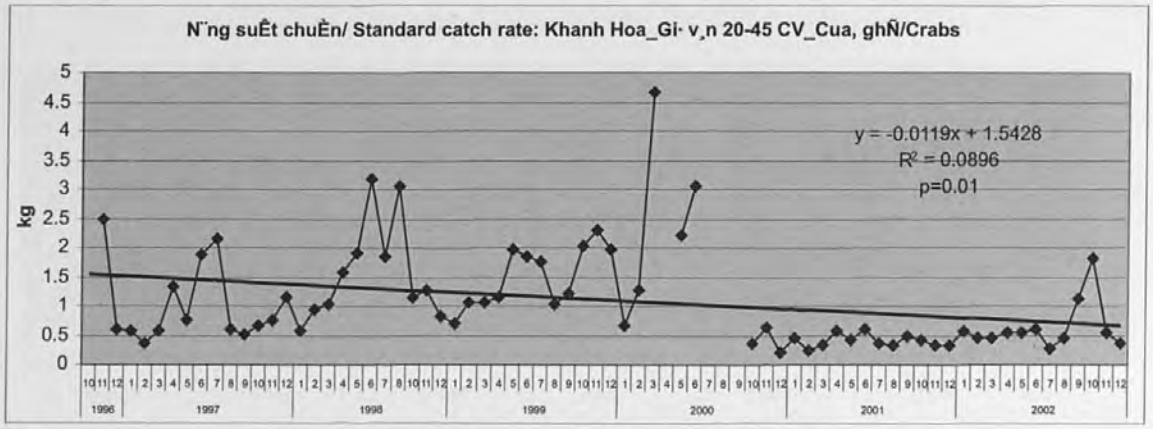

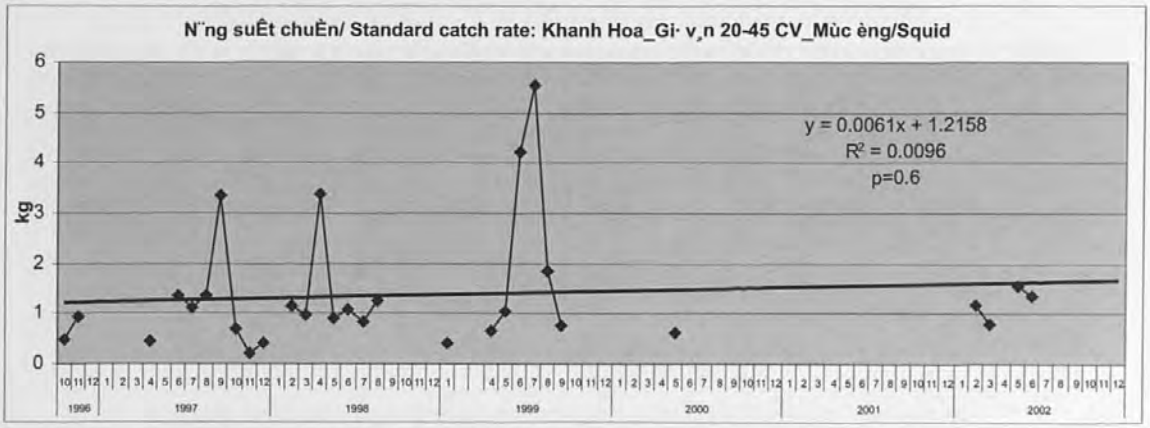

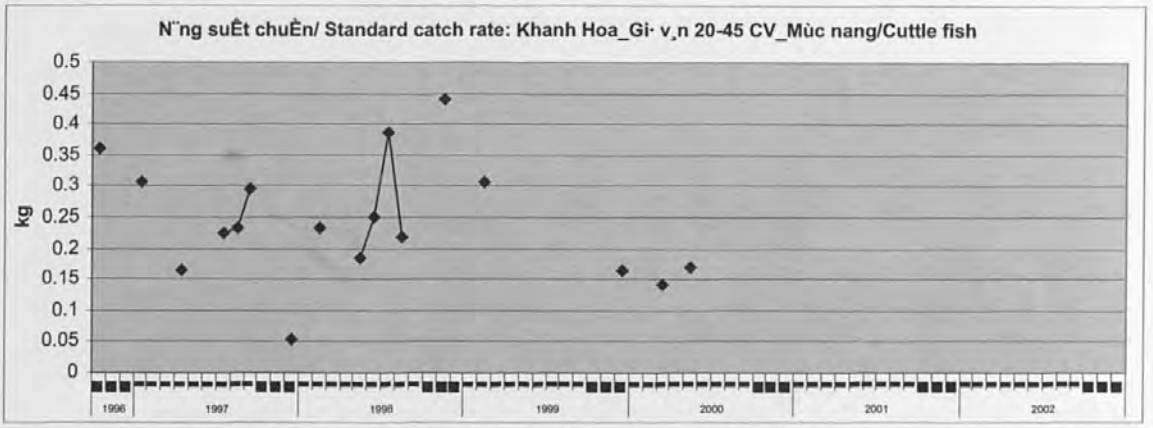

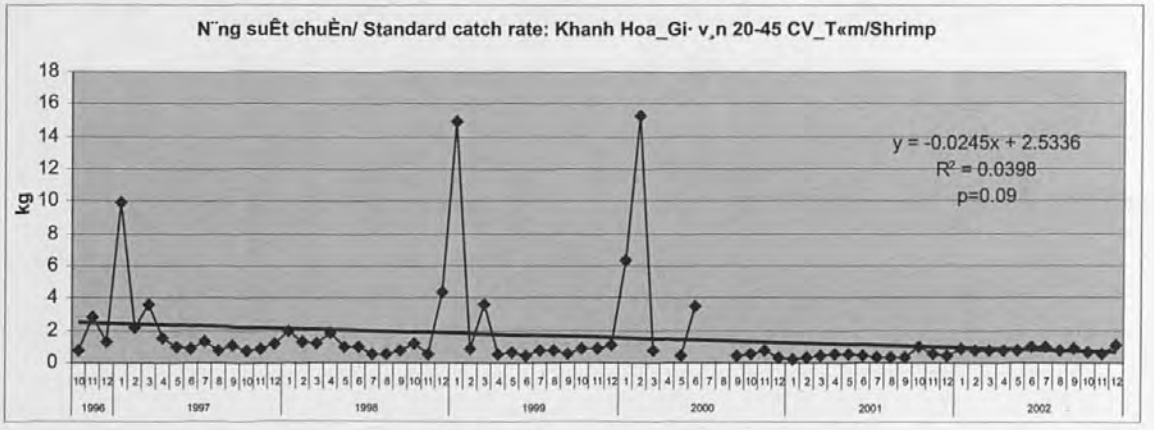

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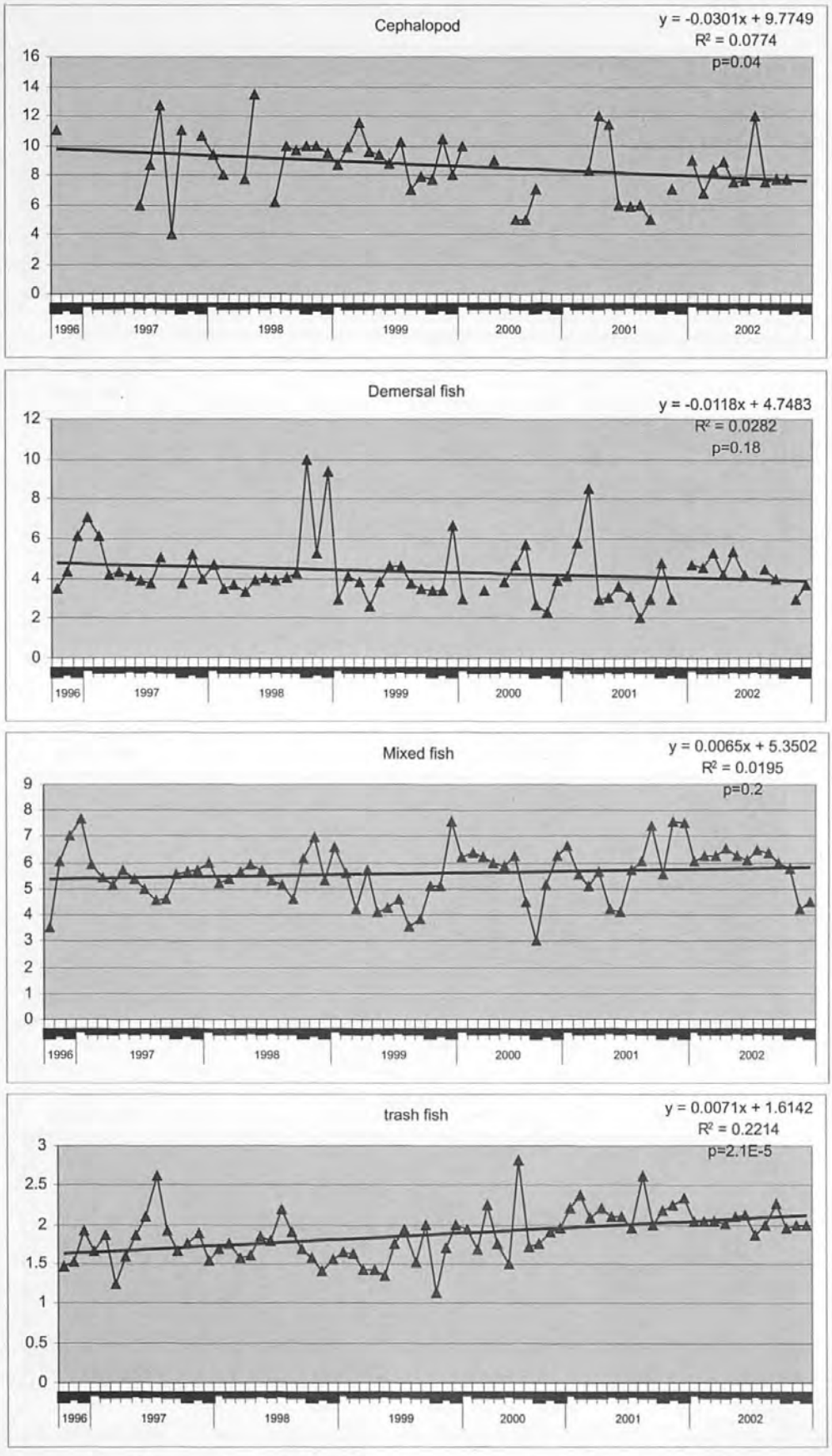
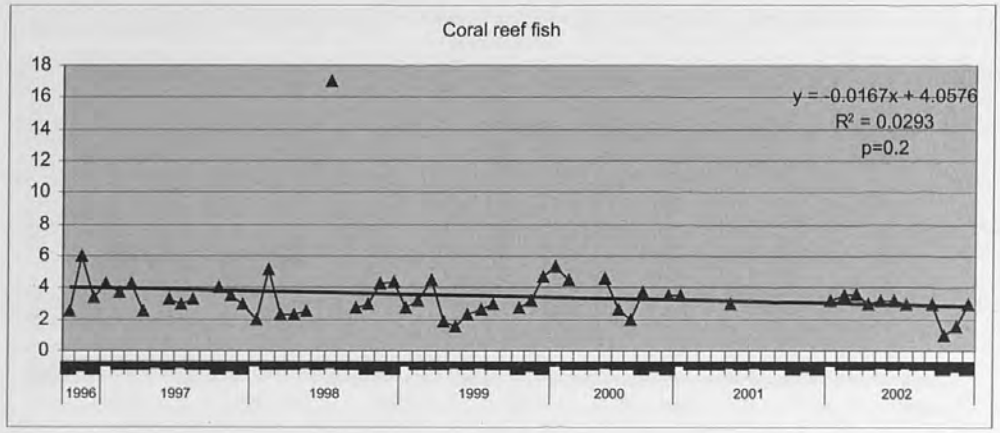
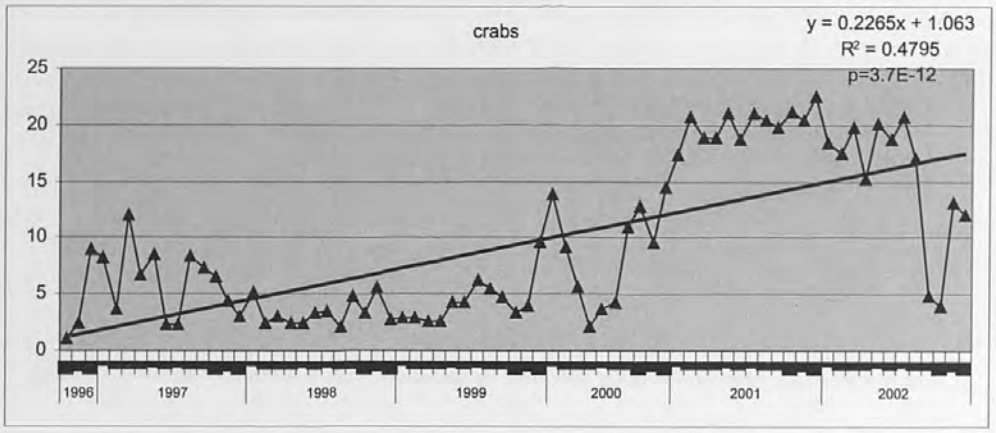
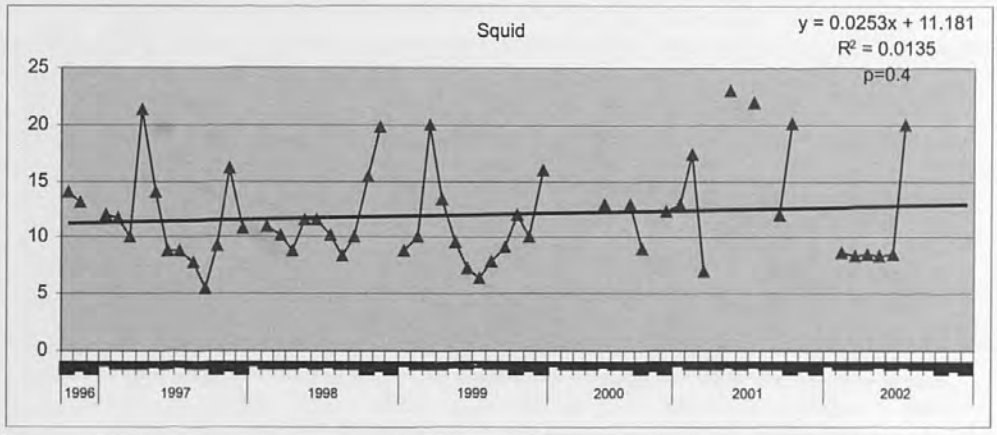
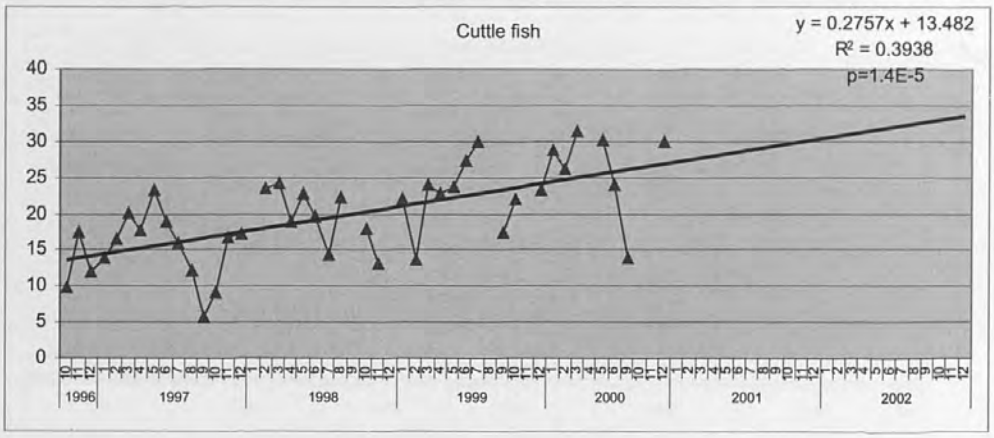


Figure 12: Mean price in VND/kg for some ecological groups for Otter trawl 20-45 HP in Khanh Hoa









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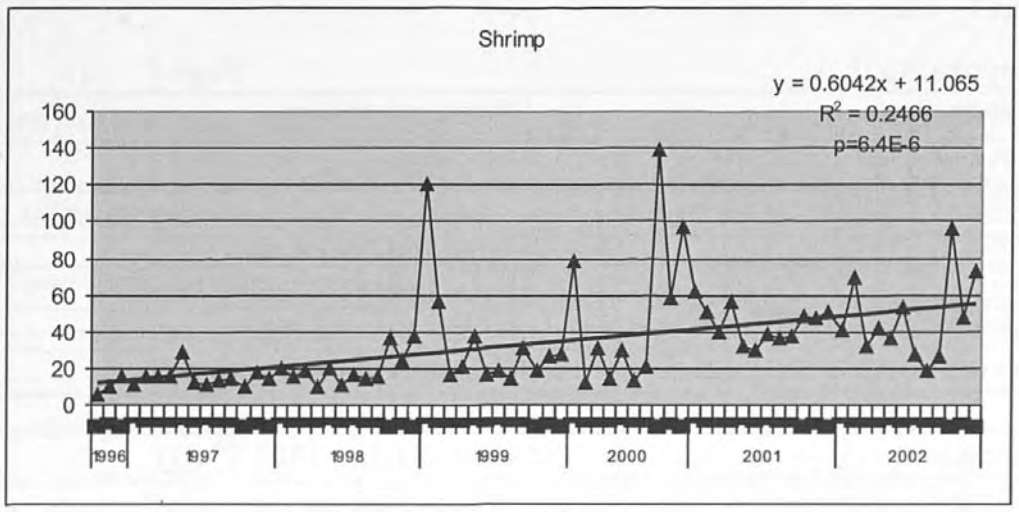


Figure 12: continue .....

Appendix 1: Interview Form

Questionnaire No. 1 **Page 1** 8.2.04

General information	Vessel information
Sampling Province :	Skipper name :
Enumerator :	
Sampling data :	Vessel registration code :
Sample No :	Horse power (HP) :
Landing data :	Length of vessel (m) :
Landing place :	Fishing days in the last month :

Trip information	Cost of trip (1000 VND)
Number of crew :	Fuel (*only this trip*):
Fishing ground : ☐not known☐ out of map	Bait :
Fishing depth (m) :	Storage cost :
Target sepcies :	Provision for the crew
Length of trip (days) :	Small repair
Non-active days during this trip :	Salary
Number of haul :	Others (Fee, ... *(clarify)*)
Duration of the haul (hour) :	.....
Fishing time : (day/night/day & night)	.....

Gear

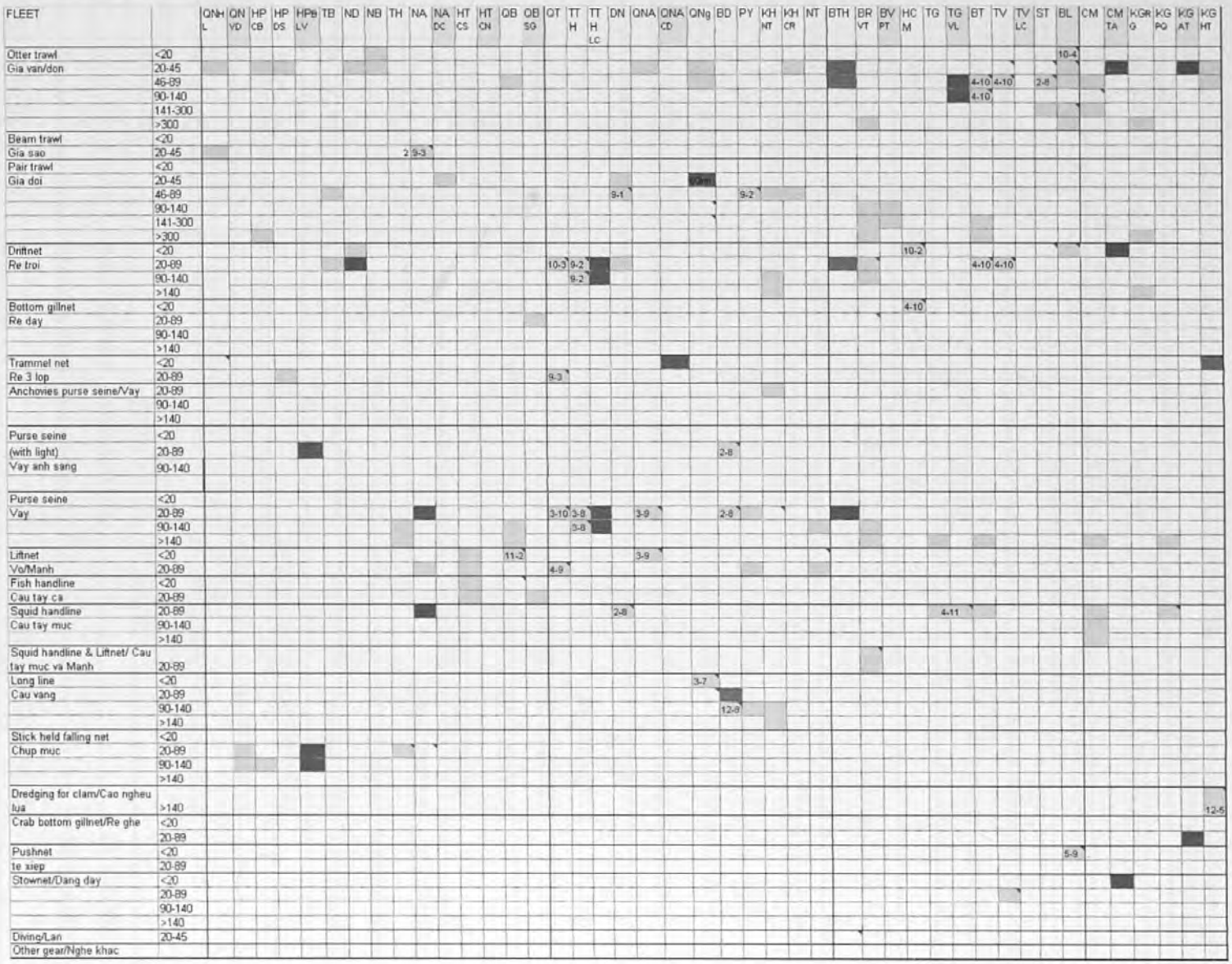
Name of gear		Total length (m)	Mesh size (2a) (mm)	Number of gear	No. of hooks/line	Height of gear (m)
Gill net	Drift net					
	Stationary net					
	Trammel net					
Trawl	Pair trawl	L Load rope	in cod end :			
	Otter trawl	L Load rope	in cod end :			
	Beam trawl	L Load rope	in cod end :			
Purse seine	Purse seine		in cod end :			
	Anchovies p.s.		in cod end :			
	A.D./use light		in cod end :			
Lines	Long line					L Hanging line
	Fish hand line			Number of lines :		
	Squid hand line			Number of lines :		
Stick held falling net		Circut of the opening :				
Lift net		Area (m^2)				
Portable Lift net		The wing spread :				
Dredging for clam		Length of steel frame:				Height of steel frame:
Stow net		Length of steel frame:	in cod end :	Number of net:		

Questionnaire

Page 2

Catch infomation			
Commercial groups	Weight (Kg)	Price per Kg (1000 VND)	Value in total (1000 VND)

Appendix 2: Sampling Plan for 2004



INDICATORS: ONLY PART OF THE STORY

Derek Staples
Senior Fishery Officer
FAO Regional Office for Asia and the Pacific
Maliwan Mansion
39 Phra Atit Road
Bangkok 10200
Thailand

INDICATORS: Only part of the story

Derek Staples

Indicators in the context of Fisheries Management

Contents

- Modern fisheries management
  - Ecosystem approach to fisheries
- Role of indicators
- Setting objectives

World Summit on Sustainable Development

Johannesburg, 2002

Encourage by 2010 the ecosystem approach [to fisheries]"

Fisheries management

- Human needs
- Target resources
- Manages fishing activities
- Human well-being

Ecosystem management

- Ecosystem health
- Manages biophysical
  - **eg Marine Protected Areas**
- Ecological well-being

Ecosystem approach to fisheries

- Merging of two paradigms
  - **Ecosystem management**
  - **Fisheries management**

Ecosystem approach to fisheries

Way to achieve the sustainable development of fisheries

Technical Guidelines

- Expert Consultation
  - Reykjavik Sept 2002
  - Make EAF operational

Definition

is to plan, develop and manage fisheries in a way that addresses the multiple needs and desires of society, without jeopardising the options for future benefits from the full range of goods and services provided by marine ecosystems

Something new?

- Principles & concepts
  - **Law of the Sea Convention**
  - **Conference on Environment & Development**
    - **Agenda 21**
  - **Convention on Biological Diversity**
  - **UN Fish Stocks Agreement**
  - **FAO Code of conduct**

Principles

- Improve human well-being and equity
- Avoid overfishing
- Minimize fisheries impacts
- Consider species interactions
- Apply precautionary approach
- Maintain system integrity
- Ensure reversibility & rebuilding

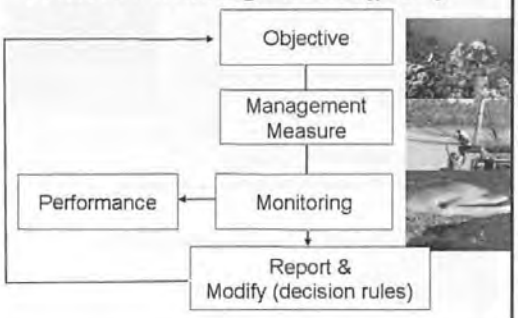
1. Sensible geographic boundaries

- Align with ecosystem boundaries
- Align with stock boundaries
- Include all methods of harvest
- Depends on question
  - **Eg Large Marine Ecosystems for planning**

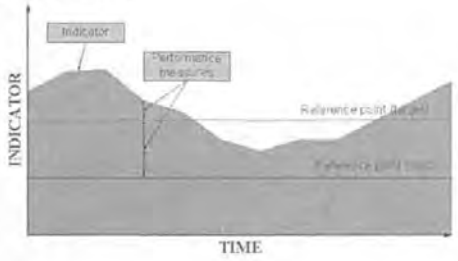
2. Broad stakeholder engagement

- Involvement of all stakeholders in process, especially planning
  - **Indicators** & performance measures
- Ownership of outcomes
- Incentives for responsible behaviour

Fisheries management (plan)



Indicators & Performance measures



3. Translate principles & policy goals

→ Operational objectives
- Influenced by management
- Social/Economic/Ecological
- Measured using an **indicator** & performance measure
- Monitored over time
- Evaluated

4a. Broad Management measures

Conventional measures
Effort, capacity, gear, catch

Gear technology
Friendly & selective gear

4b. Management measures

Ecosystem manipulation
Habitat alteration
Restocking
Culling
Protection
MPAs

5. Decision rules

- Pre-agreed set of rules
  - Management response
    - **Indicator** & performance measure
  - E.g. increase/decrease fishing effort

6a. Short-term reviews (annual)

- Fishery assessment
  (**Indicators** & performance measures)
  - Stock assessment
  - Ecological assessment
  - Social assessment
  - Economic assessment

- Adjust management according to rules

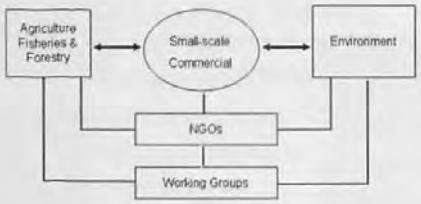
6b. Long-term review (3-5 years)

- Indicators & performance measures
  - Policy goals
  - Operational objectives
  - Monitoring/data schemes
- Update plan
  - Stakeholders
  - Operational objectives
  - Management measures

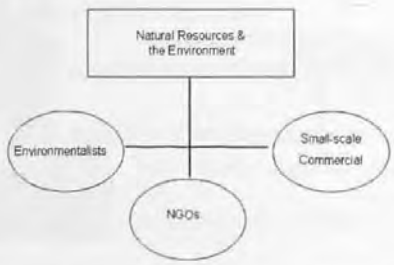
7. Triple bottom line reporting

- System of National accounts
  - **Indicators** & performance measures
- System of Environmental & Economic Accounts

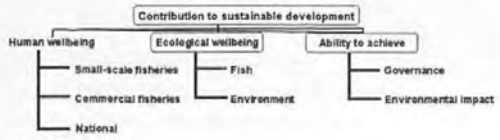
8a. Institutional change



8b. Institutional change



Objectives, indicators & performance measures



Ecological objective (1)

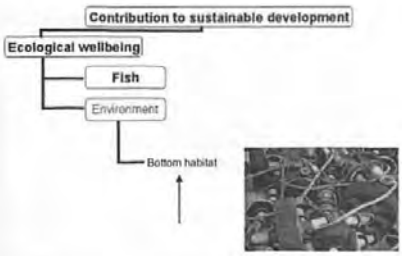
Operational objective

- Overcapacity
  - Reduce overcapacity

Indicator & performance measures

- Overcapacity
  - **Indicator of capacity**
  - **Target 50%**

Ecological objective (2)



Operational objective

- Bottom habitat
  - Protect habitat by introducing closed areas

Indicator & performance measures

- Bottom habitat
  - Area closed to fishing
  - Target 30%

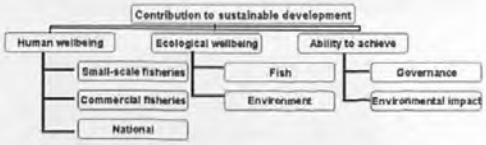
Socio-economic objective

Objective, indicator & performance measure

- Objective
  - To maintain or increase income to fishers

Indicator
  - Fisher's income
- Reference level
  - Current level (limit)

Objectives, indicators & performance measures



Final objectives/indicators Risk Assessment & Conflict Resolution

Too difficult!!!! Need capacity building!!

- Bring people together to develop management plan/s. Agree
  - Geographic area
  - What you want to achieve
  - How you are going to monitor progress
    - Indictors and reference points
  - Simple set of management rules
  - How to report, review and modify
- Good facilitator

Messages

1. Fisheries management today
   - **Economic/social/ecological**
   - **Principles agreed**
2. Changes from the past
   - **Participatory – broad stakeholders**
   - **Talking & planning**
   - **Monitoring progress**
3. Indicators & performance measures are part of management process

Messages

Indicators & performance measures

1. Setting objectives
   1. Stakeholder participation
2. Monitoring & reporting
3. Modifying management

Messages

NOT just Indicators

for indicator's sake

Only part of the story

LOCALLY BASED COASTAL FISHERIES (RESOURCE) MANAGEMENT: EMPOWERMENT, PEOPLE'S PARTICIPATION AND CAPACITY BUILDING

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Introduction

This article discusses the locally based coastal fisheries management project in Pathew District (LBCFM-PD), Chumphon Province, Thailand and the locally based coastal resource management project in Pulau Langkawi (LBCRM-PL), Malaysia. Phase I of the LBCFM-PD project terminated in December 2003. The outcomes are reported in this article. This article includes justification of each activity to propose proper solutions for alleviating weaknesses and threats of the activity. It also discusses proposals that can contribute to strengthen the activity and opportunities available. The LBCFM-PD project emphasises on people's participation, capacity building and empowerment throughout the implementation of the project activities. The LBCRM-PL project started in August 2003. The results of the preliminary survey in Pulau Langkawi are reported. These include the status of the community particularly in terms of socio-economic criteria and age of fishers. This article concludes with the outline of the direction and action plan for future project implementation.

Implication of the Locally Based Coastal Fisheries (Resource) Management

Locally Based Coastal Fisheries Management Project in Pathew District, Chumphon Province, Thailand

Framework of Project Implementation

The LBCFM-PD project will be implemented in five years. Phase I of this project started in October 2001 and terminated in December 2003 (Figure 1). The conceptual framework of the LBCFM-PD project emphasises on development of human resource and people's participation. LBCFM-PD has six main activities (Figure2). The core activities are to encourage and extend LBCFM and to encourage local business. The other four activities are supportive activities to provide data, information and the practical means to contribute to the two core activities

The LBCRM-PL started in Pulau Langkawi, Malaysia, in August 2003 with the aim to strengthen local people's capacity, participation and empowerment in coastal management and community development through their involvement in the project activities.

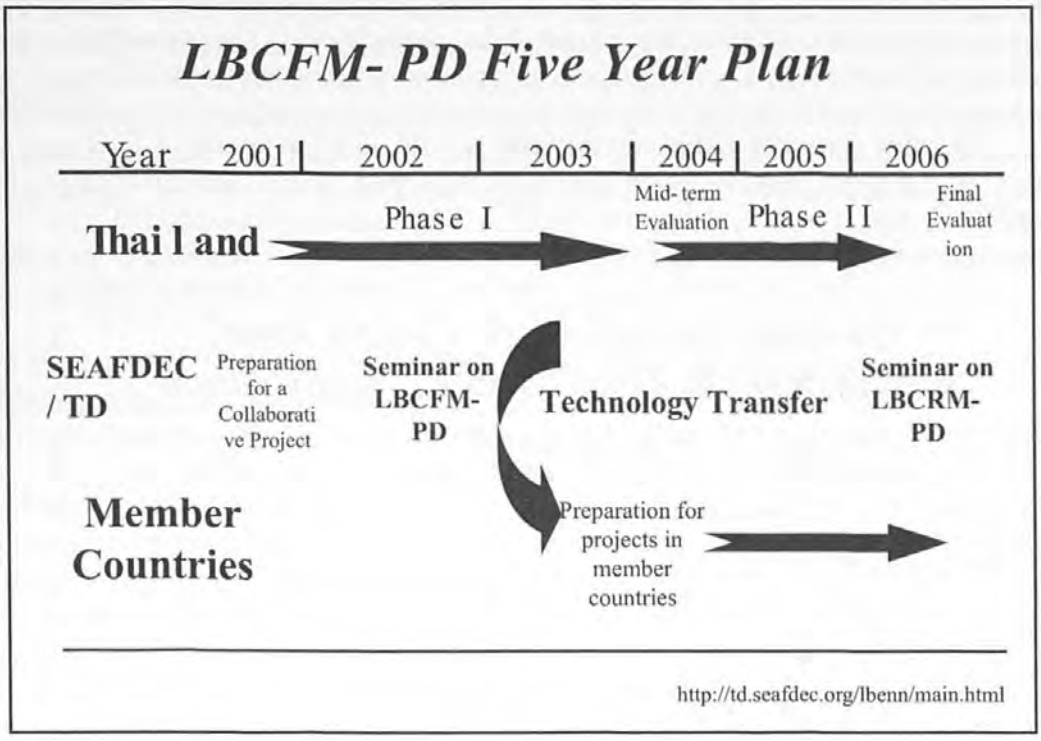

Figure 1: LBCFM-PD Five Year Plan

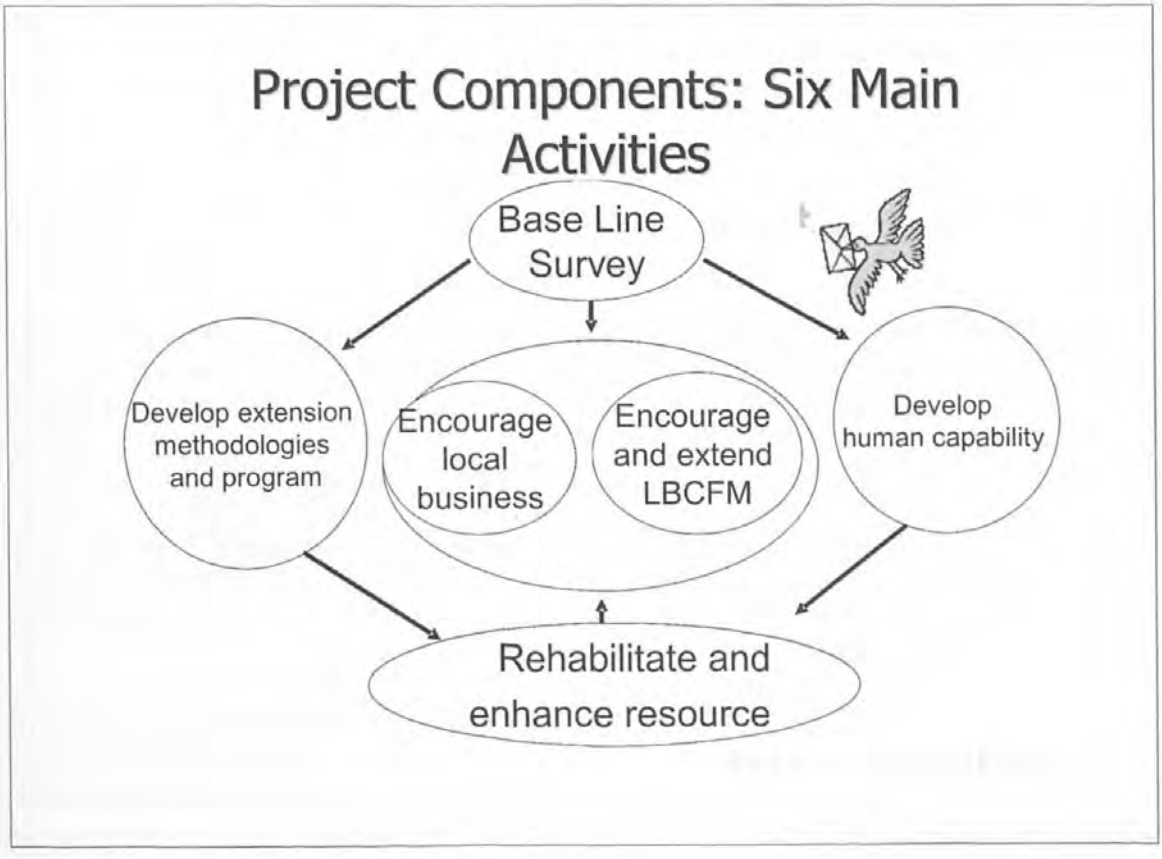

Figure 2: LBCFM-PD Project Components

Outcomes of the Phase I LBCFM-PD Project

The outcomes are illustrated through the core activities. Local people's participation and capacity building are key factors to show the progressive implication of each activity. Figure 3 shows sequence of the outcomes. The demarcation of the project site was approved by the cabinet and was officially proclaimed by the Chumphon Province on 6 November 2002. This official proclamation prohibits illegal fishing in the demarcated areas of the project siste (Figure 4).

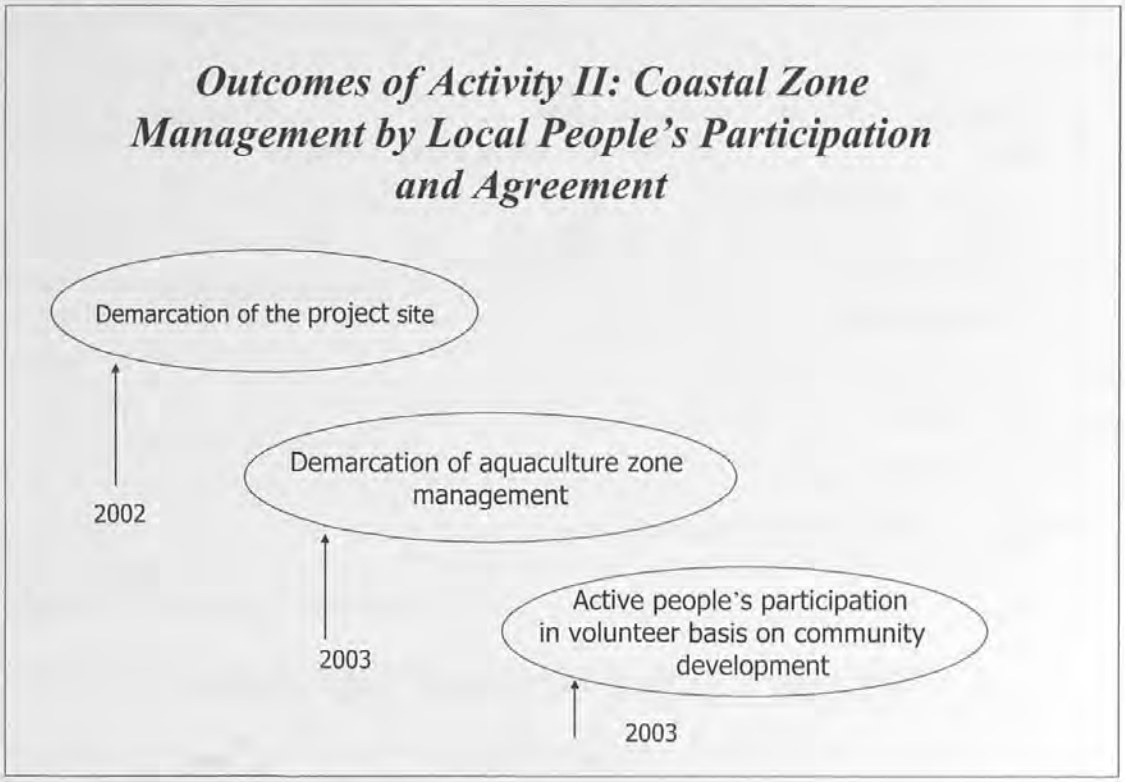

Figure 3: Coastal Zone Management by Local People's Participation and Agreement

Fishers, fish-farmers and other stakeholders partcipated in the discussion for the demarcation of the aquaculture zone to alleviate conflicts of interests among them. These resource users and stakeholders succeeded in preparing the draft of the demarcated zone for aquaculture in October 2003. Local resource users and stakeholders were aware of purpose of the demarcation and after the draft was presented to them, the local people signed the agreement (Figure 5).

The local people also participated in community development on a voluntary basis. They held discussions among them on what activities should be implemented and when they should be implemented. Active people's participation in community development is the initial stage of self-sustaining community development.

Capacity building of women's groups and their members' participation contributed to the establishment of local business entities. Women's groups and members tried and worked hard to develop their skills in fish processing to produce products for retail at local and urban markets. To promote a group's products, the group often joins food fairs and festivals to increase the number of market channels.

Factors Supporting the LBCFM-PD Project

The outcomes from Phase I of the project confirm that local people have motivation to participate in coastal resource management and community development. It is necessary to analyse each activity to define and propose proper management measures and the means for implementation of the project. This is to strengthen local people's capacity in community development and increase participation so that their own activities can be self-sustaining. Figures 6 and 7 are basic information on the status of each activity. The information provides the means and/or solutions for the local people to contribute to the management and to achieve progress through milestones of community development.

People's Participation and Capacity Building to Strengthen Decentralization of Coastal Resource Management and Community Development

People's participation in the project site can be categorized into two types and groups. The first is the business group which mostly relies on gender empowerment and participation to handle the group's business. The second is the volunteer group that fishers and the communities organize themselves and participation is voluntary. These two types of local people's groups are the community based management units (CBMU). Community based fisheries management (CBFM) and participatory approaches encourage local people to be involved in the decision-making process. Strengthening capacity of each group can enhance development of its own functional activities into cooperative work. A network among CBMUs that share common interests can be built (Figure 8).

Business and volunteer groups have their own functions. The first group highlights on the creation of jobs and the in increase job opportunities particularly for women in the community. The second group takes on the function to manage, rehabilitate and enhance community resource to secure community productivity. Strengthening of each group's functions can help achieve sustainability of coastal resources and alleviation of poverty to the community.

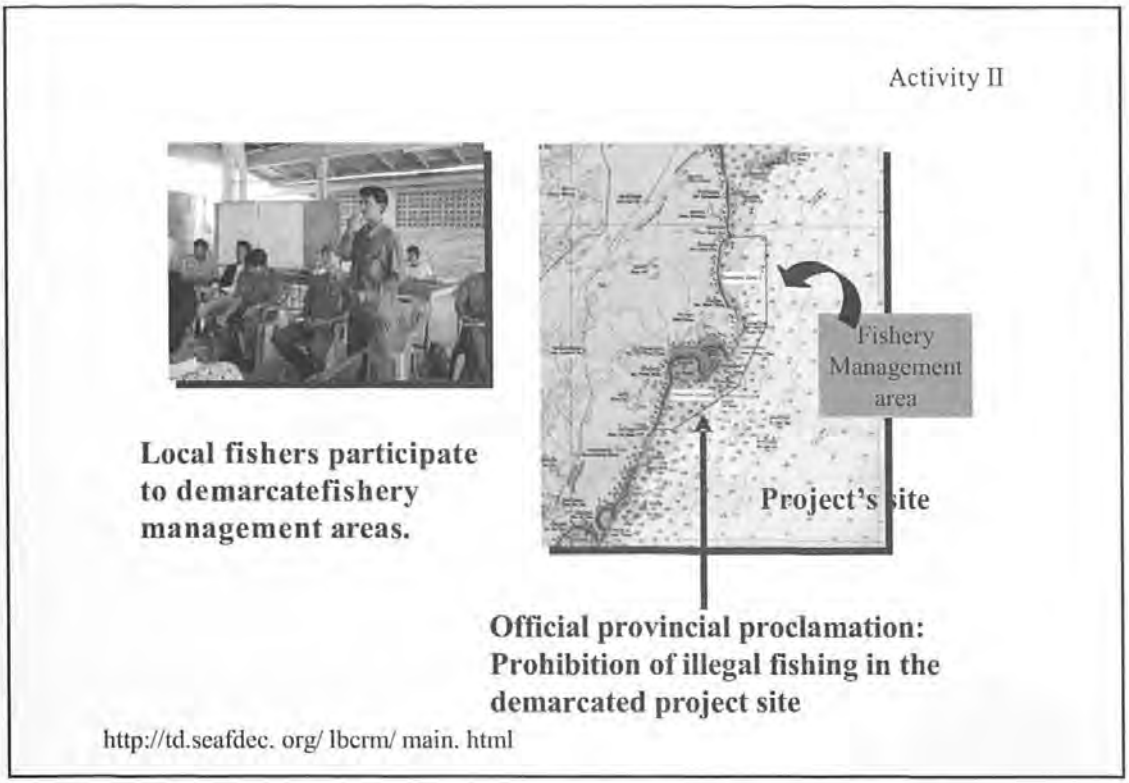

Figure 4: Demarcation of project site

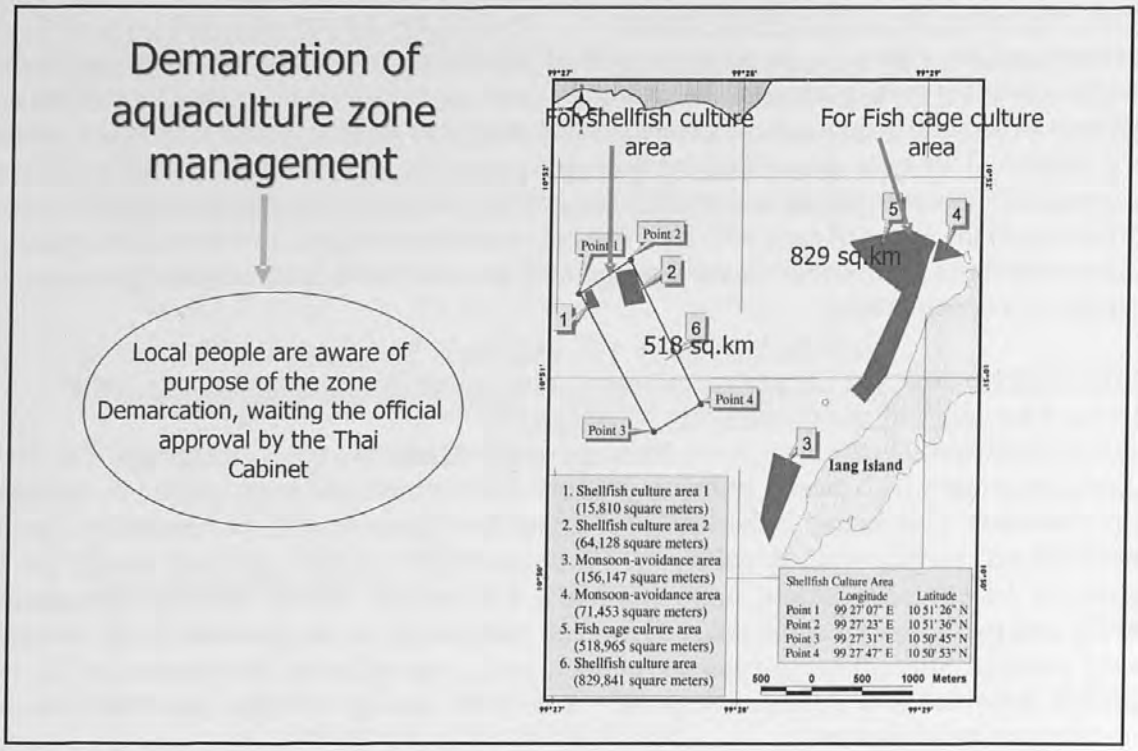

Figure 5: Demarcation of aquaculture zone for management

Items	Strengthen	Weakness	Opportunity	Threats
Demarcation of the project site	Manage resource in community owned-authorized areas	Effective enforcement by Govt. and MSC by LMB	Cooperation of Govt. and local management body	Operation cost of MSC
Aquaculture zone demarcation	Satisfy common interests	Empowerment of self-regulations	Fish farmimg cost-effective management	Geographic conditions of areas and fish diseases

Figure 6: Analysis of activities (1)

Items	Strengthen	Weakness	Opportunity	Threats
Local business entity	Develop women's skill in fish process and business management	Profit distribution	Produce varieties of products and market seeking	Member's manpower and quality of products
Community development	Initiate self-sustaining community development	Numbers of volunteers	Put activity in community development plan	Incentives

Figure 7: Analysis of activities (2)

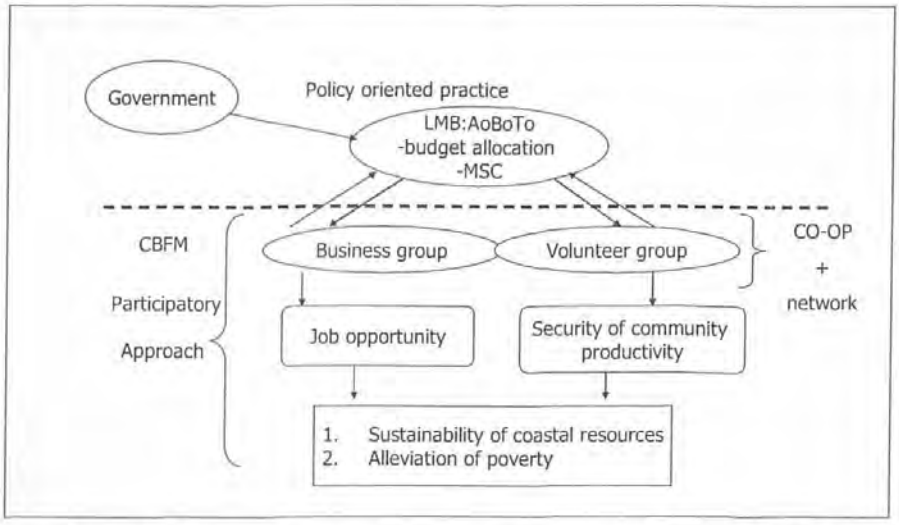

Figure 8: Strengthening decentralization of CRM and CDMz

However, these two groups need official contributions from local management bodies such as the Sub-district Administrative Organization (Ao.Bo.To.) in the case of Thailand. The Thai government officially implements decentralization of authority to the Ao.Bo.To. by mandate of the Thai Constitution, 1997. Nevertheless, the government should arrange for policy oriented practices to develop capacity building of the Ao.Bo.To to support community development. Ao.Bo.To. takes on the fundamental responsibility to allocate budget to develop the community and undertakes monitoring, control and surveillance (MCS) for resource management.

To strengthen people's participation which is based on experience gained from the field, emphasis should be placed on people considering their basic needs and common interests; logistics of the community and profit distribution. Therefore, there is a need for 1) a clear direction and action plan for activities in the short and long terms; 2) extension programs and officers to follow-up and monitor these programs; and 3) SWOT analysis and activity justification for the current project implemented (Figure 9).

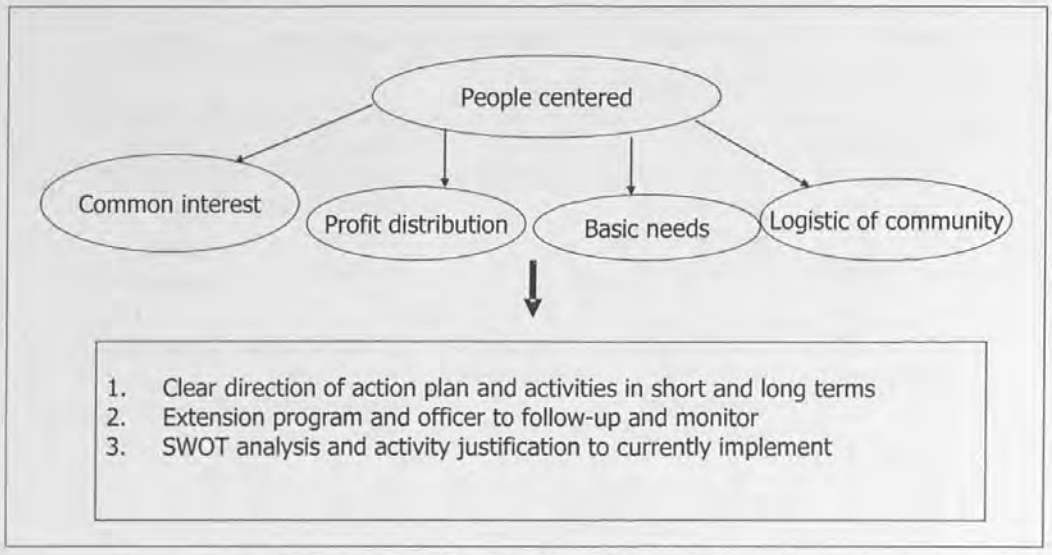

Figure 9: Achievement of active people's participation

Locally Based Coastal Resource Management Project in Pulau Langkawi, Malaysia

Framework of the Project Formulation

The LBCRM-PL is two year project which composes six activities. The six activies are:

1. base line survey
2. rehabilitation and enhancement of coastal resources
3. promotion of fish-based business
4. fishing gear technology improvement
5. encouragement and extension of LBCRM, and
6. enhancement of human capacity and participation.

Activities 1 to 4 are supportive activities and Activities 5 and 6 are core activities (Figure 10).

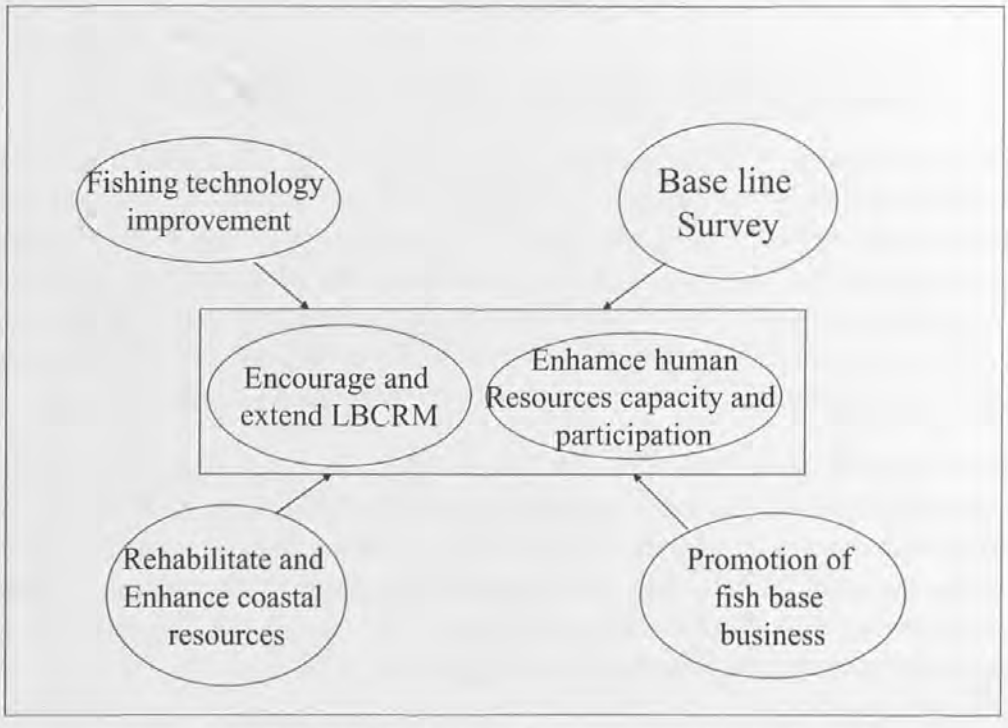

Figure 10: LBCRM-PL Project Components: Six main activities

The project conducted preliminary base line surveys on socio-economics and oceanography to gauge the need for capacity building of the target fishing community relative to the area of the fishing grounds. Results of the preliminary surveys show that the range of age of fishers in the community is between 45-55 years. This means that employment in the fisheries sector has only a few youths and few of the young generation are in fishing (Figure 11).

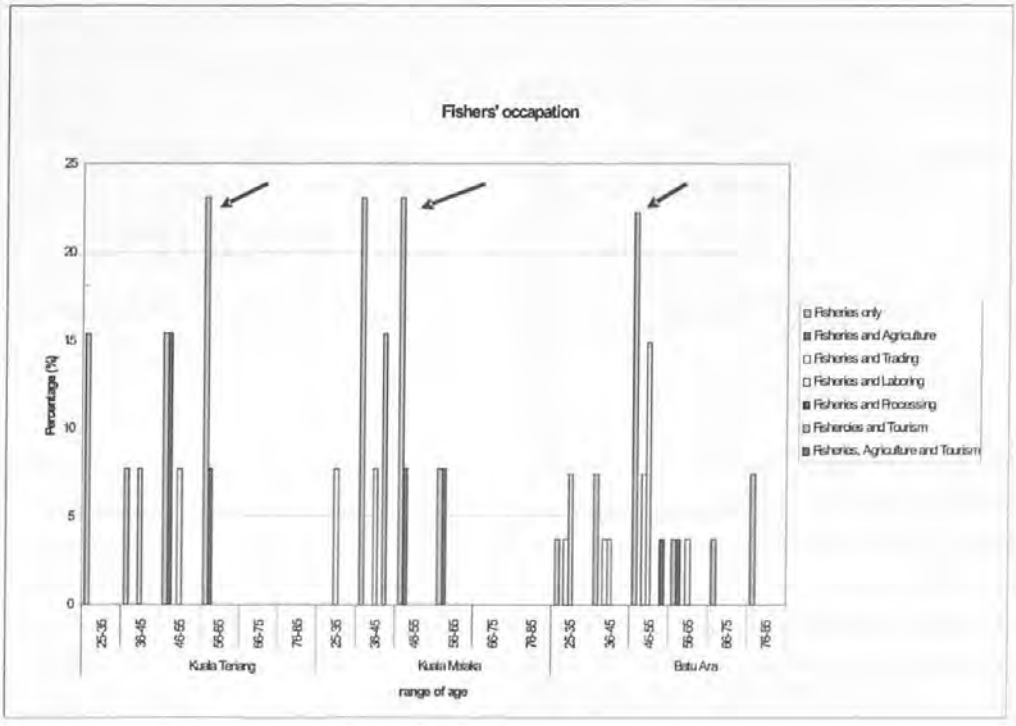

Figure 11: Results LBCRM-PL Project preliminary survey

The project also conducted Actvity 6 by conducting an orientation workshop for local fishers. This workshop brought representatives from Pathew District including the head of a Sub-district, Chairperson of a women's group, Chairperson of a fishers' group, a staff member of the Marine Fisheries Research and Development Center to present the activities of the LBCFM-PD and to share their experiences. The Malaysian fishers also actively participated in asking questions and making comments. Malaysian women were also very interested in the women's group activities of the Pathew District.

Progress of Project Implementation

The Fishers Economic Group (Kumpulan Ekonomi Nelayan, KEN) mainly conducts business to sell ice, fuel oil, lubricants and fishing gear to fishers in the community. KEN supports women to establish women's groups. The objective of the women's groups is to enhance women's capacity in community economic development. The members of women's groups discuss among themselves on the skills they have and assess their own capacity and capability to undertake activities (Figure 12).

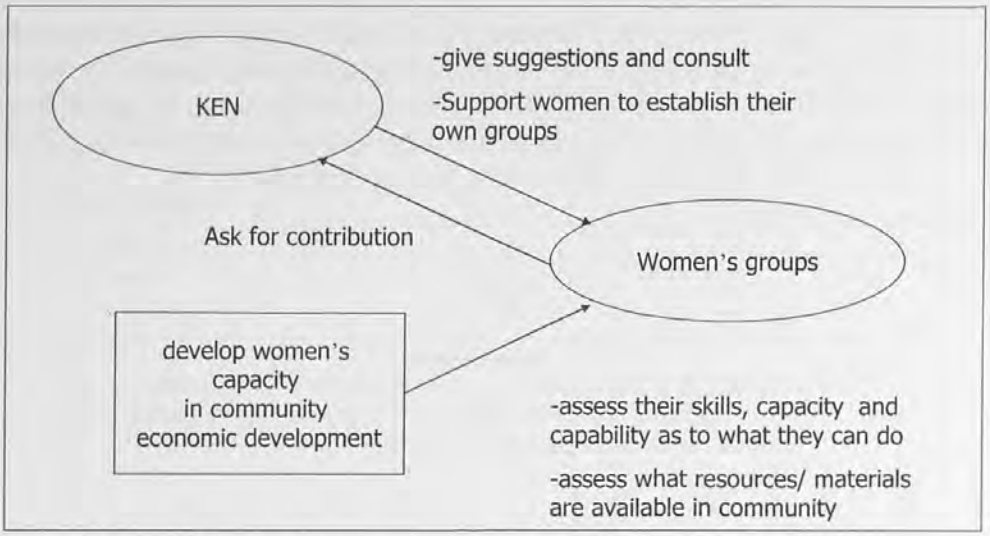

Figure 12: People's participation in CRM and CDM

What to do Next for the Projects

The LBCFM-PD plans to contribute to people's participation and capacity building through organization-driven strategies to strengthen CBMUs as the work force of community development and resource management. In the LBCRM-PL project it is necessary to motivate people's participation in coastal management and community economic development by creating group business activities that satisfy them with profit distribution. Strengthening of people's participation on a voluntary basis should generally contribute to each project through defining milestones of people's awareness building in community development and resource management.

Conclusion

People's participation and capacity building are mechanisms to strengthen and empower CBMUs to sustain coastal resource management and community development. Organization-driven strategy is a means to encourage systematic work and management in CBMUs to lead local people to coordinate with the local management body to improve and secure community economic development towards achieving sustainability of coastal resources.

Acknowledgements

The author is indebted to local fishers and all stakeholders, who actively participated in the LBCF(R)M project, for their support in the accomplishment of the production of this article.

IMPROVEMENT IN THE USE OF INDICATORS

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Draft Guidelines on the Use of Indicators for Improved Fisheries Management

Draft Guidelines on the Use of Indicators for Improved Fisheries Management

INTRODUCTION
- Purpose of guidelines
- Why use of indicators?

Draft Guidelines on the Use of Indicators for Improved Fisheries Management

DEFINITION
- What is an "Indicator" for fisheries management?
- Do we have a common understanding?
- Definition

Draft Guidelines on the Use of Indicators for Improved Fisheries Management

HOW DO WE USE INDICATORS TO IMPROVE FISHERIES MANAGEMENT?

- *Development of process*

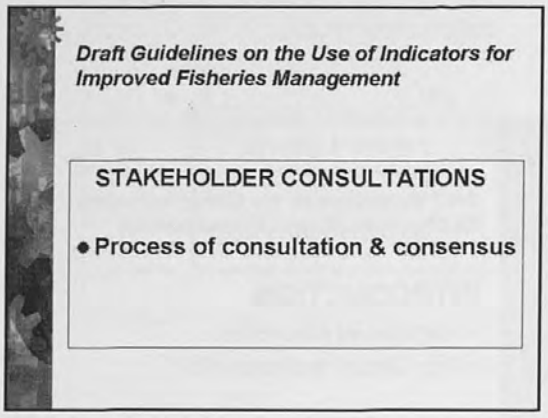
Draft Guidelines on the Use of Indicators for Improved Fisheries Management

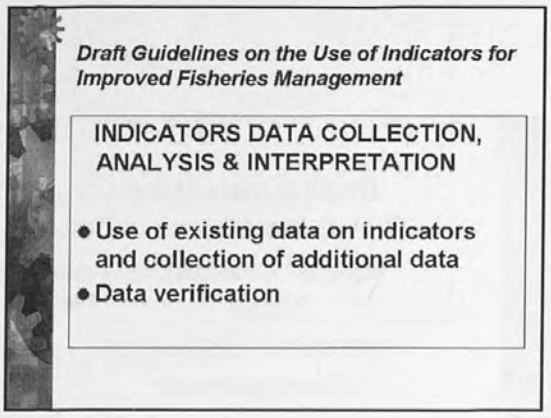
PLANNING PROCESS

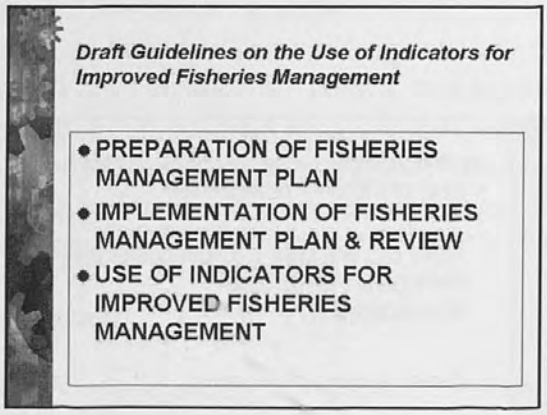
- Development of framework for the use of indicators in fisheries management
- Development of scope
  - Identification of fishery
  - Identification of stakeholders
  - Identification of candidate indicators

Draft Guidelines on the Use of Indicators for Improved Fisheries Management

- DESCRIPTION OF FISHERY


Draft Guidelines on the Use of Indicators for Improved Fisheries Management
STAKEHOLDER CONSULTATIONS
• Process of consultation & consensus


Draft Guidelines on the Use of Indicators for Improved Fisheries Management
INDICATORS DATA COLLECTION, ANALYSIS & INTERPRETATION
• Use of existing data on indicators and collection of additional data
• Data verification


Draft Guidelines on the Use of Indicators for Improved Fisheries Management
• PREPARATION OF FISHERIES MANAGEMENT PLAN
• IMPLEMENTATION OF FISHERIES MANAGEMENT PLAN & REVIEW
• USE OF INDICATORS FOR IMPROVED FISHERIES MANAGEMENT

BRUNEI DARUSSALAM: WORK PLAN 2004

Activity	Status in 2003	Implementation in 2004 (Month)	Expected Output	Comments
1. Pilot Project: Trawl fishery	Initiated in September 2003	On-going and to be completed by September 2004.	{Progress report of the pilot project for the period of 2003 (status)	Initiation of the project was delayed due to the re-structure of the Dept. of Fisheries
2. Consultation with the stakeholders	Conducted in December 2003	First meeting will be in April 2004	Response from the stakeholders on the preliminary findings of the project	
3. Data collection on catch rates, species composition and catch per unit effort	Implemented since 2003, data analysis on-going	Data collection and analysis until August 2004	Trends of catch rate and size of catches	
4. Technical training on the effective use of indicators	None available	Requested June / July 2004	Appreciation on the use of indicators as a tool in fisheries management	Request SEAFDEC to assist in the conduct of training

BRUNEI DARUSSALAM: WORK PLAN 2005

Activity	Status in 2004	Implementation in 2005 (Month)	Expected Output	Comments
1. Data collection and analysis on catch rates and species composition	On-going	Data collection until June 2005	Trends of catch rate and size of catches	
2. Consultation with stakeholders	Meeting to be conducted in April 2004	Meeting to be held in June / July 2005	Presentation of the preliminary findings to stakeholders	
3. In-house training in the use of indicators as a tool for fisheries management	Technical training to be conducted in June / July 2004	May 2005	Better understanding in the use of indicators	Assistance from SEAFDEC

INDONESIA: WORK PLAN 2004

Activity	Status in 2003	Implementation in 2004 (month)	Expected Output	Comments
1. Coordination with Central Java Province Office & Pekalongan District Office		2004	Close cooperation to conduct activities	
2. First Stakeholders Meeting		2004	Understanding of stakeholders on the indicators for monitoring	
3. Strengthening of catch & effort data collection in Pekalongan Fishing Port, Wonokerto & Jambean Landing Site	On-going	2004	More detail data can be collected	
4. Strengthening of biological data collection in Pekalongan Fishing Port, Wonokerto & Jambean Landing Site	On-going	2004	Preliminary biological and ecological status of resource	
5. Collection of income data in Pekalongan District		2004	Seasonal trend on income of fisheries households can be collected	

INDONESIA: WORK PLAN 2005

Activity	Status in 2004	Implementation in 2005 (Month)	Expected Output	Comments
1. Data processing		2005	Data of catch & effort, biology & income	
2. Data analysis		2005	Analysis of condition in Pekalongan	
3. Second Stakeholders Meeting	Conducted	2005	Acceptance of indicators by stakeholders	
4. Preparation of the draft of implementation of indicators for local management plan		2005	Draft of implementation of indicators for local area management	Draft can be prepared if indicators are accepted by stakeholders

MALAYSIA: WORK PLAN FOR 2004

Activity	Status in 2003	Implementation in 2004	Expected Output	Comment
1. Data/ Information collection on Socio-economic component	Data/ information collection started in Nov. 2003	Completing the data/information collection in January and February	Complete latest information for various indicators under Socio-economic component	
2. Data analysis/ review on socio-economic indicators	-	Data analysis will begin in Mac 2004	Updated trend analysis for all indicators under Socio-economic component	For Second Stakeholders Consultation
3. Data collection on resource & environmental parameter using fishing vessel	-	Data collection was done in February 2004	Complete latest information for various indicators under Resource & Environment components	
4. Data analysis/review on resource & environmental indicators	-	Data analysis will begin in Mac 2004	Updated trend analysis for all indicators under Resource & Environment components	For Second Stakeholders Consultation
5. Second National Stakeholders Consultation		Planned for May 2004	Finalize potential indicators for Zone B trawl fishery.	
6. Core-group meeting to finalize selected indicators & to prepare draft of Management Plan		Planned for June / July 2004	List of indicators for sustainable development and management of trawl fishery and draft of Management Plan	
7. Expert group meeting to review draft of Management Plan for trawl fishery		To review the draft of the Management Plan	Reviewed draft of Management Plan for trawl fishery in the study area	
8. National Stakeholder Consultation on the Management Plan		Planned for June / August 2004	Accepted version of Management Plan for trawl fishery	

MALAYSIA: WORK PLAN 2005

Activity	Status in 2004	Implementation in 2005	Expected Output	Comment
1. Approval for implementation of Fisheries Management Plan			Endorsement by the DOF to implement the Plan	
2. Implementation of Fisheries Management Plan				To obtain legal back-up on the implementation of the Fisheries Management Plan

THE PHILIPPINES: WORK PLAN 2004

Activity	Status in 2003	Implementation in 2004 (Month)	Expected Output	Comments
1. Second Regional Technical Consultation		March	Progress report of pilot project for 2002-2003	
2. Field data sampling – Catch rates Data analysis	Implemented since December 2002. Data for 2003 being analysed.	Data collection until June 2004 and probably up to December 2004. Continue analysis of 2003 and 2004 data.	Trend of catch rates	
3. Review and validation of the suitability of the indicators identified		Literature review, On-site validation and actual interviews with the fisherfolk.	Best or suitable indicators identified	
4. Stakeholder consultation, presentation of the results of the project		June 2004	Results validated by the stakeholder based on their observation of the fisheries	
5. Analyze economic data collected in 2003 for possible development of economic indicators	Implemented from January to December 2003.	Data analysis and interpretation	Develop economic indicators	

THE PHILIPPINES: WORK PLAN FOR 2005

Activity	Status in 2004	Implementation in 2005 (Month)	Expected Output	Comments
1. Basically the same with the 2004 but maybe modified based on the results of the 2004 project implementation				

THAILAND: WORK PLAN 2004-2005

Activity	Status in 2003	Implementation in 2004 (Month)	Expected Output	Comments
1. Data analysis	On-going	September 2004	Results on indicators and enlarging of cod-end mesh size	Problems and solutions
2. Conclusions from Meeting with Fishers	First Consultation was conducted in July 2003	October 2004		
3. Conclusion of Pilot Project			Final Report	
4. Publication of Final Report		December 2004		
5. Promote the conclusions from the Pilot Project to DOF		February 2005	Advisory Report	

MFRDMD: Work Plan for 2004

Activity	Status in 2003	Implementation in 2004 (Month)	Expected Output	Comments
1. Second Regional Technical Consultation 2. Publication of Proceedings	(First RTC was conducted in Sept. 2002)	9-11 March 2004 May 2004	Progress reports of pilot projects for period 2002-2003 Publication and information dissemination	a) Problems / constraints / solutions / improvements / training / HRD b) Proposals for follow-up action??
3. Participation in FAO Fishing Capacity meeting		June 2004	Publicity and information dissemination	Follow-up action from SEAFDEC 26th. PCM
4. Consultation with National Project Technical Officers	i) Visits to pilot project sites and consultation with stakeholders in: Cebu, the Philippines (Dec. 2002), Pran Buri, Thailand (July 2003). ii) Attended core group and expert group meetings in Pulau Langkawi, Malaysia (March, August 2003). iii) Discussion with National Project Technical Officers in Indonesia.	i) Stakeholder consultation in Malaysia – April 2004. ii) On-site visit to Brunei Darussalam – May 2004 iii) On-site visit to pilot project site in Cebu, the Philippines - May 2004 iv) On-site visit to Pekalongan, Indonesia – June 2004 v) On-site visit to Pran Buri, Thailand – July 2004.	i) Monitoring of process of project development. ii) Monitoring of pilot project implementation. implementation. iii) Evaluation of pilot project. iv) Monitoring of pilot project v) Evaluation of pilot project.	a) Problems / constraints / solutions / improvements / training / HRD b) Proposals for follow-up actions
5. Formation of core group for development of regional guidelines based on framework adopted at Second RTC.		Framework to be reviewed in May 2004. Draft of guidelines to be ready in September 2004.	Revised framework	May need further consultation
6. Review of draft guidelines	Draft of guidelines.	October 2004.	Revised draft guidelines.	Consultation among core group members.

MFRDMD: WORK PLAN FOR 2005

Activity	Status in 2004	Implementation in 2005 (Month)	Expected Output	Comments
1. Termination of pilot projects.	Pilot projects on-going.	March 2005	Results and preliminary reports.	
2. Consultation with National Technical Project Officers.		January – March 2005	Results and reports.	
3. Third Regional RTC on Indicators		June 2005	Evaluation of pilot projects. Presentation of Management Plans.	Proposals for follow-up action
4. Presentation of Draft Regional Guidelines on the Use of Indicators.	Draft to be prepared.	June 2005	Draft for publication.	
5. Core group meeting	Draft to be reviewed.	August 2005	Draft for publication.	
6. Publication of the Proceedings of the Third Regional RTC.		October 2005	Publication	
7. Publication of Regional Guidelines on the Use of Indicators.		November 2005	Publication and information dissemination.	

CONCLUSIONS & RECOMMENDATIONS (*Con*)

WORKING GROUP 1
FRAMEWORK FOR THE DRAFT GUIDELINES ON THE USE OF INDICATORS FOR IMPROVED FISHERIES MANAGEMENT IN ASEAN REGION

MEMBERS

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7. Dr. Woravit Wanchana - Sida
8. Ms. Mariani Haji Sabtu - Brunei Darussalam
9. Ms. Ranimah Haji Abd Wahab - Brunei Darussalam
10. Mr. Len Garces - WorldFish Center
11. Mr. Ahmad Adnan Nuruddin - Malaysia
12. Dr. Mansor Mat Isa - SEAFDEC MFRDMD
13. Mr. Zulkifli Talib - SEAFDEC MFRDMD

Preparation of draft guideline to use indicators to improve fisheries management

The group agreed that the purpose of this guideline is how to develop and how to use indicators in the Southeast Asian Region. The audience will be a wide-range of stakeholders including government, NGOs, private sector and fishing communities. SEAFDEC should establish a regional consultation process in developing the guidelines, including gaining concensus.

Contents of the Guideline

1. INTRODUCTION

- purpose of guideline
- why we use indicators
- other indicator activities
- published guidelines
- regional context
- multi species
- multi gear
- Shared stocks
- examples of success stories

2. DEFINITION

- What is an indicator for fisheries management?
- Definition

3. HOW DO WE DEVELOP INDICATORS?

- Sequence of activities e.g., training, planning and consultation
- Role of a Fisheries Management Plan
  - Legal implication
- Responsibility, lead agency

3.1 **Training**

- Technical staff
- Fishers
- Managers
- Facilitators

3.2 **Planning Process**

- Development of scope
  i. Identification of fishery
  ii. Identification of stakeholders
  iii. Identification of candidate indicators
- Description of fishery
- Management objectives
- Indicators and reference point
- Monitoring process

3.3 **Stakeholder Consultation**

- With whom and when (including in developing and implementing management plan)
- Public awareness

4. PREPARATION & IMPLEMENTATION OF MANAGEMENT PLAN

- Content
- Linkages to other plans
- Review schedule

5. DATA COLLECTION, ANALYSIS AND INTERPRETATION

- Use of existing data on indicators and collection of additional data
- Data verification

6. MONITORING AND REVIEW OF MANAGEMENT PERFORMANCE

APPENDIX: List of Generic Indicators Developed from Pilot Studies

WORKING GROUP 2
FRAMEWORK FOR THE DRAFT GUIDELINES ON THE USE OF INDICATORS FOR IMPROVED FISHERIES MANAGEMENT IN ASEAN REGION

MEMBERS

1. Mr. Noel C. Barut - Philippines (Chairperson)
2. Ms. Grace V. Lopez - Philippines
3. Dr. Somboon Siriraksophon - SEAFDEC Training Department
4. Dr. Phattareeya Suanrattanachai - SEAFDEC Training Department
5. Dr. Nguyen Long - Vietnam
6. Mr. Nguyen Quoac Anh - Vietnam
7. Mr. Suriyan Vichitlekarn - SEAFDEC Secretariat
8. Mr. Dang Van Thi - RIMF Vietnam
9. Ms.Nguyen Thi Dieu Thuy - ALMRV
10. Mr. Nguyen Khac Bat - RIMF Vietnam
11. Dr. Ilona Stobutski - WorldFish Center
12. Mr. Sallehuddin Jamon - Malaysia
13. Mr. Raja Mohd Noordin Raja Omar - SEAFDEC MFRDMD
14. Mr. Ku Kassim Ku Yaacob - SEAFDEC MFRDMD
15. Dr. Mohd. Taupek Nasir - SEAFDEC MFRDMD

Contents

1. Executive summary
2. Introduction
   - i) Definition
   - ii) Purpose of guidelines
   - iii) Background
     - Fisheries management cycle
     - Current status of fisheries management
     - History
     - Comparison to other guidelines
   - iv) Objective

3. Prior considerations
4. What is an indicator?
   Types of indicator ← Refer to FAO guidelines
5. Process
   - i. Planning
   - ii. Management objective
   - iii. Scope
     - Identification of fishery
     - Identification of stakeholders
     - Identification of candidate indicators

6. Description of fishery
7. Stakeholder consultations
   - Process of consultation and consensus
8. Indicators data collection, analysis and interpretation
   - Use of existing data on indicators and collection of additional data
   - Data verification

9. Preparation of fisheries management plan
10. Implementation of fisheries management plan and review
11. Use of indicators for improved fisheries management

Issues of indicators

- Free-access fishing zone, difficult to monitor
- Difficulties in collecting data
- Lack of staff in collecting data for indicators
- No data collection system for fisheries management
- Different data collection system between province
- No clear linkage between local level and national level management
- Involvement of stakeholders
- How indicators can be applied to improve fisheries management

- Insufficient capacity in interpretation/analysis of data
- Problems in identifying stakeholders. Who is really a stakeholder?

WORKING GROUP 3
FRAMEWORK FOR THE DRAFT GUIDELINES ON THE USE OF INDICATORS FOR IMPROVED FISHERIES MANAGEMENT IN ASEAN REGION

MEMBERS

1. Dr. Mala Supongpan - Thailand (Chairperson)
2. Dr. Yasuhisa Kato - SEAFDEC Secretariat
3. Mr. Karl Johan Staehr - ALMRV
4. Ms. Ratanawalee Phoonsawat - Thailand
5. Ms. Jintana Jindalikit - Thailand
6. Mr. Deap Loeung - Cambodia
7. Mr. Chan Sokheng - Cambodia
8. Mrs. Dyah Retnowati - Indonesia
9. Mr. Duto Nugroho - Indonesia
10. Mr. Le Trung Kien - Vietnam
11. Dr. A. G. Poniah - WorldFish Center
12. Ms. Lim Chai Fong - Malaysia
13. Ms. Chee Phaik Ean - SEAFDEC MFRDMD
14. Dr. Erik Lindebon - Danish Research Institute for Food Economics
15. Mr. Raja Bidin Raja Hassan - SEAFDEC MFRDMD

INTRODUCTION

- Purpose of guideline
  Practical guideline for the ASEAN region
- Why use of indicators
  - i) Communication tool among stakeholders.
  - ii) Indication for needed action
  - iii) Monitoring and evaluation tool

DEFINITION

- What is an "indicator" for fisheries management easily understood by all stakeholders *
  i) What should be used for?
  ii) Clear justification of the indicators for management purposes (biological, ecological, social economic)
  iii) Combination of short term and long term indicators
  iv) Multidisciplinary teamwork
- Do we have a common understanding?
  Stakeholder consultation at various levels
  - Policy brief, awareness documents
  - Facilitation through extension and awareness building exercise

* *The group suggested to defining the word: Stakeholder (fishers, policy makers, scientist, researcher and statistician)*

HOW DO WE USE INDICATORS TO IMPROVE FISHERIES MANAGEMENT?

- Development of process
  - i. Core group meeting
  - ii. Formation of national steering committee
  - iii. Technical Expert group meeting
  - iv. Stakeholder consultation
  - v. Harmonization and revision of management plan
  - vi. Collection and analyses of information
  - vii. Compliance and management action
  - viii. Monitoring and feedback
    (suggested that this should be put in diagram)

List of possible indicators
(In the form of a table)

Name of indicator	Data requirement	Constraints	Potential usage	Cost Effectiveness	Frequency of data collection (short or long term)

Description of fishery
- i) Management problem description
- ii) Interaction with other fishery and other activities

STEPS FOR STAKEHOLDER CONSULTATION

- Identification of stakeholders
- Organization of stakeholder
- Identification of management problems
- Process to reach a common understanding
- Introduction of appropriate indicators
  -Required data collection
  -Collaboration to collect the data
  -Transparency in data process and analysis
- Presentation of results of indicator
- Proposal solutions and follow-up

INDICATOR DATA COLLECTION AND ANALYSIS

- Allocation of responsibility and cooperation in data collection
  (Biologist, economist, lawyer, fisher, statistician, manager, industry, sociologist, local government/organization/NGOs etc)
- Allocation of responsibility and cooperation in data verification and analysis
  (Biologist, economist and statistician)
- Sustainable data collection and analysis
  (Full collaboration with statistical group)

MANAGEMENT PLAN

- Incorporating the use of the outcome of indicators in the management plan
- Agreement from policy makers

Implementation

- Stakeholder consultation
    - Review the outcome of the management tools introduced

Monitoring Process

THE SECOND REGIONAL TECHNICAL CONSULTATION ON THE USE OF INDICATORS FOR THE SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF CAPTURE FISHERIES IN THE ASEAN REGION
9-11 MARCH 2004
KUALA LUMPUR, MALAYSIA

Adopted Conclusions and Recommendations

With the view to promote the effective use of indicators for fisheries management in the ASEAN region, the Regional Technical Consultation (RTC) adopted the following conclusion and recommendations:

1. Indicators should be used as effective planning, communication, monitoring and evaluation tool in fisheries management.

2. Use of indicators should be integrated into fisheries management plans and there should be clear linkages of indicators with management objectives with special consideration on reduction of excess fishing capacity.

3. In using indicators for fisheries management, due consideration should be made to linkages, relationships and combination among various indicators or indicators groups to provide better understanding of management problems and solutions.

4. Active involvement as well as close consultation and communication among stakeholders i.e. those who are contributing to or influenced by the outcome of fisheries management process, should be promoted. This is in order to ensure their common understanding, awareness and consensus building and cooperation in selecting and using indicators thereby enhancing their compliance in fisheries management.

5. Close coordination between a long-term routine data collection system and scientific research as well as cooperation with stakeholders in the provision of data and information should be promoted to develop indicators in sustainable manner.

6. Capacity building to enhance understanding of stakeholders as well as to develop capacity of fishery officers, researchers and managers to facilitate the use of indicators for fisheries management should be conducted.

7. To support future promotion in the development and use of indicators, "Guidelines on the Use of Indicators for Improved Marine and Inland Fisheries Management in the ASEAN Region" should be developed. The tentative framework proposed during the RTC will be used as the basis for formulating the guidelines.

8. While appreciating the progress of pilot projects being implemented in Brunei Darussalam, Indonesia, Malaysia, the Philippines and Thailand, all the Member Countries are encouraged to further promote the implementation of pilot projects. The results of pilot project implementation are found very useful for the formulation of the guidelines.

9. To ensure successful implementation of this Special 5-year project on the Use of Indicators for the Sustainable Development and Management of Capture Fisheries in the ASEAN Region, the work plan for 2004 and 2005 was adopted for future implementation.

10. There should be closer collaboration and cooperation among SEAFDEC member countries, national and international bodies e.g. Assessment of Living Marine Resources of Vietnam (ALMRV), World Fish Center (WFC) and Food and Agriculture Organization of the United Nations (FAO) to promote the use of indicators for improved fisheries management in the ASEAN region.

11. Considering close linkages between the use of indicators and reduction of excess fishing capacity, the Member Countries are encouraged to participate in the Technical Consultation on the International Plan of Action for the Management of Fishing Capacity (IPOA-Capacity) to be conducted by FAO in June 2004.

2004-2005 WORK PLAN FOR THE PROJECT ON THE USE OF INDICATORS FOR THE SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF CAPTURE FISHERIES IN THE ASEAN REGION

2004

Activity	Proposed Schedule	Expected Output
1. Second Regional Technical Consultation	9-11 March	Progress reports of pilot projects for period 2002-2003
2. Submission of the new pilot projects	End of March	Detailed proposal and plan for implementation of pilot projects
3. Publication of Proceedings of the Second RTC	May	Publication and information dissemination
4. Technical support to pilot projects by the Regional Project Leader and consultation with National Project Technical Officers	April – Malaysia May – Brunei Darussalam May – Philippines June – Indonesia July – Thailand	Progress of implementation and inputs for drafting of the guidelines
5. Formation of a core expert group for development of regional guidelines	June	Identified core experts and tentative structure of guidelines
6. Core expert group meeting	August	Review of framework, structure of draft guidelines, drafting process and tasks of members
7. Review of the draft guidelines by the core experts	September - October	Revised draft guidelines.
8. Consolidation of the draft guidelines	December	The first draft of guidelines

2005

Activity	Proposed Schedule	Expected Output
1. Technical support to pilot projects by the Regional Project Leader and consultation with National Project Technical Officers	January - May	Results and preliminary reports
2. Completion of pilot projects	May 2005	Results and reports
3. Third RTC on Indicators	June 2005	Evaluation and reports of pilot projects, adoption of the first draft guidelines, identification of follow-up project and activities.
4. Core Group of Experts meeting	August 2005	Final draft of guidelines
5. Publication of the Proceedings of the Third RTC.	October 2005	Publication
6. Publication of Regional Guidelines on the Use of Indicators.	November 2005	Publication and information dissemination.
7. Submission of the guidelines and proposals for follow-up activities to the ASEAN-SEAFDEC Fisheries Consultative Group (FCG)	April 2006	Adopted guidelines and follow-up activities