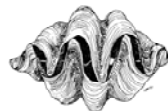




Australian Government

**Australian Centre for
International Agricultural Research**

**ACIAR ACTIVITIES IN
FISHERIES & AQUACULTURE
IN INDONESIA
2005-2006**



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TABLE OF CONTENTS

INTRODUCTION TO ACIAR'S FISHERIES PROGRAM IN INDONESIA.....	3
1. CAPTURE FISHERIES PROJECTS	5
FIS/2002/019: MANAGEMENT AND POLICY FRAMEWORKS FOR ILLEGAL, UNREPORTED AND UNREGULATED (IUU) FISHING IN INDONESIAN AND PHILIPPINE WATERS	5
FIS/2002/074: CAPACITY DEVELOPMENT TO MONITOR, ANALYSE AND REPORT ON INDONESIAN TUNA FISHERIES	8
FIS/2002/111: CULTURE, CAPTURE CONFLICTS: SUSTAINING FISH PRODUCTION AND LIVELIHOODS IN INDONESIAN RESERVOIRS.....	12
FIS/2003/037: ARTISANAL SHARK AND RAY FISHERIES IN EASTERN INDONESIA AND THEIR RELATIONSHIPS WITH AUSTRALIAN RESOURCES	15
FIS/2003/083: AN ASSESSMENT OF THE PATTERNS OF GENETIC DIVERSITY AND STOCK STRUCTURE IN WILD POPULATIONS OF THE GIANT FRESHWATER PRAWN (<i>MACROBRACHIUM ROSENBERGII</i>): A RESOURCE FOR IMPROVING CULTURE STOCKS IN INDONESIA AND THE PHILIPPINES (RECENTLY CONCLUDED PROJECT)	18
2. AQUACULTURE PROJECTS	20
FIS/2000/061: DEVELOPMENT AND DELIVERY OF PRACTICAL DISEASE CONTROL PROGRAMS FOR SMALL-SCALE SHRIMP FARMERS IN INDONESIA, THAILAND AND AUSTRALIA	20
FIS/2000/065: ASSESSING THE POTENTIAL FOR LOW COST FORMULATED DIETS FOR MUD CRAB AQUACULTURE IN AUSTRALIA, INDONESIA AND VIETNAM.....	23
FIS/2002/036: DEVELOPMENT OF THE AQUACULTURE COMPENDIUM	26
FIS/2002/075: APPLICATION OF PCR FOR IMPROVED SHRIMP HEALTH MANAGEMENT IN INDIA, THAILAND AND INDONESIA	30
FIS/2002/077: IMPROVED HATCHERY AND GROW-OUT TECHNOLOGY FOR MARINE FINFISH AQUACULTURE IN THE ASIA-PACIFIC REGION	32
FIS/2003/027: PLANNING TOOLS FOR ENVIRONMENTALLY SUSTAINABLE TROPICAL FINFISH CAGE CULTURE IN INDONESIA AND NORTHERN AUSTRALIA	35
FIS/2002/076: LAND CAPABILITY ASSESSMENT AND CLASSIFICATION FOR SUSTAINABLE POND-BASED AQUACULTURE SYSTEMS.....	37
3. SMALL RESEARCH ACTIVITIES	39
FIS/2005/028: TECHNICAL TRAINING AND CAPACITY BUILDING PROGRAM FOR THE RESTORATION OF TSUNAMI-IMPACTED BRACKISHWATER AQUACULTURE PONDS IN ACEH	39
FIS/2005/025: FISHERIES REHABILITATION IN TSUNAMI-AFFECTED INDONESIA: COMMUNITY NEEDS ASSESSMENT AND RESOURCE STATUS	42

Introduction to ACIAR's Fisheries Program in Indonesia

ACIAR's Indonesia program has a strong emphasis on agricultural research interventions to increase farmer and fisher incomes, especially in eastern Indonesia. Indonesia's proximity and strategic importance to Australia, and the large proportion of its population living in poverty mean that its prominence in ACIAR's portfolio will continue. A key challenge for ACIAR and its partner agencies in Indonesia is to secure more practical outcomes for farming and fishing communities from what has been a considerable research investment.

Fisheries projects have had significant impact in the areas of management of shrimp diseases, rehabilitation of degraded or unproductive shrimp ponds on acid sulfate soils, mariculture of high-value fish and crustaceans, restocking of depleted fisheries, management of illegal, unreported and unregulated (IUU) fishing, and monitoring and harmonised management of shared fish stocks.

Existing collaborative research priorities between Australia and Indonesia were established during the 2002 consultations between ACIAR and government ministries including MMAF, universities, LIPI, the private sector and farmer's associations. A full list of agreed priorities are available at the ACIAR web site. Current priorities also include assisting in the rehabilitation of fisheries and aquaculture industries affected by the December 2004 tsunami in the Province of Aceh.

Indonesia and Australia share many interests including a common marine border in the Timor and Arafura seas, shared fish stocks and similar resource development management challenges. Reflecting the growing importance of this commonality, ACIAR and the Indonesian Ministry of Marine Affairs and Fisheries signed a Memorandum of Understanding in November 2001. Under this arrangement Indonesian and Australian scientists are currently working on over 14 collaborative fisheries research projects. Individual projects are profiled in this document and include major projects under capture fisheries and aquaculture, projects linked with other ACIAR Programs, and small R & D activities.

Further information relating to ACIAR's Fisheries Program can be obtained by contacting Program staff or referring to the ACIAR web page - www.aciar.gov.au.

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1. Capture Fisheries Projects

FIS/2002/019: Management and policy frameworks for illegal, unreported and unregulated (IUU) fishing in Indonesian and Philippine waters

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Overseas Collaborating Countries	Indonesia, Philippines
Commissioned Organisation	University of Wollongong, Centre for Maritime Policy, Australia
Collaborating Institutions	Department of Foreign Affairs, Maritime & Ocean Affairs Centre, Philippines Agency for Marine & Fisheries Research, Research Centre for Capture Fisheries, Indonesia
Project Budget	\$318,785
Project Duration	01/01/2004 to 31/12/2005

Project Background

Illegal, unreported and unregulated fishing is a major impediment to the sustainable management of fisheries. Effective fisheries management relies on accurate data collection, especially relating to fish catches and setting of catch quotas at sustainable levels. Without these forms of control overfishing is likely and if continued will result in a collapse of a fishery.

In March 2001 the Food and Agriculture Organisation (FAO) Committee introduced the International Plan of Action to Prevent, Deter and Eliminate IUU Fishing. This plan requires FAO members to develop a National Plan of Action by October 2004. The FAO Plan calls for bilateral, regional and international cooperation to deal with IUU fishing. This is especially the case for shared fisheries that require coordination between countries.

One such shared fishery is the Sulawesi or Celebes Sea, shared by Indonesia and the Philippines. The key factors contributing to the IUU problem in the Sulawesi Sea include:

- Lack of agreement between Indonesia and Philippines on a maritime boundary;
- The complex administrative and legal structures (national, provincial and district interactions) on both sides of the Sulawesi Sea;
- The difficulties of harmonising management, administrative and policy measures across two national boundaries; and
- The high incidents of illegal foreign fishing activities in the area.

In addition to developing National Plans of Action, a cooperative framework between Indonesia and Philippines is required to comprehensively deal with the IUU fishing problem between the two countries because they share a number of fish stocks. Cooperation is, in fact, a significant requirement under the International Plan of Action on IUU Fishing. The groundwork for this has been established in a previous ACIAR project (FIS/2000/163), which initiated discussions between the two countries leading to a cooperative framework to tackle IUU fishing.

Objectives

To research the options for developing policy and management frameworks to deal with the extensive IUU fishing Indonesia and the Philippines, and in so doing, implement the outcomes of the 2001 ACIAR Small Project. Specifically:

1. Prepare an IUU Audit of Indonesia and Philippine fisheries.
2. Develop a Prototype National “Plans of Action to Combat IUU Fishing” for Indonesia
3. Develop a Prototype National “Plans of Action to Combat IUU Fishing” for Philippines
4. Develop a synthesised and comparative report profiling the fisheries of the Sulawesi Sea
5. Develop a synthesised and comparative report on Indonesia’s and Philippines’ legislative, administrative and policy framework for fisheries in Sulawesi Sea.
6. Prototype IUU Regional Plan of Action developed

Current Status/Progress

The progress of the project in both Indonesia and Philippines has been hampered, to some extent, by security issues in these countries and various warnings from the Australian government regarding travel. However, many of the proposed research activities are now proceeding at a good rate. Recently completed activities include the following:

Philippines:

A National IUU Fishing Workshop was held in General Santos City, Philippines, on 04 September 2004. Over 50 participants attended the workshop, including members of government agencies and many industry group representatives. Presentations from the workshop have been prepared as a Draft Report and will be printed in combination with a similar workshop held in Jakarta (see below). Draft reports have been prepared on a number of issues related to the Philippine fisheries and IUU fishing activity, such as: Philippine Fisheries Profiles, Fisheries Management Arrangements, National and International Obligations, Fisheries Vessel Registration and Licensing, MCS in Philippine Fisheries, and, Illegal Fishing Activities in Philippine waters. In addition, a Draft National Plan of Action on Combating IUU Fishing has been prepared by Mary Ann Palma, who is completing a PhD at the University of Wollongong.

Indonesia:

A National IUU Fishing Workshop was held at the Research Centre for Capture Fisheries in Jakarta on 28th March 2005. Again more than 50 participants attended the workshop and a range of presentations were made related to the IUU Fishing issue. These presentations and the workshop proceedings are to be published in the form of a workshop report. In addition, several reports have been prepared on issues related to IUU Fishing in Indonesia, including papers on: Profile of Indonesian Fisheries, Review of Illegal Fishing Adequacy of Existing Regulations, Data Gathering and IUU Fishing and Registration and Licensing Systems in Indonesia. Additional papers are to be prepared based on the workshop presentations and transcript. A number of different arms of the Ministry for Marine Affairs and Fisheries have prepared separate early drafts of a National Plan of Action on Combating IUU Fishing, and one of the objectives of the workshop was to compile a new agreed draft taking into account the information presented. In addition to these activities, an Indonesian legal student, Dikdik Mohamad Sodik, is completing a PhD at the University of Wollongong.

Expected Outputs

The outputs from ACIAR IUU Fishing project will be a set of reports from both countries regarding the major issues confronting each country in relation to combating IUU fishing in Indonesian and Philippine waters, as well as some agreements of the policy and management issues related to the IUU fishing activities in the Sulawesi Sea.

Anticipated Impacts

The anticipated impacts from the series of national workshops, the various workshop and research papers and the production of draft National Plans of Actions to Combat IUU Fishing in both countries include:

- Review of legislation and policy in both countries with the objective of identifying shortcomings and making recommendations for improvements.
- Review and development of improved systems and better co-ordination in relation to current policy and practice in respect to fisheries data collection, monitoring and surveillance activities and licensing and registration of vessels and fishers.
- An increase in industry awareness of the issue of IUU fishing and an understanding of the financial and legal consequences on individuals and companies of these continuing these practices.
- Improved co-ordination and better decision making within agencies and between Indonesia and Philippines in regard to shared stocks in the Sulawesi Sea.
- Compliance with international obligations in regard to IUU Fishing.

FIS/2002/074: Capacity development to monitor, analyse and report on Indonesian tuna fisheries

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Commissioned Organisation	¹ Research Centre for Capture Fisheries, Jakarta
Collaborating Institutions	² Directorate General of Capture Fisheries, Jakarta Dr Subhat Nurhakim ¹ & Mr Parlin Tambunan ² Indonesia
Project Budget	\$718,549
Project Duration	01/01/2005 to 31/12/2008

Project Background

Indonesia's tuna catches, in both the artisanal and industrial sectors, make it one of the biggest tuna catching nations in the world. The catches of Indonesia's fleets currently account for around 15% of the total catch of tunas taken annually from the Indian Ocean. It is estimated that in year 2000, Indonesia's catch of tuna and tuna-like species was 177,000 tonnes, and was worth about US\$200 million to the Indonesian economy through export sales alone. However, in recent years the industrial longline fishing fleets in Indonesia have experienced declining catches for the key target species (yellowfin, bigeye, and southern bluefin tunas) in both total tonnage landed and in the average size of fish caught. The longline vessels are having to travel further from their ports to catch enough fish to make a profit and the size and age of fish continue to decline.

Indonesia and Australia are the two countries that have exclusive economic zones that overlap the spawning grounds of several commercially important tuna species. In fact, the area of the Indian Ocean bordered by the southern coast of Indonesia and by Australia's northwestern coast is the only known spawning ground for Southern Bluefin Tuna (SBT). As such, the impacts of Indonesia's longline fishing operations on the SBT in this area are of great concern to fisheries scientists and managers in both countries and to the international management agencies for the region.

To achieve this sustainability of Indonesia's tuna fisheries, effective catch monitoring is essential to feed into management plans. A previous ACIAR project introduced Indonesia's fisheries authorities to improved methods of catch monitoring and, in collaboration with IOTC and Japan's Overseas Fisheries Cooperation Foundation (OFCF), established port based monitoring teams at the three main tuna landing ports. During each month of the past three years, the teams have achieved sampling of more than 30% landings at each port. This follow-on project is building on this monitoring program by establishing much needed sources of reliable CPUE data to enable a better understanding of the declining trends in catches, and to develop improved stock assessment skills within Indonesia's fisheries research institutions and government agencies.

Objectives

Goal:

To improve Indonesia's capacity to independently monitor and assess its tuna and billfish fisheries, and the capacity for reporting to international management organisations – critical steps

towards the higher goal of achieving capacity for effective management procedures and sustainable fisheries.

This will be achieved through several components each with a specific objective and several defined activities as detailed below. There are strong cross-linkages between these activities and all will involve close collaboration between the RCCF/RIMF, DGCF, DGMFRS and the active cooperation of industry.

1. To improve and extend existing national systems and capabilities for the collection, compilation and analysis of reliable, high quality fisheries data for Indian Ocean tuna longline fisheries in Indonesia.

Specific activities under this component include:

- To evaluate and analyse existing CPUE/bycatch¹ data
 - To improve the operations and outputs of the existing fisheries school observer program
 - To establish a trial on-board observer monitoring program for the fishery operating out of the port of Benoa
 - To improve the existing log-book system.
2. To conduct a thorough review on Indonesia's tuna fisheries operating in the eastern region, including Banda Sea and Western Pacific Ocean waters review of Eastern Indonesia tuna fisheries.

Specific activities under this component include:

- To provide a comprehensive description of long-line and surface tuna fisheries (industrial and small-scale) operating in this region.
- To evaluate current and historical catch monitoring and reporting procedures for these fisheries.
- As best as possible, to assess the scale and importance of catch of juvenile yellowfin and bigeye tunas in both the industrial and artisanal fisheries sectors.
- Drawing on the above, to work with all relevant MMAF agencies to develop recommendations on strategies for improved systems of monitoring, data collection, data collation and reporting – strategies appropriate to the characteristics and dynamics of the eastern ports and their fisheries.

3. To develop a broader based capacity within MMAF to analyse and interpret fisheries data and to ultimately be able to independently produce and report fisheries assessments in line with international requirements for shared fish stocks.

Specific activities under this component include:

- To provide training to RCCF/RIMF trainees in database handling and programming, data analyses, stock assessment basics, fisheries concepts.
- To improve the level of understanding of the principles and rationale of science-based stock assessment among other RCCF/RIMF staff and DGCF Data and Statistics staff.

¹ "CPUE/bycatch data" refers to all catch and fishing activity associated data – both for targeted catch and that for bycatch species

- To establish mechanisms for stronger collaboration between relevant MMAF agencies on shared-stock issues.

Current Status/Progress

Formal start-up for this project was delayed from 1 January to mid-April 2005 due to negotiations between CSIRO Corporate and ACIAR over indemnity clause issues at organisational funding agreement level (i.e. not project level). However, although official commencement of the project has only occurred in recent weeks, activities for some of project objectives have been underway for several months:

1. Two stock assessment trainees (graduates from Faculty of Mathematics and Information Sciences, Bogor Agricultural University) have already been recruited to Research Centre for Capture Fisheries, and one of these trainees (Lilis Sadiyah) had her first training visit to Australia in November 2004. A supervisor at University of Tasmania has already been arranged for Lilis should she be successful in obtaining a John Allwright Fellowship for MSc/PhD candidature. RCCF and DGCF project colleagues (including Lilis) participated in an 8 day training course for fisheries monitoring procedures, delivered by Indian Ocean Tuna Commission in Jakarta, December 2004.
2. Data from several years of the Fisheries School Observer program have already been entered into a database and preliminary CPUE analysis has commenced.
3. Formal discussions have already occurred with tuna fishing industry in Benoa and with Indonesian government fisheries agencies in the lead up to establishment of the trial scientific observer program. Both industry and government have expressed strong support.

Expected Outputs

The project will improve and extend sources of CPUE/bycatch data for Indian Ocean tuna longline fisheries by 1. making maximum use of existing CPUE data to interpret long-term catch trends of the fisheries, and 2. establishing a new observer monitoring program and improved log-book system. The capacity for Indonesia to independently meet its reporting requirements to international management organisations IOTC and CCSBT will be greatly enhanced with comprehensive training of two stock assessment trainees within RCCF and will also achieve a cadre of key RCCF/RIMF and DGCF staff conversant with the principles and rationale of science based stock assessments. Monitoring and stock assessment procedures will continue beyond the term of the project in a well coordinated and timely way, executed at National level and stronger collaborative links will be forged between the marine research institutes, government fisheries agencies, provincial fisheries offices, and port authorities.

Our review of eastern Indonesia tuna fisheries will fill information gaps on tuna and billfish fisheries in the Western Pacific and Banda Sea sectors and enable the newly formed Western and Central Pacific Fisheries Commission and the Secretariat of the Pacific Community to develop strategies for establishment of port-based monitoring programs for fisheries in these regions.

Anticipated Impacts

The most significant impact from this project will be at National level – improving Indonesia's capacity to independently monitor and assess its tuna and billfish fisheries, and the country's capacity for reporting to international management organisations. These are critical steps towards the higher goal of achieving capacity for effective management procedures and sustainable fisheries. The principal beneficiaries in the short-term will be first and foremost Indonesia's

Ministry for Marine Affairs and Fisheries (including RCCF, DGCF, DGMFRS), but IOTC, CCSBT, DAFF will also benefit. In the longer term, Indonesia's communities reliant on Indian Ocean tuna stocks, the tuna stocks themselves, and countries that fish the shared stocks will benefit from the project's achievements.

The review of eastern Indonesia tuna fisheries will have the immediate impact of enabling WCPFC and SPC to progress with implementing a port-based monitoring program for the eastern region. This in turn will provide data to address current information gaps with respect to the impact of Indonesia's fishing fleets on yellowfin tuna and bigeye tuna stocks in the Western Pacific Ocean and also address concerns surrounding bycatch species.

FIS/2002/111: Culture, capture conflicts: sustaining fish production and livelihoods in Indonesian reservoirs

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Overseas Collaborating Countries	Indonesia
Commissioned Organisation	Deakin University, Australia
Collaborating Institutions	Network of Aquaculture Centres in Asia Pacific, Thailand Directorate General for Aquaculture, Indonesia Central Research Institute for Capture Fisheries, Indonesia Research Centre for Marine Fisheries Product Processing and Socio-Economics, Indonesia Victorian Marine and Freshwater Research Institute, Australia
Project Budget	\$398,840
Project Duration	01/01/2004 to 30/12/2006

Project Background

Inland cultured fish production is a growing industry in Indonesia. This takes two main forms, pond culturing and cage culturing. Inland aquaculture makes a significant contribution to the livelihood of many households, this being a major factor in its rapid expansion. In 1986 the Cirata reservoir held 74 7x7 cage units, by 2000 this number was more than 30,000. Expansion has not been without its problems. Poor fishers relying on capturing wild stocks from reservoirs and other inland water sources have been left behind during this expansion.

The Indonesian Government, which has encouraged cage culturing in reservoirs has not been able to keep pace with the rate of growth. Regulations and data on wild fish stocks are not yet in place. As cage culturing has expanded pressures on wild stocks have steadily increased, with mounting pressures on wild stocks. Recently this has contributed to a growing number of fish kills, affecting both caged and wild stocks.

Poor fishing families relying on wild stocks have been left without an income source for between four and six months while these stocks regenerate following fish kills. Culture fishers have financial resources and can deal with income losses from fish kills. Poor fishers, without this fallback, often resort to activities such as bamboo harvesting, that impact on reservoir catchments and ecosystems, possibly increasing the speed of cycles causing fish kills.

Objectives

The primary objective of the project will be to develop suitable implementation plans that will lead to co-management strategies for long-term sustainable utilisation of the reservoir resources, harmonised development of fish culture and the capture fishery, and overall environmental integrity.

Current Status/Progress

The project received final approval and funds became available on 01-06-04, when activities commenced almost immediately. Relevant recruitments (two Research Assistants in Indonesia and one at Deakin University) were made and other activities commenced almost immediately. Analyses of historical data on cage production and wild catches and interactions thereof were completed and a manuscript was drafted. The Indonesian counterparts to coordinate the different components of the projects, i.e. Culture (Maskur), Capture (Endi Kartamihardja) and Socio-economic (Dr. Sonny Koeshendrajana) were appointed. A meeting of all Indonesian researchers were held on 25-09-04, in conjunction with Principal Investigator's travel to Indonesia on other work. The Indonesian researchers commenced cage culture and wild fishery surveys in Dec. 2004, and the expected cage culture responses from Saguling, Cirata and Jatiluhur reservoirs are 72, 355 and 28, respectively, and correspond to 10% of all cage farmers in each of the reservoirs. Enumerators for the capture fishery component were selected and the field surveys on daily catches commenced in Dec. 2004. With regard to the Socio-economic component a work plan was developed, and a questionnaire was designed. A rapid census was undertaken. The survey revealed that there are 282, 3,554 and 963 cage farmers in Jatiluhur, Cirata and Saguling reservoirs, respectively, and 871 and 94 active wild capture fishery households in Jatiluhur and Cirata (Saguling does not have a wild fishery).

It is expected to have the first stakeholder meeting in May 2005, in conjunction with a visit by the Principal Investigator. The stakeholder meeting will be attended by representatives of the wild fisheries and cage farmers, the fishery conservation units, provincial authority and the researchers, and will be held for each of the three reservoirs. An agenda will be developed for this purpose, and issues arisen from the on-going surveys will be addressed at the meetings.

Expected Outputs

The primary objective of the project will be to develop suitable implementation plans that will lead to co-management strategies for long-term sustainable utilisation of the reservoir resources, harmonised development of fish culture and the capture fishery, and overall environmental integrity.

The findings of the project will lead to specific recommendations on management arrangements for the individual reservoirs, which will include agreed institutional responsibilities and stakeholder participation. The arrangements will consider the fishery and cage culture activities in the reservoirs, and will be arrived at in consultation with the different stakeholders and the authorities concerned. Implementation of the agreed management arrangements for each reservoir will be through the local reservoir management committees, under the purview of the Directorate of Aquaculture.

It is anticipated that the project will also facilitate 1) the development of guidelines and advice on possible pathways, approaches and co-management models for the sustainable management of cage culture and fisheries in reservoirs, and 2) the preparation of a set of recommended management practices for environmentally responsible siting and operation of cage culture operations in reservoirs. Both outputs will be disseminated throughout Indonesia through the proposed Reservoir Fisheries Network subcomponent of the Indonesian Aquaculture Network (under the purview of the Directorate of Aquaculture), and more broadly to other interested Asian countries through the NACA network.

Anticipated Impacts

A management strategy acceptable to both fishers and cage farmers that would facilitate and sustain the activities in the long term and avoid/ minimize the occurrence of fish kills and increase the economic returns for both groups. The project will endure to develop a model that would be used for adoption in the region where water resources are shared for capture and culture.

FIS/2003/037: Artisanal shark and ray fisheries in Eastern Indonesia and their relationships with Australian resources

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Project Budget	\$619,966
Project Duration	01/01/2004 to 31/12/2006

Project Background

Stocks of sharks and rays (elasmobranches) are abundant in Indonesian waters. Some of these stocks are also shared with Australia, inhabiting the warm northern waters separating the two countries. This abundance makes elasmobranches an attractive target for fishermen, and results in large numbers also being taken as by-catch.

Despite their abundance elasmobranches are particularly vulnerable to overfishing. Sharks and rays are slow maturing and long lived, but do not have high levels of fecundity. This combination means over-exploitation of their fisheries can result in quick declines. Efforts, initiated by the FAO and other international agencies are addressing this unwanted potential, requiring countries to develop National Plans to sustainably manage elasmobranch fisheries. Indonesia has the highest reported levels of elasmobranch catches worldwide, and is yet to develop a National Plan for fisheries management.

A previous ACIAR-supported project established baseline data on elasmobranch fisheries in Indonesian waters. This proved the high level of diversity of these species (>150 species are now listed), basic biological parameters for some species and the socio-economic characteristics of artisanal fisheries.

Objectives

The main objective is to provide sufficient information to enable Australia and Indonesia to jointly manage shared stocks of elasmobranches on a sustainable basis. Other objectives are:

1. to enable Indonesia to develop a National Plan of Action for elasmobranches in accordance with FAO and other international guidelines.
2. to provide technical training in various biological disciplines and to enhance Indonesia's stock assessment capability.

Current Status/Progress

Indonesian and Australian staff met over one week in March 2005 in Bali for the second coordination meeting and stock assessment workshop. Project staff from both countries are continuing to assemble all available shark and ray fisheries catch data from Indonesia and northern Australia. Analyses of fishery independent research survey data from both countries is almost complete and shows alarming declines in elasmobranch numbers in both the Java and Arafura Seas. A metadatabase of all relevant catch and research data has been set up and will be updated as necessary. With the completion of socioeconomic studies on the shark and ray fisheries at Cilacap project socio-economists are now concentrating on the very different shark fishery based at Tanjung Luar (Lombok). Stock assessment has begun with the compilation of data for yield per recruit analyses and risk assessments.

A major achievement of the project has been the development of a National Plan of Action (NPOA) for sharks and ray fisheries as required by FAO and SEAFDEC.

Work on genetic stock structure has begun on the key species to determine the degree to which they are shared by Australia and Indonesia. Results so far indicate that the hammerhead, *Sphyrna lewini* is shared, but the shark *Carcharhinus sorrah* is not. About 40 of the approximately 200 species of elasmobranch collected in Indonesia are new species and full taxonomic descriptions are being prepared for publication. In addition the first draft of the bilingual Field Guide to Indonesian Sharks and Rays should be completed by the end of 2005, for publication during 2006. Negotiations are currently in progress to incorporate Timor Leste as a partner in the project and to undertake sampling of shark fisheries on the north coast of Timor Leste.

Expected Outputs

1. Stock and risk assessments for all key elasmobranch species and provision of management options.
2. Assessment of the socioeconomic status of current shark and ray fisheries and the impacts of any possible management measures.
3. Descriptions of the degree to which stocks of key species are shared by Indonesia and Australia.
4. Publishing of Field Guide to Indonesian Sharks and Rays (bilingual)
5. The establishment of a properly curated museum reference collection of Indonesian elasmobranchs at LIPI.
6. Numerous scientific descriptions of new shark species.

Anticipated Impacts

1. For fisheries management - an understanding of the species that may have stocks that are shared between Australia and Indonesia. Therefore, the impacts of fisheries in both countries can be taken into account when assessing the status of the stocks. The overall results of this research will assist the development of complementary management strategies for elasmobranch fisheries. A shared stocks committee is in the process of formation.
2. An increased capacity in Indonesia to manage their elasmobranch resources in a sustainable manner, which will particularly impact on shared stocks.
3. The increased independent research capacity developed by the project will allow Indonesia to partake more fully in joint decision making at both bilateral and multilateral management forums.
4. Benefits to artisanal fishers – elasmobranchs are now the major source of income for the majority of artisanal fishers throughout the Indonesian Archipelago. If this is to be

- maintained and thus avoid a drastic fall in income, management action is required. The vulnerable nature of these fishes to overexploitation requires sustainable management as soon as possible. Most fishing in the Timor Box of Australia and illegal incursions into Australian waters relate to searching for sharks.
5. Conservation and biodiversity – Indonesia has the highest diversity of elasmobranchs in the world. Many species are becoming endangered and some may even be extinct even before they can be described scientifically. Indonesia and Australia are both signatories to the international conventions on biodiversity and it is thus incumbent upon them to document and develop NPOAs. These can only be done with the knowledge gained from projects such as this one.

FIS/2003/083: An assessment of the patterns of genetic diversity and stock structure in wild populations of the Giant Freshwater Prawn (*Macrobrachium rosenbergii*): A resource for improving culture stocks in Indonesia and the Philippines (recently concluded project)

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Commissioned Organisation	Queensland University of Technology, School of Natural Resource Sciences, Australia
Collaborating Institutions	Bureau of Fisheries & Aquatic Resources, Philippines Research Institute for Freshwater Fisheries, Indonesia
Project Budget	\$97,708
Project Duration	01/07/2003 to 31/12/2004

Project Background

The Giant Freshwater Prawn (*Macrobrachium rosenbergii*) is the largest species of prawn occurring naturally in freshwater ecosystems. It is spread throughout tropical and sub-tropical areas of the Indo-Pacific region, including into Southeast Asia. This range has seen it widely used in aquaculture farming, including well beyond its natural range.

Wild stocks are increasingly threatened in many parts of Asia. For example wild capture outputs in Indonesia fell by more than 1000 mt between 1989 and 1998. Wild capture and grow-out, rather than rearing from larvae in captivity still form the backbone of many aquaculture farms. Larvae production is relatively simple, but grow-out is not, having been attempted unsuccessfully in many farms.

At the same time little is known about wild stocks, especially levels and patterns of genetic diversity. This knowledge is essential, both to illuminating understanding of wild stocks, their spread, catch levels and for sustainable plans of management, as well as for ensuring that genetic diversity is conserved. With increasing pressure on prawn fisheries, genetic diversity is threatened by over-fishing. Utilising this diversity to improve aquaculture, such as in larval breeding and producing more robust varieties for culture and grow-out, will be enhanced through wild stock assessments and on-going sustainable management.

Objectives

The objectives of the proposed project are:

1. To document the levels and patterns of genetic diversity in wild *M. rosenbergii* stocks as a basis for future informed breed improvement and as a basis for developing conservation plans for wild genetic resources; and
2. to increase the capacity of partner institutions in Indonesia and the Philippines to undertake and apply similar approaches to stock improvement programs in their countries.

Current Status/Progress

The project was completed in the specified time with the exception of the final project workshop planned for December 2004 in Jakarta that had to be postponed due to political and social problems in Indonesia. This workshop is now scheduled for December 2005 when the results will be presented to interested groups including researchers, culturists and farmers and the opportunities and strategies for development of improved culture lines of the species will be considered.

Outputs

At the conclusion of the project, partner institutions have developed a detailed understanding of the magnitude and distribution of genetic diversity in wild *M. rosenbergii* stocks across the species' extensive natural range. Genetic diversity is extensive in wild stocks and a major dichotomy was confirmed between wild stocks distributed either side of Huxley's Line in eastern Indonesia. The two forms have been separated from a common ancestor for more than 5 million years and may constitute independent 'biological species'. The likely factor that produced the divergence between eastern and western forms was plate tectonic movements. Variation within eastern and western forms was also large with multiple sub-clades evident. Divergence at this level was most likely the result of Pleistocene fluctuations in sea levels that periodically connected and isolated stocks in major drainage systems in the region. Very little of this natural variation has been exploited in culture to date in a systematic way. The variation provides an important genetic resource for future improvement of cultured stocks and therefore will require conservation.

A workshop will be held in Indonesia and project scientists from the partner institutions and representatives from other collaborating institutions in the region who are working on *M. rosenbergii* stock improvement will be invited to discuss the outcomes of the project. This workshop will also document the status of *M. rosenbergii* culture industries in the region, provide details of existing genetic improvement programs and permit discussions for developing a co-ordinated approach to stock improvement.

Anticipated Impacts

The potential exists for new breeding programs to produce improved cultured stocks by exploiting the variation in wild stocks in systematic ways. Specifically, divergent yet genetically compatible populations could be crossbred in captivity to test for heterotic outcomes. Equally, an approach similar to that which was successful with Nile tilapia (GIFT program) could be developed for *M. rosenbergii* to produce a synthetic stock combining genetic diversity from divergent, yet compatible wild stocks of the species. Data on patterns of genetic diversity in wild stocks can also be used to strategically target new introductions of wild germplasm for culture industries in regions outside the species' natural range where culture stocks are known to be genetically depauperate and showing declining productivity. The results of the current project provide the foundation for such developments and should stimulate new interest in development of improved culture lines.

2. Aquaculture Projects

FIS/2000/061: Development and delivery of practical disease control programs for small-scale shrimp farmers in Indonesia, Thailand and Australia

Project Leader	Dr Richard Callinan Phone: 02 6688 6289 (Home) Email: richardcallinan@versa.com.au
Overseas Project Leader	Dr Endhay Kusnendar, DGA, Indonesia Dr Supranee Chinabut, AAHRI, Thailand Dr Michael Phillips, NACA, Thailand
Collaborating Countries	Indonesia, Thailand
Commissioned Organisation	NSW Department of Primary Industries, Australia
Collaborating Institutions	Queensland Department of Primary Industries & Fisheries, Australia James Cook University, Australia Directorate General of Aquaculture, Indonesia Aquatic Animal Health Research Institute, Thailand Network of Aquaculture Centres in Asia Pacific, Thailand
Project Budget	\$1,014,019
Project Duration	01/01/2001 to 30/12/2005

Project Background

The world production of farm shrimp in 1996 was valued at over \$10 billion. About 80% of the crop is produced in Asia, largely by small-scale farmers. In Thailand, 90% of shrimp farms are smaller than 1.6 ha, while in Indonesia almost 50% are less than 2 ha. In Australia, the bulk of producers are also small farmers that operate on average on 15 ha of ponds. When the project began *Penaeus monodon* was the most important farmed shrimp species in Southeast Asia and Australia; more recently *Penaeus vannamei* has become important in many Asian countries.

Infectious diseases are consistently identified as the major threat to the long-term viability of the shrimp farming industry in the Asia-Pacific region, and recurrent massive outbreaks of viral diseases have caused serious financial losses among smallholders.

To address this situation, researchers have worked towards developing effective farm-level, shrimp disease-control programs. This work has now produced relevant expertise and information, but because of lack of definitive, on-farm program validations and inadequacies in the delivery of extension programs, smallholders have generally failed to benefit.

Objectives

The main aim of this project is for farmers, scientists and extension workers in Indonesia, Thailand, and Australia to acquire the necessary knowledge, practical skills and willingness to implement, retain and further disseminate the shrimp disease-control programs that have been developed for small-scale shrimp farms.

Additionally, the project aims to support an existing shrimp disease and coastal management study in India.

Current Status/Progress

In a changing environment in each participating country, considerable progress has been made towards achieving the project objectives. In general terms, project activities have proven that health management programs can be successfully implemented, extended and disseminated amongst small-holder farmer groups. The project is also recognized at DoF level in each participating country as a pilot program to illustrate how better health management practices can be embedded at farm level into wider 'good aquaculture practice' and 'code of conduct' programs.

In India, solid progress continues at the study site in West Godavari district, Andhra Pradesh, where programs are currently being implemented on 917 ponds belonging to 547 farmers in 16 villages.

Solid progress also continues in Indonesia, although there has been an unexpected setback in South Sulawesi. Programs in East Java have now been successfully implemented on clusters of semi-intensive as well as extensive farms in two districts, with an overall success rate of 88%. By contrast, identical programs implemented in two districts in South Sulawesi produced a failure rate of 90%. The differences were attributed to an unexpected risk factor viz. the light, sandy soil in the South Sulawesi sites which apparently facilitated disease transmission from infected, non-participating farms to adjacent project farms. Additional biosecurity measures involving clusters of farms are planned to address this problem. Importantly, the project is moving beyond its initial target areas, with programs now being implemented, following unsolicited farmers' requests, at new sites in West Java and Lombok. Project extension staff have produced a health management manual and CD (in Bahasa Indonesia) which is being widely disseminated amongst farmers and extension providers at both existing and new entrant project sites.

Changed circumstances in Thailand have impeded progress at farm level, particularly at the more marginal Chacheongsao site. These include the almost complete shift in Thailand from the target *P. monodon* to *P. vannamei*, for which less health management information is available in the small-holder context. The recent emergence of 'monodon slow-growth syndrome', whose causes are still uncertain, has influenced many farmers not to grow this species. Drought and low shrimp prices are also factors. In addition, the Project Leader (Thailand) has been redeployed and the Project Scientist-Extensionist has resigned his position; both will remain active in the project until its conclusion. Notwithstanding, there has been considerable progress in the extension area; project staff have produced a comprehensive health management manual, together with brochures and poster (all in Thai). These are now being widely disseminated through farmer groups and government extension centres.

In Australia, work continues at James Cook University on identifying factors causing GAV-associated disease outbreaks and in developing cheap, accurate tests to assist farmers and diagnosticians in monitoring crop infection status; this component should be finished shortly after mid-year. In a major project initiative being led by QDPI, a comprehensive health management manual for Australian prawn farmers is being developed, with an initial draft expected later this year.

Overall, our experience has shown that project success depends on factors operating at country, province, district and farm levels. Based on the Indonesian and Thai experiences, we have identified the following determinants for successful program adoption and dissemination.

- Sufficient science-based information on control and prevention of important endemic diseases must be available for the species being farmed
- Shrimp farming must be an important industry in the study site's province and district; this factor justifies provision of essential extension support by provincial and local government fisheries services
- Local farmers must be enthusiastic about program implementation and must be organized into groups
- Land use and environmental information must confirm that the site is suitable for shrimp farming
- One or more hatcheries and reliable PCR test providers must be available in the province.

Expected Outputs

The research outcomes will include descriptions of the pathology and epidemiology of diseases that cause significant production losses on Australian shrimp farms. The shrimp disease control program will establish cost-effective validated disease-control programs in Indonesia, Thailand, and Australia and ensure that farmers, technicians and disease diagnosticians are competent in disease diagnosis and the delivery of the programs.

Key smallholder farmer groups will be shown the effectiveness of the disease-control program and trained to develop effective extension activities in Indonesia, Thailand and Australia. An assessment of farmer adoption of the shrimp disease-control programs will allow uptake levels to be monitored.

An additional program in India will identify major factors that cause shrimp diseases, train staff and produce local extension materials.

Anticipated Impacts

Experience to date reveals a much more complex operating environment than was expected at the beginning of the project. Major successes in India and in East Java have confirmed that health management programs can be successfully implemented and disseminated at small-holder level. However, failures in South Sulawesi have shown that unexpected factors are present at some sites and biosecurity measures to circumvent these must be developed and incorporated into future programs. As well, changing circumstances can strongly influence outcomes, as has been seen in Thailand. Furthermore, gradations in farmers' level of compliance with program elements must be allowed for.

Taken together, the project is well placed to serve as a model for implementation and dissemination of science-based health management programs for small-holder shrimp farmers in participating countries. Awareness of the essential importance of these programs in best practice shrimp farming is now well established at local, provincial and national levels.

The project is therefore likely to serve as a model for embedding better health management practices into governments' wider 'good aquaculture practice' and 'code of conduct' programs. These wider programs are becoming mandatory to maintaining market access in the increasingly global and competitive shrimp market.

FIS/2000/065: Assessing the potential for low cost formulated diets for mud crab aquaculture in Australia, Indonesia and Vietnam

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Overseas Project Leader	Ketut Suwirya, GRIM, Indonesia Thach Co Nguyen, RIA 3, Vietnam
Collaborating Countries	Indonesia, Vietnam
Commissioned Organisation	Queensland University of Technology, School of Natural Resource Sciences, Australia
Collaborating Institutions	Gondol Research Institute of Mariculture, Indonesia Research Institute for Aquaculture No. 3, Vietnam
Project Budget	\$352,374
Project Duration	01/07/2004 to 30/06/2006

Project Background

Global demand for mud crabs has risen over the past decade, led by expanding wealthier markets such as those in Hong Kong, Singapore and elsewhere in Asia. This demand has largely been met by exploitation of wild stocks, causing many to go into decline. Current trends in these fisheries suggest this exploitation is unsustainable. This situation continues to be exacerbated by rising demand for seafood.

Mud crabs (*Scylla* species) are widely distributed across the Indo-Pacific region, mainly in coastal and estuarine areas, making them ideal for fishing. This does also make them highly suitable for aquaculturing, providing some barriers to production can be overcome. Past ACIAR-supported research has developed laboratory-scale technologies for hatching crabs from larvae, a first step in aquaculture development. Large-scale hatchery production is now underway in Vietnam where a leading centre for crab aquaculture has been established, along with others in Indonesia, the Philippines and Australia.

But until diets suitable for crab grow-out can be formulated based on meeting their nutritional needs, further advances will be limited. Most aquaculture of crabs uses 'trash-fish' collected from marine inshore areas or mussel meat from intertidal areas. This can damage these environments and not all feed is likely to be consumed, fouling hatchery ponds. Growing exploitation of trash-fish is also leading to declining numbers, threatening the viability of aquaculture. A cost-effective replacement diet is needed to ensure the benefits gained to date are not lost.

Objectives

1. To evaluate potential for formulated feeds to replace trash fish.
2. To determine critical nutritional requirements and evaluate key ingredients.
3. To determine the protein / energy requirements of mud crabs during growout phases
4. To formulate and evaluate improved diets.
5. Experimental diets formulated for use in mud crab aquaculture in the partner countries will be tested for their ability to promote growth under laboratory conditions.
6. If successful, these diets will be used as a basis for developing artificial feeds optimised for mud crab aquaculture. This will require developing diets that are:

- cheaper than the current diets used in intensive or semi-intensive mud crab aquaculture (i.e. prawn feeds in Australia and trash fish in Indonesia and Vietnam);
- able to provide similar or superior production performance to currently available crustacean feeds;
- less likely to impact on water quality than current mud crab diets;
- based on food grade resources which can accommodate the projected growth of the mud crab industry in Australia and the partner countries (PCs);
- made without terrestrial animal protein sources that may transmit diseases such as BSE.

Current Status/Progress

The protein and lipid requirements of *S. serrata* have been investigated in a twelve week feeding trial using pelleted diets based on fishmeal. Crabs grew well (Specific growth rates 3.0 – 3.2; Survival rates 91-100%) when fed diets containing 35% or 43% crude protein (CP) with 6% or 10% crude lipid (CL) at dietary energy levels of 16 or 17.5 Mj/kg. Interestingly, diets with a high CP (50%) or CL content (15%) were not well utilised by crabs. In particular, the lowest growth and survival rates were demonstrated by crabs fed the diet containing 50% protein and 15% lipid.

Another significant finding of the feeding trial was that crabs fed a commercial prawn diet performed significantly better for most indicators than the experimental fishmeal-based diets. This finding indicates that the influence of dietary factors other than protein and lipid, (eg. carbohydrates or attractants) in formulated diets for this species should also be assessed.

Recently, we have commenced trials to determine the digestibilities for a range of ingredients with the potential to replace fishmeal in formulated mud crab diets. These trials are testing protein rich ingredients from terrestrial animal sources (eg. meat meal and chicken meal), plant sources (eg. soya bean meal, lupin meal, canola meal and cotton seed meal) and single cell organisms (Brewers yeast). The digestibility coefficients for dry matter, crude protein and energy will be measured from food and faeces using Cr₂O₃ as an inert marker.

Expected Outputs

Wild mud crab fisheries are well developed in many parts of the Asia-Pacific region and form important industries for supplying basic food needs as well as an important means of generating income. Mud crab culture however, is a relatively new industry in the region and has largely been confined to capture and short-term fattening of undersized adult crabs for local consumption and sale or wild capture of juvenile crabs for grow out in ponds. The proposed project opens up many opportunities to expand local and regional industries to poor farmers and others who currently rely almost exclusively on exploitation of ever-decreasing wild fish resources. Many regions in Indonesia and Vietnam are currently looking at new industries and opportunities to reduce poverty and to bring unproductive or undeveloped land into gainful production. Thus for Indonesia and Vietnam the social benefits from this project may be very large and diverse in their effect.

Anticipated Impacts

At present, there is a heavy reliance on trash fish in SE Asia and artificial prawn feeds in Australia for mud crab aquaculture during grow out phases. There is a lack of scientific evidence, however, to justify these practices. In addition, the high costs or limited availabilities of many

dietary ingredients are limiting the commercial viability of mud crab aquaculture in some regions. The goals of the current project are to identify the optimal levels of dietary protein and lipid in mud crab diets and identify highly digestible feed ingredients which have the potential to replace marine animal protein. It is anticipated that data from the current project will have the following impacts;

- Reduce the dependency on trash fish which has now become an important food item for human consumption in some regions of SE Asia.
- Improve the performance of formulated diets by identifying the protein and energy levels required to promote optimal growth.
- Reduce feed storage costs by formulating pelleted diets which do not require refrigeration, as is currently a requirement for trash fish.
- Significantly reduce feed costs by replacing expensive marine animal-based ingredients (eg.fishmeal) with lower cost ingredients which promote at least equivalent growth in culture.
- Guarantee the long term sustainability of feed supply by replacing marine animal-based ingredients with readily available low-cost feed materials.

FIS/2002/036: Development of the Aquaculture Compendium

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Overseas Project Leader	
Overseas Collaborating Countries	Global
Commissioned Organisation	Centre for Agriculture & Biosciences, UK
Collaborating Institutions	Global
Project Budget	\$400,000
Project Duration	01/07/2003 to 30/06/2005

Project Background

Increasing pressure on wild capture fisheries from rising global demand for fish and other aquatic resources has resulted in moves to promote the potential of aquaculture, or fish farming. Aquaculture has the potential to improve socio-economic conditions and environmental sustainability, both in coastal settings and through preservation of wild fisheries and their associated ecosystems. Asia produced more than 90 per cent of all global aquaculture products as well as providing an important source of food security and dietary protein.

Despite this aquaculture is limited by a lack of knowledge and information. This is particularly the case in the areas of environmental management and sustainability. Knowledge about aquaculture in rural settings is also limited, including from a systems viewpoint. A recent study in Thailand where extension materials were disseminated after development through farmer participatory approaches led to significant yield increases.

A substantial research knowledge base for rural aquaculture has been developed over the past few years. This knowledge suggests a yield gap between current and potential levels is real for smallholders. Poor knowledge about many areas of aquaculture is the reason, yet much of this knowledge is contained within the research knowledge base. CABI's Compendium Technology can be used to organise and present this knowledge to extension networks to help increase information and reduce the existing yield gap.

Objectives

1. A new electronic knowledge base for intensified aquatic resource management, incorporating CAB International's innovative 'Compendium' technology.
2. Feedback obtained on Coverage and Components and User Needs Matrix from draft Inception Workshop Report.
 - Finalise integration of Coverage and Components and User Needs Matrix.
 - Using Coverage and Components document and User Needs matrix (see Inception Workshop Report) as a guide, construct datasheet templates for commissioning and compiling content (CABI to seek guidance).
 - Construct coverage lists, including permissions sign offs.
3. Design AC system and build AC information content, with input from users
 - Design and build content management system

- Commission and collate knowledge blocks and background texts, and images
 - Edit textual and graphic content
 - Develop other features as agreed at Inception Workshop
 - Evaluate 'demonstrator' system interface, with user input
4. Database design
- Start interface design in the context of database design.
 - Editing, with fully-functional editing system.
 - Field test web-based interface using alternative demonstrator versions and options for testing using limited data, through small workshops in Bangladesh and Vietnam.
 - Editing/Commissioning/Compiling/Verification control:
 - Period of 15 months total with functioning editing system; three editors in UK, two in Bangkok
5. Train selected users in the use of the AC
- Training will be provided in the use of the AC, especially in developing countries. To provide a model for this, a training programme in Asia is included in this proposal. The central activity here will be a 'Train-the-trainers' Workshop in March 2005. A 5-day Workshop is envisaged, at a venue to be decided. Training materials will be prepared. It is envisaged that some 25 trainers would be trained, each of whom would be 'contracted' to cascade their training to, say, 25 personnel in their home country. Participants will include extension officers, fisheries officers, and others. The modus operandi for the course will be clarified as we work with project partners.
6. Uptake and initial impacts of the AC will be monitored through an assessment within the year after Project end.

Current Status/Progress

Development of the Aquaculture Compendium continues to make good progress. Much work has been completed, and although a lot remains to be done we are on target for publication in September 2005. Based on CAB International's experience of Compendia projects, we feel confident that this huge development project will culminate in an excellent product. Much of this is due to the excellent planning that has taken place, starting with the Inception Workshop in Bangkok in October 2002 and the extensive feedback and on-going dialogue with Consortium members, partners and experts engaged on the project. We gratefully acknowledge this support.

Project Staff

The project is part of the Compendium Programme and as such draws on all resources of the Compendium Team of 19 people, all of whom have contributed to the Aquaculture Compendium in some way, and also more broadly on other expertise in CABI.

The main contact people are:

Julia Brunt, Compendium Programme Manager
 Tony Leaney, Business Development Manager
 Martin Parr, Aquaculture Compendium Coordinator
 Peter Edwards, Consultant
 Vicky Bonham, Editor, Aquaculture Compendium

Chris Howard, Project Assistant, Aquaculture Compendium
Peter Cornelius, Lead Software Developer

The Blueprint

The Blueprint, developed through extensive consultation and discussion, is very much a working document, and continues to be refined following feedback and discussion. For reference the latest version is attached to this message. As always, any comments you may have on this document, which outlines the whole project, are very welcome.

Commissioning and compiling content

The last 15 months have been increasingly busy as we moved from the planning phase for the project onto the operational phase. The templates for the development of the Compendium that we shared with you in our previous reports are being populated with content from a number of sources, and include:

Original material commissioned from experts
Extraction of expert knowledge from existing resources
Compilation of case studies from existing and new sources

These tasks represent the bulk of the work of developing the Compendium. Already more than 80% of the new topics we hope to include have been commissioned, amounting to more than 300 new datasheets. Our editorial team has compiled many hundreds more covering:

- Cultured aquatic species
- Diseases
- Ecosystems
- Production systems
- Key topics

We have received permission to re-disseminate relevant electronic publications from around 30 organizations and expect that many more will follow. We also expect to receive permission to include content from around 20 databases in the Compendium. These databases will be used to produce a further 1200 datasheets on aquatic organisms and diseases.

Expected Outputs

The project will result in a new electronic knowledge base for intensified aquatic resource management, incorporating CAB International's innovative 'Compendium' technology. Operationally, project objectives are to:

- Design, build, and test the AC
- Disseminate it on the Internet and on CD-ROM
- Train users of the AC
- Set up mechanisms aiming to ensure the sustainability of the AC through the market.

Anticipated Impacts

The project will lead to improved capacity for field-level promotion of aquaculture and the improved uptake of aquaculture knowledge among the many relevant user groups identified in pre-project information gathering activities.

As with other Compendia Development Consortia we plan to hold a Consortium workshop following publication, where we will review the development of the first edition and explore the future direction of the project.

FIS/2002/075: Application of PCR for improved shrimp health management in India, Thailand and Indonesia

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Overseas Project Leader	Prof. Tim Flegel, Mahidol University, Thailand
Overseas Collaborating Countries	India, Indonesia, Thailand
Commissioned Organisation	CSIRO Livestock Industries, Australian Animal Health Laboratory, Australia
Collaborating Institutions	National Center for Genetic Engineering and Biotechnology, Thailand Directorate General Aquaculture, Indonesia Network of Aquaculture Centres in Asia Pacific, Thailand Agency for Marine & Fisheries Research, Indonesia
Project Budget	\$715,921
Project Duration	01/01/2005 to 31/12/2007

Project Background

Shrimp farming, or culturing, is a profitable industry. Successful culturing provides income and employment for smallholder farmers, as well as those working in hatcheries, larger-scale farms, feed mills and processing plants. Most of this has flow-on effects as income is redistributed throughout the usually poor rural communities, many located in coastal regions, that practice shrimp culturing.

In addition to these benefits farming of shrimp is sustainable. This relieves the pressure placed on wild populations being harvested to reap the potential income on offer. This often motivates unsustainable catch levels. Thailand leads the world in farmed shrimp production, with Indonesia and India, like many other countries in Asia, both major and growing producers.

For the past decade the Asian industry has been limited by disease outbreaks. Several have been serious enough to cause declines that if continued unabated would threaten the industry. Two diseases in particular, white spot syndrome virus (WSSV) causing white spot disease and yellow head virus (YHV) have caused these declines. Past ACIAR research has developed polymerase chain reaction (PCR) and epidemiological tests against the diseases. These are used to detect the viruses in seed stock and live shrimp respectively. Despite these being widely adopted outbreaks continue, and a slow growth syndrome has become more prevalent, prompting further research into PCR use its role in ongoing farm management.

Objectives

1. Reduce risk of White spot disease in shrimp farms through the application of PCR-based detection tests and epidemiological probes
2. Reduce risk of yellow head and other shrimp diseases in shrimp farms through application of PCR-based detection tests and epidemiological probes
3. Improve the effectiveness of PCR-based viral screening in hatcheries and service laboratories in India, Indonesia and other countries in the Asian region

Current Status/Progress

The first project coordination meeting was conducted at the Central Institute for Brackishwater Aquaculture in Chennai, India on 21-22 April 2005 for detailed planning of activities during the first year of the project. Prior to the workshop, Dr Peter Walker and Mr Nick Gudkovs of CSIRO visited the site in the West Godavari District of Andhra Pradesh where a longitudinal study of shrimp ponds is currently in progress. Samples of seed have been collected from nursery and grow-out ponds at the time of stocking and sampling will continue until harvest or crop failure. The data will be used to assess the quality of seed screening data information available to farmers and to trace the origin of disease outbreaks through a progressive analysis of the load, prevalence and genotype of white spot syndrome virus in ponds.

Expected Outputs

Previous R&D and training activities in Australia, Thailand, India and Indonesia will be enhanced to address some of key issues that continue to limit effective shrimp health management. This will compliment previous and continuing activities of NACA, ACIAR and FAO in India and provide cooperative linkages with farms, a body of background data, and the capacity for ongoing research. Indonesia will substantially benefit through transfer of experiences from India. A feature will be the major investment to provide PCR training to scientists and laboratory staff in Indonesia, India and other countries, and to assist harmonisation of PCR through inter-laboratory calibration of testing standards. Guidelines for more effective health management on farms and in hatcheries drawing on a more precise knowledge of causal factors and transmission pathways of shrimp disease will be developed and disseminated. This will also be undertaken at all other stakeholder levels with special attention given to effective linkage to existing ACIAR, NACA and FAO communication channels.

Anticipated Impacts

The project aims to improve the reduce the risk of crop failure due to disease for small scale shrimp farmers in India, Indonesia and other countries in the Asian region by understanding the potential sources of infection in ponds, improving the reliability of PCR screening of seed, and communicating information on risk factors to government and shrimp farming communities.

FIS/2002/077: Improved hatchery and grow-out technology for marine finfish aquaculture in the Asia-Pacific region

Project Leader	Dr Mike Rimmer
Overseas Project Leader	Nyoman Adiasmara Giri, GRIM, Indonesia Mike Phillips, NACA, Thailand Le Thanh Luu, RIA 1, Vietnam Joebert Toledo, SEAFDEC, Philippines
Overseas Collaborating Countries	Indonesia, Vietnam
Commissioned Organisation	Queensland Department of Primary Industries & Fisheries, Australia
Collaborating Institutions	Southeast Asian Fisheries Development Centre, Philippines Central Research Institute for Aquaculture, Indonesia Research Institute for Aquaculture No. 1, Vietnam Network of Aquaculture Centres in Asia Pacific, Thailand Sam Ratulangi University, Indonesia Research Institute for Coastal Aquaculture, Indonesia Gondol Research Institute for Mariculture, Indonesia
Project Budget	\$887,710
Project Duration	01/07/2004 to 31/12/2007

Project Background

Aquaculture is an important source of supply, particularly of high-value marine finfish. Interest in pursuing this has grown, reflecting both the incomes on offer to smallholders and the potential easing of pressure on wild stocks, both driven by the lucrative (up to US\$70/kg) paid in some parts of Asia.

The sustainability of aquaculture production continues to grow, as research delivers improvements to fish grow-out survival rates. ACIAR-supported research (FIS/1997/073) developed improved diets and rearing strategies for some species. Despite this success some problems remain to be addressed: wild fry and fingerlings being used as a source of seed stock, the poor survival in rearing from larvae and the role of trash fish (low value species usually found as by-catch in fishing for higher-value species).

With marine finfish playing an important role in the economic well-being of many coastal communities, ensuring the sustainability of aquaculture is important to maintaining wild fisheries. Without such production fishing pressure on wild stocks will increase, fisher folk will increasingly be forced to trawl for trash fish and increasing numbers of wild fry and fingerlings will be removed from wild populations to act as a source of seed stock.

Objectives

The overall objective of the project is to enhance the sustainability of marine finfish aquaculture in the Asia-Pacific region by improving hatchery production technology and facilitating the uptake of compounded feeds for grow-out.

Current Status/Progress

This project has had a slow start due to various operational complexities, including:

- Delays in signing contracts. This was in part due to the restructure of DPI&F and consequent lack of appropriate delegations and contract-handling processes.
- Realignment of CSIRO Marine Research priorities with consequent uncertainty regarding their role in the project.
- Budget-induced changes in SEAFDEC AQD which resulted in the loss of all senior research staff. Consequently, SEAFDEC AQD have been unable to implement their components of the project due to lack of capacity.
- Queensland Government restrictions on travel to Indonesia from late 2002 until early 2005.
- Collapse of the laboratory roof at Gondol Research Institute for Mariculture, Bali, and water damage to laboratory equipment.

These problems have delayed the start of most components of the project for 6–12 months. To compensate, the project has been extended by 12 months (to December 2008). The change in participating institutions and the project schedule have required the extensive revision of both the budget and Phase 2 documentation.

Project implementation to date:

- Project activities implemented in Indonesia, July 2004.
- Assessment of Vietnam activities undertaken, November 2004.
- Project staff participated in project meeting for ACIAR project ADP/2003/022 *Feasibility study of economic impacts of developments in the live reef fish food trade in the Asia-Pacific region*, Noumea, New Caledonia, March 2005.
- Additional project meeting at Research Institute for Mariculture, Gondol, Bali, 3–4 May 2005, plus meeting of Indonesian project staff at World Aquaculture 2005 conference, Bali, May 2005.
- Publication of extension guides on Small-scale Marine Finfish Hatchery Technology and Feeds and Feed Management for Cultured Grouper.
- First full project meeting to be held in Hanoi, Vietnam, 4–5 June 2005.

Expected Outputs

The third component of the project will continue to develop the Asia-Pacific Marine Finfish Aquaculture Network (APMFAN) and its activities, coordinated by the Network of Aquaculture Centres in Asia-Pacific (NACA). The network facilitates collaboration and information exchange amongst researchers, policy-makers and managers, and industry in the region. The APMFAN will provide an effective and widespread dissemination mechanism for project outputs.

Anticipated Impacts

Outputs will contribute to the development of hatchery technology for marine finfish, particularly high-value species such as groupers. The main focus will be on delivering technologies appropriate to implementation in small-scale hatcheries.

Enhanced uptake of alternative (to ‘trash’ fish) feeds will improve the sustainability of marine finfish aquaculture by contributing to the conservation of fisheries resources. Subject to feed cost, compounded feeds should be more cost-effective than trash fish, improve fish condition and growth rates, and reduce localized pollution.

The impacts of feeding fish on compounded feeds instead of trash fish are yet to be assessed. However, given the differences in flesh taste and texture that can derive from feeding pellets, it is likely that adoption of pellet diets will lead to some market impacts.

The APMFAN continues to provide a valuable mechanism for distributing research outputs in the broader Asia-Pacific region. Activities such as the Grouper Hatchery Training Course assist in providing access to hatchery technologies to a wide range of practitioners in the Asia-Pacific region.

FIS/2003/027: Planning tools for environmentally sustainable tropical finfish cage culture in Indonesia and northern Australia

Project Leader	Dr David McKinnon Phone: 07 4753 4292 Email: d.mckinnon@aims.gov.au
Overseas Project Leader	Dr Rachmansyah
Overseas Collaborating Countries	Indonesia
Commissioned Organisation	Australian Institute of Marine Science, Australia
Collaborating Institutions	University of New South, Australia Research Institute for Coastal Aquaculture, Indonesia Marine Harvest, Australia Hasanuddin University, Indonesia Central Research Institute for Aquaculture, Indonesia Gondol Research Institute for Mariiculture, Indonesia Directorate General for Aquaculture, Indonesia
Project Budget	\$745,285
Project Duration	01/01/2005 to 31/12/2008

Project Background

Fish farming using sea cages is a lucrative industry for otherwise poor coastal communities throughout the tropics of Asia. High value marine finfish such as groupers are in demand, particularly in the live fish markets of Hong Kong. Recent advances in the culture of these fish have further enhanced the growth potential of this industry.

Environmental constraints on the development of fish cage culture in Asia are (i) a lack of equitable planning tools, (ii) no established means of estimating carrying capacity, (iii) a lack of tools for environmental impact assessment, and (iv) a very real risk of disease as a result of “clustering” of farms in bays and estuaries. In addition, reported economic losses associated with poor environmental management can reach or exceed 10 per cent of the value of production. If the industry stocks cages beyond sustainable levels, continued and untreated environmental impacts could cause the collapse of the industry as well as large-scale impacts in surrounding waters.

At present, the lack of planning tools to estimate capacity and for cost-effective environmental impact assessment limits the effectiveness of regulating agencies in managing the sustainable development of the sea cage industry.

Objectives

Develop and apply planning tools to establish sustainable capacity thresholds for tropical finfish cage aquaculture.

1. Establish a database detailing the environmental effects of finfish cages in Indonesian and Australian locations, by data mining and by direct measurement.
2. Adapt/develop an appropriate model to determine carrying capacity of tropical marine coasts for fish cage culture.

3. Develop a coastal aquaculture classification scheme for seacage and land-based aquaculture by combining and integrating the findings from this project and those of ACIAR Project Land capability assessment and classification for sustainable pond-based, aquaculture systems (FIS 2002/076).
4. Facilitate adoption of project outputs by Indonesian agencies.

Current Status/Progress

About to commence.

Expected Outputs

This project will develop planning tools for coastal aquaculture in Indonesia. A model will be developed as a predictive tool to determine carrying capacity for fish cage culture. Initially this model will be based upon data collected by the project participants on hydrodynamics, standing stocks of nutrients, the distribution of key biota (habitat types), and major ecological fluxes in and around fish cage sites. It is hoped to include other information, such as socio-economic data, at a later stage of model refinement. By collecting these data in a range of tropical environments, from the microtidal coral reef environments near Gondol in Bali to the macrotidal, turbid mangrove environments of the Northern Territory (at Bathurst Island), it is hoped to generate management tools to cover a wide range of tropical environments differing in their assimilative capacity.

In collaboration with ACIAR project (FIS 2002/076) *Land capability assessment and classification for sustainable pond-based, aquaculture systems* we will develop a coastal aquaculture classification scheme for seacage and land-based aquaculture by combining and integrating the findings from both projects. This will result in the introduction, for the first time in Indonesia, of a combined coastal aquaculture classification scheme.

Though this will initially apply only to South Sulawesi, protocols to apply similar schemes and mapping technologies to other islands will be developed.

The combination of modelling tools with mapping products will result in better management of the rapidly expanding coastal aquaculture in Indonesia. At local scales this will comprise recommendations for on-farm management, especially with regard to location of cage arrays and feeding practices. At provincial scale we will develop predictive guidelines for siting and best environmental practice of tropical marine fish cage culture, compatible for both northern Australian and Indonesian environments. Because of the diverse nature of our study sites, it is hoped the planning tools developed will also be applicable on a regional scale.

Anticipated Impacts

This project will result in improved capacity for decision makers to manage aquaculture development in the coastal zone, in particular by minimising adverse environmental effects of cage culture operations. The goal is to achieve sustainable growth of sea cage aquaculture in Indonesia, whilst at the same time improving the yield of cultured fish through appropriate siting of cages and improved feeding schedules (i.e. minimisation of wastage). The direction of the research, and its ultimate implementation, will be guided by a Local Advisory Group for aquaculture planning in South Sulawesi. A National Steering Committee under the chairmanship of the Director General of Aquaculture will liaise annually with the Local Advisory Group and meet with project scientists periodically. The close involvement of Indonesian management agencies with the scientific team will maximise uptake of the planning tools developed during the course of this project.

FIS/2002/076: Land capability assessment and classification for sustainable pond-based aquaculture systems

Project Leader	Dr Jes Sammut Phone: 02 9385 6211 Email: j.sammut@unsw.edu.au
Overseas Project Leader	Akhmad Mustafa, RICA, Indonesia
Overseas Collaborating Countries	Indonesia
Commissioned Organisation	University of New South Wales
Collaborating Institutions	Australian Institute of Marine Science, Australia Research Institute for Coastal Aquaculture, Indonesia Gadjah Mada University, Indonesia Directorate General Aquaculture, Indonesia
Project Budget	\$732,586
Project Duration	01/07/2005 to 30/06/2009

Project Background

In Indonesia, the rapid expansion of land-based aquaculture systems often involves the construction of earthen ponds in unsuitable environments due to a lack of effective site selection criteria and land capability assessment techniques. Similarly, intensive shrimp farming systems are often developed in areas that are more suited to less intensive or alternative aquaculture systems. Consequently, the development of land capability classification schemes is now a high priority in Indonesia to ensure that new aquaculture enterprises are sustainable. In Australia pond production targets are not being met despite relatively good estuarine water quality and an absence of virulent pathogens normally associated with large-scale production losses in South East Asia. Low yields have been putatively linked to site limitations and unsuitable pond management strategies. Presently, mapping criteria in Australia are limited to basic site factors and in some cases designed largely to satisfy screening requirements in development approval processes (Stone *et al.*, 2000).

The Indonesian component of the project will develop land capability assessment protocols using geospatial data and satellite imagery for regional-scale environmental assessment. This activity will be based on detailed field investigations and validation of secondary sources of data. The project will also develop an overall coastal classification scheme in collaboration with ACIAR Project FIS/2003/027 (*Planning tools for environmentally sustainable tropical finfish cage culture in Indonesia and northern Australia*) in order to address the needs of both land and sea-based farmers. The project outputs will also include accompanying land capability maps for sustainable pond-based aquaculture and where required, combined land and water classifications schemes. Farm-level site selection criteria, utilising low-cost and simple technology, will be developed to enable Australian and Indonesian farmers to make better choices for pond/sea cage location, design and management, and also to select the most appropriate form of aquaculture. The community benefits in both countries include more accurate site assessment, improved pond yields, more effective environmental decision-making, reduced social conflicts between land and sea-based aquaculture industries, minimised socioeconomic inequalities, and improved coastal resource management.

The project will build on the existing collaboration between UNSW and RICA, developed under ACIAR Project FIS/97/22. Gadjah Mada University (GMU) has experienced researchers in remote sensing, GIS, coastal resource assessment and environmental management and will assist with the development of image-based land classification schemes. The project has strong inbuilt linkages with FIS2003/027, coordinated by AIMS, which will involve joint extension activities and collaboration on the mapping components of both projects through sharing resources, technology and project staff, and the creation of a coastal aquaculture classification scheme.

Objectives

The overall objective of the study is to develop more effective and informative site selection criteria and land capability assessment techniques to produce land classification schemes and maps for a variety of land-based aquaculture systems in Indonesia, and secondly, to identify environmental constraints and improve existing site selection criteria and land capability assessment and mapping in Australia.

Current Status/Progress

In pipeline – anticipated start date: 1 June 2005

Expected Outputs

The planned outputs target government officers, consultants and farmers and will involve training extension officers to more effectively use the planning tools. The project will produce a coastal aquaculture classification scheme for coastal lowlands and marine environments in Indonesia, site selection criteria for both countries, and revised mapping protocols underpinned by land/water capability assessment. In collaboration with FIS/2003/027, this project will produce an aquaculture suitability map series for Indonesia and will publish site selection and aquaculture management guidelines. Extension training will also be provided.

Anticipated Impacts

Application of the research findings will be promoted through a focused engagement with key stakeholders throughout the life of the project and the active extension of a coastal classification scheme for aquaculture and improved site selection criteria for farm-level applications. In Indonesia, the project will build on existing working linkages to provincial and central fisheries departments to build ownership and to disseminate project outputs through a consultative framework developed in close consultation with Indonesian authorities. This will involve a National Steering Committee and a linked Local Advisory Committee in South Sulawesi, both to be coordinated through DGA, and covering the activities of both ACIAR projects. In Australia, the findings of the study will be made available to the relevant state authorities responsible for revisions of current aquaculture planning strategies and more directly to farmers through QDPI, NSW DPI, and the Australian Prawn Farmers Association (APFA).

3. Small Research Activities

FIS/2005/028: Technical training and capacity building program for the restoration of Tsunami-impacted brackishwater aquaculture ponds in Aceh

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Overseas Collaborating Countries	Indonesia
Commissioned Organisation	University of New South Wales, Australia
Collaborating Institutions	Brackishwater Development Centre, DGA, Ujung Batee Regional Mariculture Development Centre, DGA, Batam Centre for Marine Science and Fisheries, Syiah Kuala University, Banda Aceh
Project Budget	\$102,948.77
Project Duration	27/04/2005 to 31/12/2005

Project Background

The 26 December Tsunami in Aceh, North Sumatra, caused extensive damage to brackish water aquaculture ponds, particularly in the north-eastern coastline where the industry was well developed. Over 20,000 ha of ponds are currently out of production and 13,000 ha are severely degraded or lost (Phillips and Budhiman, 2005). Brackishwater aquaculture is an important industry in Aceh and mainly involves family-run, extensive ponds to cultivate milkfish and shrimp. Approximately 40,000 people in the aquaculture sector have been directly affected and there are unquantified negative multiplier effects in the community (Phillips and Budhiman, 2005). Following the tsunami, The Government of Indonesia (GoI) requested assistance from ACIAR to provide technical support and capacity building activities for staff from institutes under the Directorate General of Aquaculture (DGA), Ministry of Marine Affairs and Fisheries (MMAF). An ACIAR scoping mission to Indonesia from 13-18 March 2005 involved discussions with a number of government and non-government agencies involved in the restoration of livelihoods, particularly in the agriculture and fisheries sector. These meetings were facilitated by DGA in an effort to identify key areas of need that DGA and ACIAR could collaboratively address. The restoration of brackishwater aquaculture ponds was consistently identified as a high priority. Ponds close to the pre-tsunami coastline, which has now been altered due to severe erosion, have been completely destroyed. Further inland, many ponds are no longer operational due to sedimentation, destruction of dykes, infilling of inlet and outlet canals due to deposition of eroded coastal soils and domestic and industrial waste, and loss of infrastructure. Tragically, the tsunami also caused extensive loss of life. Skilled fisheries workers were also killed and fisheries support services are now very limited due to loss of staff and facilities. The surviving staff require additional training to face the challenges of restoring severely degraded brackishwater ponds. Despite the catastrophe, farmers are willing and eager to rehabilitate their ponds to restore their livelihoods. A need for longer-term technical support for pond restoration, based on the set up and monitoring of pilot trails, was also identified.

A 'train the trainer' workshop was recommended by DGA and its various research and extension institutes as an essential early intervention in the restoration process. The primary purpose of this activity is to provide technical training to selected staff who would then build technical/extension teams that will be responsible for the delivery of low technology solutions to farmers in tsunami-affected areas of north east Aceh. The trained staff would have the capacity to train other government staff as part of a longer term training program coordinated by DGA but with assistance from ACIAR if required. The training would underpin the creation of extension teams to provide technical assistance to farmers in the impacted sub-districts of Aceh.

The development of pilot restoration projects and demonstration areas was also identified as a priority in order to facilitate the dissemination of restoration methods and to refine and further strengthen the rehabilitation services and activities. This activity would disseminate valuable research findings and extension outputs generated by ACIAR Project FIS/97/22 at the Research Centre for Coastal Aquaculture (RICA) in South Sulawesi and the University of New South Wales (UNSW). This project, a collaborative effort between RICA and UNSW, facilitated by ACIAR, has developed simple solutions for the restoration of degraded shrimp farms based on a series of rigorous scientific studies and field trials. There is, therefore, an opportunity to quickly apply these research and management outputs to the situation in Aceh to generate immediate positive impacts.

Furthermore, the DGA, its provincial and regional agencies and other organisations involved in the restoration of livelihoods, identified a need for medium to longer term interventions for wider, strategic redevelopment of the aquaculture centre. It was suggested that during the proposed technical training program, the potential for longer-term projects could be investigated. An adaptive approach to the restoration process was considered an appropriate approach and would involve regular monitoring of the impact of the technical training program. Pilot trials that would follow the initial training would provide an opportunity to assess the effectiveness of the restoration techniques, to assess the development and impact of the extension teams, and identify areas for further training. Additionally, resource needs for long term support will be identified.

Objectives

The overall objective of the proposed project is to provide technical training to fisheries staff from institutes managed by the Directorate General of Aquaculture in order to build extension teams to help farmers restore degraded ponds. The main agencies include Dinas Perikanan and the Aquaculture Centre Ujung Batee. Staff from UNSYIAH, the main tertiary institute in Aceh, will also be involved to provide laboratory and research support to the government staff. The training program will be based on a 'train the trainer' model so that participants will be able to progressively build more extension teams to assist farmers in the various affected sub-districts. The specific objectives include:

1. To design and deliver a 'train the trainer' program to establish technical/extension teams, under the management of DGA, that will assist farmers in the restoration of degraded brackishwater aquaculture ponds.
2. To develop pilot programs in selected sub-districts to build Dinas Perikanan extension teams and to commence the pond restoration process.
3. To identify and provide long term technical/training support to DGA, its institutes and allied organisations.

Expected Outputs

- A ‘train the trainer’ workshop that will enable DGA institutes to build extension teams that will deliver technical solutions for pond remediation work.
- The establishment of extension teams that are resourced to tackle the pond restoration issues.
- The provision of supporting technical materials and minor equipment necessary for the pond restoration programs.
- Improved linkages between DGA, UNSYIAH and farmers.
- Increase in the overall capacity of groups involved in the restoration programs.

Anticipated Impacts

- Opportunities to develop linked projects and to create links with other programs also involved in the restoration of livelihoods.
- Restoration of degraded ponds that will be more productive and sustainable.
- Minimise the potential for economic losses that would otherwise occurred without technical input.
- Reduced need for development of natural landscapes or other coastal land uses for aquaculture.
- Capacity of government institutes to provide long term support to the aquaculture industry.

Improved socio-economic outlook of the community by re-establishing livelihoods and generating employment opportunities.

FIS/2005/025: Fisheries rehabilitation in tsunami-affected Indonesia: community needs assessment and resource status

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Background

The Indonesian coastal communities impacted by the December 26 tsunami relied significantly on capture fisheries as a source of livelihoods and income. In Aceh capture fisheries produced over 133,000 tons, and the total value of capture and aquaculture production was over AUS\$225 million. It is estimated 16% of the coastal population was directly employed in the fishery sector and it accounted for 3% to Aceh's GDP. The tsunami heavily impacted fisheries livelihood, 15-20% of fishers were killed, support infrastructure was destroyed or damaged and many community members lost houses, fishing boats, engines and gear. There is a clear need to assist communities to rebuild their assets and restart their livelihoods.

Prior to the tsunami, coastal communities were already facing serious issues, such as poverty and potentially overfished and declining natural resources. In the rehabilitation and reconstruction of fisheries livelihoods it is crucial that these communities are assisted to develop more sustainable livelihoods and pathways out of poverty. This will require strategic planning and the implementation of appropriate fisheries management approaches. These principles are reflected in the Indonesian *Strategy for Rehabilitation and Reconstruction of the Fishery Sector* developed by the Ministry of Marine Affairs and Fisheries (MMAF). This Strategy requires key information on community needs and resource status to develop the medium-term action program to support the Strategy. This information needs to be available urgently to ensure effective targeting of resources and investments.

Objectives

The project objective is to ensure that the Indonesian strategy for rehabilitation and restoration of capture fisheries in tsunami-impacted areas is founded on an understanding of 1) the community needs and perspectives in terms of sustainable livelihoods strategies and 2) the fisheries resource status.

Justification and outputs

To date the focus of on the ground activities in Aceh has been on immediate humanitarian relief followed by interventions to rapidly restart livelihoods (e.g. provision of boats and port infrastructure). In line with these activities, the impact and needs assessments and community engagement have focused on these immediate issues. In order to move towards longer-term planning and the development of sustainable fisheries livelihoods, there is a need for a more detailed understanding of the communities, resources and fisheries. This has been stated as a priority by MMAF. This is critical to ensure appropriate community engagement and the development of realistic objectives and activities that take into account community needs and aspirations and the limitations of the natural resources. This project will provide this key information for communities within the Aceh province. The key outputs will include:

1. An assessment of the fishing community needs, livelihood strategies and perceptions,
2. An evaluation of the state of fisheries resources and fisheries prior to the tsunami.
3. Action plans at the District, Province and National level that reflect the community needs and resource status.

Approach and activities

The activities in relation to each output are given below:

An assessment of the fishing community needs, livelihood strategies and perceptions. This will be obtained through participatory rural appraisals, conducted within selected villages in each SubDistrict. Within each village the appraisals will be conducted with different community groups, e.g. women's groups, men's groups, *Panglima laot* (fishers' representatives). The appraisal will focus on: livelihood strategies prior to the tsunami, the role of capture fisheries and related activities, community institutions, rehabilitation needs and perceptions of the resource status.

An evaluation of the state of fisheries resources and fisheries prior to the tsunami:

The available data on fisheries resources will be collated from District and National levels, including catch and effort records and any available resource surveys. An assessment of the state of the resource, evidence for overfishing and appropriate levels of fishing capacity. The structure of the fisheries and market pathways prior to the tsunami will also be documented.

Action plans at the District, Province and National level that reflect the community needs and resource status:

Facilitated workshops will be held to incorporate the results of the community and resource assessments into District and Province level action plans. These action plans will also be discussed with the MMAF and contribute to the development of the medium and long-term National action plans.

These activities will result in strengthened linkages between communities and the District, Province and National government in developing the rehabilitation and reconstruction plans. The capacity of District and Provincial agencies to facilitate participatory assessments and work with the communities will also be increased through their direct involvement in the participatory rural appraisals, resource data collation and workshops.

Why the WorldFish Center

The WorldFish Center has been engaged in projects within Indonesia for over 15 years. These have focused on the improvement of fisheries and aquaculture related livelihoods, sustainable management of coastal resources and the identification of pro-poor technologies and policies. Through these projects the WorldFish Center has developed strong partnerships in Indonesia, particularly with National fisheries agencies. Due to our partnerships and experience in Indonesia, the WorldFish Center has been specified as providing inputs into the ADB Technical Assistance to develop an Indonesian Marine and Fisheries Sector Strategy. This project will build on these partnerships and previous experience, while providing the necessary multidisciplinary approach and expertise.

Project location

The focus is on the impacted coastal communities in Aceh, Indonesia. The initial emphasis will be on east coast communities. These communities suffered comparatively less damage and are more rapidly moving towards the stage of being receptive and able to participate in planning discussions. The communities on the west coast, which were most heavily impacted, will also be covered, but this will start once their immediate needs have been addressed.

Collaboration and capacity strengthening

This project will be undertaken in consultation with the FAO representatives in Banda Aceh, who will contribute to technical oversight and ensure coordination with other activities. The District and Provincial Dinas Perikanan will be key partners in undertaking the fieldwork and also establishing mechanisms for community participation and developing District and Provincial action plans. The Agency for Marine Affairs and Fisheries Research and the University Syiah Kuala University (Banda Aceh) will be collaborators in terms of contributing to the resource assessment and analysis of the participatory rural appraisals. The MMAF will also be a key partner to ensure integration of the results in the National Strategy.

Beneficiaries and strategy for impact

The immediate beneficiaries would be the coastal communities in Aceh impacted by the tsunami that rely on capture fisheries. This project aims to ensure that the needs and perceptions of these communities and the sustainable limits of the natural resources are integrated into District, Province and National Strategies for rehabilitation. This will result in action programs that have a greater likelihood of providing sustainable fisheries livelihoods for these communities and ensuring the integrity of the natural resource base.

Project duration

18 months

Budget

The budget requested from ACIAR would be AUS\$150 across 18 months, with 45% allocated for staff time (6 person months, international and regional staff), 42% allocated for field work and training, 13% for operating expenses and general administration costs.

The WorldFish Center and Indonesian partner organizations will contribute AUS\$50 in kind support to the project.