A Value Chain Assessment of the Aquaculture Sector in Indonesia

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"Helping Indonesia to Grow"

A VALUE CHAIN ASSESSMENT OF THE AQUACULTURE SECTOR IN INDONESIA

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For the

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Acronyms

ADB	Asian Development Bank
AMARTA	Agribusiness and Market Support Activity
AusAID	Australian Agency for International Development
BAP	Best Aquaculture Practices
BMPT	Badan Musyawarah Pembudidaya Tambak (Shrimp farmers association)
BRR	Badan Rehabilitasi dan Rekonstruksi NAD-Nias (Agency for Rehabilitation and Reconstruction)
CAP	Chloramphenicol
CIF	Cost, Insurance, and Freight
COO	Certificate of Origin
DCA	Development Credit Authority Program
DGA	Directorate General of Aquaculture
DGSIC	Directorate General of Small Island and Coastal Area
DKP	Dias Kelautan dan Perikanan (provincial/district fisheries department)
DNA	Deoxyribonucleic acid
EU	European Union
FAO	Food & Agriculture Organization
FOB	Freight-on-Board
GAPPINDO	Indonesian Fishery Business Association
GDP	Gross Domestic Product
GRIM	Gondol Research Institute of Mariculture
GOI	Government of Indonesia
HACCP	Hazard analysis critical control points
HPV	Hepatopancreatic parvovirus
IFC	International Finance Corporation
INBUDKAN	Aquaculture Intensification Program (Intensifikasi Budaya Perikanan)
JICA	Japan International Cooperation Agency

JICS	Japan International Cooperation System
MBV	Monodon baculovirus
MMAF	Ministry of Marine Affairs and Fisheries
MOT	Ministry of Trade
MSME	Micro, Small, and Medium Enterprises
MT	Metric ton
NACA	Network of Aquaculture Centers in Asia Pacific
NAD	Nanggroe Aceh Darussalam
NGO	Non Governmental Organization
NF	Nitrofurans
NTT	Nusa Tengara Timur
PCR	Polymerase Chain Reaction
PL	Post Larvae
PNM	Permodalan Nasional Madani
UNDP	United Nations Development Program
SPF	Specific Pathogen Free
SPR	Specific Pathogen Resistant
SUMSEL	Sumatra Selatan
SUMUT	Sumatra Utara
TIR	Tambak Inti Rakyat
TSV	Taura Syndrome Virus
USAID	United States Agency for International Development
WSSV	White Spot Syndrome Virus

1. Executive Summary

The value chain (VC) assessment is the first step to understand and to identify opportunities and constraints in the aquaculture sector in Indonesia. This assessment provides a basis to evaluate needs and capacity to respond to market demands. AMARTA's technical approach encompasses the identification and strengthening of successful firms and dynamic key actors within the value chain which will serve as models to catalyze improvements of other firms.

The strength of AMARTA will be to facilitate among all actors in the aquaculture VC in areas with existing comparative advantages. The efficacy of AMARTA's interventions and support lies in the vertical and horizontal linkages among the VC participants such as the farmers, the processors, the buyers, the government and other donors in the sector. Indonesia is the biggest archipelago on earth, with some 17,508 islands, and a coastline of 81,000 km. However Indonesia's seafood industry is still in its infancy compared to its Asian neighbors.

We have identified three target sub-sectors in the aquaculture industry located in the provinces of Bali, Nusa Tengara Timur (NTT), Aceh, Sumatra Utara (SUMUT), Sumatra Selatan (SUMSEL), Java Barat and Jakarta. The sub-sectors have been chosen based on their existing comparative advantages and opportunities they represent to increase Indonesian competitiveness. The recommended strategies are:

- Increase and strengthen Indonesian Competitive Position in the Life Fish Grouper market. Indonesia has been in the forefront of the grouper culture technology, however it has been struggling in materializing this comparative advantage in capturing the potential revenues in the growing high-value niche market.

- Improve and strengthen the Indonesian Shrimp Brand in the world. Among Indonesia's fishery products, shrimp contribute the largest foreign exchange earnings (During January-August 2006 period, Indonesia exported 112.5 million tons of shrimp with a total value of US$739.2 million.) However, increased international consumer demands for food safety standards and traceability is a challenge for farmers and the industry to meet. By establishing a national brand of safely produced shrimp, Indonesia will not only maintain its position in the world market but can demand a premium and distinguish themselves from other major shrimp producing countries such as Thailand and China.

- Improving the Added Value of Freshwater Aquaculture products for the markets in the Jakarta region (estimated at 20 million people). The growing urban markets represent a market opportunity for fish farmers in the Java region by improving their fish products through value added processes, cold chain and linkages with supermarket market segments.

2. Introduction

Indonesia is currently the ninth largest fish producer in the world. Indonesian climate lends itself to aquaculture production all year round and the country has tremendous potential to be a bigger seafood player, given the country's extensive coastline and abundant marine resources. Indonesia was estimated to earn a total of US$2.1 billion from the export of aquaculture products last year. The aquaculture products were exported to 126 countries in 2006. The United States was the main importer, buying 83,347 tons (12.54%, representing a value of US$475.14 million) of Indonesia's total aquaculture exports last year. Indonesia also exported products to China (78,686 tons or 11.84 percent), Japan (74,973 tons or US$409.66 million, 11.28 percent), and the European Union (51,976 tons or US$193.56 million, 7.82 percent) (ANTARA news 2007).

Aquaculture is an important source of employment, providing livelihoods to an estimated 2, 384, 208 households involved in fish culture in marine areas, brackish water ponds, freshwater ponds, freshwater cages and paddy fields (Ministry of Marine Affairs and Fisheries (MMAF), 2004). The coastal areas are potential for mariculture development with species such as coral fish, oyster and seaweed and the coastal, intertidal and marginal areas still provide opportunities for further development in shrimp culture and other species. "*The natural potential of this sector is far from optimized*" (Minister of Economy Dr Dipo Alam).

2.1. Current Production Levels

Table 1 provides a description of the growth of fish production in Indonesia categorized into two broad sources, marine fisheries and inland fisheries, and for the various sub sectors within each category for the period of 2002 – 2005.

Table 1 Growth of Fisheries Production, 2002 - 2005 (in Mt) by Sub Sectors

	Year (Unit: MT)				Average Growth Rate (%)
TYPE OF FISHERIES	2002	2003	2004*	2005*	2000 - 2005
Marine fisheries	4,073,606	4,383,103	4,571,510	4,663,010	4.32
Inland fisheries	304,989	308,693	310,300	312,000	8.09
AQUACULTURE					
Marine Aquaculture	234,859	249,242	420,919	519,200	23.30
Brackish Water	473,128	501,977	559,612	643,600	15.00
Fish Ponds	254,624	281,262	286,182	307,900	7.60
Cage	40,742	40,304	53,694	65,600	22.20
Floating Cage	47,172	57,628	62,371	72,300	15.90
Paddy field water	86,627	93,779	85,832	90,000	4.90
TOTAL PRODUCTION	5,515,747	5,915,988	6,350,420	6,673,610	7.36

3. Activities and Methodology

The team, Ingrid Ardjosoediro and Franz Goetz, conducted interviews with representative members of the value chain in the selected provinces of Bali , Nusa Tengara Timur (NTT), Aceh, Sumatra Utara (SUMUT), Sumatra Selatan (SUMSEL), Java Barat and Jakarta. The value chain assessment took place December 3-23 2006. This information was supplemented by desk research using donor, NGO and government reports and interviews with officials from the provincial Fisheries Bureau and representatives of NGO's and donor organizations active in the target provinces.

3.1. Objectives and Tasks

The overall objective of the assignment was to conduct a rapid assessment of the aquaculture value chain in Indonesia. The following critical points were evaluated:

- Current production levels (species captured, farmed, common diseases limiting yield and/or quality).
- Market channels through which product flows, the types of firms participating and inter-firm relationships, and dynamics driving change.
- The characteristics of the market segments for main products.
- Level of technology (extensive, semi-intensive through intensive aquaculture practices, hatchery grown seed stock or wild caught, antibiotics or chemicals used).
- Post-harvest handling/processing practices, including cold units available off-dock, packing house and packaging materials used, cold storage available or used, food safety practices (Hazard analysis critical control points or HACCP) or Best Aquaculture Practices (BAP), processing for added value, labor requirements.
- Technical assistance availability (public or private advisory services available).
- Financial assistance availability (access to credit, export and local financial plans/services available).
- Distribution and logistic issues (mode of product delivery, role of brokers and/or wholesalers, status of cold chain system to final delivery, use public and/or private warehouses).
- Sales/marketing practices and conditions (Selling Freight-on-Board (FOB) or Cost, Insurance, and Freight (CIF), terms of sale - cash or credit, use of contracts, export and/or local sales).
- Policy and regulatory Issues (local, regional, international Quarantine issues, rules on food safety standards etc).

3.2. The Value Chain Approach

The Value Chain Approach focuses on four key factors that affect competitiveness:

1. *Inter-firm cooperation and coordination;* this cooperation generates opportunities for efficient inputs, product and information flows between firms, enabling them to respond to competition from other countries.
2. *Relationships among firms;* Facilitating mutually beneficial, or "win-win," relationships among firms in a value chain creates incentives for firms to seek increased efficiencies in moving products and information between firms, and developing industry level strategies to compete in a global market place.
3. *Distribution of benefits creates incentives or disincentives for performance*. Benefits within a value chain are varied, but can translate into increased income, reduced market risk (more stable income), and increased value of assets.
4. *Learning and innovation are essential for creating and sustaining competitiveness.* Rapid learning about consumer preference and access to the skills and technologies needed to respond are important, particularly if small firms are to remain competitive and continue to upgrade in response to market opportunities.

3.3. The Value Chain Methodology

An intervention strategy must start with an understanding of the threats and opportunities for participants in a market. The Value Chain Approach assesses the constraints to and opportunities for enhancing an industry's competitiveness through a diagnostic framework that includes five elements:

- End Market Opportunities
- Enabling Environment (international and national)
- Inter-firm Cooperation: Vertical Linkages
- Inter-firm Cooperation: Horizontal Linkages
- Supporting markets (sector-specific and non-sector specific services, including financial services)
- Firm-level Upgrading (product and process upgrading)

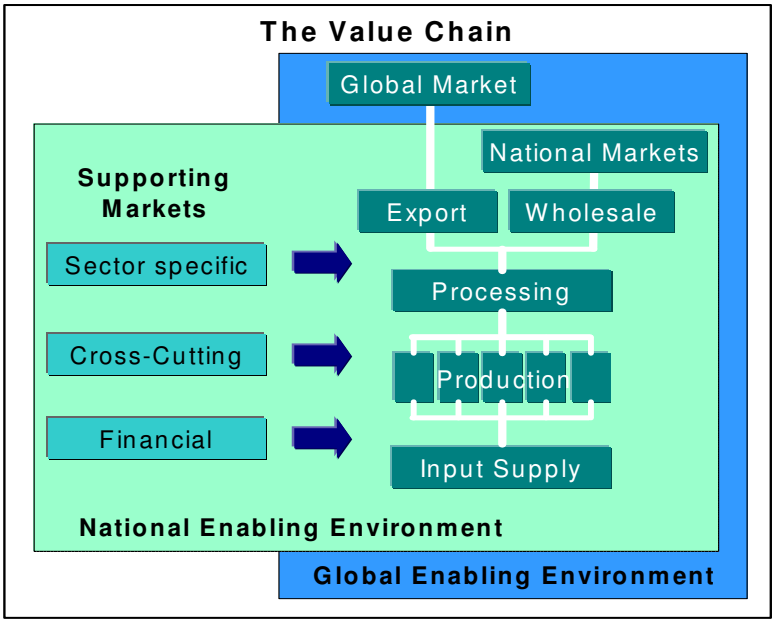

Figure 1 The Value Chain

(Source: USAID Abstract: Value Chain Approach to Poverty Reduction: Equitable Growth in Today's Global Economy Accelerated Microenterprise Advancement Project – by Business Development Services Indefinite Quantity Contract; Mark Freeman, 2005)

4. Policy, Regulatory and Institutional Framework

The Ministry of Marine Affairs and Fisheries (MMAF or Departemen Kelautan dan Perikanan or DKP) is the principal agency responsible for marine and fisheries sector planning, management and administration in Indonesia. As of February 2005, the Ministry comprised: (i) six line offices, consisting of an Agency for Marine Affairs and Fisheries and five Directorate Generals - of Aquaculture, Capture Fisheries, Coastal and Small Islands, Marine and Fisheries Resource Controls and Capacity Building and Marketing (ii) two staff offices, a Secretariat General and an Inspectorate General, and (iii) an Advisory Staff providing expertise to the Minister in specific fields.

On matters related to aquaculture, the Ministry operates through the Directorate-General of Aquaculture Development. At national level, fisheries and aquaculture are regulated by Fisheries Law No. 31/2004 (2004), which underscores the importance of sustainable use of aquatic resources in the development of fisheries.

Under Law No.22/1999 on Regional Administration (1999), and in the context of the decentralization process, Provincial Governments are held responsible for the management, use and conservation of marine resources in their own territory, within territorial waters.

4.1. Food Safety and Traceability issues

The legal framework for food safety is based on Act No.7 on Food (1996). This includes provisions on food processing, storage, packaging, labeling and transport. The use of food additives and genetic engineering are also regulated. It is established that food processing plants must implement a quality control system. Only few provisions on fish products safety are found in the 2004 Fisheries Law.

Aquaculture farms and fish processing plants are required to implement a quality control system, consisting of the following instruments:

- Quality monitoring and control.
- Implementation of required health standards in activities such as handling, cultivation and processing, and in the maintenance of facilities and infrastructure.
- Adoption of certification system.
- A Certificate of Application of Integrated Quality Management Program is granted to complying subjects.

5. Overview of the Marine Aquaculture Value Chain (Grouper species)

5.1. Market Demand

The production of live fish grouper species is primarily focused on the international market and was established to supply the growing demand in Hong Kong and the region. Market demand is on a steady rise with the economic development in Asia, especially in China. The center for the Live Food Fish Trade is located in Hong Kong -- this market contributes $400 million to the estimated $1 billion of the global trade value. Total imports flowing into Hong Kong included 10,153 metric tons, of which 30 percent was re-exported to mainland China. Other major markets include Singapore, mainland China, and Taiwan. Initially, the supply was based on marine capture fisheries using unsustainable environmental practices such as the use of potassium cyanide, which resulted in over fishing of the natural fish stocks of coral reefs.

Due to increased pressure from consumers and the environmental community to cease these practices, fish farmers have resorted to aquaculture production of several grouper species. The Gondol Research Institute of Mariculture (GRIM) owned by the Government of Indonesia (GOI) located in Bali in co-operation with the Japan International Cooperation Agency (JICA) has played a significant role in this development.

5.2. Description of Value Chain Participants

The production of the grouper species could be categorized into distinction in export value and production requirements:

3. Group 1: Production of Humpback grouper (*Comilepties altivelis*) and Red Coral trout (*Plectropomus Leopardus*); relatively higher value, but superior requirements for grow-out conditions, located in the eastern regions of Indonesia.
4. Group 2: Production of Mud grouper (*Epinephelus tauvina*), Tiger grouper (*Epinephalus malabaricus*), and Greasy grouper (*Epinephalus fuscoguttus*); production occurs in Riau islands, South and North Sumatra (Nias) and on the northern western coast of Aceh.

Input Supply

Brood stock supply: Most of the brood stock for fingerling production is obtained from the wild. The GRIM has initiated breeding programs to improve on the quality of brood stock to increase fingerling survival rates, growth rates and decrease in diseases and deformities. Breeding and hatching technology of a number of grouper species are among the first developed in the world, and production practices of nursery and grow-out technology have been successfully developed.

Fingerling supply: For the production of fingerlings of Group 1, most farmers are reliable on the supply from GRIM and a handful of private hatcheries located in Bali. (E.g.

Hatchery operated by Dr Shogo Kawahara). These fingerlings are usually fed an artificial diet and subsequently require the continuation of this feed regime during the grow-out period. The fingerlings of Group 2 are produced without difficulty by GRIM, privately owned hatchery owners or supplied from the wild. However there is still need for improvement on the quality of the fingerling production in both categories, because many nursery and grow-out operators have expressed the problem of low survival rates of fingerlings and lack of conformity.

Feed supply: Feed companies in Indonesia have actively supported the research in grouper feed and are working in co-operation with GRIM and other stakeholders on the production and improvement of palletized feeds for the higher prized grouper varieties. However it has been expressed by several farmers that there still is a lack of an adequate feed diet for the grouper fingerling and nursery phase and some of the palletized feed is supplemented by imports. The use of trash fish for feed is common in the production of both group 1 and group 2. The supply of trash fish is seasonal and dependent on the capacity of the local fisheries production. Improvement is needed in feeding practices when using trash fish, as this creates a habitat for diseases and environmental degradation when not managed properly.

Labor supply: Labor for the development of the fingerling, nursery and grow-out operations is available, as more fishermen are looking for alternative sources of income. However there is a need in training for technicians and farm management,

Production technology

The production technology used in the grow-out phase is the net cage technology located along the coast. The location of these net-cages is dependent on the water quality requirements for each species. The average grow-out phase of the grouper is nine months. The production of the Group 1 species require a relatively higher standard for water quality and interested grow-out operators are looking into the eastern regions of Indonesia, such as Flores and Irian Jaya. This area has not been affected by pollution due to the remoteness and clear waters due to the coastal characteristics.

The production of the group 2 category has been developed in several areas in Indonesia, such as Riau islands, South and North Sumatra (Nias) and on the northern western coast of Aceh. The production flow for the group 2 category can be illustrated as follow; it starts with the import of fry from Bali hatcheries by grouper traders based in Medan to nursery operations in Aceh (Biruen, Sigli, Loksmaweh and Langsa area). Contract nursery operators raise these fry until they reach 8-10 cm in length in tambak facilities. This is a system of net structures (hapas) placed in earthen ponds. The fingerlings are then transported by truck (approx, 14 hr drive) back to Medan, where they are either exported to grow-out facilities in Malaysia or Hong-Kong or raised in grow-out facilities in Indonesia owned by these traders. It has been observed that there is a desire from fish farmers to expand into grow-out operators, but limited cash flow capacity, long grow-out period (9 months) and monopoly of traders based in Medan, are some of the barriers to entry.

Trading

The trading of group 1 species has been very limited, due to the remoteness of the production facilities and therefore air cargo is the only option. However, existing flight connections are unreliable and limited and thus represent a high cost factor. Fish farmers are subsequently dependent on the few traders operating at the Benoa harbor in Bali, where live fish are packed and shipped to markets in Hong Kong, China, and Singapore. In addition, fish farmers are not able to negotiate a fair price due to their low volume capacity. It was cited that monthly production of any project or group of co-operating projects should exceed 10 tons of live fish to justify direct collection by international traders. Currently, the low production level from collectors and aquaculture operators result in low prices, irregular sales and subsequently inhibits new investments.

Similar observations can be made regarding the trade of group 2; only limited producers are holders of export permits and contracts with traders, based in Hong Kong, and those few are mainly based in Medan. The mature live grouper is sold FOB in US currency to foreign vessels at harbors located in Indonesia. As there is no Indonesian company established in live fish transportation. The main concern raised by key actors is the difficulty in obtaining the legal license to trade in the life-fish grouper.

Processing

The grouper production is based on the live fish market and no processing is required. Preparation for live fish transport, safe packing and acclimatization of fish to the variable conditions is important and the technologies for transport seem to be well known and applied.

Consumers

The final consumer target for the market size grouper constitutes of luxury restaurants and hotels located in Hong Kong, the Chinese mainland, and Singapore. The demand in this affluent market has been on a steady rise.

Supporting Products and Services

Research and Technology: The JICA research in collaboration with the Gondol Research Station based in Bali, have resulted in viable seed production of several grouper species such as the juvenile Humpback grouper (*Cromilepties altivelis*) and Red coral trout (*Plectropomus Leopardus*). Both species have extreme high market values, require excellent water qualities for grow-out and also appear to perform well with artificial diets. The Gondol Research Institute continues to improve the technology and provides facilities for university students, international workshops and training specialized in grouper culture. Non-Government Organizations (NGOs): There has been a lot of support from the NGO community in the Aceh region after the tsunami with the provision of free fry and fingerling to fish farmers, but little has been provided in investment and technology supervision.

5.3. Key Constraints and Possible Solutions: Marine Aquaculture (Grouper Species) Value Chain

Strategy: Increase Grow- Out production and Improve Environmental safety practices to capture unmet international market demand.			
Key Constraints	**Solutions**	**Facilitators and Providers**	**Illustrative Interventions**
Supply and Handling of Seed stock Lack of hatchery and farm management practices to control diseases and reduce mortality	- Improving hatchery management practices to minimize disease incidence. - Develop MSMEs that can provide value added services to value chain participants	- AMARTA Staff - Technical Partnerships with Research stations such as the Gondol Research station - Private partnerships with leading fingerlings producers	- Develop business model for fish hatchery practices based on good aquaculture practices - Training of Trainers through the Gondol Research Station, Assistance on proper seed handling and tambak stocking techniques will reduce the mortality rate and the production costs. (or Sitobundo) - Work closely with other donors active in this sector, such as the ADB, the TNC and the IFC (see annexes)
Weak cash flow position of small farmers Long grow out production period for live groupers causes a low cash flow income for poor farmers	- Develop a grow-out production system, with continual harvest at periodic marketable sizes	- AMARTA STAFF - Grow out technicians from the Gondol Research Station and the private Sector - Other donors	- Linking farmers to differentiated market segments, such as markets for fingerlings, and midsize to full size live fish. Farmer can improve their cash flow and bargaining power. - Creation of associations or cooperation to strengthen the negotiation leverage towards buyer organizations
Lack of access to credit. Microfinance can help the poor meet their financial needs to engage in aquaculture. The initial investment capital for tambaks and production costs, including seed and feed, requires access to credit or other sources of financial capital.	Interventions aimed at aquaculture development for the poor should be based on a microenterprise approach, taking into account access to and availability of rural financial services. - The feasibility and viability of the microfinance services themselves should be emphasized to ensure sustained delivery of credit and savings services to the targeted groups.	- The Ministry of Fisheries and Aquaculture, - Other Donors, such as the World bank, The IFC, the American Red Cross - the existing NGOs providing microfinance services to rural customers	- The Ministry of Fisheries and Aquaculture is managing a World Bank Funded Project where a loan guarantee is provided to the bank for farmers in need for micro-credit (see annex). - Through project participation linking to the DCA program - Establishment of business development services to assist farmers with viable business plans and support during the application process.
Uninformative Marketing Systems Grouper, hatchery, nursery and grow out farmers lack integration with and knowledge about linking to the	-.Develop a good marketing system to provide the producer a remunerative price	- AMARTA facilitators - MMAF - Lead Exporters	- Organize field days for farmers and buyers to increase to communication flow between the actors within the value chain

export market. Lack of communication and links to main exporters is limited in remote areas.	- Improve transparency in the governmental and legislative framework in attaining permits in export of life fish species	- Buyers	- Organize forums to address market development constraints in cooperation with the GOI, to develop easy to follow procedures in attaining legal permits for exports.

6. Overview of the Shrimp Aquaculture Value Chain

6.1. Market Demand

Indonesia exported 112.5 million tons of shrimp with a total value of US$739.2 million, during the January-August 2006 period. The United States is the largest export market for Indonesian shrimp, followed by the Japan and the European Union (EU, mostly France). As for the US market, Thailand remains the main supplier for the US market, with a 32.6% share of the imported volume. The second exporter is now China which accounts for 11.3% of imports, followed by Indonesia (10.9%) and Ecuador (10.5%). These four countries concentrate 65.3% of total shrimp imports, which shows a continued trend to increased origin concentration given that in the same period in 2005, the same countries accounted for 59% of imported volumes.

Indonesia has been the main exporter of raw frozen shrimp to Japan (13,909 MT), followed by Vietnam (11,316 MT), India (7800 MT) and Thailand (5222 MT) during the first half of 2006. (Info fish Asia 2006). Although global shrimp aquaculture is dominated by the White shrimp or P. vannamei species, Black tiger or P. monodon continues to remain the dominant species imported into the Japanese market. Frozen raw Black tiger are imported as head-on, headless shell-on, peeled tail-on Nobashi. The demand for raw farmed White shrimp has increased in the Japanese market as it has gained acceptance among Japanese households due to price factors, although sizes are smaller than that of the Black tiger species. Although Japan is the second largest single market for shrimp after the USA, per capita consumption of shrimp is still higher in that country at 2.5kg compared to 1.90 kg (4.20 lb) in the USA. (Info fish Asia 2006)

There is an increase demand for higher quality standards by major importers, namely Japan, the United States and the EU. Indonesia's shrimps have been found to be infected by viruses and highly contaminated by antibiotics such as oxytetracyline, chlortetracyline, and chloramphenicol (Kompas, 3 January 2004). The EU has since 2001 required virus-free as well as antibiotic-free shrimp imports; the relevant regulation (1) strictly obliges all imported shrimp to be free from chloramphenicol.

The Ministry of Marine Affairs and Fisheries (MMAF) announced on March 3 2006 that the GOI would adopt international standards on exports of shrimp, particularly to the European Union and the United States. Director General for Fish Breeding Made L. Nurdjana stated the ministry expects to implement a standardization and certification program for breeding, cultivation and post-harvest handling of shrimp.

6.2. Supply

Indonesia is also a shrimp importer, mainly from China, Thailand and Vietnam. This increased in 2004 as a result of the US anti-dumping policy towards these countries. The imported shrimp eventually depressed Indonesia's domestic prices, since some of them are marketed domestically (Kompas, 10 July 2004). These imports were primarily used for transshipments to the existing export channels and local processors preferred the uncomplicated process of repacking of imported mass product over purchasing and

collecting of local shrimp from farmers. Due to limited quality control in Indonesia on these imports, concerns have been reported on contamination problems.

Ministry of Trade (MOT) Director General for International Trade Diah Maulida issued Director General for International Trade Regulation No. 4/2005 on October 7, 2005 limiting the issuance of Indonesian Certificates of Origin (COOs) for sensitive items like shrimp, textiles, garments and footwear to 14 of 85 provincial offices. He admitted however, that the MOT needs to strengthen implementation of the regulations since transshipments of goods through Indonesia continue to flourish. (Indonesia: Trade and Investment Highlights 2006, US Embassy). The regulation limits issuance of COO's for Indonesian shrimp to 14 provincial trade offices are required from North Sumatra, South Sumatra, Lampung, Jakarta, West Java, East Java, Central Java, South Sulawesi, South Kalimantan, East Kalimantan, Tarakan, Kalimantan, South East Sulawesi, Cirebon Regency, West Java; and Bali.

6.3. Description of the Value Chain Participants

The aquaculture production of shrimp in Indonesia can be categorized into:

1. Production of Black tiger shrimp or *Penaus Monodon*; due to bigger sizes and decreased supply from China and region, gain a higher price in the market. Production in the world has decreased due to the outbreak of diseases such as the White Spot Syndrome Virus (WSSV), Monodon baculovirus (MBV) and Hepatopancreatic parvovirus (HPV).
2. Production of White shrimp or *Peanaus Vannamei*: this species receives relatively lower prices on the world market due to smaller sizes and greater world supply from other producing countries like Thailand, China, and Vietnam. Production can also be affected by several diseases such as the Taura Syndrome Virus (TSV), White Spot Syndrome Virus (WSSV), the Yellow Head Virus (YHV) and Vibriosis.

Input Supply

Brood stock supply: Brood stock for the Black tiger shrimp is sourced from the wild. Indonesia has a major resource for Black tiger shrimp within its coastal waters. The Aceh region is known for quality Black tiger shrimp brood stock, supplying to hatcheries in Aceh and elsewhere in Indonesia. The collection of brood stock has been affected by the tsunami; of the 223 shrimp hatcheries in Aceh, a total of 193 were extensively damaged (85% reduction). (Phillips and Bhudiman 2005). However, it should be noted that most of the hatcheries had been closed down prior to Tsunami due to the countrywide collapse of Black tiger production and the consequent loss of customer-base for Black tiger prawn fry due to diseases. Introduction of the White shrimp has also affected the viability of these hatcheries prior to the Tsunami as it has been dominated by some larger companies.

This loss will have severe implications for the recovery of the Black tiger shrimp aquaculture. Dr. Michael J. Phillips, the Program Manager of the tsunami rehabilitation efforts of the FAO (Food and Agriculture Organizations of the United Nations)

indicated that his mission has submitted a proposal for the rehabilitation of the Ujung Batee Brackishwater Aquaculture Centre and responsible aquaculture rehabilitation in Aceh Province (Value of funding: $2,179,059). This project will support the reconstruction and purchases of equipment for the Black tiger shrimp hatchery, brood stock, and training of staff.

The brood stock supply of the White shrimp does not come from the wild, as it is not a native species of Indonesia. When the GOI released a Ministerial Decree (No. 4/2001) in 2001 to allow importation of Pacific White shrimp for culture purpose, brood stock production have expanded and are now produced by local hatcheries in Lampung, West Java, Central Java, East Java and Bali. There are three sources of brood stock of the White shrimp;1) Broodstock imports from Taiwan and Hawaii ;2) Cultured shrimp harvested from ponds (after 4–5 months at 15–25 g); 3) Purchased from tank-reared Specific Pathogen Free (SPF) and Specific Pathogen Resistant (SPR) brood stock, usually from the US. This is usually very expensive and only done by bigger companies.

The main reason for detecting and identifying pathogens in shrimp brood stock is to detect pathogens in the carrier state before the onset of disease. Shrimp diseases have had a devastating effect on world shrimp farming; because these are usually viral diseases, for which there are no therapeutic cures. Techniques to demonstrate viral infections in shrimp include examination of epidemiological features and gross structural changes, microscopy of stained and wet mount preparations, histopathology, electron microscopy, immunological methods and DNA-based protocols. Best Aquaculture Practices (BAP) for hatchery management, which include the use of drugs, hygiene and disease control, and quality management, need to be established for both the Black tiger shrimp and the White shrimp to ensure sustainable production.

Post-larvae (PL) supply: Approximately 90 percent of the post-larvae sold in Indonesia are produced in hatcheries. Although post-larvae are still collected in the wild, they are generally sold to growers who have traditional and extensive culture operations. Shrimp larval quality is considered as another key factor in establishing a successful shrimp culture. Shrimp health management has become the main focus of improving production and minimizing infectious diseases in shrimp ponds. To accomplish this goal, one should be concerned with the quality of post-larval shrimp especially the selection of high-health post larval shrimp, before stocking in the pond. Molecular biology techniques such as DNA probes and polymerase chain reaction (PCR) provide accurate, sensitive and rapid diagnostic tools for detecting and identifying viral diseases both in post larval shrimp and shrimp brood stock. The establishment of PCR laboratories, both from government and private sectors, for screening WSV post larval shrimp in Indonesia is still limited and expensive. Efforts should be made to intensify PCR screening for both the Black tiger shrimp and White shrimp.

Feed supply and other: Shrimp feed diets have been successfully developed by feed companies and are readily available in Indonesia. A large number of feed brands are available and farmers are generally aware of the requirements of quality feeds for good performance. Attempts to create low cost and low protein formulations did not perform well. Medication and antibiotics are normally not used in grow-out operations for cost and economical reasons. However, there is a certain level application of

tetracycline and tetracycline in the hatchery operations. Samponine, lime and formalin are widely used and are only used depending on the capital strength of the farmer.

Labor supply: Skilled manpower on worker and managerial level is available.

Production technology

There are a wide range of production techniques and owner-management arrangements, but the primary production techniques are extensive and semi-intensive:

- Small-scale extensive or traditional farmers are typically less than 5 hectares and are likely to be owner-operated and living nearby. Under the traditional management system, 1-5 post larvae (PL) are stocked per square meter. At this stocking rate the natural pond environment provides all the nutrition until the third month of production. Land converted from rice paddy is prepared by scraping solid waste from the pond floor and walls, before filling with water, by diesel or petrol driven pumps. After filling the pond there is a period of conditioning, usually with the addition of fertilizer and some form of lime to create an adequate population of plankton in the pond (water turns a green- brown) when post-larvae are added. The plankton community or "bloom" is controlled by adding water, to dilute the plankton concentration and replace evaporated water. This farm technology is referred to as "traditional plus" if feed or aeration is added in the third or fourth month of culture. The productivity of traditional, extensive culture is only about ten percent that of semi-intensive culture. Poly culture is typical in extensive farms with either wild caught or hatchery raised milkfish fry which are stocked after the shrimp have been in the pond for a period of time. The milkfish are consumed and sold locally and nationally and contributes to local food security.

- Small-scale, semi-intensive farms are typically less than 5 hectares in total pond area. Many are owned by absentee landowners and operated on a share basis. Semi-intensive farms stock between 5 and 25 PL per square meter. Feed is added beginning in the first month and aeration is used at night. This production system is primarily used for the Black tiger shrimp.

- Intensive culture is defined as stocking above 25 PL per square meter and requires careful management of water, plankton and feeding to keep the water environment optimal and minimize stress to the animals. The investment in PL, feed and equipment for semi-intensive and intensive shrimp farming usually excludes the small local farmer. The majority of intensive farmers have their own teams of technical staff who are paid a base salary and a production bonus. The use of technicians with experience from other parts of Indonesia or abroad, limits employment opportunities for local labor to unskilled and low paid jobs (e.g. watchmen or harvesters).

- Fully integrated intensive system (The Tambak Inti Rakyat (TIR) or nucleus-estate concept) usually apply stocking rates up to 100 shrimp per square meter. This stocking rate for intensive system is used primarily for the White shrimp. The nucleus of the TIR, to be operated by the developer, consist of the water supply

system including the central pumping station; hatcheries for the production of seed stock; possibly a feed mill; processing, packing and marketing facilities as well as a corps of extension technicians. The "plasma" consists of the grow-out ponds which are to be distributed to individual growers who qualify under the program. Most of the above described facilities, except for feed mill and processing are also integrated into most of the farms described as "semi-intensive".

The majority of Indonesian shrimp farmers apply the extensive production system. However, there is need to improve on sustainable aquaculture production practices because of increased pressure from the European Union (EU) and the US for improved food safety and production standards. Implementation of these standards has to start at the farm level. To promote the adoption of suitable, environment-friendly, community-based/managed aquaculture practices (such as the BAP) by farmers, demonstration facilities and/or model enterprises may be replicated with close collaboration of other donors, the local community and the local government. Well performing privately owned shrimp farms and independent shrimp organizations can be invited to provide experts to prepare models of demonstration facilities and supervise shrimp farmers in managing and operating these facilities.

Trading

There is an active organized system of trading partners (who are in some cases export permit holders), which manage group of collectors and buyers who in their part deal directly with small farmers. The general term for these collectors is *tokeh* (some might call them "middlemen") and they dominate the buying market in the more remote regions in Indonesia. Because of their capital power, tokeh often provide micro finance to farmers during the production period (provisions of operational inputs mainly) and this creates a non-official contract farmer system, this relationship restricts the farmer to selling his harvest exclusively to the respected tokeh, usually at an unfair price. In addition, due to expensive post-harvest transportation containers and lack of cold storage, tokeh often provide rental or transportation services and therefore increasing their hold on small farmers. Empowering small farmers with direct access to micro-credit or loan guarantees could relieve them from the tokeh system and provide them with a bargaining power. Semi-intensive to intensive farmers have direct contracts with processing plants or exporters and are usually not affected by the tokeh system.

Processing

Shrimp processing in Indonesia varies from low level to high level value added products (such as headless, head-on, individually quick (frozen IQF), butterfly, and cooked shrimp). Shrimp processors are usually also exporters and therefore directly faced with increased demands from the US and EU in food safety standards and traceability issues. In 2001, EU decided to examine 100 percent of shrimp products imported from Indonesia and other countries because they discovered residual antibiotics chloramphenicol (CAP) and nitrofurans (NF) in some products and thus initiated a food-safety policy called "zero tolerance" towards chloramphenicol, nitrofuran and other antibiotics. Imports into the USA are regulated under the Federal Regulations, often referred to as 21 CFR 123. They require that seafood processors operate preventive

control systems that incorporate the seven principles of Hazard Analysis Critical Control Points (HACCP). The essence of the regulations is that the purchaser/importer of the products should be able to demonstrate to the authorities that the products have been produced in a safe and acceptable manner. This implies that the producers are using a quality assurance system that incorporates HACCP, standard sanitary operating procedures and good manufacturing practices. Most seafood processors have indicated a lack of food safety standards and poor post-harvest handling techniques implemented at farm level which ultimately affects their ability to comply with the standards.

Consumers

Most of the consumers of the shrimp produced in Indonesia are in the international market, like Japan, the US and the EU. Small size shrimp either from aquaculture or fisheries are consumed in the local market.

Supporting Products and Services

Institutional capacity support: The Indonesian government has long been actively involved in the shrimp production sector. They have implemented the ban of the use of chloramphenicol for animal health protection and as a supplement ingredient in animal feed. The government, along with the Indonesian Fishery Business Association (GAPPINDO), has actively encouraged farmers to abandon the use of chloramphenicol, particularly during the harvest stage of cultivation. In addition, the MMAF, announced the formation of the Indonesian Shrimp Commission on 8 October 2004, consisting of government policy-makers, academicians and business representatives (GAPPINDO). Its mission is (i) to prepare a draft of the shrimp industry's development policy, including production, processing and international marketing development policy; (ii) to harmonize the downstream and upstream shrimp industries; and (iii) to empower the shrimp entrepreneurs, especially in terms of technology, management and financial capacity (Pasaribu 2004).

Access to micro-credit: Mr. Iman, representative of the, Directorate of Aquaculture, introduced the World Bank Funded program called Revitalization of Aquaculture Fishery (this represent a loan in the amount of US$40.0 million and a proposed credit US$40.0 million); this project includes a lending program to assist aquaculture producer organizations to access affordable commercial credit on behalf of the members, by providing partial credit guarantees to local banks on behalf of the organizations (where necessary through a middleman company or NGO). This guarantee would roll over as the credit is repaid, in order to leverage the next cycle of lending to the producer organization and members. This activity also provides training to the staff of the producer organization in financial management and accounting, including credit processes, reporting and loan supervision requirements, obligations under the partial guarantee, and procedures for assessing and processing credit applications, in order to build the capacity of the organization to be more credit-worthy. However this particular micro-finance program is largely unknown at village levels and Mr. Iman indicated a need for wider exposure and awareness about this program to small farmers and shrimp organizations. Technical and capacity building could be provided by

AMARTA to small farmers by educating them in how to apply for these specific loan programs and assist the farmers in developing feasibility studies when needed. Transparency and public awareness of these programs can decrease the barriers for access to finance.

Most of seafood processing entrepreneurs have complained about shortage of raw materials. The increase of quantity of raw materials can be affected only by efficient support to the primary producers and strengthening of their capacities. Processors and buyers are generally well aware of credit programs and other means of access to finance, however small shrimp-farmers require more support to make use of support services like credit schemes.

6.4. Key Constraints and Possible Solutions: Shrimp Aquaculture Value Chain

Strategy: Strengthen and Improve Indonesian Shrimp Export Position in the World by facilitating relationships and information flows to develop the market and improve food safety standards and traceability in the production of shrimp.			
Key Constraints	**Solutions**	**Facilitators and Providers**	**Illustrative Interventions**
Traceability and Food Safety Concerns from the consumers. Increasing international requirements for food safety standard, traceability and environmental concerns require more a re-thinking of how shrimp is traditionally produced and processed	- Better coordination and integration of the value chain to enhance compliance as well as share costs - Strengthen the general practice of Best Aquaculture Practices (BAP standards) from the farmer up to the processor level	- AMARTA staff - Aquaculture Certification Council - Independent Consultants - Scientific community and professional associations - Ministry of fisheries and regional Dinas Perikanan staff. - Other donors and supportive project owners - Operators of demonstration farms in conjunction with extension services .	- Training and Education on the BAP standards biosecurity and traceability regulations and requirements - Establish model farms for integrated systems, suitable bio remediation, Filtration and use of secondary products in the filtration systems. - Create links to processors or consumers of secondary products (mussels, sea-grass, milkfish, tilapia etc) thus improving overall economic outlook on sustainable farming.
Access to micro-credit There is usually little information flowing to the farmers regarding existing micro- credit sources	- Link shrimp farmers to business development services and micro-credit providers	- AMARTA staff - - Local NGOs, Commune councils, district government. Business associations. - GOI - AMARTA in conjunction with other donors and supportive operators of demonstration projects.	-Organize forums for farmers to address micro-credit access constraints. - Facilitate dissemination of micro-credit providers information through local media
Insufficient knowledge, technology and investment for Shrimp p**rocessing**, packaging, storage, transport and value adding processing	- Need to increase the value added of shrimp products and diversify away from the frozen shrimp market and enter the value added market segments, such as quick-frozen, peeled, butterfly-cut shrimp, and cooked products .by facilitating communication among producers, processors and buyers. - Expose processors to best practices in relevant technologies, processes	- AMARTA staff - Leading buyers (e.g., wholesalers, restaurants). - Processors from neighboring countries. - National and international input suppliers (e.g., packaging materials, cold chain technology, machinery). - Regional experts, research and educational institutes. - Local service providers (e.g., extension agents and	-Organize forums for leading processors to address common issues and challenges. - - Disseminate technical information and promotional materials from industry leaders, universities, research institutes and experts to processors. - Work with financial institutions to expand services and develop new products for fish processors.

	and standards. -Improve post-harvest handling for poor farmers	trainers in fish processing). Banks and MFIs. - Business associations.	- Promote innovation and dissemination of cold chain technology (e.g., live fish transport, flash freezing) by the private sector.

7. Overview of the Fresh Water Aquaculture Value Chain

7.1. Market Demands

About 90%of the country's total fish production is consumed domestically. Fish is a staple food item in the diet of Indonesians, providing two-thirds of the total domestic animal protein supply. Among different sources of animal protein, fish can still be regarded as relatively inexpensive and is thus the main source of cheap protein of the poor. Per capita fish consumption in the country has thus doubled, from a low of 12.8 kg/yr in 1982 (ADB, 2004) to about 23.63 kg/yr in 2002 (MMAF, 2003).

7.2. Supply

Freshwater aquaculture produced 472,973 MT in 2003 compared to 334,085 MT in 1999, an increase of 9.09% per year. The growth in production is assumed to be a result of the expansion of pond culture area by using ponds and floating cages, while increased productivity was mainly a result of technological innovations. The five provinces that were the main producers of freshwater fish were West Java (34%), East Java (13%), West Sumatra (8%), Central Java (7%) and South Sumatra (5%). The freshwater aquaculture has been predicted increase in providing high quality animal protein, employment and export earnings.

7.3. Description of Value Chain Participants

Input Supply

Primary input providers include providers of fry, and fingerlings. Providers of construction materials, pumps, and other technical inputs necessary for pond construction, pond maintenance, and fish processing are available. Most input providers are small-scale entrepreneurs. Most of the fingerling production centers are located in for example Sukabumi, but these rely on donor and governmental support.

Production Technology

The production of freshwater species farmers usually practice extensive culture using low-yielding, low-input and low-level technology, and they lack the technical know-how or skill that would enable them to adopt new or improved production methods and techniques. Pond culture is usually done traditionally, in backyards or nearby ponds. Since 1960, the running water system, adopted from Japan, has been developed in Indonesia. Generally, in this system, the concrete pond is square or trilateral in form, with sizes of 50-100 m^2/unit, and 100 g fingerling density of 5-10 pieces/m^2. Common carp is the main commodity, and production is about 1 ton/unit/crop. Cage culture is a more commercial effort and a main livelihood for those involved in it. Floating net cage culture has been developed in lakes and reservoirs. The cages are put down adrift in territorial water using a construction of bamboo or iron bars, and a net is bound to form a floating cage containing drums/containers/styrofoam. The cage is made from

polyethylene net. Paddy field culture involves establishing a nursery of seed before these are cultured in cages or floating net cages. Culture species vary according to the requirement of fish farmers, i.e. common carp, tawes, sepat siam, even tilapias, and the rearing period is 30 days. Paddy field culture is differentiated into three types: 'Penyelang' (before paddy planting), 'Tumpang Sari' (at the same time as paddy planting) and 'Palawija' (between 2 seasons of paddy planting). Even if this low intensity production level does not pay well, freshwater aquaculture has been able to alleviate the economic hardship faced by people looking for gainful employment or means of livelihood to support their families.

Trading

The range of wholesalers, retailers and other middlemen in the fish distribution chain is wide and varied, and is sometimes dominated by the tokeh system. Most traders in the provinces are small entrepreneurs serving local markets, having limited knowledge of market demand, and using very basic means of transport (bicycles, and motor-bicycles), storage, and marketing. Lack of cold storage, affects the fish quality and lowers the bargaining power of fish farmers as they have to sell their fish at reduced prices at the end of the day to avoid loss of income.

Processing

Little processing is done for the local market and if available usually not located near the fish farmers. Some local processing includes smoked or salted fish. Most of the larger processor and packagers in the value chain are located in and around Jakarta, this result in a lower return for the fish farmer as the value added does not benefit them directly. This creates an opportunity to provide value added services. Most of the processors are facing a lack of supply from the local production, because of the decrease of capture fisheries and low quality and insufficient supply from undeveloped aquaculture sector. Some processors are now into importing most of their supply to supplement their capacity.

Consumers

There is a range of different type of consumers for fish. The majority of local production is consumed within the provinces. In addition, there is a growing need for local produced fish from the growing urban Jakarta market through either wholesalers or the supermarket channels for fresh, cleaned and chilled fish.

Supporting Products and Services

There are a variety of supporting enterprises for the freshwater value chain. Many fish farmers have investment in floating cages and get advanced credit from their potential buyers to supply for the feed during the grow-out period. The GOI has a number of research stations active with a special focus on freshwater aquaculture species, but with the wide range of fish farming conducted all of Indonesia, there is a real need for technical assistance and extension services.

7.4. Key Constraints and Possible Solutions: Freshwater/Inland Aquaculture Value Chain (Includes Tilapia, Catfish, Gouramie Species)

Strategy: Increase and improve the value added products in freshwater fish species such as tilapia, gouramie, carp and catfish for the growing urban/local markets.			
Key Constraints	**Solutions**	**Facilitators and Providers**	**Illustrative Interventions**
Insufficient development of the fish processing. There is much underutilization of the seafood processing capacity. Insufficient knowledge, technology and investment for aquaculture products for storage and transport by the local producers results in poor quality and unnecessary waste.	- Improvement on the post-harvest handling techniques will improve the quality and freshness of the fish products - Improving on the cold chain infrastructure will enable the farmers to maintain superior quality and secure a higher price	- AMARTA staff - Processing Industry - STTA - Fish Farmers Association	- Linking leaders in the seafood processing industry with an organized producer group who will facilitate the improvement of fisheries products quality from pond to ice plant. - Create a business model for a simple value added processing plant, where fresh water species could be processed: gutted, scaled and chilled and made for the ready to cook market for the Jakarta and suburban Region. - Improvements in harvest, transport and handling can be provided through an organized grant which could include replacements of bamboo baskets to coolers
Insufficient food safety and traceability standards Unsustainable food safety practices along the value chain hinders entering into higher value markets, such as the supermarkets and restaurant market	-Promote compliance with BAP, FDA and EU standards	- AMARTA staff - Consultants - Other Donor Activities, such as the new ADB project and existing USAID ESP project focused on the environmental of water use	- Conduct Seminars and certification of participants from farming and trading organizations.
Access to micro-credit There is usually little information flowing to the farmers regarding existing micro- credit sources	- Link fish farmers to business development services and micro-credit providers	- AMARTA staff - - Local NGOs, Commune councils, district government. Business associations. - GOI - AMARTA in conjunction with other donors and supportive operators of demonstration projects.	-Organize forums for farmers to address micro-credit access constraints. - Facilitate dissemination of micro-credit providers information through local media
Insufficient investment and lack of information There is no transparency on the market prices for	- Support leading firms and extension agents to improve and apply knowledge of fish raising.	- AMARTA staff - Leading buyers (e.g., wholesalers, restaurants, large processors, exporters).-	- Facilitate private sector provision of training in fingerling and fish raising. - Work with financial

chemicals, fish feed, improved fish varieties and sources of capital to boost quality and quantity of **production**.	- Engage leading service providers and input suppliers to improve and expand services and input delivery to fish raisers.	- National and international input suppliers (e.g., fish feed and chemical companies, fry and fingerling producers). - Regional experts, trade fair and other event organizers. - Local service providers (e.g., extension agents, trainers in fish raising).	institutions to expand services and develop new products for the fish raisers and input suppliers. - Support private investment in hatchery, brood stock maintenance and quality controlling operations

8. RECOMMENDATIONS

There is need to improve the competitiveness of the aquaculture sector in Indonesia. However, there are many factors arising from the socio-cultural context that influence the context in which activities can be implemented. These include: (1) pervasive poverty in rural coastal areas, (2) dependence on the "boss" system for credit; (3) dependence on traders and middlemen for marketing products; (4) limited capacity of local communities to enforce user rights and marine tenure against external fishers; (5) limited capacity of producer organizations and village financial management institutions to manage and implement field activities; (6) ethnic and cultural heterogeneity among rural populations; (7) conflicting demands on the same resources – potential for internal conflict within and between neighboring communities on access to limited resources. Each of these challenges has to be taken into considerations when designing intervention activities. The assessment team in company of the AMARTA Chief of Party, David Anderson and the Industry Advisor Henry Harmon presented the findings of the value chain assessment to the USAID mission. The key target sub-sectors with corresponding strategies were discussed and some priorities for follow up actions are summarized in the recommendations below.

- To develop grouper grow-out production system, with continual harvest at periodic marketable sizes to increase cash-flow for poor fish farmers. Possible sites include Flores and Banda Aceh. Assistance could include development of markets for fingerlings and financial aid for initial investment needs.
- To develop a viable fish processing facility to improve the value adding of the freshwater aquaculture produced for the local Jakarta market.
- To assist with the adoption of the Best Aquaculture Practices in the shrimp sector, this would prepare farmers and the shrimp industry for possible certification processes. Possible sites include the Aceh region, where the culture of Black tiger shrimp could be revitalized and improved.

In order to implement suggested interventions in the value chain, some key steps are required:

1. Classify the frame work and criteria in which AMARTA will operate to identify those groups within the value chain that the project can feasibly assist to achieve its targets. This framework of conditions and corresponding criteria to reach the objective of each strategy will be written up in an action work plan.
2. Identify those key actors within the value chain eligible for project assistance, based on criteria set by the USAID mission and AMARTA and categorize the leading few among the target group of fish/shrimp farmers, traders and processors and work with them to achieve early successes at the beginning of the project.
3. Identify partners that will allow the project to efficiently reach large numbers of micro, small, and medium enterprises (MSME) in the value chain. This can be

done through associations, NGOs, Government, banks, community groups etc. This in order to :

- Leverage contacts with other organizations to obtain maximum outreach among target groups.
- Use partnerships with these organizations to establish trust and build working relationships with value chain entrepreneurs.
- Design and evaluate each intervention as a business plan model
- Replicate initial successes and ramp up interventions by exposing other members of target groups to initial successes to achieve demonstration effects through information campaigns etc.

Appendix A: Key Informants Details

During the mission on 4th December to 23th December, the following individuals/organizations were consulted, and places visited.

Date	Persons met	Position	Organization (or Company)	Telephone	E-mail
Dec 4th	Mr. A.L. Hoen	Senior Manager Resource and Development	DSB Processing, storaging, Ice Factory Export/Import-Marine Product	62-21-69177578	kemalabna@telkom.net
Dec 4th	Dr Shogo Kawahara	Former Lead Grouper Researcher and current Grouper hatchery owner		62 81558066781	
Dec 5th	Pak Robert	Gondol Research Station	Gondol Research Station		
Dec 5th	Tom Cochran	Owner of Grouper Hatcher		62 361 289843	
Dec 6th	Pak Edi			+62 362 92278	
Dec 7th	Pak Suleiman	Fisherman Representative			
Dec 8	Isabelle Antunes	Liason and Coordination Rehabilitation Support Coordination Unit	FAO	62-517428576 Mobile 62-8121077184	Isabelle.Antunes@fao.org
	Pak Abdin	Shrimp Farmer	Sigli		
	Pak Afrizal	PinBiz	Biruen		
Dec 9th	Pak Ahmed	Grouper Fingerling Operation	Biruen		
	Pak Muchtar Wede	Shrimp Collector and Farmer	Biruen		
Dec 10	Leroy Hollenbeck	Senior Advisor to the Governor of Aceh	Chemonics Aceh Technical	62-6517411213 Mobile:081199	lhollenbeck@chemonics.com

			Assistance Recovery Project (A-TARP)	0040	
	Michael J. Phillips	Program Manager (Environment Specialist)	Network of Aquaculture Centers in Asia-Pacific (ENACA)	66-2561728 Mobile:66-17335186	mjpaqua@yahoo.co.uk, mjphillips@inet.co.th
	Arun Padiyar	Aquaculture Specialist	International Finance Fund	62-8126991697	arunpadiyar@gmail.com
Dec 11	Bert Knellison	Project Advisor	Swiss Contact	62-614510760	bert@smtr.swisscontact.or.id
	Tom M. Meier	Project Assistant	Swiss Contact	62-614510760	bert@smtr.swisscontact.or.id
	Husin Pratama	Managing Director	PT. Medan Tropical Canning and Frozen Industries	62-616850038 Mobile:62-811647737	mtcfi@indosat.net.id www.indonesianseafood.com
	Tuti Indrawati	Assistant Marketing Manager Canning Division	PT. Medan Tropical Canning and Frozen Industries	62-61-6850038	mtcfi@mdn.prima.net id
Dec 12	Dr. T. Azizul Hakim	Owner of Grouper Fingerling Producer and Exporter	XKL Worldwide Sdn Bhd	62-61-820085 Mobile: 0811611060	xkl@time.net.my
	Michael Cheong Chandra (Ba.Ap.Sc)	Growout and Hatchery Technician	PT. Sumatera Budidaya Marine (Grouper life Fish Exporter)	62-614562666-4562620	marine_export@yahoo.com.au www.lifefish.com
Dec 13	Dr. Bambang Widigdo	Integrated Quality Assurance	PT Centralpertiwi Bahari (fully Integrated shrimp farming	0725-556-222-5 Fax: 0725-556-064 08127201451	Bambang.widigdo@cpp.co.id
	Rubiyanto W. Haliman	Senior Manager	PT Centralpertiwi Bahari	08154040322	rubiyanto.haliman@cpp.co.id
Dec 14	Michael Cheong Chandra	Growout and Hatchery Technician	PT. Sumatera Budidaya	62-614562666-4562620	marine_export@yahoo.com.au

	(Ba.Ap.Sc)		Marine (Grouper life Fish Exporter)		www.lifefish.com
	Pak Aseng (willy)/ Efendh	Grouper nursery organization /exporter fingerlings	CV. Sondoro	62-811632388	
Dec 18	Mr. Ir. Iman	Assistant DGF	DGF / Ragunan jakarta	62-21-7890552	
Dec 19	Maskur ,	Kepala BBPBAT	Sukabumi/ jl. Selabintana 37	62-266-225240	maskfish@telkom.net
	Ir. Adang Sudjana	Kepala dep Standardisation and Information	Sukabumi/ jl. Selabintana 37	62-266-225211	bbats@telkom.net
Dec 20	David Finneren	ACC certifier	P.T. Minaca Selaras	62-21-527-4527 08161823890	finnindo@cbn.net.id
Dec 22	Rafael Jabba	CTO	USAID	62-21-34359418	rjabba@usaid.gov
	John A. Pennel	Director	Economic Growth Office USAID	62-21-34359418	jpennell@usaid.gov

Appendix B: Illustrative list of Other Donors Activities:

Project	Donor	Location	Sector Issue	Budget	Implementation Period
COREMAP I	ADB	West Indonesia	Coral Reef Management	US$6.7 - US$33 million	2003-2006
COREMAP Sikka Aus	AusAid	Flores	Coral Reef Management	$8.2 million	1998-2004
COREMAP II	World Bank	Coral Reef Management East Indonesia		US$75 million	2006 - 2010
Marginal Fishing Communities Development Farmers	World Bank	Co-Management of Coastal Resources, Alternative Livelihoods	Pilot 6 Districts throughout Indonesia	US$1.7 million 2004 -	2006-
Empowerment through Agricultural Technology and Information Project (FEATI)	World Bank	Throughout Indonesia	Increased Agricultural Productivity, Organization of Rural Producer Organizations	US$98.9 million	In preparation
Sustainable Aquaculture Development for Food	ADB	-Langkat in North Sumatera Province; -Ogan	Aquaculture production and support to Government	US$33 million	2006-2013

Security and Poverty Reduction Project		Komering Ilir (OKI) in South Sumatera - Karawang and Sumedang in West Java and - Buton in Southeast Sulawesi	to promote community-managed freshwater, brackish water, and marine aquaculture development among poor communities of the country		

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