STRATEGIES AND OPTIONS FOR INCREASING AND SUSTAINING FISHERIES AND AQUACULTURE PRODUCTION TO BENEFIT POOR HOUSEHOLDS IN ASIA, ADB-RETA 5945

Progress Report
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RETA 5945

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EXECUTIVE SUMMARY

This Project Report highlights the progress of activities and accomplishment of the project on "Strategies and Options for Increasing and Sustaining Fisheries and Aquaculture Production to Benefit Poor Households in Asia" (ADB-RETA 5945) for the period of 1 September 2001 to 28 February 2002.

After the conduct of the Inception Workshop in August 2001, signing of the Memorandum of Agreement (MOA) with concerned agencies in the participating developing member countries (DMCs) of ADB were completed. Field visits and follow-up discussions were done by ICLARM team during the last quarter of 2001 to provide technical guidance to the DMCs.

The Project works on five interrelated research components to attain the project objectives and these were given below.

Component 1 - Profile of Key Aquaculture Technologies and Fishing Practices;
Component 2 – Analysis of Policies, Institutions, Infrastructure and Support Services to Fisheries and Aquaculture
Component 3 – Socioeconomic Profile of Major Stakeholders (Producers, Consumers, Traders) in Fisheries and Aquaculture
Component 4 – Analysis of Fish Supply and Demand and Projections
Component 5 – National Action Plan

The DMCs with technical guidance from ICLARM experts reviewed all existing information and available data in their respective countries required for Components 1 and 2. Results of the preliminary analysis were presented during the Inception Workshop on 21-24 August 2001 in ICLARM Headquarters, Penang, Malaysia. ICLARM experts reviewed these documents and provided suggestions for improving the documents. The national teams of participating DMCs have revised technical reports for Compenents 1 and 2 taking into account the comments provided by ICLARM experts. On-going research activities deal with completion of other relevant information and data for Components 1 and 2, while data collection using surveys or rapid appraisal or both depending on data availability has started for Component 3. Results from Component 3 will be utilized for analysis and projections of fish supply and demand (Component 4).

There were slight delays in implementing the scheduled project activities in Bangladesh, India and Sri Lanka due to delay in signing of memorandum of agreement in Bangladesh

and India, and transfer of the national team leader in Sri Lanka to a new post. ICLARM team has been working closely with the concerned officials of these countries to expedite the implementation of project activities. The government and national scientists of the participating DMCs are proving necessary supports. The ICLARM project team does not foresee any issues that will hamper the smooth implementation of the Project activities. The planned project activities are expected to be completed as scheduled.

The Main Report

1. Introduction

Recognizing the importance of policy research on fisheries and aquaculture, ICLARM – The World Fish Center is implementing the project "Strategies and Options for Increasing and Sustaining Fisheries and Aquaculture Production to Benefit the Poor Households in Asia" with financial support from the Regional Technical Assistance (RETA) umbrella of the Asian Development Bank (ADB-RETA 5945). The Project is being implemented in nine developing member countries (DMCs) of ADB (namely, Bangladesh, China, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam) for a three years period (March 2001 – February 2004).

This Project outputs will enable DMCs to (i) improve fisheries policies affecting resource allocation and choices about technology, and (ii) set targets of investments and development to address poverty and increase fish production. The projections of trends and prospects for the fisheries sector in Asia will provide DMCs and development agencies, including ADB, with a reliable and disaggregated picture of fisheries in the region. The information will enable development agencies to formulate country strategies and options for fisheries development and set development and investment priorities geared toward poverty reduction and food security improvement. The research will further enhance ADB's commitment to support DMCs efforts to provide a reliable and adequate supply of nutritious food at prices affordable to different income groups, especially the low-income group. This research is in line with ADB's fisheries policy and investment objectives, which emphasize on (i) policy support for the development of long-term sustainable fisheries management; (ii) capacity building for development and resource management; (iii) crating and strengthening productive capacity, infrastructure, and services; and (iv) regional cooperation.

Objectives

The general objectives of the Project are to assist the developing member countries (DMCs) in (i) developing appropriate strategies for helping poor (often-landless) fisher folk to escape poverty, and (ii) identifying appropriate fish species and technologies in aquaculture and fisheries management to increase fish production and improve the income and nutrition of poor fishers and fish farmers, and to protect the fisheries resources.

The specific objectives are to (i) formulate strategies and an action plan for increasing fish production, improving nutrition and income, and protecting fisheries resources so as to benefit poor fish producers and low-income consumers; (ii) determine the most viable and sustainable aquaculture and fisheries practices (including prioritization of fish species, farming systems, fishing technologies, and management practices) that are of critical importance to poor fish farmers as fishers as well as low-income consumers; (iii) analyze and forecast fish production and consumption by fish species and income groups to evaluate the market potential for alternative fish products of poor farmers and fishers and to identify fisheries management options for increased participation by small-scale fishers; and (iv) strengthen the capacity of the DMC participating institutions in fisheries policy research in monitoring the impacts of changes in policy, technologies, and markets on poor households.

To date, ICLARM has submitted two reports: 1) a Progress Report (March – June 2001) and 2) a Project Inception Report (March – August 2001) to ADB in June and October 2001, respectively. This technical report discusses the progress of activities and accomplishment of the Project from September 2001 to February 2002.

2. Status of the Research Components of the Project

The scope of research, training and workshop under the Project has been elaborated by identifying five interrelated components. These components are:

Component 1 – Profile of Key Aquaculture Technologies and Fishing Practices
Component 2 – Analysis of Policies, Institutions and Support Services to Fisheries and Aquaculture
Component 3 – Socioeconomic Profile of Major Stakeholders in Fisheries (Producers, Consumers and Traders)
Component 4 – Analysis of Fish Supply and Demand and Projections
Component 5 – National Action Plan

Methodologies for their implementation have been discussed and elaborated on during the national planning meeting (April – July 2001) in each country and during the First Regional Workshop (August 2001). These research activities are carried out in nine participating countries and ICLARM as planned. ICLARM houses two internationally recruited staff that coordinates the implementation of the activities and provides technical support to the nine national project teams. These national project teams are actively

implementing the research activities in their respective countries to achieve the objectives of the Project. The progress of the each national team for the research activities in Components 1 to 4 was discussed below.

2.1. Component 1. Profile of Key Aquaculture Technologies and Fishing Practices

Research topics covered in aquaculture technologies include a) aquaculture practices (e.g. farming practice, areas, production level, cost and return, adoption pattern), b) cultured major fish species (e.g. carp, tilapia, milkfish, seabass, shrimp, shellfish, grouper, ornamental fish) both from inland and marine waters, and c) post-harvest handling and processing (e.g. type of product, available technology, existing research, etc.) for key fish species. Research areas in capture fisheries deals with structure of fisheries, gear type, profile of fisheries, cost and return, CPUE and others. Secondary information was gathered from government agencies and other institutions in each respective country. Data collection started in June 2001 with initial results presented during the Inception Workshop in August 2001. ICLARM experts reviewed these technical reports and provided comments for improvement. The national teams in participating DMCs have revised the reports and their major findings were presented below.

2.1.1. Bangladesh

Freshwater Aquaculture

The fisheries sector comprises of i) inland capture, ii) inland culture, iii) brackishwater culture, iv) marine industrial fishing (trawl) and v) marine artisanal (small-scale traditional gears). Inland capture fisheries is made up of 4,947,256 hectares of water area which is composed of river and estuaries (1,031,563 ha), *beels* (114,161 ha), Kaptai lake (68,000 ha), floodplain (2,832,792 ha), and polder and enclosures (873,000 ha). Inland culture fisheries covers 361,841 ha of water area consisting of ponds and ditches (215,000 ha), ox-bow lakes (*baors)* (5,488 ha) and (shrimp farms 141,353 ha). The total area of inland water is 4,337,690 ha.

Total fish production of Bangladesh is 1.61 million tons coming from open water capture fisheries (0.67 million ton), closed water culture (0.65 million ton) and marine fisheries (0.34 million tons) (DOF, 2001a). In general, fish production over the last decade (1991-

92 to 1998-99) grew at a rate of 7.09% per annum. Annual growth of production has been highest for the ponds (15.32%).

Carps are by far the most important species in cultured fish production. Total carp production accounted for 88% of the total freshwater fish production in the country. About 88% of all fish species in pond culture are carps. Three major Indian carps namely, rohu (*Labeo rohita*), catla (*Catla catla*), mrigal (*Cirrihinus mrigala*) and one exotic carp, silver carp (*Hypopthalmichthys molitrix*), together account for more than 78% of pond production. Other species include grass carp and common carp.

Polyculture of carps and monoculture of Thai pangus and catfish in ponds are the most widely practiced culture systems in Bangladesh. In 1995, total production from ponds culture reached 307,974 mt, which constitute about 81% of total fish production. Other culture systems include polyculture and monoculture of fish in cage, ox-bow lake (*baors*), ricefield and integrated polyculture in conjunction with poultry. In general, fish culture in Bangladesh is characterized by extensive to moderate or semi-intensive.

Carp polyculture in pond is more productive, capital intensive and is a profitable activity compared to the other culture systems. On the average, the yields for carp polyculture, tilapia monoculture and integrated rice-fish culture are about 4,000 kg/ha, 4,050 kg/ha, and 1,440 kg/ha, respectively. With a corresponding operating cost of US$ 1,840/ha, US$ 453/ha and US$ 453/ha, estimated net returns are about US$ 2,241 /ha, US$ 1,420 /ha, and US$ 400 /ha for carp polyculture, tilapia monoculture and integrated rice-fish culture, respectively. Feed and labor costs were the two most important components of the total cost in most of the culture systems in Bangladesh, each accounting for about 20% and 17%, respectively of the total costs. Among integrated culture systems however where natural feeds are readily available, the contribution of feed cost is the lowest, which constitute about 0.6% of the total cost (Table 2.1.1.1).

Table 2.1.1.1. Cost and return of different freshwater aquaculture technologies, Bangladesh, 1999 (in US$).

Item	Carp Polyculture		Tilapia Monoculture		Integrated rice-fish[5]	
	Pond 1[1]	Pond 2[2]	Pond[3]	Cage[4]	Rice-fish[6]	Rice-fish[7]
Yield						
Fish	4,000	3,262	4,050	383	1,440	505
Rice					3,988	2,000
Price						
Fish	1.02	0.53	0.46	0.82	0.97	2.27
Rice					0.15	0.10
Gross value						
Fish	4,082	1,715	1,873	312	1,404	1,148
Rice					580	204
Total	4,082	1,715	1,873	312	1,983	1,352
Variable cost	1,175	612	453	122	453	745
Fish fingerling	153	84	127	45	179	285
Seeding rate (rice)					21	
Feed	392	124	186	65	399	
Rice/wheat bran	245	60	186	-	3	-
Mustard oil cake	147	65		-		-
Fertilizer	255	70	24		127	24
Chemical fertilizer	153	39		-	89	24
Organic manure	102	31	24	-	39	-
Chemicals	38			-		17
Lime	31	10	39	-		8
Labor	306	323	78	12	92	-
Family		176		-	14	-
Hired		146		-	77	-
Others		0			33	11
Fixed cost	665		-	25		
Annual lease value	510			-		
Interest of Bank loan	155			-		
Total Expenditure:	1,840	612	453	147	453	745
Return to variable cost	2,907	1,104	1,420	190	951	-
Return to Family labor		1,539			1,969	
Net returns	2,241	1,104	1,420	165	400	399
Breakeven price above total cost	0.46	0.19	0.11	0.39	0.31	1.47

[1] from Hossain and Humayon (2001)

[2] from ICLARM (2001)

[3] from Dey and Bimbao (1998)

[4] from Hossain and and Humayon (2001). Unit is in m^2

[5] adapted from Development of Sustainable Aquaculture Project (2001)

[6] Fish include golda and carps (unit price of golda is US$ 8.37/kg)

[7] Fish are mainly carps

Brackishwater Aquaculture

The brackishwater aquaculture is initiated as an important economic activity in the early 1980's with shrimp as the dominant species. Shrimp farming contributes about 18% of the total production from various culture systems in the country and contributes about US$ 285 per year to export earnings. Three different type of culture systems prevailed in the coastal area, namely traditional/extensive, improved extensive and semi-intensive. Shrimp farming is a capital-intensive business with total production costs of US$ 735 per ha/crop for traditional/extensive system, US$ 1,837 per ha/crop for improve traditional system and US$ 9,184 per ha/crop for semi-intensive system with the corresponding net benefit of US$ 1,275, US$ 2,204 and US$ 153,061, respectively (Table 2.1.1.2.).

Table 2.1.1.2. Culture management aspects and cost benefit ratios in various shrimp culture systems, Bangladesh, 1999.

Items	Tradition shrimp farming	Improved traditional shrimp farming	Semi-intensive farming shrimp
Dewatering	5%	80%	OK
Drying	Natural	80%	OK
Ploughing/tilling	-	OK	OK
Lime application	20%	80% (occasional 20%)	OK
Flashing	-	40% (occasional)	OK
Seed source			
a. Natural	80%	50%	20%
b. Hatchery Produced	20%	50%	80%
Stocking rate	Below 1/m^2	1.4/m^2	11/m^2
Feed application	-	Occasional in 40%	OK
Aeration	-	-	OK
Fertilization	20%	Occasional in 80%	OK
Disease treatment cost			
Water exchange	Natural	Natural	Routine work
Harvesting nature	During lunar cycle (cast net)	During lunar cycle (cast net)	Cast netting (total harvest)
Total cost involved (Tk/ha/year)	Tk. 36,000/-	Tk. 90,000/-	450,000/-
Total average production (kg/ha/year)	178.59	422 kg	4,500 kg
Total return in Taka	Tk. 98,500/-	Tk. 1,98,800/-	1300000/-
Net benefit	Tk. 62500/-	Tk. 108000/-	Tk. 7.5 lac
Cost benefit ratio	1:2.73	1:2.20	1:2.80
Expected cost benefit ratio	1:3.56	1:2.84	1:2.6

Source: Ahmed, S.U. et al, 2000

Marine Capture

Bangladesh possesses a vast marine environment of 1.66 lakh sq. km. having abundant fisheries resources including 475 fish and 36 shrimp species. The main species caught are Spanish mackerel, tuna, India salmon, anchovy, croaker, snapper and grouper. The marine fishery subsector includes both industrial and artisanal fisheries. Most of the

fishers are small-scale fishers who use both motorized and non-motorized boats. Trawlers are used in the deep sea by some commercial firms. In 1997, there were about 3,317 mechanized boats, 10,014 non-mechanized boats and 23,810 fishing gears (Khan and Haque 2001).

The total investment, running cost and income in trawl fishing is much higher compared to other types of fishing gears. The total investment cost and running cost of trawl fishing (Tk.38, 089,580 and Tk.15, 761,000 per annum, respectively) are more or less 20 times higher than that of large motorized boat (Table 2.1.1.3). On the other hand, the annual net income of trawl fishing (Tk 3,236,800) is only 8 times higher than that of large motorized boat. Fuel cost is a major expenditure item, which constitutes about 25% - 35% for all type of gears. On the average, the annual expenditure on food is about Tk 0.50 million for trawlers and Tk 135,000 for large motorized boats. The trawler owners spent on an average of Tk 1.54 million per annum on salary of crews and officers (Table 2.1.1.4).

Table 2.1.1.3. Average investment costs (Tk) for marine fishing in Bangladesh, 1998.

Sample	Large Motorized Boat	Trawler
Investment Cost for Crafts	1,291,700	37,768,000
Depreciation Cost for Crafts	156,781	1,432,902
Investment Cost for Gears	349,170	321,580
Depreciation Cost for Gears	76,706	2,461,123
Total Investment Cost	1,640,870	38,089,580
Total Depreciation	233,488	1,679,025

Source: Khan and Haque 2001

Table 2.1.1.4. Cost structure- absolute values (Tk) for marine fisheries in Bangladesh, 1998.

Item	Large Motorized Boat	Trawler
Total Revenue from Forward Selling	1,239,300	18,998,000
Fuel Cost	216,260	5,061,600
Food Cost	135,220	543,470
Labor Cost/ Salary of Crews		1,538,200
Maintenance Cost	159,080	942,010
Other Variable Cost	40,000	3,019,600
Total Variable Cost	550,560	8,624,700
Depreciation Cost	224,210	1,411,400
Interest Payments	31,510	3,146,200
Registration Cost & Licensee	11,800	98,770
Total Fixed Cost	267,520	7,136,600
Total Cost	818,080	15,761,000

Source: Khan and Haque 2001

On the other hand, the average net income from operating tong nets and setbag nets from a survey in North Salimpur and Peshkar Para is around Tk 50,000 and Tk 41,000, respectively. In Peshkar Para, average profit from another local variant of purse seine called floating nets was Tk 195,000, which is more than four times the average profit made from two local variants of gillnet, Pomfret nets (Tk 49,000) and Lakkha nets (Tk 41,000) (Table 2.1.1.5).

Table 2.1.1.5. Net income (Tk) by fishing gears in North Salimpur and Peshkar Para, Bangladesh, 1998.

Sample	Gears	Total Revenue	Total Variable Cost	Total Cost	Net Income
North Salimpur	Purse Seine (Tong)	89,160	22,622	39,220	49,940
	Setbag Net	115,724	68,250	75,170	40,553
	Purse Seine (Floating)	na	na	na	194,487
Peshkar Para	Gill Net (Pomfret)	na	na	na	49,169
	Gill Net (Lakkha)	na	na	na	47,674

Source: Khan and Haque 2001
Legend: na- information not available

2.1.2. China

Freshwater aquaculture

The culture system in China varies according to environment and culture species used. Freshwater aquaculture systems can be classified into poly/monoculture in pond, cage/pen lakes, brooks, reservoirs and ricefields. This has a total area of 4,955,000 ha comprising of 1,994,000 ha in ponds, 880,000 ha in lakes, 1,568,000 ha in brooks, 371,000 ha in reservoirs, 1,586,000 ha in rice and paddy fields and 142,000 ha in other freshwater bodies. Ponds account for about 71% of the total production with the highest productivity of 4,474 kg/ha, followed by brooks (1,623 kg/ha), lakes (921 kg/ha) and reservoirs (743 kg/ha). Culture fisheries in China are very intensive. Stocking is relatively high with good use of feed and fertilizer. Fish culture takes place on state owned, collective, family-owned and private commercial farms (ICLARM, 2001).

Although China has more than 800 freshwater fish species, carp species dominate the freshwater culture and capture fisheries production contributing about 80-90% of the total. Eight of the 10 major carp species being cultured are of national economic importance, including common carp (*Cyprinus carpio*), grass carp (*Ctenopharyngodon idella*), silver carp (*H. molitrix*), bighead (*Aristichthys nobilis*), black carp

(*Mylopharyngodon piceus*), crucian carp (*Carassius auratus*) and Chinese bream (*Megalobrama amblycephala* and *Parabramis pekinesis*). Production of these eight species reached nearly 12 million tons in 1999 and together accounted for about 83% of the total freshwater aquaculture production. The other main species cultured are freshwater prawn, Chinese mitten handed crab, eel, Chinese bream and tilapia.

The most popular culture systems are carp polyculture in pond and tilapia monoculture in pond and cage. Monoculture of carp is becoming popular for intensive culture in cages, ponds and running water systems.

On the average, the net return of carp polyculture is about US$ 6,432/ha with a breakeven price of US $ 0.36 /kg. Carp polyculture can be classified into high, medium and low level of intensity. The yields from these three levels of carp polyculture are 17,764 kg/ha for high intensity, 12,080 kg/ha for medium and 6,298 kg/ha for low with corresponding operating cost of US$11,1000/ha, US$ 7,105/ha and US$ 3,109/ha, respectively. It was also observed that the higher the intensity level, the higher the breakeven price (Table 2.1.2.1).

Compared to carp polyculture, the yield of tilapia monoculture is lower, with productivity of about 5,860 kg/ha for pond system and 5,613 kg/ha for cage system. Total cost of tilapia production is around US$ 5,000/ha to US$ 7,500/ha for both systems, respectively. Feed is an important component of the total operating costs for both carp polyculture and tilapia monoculture systems, which comprise about 40% to 50% of total cost. On the other hand, fertilizer cost has the lowest contribution to total cost (1.5%).

Tilapia monoculture in cage is more profitable compared to tilapia monoculture in pond with a net return of about US$ 3,410/ha with breakeven price of US$1.30 /kg. The net return for tilapia monoculture in pond is around US$ 2,650 /ha with breakeven price of US$0.89/kg.

Table 2.1.2.1. Cost and return of different freshwater aquaculture technologies, China, 1999 (in US$).

Item	Carp polyculture (pond)[1]				Tilapia Monoculture[2]	
	Level of intensity				Pond	Cage
	High	Medium	Low	All		
Average fish production (kg/ha)	17,764	12,080	6,298	12,047	5,860	5,613
Average price of fish (US$/kg)	0.89	0.89	0.89	0.89	1.35	1.91
Gross Return (US$/ha)	15,810	10,751	5,605	10,722	7,893	10,724
Variable cost (US$/ha)	9,541	6,101	2,403	3,632	4,013	6,182
Fingerling	3,140	1,724	677	1,116	1,317	2,348
Feed	5,118	3,486	983	1,930	2,343	3,357
Pesticides	182	148	115	90	1.04	1.04
Fertilizer	171	135	112	84	41	0
Labor	930	607	516	413	123	191
Others	0	0	0	0	188	285
Fixed costs (US$/ha)	1559	1,003	706	658	1,230	1132
Land rent	1039	607	535	439	1,110	959
Depreciation/equipment rental	0	0	0	0	85	161
Fuel	359	284	124	154	0	0
Others	161	112	47	65	35	12
Total cost (US$/ha)	11,100	7,105	3,109	4,290	5,243	7,314
Return Over Variable Cost	6,269	4,650	3,202	7,090	3,880	4,542
Net Returns (US$/ha)	4,710	3,646	2,496	6,432	2,649	3,410
Break even price above total cost (US$/kg)	0.62	0.59	0.49	0.36	0.89	1.30

[1] from producer survey, Carp project (ICLARM 2001)

[2] from producer survey, DEGITA project (ICLARM 1998)

Shrimp culture is the most important component of mariculture in China. Total production of cultured shrimp reached to 170,830 tons in 1999. *Penaeus chinensis* and *Penaeus monodon* are the two major shrimp species cultured in the country. Pond is the dominant farming environment for shrimp culture although culture of shrimp in indoor running water system and cage have been tested recently. Polyculture of shrimp with mussel, clam and marine crab is becoming a very popular practice recently. The yield of shrimp monoculture is around 1,500-3,000 kg/ha with a stocking rate of about 105,000 - 450,000 pcs/ha. On the other hand, the yield of shrimp polyculture in pond is around 300 - 600 kg/ha with a stocking rate of about 20,000 - 90,000 pcs/ha (Table 2.1.2.2).

Table 2.1.2.2. Stocking and yield in shrimp culture in pond, China, 2000.

Culture Environment	Stocking (pcs/ha)	Production (kg/ha)
Monoculture	105,000-450,000	1,500-3,000
Polyculture	20,000-90,000	300-600

Source: National Bureau of statistics, (2001)

Marine Capture

Fish production from marine capture fisheries reached 14.98 million tons in 1999, accounting for 87% of the total capture fish production in China. The production of marine fishing is composed of finfish, crustacean, mollusk, seaweed and other marine products. Finfish holds the largest share in the marine fishing production, which accounted for 68% (10.24 million tons). The major finfish species are shrimp, crab, mollusk and mackerel (Table 2.1.2.3).

Table 2.1.2.3. Major species (species group) and their production (ton) in marine capture fisheries, China, 1999.

Major Species	Production (tons)	Share (%)
Shrimp and crab	2,504,410	16.72
Mollusk	1,656,078	11.06
Hairtail	1,222,454	8.16
Mackerel	565,764	3.78
Amberfish	502,590	3.36
Chub mackerel	402,540	2.69
Pomfrets	337,919	2.26
Delagoa threadfin bream	246,601	1.65
Small yellow croaker	243,101	1.62
Drab filefish	240,214	1.60
Sea eel	234,314	1.56
Spotted sardine	147,125	0.98
Mullet	113,454	0.76
Ilisha	110,359	0.74
Sea bream	78,149	0.52
Large yellow croaker	65,806	0.44
Grouper	40,245	0.27
Seaweed	21,555	0.14
Pacific sprat	17,936	0.12
Other fish	6,225,609	41.57
Total	14,976,223	100

Source: DOF (2001b)

Among the fishing gears used, drawling contributes the largest share (47%) in the total marine capture fish production (14,976,223 tons) in 1999. Set net ranked the second with total production of 2,626,934 tons (18%), followed by drift gillnet (2,045,876 tons or 14%), seine (646,543 tons or 4%) and hook (473,769 tons or 3%) (Table 2.1.2.4). Currently, both powered and non-powered fishing vessels are used for marine and inland fishing. There were about 279,994 poser-fishing vessels used with a total capacity of 56,000,419 tons and a total power of 12,180,709 kw (Table 2.1.2.5). On the other hand, there were about 23,276 non-powered fishing boats with a total capacity of 34,192 ton (Table 2.1.2.6.).

Table 2.1.2.4. Production (ton) from different fishing gears in marine fisheries, China 1999.

Fishing Gear	Production (ton)
Drawling	7,054,960
Seine	646,543
Drift gillnet	2,045,876
Set net	2,626,934
Hook	473,769
Others	2,128,141

Source: DOF (2001b)

Table 2.1.2.5. Information on power fishing vessels used in China, 1999.

Power Fishing Vessels	Values
Marine Fishing	
Number	279,994
Total capacity (ton)	5,600,419
Total power (kw)	12,180,709
Total	
Number	470,710
Total capacity (ton)	6,694,002
Total power (kw)	13,717,080

Source: DOF (2001b)

Table 2.1.2.6. Information on non-powered fishing boats used in China, 1999.

Non-Powered Fishing Vessel	Values
Marine Fishing	
Number	23,276
Total capacity (ton)	34,192
Total	
Number	518,881
Total capacity (ton)	799,109

Source: DOF (2001b)

2.1.3. India

Freshwater Aquaculture

The major freshwater farming environments in India are pond, cage, pen, rice field, sewage feed and air breathing. Polyculture is the dominant culture system practiced. The major species are carp, freshwater prawn and catfish. Basically India's aquaculture is carp-oriented and the contribution of other species is marginal. The three Indian major carp (Rohu, Catla, Mrigal) contributed about 87% of the total freshwater production in 1999. Most of the operation however can be considered as moderately semi-intensive as it is limited by low applications of feed and fertilizer (ICLARM, 2001). Fish culture in India can be classified as extensive, semi-intensive or intensive and stocking rate is high at 18,408 fish/ha.

The average yield varies according to species group, level of input use and intensity level. Highest yield is observed in pen culture of carp and catfish (40,000 kg/ha) followed by intensive carp pond polyculture (12,500 kg/ha) and the lowest for integrated rice-fish culture (1,000 kg/ha). In most cases, it ranged between 4,000-7,000 kg/ha. In case of prawn culture, the yield is around 1000-1500 kg/ha (Table 2.1.3.1).

Cost structure is primarily composed of lease cost of the water body, cost of inputs (fertilizer, seed, feed), management and harvesting. Lease value varies according to the fertility and property and management regimes of the water body. The cost of inputs varies according to intensity of their use across different technologies in accordance with requirements. The production cost in pen culture was highest (US$ 6,336) primarily due to the high costs in the construction and feed. Low input carp polyculture has the lowest production cost (US$ 326) due to absence of feed component. In most of culture system, feed is the most important component of cost, accounting for more than 50% of the total cost. The net profit is lowest for paddy cum fish culture (US$ 99/ha) and highest in pen culture (US$ 11,055/ha). The benefit cost ratio (BCR) was highest for low-input carp pond polyculture (3.13) due to very low investments. For the rest of the technologies, BCR is around 2, except for pen culture, integrated fish farming, weed based farming and medium input carp culture.

Table 2.1.3.1. Cost and returns for different freshwater technologies, India, (in US$/ha, 1999 prices)

Item	Carp pond polyculture Level of intensity			Carp-prawn culture	Prawn culture	Sewage fed		Integrated						
	Low	Medium	High	(pond)	(pond)	Without feed	With feed	Weed Based	Duck-fish	Poultry - fish	Pig-fish	rice-fish	Pen culture	Air-breathing
Yield (kg/ha)	2,000	6,000	12,500	4,000	1,500	5,000	7,000	4,000	4,000	4,000	4,000	1,000	40,000	6,000
Meat	-	-	-	-	-	-	-	-	2	5	16	-	-	-
Eggs (pcs)	-	-	-	-	-	-	-	-	8,000	28,000	-	-	-	-
Paddy	-	-	-	-	-	-	-	-	-	-	-	6,000	-	-
Prawn	-	-	-	500	-	-	-	-	-	-	-	-	-	-
Price of fish (US$/kg)	0.54	0.54	0.54	1.09	5.43	0.54	0.54	0.43	0.65	1.09	0.82	1.48	0.43	0.54
Total return (US$/kg)	1,087	3,261	6,793	4,891	8,152	2,717	3,804	1,739	2,609	4,348	3,261	1,478	17,391	3,261
Return (from Fish)	1,087	3,261	6,793	4,891	8,152	2,717	3,804	2,174	2,174	2,174	2,174	543	17,391	3,261
Variable Cost (US$/kg)	228	1,036	2,674	1,870	3,283	761	1,196	418	877	1,755	842	346	3,620	1,222
Stocking	22	38	109	217	652	217	217	27	38	38	38	11	1,522	217
Feed	-	-	-	-	-	-	-	-	217	1,087	163	-	-	-
Rice bran	-	326	696	543	870	-	217	-	217	217	217	87	870	174
Oil cake	-	435	1,043	543	870	-	217	-	217	217	217	87	1,087	174
Weeds	-	-	-	-	-	-	-	109	-	-	-	-	-	-
Fish meal	-	-	435	217	543	-	-	-	-	-	-	-	-	-
Trash fish	-	-	-	-	-	-	-	-	-	-	-	-	-	609
Fertilizer	54	76	163	76	76	-	-	163	-	-	-	65	76	-
Cow Dung	43	52	65	109	109	-	-	65	-	-	-	52	65	22
Pond preparation	109	109	163	163	163	543	543	54	109	109	109	43	-	26
Bird/Animal	-	-	-	-	-	-	-	-	78	87	98	-	-	-
Fixed costs (US $/kg)	98	228	523	448	589	341	391	122	164	252	160	297	2,716	216
Interest	33	119	305	230	372	124	174	57	99	186	95	68	586	150
Lease value	65	109	217	217	217	217	217	65	65	65	65	65	65	65
Paddy	-	-	-	-	-	-	-	-	-	-	-	163	-	-
Pen (deprectiation)	-	-	-	-	-	-	-	-	-	-	-	-	2,065	-
Total cost (US $/ha)	326	1,263	3,197	2,317	3,872	1,102	1,587	541	1,041	2,007	1,003	642	6,336	1,437
Net returns (US $/ha)	761	1,998	3,597	2,574	4,280	1,615	2,217	1,633	1,133	167	1,171	-99	11,055	1,823
Breakeven price above total cost (US $/kg)	0.16	0.21	0.26	0.58	2.58	0.22	0.23	0.14	0.26	0.50	0.25	0.64	0.16	0.24

Source : Katiha (2001)- country report

Brackishwater Aquaculture

Coastal aquaculture is a significant contributor to aquaculture production. This is mainly composed of shrimps (*Penaeus monodon* and *P. Indicus*) and other species cultured like lobster, crab, molluscan (edible oyster, pearl oyster, mussel, and clam), sea cucumber, marine finfish (mullets, groupers, seabass, milkfish, and pearlspot) and seaweed. Among these culture systems, the yield, operating cost and net profit from shrimp farming are highest. The yield from shrimp farming is around (3.12 t/ha), followed by polyculture of mud crab farming (1.14 t/ha crabs and 0.7 t/ha milkfish), edible oyster farming (0.8 t/ha meats) and monoculture of mud crab farming (0.78 t/ha crabs). The operating cost for shrimp farming is US$ 27,000/ha compared to US$ 915 (mud crab monoculture), US$ 1,010/ha (mud crab polyculture), US$ 510/ha (edible oyster) and US$ 560/ha (mussel farming). The net profit ranged between US$ 226/ha for edible oyster farming up to US$ 22,250/ha in case of shrimp farming.

Marine Capture

The Indian marine fisheries sector is characteristically an open access, that is, with free and common property rights. The multi-species fishery comprises of over 200 commercially important finfish ad shellfish species. Mackerel, penaeid prawn, clupeiods, sciaenids and perches were the major species with the yield of 206,000 tons, 213,000 tons, 189,000 tons, 183,000 tons and 146,000 tons, respectively in 1994-95. During 1996, there were about 238,125 fishing fleets which were composed of 160,000 traditional crafts, 31,726 motorized crafts (converted from traditional craft), and 46,918 mechanized vessels, being operated with different gear combination in the Indian exclusive economic zone (EEZ) (Pillai et. al, 2001).

The most widely used traditional crafts (non-motorized) are *catamarans* and *canoes* with gears such as hook and lines, gillnets and boat seines. The investment requirement for catamarans operating hook and line (H&L) or gillnets varies from Rs. 17,000 to Rs.75,000 and investment for a canoe operating H&L or boat seine varies from Rs. 40,000 to Rs.85, 000. All these fishing units earn an annual net profit ranging from Rs. 5,000 in Tamil Nadu to Rs.10, 000 in Kerala after deducting all costs (Table 2.1.3.2).

Table 2.1.3.2. Economic performance of different types of artisanal fishing units in the marine sector, India, 1993-1994. (Rupee in lakh)

Economic parameter	Catamaran + Hook & Line (Tamil Nadu)	Catamaran + Gillnets (Tamil Nadu)	Canoe + Boat-seine (Kerala)	Canoe + gillnet (Kerala)	Canoe + Hook & Line (Kerala)
Initial Investment	0.17	0.32	0.85	0.65	0.40
Annual catch (t)	7.50	13.00	51.00	17.50	11.60
Value	0.45	0.55	1.28	0.71	0.75
Operating cost	0.36	0.42	0.98	0.46	0.58
Fixed cost	0.04	0.08	0.20	0.19	0.12
Total cost	0.40	0.50	1.18	0.65	0.70
Net operating income	0.09	0.13	0.30	0.25	0.17
Net income	0.05	0.05	0.10	0.06	0.05
Rate of return (%)	44	31	27	24	28
Pay back period (year)	2.50	3.90	4.60	5.20	4.40
Value realised per kg of fish (Rs./kg)	6.00	4.23	2.51	4.06	6.47
Average total cost per kg of fish (Rs./kg)	5.33	3.85	2.31	3.71	6.03
Average operating cost per kg of fish (Rs./kg)	4.80	3.23	1.92	2.63	5.00

Source: Sathiadhas, 1996

In the motorized crafts, the ring seine unit requires a maximum investment of about Rs.5 lakhs and the average annual revenue per unit is around Rs6.43 lakhs. Among motorized catamarans, the gross earnings are higher for H&L units compared to that of the gillnet units. However the net operating income and net profit are higher for the motorized catamarans operating gillnets as it accounts for less variable costs than the H&L units. In the artisanal sector where the motorized and non-motorized units are owner-operated, about 60% of the gross revenue are paid as wages to the crew or fishing workers (Table 2.1.3.3). Hence, the fishing income received by the owners is the net income plus the wages shared by family laborers.

Table 2.1.3.3. Economic performance of different types of motorised fishing units in the marine sector, India, 1993-1994.

Economic parameter	Catamaran + Hook & Line (Tamil Nadu)	Catamaram + Gillnets (Tamil Nadu)	Canoe + Ring seine (Kerala)	Canoe + Gillnets (Kerala)	Canoe + Hook & Line (Kerala)	Canoe + Gillnets (Gujarat)
Initial Investment	0.35	0.50	5.00	1.00	0.75	1.20
Annual catch (t)	14.50	16.20	220.00	21.00	18.40	16.95
Value	0.82	0.76	6.43	1.08	1.50	1.50
Operating cost	0.65	0.54	3.98	0.69	1.09	1.15
Fixed cost	0.09	0.13	1.47	0.26	0.25	0.20
Total cost	0.74	0.67	5.45	0.95	1.34	1.35
Net operating income	0.17	0.22	2.45	0.39	0.41	0.35
Net income	0.08	0.09	0.98	0.13	0.16	0.15
Rate of return (%)	38	33	35	28	36	28
Pay back period (year)	3.0	3.6	3.4	4.4	3.2	4.1
Value realised per kg of fish (Rs./kg)	5.66	4.49	2.92	5.14	8.15	8.85
Average total cost per kg of fish (Rs./kg)	5.10	4.14	2.48	4.52	7.28	7.69
Average operating cost per kg of fish (in Rs./kg)	4.48	3.33	1.81	3.29	5.92	6.78

Source: Sathiadhas, 1996

Small trawlers, purse seiners, dolnetters, gillnetters, pair trawlers and sona boats are the major types of mechanized fishing units operating in inshore waters (up to 50 m depth). Initial investments for small trawlers vary from Rs 4.20-6.00 lakh (Table 2.1.3.4). Annual catch, operating cost and net income varies from state to state.

The operations of trawlers and gillnetters are carried out widely all along the Indian coast while the operations of purse seiners, dolnetters, pair trawlers and sona boats are confined to certain regions only. Among all these gears, purse seiners are more profitable. The annual operating cost is about Rs.5.80 lakh and the fixed cost is Rs.3.06 lakh leaving an annual net earning of Rs.3.14 lakh. Sona boat ranked second with an annual operating cost of about 15.00 lakh and a net income of Rs.2.25 lakh per annum. The gillnetters have the smallest net income, ranging from Rs. 34, 000 per annum in Maharshtra to Rs.70, 000 per annum in Tamil Nadu (Table 2.1.3.5.).

Table 2.1.3.4. Economic performance of small trawlers (32'-36') in different maritime states, (Rs. in lakh), India, 1993-1994.

Economic parameter	Kerala	Karna-taka	Goa	Guja-ratha	West Bengal	Orissa	Andhra Pradesh	Tamil Nadu	Mahara shtra
Initial Investment	5.6	5.2	5.5	5.25	4.20	4.50	4.85	5.20	6.00
Annual catch (t)	89	72	43.50	68	34	40	51	99.60	57
Value	11.24	9.04	7.22	9.25	6.01	6.78	9.10	10.71	9.34
Operating cost	8.72	6.58	5.13	6.85	3.90	4.57	6.75	8.39	6.49
Fixed cost	1.68	1.56	1.38	1.58	1.26	1.35	1.46	1.56	1.80
Total cost	10.40	8.14	6.51	8.43	5.16	5.92	8.21	9.95	8.29
Net operating income	2.52	2.46	2.09	2.40	2.10	2.21	2.35	2.32	2.85
Net income	0.84	0.90	0.71	0.82	0.85	0.86	0.89	0.76	1.05
Rate of return (%)	33.00	35.28	30.90	33.60	38.24	37.11	36.40	32.60	35.50
Pay back period (year)	3.7	3.41	4.01	3.62	3.11	3.21	3.29	3.75	3.39
Value realised per kg of fish (Rs./kg)	12.60	12.55	16.60	13.60	17.70	16.95	17.84	10.75	16.39
Average total cost per kg of fish (Rs./kg)	11.69	11.31	14.97	12.40	15.18	14.80	16.10	9.98	14.54
Average operating cost per kg of fish (Rs./kg)	9.80	9.10	11.79	10.07	11.47	11.43	13.20	8.42	11.39

Source: Sathiadhas et al.1995

Table 2.1.3.5. Economic performance of other mechanized boats, (Rs. in lakh), India, 1993-1994.

Economic parameter	Gillnetters		Purse seiners	Dolnetters		Pair trawlers	Sona boats
State	Maha rashtra	Tamil Nadu	Kerala	Maha-rashtra	Gujarath	Tamil Nadu	Orissa
Initial investment	3.3	3.5	10.00	3.2	3.75	9.0	11.00
Annual catch (t)	22	23	280	51	52	150	22
Value	3.36	4.38	12.00	4.54	5.25	13.0	20.00
Annual operating cost	2.02	2.63	5.80	2.95	3.0	8.8	15.00
Fixed cost	1.0	1.05	3.06	0.96	1.13	2.25	2.75
Total cost	3.02	3.68	8.86	3.91	4.13	11.05	17.75
Net operating income	1.34	1.75	6.20	1.59	2.25	4.20	5.00
Annual net profit	0.34	0.70	3.14	0.63	1.12	1.95	2.25
Rate of return (%)	28.30	38.00	46.00	37.69	34.10	37.00	35.00
Pay back period (year)	4.48	3.13	2.4	3.20	3.34	3.20	3.3
Average value realized Per kg of fish (Rs./kg)	15.26	19.64	4.29	8.90	10.10	8.67	90.91
Average total cost per kg of fish (Rs./kg)	13.73	16.00	3.16	7.60	7.49	7.37	80.68
Average operating cost per kg of fish (Rs./kg)	9.80	11.43	2.07	5.78	5.76	5.87	68.18

Source: Sathiadhas et al. 1995

2.1.4. Indonesia

Total fish production in Indonesia reached up to 4,797,060 with 86% (4,149,420 mt) coming from capture fisheries and 14% (647,640 mt) from aquaculture in 1999 (FAO 2001b). Fisheries sector plays an important role in the national economy where fish provides the supply for domestic consumption, supporting marketing and processing industries, and offers job opportunities.

Aquaculture industry was developed in Indonesia to be the main source of fish supply where 25.67 mil ha has been allocated for development. This consists of 0.76 mil ha for freshwater, 0.91 mil ha for brackishwater and 24 mil for marine aquaculture. Small-scale farms dominate the industry and are carried out in brackishwater ponds, freshwater ponds, rivers, irrigation canals, water reservoirs and lakes. This activity augments food supply for domestic consumption and increases household income. Aquaculture development in Indonesia consists of three main activities namely, intensification, extensification and diversification.

Freshwater Aquaculture

In Indonesia, monoculture of tilapia and common carp in single floating cage system (FCS) and double floating cages system (DFCS) and monoculture of common carp in running water system (RWS) and in ricefields are the most widely practiced freshwater aquaculture. The other major freshwater culture are polyculture of tilapia, catfish, *Pangasius* and gouramie in pond. By far, carps are the most important cultured species in the country and include two types: common carp and Nilem carp, and Java barb.

On the average, the yield and net returns of tilapia in FCS and DFCS are higher compared to the yield of common carp with the same systems including RWS. Culture of tilapia in DFCS and FCS generate a net return of US$490/m^2 and US$ 419/m^2, respectively compared to net returns of common carp in RWS (US$266/m^2), in FCS (US$ 20/m^2), and in DFCS (US$ 89/m^2) (Table 2.1.4.1). In general, culture in DFCS of a particular species is more productive and more profitable.

The operating cost of tilapia monoculture in DFCS is higher compared to tilapia monoculture in FCS due to its higher feed cost. Among common carp, the total cost in semi-intensive culture in DFCS is the highest (US$ 1,044/ha) followed by semi-intensive culture in RWS (US$ 662/ha), extensive culture in DFCS (US$ 604/ha) and the lowest in extensive culture system in FCS (US$ 203/ha). In most of the systems and species, feed cost is the major component of total cost accounting for about 50% to 70% of the total cost. The benefit cost ratio is highest for tilapia monoculture in FCS (2.24) due to low operating cost and lowest for semi-intensive common carp in FCS (0.96).

Table 2.1.4.1. Cost and return of different freshwater aquaculture technologies, Indonesia (US$/100 m^2, 1999 prices)

	Common carp[1]									Tilapia[2]	
	Running water system (RWS)			Floating cage system (FCS)			Double floating cage system (DFCS)			DFCS	FCS
	semi/intensive	Extensive	All	semi/intensive	Extensive	All	semi/intensive	Extensive	All		
Yield (kg/m^2)	505	281	393	161	97	129	396	394	395	1525	789
Price (US$/kg)	1.97	2.85	2.28	1.38	2.10	1.64	2.53	2.11	2.33	1.54	0.96
Gross return (US$/m^2)	992	800	896	221	204	213	1002	833	920	2347	756
Variable cost (US$/m^2)	651	586	618	253	196	225	1026	578	809	1468	280
Stock	143	170	157	93	64	79	291	120	208	307	123
Feed	471	394	432	91	74	82	686	415	555	1129	125
Medicine	0.5	0.6	0.6	0.1	0.5	0.3	1.8	1.9	1.8		
Labor	36	21	29	69	57	63	48	41	45	26	26
Others										5	5
Fixed cost (US$/m^2)	10	12	11	8	7	7	17	26	22	389	57
Depreciation	9	11	10	6	6	6	16	25	21		
Equipment	1.5	1.6	1.5	1.5	1.6		0.8	0.9	0.9		
Total cost	662	598	630	260	203	232	1044	604	831	1857	337
Return Over Variable cost (US$/m^2)	341	214	278	-31	8	-12	-24	254	111	879	476
Net Returns (US$/m^2)	331	202	266	-39	0	-20	-42	228	89	490	419
Break even price above total cost (US$/kg)	1.31	2.13	1.60	1.62	2.09	1.79	2.63	1.53	2.10	1.22	0.43
RC-Ratio	1.50	1.34	1.42	0.85	1.00	0.92	0.96	1.38	1.11	1.26	2.24

[1] from producer survey, Carp project (ICLARM 2001)

[2] from Krismono et al 1998

Marine Capture

Capture fisheries is being practiced both in marine and inland waters. Marine capture fisheries include coastal or small-scale fisheries and offshore or commercial fisheries. Inland or open water capture fisheries include the lakes, rivers, reservoirs and dams. The number of fishers was 1.5 million (from 380,000 fishing households) in 1990, which rose to about 2.4 million (from 499,704 fishing households) in 1999 (DGF 1999). The rate of increase on the number of fishers is about 4.61% per year and the fishing households by 2.03 % per year in 1990-1999.

In marine capture fisheries, fishing operations can be categorized as small-scale and commercial scale unlike in inland capture fisheries where almost all fishing units are artisanal, small-scale, subsistence and labor-intensive. Fishing operations for inland can only be done for short period given water level appropriate in using a particular fishing gear. Production from marine capture fisheries in Indonesia consist of small pelagic (37.21%), demersal (28.58%), large pelagic (9.97%), corral fishes (2.45%), peneid (1.89%), squids (0.58%) and ornamental fishes estimated to be around 1.5 billion of fish. The majority of Indonesia's fishing fleet are of small-scale thus with limited capacity to sail offshore. The dominant fishing gears were hook and line (40% of total gears used), gillnet (30.60%), traps (10%), liftnet (5.80%), seine net (5.84%), purse seine (1.34%), shrimp net with BEP (0.04%) and other gears (7.37%).

In terms of capital investment, shrimp trawl and large purse seine have the highest capital investment, amounting to Rp 4,500 million and Rp 675,000 million, respectively. Shrimp-trawl, Danish seine B (arad), large purse seine and Danish seine C (cantrang) are considered as capital intensive gears which need longer time to acquire the vessels, gears, nets, and other equipment. On the other hand, mini purse seine, beach seine, monofilament gillnets and Danish seine A (Payang/Dogol) are considered as less capital intensive and more profitable compared to others with the benefit cost ratio is around Rp 1.48/craft up to Rp 1.66/craft (Table 2.1.4.2).

Table 2.1.4.2. Investment costs from the different fishing boats/gears operated in Indonesia, 2000.

Boat/Gears	No. of vessels		Capital Investment (in million Rp.)	Ratio Capital Productivity	Ratio Capital Intensity (Rp./Craft)	B/C ratio	Payback periods (months)
	Indonesia (1997)	North Java					
1. Danish seine A (Payang/Dogol)	6,173	5,473	39,75	0.36	2,656	1.48	8
2. Beach seines	10,268	701	28,00	0.78	685	1.53	4
3. Mini purse seines	24,200	2,968	224,00	0.45	3,824	1.66	16
4. Monofilament Gillnet	24,470	8,434	15,50	0.48	2,500	1.53	2
5. Gillnet (JIT)	58,129	4,464	45,00	0.15	3,929	1.41	8
6. Stationary liftnet	11,738	1,244	11,50	0.49	2,639	1.45	6
7. Danish seine C (Cantrang)	na	2,598	200,00	0.51	16,369	1.19	40
8. Bottom long line	24,710	844	17,50	0.28	1,983	1.28	10
9. Large purse seine	9,341	297	675,00	0.35	8,547	1.26	35
10. Danish seine B (Arad)	na	5,473	70,00	0.31	8,167	1.28	36
11. Trammel net	30,931	14,401	na	-	-	1.17	-
12. Shrimp trawl	1,387	-	4,500	0.08	69,450	1.30	78

Source: Priyono 2001

On the average, the total variable cost accounts 88% of the total cost, of which 67% is contributed by the labor cost (Table 2.1.4.3). As shrimp-trawl, mini purse seine, Danish seine A and Danish seine B operate at farther areas between the fishing ground and fishing base, they require higher running cost (fuel and oil, ice, kerosene, waters, daily repairs and administration cost) which accounts for 18%-33% of total cost. On the other hand, the shrimp-trawl, Danish seine B, large purse seine and mini purse seine involve higher fixed cost possibly since these gears utilize more equipment and engines to operate the vessels and gears. The beach seine, monofilament gillnet, bottom longline and stationary liftnet need higher labor cost (more than 70% of total cost) with the exception of large purse seine, which usually operates at extensive areas such as from Pekalongan/Juwana to South China Sea in the west and Makassar Strait in the east (Priyono, 2001).

Table 2.1.4.3. Cost structure for various fishing gears/boats in Indonesia, 2000

Items	Fishing Vessel/Gear Indicators										
	Danish seine A	Beach seine	Mini purse seine	Mono filament gillnet	Gillnet (JIT)	Stationary liftnet	Danish seine B	Bottom longline	Large purse seine	Shrimp-trawl	Average
1. Total Variable Cost (%)	94.50	96.29	85.20	93.68	93.60	91.90	85.18	94.22	85.38	57.02	87.68
Running cost	19.38	3.58	23.40	9.25	12.86	14.60	17.64	12.48	12.92	33.10	15.92
Labor cost	70.67	88.13	57.42	79.52	71.20	72.96	63.98	77.92	68.69	20.22	67.07
Share cost	4.45	4.59	14.42	4.63	9.62	4.34	3.56	3.82	3.78	3.70	4.69
2. Total Fixed Cost (%)	5.50	3.71	14.76	6.60	6.32	8.10	14.82	5.78	14.62	42.98	12.32
Total Cost (%)	100	100	100	100	100	100	100	100	100	100	100
In Cash (Rp/Million)	141.70	221.21	263.16	58.30	167.58	56.29	226.44	81.85	732.05	3.072	

Sources:Priyono, B.E., 2001

2.1.5. Malaysia

Aquaculture

Total aquaculture production in Malaysia was 133,647 tons valued at US$172.2 (RM654.29) million, which constitutes about 9.9% of the total fisheries production (1,349,969 mt) (FAO 2001a). Aquaculture covers freshwater and brackishwater culture. Culture is carried out in cages, ex-mining pools, cement tanks and pens for freshwater and ponds and cages for finfish and mollusks (e.g. cockle, mussel and oyster) for brackishwater. The bulk of the production was from cockle culture, which constituted about 80% of the total brackishwater culture production. In general, brackishwater culture contributes 75% of total aquaculture production. In 2000, there are 21,774 aquaculturists in the country with 80.8% from the freshwater and 19.2% from brackishwater. The main species cultured in freshwater are red tilapia, black tilapia and catfish while in brackishwater, these are tiger prawn, seabass and snapper.

Marine Capture

Marine capture fisheries accounted for 91% of total production in 1997 while production from aquaculture and inland fishery stood at 9%. Within the marine capture fisheries, production from inshore fishery accounted for 89% of total marine landings while deepsea fisheries contributed 11%. The main species caught were India Mackerel (8%), prawn (7%), squids (5%), round scad (4%), tuna (4%), yellow striped trevally (3%) and threadfin bream (3%).

The fishing fleet in Malaysia can be categorized into commercial (trawl and purse seine) and traditional fleets (drift/gillnet) (Abu Talib et al., 2000). Among commercial fishing vessels, the trawler is more productive in terms of labour although production costs are slightly higher than the purse seiner. For both the trawl and purse seine fisheries, the larger vessels (40-69.9 GRT category) are more efficient than the smaller vessels (25-39.9 GRT category) (Table 2.1.5.1). Capital investment varies depending on the level of sophistication of the equipment used. The capital investment of the purse seine fishery is lower than that of the trawl. The trawl is more productive compared to the purse seine although its production costs and capital investment are higher (Table 2.1.5.2). With the trawlers now catching substantial proportions of pelagic fish in addition to their catch of demersal finfish, interaction between trawlers and purse seiners in the commercial fishery will evolve.

Table 2.1.5.1. Average costs and earnings of trawlers, purse-seiners and driftnetters by size of vessel on the west coast of Peninsular Malaysia, 1989. (in Ringgit Malaysia)

	Trawlers*		Purse-seiners		Driftnetters
Size of vessel (GRT)	25-39.9	40-69.9	25-39.9	40-69.9	
No. of days per trip	2	2	1	2	1
No. of trips per month	14	15	19	16	17
No. of trips per year	168	180	232	186	204
No. of workers	4	3	14	15	2
Annual Landings					
Quantity (kg)	173,781	236,936	173,473	386,100	5,765
Value (RM)	186,407	217,392	193,008	403,278	21,095
Annual Operational Costs					
Fuel (RM)	81,298	76,355	53,789	152,670	3,529
Ice (RM)	8,406	7,400	18,547	34,740	950
Food for workers (RM)	4,639	3,113	7,147	18,840	1,681
Wages (RM)	35,445	64,707	53,260	102,597	3,734
Maintenance cost (RM)	9,606	7,933	12,053	21,100	3,192
Others (RM)	620	721	1,262	645	14
Total (RM)	140,014	160,229	146,058	330,592	13,100
Annual gross earnings (RM)	46,393	57,163	46,950	72,686	7,995
Monthly gross earnings (RM)	3,866	4,764	3,913	6,057	666
Annual depreciation (RM)	9,873	13,562	6,848	9,124	1,359
Annual net earnings (RM)	36,520	43,601	40,102	63,562	6,636

Source: DOF 1989

* These vessels use Refrigerated Sea Water (RSW) system

Table 2.1.5.2. Productivity efficiency indicators of selected fisheries on the west coast of Peninsular Malaysia.

Fishery	Production Costs (RM/kg)	Labour Productivity (kg/person-day)	Capital Intensity (RM/person-day)
Trawl (25-39.9 GRT)	1.24	129	74.40
Trawl (40-69.9 GRT)	1.48	219	92.59
Purse seine (25-39.9 GRT)	1.19	53	30.79
Purse seine (40-69.9 GRT)	1.17	69	17.92
Drift net	0.44	14	29.41

Source: Abu Talib et. al, 2000

In traditional fleet, there is an increased in the number of operating drift nets. This could be due to its low capital investment, low labour requirement and cost effectiveness of this gear. The drift net being a small-scale gear is the most cost-effective although its

production effectiveness per variable cost is the lowest. This is probably explained by the small quantities of high-valued catch. According to DOF's survey in 1989, the average net earnings of driftnetters amounted of RM6,636 per year with the annual operational costs is about RM13, 100 (Table 2.1.5.1).

2.1.6. Philippines

Philippines has a vast natural resource endowments composed of freshwater (106,328 ha) and brackishwater (232,065 ha) swampland, existing freshwater (14,531 ha) and brackishwater fishponds (239,323 ha), lakes (200,000 ha), rivers (31,000 ha), and reservoirs (19,000 ha). The Philippine fisheries sector can be divided into three sub-sectors namely, aquaculture, commercial (large-scale) and municipal (artisanal or small-scale) fisheries. Over the five-year production trend, the highest % share of total fish production comes from aquaculture at 34.1% followed by commercial at 32.99% and lastly by municipal, 32.91%.

Capture fisheries system in inland and marine waters were presented in the report. There are about 1,246 inland fishing gears and 10,493 marine gears. In small-scale freshwater fishing operations, gillnet has the highest production (32.85%) followed by hook-and-line (24.13%). Adoption pattern and technical and economic characteristics of the different fishing technologies were also enumerated and discussed in the report.

Aquaculture in the Philippines is classified into three major industry groups based on farming environments. These are a) freshwater aquaculture (fish farming in lakes, dams, rivers, small-water impoundments, paddy-culture, tanks), b) brackishwater aquaculture (traditionally fishponds in coastal estuaries) and c) mariculture or seafarming (classified into three sub-commodities: finfish, shellfish and seaweed cultures). The major culture species are seaweeds, milkfish, tilapia and shrimps/prawns. Most of these aquaculture systems are operated as a stand-alone operation. These are mainly owner-operated with other members of the family assisting in the operation. On the other hand, large-scale operators rely heavily on farm managers or caretakers for their operation. Except for the freshwater fishponds, none of the aquaculture systems could be integrated with other farming activities.

Freshwater Aquaculture

Freshwater culture systems are more on monoculture in ponds, cages, pens and tanks with extensive, semi-intensive and intensive management systems. Milkfish, tilapia and carps are the major aquaculture species cultured in freshwater fishpens in the country. Milkfish dominates production in this culture system. Tilapia (monoculture) and carps are commonly reared in freshwater fish cages in the Philippines. Tilapia was more popular to farmers than the carp species in this culture system. Pond monoculture of tilapia and catfish is equally important culture system in freshwater environment. Carps are also cultured in ponds using both monoculture and polyculture system. In addition, tilapia and catfish are stocked in tanks, cultured by monoculture systems.

Brackishwater Aquaculture

Brackishwater aquaculture is traditional fishponds in coastal estuaries. For brackishwater environment, both monoculture and polyculture systems are carried out for shrimp/prawn, milkfish, tilapia, mudcrab and grouper culture.

Mariculture

For mariculture environment, ponds are a common farming system used to stock shrimp, milkfish and grouper. Seaweeds and mussel are cultured by floating and hanging farming system with extensive culture system. Milkfish and grouper are the major species produced by using polyculture in cage.

Marine Capture

The marine capture fisheries sector in the Philippines is categorized into two sub-sectors, namely, municipal (artisanal) fisheries and commercial fisheries. Municipal fisheries refer to fishing in the communal coastal waterbody within a defined boundary of water-limit and with specific requirements of fishing gears and vessels. Commercial or deepsea fishing are those that operates outside the municipal fishing boundaries using passive or active gears and with a defined gross tonnage of fishing vessels. During the early 1950s, the small-scale sector comprised the bulk of fisheries production, which was, on average, 150% greater than the commercial sector. Towards the 1970s and well into the 1990s, this ratio drastically dropped to a little over 30% indicating either stagnation in catch of the municipal fishery or increased activity in the commercial sector. In 2000, total fish production was 2,868,605 mt of which 33% came from the commercial

sector and 33% came from the municipal sector (Table 2.1.6.1). Based on the latest data of municipal and commercial fishing vessel, it is estimated that there were 469,807 bancas (less than 3 GT) in 2000 and 3,601 vessels (more than 3 GT) in 1999. Being multi-species fisheries, fishers in municipal fishery sector use various choice of fishing gear and at present there are about 46 types. The most common are gillnet, hook and line, jig, fish corral, beach seine and longline. In coastal waters, several kinds of fishing gears and methods are used by the fishers causing the fishing effort to increase, which contribute to overfishing. There are 14 types of fishing gears being used in the commercials sector. In terms of production, purse seine and ring nets produced 52% and 16% of the total production, respectively.

Table 2.1.6.1. Five-year fish production by Sectors (in MT), Philippines, 1996-2000

Year	Commercial		Municipal		Aquaculture		Total	Growth (%)
	Total	%	Total	%	Total	%		
2000	946,485	33.0	943,951	32.9	978,169	34.1	2,868,605	1.6
1999	948,754	33.6	924,693	32.8	948,995	33.6	2,822,422	1.3
1998	940,533	33.8	891,146	32.0	954,396	34.3	2,786,075	0.7
1997	884,651	32.0	924,466	33.4	957,390	34.6	2,766,507	-0.1
1996	897,073	31.7	909,248	32.8	980,829	35.4	2,769,150	-
Ave-rage	923,499	32.8	918,701	32.8	963,956	34.4	2,802,552	

Source: Philippine Fisheries Profile (BFAR, 2001)

Purse seines and trawlers have the highest operating expenses mainly because of high contribution of fuel cost. Fuel cost and ice are the major components of material expenses. Material expenses increase in tandem with tonnage (Table 2.1.6.2). Repairs and maintenance expense are correlated to age of the asset. Revenues of commercial fishing vessels depend on total volume of catch, species composition, and prices. A higher volume of catch results in higher revenues and this is further enhanced when the species caught are commercially desirable. Catch per trip for purse seines is the highest among the gears surveyed, followed by trawlers, Danish seines and gillnets (Table 2.1.6.3).

Table 2.1.6.2. Average material expenses of commercial fishing vessels sampled from August to December 1994 in peso per trip, by gear type and tonnage category, Philippines.

Gear Type	Fuel	Oil	Kerosene	LPG	Ice	Salt	Food	Cigarettes	Others	Total
Bagnet										
<=5	409	115	0	0	183	0	10	1	8	726
5 – 15	871	189	12	8	507	2	186	12	34	1,821
16 – 25	1,262	223	3	2	421	2	228	2	2	2,145
26 – 50	1,412	93	0	5	330	0	90	5	15	1,950
Danish seine										
<=5	1,252	85	0	0	1,027	0	373	246	12	2,995
5 – 15	3,729	424	15	48	2,888	5	605	93	63	7,870
16 – 25	2,105	256	0	70	1,823	0	1,159	108	105	55,626
> – 50	3,281	477	0	40	1,483	0	1,130	103	74	6,588
Drift filter net										
<=5	248	31	40	0	0	0	410	180	30	939
5 – 10	278	29	0	0	0	0	467	190	22	986
Gillnet										
<=5	702	410	33		2,398	116	943	123	0	4,742
5 – 15	652	473	53	17	2,151	55	1,891	194	0	5,524
Hook & line				55						
<=5	3,582	545	2,810	0	1,736	50	646	100	275	9,690
5 – 15	7,821	1,030	108	0	2,063	150	1,044	236	900	13,352
Purse seine										
5 – 15	2,839	72	1,095	5	1,085	0	110	40	10	5,256
50 – 100	2,550	6,800	0	0		4,125	1	3,232	0	39,707
> = 100	53,194	843	0	98	4,056	0	744	50	0	58,985
Ringnets										
<=5	457	53	27	1	90	1	118	10	12	769
5 – 15	1,163	162	75	0	419	13	298	32	32	2,194
16 – 25	2,194	73	2	0	1,047	1	310	1	28	3,656
26 – 50	2,112	501	5	86	1,577	2	405	24	80	4,791
Round haul seine										
<=5	434	60	160	0	0	0	120	40	27	841
5 – 15	583	90	287	0	0	0	150	60	55	1,225
Trawlers										
<=5	2,860	42	3	22	576	0	350	0	0	3,853
5 – 15	5,922	592	3	12	1,955	56	584	122	45	9,291
16 – 25	10,583	1,301	6	42	3,016	133	1,096	146	27	16,350
26 – 50	5,293	571	0	30	1,322	4	592	153	57	8,022
51 – 100	35,000	4,179	325	67	4,581	26	1,054	317	350	45,899
> = 100	46,570	713	0	73	8,655	5	1,208	11	74	57,309

Source: Cruz-Trinidad 2001

Table 2.1.6.3. Average catch of commercial fishing gears by gear type, region and average tonnage, Philippines.

Gear Type	Region	Tonnage	Catch (kg)
Bagnet	4	12	421
	5	11	2,158
	9	13	785
Danish seine	1	19	759
	6	8	636
	9	23	15,230
Drift filter net	2	7	258
Gillnet	3	5	4,452
Hook and line	9	3	3,098
	12	5	741
Purse seine	1	208	7,428
	2	415	207
	5	118	4,120
	8	6	1,474
	11	57	55,000
Ringnet	5	3	232
	7	25	837
	11	16	2262
Round haul seine	11	3	50
Trawl	5	10	1,278
	6	34	2,361
	9	15	1,298

Source: Cruz-Trinidad, A. 2001.

2.1.7. Sri Lanka

Freshwater Aquaculture

Sri Lanka has extensive freshwater, brackishwater resources and coastal areas available for inland fisheries and aquaculture. Although Sri Lanka is reported to have the highest ratio of freshwater bodies to land in the world, the share of freshwater aquaculture production in the total production was as low as 3%. At present, aquaculture production in Sri Lanka has a minor role in the domestic fish supply. The major land resource available for aquaculture is seasonal village tanks, which hold water for about 6 to 8 months. The major species produced by using polyculture system in tanks are carps (Chinese carps, common carp and Indian major carps) and tilapia. Chinese and Indian major carps were the major freshwater species cultured in pond.

Brackishwater and Mariculture

The brackishwater and mariculture species include *Penaus monodon*, *Macrobrachium rosenbegii, Scylla serrata, Perna perna, P. viridis, Chanos chanos, Lates calcarifer, Ephinephalus sp, Crassostrea spp* and sea weed *Gracillaria eduli.* However, culture of some of these species is limited to experimental trials only. Culture of *Penaus monodon* brings in a considerable amount of foreign exchange to the country (Wijayaratnet and Maldeniya 2001).

Marine Capture

The marine fisheries industry in Sri Lanka has a long history. During the early stages of development, traditional methods of fishing using canoes and gear such as beach seines, handline, nets made out of coir and stake nets were used in coastal areas. The stage of rapid development and highest rate of growth in the fisheries began in late 1950s with a significant impact by motorization and introduction of modern craft and methods in the country. This technological development and the open access nature of operation had accelerated the fishing effort over the years, increasing both fishing power and fishing units. In addition the state provided incentives in the form of subsidies on capital goods and institutional credit. The technological inputs increased coastal fish production from 84,400 t in 1962 to 152,750 t in 1999.

The stable phase of the coastal fisheries development, with a reduced rate of increment in production has led to decrease in fishery outputs. The fishing effort has increased despite that the catch remained static. The fishing sector has reacted to this by investing in new fishing gear such as purse seine, ring net in pelagic fisheries and bottom longline and trammel nets in demersal fisheries. Such adaptation was often beyond the available capital resources of the majority of small-scale fishers.

Coastal fisheries mainly target on pelagic resources (small pelagic and large pelagic), demersal and shellfish such as prawns, lobsters and crabs. Small pelagic fishing is mainly conducted with small mesh gillnet followed by beach seine. Medium mesh (2.5"-3.5"), large mesh (5"-6") and ring nets (1.2"-2.5") are mainly used in large pelagic fishing. Two kinds of crafts, 3.5 ton 30-32' inboard motor boats and 17-22' FRP OBM (outboard motor boats) are generally involved in drift net fishery (Wijayaratne and Maldeniya, 2001).

Labour is the most important input in all fishing activities followed by fuel cost. In the ring net fishery labour cost accounted 64% of the variable cost. In the handline and bottom longline fishery, the cost of bait is higher than the cost of fuel (Table 2.1.7.1). Gillnet fishery for small pelagic fish has the least revenue due to relatively lower price of catch and the lower catch volume. Ring net and bottom longline were the most profitable gears operating in the coastal waters (Table 2.1.7.2).

Table 2.1.7.1. Variable cost by different craft-gear combination in Sri Lanka, 1998-1999.

Craft gear combination	Cost items (Rs)						Variable cost per fishing day
	Fuel	Bait	Food	Ice	Labour	Repairs	
Large pelagic							
17-22'OBM/DN	439.00		217.80		736.90	330.80	1718.50
TR OBM/RN	689.20		327.90		3085.90	237.90	4340.00
Small pelagic							
17-22'OBM/DN	309.34		96.68		219.33	NA	1126.15
TR OBM/DN	NA		NA		148.70	NA	884.37
Demersal							
17-22'OBM/HL	286.70	344.93	78.20	93.65	996.78	NA	1852.29
17-22' OBM/BLL	369.57	409.84	107.71	43.13	1413.20	NA	1611.09
17-22' OBM/BTN	281.97				459.51	NA	795.88
17-22' OBM/BSN	331.69				835.30	NA	1219.70

DN = Drift net RN = Ring net HL = Handline
BLL = Bottom longline BTN = Bottom trammel net BSN = Bottom set gillnet.
TR = Traditional crafts (Vallam) OBM = Out board motor
Source: Wijayaratne and Maldeniya, 2001

Table 2.1.7.2. Profitability indicators of fishing, Sri Lanka, 1998-1999.

Craft gear combination	Gross profit (Rs)	Net profit (Rs)
Large pelagic		
17-22'OBM/DN	369.35	225.89
TR OBM/RN	3479.42	3307.71
Small pelagic		
17-22'OBM/DN	314.58	238.36
TR OBM/DN	305.23	230.78
Demersal		
17-22'OBM/HL	246.22	204.72
17-22' OBM/BLL	1002.55	945.64
17-22' OBM/BTN	228.13	157.61
17-22' OBM/BSN	557.13	483.66

Source: Wijayaratne and Maldeniya, 2001

2.1.8. Thailand

Thailand fisheries sector can be classified into marine capture, coastal aquaculture, freshwater aquaculture and inland capture. Almost 80 of the total fishery production are coming from marine captured fisheries. Coastal aquaculture, freshwater aquaculture and inland captured fisheries contributing around 8.8%, 5.9% and 6.1%, respectively.

Freshwater Aquaculture

Fish farming practice in freshwater environment can be classified into four culture systems; pond culture, paddy field culture, ditch culture, and cage culture. Considering the number of farms and area, pond culture is the most popular practice. However, in terms of productivity, cage culture is the most productive culture system. In addition, fish culture integrated with pig, poultry and rice farming, among others is also practiced to some extent.

Nile tilapia, catfish and Thai silver barb are the most popular freshwater species in Thailand contributing around 38%, 27% and 16%, respectively of the total freshwater fish production in 1999. Other species include common carp, striped catfish, striped snakehead and sepat siam. The use of monoculture and polyculture varies according to species. Omnivorous species like tilapia, silver barb, common carp, Chinese carp and mrigala were cultured in pond by using polyculture system while carnivorous species like walking catfish, snake-head, freshwater prawn and sand goby were cultured by monoculture system.

On the average, tilapia culture is more productive and profitable among monoculture systems (Table 2.1.8.1). Culture of snakehead in ponds, a high-value freshwater fish species is the least productive and profitable activity. Comparing across production environment, cage culture of tilapia is more productive and profitable than that in pond. Among integrated systems, fish-pig and fish-duck are more productive and profitable while rice-fish culture is the least productive and least profitable. In general, polyculture is more productive and profitable than monoculture. In pond polyculture, the higher the intensity level, the higher the yield and net returns.

Variable cost is an important component of the total costs, which accounts for more than 70% of the total cost in Thailand freshwater aquaculture. Feed cost is the most important component of variable cost in most species and intensity level.

With market price twice higher than other fish species, the breakeven price of snakehead is 3-5 times higher (US$ 1.08/kg - US$ 1.33/kg) than other species. The breakeven price in rice-fish farming is the highest among the integrated farming system while it is lowest in fish-chicken farming. In carp polyculture, the difference in breakeven price among intensive and semi-intensive farms isegligible.

Table 2.1.8.1. Cost and Return of different freshwater technologies, Thailand (US$/ha, in 1999 prices)

Items	Polyculture[1]											Monoculture[2]				
	By farm type				By intensity level				By farm size			Tilapia		Catfish	Snakehead[3]	
	Fish-Pig	Fish-chicken	Fish-duck	Rice-fish	Fish farm	High	Medium	Low	Large	Medium	Small	Pond	Cage[4]	Pond	Pond Big-size	Pond Small-size
Yield (Kg/ha)	6,183	6,047	4,822	533	4,281	4,671	4,979	5,248	6,017	5,099	4,133	5,560	780	3,287	1,547	1,813
Price (US$/Kg)	0.62	0.40	0.53	0.61	0.67	0.55	0.63	0.66	0.58	0.66	0.60	0.42	0.55	0.55	1.41	1.16
Gross Return (US$/ha)	3,856	2,425	2,570	323	2,870	2,549	3,151	3,480	3,495	3,354	2,466	2,342	428	1,810	2,179	2,111
Variable Costs (US$/ha)	1,321	1,022	1,793	352	1,358	1,200	1,266	1,507	1,711	1,409	927	1,001	365	1,277	1,844	1,717
Stock	316	240	372	93	282	272	256	346	155	287	322	283	38	71	178	86
Feeds	494	315	1,049	62	561	431	578	581	1,217	608	92	394	303	1,026	1,531	1,359
Commercial Feeds	141	188	-	-	258	207	176	257	401	308	7	341	303			
Rice Bran	38	119	963	33	221	140	372	223	772	230	21	52	-			
Vegetable	39	2	-	3	63	47	19	46	39	45	22	-	-			
Kitchen trash	275	5	86	26	20	37	12	55	4	25	42	-	-			
Fertilizer	129	208	186	74	263	279	192	194	124	228	282	-	-			
Inorganic	9	-	-	-	117	141	1	1	1	1	138	-	-			
Manure	120	208	186	74	146	138	190	193	123	227	144	-	-			
Lime	5	10	5	0.2	9	8	9	9	4	13	7	-	-			
Pesticides	-	14	-	-	2	10	2	4	1	3	10	87	-	7	33	28
Labor	377	236	180	123	241	199	229	374	210	270	214	237	25	173	103	243
Hired labor	108	18	6	-	18	16	15	40	2	42	7	133	15			
Family labor	269	218	174	123	223	183	214	334	209	227	207	104	10			
Fixed Cost	542	171	94	2	148	157	154	150	137	225	107	99	10	124	218	233
Electricity	111	66	23	-	9	33	20	74	23	31	36			6	1	
Fuel/Gasoline/Diesel	40	4	37	2	16	10	18	17	5	23	12			4.9	49	67
Land rental	-	74	35	-	34	9	89	6	75	23	49			19	24	2
Others*	390	27	-	-	89	105	27	53	34	147	9	99	10	94	144	164
Total cost (US$/ha)	1,863	1,193	1,887	354	1,506	1,357	1,420	1,657	1,848	1,633	1,034	1,100	375	1,401	2,062	1,950
Return above variable cost (US$/ha)	2,535	1,403	777	(29)	1,512	1,350	1,885	1,973	1,784	1,946	1,539	1,341	62	533	334	394
Net return (US$/ha)	1,993	1,232	682	(31)	1,364	1,192	1,731	1,823	1,647	1,721	1,432	1,242	53	408	117	161
Breakeven price above variable cost (US$/kg)	0.30	0.20	0.39	0.66	0.35	0.29	0.29	0.32	0.31	0.32	0.25	0.20	0.48	0.43	1.33	1.08

[1] from producer survey, Carp project (ICLARM 2001)

[2] from Department of Fisheries, Thailand (2000)

[3] The average culture period of small-size is 2.75 months and big-size is 5.38 months

[4] Unit area for cage is 100 m^2

* includes maintenance, interest and opportunity cost

Marine Capture

The marine capture fisheries can be broadly divided into commercial and small-scale sub-sectors. Small-scale vessels typically employ gillnets, small push nets, lift nets or other modern small-scale gear, or alternatively set traps, bag nets and other stationary gear in estuaries or protected inshore waters. As for commercial fisheries, trawlers and purse seines are the most important components of the fleet. Push nets and gill nets also take significant catches.

A structural change in Thailand's fisheries has taken place during the last 10 years. From 1985-1990, the number of fishing households and fishing boats decreased by 6.7% and 2.3%, respectively. The decrease in the number of small-scale fishing boats was largely due to the decrease in coastal fishing resources on one hand and the conflicts between small-scale and the commercial-scale fishers on the other. During 1990-1995, the number of fishing households and fishing boats in Thailand increased by 11.0% and 5.4%, respectively. The increase in fishing boats has been in the small-scale sector. Small-scale fishing boats account for 8.1% of the total increase while commercial boats have actually decreased in number by 3.7%. One reason for the change in commercial boats has been the creation of a boat-tenure system within the commercial fishing sector, which resulted in a decrease of the number of boats per household (Table 2.1.8.2).

Total cost of gears in capture fishery in Thailand ranges around Baht 36,000 to Baht 240,000 per unit unit, depending on the number of gear combination (Table 2.1.8.3). In general, the cost increases as number of gear increases. The fixed cost of single geared accounts 29-35% of the total cost (29% for shrimp gillnets, 35% for cuttlefish trammel nets and 32% for Indo-Pacific mackerel gillnets) (Table 2.1.8.4). Variable cost items ranged from 65% to 71% of total fishing costs for single gear groups. On the other hand, there is a significant difference in the share of fixed costs between two-gear combination, three-gear and four-gear combination operations. In general, Hired labour accounts for about 26%-49% of total costs.

Table 2.1.8.2. Number of selected types of gear (fishing units) registered and marine fish caught in Thailand, 1957-1995

Year	Pelagic fishing gear				Demersal fishing gear	
	Stake traps	Purse Seines[1/]	Mackerel Encircling Gillnet	King mackerel drift gillnet	Trawlers[2/]	Push nets
1957	1287	324	Na	na	na	na
1958	1344	392	Na	na	na	na
1959	1470	379	Na	na	na	na
1960	1409	323	48	na	99	na
1961	918	251	233	na	201	na
1962	792	228	386	na	976	na
1963	662	212	537	na	2026	na
1964	602	144	890	na	2360	na
1965	697	226	634	na	2393	na
1966	663	228	409	na	2695	na
1967	447	278	417	na	3077	na
1968	457	361	329	na	3182	na
1969	374	314	224	na	3185	na
1970	371	716	260	235	3082	354
1971	313	475	244	151	3608	610
1972	236	506	254	138	4486	1327
1973	189	680	228	231	5837	1628
1974	229	657	188	148	5271	1213
1975	262	625	187	177	4962	1075
1976	222	726	226	157	5204	844
1977	242	706	314	244	6288	1177
1978	250	843	359	151	6453	1426
1979	258	681	256	227	8747	1923
1980	225	781	307	287	10421	2262
1981	277	833	258	327	7525	1216
1982	233	840	238	281	11475	1899
1983	225	846	144	264	9390	1326
1984	254	961	245	265	9131	960
1985	234	951	227	269	8325	759
1986	258	996	203	329	7407	664
1987	253	1174	223	365	7343	624
1988	231	1456	146	461	6950	531
1989	208	1443	114	282	13113	1907
1990	188	1629	101	299	12905	1879
1991	188	1614	88	338	10298	1047
1992	204	1452	72	362	9465	818
1993	190	1509	94	271	9086	808
1994	190	1511	99	280	8346	651
1995	139	1397	82	330	7995	634

Source: Fisheries Economic Division, DOF (1997)

[1] Chinese purse seine, Thai purse seine, Luring purse seine and Anchovy purse seine

[2] Otter trawl, Pair trawl and Beam trawl

Table 2.1.8.3 Major cost items (Baht/year) per fishing unit by types of fishing gear, Southern Thailand, 1998

Type of gear combination	Fixed costs (Bahts/year)		Variable costs (Bahts/year)				Cash cost (Bahts/year)	Imputed cost (Bahts/year)	Total cost (Bahts/year)
			Cash cost						
	Depreciation	Opp. cost of capital	Hired labour	Fuels	Others	Opp. Cost of family labour			
Single gear:									
Shrimp gill nets	20626	3600	14181	3742	11322	30415	29244	54641	83885
Cuttlefish trammel nets	29087	5520	27261	6060	10080	20865	43402	55472	98873
Indo-pacific mackerel gill nets	6244	5340	1703	3630	10572	8775	15904	20359	36263
Two-gear combined:									
SC	40203	4166	35379	13521	13741	29491	62642	73860	136502
SI	25167	4800	58763	6930	13960	10969	79653	30935	120588
CI	46457	4440	112500	16613	24100	36400	153213	87297	240510
OA	35100	17400	103040	27747	26400	12968	157187	65468	222654
Three-gear combined:									
SCO	22999	5850	83850	16300	12934	54616	113083	83465	196548
Four-gear combined:									
SCIO	45820	5160	70700	33757	30657	46069	135113	97049	232162

Source: Boonchuwongse, P and W. Dechboon (2001)

SC=Shrimp gill nets, and Cuttlefish trammel nets
SI=Shrimp gill nets, and Indo-pacific makerel gill nets
CI=Cuttlefish trammel nets, and Indo-pacific mackerel gill nets
OA=Others gill nets, and Acetes trawl nets
SCO=Shrimp gill nets, Cuttlefish trammels nets, and other gill nets
SCIO=Shrimp gill nets, Cuttlefish trammel nets, Indo-pacific mackerel gill nets, and Other gillnets

Table 2.1.8.4. Cost structure of small-scale fishing operation by types of fishing gear, Southern Thailand, 1998

Type of gear combination	Fixed Cost (%)			Variable cost(%)					
	Depre-ciation	Opp. cost of capital	Sub-total	Cash Cost			Opp. Cost of family labour	Sub-total	Total Cost (%)
				Hired labour	Fuel	Others			
Single gear:									
Shrimp gill nets	24.6	4.3	28.9	16.9	4.5	13.5	36.3	71.1	100
Cuttlefish trammel nets	29.4	5.6	35.0	27.6	6.1	10.2	21.1	65.0	100
Indo-pacific mackerel gill nets	17.2	14.7	31.9	4.7	10.0	29.2	24.2	68.1	100
Two-gear combined:									
SC	29.5	3.1	32.5	25.9	9.9	10.1	21.6	67.5	100
SI	20.9	4.0	24.9	48.7	5.7	11.6	9.1	75.1	100
CI	19.3	1.8	21.2	46.8	6.9	10.0	15.1	78.8	100
OA	15.8	7.8	23.6	46.3	12.5	11.9	5.8	76.4	100
Three-gear combined:									
SCO	11.7	3.0	14.7	14.7	8.3	6.6	27.8	85.3	100
Four-gear combined									
SCIO	19.7	2.2	22.0	22.0	14.5	13.2	19.8	78.0	100

Source: Boonchuwongse, P and W. Dechboon (2001)

Note:
SC=Shrimp gill nets, and Cuttlefish trammel nets
SI=Shrimp gill nets, and Indo-pacific mackerel gill nets
CI=Cuttlefish trammel nets, and Indo-pacific mackerel gill nets
OA=Others gill nets, and Acetes trawl nets
SCO=Shrimp gill nets, Cuttlefish trammels nets, and other gill nets
SCIO=Shrimp gill nets, Cuttlefish trammel nets, Indo-pacific mackerel gill nets, and Other gillnets

2.1.9. Vietnam

Freshwater Aquaculture

Monoculture of fish in ponds, cages and rice field and polyculture of fish in ponds are the main freshwater culture systems in Vietnam. Pond polyculture is the most important farming system and commonly stocked with Chinese carps (silver carp, grass carp and bighead) in the northern region and river catfish, common carp and Indian major carps (rohu, mrigal) in the Southern region. In recent years, red tilapia is cultured in ponds by using intensive monoculture system while giant prawn is cultured in ponds and ditches using semi-intensive system. In addition, an integrated VAC system (V: garden, A: fish pond, C: livestock) is also common in the country.

Up to year 1998, there were about 16,000 freshwater cages and 75% of the cages are located in rivers. Cage culture of *Pangasius bocourti*, common carp, snakehead are mainly carried out in the Mekong and Bassac rivers where bordering to Cambodia. The culture of prawn (*Macrobrachium rosenbergii*) by monoculture system in rice fields is extensively practiced in the Mekong Delta.

Brackishwater Aquaculture

Vietnam has huge potential of coastal aquaculture with the shrimp culture being dominant. The farming system of brackishwater culture can be divided into traditional extensive, improved extensive, semi-intensive and intensive culture. The following species namely, shrimp, mud crab, bivalve and artemia. Mixed shrimp farming-mangrove forest system and shrimp farming in rotation with rice were the farming system especially for shrimp culture only.

Marine Capture

During 1990-1998, Vietnamese fisheries have increased rapidly. In 1998, there were about 71,800 motorized fishing boats with engine capacities of 1,880,000 HP with total catch of 1,130,680 tons. In spite of the increase in the fish production in Vietnam, the country utilizes more on the small-scale fisheries and has conducted fishing activities mostly in coastal water. In general, the number of fishing boats having engine capacity less than 84 HP constitutes 93.6% of the total fishing boats (Long, 2001). The total fish catch in the traditional fishing area is beyond the sustainable limits of 582,000 t, thus the Government of Vietnam has developed policies and plans to reduce the fishing pressure in coastal waters

and promoting a development program for offshore fisheries (Table 2.1.9.1). In order to reach the target of increasing off-shore fishery production, a program of investing off-shore fishing vessels have been implemented since 1997. However, the efficiency of the program is limited due to some reasons such as lack of suitable fishing technologies, unidentified fishing grounds, lack of skilled labour forces, difficulties in fish consumption, inadequacy of services for the vessels operated in off-shore areas. In recent years, the number of fishing boats has increased considerably in Vietnam.

Table 2.1.9.1. Composition of Vietnamese fishery in 1980 and 1998

Criteria	1980	1998
Number of mechanized fishing boats (boat)	28,021	71,800
Total Horse power (HP)	553,995	1,880,000
Average Horse power (HP/boat)	16.3	26.2
Catch per year (t)	419,740*	1,130.660

*is the catch in 1981

Source: MOFI 1999

Fisheries in Vietnam are small-scale, multi-species, multi-gear and utilizes traditional fishing techniques. Fishers have limited ability in terms of capital investment. In conjunction with Vietnam government program to develop offshore fishing, credit fund with low interest of 0.81% has been provided to fishers to build new fishing boats. The average increase in the number of fleets is 8.7% per year from 1983 to 1998. The average horsepower per boat also grew from 16.3 HP in 1983 to 26.2 HP in 1998 (Table 2.1.9.2). The fishing operations in Vietnam have been conducted using different types of fishing gears. However, according to catch statistics, types of fishing gear providing outstanding catch are the trawl, purse seine, coastal gill net, hook and line and lift net. From these the most important types are the trawl and purse seine fisheries.

Table 2.9.1.2. The total number of fishing boats and engine capacities in Vietnam, 1980-1998.

Year	Total number of motorized fishing boats (unit)	Total engine capacities (HP)	Average horsepower per boat (HP/boat)
1980	28021	553915	19.8
1981	29584	453871	15.3
1982	29429	469976	15.9
1983	29117	475832	16.3
1984	29549	484114	16.4
1985	29323	494507	16.9
1986	31680	537503	17.0
1987	35406	597022	16.9
1988	35744	609317	17.0
1989	37035	660021	17.8
1990	41266	727585	17.6
1991	43940	824438	18.1
1992	54612	986420	18.1
1993	61805	1291550	20.9
1994	67254	1443950	21.5
1995	68000	1500000	22.1
1996	69953	1543163	22.1
1997	71500	1850000	25.9
1998	71800	1880000	26.2

Source: MOFI 1999

2.2. Component 2. Analysis of Policies, Institutions and Support Services

This component deals with the analysis of the current fisheries and aquaculture policies, feed policies, and other sectoral and macroeconomic policies. Institutional arrangements (e.g. existence and application of co-management, formal and informal regulations for fisheries, role of local organizations, etc) were discussed. Support services and infrastructure were assessed by examining credit/delivery, marketing of input/output, extension, research and training, role of private sector and others. Secondary information was gathered from government agencies and other institutions. Data collection started in June 2001 and initial results were presented in the Inception Workshop in August 2001. ICLARM experts have reviewed these reports and provided comments for improvement. National teams from the participating countries are revising the reports to incorporate comments received and are expected to submit the revised reports to ICLARM in May 2002.

2.2.1. Bangladesh

The preliminary analysis of this Component was presented during the Inception Workshop in August 2001. ICLARM team made field visit and held discussions with the national project team. The draft technical report was reviewed and areas for strengthening were pointed out. Data and other relevant information are being collected to substantiate the discussions on this Component.

2.2.2. China

The national project team presented their initial results of the study during the Inception Workshop. ICLARM experts provided comments on the draft report. These were taken note of and more information was collected to strengthen the report. The revised report was submitted and a summary of the results is given below.

China is the number one producer of aquatic products in the world with 42.8 mil tons of aquatic products in 2000 (NBS 2001). With the country's rapid economic development, the national income increases and the demand for aquatic products growing. As a result, the per capita consumption of aquatic products rose from 3.6 kg in 1990 to 6.74 kg in 2000, an 87% increase over the last decade. Note however that agriculture made an important but declining GDP contributions in China's overall economy (40% in 1970 to 16% in 2000) (NBS 2001). In contrast to agriculture sector in the national economy, fisheries sub-sector augments the overall economic growth of China thru meeting the needs created with the changes in consumption pattern and thus, contributing to the improvement of the living

standard of the people. The expansion of water areas for aquaculture production and rising aquaculture productivity has contributed to the rapid growth in the fisheries sub-sector. However the rapid expansion of aquaculture areas raises concerns on the competition for crop land use and the country's ability to achieve higher grain self-sufficient level. Thus policies on fisheries development were created.

Fisheries development policies include production policy (aquaculture and capture), feed policy, public financial and investment policies and aquaculture ownership. Relevant agricultural and macro policies like land tenure policy, international trade policy (e.g. tariff, quotas, import and export of aquatic products, effect of WTO), foreign exchange policies (e.g. foreign exchange management policies, foreign exchange rate policies) and monetary policies were likewise discussed.

Under the institutional arrangements section, the Ministry of Agriculture issued most of the policies related to fisheries. Policies on the management of marine fishing vessel was issued by the Ministry on 31 October 1983, resolution on further accelerating the development of fisheries was made by the Ministry and announced by the State Council in January 1997, fishing license regulation was issued on 13 April 1989 and others to name a few.

The continuing development of infrastructure such as aquaculture research, extension services, aquatic product processing and marketing systems have enhanced the rapid growth of fisheries and aquaculture production in China. Information on support services like marketing systems, education, research and extension and storage and processing were compiled and discussions on each section provided.

2.2.3. India

The national project team presented the preliminary analysis of policies, institutions and support services during the Inception Workshop in August 2001. Comments and clarifications were provided and data are currently being collected to fill-in the gaps more so with the trade policies and substantiate the discussion for this Component.

2.2.4. Indonesia

The revised report submitted by the national project team in Indonesia for this Component covers the marine capture fisheries and aquaculture. Additional information on policies for

inland fisheries is currently being gathered and will be incorporated to the final report of Indonesia for submission by May 2002.

The development of fisheries in Indonesia can be divided into three periods namely, 1968-1993, 1994-1997 and 1998-2001 (DGF 1994, 1998a, 1998b). This development covers only the marine capture fisheries and aquaculture. The first period (1968-1993) aimed in supporting the national economic development on which effort has been spent to increase fish production and sustain the fishery resources. This objective incorporates enhancement of domestic fish consumption, increase in foreign exchange earnings, supply enough raw material for industries and raise the income and standard of living of fishers and fish farmers. In 1997-1998, political and economic turmoil has forced the government to change the development program. In 1998, the Government implemented a rescue program for national economy recovery (DGF 1999). With the availability of under-exploited fish stocks and potential areas for aquaculture development, fisheries sector was further developed to assist in the recovery of the Indonesia economy (DGF 1999). This development program was named PROTEKAN 2003 (PROgram peningkaTan Ekspor hasil periKanan (1999-2003), a program to boost fisheries export. Other development programs in Indonesia for marine capture fisheries deal with the efficiency and productivity of fishing vessels, fish quality and fisheries product quality and development and improvement of capture fisheries infrastructure and facilities. Government policies in the market for private goods and services were listed and discussed in the report. These are the general import tariff, high degree of market concentration, export support policies, overcoming effort (trade) barriers and macro policies on investment, monetary and fiscal.

The Directorate General of Aquaculture (DGA) under the Ministry of Marine Affairs and Fisheries is mandated to formulate the policies and standardization of techniques on aquaculture development. One of the policies of the DGA is the development of integrated aquaculture zone for marine, brackishwater and freshwater that will apply enhance the growth and sustainability of aquaculture business. Plan of activities and objectives to achieve this integrated aquaculture zone was enumerated and presented in the report. Other policies on aquaculture encompass regulations on environment and production.

Under the institutional arrangements in Indonesia, the fisheries sector is housed in the Ministry of Agriculture from the 1960s until 1990s and recently (effective 2000) in the Ministry of Marine Affairs and Fisheries. However in terms of capture fishery resource management, the various institutions involve are the Directorate General of Fisheries (DGF), the Directorate General of Marine Surveillance and Protection (DGSP), Central Research

Institute for Fisheries (CRIFI), Provincial Fisheries Services and District Fisheries Services. There are also five professional and business/industry groups in capture fisheries namely, a) Association of Indonesia Fisheries Scholars, b) Federation of Indonesian Fisheries Entrepreneurs, c) Association of Indonesian Fishers, d) Federation of Indonesian Fisheries Cooperatives and e) National Fisheries Society. Traditional community based systems of fish resource management exist in Indonesia such as Sasi, Panglima Laut, Lubuk Larangan, Lebak Lubung, Maawu Danau, Ikan Larangan, Ikan Diniatkan, Suaka Perikanan and others. These systems build and arise the awareness and understanding of the stakeholders on fisheries management and work out on practical solutions acceptable to all stakeholders. Other systems of co-management with the central and local government were also presented on the report. In the aquaculture sector, examples of institutions are the Fish Farmer Cooperation, Fish-Farmer Groups, Women Groups of Fish-Farmer, Youth Fish-Farmer, joint aquaculture groups and business partner while co-management with the central and local government exists (e.g. Central Research Institute for Aquaculture and Directorate General of Aquaculture for technical inputs, the research institutes carry out the studies including seed production and post-harvest technologies). Other government institutions involve in the development of rural aquaculture are the Department of Public Work (DPW), Department of Home Affairs (DHA) and the provincial and district governments.

In terms of support services, the Government of Indonesia has implemented several institutional credit that will cater to the financial needs of fishers and fishery companies including provision of a fishing unit (purchase or building and improvements of fishing vessels, purchase of fishing equipment/gear and working capital). Fish infrastructures like fish ports, wharfs, landing places, hatcheries, etc were developed since 1974 up to 2000. These were listed and presented in the report.

2.2.5. Malaysia

The revised report submitted by the national project team of Malaysia presents a review of policies, institutions and support services of the fish industry in the country. The Department of Fisheries under the Ministry of Agriculture manages all aquatic resources and their by-products. The National Agriculture Policies under the Ministry of Agriculture was formulated to provide guidance and development of the agriculture sector including fisheries. The overall objective of the fisheries policies is to develop the sector into a modern, efficient and highly commercial fishing industry. Intensify private sector participation and promote commercial aquaculture, intensify technological improvement in aquaculture, intensify R&D are among the fisheries policies discussed. Coastal fisheries should be managed to sustain optimum production while deepsea fishing is to focus on the resources in the Exclusive Economic Zone and international waters. Exports of fish and its by-products should also be increased and at the same time improve the standard of living of fishing communities. Strategies for aquaculture development were likewise presented in the report. This includes production target and potential development areas, species and culture systems and code of practice (COP) for aquaculture. Other policies presented that are relevant to the fisheries sector are credit and finance policy, national land use policy, environmental/pollution policy, national forestry policy, national mineral policy and investment incentives policy.

There are two important government agencies committed to the fish industry of Malaysia: the Department of Fisheries and the Fisheries Development Authority of Malaysia (FDAM). The functions, organizational structure of each institution, state offices, research agencies related to fisheries and semi-government agency dealing with fisheries was provided in the report. Fishing industries development, marketing support services, fishermen institutional development and entrepreneurial development are the main programs of FDAM.

In terms of the support services and infrastructure, the report provided information on credit, fish marketing system, extension, research and training, processing, related infrastructures and role of private sector.

2.2.6. Philippines

The national project team submitted an overview of the policies affecting the fisheries industry in the Philippines. There are currently two fisheries development programs namely, the "Ginintuang Masaganang Ani for Fisheries (GMAF)" and Fisheries Resources Management Project (FRMP). The first program is divided into several components that

include fish production, conservation and management, fisheries post-harvest and infrastructure, training and extension services, information and marketing support, R&D, rural finance in fisheries and program organization and management. Priority projects for aquaculture, marine fisheries and credit support were also enumerated and discussed. FRMP is comprised of three components: fisheries resource management, income diversification and capacity building. The role of the local government units (LGU) in fisheries development and management were also discussed.

Institutional and financial support was presented in three levels: local, regional and international. Local level support comes mostly from the Bureau of Fisheries and Aquatic Resources (BFAR) and the LGU. Other agencies and organizations that extend support to fisheries development are the Bureau of Agricultural Research (BAR), Bureau of Agricultural Statistics (BAS), both government agencies under the Department of Agriculture, Philippine Council for Aquatic and Marine Research and Development (PCAMRD), a government agency under the Department of Science and Technology (DOST), the National Census and Statistics Office (NCSO) and the academe such as the University of the Philippines in the Visayas (UPV), Mindanao State University (MSU) and the Central Luzon State University (CLSU). These local research and development institutions provide formal education, trainings, seminars and collaborative technology demonstrations to fishers and fish farmers. At the regional level, institutional support is technically contributed by regional organizations like the Southeast Asian Fisheries Development Center – Aquaculture Department (SEAFDEC-AQD) and the Network of Aquaculture Centers in Asia (NACA). In terms of financing scheme, the Asian Development Bank (ADB) played a significant role in implementing environmental related projects both in aquaculture and marine fisheries in collaboration with other research organizations. Financial and institutional support at the international level are primarily given by the United Nations Development Program (UNDP) through the Food and Agriculture Organization (FAO), ICLARM, World Bank, Japan International Cooperation Agency (JICA), the Korean International Cooperation Agency, Canadian International Development Agency (CIDA), the Australian Center for International Agricultural Research (ACIAR), the International Development Research Center (IDRC) to name a few.

Co-management and participatory fisheries management were tested and applied through projects that provide technical assistance and training to coastal communities and local government in managing their coastal resources.

2.2.7. Sri Lanka

The national project team is compiling all information on policies, institution, infrastructure and support services to validate the initial results presented and strengthen the discussion on the development of fisheries policies in Sri Lanka. The draft technical report is expected for submission by end of May 2002.

2.3. Component 3. Socioeconomic Profile of Major Stakeholders in Fisheries (Producers, Consumers, Traders)

In each of the participating countries, primary data are being collected form a stratified random sample of households through surveys or rapid appraisals. From fish consumers, information is being collected on quantity of fish consumed by species, preferred species, size (kg) of fish, price of fish by species, other food and non-food expenditures. From fish producers, data are currently collected on farm area devoted to crops and to aquaculture (ponds, cages), general characteristics of the aquaculture system, pond management, other farm specific cost of aquaculture, total fish production and other social aspects (problems/issues/conflicts related to aquaculture, future plans of farmers, etc.). Secondary data are also being collected to complement primary information. Data collection started during the last quarter of 2001. A progress regarding the activities for this Component per participating country is hereby reported below.

2.3.1. Bangladesh

The national project team has prepared the survey questionnaires to implement the research activities for this Component. Secondary data are being collected from government institutions and private organizations.

2.3.2. China

The national project team has developed the survey questionnaire. The survey will be initiated during the second quarter of 2002. Secondary information was collected from various government offices, private organizations and the academe.

2.3.3. India

A review of the existing socioeconomic information on the producers, consumers and traders has been done by the national project team. Data gaps were identified and this will be filled-up by conducting rapid appraisal and surveys as agreed upon during the Inception Workshop. The team is currently preparing the questionnaires for the survey after deliberations on the survey design and methodology.

2.3.4. Indonesia

The national project team is organizing the implementation of this Component through primary and secondary data collection. Survey questionnaire will be administered through

different study sites based on the research design and methodology agreed upon during the Inception Workshop. Secondary information was likewise gathered and survey will start by April 2002.

2.3.5. Malaysia

The Fisheries Development Authority of Malaysia (FDAM) is responsible for socioeconomic matters of Malaysian fishers. In 1995, FDAM conducted a nationwide socioeconomic survey (Socioeconomic and Household Fisher Survey 1995) involving 28,832 fishers in all the states except Sabah (Table 2.3.5.1)

Discussions were held with FDAM concerning the possible use of the data collected for the socioeconomic component of this project and they have agreed to its. The national team in Malaysia (which also includes FDAM) will re-survey selected fishers covered in the 1995 FDAM survey and a questionnaire is being developed for this purpose. Though sate of Sabah was not covered by the FDAM study, our sample for this study will include Sabah.

Table 2.3.5.1. Coverage of the 1995 FDAM Socioeconomic Survey, Malaysia.

Region	No. of Fishers			No. of Boats		
	Actual	Surveyed	% coverage	Actual	Surveyed	% coverage
West Coast						
Perlis	4073	1899	46.62	713	217	30.4
Kedah	6055	2705	44.67	1767	872	49.3
P. Pinang	2965	1653	55.75	1783	1055	59.1
Perak	8615	3711	43.08	4799	2241	46.7
Selangor	5574	2069	37.12	2758	1663	60.3
N.Sembilan	327	119	36.39	191	91	47.6
Melaka	1041	729	70.03	750	506	67.4
Johor Barat	4783	2459	51.41	3737	2109	56.4
Total	33433	15344	45.89	16498	8754	53.0
East Coast						
Kelantan	3223	2045	63.45	929	701	75.4
Terengganu	9636	3435	35.65	2530	933	36.8
Pahang	4613	1790	38.80	1301	589	45.2
Johor Timur	4097	2335	56.99	1724	916	53.1
Total	21569	9605	44.53	6484	3139	48.4
Peninsular	55002	24949	45.36	22982	11893	51.7
Sarawak	7125	3489	48.97	3013	1847	61.3
Labuan	254	394	155.12	89	124	139.3
Total	62381	28832	46.22	26084	13864	53.1

Under the Fish Marketing Regulations 1973 fish dealers within the marketing control areas have to be licensed. Discussions are being held with FDAM for access to this database.

2.3.6. Philippines

The national project team submitted their research plan and schedule in implementing the research activities for Component 3 which was divided into a) profiling of the fish consumers and producers and b) traders.

To characterize the fish consumers and small-scale fishers in the Philippines, information from the Family Income and Expenditures Survey (FIES) published by the National Statistics Office (NSO) will be used by the national project team. FIES is a nationwide survey of households which gathers information on household income, sources and levels of spending patterns of Filipino families by various commodity groups. It involves an interview of a national sample (about 39,500 households) stratified by provinces and key cities in the

country. FIES has been conducted since 1957 but this project will use the two most recent dataset, FIES 1997 and 2000.

For the sampling design, FIES uses a multi-stage sampling design that covers all of the 16 regions of the country on the first stage. The second stage is the provincial classification that covers the complete enumeration of all the 82 provinces in the country. The third stage involves the selection of municipalities within the provinces while the fourth stage involves the selection of villages (barangay) within the municipalities. Finally the last stage selects the sample households within the barangay. The frame for sample selection was based mainly from the 1995 population census of the country. The census list of barangays with the corresponding household population counts was used in the final stage of sample selection.

For the survey design, the FIES adopts a "shuttle type" data collection wherein the households were interviewed in two separate operations, each time using the half year period preceding the interview as reference point. In effect, FIES data were gathered on a semestral basis. This was done to minimize the memory bias of respondents and to capture the seasonality of income and expenditure patterns. A sample questionnaire is given in Appendix 1a for demographic characteristics of the respondent/household, household expenditures and entrepreneurial activities.

An "enterprise study" or "localized industry analysis" will be conducted and this will serve as the research design for traders. This method seeks to study the aggregation of firms undertaking similar functions and activities and occupying a similar step in the supply process. Technically this will cut across various commodity systems, particularly the type of fish/fish species group such as tilapia, milkfish, catfish, etc.

For the survey design, a mixed communication and observation type of data collection will be used for the trader's survey. The communication type will elicit responses from the respondents using interview guide or questionnaire. List of registered traders will be secured from appropriate agencies like the Department of Trade and Industry (DTI) to identify the respondents. A sample questionnaire for the traders is given in Appendix 1b.

2.3.7. Sri Lanka

Implementation of the project activities in Sri Lanka is being hampered because of the transfer of the national project team leader (NPTL) to another office. The national project team is awaiting for the appointment of the new NPTL by the Ministry of Fisheries. Nevertheless the team met and is working on the preparation of the survey questionnaire to implement the survey in various project sites in Sri Lanka.

2.3.8. Thailand

The national project team submitted their research plan in conducting this Component. The stakeholders consist of the producers, consumers and traders. These categories were further classified based on the fisheries sector (marine fisheries, coastal aquaculture, inland fisheries, freshwater culture). Methodology, sampling framework and questionnaire have been developed jointly by the national team and ICLARM experts. The team has completed the first round consumer survey conducted in five provinces with 300 samples including editing and data processing. They are currently compiling time series data, which will be used in supply estimation for Component 4. A sample of their survey questionnaire is presented in Appendix 1c.

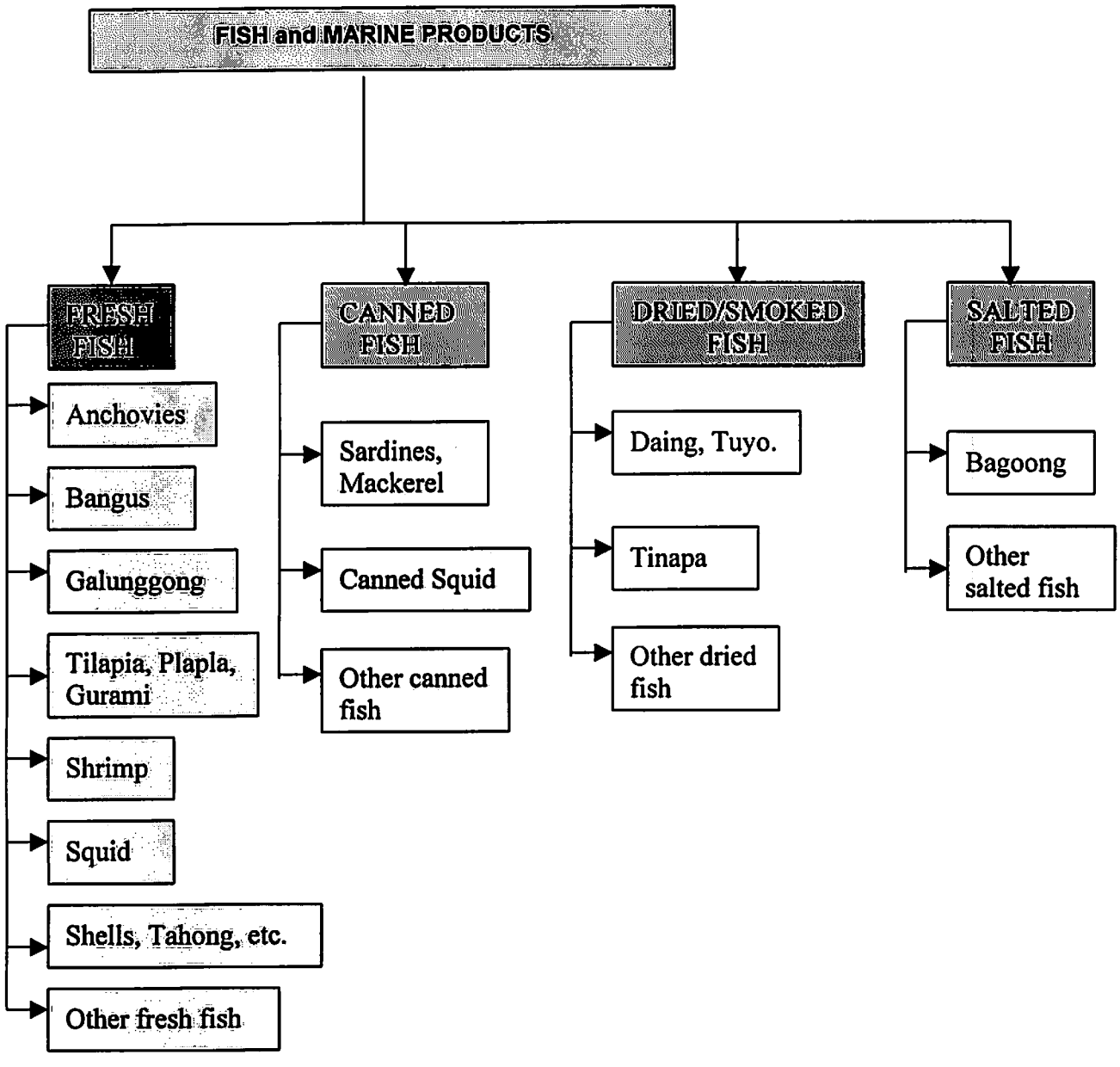
2.4. Component 4. Analysis of Fish Supply and Demand and Projections

Estimation of supply and demand functions will be done in this research activity. Data collection started in January 2002 and technical report due in July 2003. The methodology reported in the Inception Report will be followed for this Component.

2.4.1. Philippines

The Philippine team provided an update on the progress of their activities for this Component. This is given below.

This component aims to estimate demand and supply elasticities for various fish groups/species in the Philippines. The fish groupings that will be adopted by the study are presented in Figure 1, which shows a two-level consumption tree by fish category (on the first stage) and fish species (on the second stage). For Family Income and Expenditure Survey (FIES) 1997, the demand-system estimation will be done only for the first level classification since the second-level disaggregation is not present in the said data set. However, the FIES 2000 allows for the estimation of the demand-systems for both levels of fish category.



The theoretical framework for consumer demand theory was also discussed. The second stage estimation of fish demand functions will use 2nd level disaggregation by fish species (e.g. fresh fish, canned fish, dried fish and salted fish).

The current activities of this component are focused on data management from FIES and National Statistics Office (NSO) price data sets in preparation for the estimation of demand-systems by fish category and species. Regression coefficients of the demand-systems will provide the necessary slope parameters of the demand equations to compute for the various price and income elasticities by various fish groups and species. The elasticity estimates will later be used in the national demand and supply projection for fish in the next 15 years as

inputs to the simulation model that will be formulated for the fishery sector (Component 5). It is expected that demand-system estimation will be finished by April. Soon after, the attention will be focused on the supply estimation. As of the moment, the project is still scouting for good secondary data source to fit the fish supply functions. If such data sets will not be available, then the project will have to gather the necessary information first hand.

2.5. Component 5. National Action Plan

After the implementation of the research activities discussed above, policy recommendations, strategies and options to increase and sustain the fisheries and aquaculture resources will be drawn out based on the scientific findings of these research components. A National Workshop per participating country will be conducted in November - December 2003 where the government agencies and other stakeholders will be invited to discuss the policies and strategies in increasing and sustaining the fisheries and aquaculture resources to benefit the poor households and other stakeholders as recommended by the National Project Team of the respective country.

3. Project Workplans

The activities and schedule in pursuit of the Project objectives are summarized in the regional workplan given in Appendix 2. The specific country workplans were likewise provided in Appendix 3. The following are the major elements of the work program during the three-year project implementation:

Year 1 Activities (March 2001 – February 2002)

- Start-up activities including national planning meetings
- Compilation of available literature on aquaculture technologies and capture fisheries practices, policies, institutions, infrastructure and support services to fisheries including aquaculture, supply and demand studies and other fishery management references
- Conduct Inception Workshop
- Signing of the Memorandum of Agreement between ICLARM and the nine participating countries
- Preparation of the first Progress Report (March – July)
- Preparation of the First Semi-annual Report (March – August)
- Review and evaluation of existing policies, institutional framework, infrastructure and support services to fisheries and aquaculture

- Review methodologies and available data and information relevant to the socioeconomic profile of major stakeholders and the supply and demand analysis components
- Preparation of the Second Semi-annual Report (September – February)

Year 2 Activities (March 2002 – February 2003)

- Review and finalization of reports on Component 1 (Technologies) and Component 2 (Policies)
- Continuation on the review of policy analysis for fisheries management
- Collection of primary data through the surveys of fish producers, consumers and traders
- Development of fish sector model
- Conduct a) training on ' estimation of fish supply and demand elasticities' and b) mid-Project review workshop
- Preparation of the Third (March – August) and Fourth (September – February) Semi-annual Reports

Year 3 Activities (March 2003 – February 2004)

- Estimation of fish supply and demand elasticities, and projection of fish supply and demand for next 15 years
- Review and finalization of reports on Component 3 (Socioeconomic Profile) and Component 4 (Supply and Demand Analysis and Projections)
- Continuation of the formulation of national/regional development strategies and action plans
- Participation in the National Planning Workshop of each DMC
- Organize and conduct the Final Regional Workshop
- Preparation and submission of final project report
- Preparation of RETA report for publication

4. Financial Report and RETA fund utilization

ICLARM has received the amount of US$ 223,000 for the first tranche from ADB on 24 April 2001. Out of this amount, US$ 86,798.25 was spent from March – August 2001 and US$ 114,244.10 during the reporting period. Disbursements of funds to DMCs were done in September to December. Table A2 provides the summary of financial report during the reporting period. Procurement of research equipment (like desktop computer and accessories) are being made by ICLARM and DMCs in accordance with the appropriate procurement guidelines using the funds allocated for this line item.

5. Problems/ Issues

The Project encountered some difficulties during the process of the signing of the Memorandum of Agreement (MOA) with two participating countries, Bangladesh and India. Bangladesh MOA got the clearance from the Ministry of Fisheries and Livestock (MoFL) only in December 2001 upon which ICLARM immediately disburse the first tranche for the implement of the research activities. In India, the Indian Council for Agricultural Research (ICAR) cleared the MOA in February 2002 and ICLARM acted accordingly in disbursing the funds to the collaborators. Thus these two DMCs are lagging behind in conducting their surveys for Component 3. ICLARM experts are working closely with the concerned government officials and scientists to expedite the implementation of project activities in these two countries.

In Sri Lanka, the transfer of the national project team leader (NPTL) to another office is delaying the implementation of the research activities more so for Component 3. ICLARM team is always in touch with the national project team and the concerned government officials to ensure that there will be minimal disruption on the research work due to the absence of a NPTL. The government of Sri Lanka is expected to nominate a new NPTL very soon.

The ICLARM Project team does not foresee any major issues that are likely to hinder the smooth implementation of the project. The planned project activities are expected to be completed as scheduled

Table A2. Summary of financial report, September 2001-February 2002.
(Please see attached)

RETA No. 5945

Study on Strategies and Options for Increasing and Sustaining Fisheries and Aquaculture Production to Benefit Poor Households in Asia

Project Financial Status for the period :1 September 2001 to 28 February 2002

Item or Category	Approved Cost Estimates	Actual Expenditure		Balance of Cost Estimates
		Current Period	Cumulative From Start to Current	
Funds Received			**223,000.00**	
A.Personnel				
ICLARM				
a. Project Coordinator (8)	-		-	-
b. International Expert/Fisheries Economist (20)	100,000.00	38,440.61	62,256.00	37,744.00
c. International Expert/Marketing Specialist (6)	30,000.00		-	30,000.00
d. International Expert/Fisheries/Database (8)	50,000.00	971.25	971.25	49,028.75
e. National Research Assistants (100)	50,000.00	2,979.21	4,589.47	45,410.53
NARS				
a. National Scientists (180)	40,000.00	5,744.49	5,744.49	34,255.51
b. National Visiting Scientists (40)	30,000.00		-	30,000.00
Subtotal (A)	**300,000.00**	**48,135.56**	**73,561.21**	**226,438.79**
B.Travel				
1. International Travel	80,000.00	7,392.82	24,270.15	55,729.85
2. Domestic Travel	30,000.00	348.20	1,489.28	28,510.72
Subtotal (B)	**110,000.00**	**7,741.02**	**25,759.43**	**84,240.57**
C. Research				
1. Field Survey and Research	230,000.00	13,929.23	13,929.23	216,070.77
2.Equipment and Supplies	60,000.00	6,506.55	12,276.93	47,723.07
Subtotal (C)	**290,000.00**	**20,435.78**	**26,206.16**	**263,793.84**
D. Workshop and Training				
1. Regional Workshops (3)	60,000.00	24,973.29	54,467.14	5,532.86
2. National Workshops/Seminars	50,000.00		-	50,000.00
3. Exchange Visits and Local Training	40,000.00		84.66	39,915.34
4. Reports and Communications	30,000.00	492.16	492.16	29,507.84
Subtotal (D)	**180,000.00**	**25,465.45**	**55,043.96**	**124,956.04**
E. Administrative Expenses Subtotal (E)	**110,000.00**	**10,633.11**	**18,638.41**	**91,361.59**
F. Contingencies Subtotal (F)	**110,000.00**	**1,833.18**	**1,833.18**	**108,166.82**
GRAND TOTAL	**1,100,000.00**	**114,244.10**	**201,042.35**	**898,957.65**

Funds Balance **21,957.65**

It is hereby certified that the above amounts have been paid for the proper execution of the Technical Assistance activities, all within the terms and conditions of the Technical Assistance Agreement.

All supporting documentation substantiating these expenditures will be made available upon request by ADB.

MAHFUZUDDIN AHMED
Team Leader/Project Director or Manager

EDWARD SAYEGH
Associate Director General
Corporate Services

RETA No. 5945

Study on Strategies and Options for Increasing and Sustaining Fisheries and Aquaculture Production to Benefit Poor Households in Asia

Statement of Expenditures for the period :1 September 2001 to 28 February 2002

Item No.	Description of goods and services	Payee (Supplier/Contractor)	Date of Payment	Amount Paid in Local currency	US Equivalent	Remarks
1	Sony D8 tape	Central Audio Co Sdn Bhd	18-Oct-01	MYR 110.00	28.99	VP109118
2	MS floopy adaptor	Central Audio Co Sdn Bhd	18-Oct-01	MYR 350.00	92.23	VP109118
3	Memory stick	Central Audio Co Sdn Bhd	18-Oct-01	MYR 920.00	242.42	VP109118
4	Intelligent flash light	Central Audio Co Sdn Bhd	18-Oct-01	MYR 500.00	131.75	VP109118
5	Mileage claim-send report for binding	Lye Hooi	08-Oct-01	MYR 10.60	2.79	GJ-2110072
6	Mileage claim-send report for binding	Azmarya	12-Oct-01	MYR 10.60	2.79	GJ-2110072
7	Binding inception report	Bing Santos	16-Oct-01	MYR 40.20	10.59	GJ-2110072
8	CBE 807A- red files (15 pieces)	DSOP Office System & Supplies	26-Dec-01	MYR 19.50	5.14	VP111120
9	CBE 412- blue files (20 pieces)	DSOP Office System & Supplies	26-Dec-01	MYR 70.00	18.45	VP111120
10	CBE 2R635- red files (20 pieces)	DSOP Office System & Supplies	26-Dec-01	MYR 96.00	25.30	VP111120
11	Stationery charge - Nov 01	Allocation per project	31-Dec-01	MYR 25.74	6.78	GJ-2112205
12	Stationery charge - Dec 01	Allocation per project	31-Dec-01	MYR 43.70	11.52	GJ-2112205
13	Stationery charge - Jan & Feb 02	Allocation per project	31-Jan-02	MYR 503.65	132.71	GJ-2202065
14	A4 Paper - August 01	Citi Office Machine Sdn Bhd	18-Oct-01	MYR 369.00	97.23	VP109047
15	Stationery charge - Aug 01	Allocation per project	17-Oct-01	MYR 36.40	9.59	GJ-2110018
16	Paper charge - Aug 01	Allocation per project	17-Oct-01	MYR 90.00	23.72	GJ-2110018
17	Stationery & Paper - Sept 01	Allocation per project	17-Oct-01	MYR 191.00	50.33	GJ-2110018
18	Casio label printer	DSOP Office System & Supplies	26-Dec-01	MYR 189.00	49.80	VP111127
19	Casio label printer ribbon IT9BU1	DSOP Office System & Supplies	26-Dec-01	MYR 45.00	11.86	VP111127
20	Casio label printer ribbon IT8BU1	DSOP Office System & Supplies	26-Dec-01	MYR 55.00	14.49	VP111127
21	CD Drawer CD-201	DSOP Office System & Supplies	20-Dec-01	MYR 45.00	11.86	VP111130
22	Filing cases	DSOP Office System & Supplies	20-Dec-01	MYR 57.60	15.18	VP111130
23	Diskette storage box - 50 pcs	DSOP Office System & Supplies	20-Dec-01	MYR 104.00	27.40	VP111130
24	Telephone charges - Aug 01	Telekom Malaysia	30-Sep-01	MYR 1,083.77	285.58	GJ-2109122
25	Telephone charges - Sept 01	Telekom Malaysia	15-Dec-01	MYR 43.23	11.39	GJ-2112040
26	Telephone charges - Oct 01	Telekom Malaysia	31-Dec-01	MYR 74.01	19.50	GJ-2112259
27	Telephone charges - Nov 01	Telekom Malaysia	27-Feb-02	MYR 21.63	5.70	GJ-2202024
28	Telephone charges - Jan 01	Allocation per project	N/A	MYR 27.19	7.16	GJ-2202096
29	Telephone charges - Jan 01	Allocation per project	N/A	MYR 63.11	16.63	GJ-2202096
30	Telephone charges - Jan 01	Allocation per project	N/A	MYR 75.51	19.90	GJ-2202096
31	Courier charges - Aug 01	DHL Worldwide Express	27-Sep-01	MYR 43.20	11.38	VP109058
32	Courier charges - Aug 01	DHL Worldwide Express	27-Sep-01	MYR 121.80	32.09	VP109058
33	Courier charges - Aug 01	DHL Worldwide Express	27-Sep-01	MYR 235.80	62.13	VP109058
34	Courier charges - Aug 01	United Parcel Services	11-Oct-01	MYR 13.65	3.60	VP109074
35	Courier charges - Aug 01	United Parcel Services	11-Oct-01	MYR 13.65	3.60	VP109074
36	Courier charges - Aug 01	United Parcel Services	11-Oct-01	MYR 40.95	10.79	VP109074
37	Courier charges - Aug 01	United Parcel Services	11-Oct-01	MYR 54.60	14.39	VP109074
38	Courier charges - Aug 01	United Parcel Services	11-Oct-01	MYR 280.66	73.96	VP109074
39	Courier charges - Sept 01	DHL Worldwide Express	29-Nov-01	MYR 43.20	11.38	VP110118
40	Courier charges - Sept 01	DHL Worldwide Express	29-Nov-01	MYR 100.20	26.40	VP110118
41	Courier charges - Sept 01	DHL Worldwide Express	29-Nov-01	MYR 149.76	39.46	VP110118
42	Courier charges - Aug 01	Camden Enterprise	29-Nov-01	MYR 5.88	1.55	VP110155
43	Courier charges - Aug 01	Camden Enterprise	29-Nov-01	MYR 5.88	1.55	VP110155
44	Courier charges - Oct 01	DHL Worldwide Express	29-Nov-01	MYR 148.60	39.16	VP110153
45	Courier charges - Nov 01	United Parcel Services	Contra	MYR 13.65	3.60	GJ-2112151
46	Courier charges - Jan 02	DHL Worldwide Express	27-Feb-02	MYR 42.49	11.20	VP202113
47	Courier charges - Feb 02	DHL Worldwide Express	not pay yet	MYR 42.49	11.20	VP202116
48	Postage - Aug 01	POS Malaysia	26-Sep-01	MYR 1.60	0.42	VP109149
49	Postage - Aug 01	POS Malaysia	26-Sep-01	MYR 10.45	2.75	VP109149
50	Postage - Dec 01 & Jan 02	POS Malaysia	09-Jan-02	MYR 141.95	37.40	VP201020
51	Postage - Jan - Feb 02	POS Malaysia	28-Feb-02	MYR 0.90	0.24	VP202144
52	Memo pads	Jutaprint Sdn Bhd	18-Oct-01	MYR 980.00	258.23	VP109007
53	Photocopy of books	The British Library	11-Oct-01	N/A	21.12	VP109165
54	Photocopy of books	The British Library	29-Nov-01	N/A	10.36	VP110080
55	Photocopy charges - Nov 01	Allocation per project	N/A	MYR 322.80	85.06	GJ-2111067
56	Photocopy - library	Allocation per project	N/A	MYR 0.15	0.04	GJ-2112010
57	Photocopy of books	Universiti Putra Malaysia	19-Dec-01	MYR 7.50	1.98	VP112050
58	Photocopy - library	Allocation per project	N/A	MYR 22.80	6.01	GJ-2112010
59	Photocopy charges - Dec 01	Allocation per project	N/A	MYR 196.05	51.66	GJ-2112193
60	Photocopy charges - Jan 02	Allocation per project	N/A	MYR 96.30	25.38	GJ-2201063
61	Photocopy charges - Feb 02	Allocation per project	N/A	MYR 83.85	22.09	GJ-2202055
62	Bank transfer fee	Citibank New York	29-Nov-01	N/A	30.00	B11113
63	Bank transfer fee	Citibank New York	29-Nov-01	N/A	30.00	B11113
64	Bank transfer fee	Citibank New York	29-Nov-01	N/A	30.00	B11113
65	Bank transfer fee	Citibank New York	15-Feb-02	N/A	30.00	GJ-2202062
66	Bank transfer fee	Citibank New York	13-Sep-01	N/A	30.00	B10906
67	Bank transfer fee	Citibank New York	20-Sep-01	N/A	30.00	B10906
68	128MB SDRAM travelmate notebook	General Computers (M) Sdn Bhd	31-Jan-02	MYR 250.00	65.88	VP112102
69	Philippines collaborator liquidation	University of Philippines	N/A	N/A	1,991.71	GJ-2202099
70	Book subsciption fees	Allocation per project	N/A	N/A	3,000.00	GJ-2110040
71	Correction of allocation of subscriptio	Allocation per project	N/A	N/A	(1,000.00)	GJ-2201033
	TOTAL Equipment/Supplies/Communications				6,506.55	

RETA No. 5945
Study on Strategies and Options for Increasing and Sustaining Fisheries and Aquaculture Production to Benefit Poor Households in Asia
Statement of Expenditures for the period :1 September 2001 to 28 February 2002

Item No.	Description of goods and services	Payee (Supplier/Contractor)	Date of Payment	Amount Paid in Local currency	US Equivalent	Remarks
72	Indonesia collaborator liquidation	RCMFPPSE	N/A	N/A	2,993.52	GJ-2202099
73	Air fare - Dhaka	Holiday Tours	25-Jan-02	MYR 1,531.00	403.43	VP111072
74	Air fare & visa	Holiday Tours	06-Feb-02	USD 1,793.00	472.46	GJ-2201009
75	Air fare -sponsored	Asian Fisheries Forum	10-Dec-01	N/A	(430.00)	GJ-2201009
76	Manila visa application fee	Holiday Tours	not pay yet	MYR 158.00	41.63	VP202067
77	Air fare - Manila	Holiday Tours	not pay yet	MYR 1,254.00	330.43	VP202067
78	Telex fees for visa application	Holiday Tours	06-Feb-02	MYR 20.00	5.27	VP112152
79	Bangkok visa fee	Holiday Tours	not pay yet	MYR 119.00	31.36	VP201036
80	Air fare - Dhaka/Bangkok	Holiday Tours	not pay yet	MYR 1,587.00	418.18	VP201036
81	Transit hotel	Holiday Tours	not pay yet	MYR 436.00	114.89	VP201036
82	Airport tax	Bangladesh		BDT 1,800.00	30.43	GJ-2201045
83	Airport tax	Bangladesh		BDT 1,800.00	30.43	GJ-2201045
84	Taxi_Hatyai	Dr Mahfuz	Sep-01	MYR 25.00	6.59	GJ-2109016
85	Hotel_Hatyai	Lee Garden Plaza Hotel	Sep-01	MYR 279.14	73.55	GJ-2109016
86	Per diem	Dr Mahfuzzudin	Sep-01	N/A	87.50	GJ-2109016
87	Reclassification of incorrect coding	Expenses in July	N/A	N/A	1,112.76	GJ-2111007
88	Travel expenses	American Expenses	Feb-02	MYR 140.73	37.08	GJ-2112029
89	Per diem	Dr Mahfuzzudin	N/A	N/A	66.00	GJ-2112029
90	Telephone - Dhaka	Dr Mahfuzzudin	Feb-02	N/A	0.68	GJ-2201055
91	Telephone - Dhaka	Dr Mahfuzzudin	Feb-02	N/A	3.37	GJ-2201055
92	Telephone - Dhaka	Dr Mahfuzzudin	Feb-02	N/A	3.84	GJ-2201055
93	Taxi to airport	Dr Mahfuzzudin	Feb-02	MYR 28.00	7.38	GJ-2201055
94	Taxi from airport to home	Dr Mahfuzzudin	Feb-02	MYR 28.00	7.38	GJ-2201055
95	Airport tax-Bangkok	Dr Mahfuzzudin	Feb-02	N/A	11.36	GJ-2201055
96	Airport tax-Bangkok	Dr Mahfuzzudin	Feb-02	N/A	11.36	GJ-2201055
97	Taxi_Bangkok	Dr Mahfuzzudin	Feb-02	N/A	18.18	GJ-2201055
98	Taxi_Bangkok	Dr Mahfuzzudin	Feb-02	N/A	18.18	GJ-2201055
99	Hotel_Dhaka	Dr Mahfuzzudin	Feb-02	N/A	26.94	GJ-2201055
100	Per diem - Dhaka/Bangkok	Dr Mahfuzzudin	Feb-02	N/A	750.00	GJ-2201055
101	Official lunch-Dhaka	American Expenses	Feb-02	MYR 192.38	50.69	GJ-2201064
102	Hotel_Dhaka 7/1/02-11/1/02	American Expenses	Feb-02	MYR 863.52	227.54	GJ-2201064
103	Hotel_Dhaka 13/1/02-21/1/02	American Expenses	Feb-02	MYR 1,633.39	430.41	GJ-2201064
	Total International Travel				**7,392.82**	
104	Local transport	Irene Robel	Oct-01	N/A	14.39	GJ-2110128
105	Fuel	Bangladesh	Jan-02	BDT 6,373.00	107.73	GJ-2201045
106	Local Transport	E Pasamba	Aug-01	N/A	15.61	GJ-2112287
107	Philippines collaborator liquidation	University of Philippines	N/A	N/A	211.77	GJ-2202099
108	Hotel_visitors	Hotel Equitorial	23-Oct-01	MYR 155.25	40.91	GJ-2110050
109	Hotel_visitors	Hotel Equitorial	23-Oct-01	MYR 1,086.75	286.36	GJ-2110050
110	Contra of hotel expenses with deposi	Hotel Equitorial	Oct-01	(MYR 1,086.75)	(287.50)	DM1007
111	Contra of hotel expenses with deposi	Hotel Equitorial	Oct-01	(MYR 155.25)	(41.07)	DM1007
	Total Domestic Travel				**348.20**	
112	Tax - workshop participants	IRRI	Nov-01	N/A	7.89	GJ-2110128
113	Air fare - workshop participants	IRRI	Nov-01	N/A	467.50	GJ-2110128
114	Air fare - workshop participants	IRRI	Nov-01	N/A	467.50	GJ-2110128
115	Air fare - workshop participants	IRRI	Nov-01	N/A	467.50	GJ-2110128
116	Air fare - workshop participants	IRRI	Nov-01	N/A	467.50	GJ-2110128
117	Air fare - workshop participants	IRRI	Nov-01	N/A	470.10	GJ-2110128
118		NOT USED				
119	Hotel_Thai participants	Vistana Hotel	11-Oct-01	MYR 200.00	52.70	VP109017
120	Hotel_Indonesia participants	Vistana Hotel	11-Oct-01	MYR 200.00	52.70	VP109017
121	Hotel_China participants	Vistana Hotel	11-Oct-01	MYR 300.00	79.05	VP109017
122	Hotel_KL participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
123	Hotel_KL participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
124	Hotel_KL participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
125	Hotel_KL participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
126	Hotel_KL participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
127	Hotel_KL participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
128	Hotel_KL participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
129	Hotel_KL participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
130	Hotel_Indonesia participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
131	Hotel_India participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
132	Hotel_India participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
133	Hotel_India participants	Vistana Hotel	11-Oct-01	MYR 400.00	105.40	VP109017
134	Hotel_Thai participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
135	Hotel_Thai participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
136	Hotel_Thai participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
137	Hotel_Thai participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
138	Hotel_China participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
139	Hotel_China participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
140	Hotel_Philippines participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017

RETA No. 5945
Study on Strategies and Options for Increasing and Sustaining Fisheries and Aquaculture Production to Benefit Poor Households in Asia
Statement of Expenditures for the period :1 September 2001 to 28 February 2002

Item No.	Description of goods and services	Payee (Supplier/Contractor)	Date of Payment	Amount Paid in Local currency	US Equivalent	Remarks
141	Hotel_Philippines participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
142	Hotel_Philippines participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
143	Hotel_Philippines participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
144	Hotel_Bangladesh participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
145	Hotel_Bangladesh participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
146	Hotel_Bangladesh participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
147	Hotel_Bangladesh participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
148	Hotel_Vietnam participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
149	Hotel_Vietnam participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
150	Hotel_Vietnam participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
151	Hotel_Indonesia participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
152	Hotel_Indonesia participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
153	Hotel_Indonesia participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
154	Hotel_India participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
155	Hotel_India participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
156	Hotel_Sri Langka participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
157	Hotel_Sri Langka participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
158	Hotel_Sri Langka.participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
159	Hotel_Sri Langka participants	Vistana Hotel	11-Oct-01	MYR 500.00	131.75	VP109017
160	Hotel_China participants	Vistana Hotel	11-Oct-01	MYR 600.00	158.10	VP109017
161	Hotel_Vietnam participants	Vistana Hotel	11-Oct-01	MYR 600.00	158.10	VP109017
162	Workshop supplies	Dr Mahfuzzudin	21-Sep-01	MYR 51.00	13.44	GJ-2109091
163	Workshop supplies	Bing Santos	21-Sep-01	MYR 119.40	31.46	GJ-2109091
164	Photocopy-Sept 01	Allocation per project	30-Sep-01	MYR 4,278.15	1,127.31	GJ-2109097
165	Conference beg for workshop	Perniagaan Gunung Emas	06-Feb-02	MYR 210.00	55.34	VP202013
166	Flags for workshop	Pen Ads (M) Sdn Bhd	Mar-02	MYR 135.00	35.57	VP202165
167	Flag stands for workshop	Pen Ads (M) Sdn Bhd	Mar-02	MYR 270.00	71.15	VP202165
168	Indonesia collaborator liquidation	RCMFPPSE	Mar-02	N/A	1,132.12	GJ-2202099
169	First tranche to China collaborators	FFRC Chinese Academy of FC	20-Nov-01	N/A	3,500.00	VP111025
170	First tranche to China collaborators	CCAP-Chinese Academy of Science	20-Nov-01	N/A	5,000.00	VP111024
171	First tranche to Vietnam collaborator	Ha Xuan Thong	29-Oct-01	N/A	2,900.00	VP110089
172	First tranche to Vietnam collaborator	An Giang University	29-Oct-01	N/A	2,900.00	VP110090
173	First tranche to Thailand collaborator	Somying Piumsombun	19-Sep-01	N/A	7,000.00	VP109015
174	Liquidation of first tranche-Thailand	Somying Piumsombun	Mar-02	N/A	(6,070.39)	GJ-2202099
175	First tranche to Malaysia collaborator	Universiti Putra Malaysia	25-Oct-01	MYR 30,360.00	8,000.00	VP110092
176	Liquidation of first tranche-Malaysia	Universiti Putra Malaysia	Feb-02	(MYR 9,226.54)	(2,431.24)	VP202104
177	Second tranche to Malaysia	Universiti Putra Malaysia	03-Nov-02	MYR 9,226.54	2,431.24	VP202104
178	First tranche-Philippines collaborators	UPLB Foundation Inc.	01-Nov-01	N/A	8,450.00	VP110116
179	Liquidation of first tranche-Philippine	UPLB Foundation Inc.	Mar-02	N/A	(9,609.84)	GJ-2202099
180	Liquidation of first tranche-Indonesia	RCMFPPSE	Mar-02	N/A	(12,501.81)	GJ-2202099
181	First tranche-Sri Langka	Min of Fisheries & Aqua Resources De	12-Feb-02	N/A	5,400.00	VP202046
	Total Regional Workshop				**24,973.29**	
182	Liquidation of Malaysia collaborator	Universiti Purtra Malaysia	Feb-02	MYR 3,793.80	1,431.55	VP202104
183	Liquidation of Thailand collaborator	Somying Piumsombun	Mar-02	N/A	4,771.89	GJ-2202099
184	Liquidation of Indonesia collaborator	RCMFPPSE	Mar-02	N/A	7,725.79	GJ-2202099
	Total Field Survey & Research				**13,929.23**	
185	Indonesia Liquidation-inception repor	RCMFPPSE	Mar-02	N/A	**373.58**	GJ-2202099
186	Salary - Sept 01	International Recruit Staff	Sep-01	N/A	7,069.09	
187	Salary - Oct 01	International Recruit Staff	Oct-01	N/A	5,797.83	
188	Salary - Nov 01	International Recruit Staff	Nov-01	N/A	6,342.71	
189	Salary - Dec 01	International Recruit Staff	Dec-01	N/A	8,926.99	
190	Salary - Jan 02	International Recruit Staff	Jan-02	N/A	8,745.72	
191	Salary - Feb 02	International Recruit Staff	Feb-02	N/A	1,558.27	
	Total International Expert/Fisheries Economist				**38,440.61**	
192	Salary - Jan 02	Research Assistant	Jan-02	N/A	986.09	
193	Salary - Feb 02	Research Assistant	Feb-02	N/A	994.75	
194	Staff Benefit - Dec 01	Research Assistant	08-Jan-02	MYR 560.00	147.56	VP112092
195	Salary - Collaborator, Philippines	Research Assistant	Mar-02	N/A	850.81	GJ-2209099
	Total National Research Assistant				**2,979.21**	
196	Salary - Collaborator, Philippines	National Scientist	Mar-02	N/A	4,234.96	GJ-2209099
197	Salary - Collaborator, Thailand	National Scientist	Mar-02	N/A	509.85	GJ-2209099
198	Salary - Collaborator, Malaysia	National Scientist	Mar-02	MYR 3,793.80	999.68	VP202104
	Total National Scientist				**5,744.49**	
199	Salary - Collaborator, Philippines	Database	Mar-02	N/A	**971.25**	GJ-2202099

RETA No. 5945

Study on Strategies and Options for Increasing and Sustaining Fisheries and Aquaculture Production to Benefit Poor Households in Asia

Statement of Expenditures for the period :1 September 2001 to 28 February 2002

Item No.	Description of goods and services	Payee (Supplier/Contractor)	Date of Payment	Amount Paid in Local currency	US Equivalent	Remarks
200	Indonesia Collaborator liquidation	Contingencies	Mar-02	N/A	276.80	GJ-2202099
201	Philippines Collaborator liquidation	Administrative	Mar-02	N/A	767.73	GJ-2202099
202	Thailand Collaborator liquidation	Contingencies	Mar-02	N/A	788.65	GJ-2202099
	Total Contingencies				1,833.18	
203	Overhead undertaken up	N/A	30-Sep-01	N/A	423.74	GJ-2109096
204	Overhead - Sept 01	N/A	30-Sep-01	N/A	2,213.08	GJ-2109143
205	Overhead - Oct 01 (second close)	N/A	31-Oct-01	N/A	881.88	GJ-2110145
206	Overhead - Oct 01 (first close)	N/A	31-Oct-01	N/A	2,559.70	GJ-2110097
207	Overhead - Nov 01	N/A	30-Nov-01	N/A	1,907.59	GJ-2111108
208	Overhead - Dec 01	N/A	31-Dec-01	N/A	596.06	GJ-2112097
209	Overhead - Jan 02	N/A	31-Jan-02	N/A	1,113.74	GJ-2201091
210	Overhead - Feb 02	N/A	28-Feb-02	N/A	937.32	GJ-2202108
					10,633.11	
211	Design & html programming	C-Square Sdn Bhd	29-Nov-01	MYR 450.00	118.58	VP110144
				TOTAL	114,244.10	

It is hereby certified that the above amounts have been paid for the proper execution of the Technical Assistance activities, all within the terms and conditions of the Technical Assistance Agreement.

All supporting documentation substantiating these expenditures will be made available upon request by ADB.

MAHFUZUDDIN AHMED
Team Leader/Project Director or Manager

EDWARD SAYEGH
Associate Director General Corporate Services

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Appendices

Appendix 1

Sample questionnaire for Component 3. Socioeconomic Profile of Major Stakeholders in Fisheries (Producers, Consumers and Traders)

Appendix 1a. Sample survey questionnaire for Component 3 – Philippines.

Demographic characteristics of the respondent/household

APPENDIX A

FIES FORM 1 (2000)
NSCB Approval No. NSO - 0018 - 02
Expires June 30, 2001

CONFIDENTIALITY
This Survey is authorized by Executive Order 121 dated January 30, 1987
All information is strictly confidential. The data cannot be used for taxation, investigation or enforcement purposes.

Republic of the Philippines
NATIONAL STATISTICS OFFICE
Manila

2000 FAMILY INCOME AND EXPENDITURES SURVEY

PART I. IDENTIFICATION AND OTHER INFORMATION

A. IDENTIFICATION:

1. Province: _____
2. City/Municipality: _____
3. Barangay: _____
4. Enumeration Area (EA) .....
5. Segment .....
6. Urban/Rural .....
7. Barangay Stratum .....
8. Household Control Number .....
9. Household Serial Number _____
10. Address: _____

	[First Visit - JULY 2000]	[Second Visit - JANUARY 2001]
11. Name of Respondent	_____	_____
12. Line Number of Respondent from ISH Form 2	_____	_____
13. Time Started	_____	_____
14. Time Finished	_____	_____

INTERVIEW STATUS: (Enter appropriate code in the box provided.)

				[First Visit - July 2000]	[Second Visit - January 2001]
1	Same sample HH last quarter or sample HH of new panel/Same sample as in First Visit	5	Replacement (Present Occupant of HU)		
2	Refusal	6	Replacement from replacement list		
3	Temporarily away, on vacation, not at home	7	Housing Unit demolished, destroyed by fire/typhoon		
4	Vacant	8	Others, specify _____		

CERTIFICATION:

I hereby certify that the data gathered in this questionnaire were obtained/reviewed by me personally and in accordance with instructions.

	Date Accomplished	Name & Signature of Interviewer	Date Reviewed	Name & Signature of Supervisor
[1st Visit - July 2000]				
[2nd Visit - Jan. 2001]				

Appendix 1a. continued....

B. OTHER INFORMATION APPENDIX A (Continued)

TRANSCRIBE FROM ISH FORM 2 EXCEPT ITEMS 1(f), 1(h) AND (2)

[FIRST VISIT - JULY 2000]	101	[SECOND VISIT - JANUARY 2001]	102
1. Particulars about the Head of the Family:		1.	
✓ a. Sex: 1 - Male 2 - Female	☐	a.	☐
b. Age:	☐☐	b.	☐☐
c. Marital Status:	☐	c.	☐
d. Highest Grade Completed:	☐☐	d.	☐☐
e. Have a job/business? 1 - YES 2 - NO, GO TO 2	☐	e.	☐
f. Occupation: _____	☐☐	f.	☐☐
g. Kind of Business/Industry: _____	☐☐	g.	☐☐
h. Class of Worker: _____	☐	h.	☐
2. Others:		2.	
a. Type of Household: 1 - Single Family 2 - Extended Family 3 - Two or More Nonrelated Persons/Members	☐	a.	☐
b. Total number of family members enumerated (excluding overseas contract workers)	☐☐	b.	☐☐
i) less than 1 year old	☐☐	i)	☐☐
ii) 1 - 6 years old	☐☐	ii)	☐☐
iii) 7 - 14 years old	☐☐	iii)	☐☐
iv) 15 - 24 years old	☐☐	iv)	☐☐
v) 25 years old and over	☐☐	v)	☐☐
c. Number of boarders, domestic helpers and non-relatives enumerated	☐☐	c.	☐☐
d. Number of family members including the head who were employed for pay or profit last quarter (excluding unpaid family worker)	☐☐	d.	☐☐
e. Was the wife of the family head employed for pay or profit last quarter? 1 - YES 2 - NO 3 - NOT APPLICABLE	☐	e.	☐

INSTRUCTIONS TO INTERVIEWERS:

UNLESS INSTRUCTED OTHERWISE, ALL ITEMS SHOULD BE ANSWERED BY THE HOUSEHOLD MANAGER OR ANY MEMBER OF THE HOUSEHOLD WHO I RESPONSIBLE IN THE MANAGEMENT OF THE HOUSEHOLD FINANCES.

WRITE IN ENTRIES OR ENCIRCLE APPROPRIATE CODES.

Appendix 1a. continued....

Household expenditures.

APPENDIX B

A1.6 FISH AND MARINE PRODUCTS

(a) During the PERIOD SPECIFIED, did you or any member of your family consume fish and marine products?

1 - YES 2 - NO, GO TO NEXT PAGE (A1.7)

A1.6 1 - YES 2 - NO, GO TO NEXT PAGE (A1.7)

(b) On the AVERAGE, how much is your WEEKLY consumption of the following?

Item	Code	[JANUARY – JUNE 2000] 151 Quantity Consumed	Unit Price (₱)	VALUE CONSUMED (₱) Total	In Cash/ On Credit	In Kind	Code	[JULY – DECEMBER 2000] 152 Quantity Consumed	Unit Price (₱)	VALUE CONSUMED (₱) Total	In Cash/ On Credit	In
1. Fresh fish, shells and others	116100	kg					116100	kg				
a. Anchovies (dilis)	116101	kg					116101	kg				
b. Bangus	116102	kg					116102	kg				
c. Galunggong	116103	kg					116103	kg				
d. Tilapia, Plapia, Gurami	116104	kg					116104	kg				
e. Shrimp	116105	kg					116105	kg				
f. Squid	116106	kg					116106	kg				
g. Shells (tahong, tulya, etc.)	116107	kg					116107	kg				
h. Other's specify _____	116108	kg					116108	kg				
2. Processed fish												
a. Canned fish	116210						116210					
a.1 Sardines, Mackerel	116211	g					116211	g				
a.2 Others, specify _____	116212	g					116212	g				
b. Dried/smoked fish	116220						116220					
b.1 Daing, tuyo	116221	kg					116221	kg				
b.2 Tinapa	116222	kg					116222	kg				
b.3 Others, specify _____	116223	kg					116223	kg				
c. Salted fish	116230						116230					
c.1 Bagoong	116231	kg					116231	kg				
c.2 Others, specify _____	116232	kg					116232	kg				
3. Other processed marine products	116300						116300					
a. Canned squid	116301	g					116301	g				
b. Others, specify _____	116302	g					116302	g				
TOTAL.....	116990	XXXXXXXX	XXXXX				116990	XXXXXXXX	XXXXX			
TOTAL CASH (X 26).....	116000	XXXXXXXX	XXXXX	XXXXXXXX		XXXXX	116000	XXXXXXXX	XXXXX	XXXXXXXX		XXX

Appendix 1a. continued....

Entrepreneurial activities.

APPENDIX C

COMPUTATION OF NET INCOME FROM FISHING

[JANUARY - JUNE 2000] Code	
TOTAL VALUE	003200
less TOTAL COSTS	003300
NET INCOME	003000
[JULY - DECEMBER 2000] Code	
TOTAL VALUE	003200
less TOTAL COSTS	003300
NET INCOME	003000

A3. FISHING

(a) During the PERIOD SPECIFIED, did you or any member of your family engage in such activities as capturing fish (with a boat of three tons or less), gathering fry, shells, seaweeds and other aquatic animals or products and culturing fish, oyster, mussel, etc.?

[JANUARY - JUNE 2000] 611	[JULY - DECEMBER 2000] 612
A3 (a) 1 - YES 2 - NO, GO TO NEXT PAGE (A4)	A3 (a) 1 - YES 2 - NO, GO TO NEXT PAGE (A4)

(b) During the PERIOD SPECIFIED, did you or any member of your family catch/gather/harvest fish or aquatic products? If yes, how much was consumed by the family or given away as gifts?

[JANUARY - JUNE 2000]	[JULY - DECEMBER 2000]
A3 (b) 1 - YES 2 - NO, GO TO NEXT PAGE (A4)	A3 (b) 1 - YES 2 - NO, GO TO NEXT PAGE (A4)

Item	Quantity	Code	Total Value	Value Consumed	Value Given Away As Gifts	Quantity	Code	Total Value	Value Consumed	Value Given Away As Gifts
1. Fish and other products	kg	003210				kg	003210			
2. Fry gathered	kg	003220				kg	003220			
3. Shells and other products gathered	kg	003230				kg	003230			
4. Fish harvested	kg	003240				kg	003240			
5. Oyster and mussel harvested	kg	003250				kg	003250			
6. Other products harvested	kg	003260				kg	003260			
TOTAL VALUE . . .	XXXXXXXX	003200		XXXXXXX	XXXXXXX	XXXXXXXX	003200		XXXXXXX	XXXXXXX

(c) During the PERIOD SPECIFIED, did you or any member of your family incur expenses, in cash or in kind, in catching, gathering or culturing the fish or aquatic products reported above?

[JANUARY - JUNE 2000] 621	[JULY - DECEMBER 2000] 622
A3 (c) 1 - YES 2 - NO, GO TO NEXT PAGE (A4)	A3 (c) 1 - YES 2 - NO, GO TO NEXT PAGE (A4)

Item	Code	In Cash	In Kind	Total	Code	In Cash	In Kind	Total
1. Acquisition cost of fry/fingerlings	003310				003310			
2. Fertilizer, feeds and pesticide	003320				003320			
3. Wages of hired labor and paid family members	003330				003330			
4. Ice	003340				003340			
5. Fuel and oil	003350				003350			
6. Other expenses	003360				003360			
TOTAL COSTS	003300				003300			

Appendix 1b. Sample survey questionnaire for fish traders, Philippines.

Interviewer (sign over printed name) _____
Time/Date Accomplished _____
Region _____
Municipality _____
Barangay _____
Address _____

I. HOUSEHOLD CHARACTERISTICS

	Respondent	Household Members HH1	HH2	HH3	HH4
Name					
Age					
Sex					
Marital Status					
Relation to Respondent					
Education					
Other training					
Occupation					
Monthly income					
Other source of Income					
Religion					
Organizational Affiliation					

II. CAPITALIZATION

Nature of Establishment ___Informal ___Formal Specify _____
Places of operations _____
Date Started _____
Start-up capital _____ Source _____
Current capital _____ Source _____

Assets:

Item	Value	Remarks

Monthly working capital requirement:

Item	Value	Remarks

III. FISH/SPECIES GROUP TRADED, VOLUME AND VALUE

Fish/Species Group	Volume/Sources Month	Remark	Mode of Acquisition	Purchase Price	Terms of Payment

Fish/Species Group	Mode of Selling	Destinations	Selling Price	Terms of Payment	Remarks

IV. COSTS OF TRADING

Items/Activities	Costs	Remarks

V. TENURE, PARTICIPATION IN GROUP ACTIVITIES AND BY GENDER GROUP

Activities	Performed by	Position	Extent of participation/ Tools/machine used	Compensation

Appendix 1c. Sample survey questionnaire for consumers, Thailand.

Sample no.....

QUESTIONNAIRE
A study on Economic of Giant Freshwater Prawn Culture

Name of farmer: _____

House no.: _____

Village no.: _____

Tumbol: _____

District: _____

Province: _____

Name of respondent: _____

Relationship with household head: _____

Name of interviewer: _____

Date: _____

A. General characteristics of farmer

1. Experience in freshwater fish culture _____ years
2. Experience in giant freshwater prawn culture _____year
3. Previous occupation _____
4. Reason of interesting in giant freshwater prawn culture _____
5. Source of knowledge for giant freshwater prawn culture _____
6. No. of household members: total _____ persons
   Adults: Male _____ Female _____
   Children: Male_____ Female _____

7. Household member information

Item	Relationship with household head	Sex	Age	Education	Occupation		Percentag time for f operation
					Main	Second	

8. Type of land use before converse to giant freshwater prawn culture _____
9. Type of land use around farm area ( ) paddy field ( ) orchard ( ) others

10. Distance of homestead farm from :

Local administrative authority office _____ km.
Main road _____ km.
Source of water supply _____ km.
Local market _____km.
Source of feed supply _____ km.

B. Operation Information (previous year)

1. General status of farm
   Farm area .....rai

Infrastructure	Total area (rai)	Depth (M)
☐ pond		
☐ water treatment pond		
☐ pond.....		

2. Farm operation, Yield and Revenue (previous crop)

Items	Pond no.1	Pond no.1	Pond no.1	Total /average
1 pond area (rai)				
2 stocking rate (fry/pond)				
3 date of stocking				
4 culture period (days)				
5 size of fry (p)				
6 price of fry (baht/fry)				
7 yield (km.) male female				
8 farm price (baht/km.) male female				
9 size of prawn (piece /km.) male female				
9. harvesting month of the first harvesting month of the last harvesting				
10. survival rate (%)				
11. gross revenue (baht)[1]				

3. Investment and operation costs

3.1 initial investment

Land cost _____ baht

Land rent _____baht /rai total area _____rai amount ___baht/year

Items	quantity	Investment cost (baht)	Economic life (year)	Maintenance (baht/year)
1. Pond construction - Prawn pond - Water treatment pond - pond.....				
2. Water flow system				
3. Building construction				
4. Others				
Total initial investment cost				

3.2. Equipment cost

Items	Quantity	Price (baht)	Value (baht)	Economic life (years)	Used (years)	Maintenance (baht/year)
Water pump engine						
Water pipe						
Air equipment - per farm - per pond (.....rai)						
Electric power						
Salinity investigated equipment						
pH equipment						
Feed mixed equipment						
Boat						
Harvest equipment						
Feeding equipment						
Lift net						
Cast net						
others _____						

3.3. Operating costs
(size of pond _____ rai
culture period _____days a month of the first time of harvesting (month) _____
and a month of the last time of harvesting _____)

Items	Quantity	price (baht)	value (baht)
1. seed			
2. pellet feed			
3. fresh feed			
4. chemical			
☐ lime (kg)			
☐ chlorine (kg)			
☐ BKC			
☐ vitamin			
☐ antibiotic			
☐ organic fertilizer			
☐ other_____			
5. fuel and oil			
6. electric			
7. pond cleaning			
8. harvest cost			
- fuel			
- labor			
- transportation			
9. others			
- land rent			
- water quality monitoring			
- others _____			

Yield _____ kg. Average size ____piece/kg. Average price _____ baht/kg.

3.4 Labor cost

Type of labor	Number of persons	No. of working days	Wage (baht/person/ crop)	Bonus (baht/crop)	Total labor cost (baht/crop)
permanent					
☐ manager					
☐ labor					
Temporary					
☐					
☐					
Household labor					
☐ permanent					
☐ temporary					

4. Debt and credit

Source of loan	Principal (baht)	Objective	Interest (baht/crop)	Debt (baht)
Commercial bank				
BAAC				
Trader in village				
Relative				
others _____				

5. Product distribution
    1. Type of product for sold
        ( ) grading _____ %
        ( ) non-grading _____ %

    2. Selling Place
        ( ) farm gate
        ( ) transport to _____

    3. Type of traders
        ( ) collectors in village _____
        ( ) collectors from other village _____
        ( ) collectors from other province_____
        ( ) others_____

    4. Sold to whom
        ( ) any traders
        ( ) ordinary traders
        ( ) ordinary traders with condition (please answer item 6)

    5. Type of condition
        ( ) trader provide loan
        ( ) trader provide material and equipment credit
        ( ) others_____

    6. Price setting
        ( ) set by traders
        ( ) set by farmer
        ( ) bargaining
        ( ) others _____

    7. Type of payment
        ( ) cash
        ( ) credit (_____ days after sold)

6. Problems and Recommendation

	Problems	Recommendations
1. marketing		
1.	_____	_____
2.	_____	_____
3.	_____	_____
2. culture operation		
1.	_____	_____
2.	_____	_____
3.	_____	_____

3. Do you plan to expand the farm area or change to other fish culture?
   ( ) expand more .....rai
   ( ) no expand, reasons; _____
   ( ) change to other fish culture, what species ? _____
   ( ) no change, reason; _____

7. Recommendation

_____

_____

Appendix 2

Regional Workplan, 1 March 2001 – 28 February 2004

Appendix 2. Regional Work Program, March 2001 - February 2004.

ACTIVITIES	2001*										2002												2003												2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
A. PLANNING PHASE																																				
1. Team formation																																				
2. Finalization of workplan																																				
3. Review and finalize MOA																																				
4. Preparation of report and workplan for Inception meeting																																				
5. Inception meeting																																				
B. RESEARCH COMPONENTS AND ACTIVITIES																																				
1. Profile of Key Fishing Practices and Aquaculture Technologies																																				
1. Review of existing information																																				
2. Cataloguing of current and pipeline technology																																				
2.1. Partial listing of technologies based on available information																																				
2.2. Collection of additional information including pipeline technology																																				
3. Analysis of technology																																				
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3.2. Selection of key technologies and construction of indexes on these technologies																																				
3.3. Implementation of surveys/appraisal for additional information																																				
4. Prioritization of technology																																				
4.1. To be done (maybe after analyzing the impact of technology on the different classes of the society)																																				
2. Analysis of Policies, Institutional and Support Services in Fisheries																																				
2.1. Review of existing literature																																				
2.2. Identification of major/key policy and institutional arrangements																																				
2.3. Analysis of the impact of policy (to be done as a part of simulation exercise)																																				

Appendix 2.continued ...

ACTIVITIES	2001										2002											2003											2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
3. Socioeconomic Profile of Major Stakeholders in Fisheries and Aquaculture (Producers, Consumers and Traders)																																				
3.1. Review of existing literature/databases																																				
3.2. Identification of additional data to be collected																																				
3.3. Identification/selection of data collection instruments (survey/appraisal)																																				
3.4. Sampling design																																				
3.5. Conduct of survey/appraisal																																				
3.6. Analysis																																				
4. Analysis of Fish Demand, Supply and Projections																																				
4.1. Review of existing literature/databases																																				
4.2. Finalization of generic methodology																																				
4.3. Formulation of country specific analytical model																																				
4.4. Identification of data source																																				
4.5. Collection of data (primary/secondary)																																				
4.6. Estimation of parameters (elasticities)																																				
4.7. Simulation/projection and impact assessment																																				
5. Preparation of National Plan																																				
5.1 Development of draft national action plan																																				
5.2. National consultative workshop																																				
5.3. Institutionalization of the action plan																																				

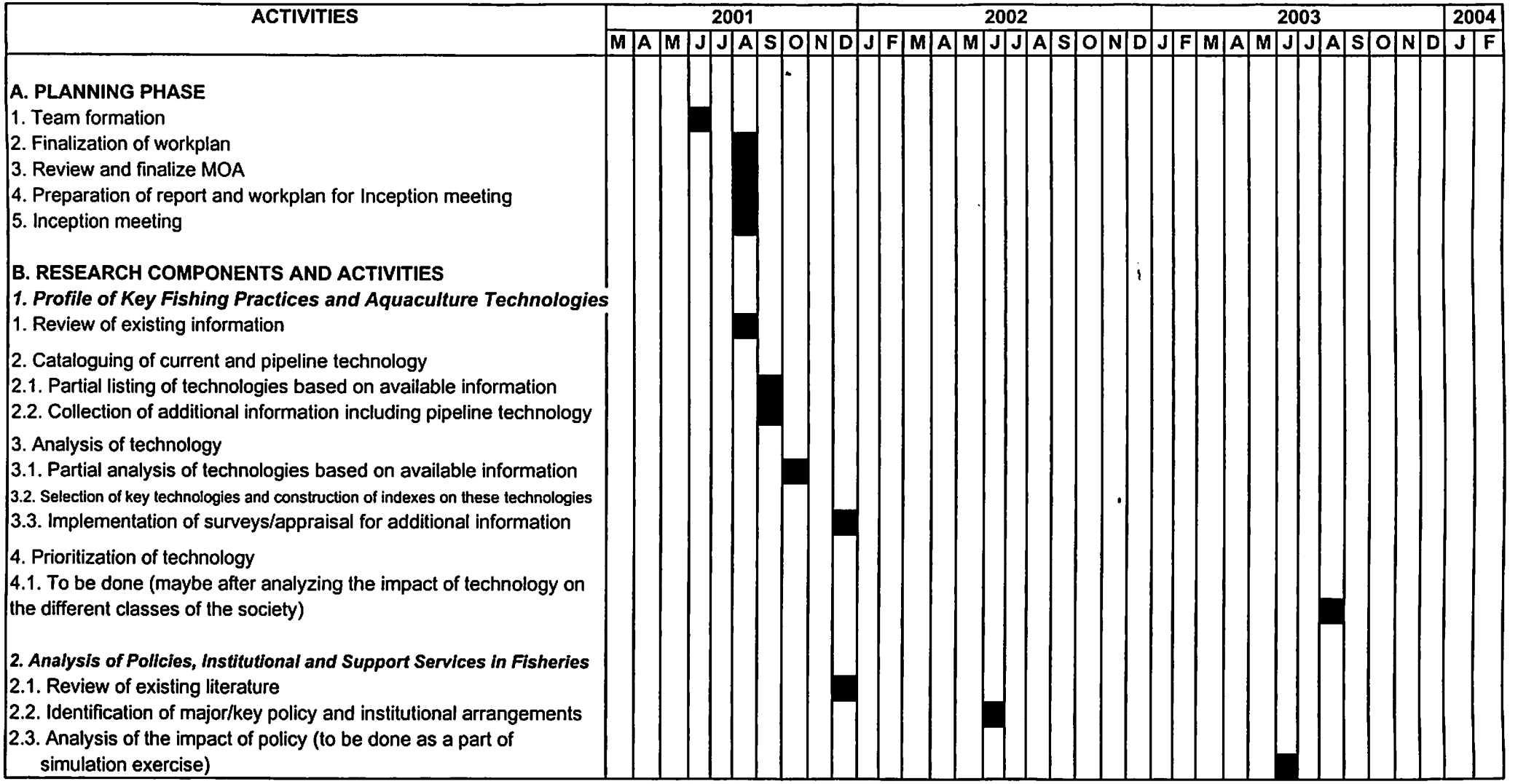
Appendix 2.continued ...

ACTIVITIES	2001										2002												2003												2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
C. TRAINING, WORKSHOP AND PREPARATION OF THE REPORT																																				
1. Training of Scientists from partner institutes (on-the-job)																																				
1.1. Database management																																				
1.2. Supply-Demand analysis and projections																																				
2. Workshops																																				
2.1 Mid-project review																																				
2.2 National Consultative Workshops																																				
2.3 Final Regional Workshop																																				
3. Preparation and submission of reports (technical and financial)																																				
3.1 First semi-annual report																																				
3.2 Second semi-annual report																																				
3.3 Third semi-annual report																																				
3.4 Fourth semi-annual report																																				
3.5 Fifth semi-annual report																																				
3.6 Final project terminal report																																				
4. Actual submission of reports to ADB																																				

Appendix 3

National Workplan of Developing Member Countries, 1 March 2001 – 28 February 2004

Appendix 3.1. National Work Program for Bangladesh, June 2001 - February 2004.



Appendix 3.1. National Work Program for Bangladesh, June 2001 - February 2004.

ACTIVITIES	2001										2002												2003												2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
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6.6 Final project terminal report																																				

Appendix 3.2. National Work Program for China, June 2001 - February 2004.

ACTIVITIES	2001										2002												2003												2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
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2.1. Review of existing literature																																				
2.2. Identification of major/key policy and institutional arrangements																																				
2.3. Analysis of the impact of policy (to be done as a part of simulation exercise)																																				

Appendix 3.2. National Work Program for China, June 2001 - February 2004.

ACTIVITIES	2001										2002												2003												2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
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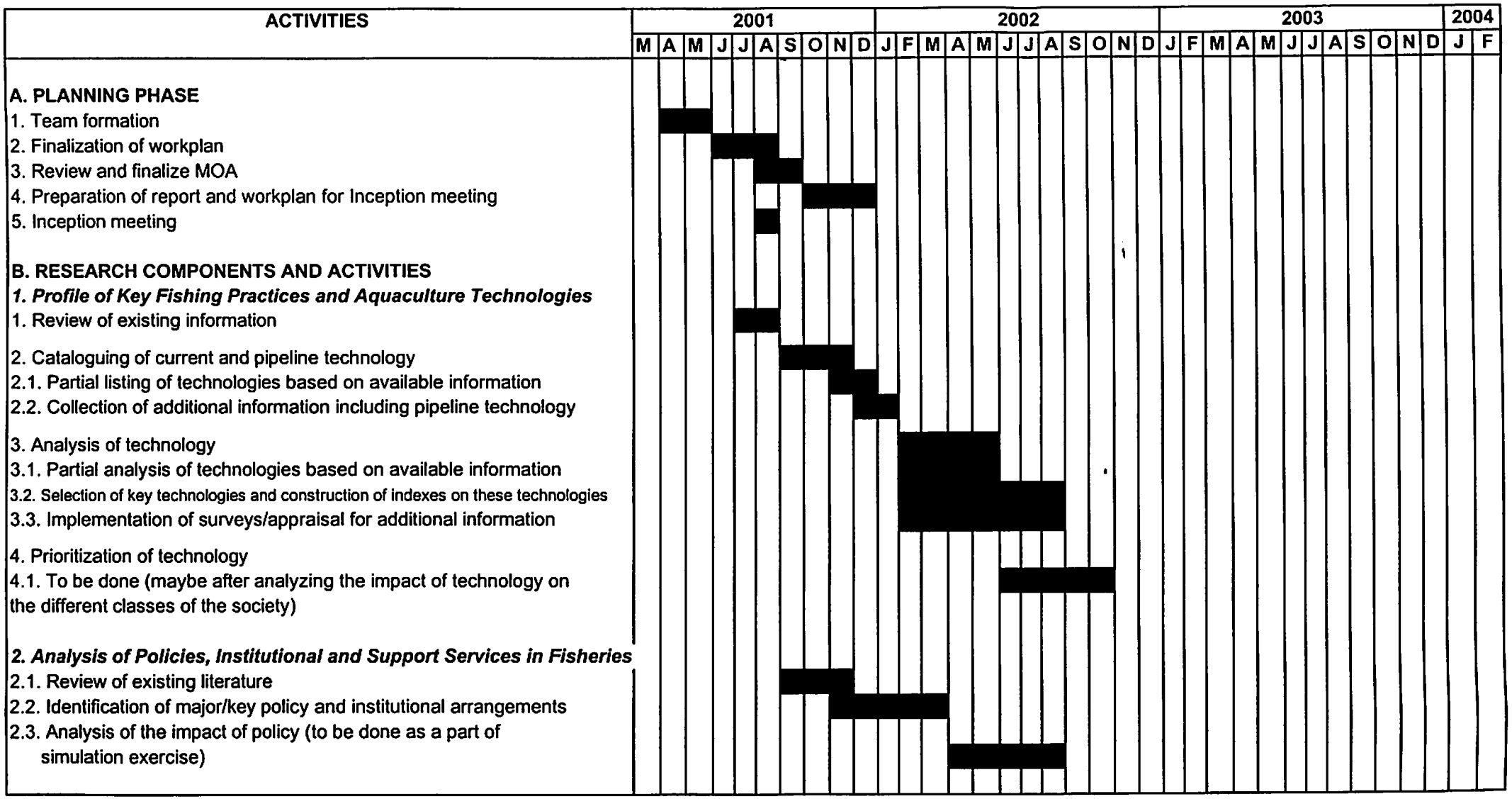
Appendix 3.3. National Work Program of India, June 2001 - February 2004.



Appendix 3.3. National Work Program of India, June 2001 - February 2004.

ACTIVITIES	2001										2002												2003												2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
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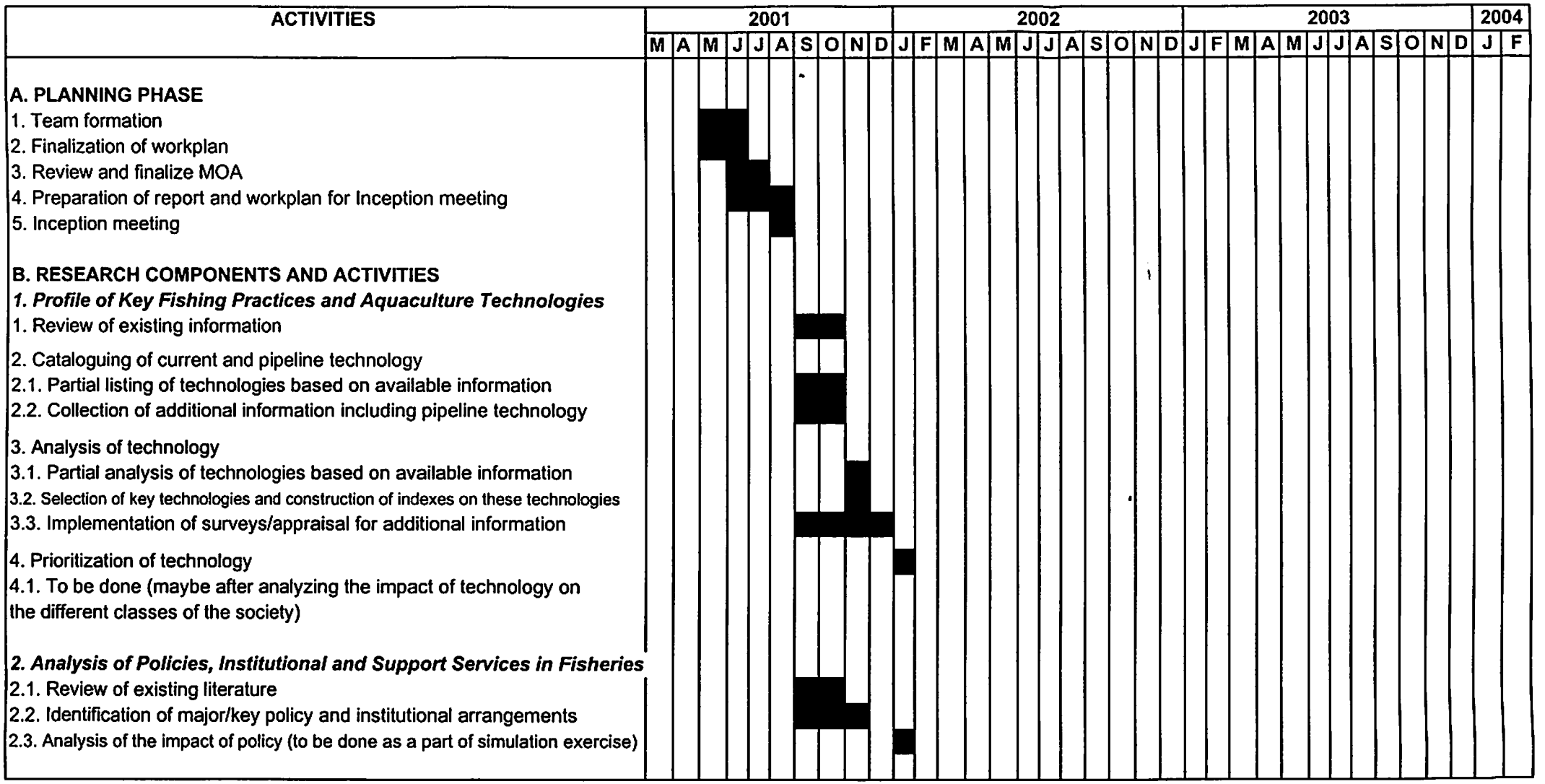
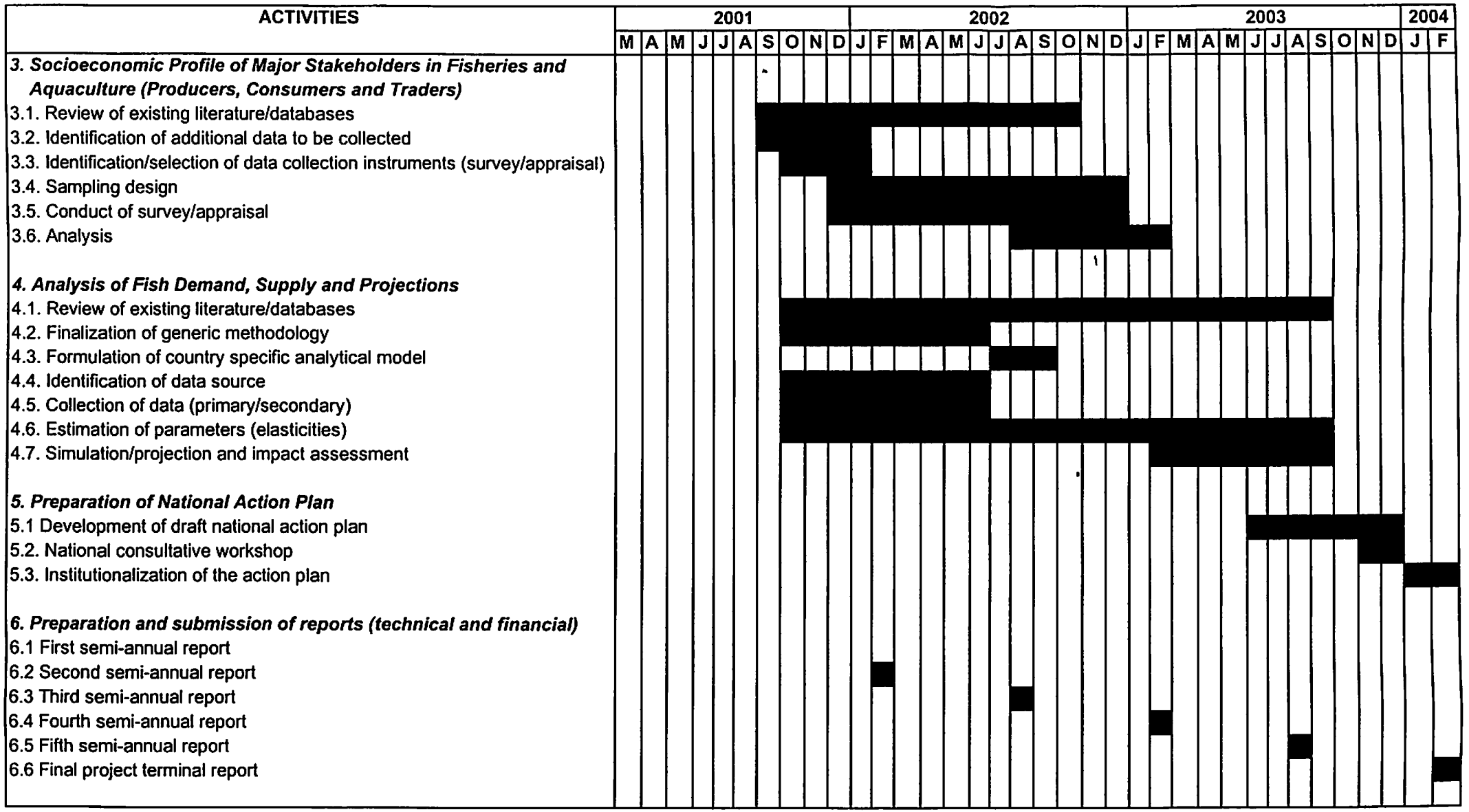
6.6 Final project terminal report																																				

Appendix 3.4. National Work Program for Indonesia, June 2001 - February 2004.



Appendix 3.4. National Work Program for Indonesia, June 2001 - February 2004.



Appendix 3.5. National Work Program for Malaysia, June 2001 - February 2004.

ACTIVITIES	2001										2002										2003										2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
A. PLANNING PHASE																																				
1. Team formation																																				
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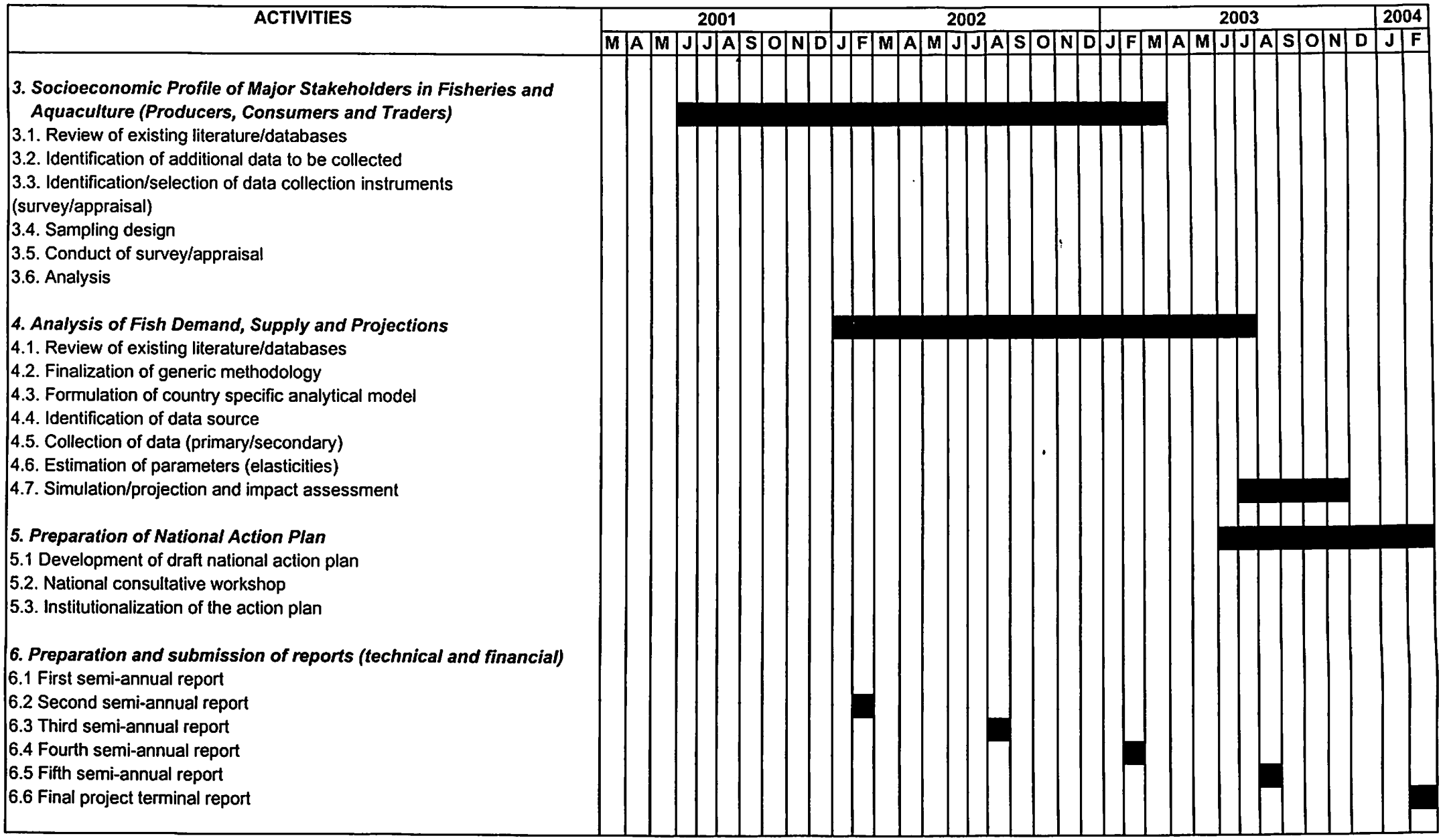
3.2. Selection of key technologies and construction of indexes on these technologies																																				
3.3. Implementation of surveys/appraisal for additional information																																				
3.3. Additional surveys/appraisal to be undertaken																																				
4. Prioritization of technology																																				
4.1. To be done (maybe after analyzing the impact of technology on the different classes of the society)																																				
2. Analysis of Policies, Institutional and Support Services in Fisheries																																				
2.1. Review of existing literature																																				
2.2. Identification of major/key policy and institutional arrangements																																				
2.3. Analysis of the impact of policy (to be done as a part of simulation exercise)																																				

Appendix 3.5. National Work Program for Malaysia, June 2001 - February 2004.



Appendix 3.6. National Work Program for Philippines, June 2001 - February 2004.

ACTIVITIES	2001											2002												2003												2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
A. PLANNING PHASE																																				
1. Team formation																																				
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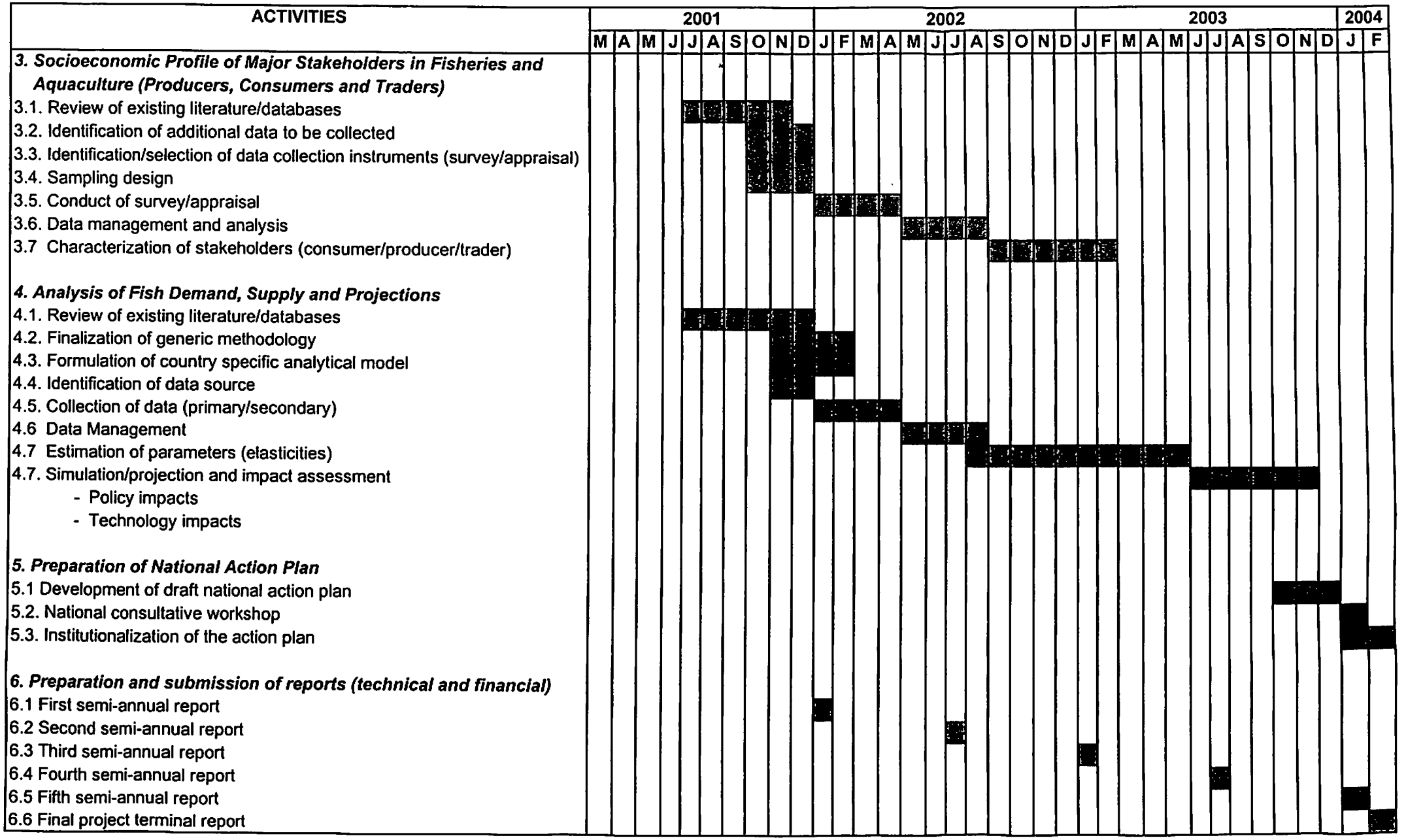
4. Prioritization of technology																																				
4.1. To be done (maybe after analyzing the impact of technology on the different classes of the society)																																				
2. Analysis of Policies, Institutional and Support Services in Fisheries																																				
2.1. Review of existing literature																																				
2.2. Identification of major/key policy and institutional arrangements																																				
2.3 Analysis of impact of policies																																				

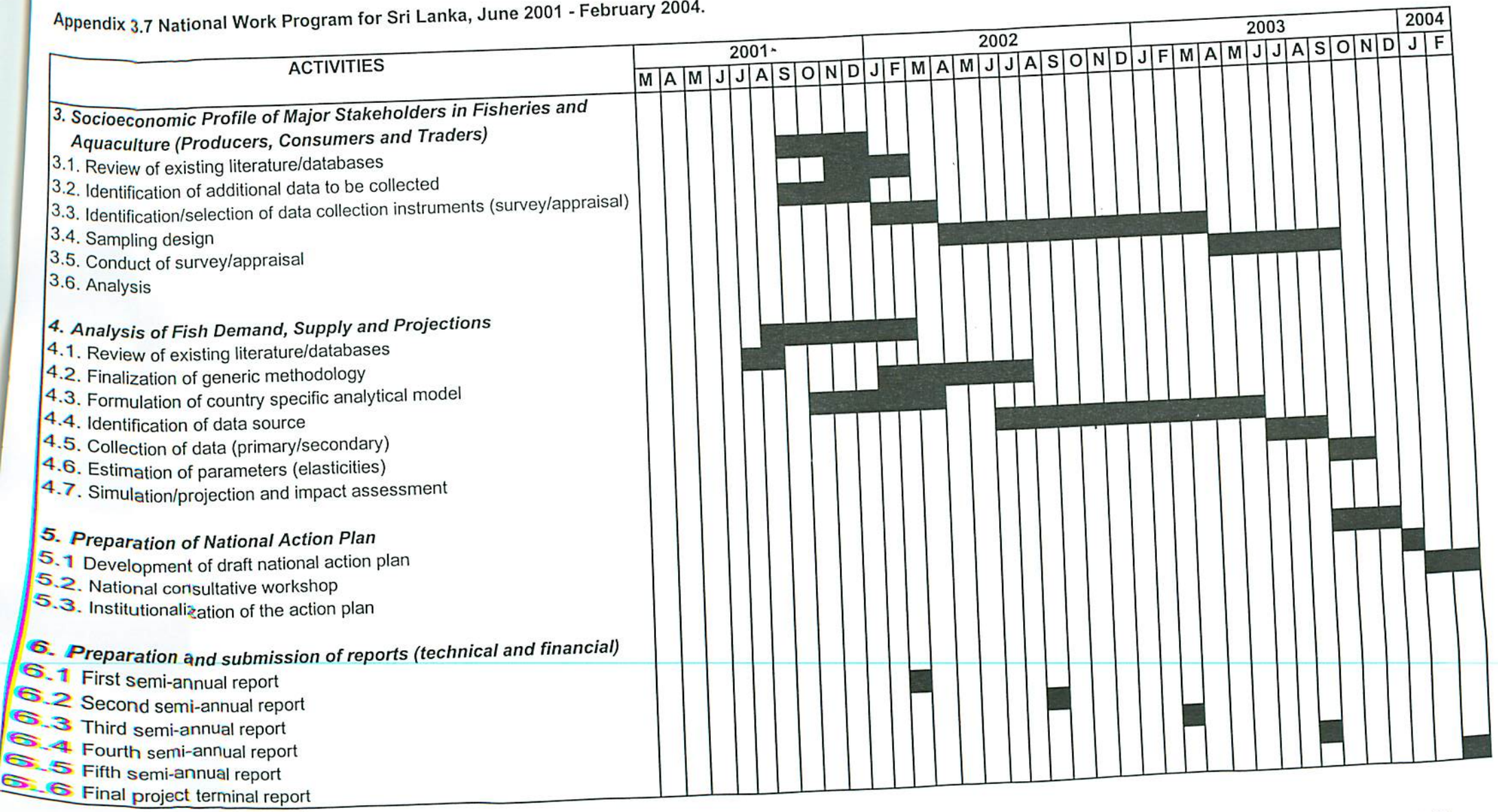
Appendix 3.6. National Work Program for Philippines, June 2001 - February 2004.



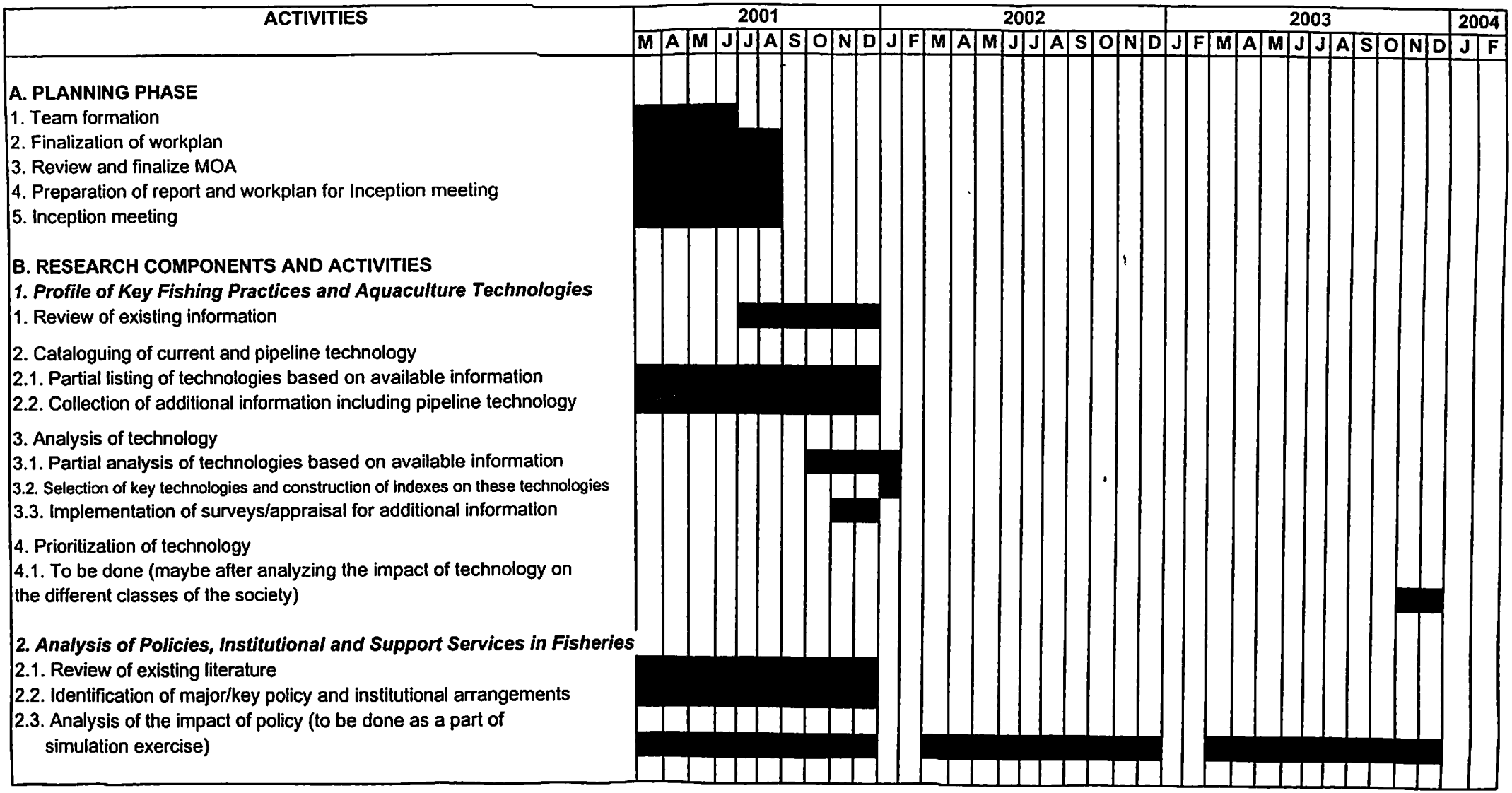
Appendix 3.7 National Work Program for Sri Lanka, June 2001 - February 2004.

ACTIVITIES	2001												2002												2003												2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
A. PLANNING PHASE																																						
1. Team formation			■	■	■	■																																
2. Finalization of workplan			■	■	■	■																																
3. Review and finalize MOA			■	■	■																																	
4. Preparation of report and workplan for Inception meeting						■																																
5. Inception meeting						■																																
B. RESEARCH COMPONENTS AND ACTIVITIES																																						
1. Profile of Key Fishing Practices and Aquaculture Technologies																																						
1. Review of existing information							■	■	■	■	■	■	■																									
2. Cataloguing of current and pipeline technology										■	■	■	■	■																								
2.1. Partial listing of technologies based on available information										■	■	■	■	■																								
2.2. Collection of additional information including pipeline technology															■	■	■																					
3. Analysis of technology												■	■	■	■	■	■	■	■	■	■	■																
3.1. Partial analysis of technologies based on available information												■	■	■	■	■	■																					
3.2. Selection of key technologies and construction of indexes on these technologies																	■	■	■	■	■	■															
3.3. Implementation of surveys/appraisal for additional information									■	■	■	■	■	■	■	■	■	■	■	■																	
4. Prioritization of technology																					■	■	■	■	■	■											
4.1. To be done (maybe after analyzing the impact of technology on the different classes of the society)																			■	■	■	■															
2. Analysis of Policies, Institutional and Support Services in Fisheries																																						
2.1. Review of existing literature										■	■	■	■	■	■	■	■	■	■																			
2.2. Identification of major/key policy and institutional arrangements											■	■	■	■	■	■	■	■	■																			
2.3. Analysis of the impact of policy (to be done as a part of simulation exercise)																													■	■	■	■	■					

Appendix 3.7 National Work Program for Sri Lanka, June 2001 - February 2004.



Appendix 3.8. National Work Program for Thailand, June 2001 - February 2004.



Appendix 3.8. National Work Program for Thailand, June 2001 - February 2004.

ACTIVITIES	2001										2002												2003												2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
3. Socioeconomic Profile of Major Stakeholders in Fisheries and Aquaculture (Producers, Consumers and Traders)																																				
3.1. Review of existing literature/databases																																				
3.2. Identification of additional data to be collected																																				
3.3. Identification/selection of data collection instruments (survey/appraisal)																																				
3.4. Sampling design																																				
3.5. Conduct of survey/appraisal																																				
3.6. Analysis																																				
4. Analysis of Fish Demand, Supply and Projections																																				
4.1. Review of existing literature/databases																																				
4.2. Finalization of generic methodology																																				
4.3. Formulation of country specific analytical model																																				
4.4. Identification of data source																																				
4.5. Collection of data (primary/secondary)																																				
4.6. Estimation of parameters (elasticities)																																				
4.7. Simulation/projection and impact assessment																																				
5. Preparation of National Action Plan																																				
5.1 Development of draft national action plan																																				
5.2. National consultative workshop																																				
5.3. Institutionalization of the action plan																																				
6. Preparation and submission of reports (technical and financial)																																				
6.1 First semi-annual report																																				
6.2 Second semi-annual report																																				
6.3 Third semi-annual report																																				
6.4 Fourth semi-annual report																																				
6.5 Fifth semi-annual report																																				
6.6 Final project terminal report																																				

ACTIVITIES	2001											2002												2003												2004	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
A. PLANNING PHASE																																				
1. Team formation																																				
2. Finalization of workplan																																				
3. Review and finalize MOA																																				
4. Preparation of report and workplan for Inception meeting																																				
5. Inception meeting																																				
B. RESEARCH COMPONENTS AND ACTIVITIES																																				
1. Profile of Key Fishing Practices and Aquaculture Technologies																																				
1. Review of existing information																																				
2. Cataloguing of current and pipeline technology																																				
2.1. Partial listing of technologies based on available information																																				
2.2. Collection of additional information including pipeline technology																																				
3. Analysis of technology																																				
3.1. Partial analysis of technologies based on available information																																				
3.2. Selection of key technologies and construction of indexes on these technologies																																				
3.3. Implementation of surveys/appraisal for additional information																																				
4. Prioritization of technology																																				
4.1. To be done (maybe after analyzing the impact of technology on the different classes of the society)																																				
Report due to ICLARM																																				
2. Analysis of Policies, Institutional and Support Services in Fisheries																																				
2.1. Review of existing literature																																				
2.2. Identification of major/key policy and institutional arrangements																																				
2.3. Analysis of the impact of policy (to be done as a part of simulation exercise)																																				
Report due to ICLARM																																				

Appendix 3.9. National Work Program for Vietnam, June 2001 - February 2004.