Sri Lanka

Strategy and Programme for Post-tsunami Reconstruction and Development of the Marine Fisheries Sector

Ministry of Fisheries and Aquatic Resources

(with support from FAO)

COLOMBO,
SRI LANKA

April 2006

FOREWORD BY THE HON. MINISTER OF FISHERIES AND AQUATIC RESOURCES

The marine fisheries sector was one of the main economic sectors devastated by the tsunami waves of Dec. 2004. Coastal fishing communities suffered loss of life and property, with thousands rendered homeless. Damage and destruction to nearly three fourths of the marine fishing fleet and infrastructure facilities including fishery harbours, anchorages, post harvest and marketing facilities deprived thousands who depended on fishing and other related activities of their livelihoods. Considerable damage was also caused to the coastal environment, coast protection structures and some of the institutes coming under my Ministry.

A large number of organizations – NGOs, donor agencies and other groups as well as countless numbers of well-wishers have come forward to assist in the rehabilitation of the marine fishing industry, particularly to get our artisanal fishermen back to fishing and to resume their normal livelihoods. We are grateful for the yeomans' service rendered by these organizations and individuals.

The post-tsunami reconstruction and rehabilitation of the marine fisheries sector provides us with an opportunity to *build back better* – to restore the fishery beyond the pre-tsunami level of technical competence and wealth generation. The Strategy and Programme for Post-tsunami Reconstruction and Development of the Marine Fisheries Sector was developed to provide us with a consistent policy framework and an overall programme of action needed to ensure maximum benefits from the reconstruction and rehabilitation efforts.

I wish to thank my officers, FAO, and representatives of all other organizations for their assistance in the preparation of this valuable document.

Felix Perera
Minister of Fisheries and Aquatic Resources
Ministry of Fisheries & Aquatic Resources
Maligawatta Secretariat, Colombo 10

PREFACE

Our Ministry, amidst numerous and formidable difficulties has endeavored to provide the most urgently needed relief to raise the fishing communities and the industry affected by the tsunami catastrophe. In this enormous task, we have been ably assisted by many national agencies, the FAO of the United Nations, other donor agencies and a large number of non-governmental humanitarian organizations. Our joint efforts in the immediate aftermath of the tsunami were concentrated on providing immediate relief to the victims in the form of provision of shelter, food and clothing, drinking water and sanitary facilities. Concurrently we ensured the clearing of debris that cluttered the beaches and the adjacent areas, and made sure that communications, power and transport facilities were quickly restored.

Thereafter we moved into a short-term phase of reconstruction in which our highest priority was to restore the livelihoods of the fishing communities by carrying out urgent repairs to their damaged boats and engines and the basic support facilities. While we still have a long way to go before complete rehabilitation of damaged and destroyed infrastructure and service facilities such as fishery harbours, ice plants, etc. is complete, the replacement of larger vessels – offshore one day and multi-day boats – has received high priority since these boats contribute most substantially to fish production. With the able guidance and leadership of the Hon. Minister of Fisheries and Aquatic Resources we have now embarked on a programme for the replacement of larger vessels.

This Strategy and Programme for Post-Tsunami Reconstruction and Development of the Marine Fisheries Sector has been prepared by the Ministry of Fisheries and Aquatic Resources (MFAR), with the assistance of FAO, in order to create a consistent strategic framework and a single overall programme for coordinating the reconstruction and development of the fisheries sector in all tsunami-affected coastal areas in the country. It will serve as the basis for planning and coordination at national, district and local levels in order to improve the

efficiency and speed of addressing the needs of fishing communities while strengthening sustainable fisheries management, the optimal utilization and management of coastal zones and the conservation of the marine environment.

I wish to place on record our sincere thanks and appreciation for the valuable contributions made by all the concerned agencies and organizations in the preparation of this Strategy and wish to recommend this document to all donor organizations and non-governmental organizations interested in assisting with the rehabilitation and reconstruction of the fisheries sector. I am confident that we can rely on their continued assistance and co-operation.

E. Jinadasa,
Secretary
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Message from Mr. Pote Chumsri FAO Representative Sri Lanka

FAO was closely associated with the Government of Sri Lanka following the tsunami disaster; the immediate priority being to get the fishers back to fishing and to bring the key sub-sectors in fisheries back to operations as soon as possible. In consultation with the Ministry of Fisheries and the Department of Fisheries and Aquatic Resources, FAO's short term rehabilitation plan was immediately translated into a series of relief activities delivered through the services of highly qualified national and international experts in the various sub sectors of fisheries to the Ministry of Fisheries and Aquatic Resources and to the various actors in the sector.

The medium and longer-term planning had started already with the relief phase. The FAO has provided technical advice and assistance for boat building, quality of construction and safety, developed a master plan for the rehabilitation of fisheries infrastructure with qualified technical expertise. The FAO continued its capacity strengthening of the Ministry of Fisheries and its agencies. As an integral part of these planning and coordinating efforts, the FAO has closely collaborated with the Ministry in developing this *Strategy and Programme for Post-Tsunami Reconstruction and Development of the Fisheries Sector*. The Strategy seeks to rehabilitate the fishing communities to a status that is better than the pre-tsunami conditions and also to restore the fishing industry beyond the pre-tsunami levels of wealth generation. All relief and recovery activities of FAO post tsunami fisheries programmes address this draft strategy and are within the framework of the UN transitional strategy for post tsunami reconstruction.

The Strategy should serve as a basis for planning and coordinating at national, district and local levels to address the priority needs of men and women in fishing communities. This strategy also reinforces the Government of Sri Lanka and FAO to attain the Millennium Development Goals including: eradication of extreme poverty, assurance of environmental and fisheries resources sustainability, gender equality, creation of a global partnership for development.

On behalf of the FAO I wish to convey my thanks to the Hon. Minister of Fisheries for his guidance, and to the Secretary and the key officers of the Ministry and the organizations under it for collaborating with the FAO in the preparation of this document.

Pote Chumsri
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EXECUTIVE SUMMARY

Under the overall post-tsunami recovery programme for Sri Lanka, specific strategies and measures for reconstruction and development of the economically important fisheries sector are urgently needed. This document presents a strategy and programme for both short-term and long-term reconstruction and development of the marine fisheries sector. The document aims at facilitating the coordination and the efficient utilization of the assistance for relief and rehabilitation of the fisheries sector offered from private and public domestic sources and the international community, including governments, UN agencies, international financial institutions and civil society and non-governmental organizations.

The fisheries sector of Sri Lanka is of considerable social and economic importance. Prior to the tsunami the sector provided direct employment to about 250 000 people and sustenance to about 0.62 million dependents in the fishing households throughout the country. In the recent past, the fishing industry has also emerged as a dynamic export oriented sector with considerable foreign exchange earnings through export of various kinds of seafood and aquatic products.

Marine and brackish water fisheries of Sri Lanka are concentrated along the coastline of the Island which was adversely damaged and devastated when hit by the Tsunami disaster of 26th December 2004. It is estimated that the total fisher population affected by loss of livelihoods is over 0.5 million. Fishing communities were especially hard hit by loss of lives and destruction of houses, fishing craft and gear and fishery infrastructure. The ten most affected fisheries districts of the country accounted for over 81 percent of total marine landings.

More than half of the national fishery resources of the country are found in the conflict affected coastal areas of the North and East where the tsunami hit as the peace settlement was just starting to take hold after twenty years of civil conflict. The effects of the disaster will further set back the country's efforts

of rehabilitation and reconstruction, already challenged by years of civil war.

The most recent assessment data indicate that about three fourths of the fishing fleet of approximately 32 000 boats was affected by the tsunami. The cost of boat and gear repair and replacement is estimated to amount to approximately US$ 57 million. The fish marketing network of the island suffered severe losses. The larger urban fish markets and many retail outlets sustained heavy damages and in many cases were completely destroyed. Extensive damage has also been caused to around 200 landing sites, 10 fishery harbours and 37 anchorages as well as to the associated fish handling facilities, including ice plants, cold stores, and fishery co-operative buildings and vehicles in the affected areas. Coastal habitats, particularly coral reefs and mangroves, coast protection structures, coastal environment and the Special Area Management (SAM) sites suffered varying degrees of damages. Extensive damage was caused to many fishery related institutions, particularly those located within coastal areas, including complete loss of buildings, assets, research and training vessels. The country's foreign exchange earnings from fish exports based on near-shore resources will be considerably affected as a result of reduced availability of items such as ornamental fish, lobster, grouper, chank, beche de mer, etc. The loss of fish production in 2005 due to the disaster could be as high as 46 percent reduction from the 2004 output. The lost production, if not offset by reduced exports and/or increased imports, would cause a drop in the per capita consumption of fish from 20.7 kg in 2004 to 14.7 kg in 2005.

The strategy and programme for the reconstruction and development of the fisheries sector aims at *building back better*. They seek to rehabilitate the fishing communities beyond their pre-tsunami poor living conditions and to restore the fishing industry beyond their pre-tsunami levels of wealth generation. A foremost requirement to achieve these objectives is to create the conditions for the sustainable management of Sri Lanka's fisheries and coastal zones. Thus, the strategy seeks to both (i) restore private assets and (ii)

rebuild and enhance public goods including the governance of the fisheries sector by public agencies at national, provincial and district levels and by local community organizations. The strategy sets out key guiding principles for the planning and implementation of the short-term and long-term priority activities.

The objectives of the short-term recovery phase are, first, to ensure that the reconstruction process is guided by the local needs and priorities as identified by the fishing communities; second to allow for the repair and replacement of damaged and lost fishing boats and gear; third to re-establish the post-harvest fish processing, distribution and marketing chains, and fourth to strengthen the capacities at all levels of planning and implementation of the reconstruction and development process.

The activities under the short-term phase will build-on and complement ongoing humanitarian and recovery work that started in January 2005 and will assist tsunami-affected communities in re-establishing their fishing activities. Significant efforts will be required to coordinate the fishing boat and gear replacement activities by the various assistance agencies, including NGOs, in order to avoid duplication and redundancy and the inadvertent built-up of fishing overcapacities. The short-term reconstruction phase has an estimated cost of LKR 7.8 billion (or US$ 78 million).

In addition to continuing short-term activities, medium and long-term actions will focus on improving livelihoods of fishing communities beyond their pre-tsunami levels. These livelihoods were characterized by generally insecure and poor living conditions and heavy dependency on limited marine fishery resources most of which have reached or surpassed sustainable levels of exploitation. Therefore, a central objective of the medium and long-term reconstruction and development programme is to strengthen the sustainable management of marine fisheries and costal areas and to protect the marine environment. The implementation of the programme will seek to be in conformity with the FAO Code of Conduct for Responsible Fisheries, and promote the

diversification and broadening of the economic base of fishing communities. Actions will include the strengthening of fisheries management and integrated coastal area management, improvements to post-harvest infrastructure to add quality and value to fish and fishery products, vocational training and credit schemes to allow for income diversification, and the strengthening of public and private service providers including fishers and civil society organizations at national, district and local levels. The estimated costs for the medium to long-term reconstruction and development phase are about LKR 8.9 billion (US$ 89 million).

It is essential that fishing communities play a decisive role in the implementation of the reconstruction and development programme. This requires, *inter alia*, strengthening community and civil society organizations through measures such as awareness raising and leadership training. The Department of Fisheries and Aquatic Resources (DFAR), the Department of Coast Conservation (CCD) and the national fisheries agencies, e.g. National Aquatic Resources Research and Development Agency (NARA), National Aquaculture Development Authority (NAQDA), and National Institute of Fisheries and Nautical Engineering (NIFNE) will play pivotal roles in the programme. Their capacities would be strengthened to provide services including research and training in support of sustainable management of fisheries and coastal areas and livelihoods diversification.

The fisheries reconstruction and development programme will be coordinated by a dedicated unit in the Ministry of Fisheries and Aquatic Resources (MFAR). This Programme Coordinating Unit (PCU) will provide guidance and supervision to the reconstruction and development projects by the various private and public donor agencies, establish an overall monitoring and evaluation (M & E) system, and provide guidelines to project-level implementation

The success of the reconstruction and development programme will have to be measured on whether it will succeed in *building back better*, in providing fishing communities with more secure livelihoods, higher standards of

living, better protection from natural disasters and safety at sea, greater insurance from the vagaries of their risky occupation, and in the restoration and conservation of the fisheries resources and the marine and coastal environment.

CURRENCY EQUIVALENTS

(as of November 2005)
Currency Unit – Sri Lanka Rupee (LKR)
LKR 1.00 = US$ 0.01
US $ 1.00 = LKR 99.850

ABBREVIATIONS

ADB	Asian Development Bank
ADF	Asian Development Fund
FAO	Food and Agriculture Organization of the United Nations
CBO	Community Based Organization
CCD	Coast Conservation Department
CFC	Ceylon Fisheries Corporation
CFHC	Ceylon Fishery Harbours Corporation
CITES	Convention on International Trade in Endangered Species
COOL	Country of Origin Labeling
CPUE	Catch per unit effort
GOSL	Government of Sri Lanka
DFAR	Department of Fisheries and Aquatic Resources
DWC	Department of Wildlife Conservation
EU	European Union
FPQCU	Fishery Products Quality Control Unit of the Ministry of Fisheries and Aquatic Resources
FRP	Fiber Glass Reinforced Plastic
HACCP	Hazard Analysis and Critical Control Point System
IA	Implementing agency
IPOA	International Plans of Action

IUCN	International Union for Conservation of Nature and Natural Resources
LKR	Lanka Rupees
LTTE	Liberation Tigers of Tamil Eelam
MCS	Monitoring, Control & Surveillance
MFAR	Ministry of Fisheries and Aquatic Resources
MOFP	Ministry of Finance and Planning
MRID	Ministry of Regional Infrastructure Development
MRRR	Ministry of Relief, Rehabilitation and Reconciliation
NAQDA	National Aquaculture Development Authority
NARA	National Aquatic Resources Research and Development Agency
NGO	Non-governmental Organization
NIFNE	National Institute of Fisheries and Nautical Engineering
NORAD	Norwegian Agency for Development
PA	Protected Area
PCU	Programme Coordinating Unit
RDA	Road Development Authority
RFSDP	Rural Finance Sector Development Program
SAM	Special Area Management
SIDA	Swedish International Development Agency
SJM	St John's Market
SLEDB	Sri Lanka Export Development Board
SPC	Southern Provincial Council
TAARP	Tsunami-Affected Areas Rebuilding Project

Contents

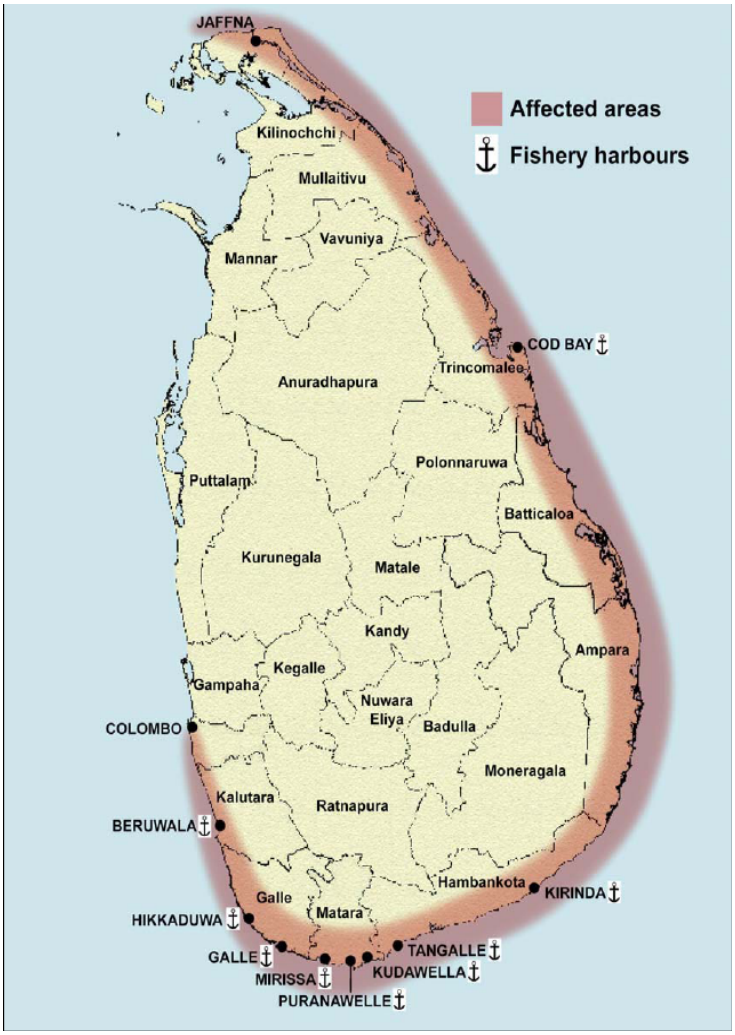
1. BACKGROUND

The Sri Lankan coast was one of the heaviest impacted areas in the region by the tsunami. Next to Indonesia, the highest number of deaths from the tsunami was recorded in Sri Lanka. It caused severe damage to coastal communities in twelve of the fourteen coastal districts in the country (**Figure 1)**. The overwhelming loss of life left the entire country in a state of shock and trauma. Those closest to the impact have of course suffered most, losing friends, family and loved ones. Many households were left with nothing and those displaced had only the clothes on their back.

The fishing communities were hard hit especially by loss of lives and destruction of their infrastructure; the ten most affected fisheries districts of the country accounted for over 80 percent of total marine landings. Records show that more than half of the national fish resources are found in the north-eastern coastal areas. Production from these areas was severely reduced during twenty years of civil conflict, and recovery following settlement was beginning to take hold when the tsunami struck. The effects of the disaster will set back the country's efforts of rehabilitation and reconstruction, already challenged by years of civil war. Together these factors emphasize the need for special assistance for fisheries both on social and economic grounds.

This document has been prepared by the Ministry of Fisheries and Aquatic Resources (MFAR) with the assistance of FAO in order to create a consistent strategic framework and a single overall programme for coordinating the reconstruction and development of the fisheries sector in all tsunami-affected coastal areas in the country. It should serve as a basis for planning and coordination at national, district and local levels in order to improve the efficiency and speed for addressing the needs of fishing communities while strengthening sustainable fisheries management, the optimal utilization and management of coastal zones and the conservation of the marine environment.

Figure 1: Coastal areas and fishery harbours affected by the tsunami



2. SCOPE AND JUSTIFICATION OF PRESENT STRATEGY

The strategy for the reconstruction and development of the fisheries sector aims at *building back better*. It seeks to rehabilitate the fishing communities beyond their pre-tsunami living conditions and to restore the fishing industry beyond their pre-tsunami level of wealth generation. In accordance with the Government's fisheries sector policy, a foremost requirement to achieve these objectives is to create the conditions for the sustainable management of fisheries, the optimal utilization and management of coastal zones and the conservation of the marine environment.

The strategy seeks to both (i) restore private assets and (ii) rebuild and enhance public goods including the governance of the fisheries sector by public agencies at national, provincial and district levels and by local community organizations. It also sets out key guiding principles for the planning and implementation of the short-term and long-term activities.

The principles of the short-term recovery phase are, first, to ensure that the reconstruction process is guided by the local needs and priorities as identified by the fishing communities; second, to allow for the repair and replacement of damaged and lost fishing boats and gear; third, to re-establish the post-harvest fish processing, distribution and marketing chains; and fourth, to strengthen the capacities at all levels of planning and implementation of the reconstruction and development process.

In addition to continuing short-term activities, the medium to long-term actions will focus on improving livelihoods of fishing communities beyond their pre-tsunami levels. These livelihoods were characterized by generally insecure and poor living conditions and heavy dependency on limited marine fishery resources many of which have reached or surpassed sustainable levels of exploitation. Therefore, a central objective of the strategy for medium and long-term reconstruction and development is to strengthen the

sustainable management of marine fisheries and costal areas and to protect the marine environment. The strategy seeks to facilitate the implementation of the FAO Code of Conduct for Responsible Fisheries and to diversify and broaden the economic base of fishing communities. Actions will include the promotion of fisheries management and integrated coastal area management, improvements to post-harvest infrastructure to add quality and value to fish and fishery products, vocational training and credit schemes to allow for income diversification, and the strengthening of public and private service providers including fishers and civil society organizations at national, district and local levels.

The Strategy assigns a central role to fishing communities in the implementation of the reconstruction and development programme. This requires, *inter alia,* strengthening community and civil society organizations through measures such as awareness raising and leadership training. Also the district administrations of the DFAR, the national fisheries agencies (e.g. NARA, NAQDA, and NIFNE) and CCD will play pivotal roles in the programme. Their capacities will be strengthened to provide services including research and training in support of sustainable management of fisheries and coastal areas and livelihoods diversification.

In accordance with the "2005 Declaration on Fisheries and the Tsumani" adopted by the FAO Ministerial Meeting on Fisheries (Rome, 12 March 2005) the Strategy focuses on restoring the livelihoods of fishers and fishing communities and on providing them with protection from future natural disasters and other environmental threats, while at the same time protecting the rights of fishers and ensuring their access to fishing grounds and resources, particularly for those involved in subsistence, small-scale and artisanal fishing.

Following the seven Key Guiding Principles that are presented in Chapter 4, the Strategy serves as a framework for the Government of Sri Lanka to coordinate and efficiently utilize the assistance for reconstruction and development of the fisheries sector offered from domestic partners and the international community, including governments, United

Nations organizations, international financial institutions, and civil society and non-governmental organizations.

3. DAMAGE AND LOSS ASSESSMENT

3.1 Situation Prior to Disaster

Marine fisheries are of considerable social and economic importance around the entire 1,770 km of Sri Lanka's coastline. In 2003 the fisheries sector contributed nearly two percent to gross domestic product and employed over 250,000 persons directly and in related activities. The livelihood of about 600,000 people depends directly and indirectly on the fisheries sector.

The fishing industry became an important foreign exchange earner for the country; in 2003 the foreign exchange earned through exports of fish products such as tuna, shrimp, lobster, ornamental fish, etc. to all major international markets amounted to about US$100 million. Fish contributes nearly 65 percent to of the total animal protein consumed in Sri Lanka[1]. Prior to the disaster about 285,000t of fish was landed annually (**Table 1**) of which 90 percent was consumed in the country and 10 percent was exported. To satisfy the local demand for fish protein, Sri Lanka imports annually a total of about 70,000 t of dried fish and canned fish.

Table 1: National Fish Production (1985-2004 in tonnes)

		1985	1990	1995	2000	2004
Marine fishery	Coastal	140 270	134 130	157 500	175 280	154 470
	Offshore	2 400	11 670	60 000	84 400	98 720
	Total	142 670	145 800	217 500	259 680	253 190
Inland fishery		32 740	38 190	18 250	36 700	33 180
Total production		**175 410**	**183 990**	**235 750**	**296 380**	**286 370**

Source: MFAR Statistical Unit

[1] Data from Food Balance Sheet compiled by the Sri Lankan Department of Census and Statistics

Fishing activities take place around the entire coast of the country, with landings made prior to the disaster at 12 fishery harbors, 37 large and small anchorages and as many as 700 landing sites. Some brackish water aquaculture (mainly shrimp farming with an estimated production of 2,400t in 2004[2]) is being practiced along the coast.

The traditional inshore fishery has been employing simple canoes, mostly with outriggers and, despite development efforts spanning over 50 years, this type of boat still makes up nearly half of the fleet. Larger, motorized "day boats" were introduced in the mid-1950s. The diverse types of traditional and larger scale fishing craft are categorized into six groups:

1) Non-motorized traditional craft
2) Motorized traditional craft
3) Beach seine craft
4) 6-7 m FRP boats
5) 3 ½ ton boats
6) Offshore multi-day boats

The major types of gear used in marine fisheries are beach seine, long line, hand line and gill net. However, a diverse array of fishing gear is used, particularly in coastal and brackish water fisheries, with differences in the specifications and quantity used, these being determined by the target species. A summary of craft types, major fishing gear, area of operation and target species is detailed in **Appendix 1**.

Marine fish production reached the highest level of 274,760 t in 2002. The decline in recent years is likely due to increased levels of over-exploitation of inshore resources while expansion of multi-day fishing operations has been the primary reason for the increase in off-shore landings. Expansion of the offshore multi-day fishery has resulted in an increase in the landings of large pelagic species, especially tuna and tuna-like species. The composition of these species in the total marine landings now stands at around 41%. Tuna and tuna-like species have a relatively high commercial value

[2] Giant tiger prawn (*Penaeus monodon*)

both locally and in export markets. Most of the tuna are exported to Japan and the EU.

Data on operating fishing crafts, whether registered or not, are regularly collected by the field officers of DFAR. In 2004 the total fishing fleet consisted of 31,663 boats, mainly small to medium size craft owned and operated by private individuals. **Table 2** shows the trend in the development of the country's marine fishing fleet over the last two decades.

Table 2: Development of Sri Lanka's Marine Fishing Fleet (No. of vessels 1984 – 2004)

Boat type	1984	1990	1995	2000	2004
Non-motorized Traditional crafts	13 171	14 580	14 649	15 109	15 260
Motorized Traditional crafts	3 861	973	1 060	1 404	674
FRP boats (6-7m)	6 882	9 758	8 564	8 690	11 559
3 1/2 ton boats (28 ft)	2 718		1 357	1 470	1 493
Offshore multi-day boats (34-50ft)	72	2 364	1 639	1430	1 581
Beach seine crafts (22 - 31 ft)	1 261			900	1 052
Total	**27 965**	**27 675**	**27 269**	**29 003**	**31 619**

Source: MFAR Statistical Unit

Prior to the disaster most traditional fishermen landed their fish catch at the estimated 700 landing sites on beaches and in estuaries and river mouths. Larger boats tied up at anchorages and used small boats to land their catch. The multi-day boats and some of the day-boats used the 12 fishery harbours, most of which were established in the 1970s. The harbours are managed by the Ceylon Fishery Harbours Corporation (CFHC). The majority of the landing sites are located in the districts most affected by the tsunami.

Fish landed at fishery harbours, anchorages and fish landing sites is either transported to major urban centres such as Colombo, Kandy, Galle, etc., or sold locally. Fish retailing is done through larger urban fish markets, private sector owned fish stalls and fish retailing outlets or vendors using motorcycles or bicycles. Over the last few years supermarkets have introduced dedicated sections for fish sales which are

becoming increasingly popular among urban consumers. Most of these also serve as supply points for institutional buyers and provide direct and indirect employment to hundreds.

Fish transportation is done in insulated or non-insulated covered transport vehicles, packed in wooden boxes with ice. The standards of handling and storage of fish on boats and landing sites are generally poor and there are frequently no hygienic processing sheds or cooling facilities which significantly affects the quality of fish catches. There are some plants producing ice to preserve fish after landing, and for transport to markets, but the supply is inadequate in most districts. The 1,000 ton cold storage facilities located at the Ceylon Fisheries Corporation Mutwal complex mainly cater to the needs of the private fish exporters and storage of other perishables such as meat and fruits. The main wholesale fish market on the island, St John's Market (SJM)[3] is located in Colombo. Fish received here is either sold to retailers, institutional buyers, caterers or consumers, or is redirected to various parts of the island. Some small-scale fish drying is practiced, generally by women on open ground.

Marine fisheries also support a series of fishery-associated industries and activities including:

- the manufacture of boats and fishing gear
- engine repair and maintenance,
- production of ice, and
- fish processing.

3.2 Damages to the fisheries industry

The ten most tsunami affected fisheries districts of the country account for over 81 percent of total marine landings. Over 60 percent of the national fleet and an estimated 80 percent of the active fishermen on the island were registered in these districts.

Fishing communities

[3] SJM receives nearly 30 percent of the total fish landings of the island.

A total of 4,870 fishers were reported dead, and an additional 136 persons are still missing. Tens of thousand of survivors saw their houses destroyed and their means of earning a living, their boats and nets washed away. The number of houses of fishers and their families destroyed and damaged has been enumerated at 16,434 and 13,329 respectively. In addition, most fishing families maintain a household plot near to their houses as a main source of food (vegetables, pulses, fruits and small livestock). These too were obliterated by the waves and families' drinking water wells were inundated.

Table 3: Humanitarian damages to fishing communities

District	No. of Active Fishermen (2003)**	No. of Fisher People Reported Dead	No. of Displaced Fisher People	No. of Fisher Houses Destroyed	No. of Fisher Houses Damaged
Ampara*	15 500	908	11 285	2 148	1 378
Batticaloa*	21 600	684	18 274	3 705	2 830
Colombo	2 800	6	3 823	762	792
Galle*	6 300	376	7 144	1 451	1 111
Gampaha	16 800	5	6 136	146	152
Hambantota*	6 100	438	4 753	630	1 083
Jaffna*	16 800	856	14 406	2 227	1 242
Kalutara*	4 200	21	4 007	1 027	1 231
Kilinochchi*	3 700	11	2 158	8	-
Mannar	9 400	-	-	-	-
Matara*	7 100	378	8 548	739	1 135
Mullaitivu*	3 300	858	7 095	1 399	462
Puttalam	22 100	1	2 220	36	162
Trincomalee*	16 100	328	13 338	2 156	1 751
Total	**151 800**	**4 870**	**103 187**	**16 434**	**13 329**

* Districts with most tsunami damage ** Source: MFAR Statistics Unit

Fishing fleet

According to government assessments, about three fourths of the fishing fleet of 32,000 boats were either made un-seaworthy (about 23 percent) or were totally destroyed (about 54 percent)[4]. The estimated numbers of fishing boats of different types destroyed and damaged in coastal districts are shown in **Appendix 2**. Many of the boat owners had obtained bank loans to purchase the destroyed capital assets and some of them still have to repay substantial amounts of the loans. However, the tsunami has not left them financially able to repay the loans and at the same time mobilize their own resources to re-establish business. The total cost of boat and fishing gear repair and replacement is estimated at approximately US$57 million.

Harbours and anchorages

Extensive damage has been caused to 10 fisheries harbours, 37 anchorages and around 200 landing sites as well as to the associated fish handling facilities, fishery co-operative buildings and fish transport vehicles in the affected areas. Additional damage has been caused to marine structures, including displacement of breakwater rock boulders, fuel tanks, pumps and distributor systems, slipways and boat repair yards. The cost estimates for damages to the harbours, anchorages and landing sites is approximately US$ 65 million.

Post harvest facilities and services

The fish marketing network of the island suffered severe tsunami damage. The larger urban fish markets at Galle, Matara, Hambantota and many retail outlets belonging to the Ceylon Fisheries Corporation and private traders sustained heavy damages and in many cases were completely destroyed. Furthermore, 28 cold storages and 18 ice plants

[4] Note that the latest figures on the number of boats already repaired are higher than the number of boats that were reported damaged. The implication is that either some of the reportedly destroyed vessels were repaired, or that initial estimates for damaged vessels were too low.

have been severely damaged at an estimated cost of US$9 million.

Coastal Environment including aquaculture

Waves penetrated on average 0.5 kilometers, impacting only on downstream parts of the main agricultural areas. The shoreline was severely disrupted, eroded and covered with debris over long stretches of the coast. Sand and sediment washed from land has deposited in the nearshore area and this has particularly impacted on the reef lagoons. The waves in low-lying areas and along creeks and inlets penetrated up to 2 kilometers from the shoreline with severe impact. Among the coastal habitats being very important for fishery productivity, coral reefs and mangroves seem to have suffered at varying levels as a result of the tsunami. Rapid assessments[5] of inshore coral reefs in the southern and south-western coastal areas indicated that there is localized high intensity damage to reef structures on all of the reefs examined except the Rumassala Buona Vista reef (Galle District). Seven Special Area Management (SAM) sites were affected by the tsunami: Negombo, Lunawa, Maduganga, Hikkaduwa, Habaraduwa, Mawella and Kalametiya. In total 38 Protected Areas (PA), including sanctuaries, wetlands and National Parks were also affected.

The coral formations that are habitats and breeding grounds for some fish species were damaged by debris (wood, fishing nets, etc.). Although it can be assumed that there are impacts such as loss of breeding and nursery habitats of species such as parrot-fishes (*Scaridae*), snappers (*Lutjanidae*) and sweet-lips (*Haemulidae*), detailed coral reef damage assessments will be necessary for confirmation.

The cost of damages to coast protection structures such as groynes and revetments, beach parks, coastal habitats and coastal environment including the SAM sites has been assessed at US$32 million.

[5] Rapid Assessment of Damage to Coral Reefs in Sri Lanka, Interim Report No. 1, 20 January 2005 NARA,CORDIO/IUCN/GCRMN, SLSAC

Though some aquaculture was being practiced along the affected coast, little damage was reported. This included damage to small shrimp farms in Batticaloa district and lost assets of divers engaged in ornamental fish, chank and beche de mer collection in some districts. The total damage has been estimated at US$0.5 million.

Fisheries Institutions

Extensive damage was caused to the assets of the DFAR. These included buildings housing the offices of the Assistant Directors and the Fisheries Inspectors and Monitoring, Controlling and Surveillance (MCS) units along with their equipment, vehicles, documents and records.

The National Aquatic Resources Research and Development Agency's (NARA) head office suffered substantial damage to its research laboratories and facilities, computers, other equipment as well as data and records pertaining to over 20 years of research. The National Institute of Fisheries and Nautical Engineering (NIFNE) also suffered considerable damage to its training institutions and facilities, particularly at Batticaloa where the training institute was completely destroyed. Vital machinery and equipment, heavy plant equipment and vehicles including site buildings belonging to the Coast Conservation Department (CCD) suffered heavy damage and destruction. Replacement/repair of these is urgent for the Department to be able to continue with the much needed physical rehabilitation work in the affected areas of the coastal zone.

The estimated total cost of repair, replacement and reconstruction of the Departments and agencies under MFAR is in the order of US$10 million.

3.3 Impact of the tsunami

The Sri Lankan coast was one of the heaviest impacted areas by the tsunami and the ripple effect of the disaster throughout local and national economy is certainly significant. With an estimated total fishery population of over 0.5 million affected, further impacts will generate significant multiplier effects both

up stream through the supply of inputs and downstream through processing and marketing.

Severe damages to coastal communities were caused in twelve of the fourteen coastal districts of the country that cover over 80 percent of the total coastline. As marine fishing communities mostly live within 200 meters of the shore, few families have been unaffected by the disaster. Especially in the conflict-affected North and East, where fishing and agriculture were the main economic activities, coastal communities were hard hit by loss of lives, destruction of houses, destruction of fishing boats and gear, destruction of social and economic infrastructure, etc.

The immediate loss in direct fishing employment is estimated at 54,100 people. This is equivalent to over one third of the total of 152,000 active fishermen reported in the marine fishery statistics in 2004[6]. In addition, a substantial number of people who traditionally fish without boats (mostly lagoon fishermen) may also have lost employment due to disrupted fisheries and loss of gear. Thousands of fishermen who earn extra cash as farm laborers or who supplemented their incomes growing vegetables, fruit and spice trees have been additionally affected through a range of other secondary economic impacts including destroyed home gardens and lost paddy seed and fertilizer. Moreover, many fishing families also lost their savings kept in their houses and their other economic activities were interrupted which previously had contributed to their livelihood strategies. The Ministry of Fisheries and Aquatic Resources has assessed the total loss in fish production in 2005 due to destroyed/damaged boats and lost gear at 117,500 t (**Table 4** and **Appendix 4**). This does not take into consideration the loss in production due to other issues, such as: (i) non-availability of infrastructure facilities and support services such as fuel, ice, etc., for boats that were not affected by the tsunami; (ii) fishers unwilling to engage in fishing while their families remain displaced; and (iii) problems associated with marketing of fish in the

[6] The number of active fishermen in the worst tsunami-affected districts (Jaffna, Mullaitivu, Trincomalee, Batticaloa, Kalmunai, Hambantota, Galle, Matara and Kalutara) was 94,600 in 2004.

immediate aftermath of the tsunami, including reluctance of consumers to eat 'contaminated' fish.

When considered against the estimated fish catch of 287,000t in 2004, the estimated loss of 117,500t is equivalent to a reduction of 40 percent in 2005. With imports and exports in 2004 recording 67,000 t and 13,700 t respectively, and a mid-year national population of 19.4 million, the lost production would cause a drop in the per capita consumption of fish from 20.7 kg in 2004 to 14.7 kg in 2005, if not offset by reduced exports and/or increased imports of fish and fishery products.

The country's foreign exchange earnings from fish exports will be affected as a result of reduced availability of items such as ornamental fish, lobster, groupers, chank, beche de mer, etc. for export. Further the country has to spend more on fish imports to maintain the fish supply. Apart from this, consumers have been also affected by unavailability of sufficient fish for consumption and increase in fish prices due to competitive demand.

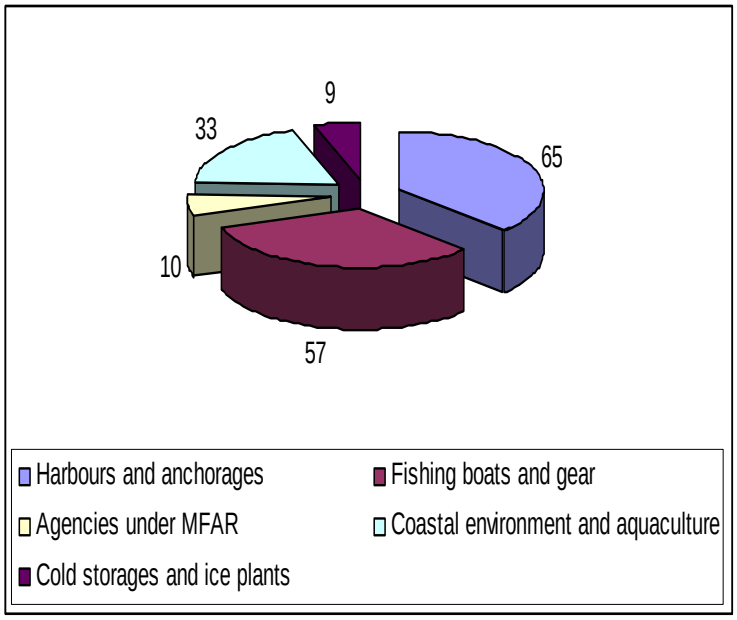
Table 4: Estimated Total Loss in Fish Production due to Tsunami

Estimated Loss in Fish Production 2005	**Tonnes**
Production Loss due to DS Boats	86 066
Production Loss due to DM Boats	25 323
Production Loss due to lost gear[7]	6 143
Total	**117 532**

DS – Destroyed
DM – Damaged

[7] The assumed loss in production due to lost gear takes into consideration the mean annual catch per unit effort (CPUE) in each boat category for previous years, as provided by the Statistical Unit/MFAR. No adjustment has been made for a possible increase in CPUE at lower level of fishing effort.

Figure 2: Estimated direct damages to the fisheries sector, including private assets (boats and gear), supporting infrastructure and coastal environment (in US $ m).



4. STRATEGY FOR RECONSTRUCTION AND DEVELOPMENT OF THE FISHERIES SECTOR

4.1 Key Guiding Principles

The strategy for reconstruction and development of the fisheries sector offers an opportunity for not merely restoring the fishing industry and protecting fishing communities and the industry from future disasters, but effecting necessary urgent improvements to create conditions for sustainable management and development of Sri Lanka's fisheries and coastal zones and to uplift the living conditions of fisher folk. Hence, employment generation, private sector development and poverty alleviation are major objectives in the reconstruction and development of the fisheries sector. This is

in line with the country's National Poverty Reduction Strategy and the Millennium Development Goals (MDGs) Strategy.

As the conflict areas in the northern and eastern provinces had already suffered from a long drawn out civil war, they were especially hard hit by the tsunami. The reconstruction and development programme provides an opportunity to place emphasis on rebuilding efforts guided by conflict sensitivity, community empowerment and transparency. Special attention should be given to private sector participation in the reconstruction and development processes.

The implementation of both the short-term and medium to long-term reconstruction and development programme of the fisheries sector should be guided by the following principles:

- **Provide the basis for sustainable management and development of the fisheries and aquaculture sectors:**

  ensuring that fishing capacity is commensurate with sustainable harvesting levels; controlling fishing capacity and establishing user/access rights to fishery resources; introducing environmentally sound aquaculture practices; adopting aquaculture technologies and practices that are appropriate to rural people; supporting the establishment of fishers and fish farmers associations

- **Ensure that reconstruction and development efforts are perceived by local communities as a right and addressed on a compassionate manner:**

  bringing in stakeholders; developing a common vision for rebuilding their livelihoods; building their capacity to respond and to make their own decisions; building confidence between actors in the process; and focusing on finding the best ways to deliver rehabilitation outcomes in partnership with the target groups irrespective of their political, religious, ethnic, or gender background.

- **Adopt a livelihood approach:**

focusing on restoring sustainable livelihoods; providing a broad and sustainable range of livelihood strategies, accessible to all members of the communities (especially to women, children and marginalized groups); developing and promoting the aquaculture sector as an additional and alternative source of income; strengthening the role of the private sector in the reconstruction and development process; and, being market-led and economically sustainable so as to ensure responsiveness to the reality of inputs and markets.

- **Adopt a coordinated and transparent approach:**

  preventing duplication or overlap in activities both short-term and long-term; encouraging local authorities to be directly engaged in the process; strengthening partnerships between governments, non-governmental organizations, and private enterprises; and, strengthening networks with international development partners to achieve information sharing, coordination as well as the undertaking of complementary or joint activities.

  Ensure that there is no discrimination ethnic, geographical or otherwise in regard to areas selected for reconstruction and development.

- **Promote the enhancement and conservation of coastal and aquatic resources through integrated and participatory management**

  supporting district-based planning and implementation procedures with the communities concerned playing the leading role; implementing comprehensive spatial analysis and integrated planning for coastal zones to reduce vulnerability to natural hazards; and, nesting fisheries and aquaculture reconstruction efforts within a multi-sectoral approach.

- **Ensure compliance with international and regional conventions, agreements and guidelines**

implement articles and provisions of the UN Convention on Law of the Sea, FAO Code of Conduct for Responsible Fisheries, UN Fish Stocks Agreement, Convention on International Trade in Endangered Species (CITES), FAO International Plans of Action (IPOAs) and others.

4.2 Overall Priorities and Phasing

The reconstruction and development programme of the fisheries sector should ensure not only that the sociological, physical and economic conditions in the affected areas are restored to pre-tsunami levels, but also that standards of living for coastal communities are improved in a sustained manner, thereby helping to reduce poverty. Given the limited nature of marine fisheries resources and their already high levels of exploitation, added wealth generation from the sector will depend on (i) judiciously managing fisheries and the associated critical coastal habitats and resources, (2) adding value to the fish that is harvested through product quality improvements, higher levels of processing and the avoidance of post harvest losses and (3) utilizing opportunities for expanding aquaculture. There is also the need to (4) diversify the economic base of a growing fisher population through the promotion of supplementary and alternative income opportunities. The overall strategic priorities are therefore the following:

1) Restoring private assets

- Build up assets of fishing communities and households
- Improve marketing infrastructures and processing facilities
- Introduce activities and technologies that generate supplementary and alternative income opportunities

2) Rebuilding and developing public goods

- Restore and improve fisheries infrastructure (e.g. harbours, anchorages and landing sites, etc.)
- Strengthen communities role in rebuilding activities and creating vision for development

- Restore and strengthen fisheries administration and support services
- Enhance sustainable fisheries and coastal areas

The phasing and duration of the fisheries sector reconstruction and development programme is shown in **Table 5**.

Table 5: Phasing and duration of the programme for reconstruction and development of the marine fisheries sector

Phase	Focus
1) Short-term Rehabilitation and Reconstruction from now up to two years: 2005 – 2006	1) Assist tsunami-affected communities to - rebuild their livelihood assets - re-establish their fishing activities - restart fish marketing, processing and distribution 2) Assess damages, impacts, rehabilitation needs, the recovery process, and reconstruction and development requirements including long-term fisheries management and coastal habitat protection 3) Rehabilitate fishery harbours, anchorages, landing sites and essential coast protection structures 4) Rehabilitate essential institutional support facilities and services and strengthen government capacities to plan, implement and coordinate reconstruction and development efforts

2) Medium to Long-term Development up to five years: 2005 - 2009	1) Reconstruction and development of the fisheries sector by - modernizing the fishing fleet - strengthen fisheries support services - raise levels of productivity and minimize losses 2) Sustained environmental protection of coastal areas and ecosystems to - raise standards of living - reduce vulnerability against natural disasters 3) Continued strengthening of government capacities to implement and coordinate reconstruction and development efforts and undertake research and training

4.3 Short-term

The short-term rehabilitation and reconstruction programme will build upon and complement ongoing humanitarian and recovery work that started in January 2005. It attempts to ensure that reconstruction process are guided by the local needs and priorities as identified in the assessments.

There are rehabilitation and reconstruction activities that are needed urgently at the village level (including repairing damaged village roads, clearing of beaches from debris, cleaning up of drainage canals, planting mangroves, etc.). These works should commence as early as possible to provide immediate local wage labor employment opportunities.

In community development programmes for *'Building back Better'*, infrastructure facilities to be provided should include facilities for women's participation in economic activities, provision of basic facilities such as water, electricity, communication, health, etc; community recreational facilities, libraries, pre-schools and vocational training centers, warning systems including public access corridors and roads for quick evacuation at times of future natural disasters. Mechanisms need to be put in place to ensure community participation in the planning and implementation of the rehabilitation and reconstruction activities and to provide optimum employment opportunities for the affected communities.

1) Repair and replacement of damaged and destroyed fishing craft and gear

The short-term reconstruction programme gives priority to repairing damaged craft while aiming also at the replacement of destroyed boats and/or outboard motors as well as lost fishing gear in order to enable fishers to resume fishing as soon as possible. However, boat replacements shall not be allowed to lead to an uncontrolled intensification of fishing effort and worsening resources overexploitation, particularly in coastal fisheries. District level coordination and information exchange between the suppliers of boats and fisheries officials shall be promoted to ensure that the pre-tsunami number of vessels will not be exceeded. Boat replacement programmes will be handled by a single agency and replacement of boats will be subject to entitlement certificates that have been issued to fishermen who lost their boats. Boat registration and the issue of fishing operations licenses shall be reviewed and revised to ensure that livelihoods of genuine fishers are protected. While ensuring that the needs are met with the utilization of the existing capabilities to complete urgently needed boat repair and replacement work, the setting up of new boat manufacturing facilities will not be encouraged so as to avoid over-capacities that might fuel unnecessary boat production in future years.

In order to satisfy essential safety standards for new boats, the present boat building practices and standards shall be reviewed and minimum standards for design and construction

shall be introduced. In this context the institutional arrangements and expertise required for approval of boat designs and specifications, as well as for monitoring and quality control during the construction phase, need to be strengthened.

Provision of fishing gear will be in accordance with existing regulations and fishing gear providers will be discouraged from delivering nets and other fishing gear that are harmful to the resource and/or environment. Although there is need to fully replace the fishing gear lost in many of the boats that were totally destroyed, there are no detailed inventories on these or for the loss of fishing gear in boats that were partially damaged[8]. However, there are strong indications that not all damaged or even destroyed boats had lost all fishing gear. An estimate of the cost of replacing lost fishing gear has been based on the assumption that all boats destroyed and damaged would be provided with one type of fishing gear. Gillnet fishing is the dominant fishing method in both coastal and offshore fisheries. Details regarding the amount of fishing gear required for different craft categories and the costs are shown in **Appendix 7**.

Adequate facilities need also to be provided on the beach for the safe storage of fishing craft, outboard engines and gear in view of the coastal buffer zone within which the fishermen are discouraged to reside.

2) Re-establish private fish retail outlets and municipal fish markets

The tsunami has severely affected the fish retailing network and the employment of thousands of people directly or indirectly engaged in this sub-sector. Hence, it is important to rebuild and rehabilitate the facilities affected and to provide financial, technical and logistical support as appropriate to the

[8] No data are available on the type and total amount of gear carried by the different boat types. While fishing boats generally carry more than one type of gear, the number of gear of a particular type vary even between boats of the same category and is determined largely by the economic status of the boat owner.

large numbers of small fish stalls, bicycle and motorcycle fish vendors and other private traders to re-establish themselves in business. In the rehabilitation and improvement of the fish marketing network, it is imperative that minimum hygienic requirements are met to ensure food safety and to improve food quality. With respect to fish transport and temporary storage, the use of unhygienic wooden boxes will be replaced by suitable containers such as durable plastic boxes. Proper distribution of new ice plants and temporary ice storage facilities is essential, with due consideration to high production areas. Assurance of adequate supplies of ice for fish preservation, at least to the level prevalent at 2004, is indispensable, as are other measures and facilities that can contribute to improved post-harvest practices and fish quality. These include, for example, better access roads from landing places to the main road, especially along the East coast, and provision of drinking water of minimum standards for making ice.

Priority should be given to the re-establishment of the large urban fish markets which are the key fish buying points for urban consumers. There is an urgent need to re-establish the three fish market areas at Galle, Matara and Hambantota which were completely destroyed. Many privately owned, as well as CFC operated retail outlets in the tsunami affected coastal belt have been severely damaged or completely dislodged while most are out of operation. In the case of reconstruction of privately owned fish retail outlets and the network of cycle/motor-cycle vendors, support by way of grants, debt relief or new loans at favorable conditions for acquiring assets and restarting their business activities should be considered. For re-establishing facilities at the same location/locations the government's declarations of a buffer zone and similar restrictions established by some municipal authorities have to be considered.

3) Re-establish fish landing facilities at fishery harbours, anchorages and landing sites

Varying degrees of damages were caused by the tsunami to most of the fish receiving/auction halls[9] at 10 fishery harbours, 37 anchorages and several fish landing sites. A list of the damaged harbours and anchorages is given in **Annex 8**. In some locations the facilities sustained severe damages and destruction. As a result of tsunami damages, most of the auction halls are in a state of disrepair and disuse and need timely rehabilitation. It is recommended that in the short-term phase the basic facilities such as water supply, fuel, ice and drainage are re-established with necessary repairs to roofs and floor areas, fish storage boxes, weighing machinery as appropriate. In this context, it is important to make necessary changes and improvements to the layout of the halls to ensure proper usage of the facility for hygienic handling of fish and to minimize post harvest losses. Suggestions for improving hygienic standards in auction halls include the following:

- extension of the auction hall (width-wise) to facilitate landing of fish from the boats directly on to the auction hall, where feasible;
- extension of the hall (length-wise) to facilitate more boats to unload fish at a given time directly to the auction hall;
- where feasible, raise the floor of the auction hall to enable easy unloading of the fish from the boats and loading of fish on to trucks;
- supervision and direction by harbour management to ensure compliance with proper sanitation/hygiene guidelines by auction hall users.

It should be the responsibility of harbour management to ensure an adequate supply of drinking water or clean sea water and ice and to provide ice and/or chilled fish storage facilities and maintenance of the general cleanliness of the environs.

[9] The facilities, commonly known as “Auction halls”, are used for a variety of activities; washing, dressing, repacking, icing and holding containers for chilled fish.

Wet fish is the most popular form preferred by the consumer in Sri Lanka. The transport and fish distribution system is reasonably good with fish on ice reaching the main fish markets in Colombo and other cities from the north and south within a few hours. However, there is still a need for more and better chill-storage facilities.

To ensure equity and cost effectiveness, formulation of a master plan for fishing harbours, anchorages and landing sites will be accorded high priority.

Establishment of adequate public access to the beach has been identified as an urgent need, the lack of which hampered evacuation of people from the beaches during the tsunami. While there is a need to relocate man-made infrastructure (hotels, residences) located in the no-build reservations and other highly sensitive areas, 'reconstruction/development' activities within the sensitive coastal reservation areas including low lying beaches will be regulated under the framework of the Coastal Zone Management Plan.

4) Re-establishment of essential institutional support services and facilities

Some of the damaged infrastructure of government support services and agencies (**Appendix 3**) needs to be quickly restored as it is essential to assist in implementation and monitoring of the reconstruction and development process. This includes the reconstruction and re-equipping of district fisheries offices and area office stores, the restoration of laboratories for water quality testing, repair and/or replacement of research and surveillance vessels (NARA), scientific equipment and radio communication systems, and training vessels and demonstration equipment (NIFNE). The repair and replacement of damaged offices and equipment of co-operatives and DFAR field offices needs to be tackled urgently in order to ensure adequate capacities for local-level coordination of reconstruction efforts. In addition, these facilities will need to be improved to strengthen local-level capacities, not only for fisheries management (e.g. vessel registration; catch monitoring; surveillance; etc.), but also in

other areas such as prediction and early warning systems and management of ocean related disasters.

Required facilities need to be provided at the earliest time to resume the continuous assessment of coastal pelagic, demersal and crustacean stocks in order to determine the impact of the tsunami on such resources and to establish baselines for future monitoring. In order to protect livelihoods of fishers and increase their earnings, research and development activities will be directed towards diversification of fisheries harvest to under-exploited resources, the promotion of increased participation of women in fisheries activities, promotion of income generating activities and improved fish processing and marketing. It is also recognized that the early rehabilitation and management of coastal habitats is vital to the resumption and sustainability of the fishing industry.

5) Capacity building in support of district-level planning and implementation

District offices of DFAR will have a pivotal role in the programme. They will have to streamline their operating procedures, including effective communications, capacity building and support systems. The responsibilities of local administration under the programme would include:

- Organizing consultative meetings and detailing procedures for prioritizing, planning, implementing and coordinating reconstruction and development programmes with fishing communities;
- Strengthening fisheries co-operatives, societies and other local organizations
- Providing assistance in project planning and implementation;
- Improving communications systems, including television and radio broadcasting, video and printed material;
- Coordinating improvements to access roads, fish market infrastructures, potable water supplies and other amenities;

- Ensuring training that includes disaster warning, management systems and practices in coastal areas.
- Ensuring efficient credit operations for programme beneficiaries, particularly women, to undertake family supplemental income activities; and
- Ensuring programme monitoring and impact assessment.

To achieve this, the facilities, capabilities and services of DFAR and CCD personnel at district levels will be further strengthened to allow them to play a pro-active and supporting role.

An institutional needs assessment will be carried out at DFAR and other agencies such as CCD, NARA and NIFNE, followed by the development of long term capacity building and training programmes.

6) Sustainable fisheries management

Sri Lanka has a long history of heavy investment in shore-based fisheries infrastructure (including harbours, landing sites and boats), but catches per unit effort have been modest as fishery resources (especially inshore) have been excessively exploited. To overcome this situation, a closer analysis is needed of what would be the maximum sustainable yields of the main commercial species, the ideal fleet size and composition, and the required institutional arrangements, facilities and human capacities for fisheries management at national, provincial and district levels. Existing arrangements need to be improved upon, in areas such as fish catch monitoring, licensing and regulating fishing crafts, use of fishing gear, surveillance of both the exclusive fishing zones and the boundaries of fishing areas under jurisdiction of local governments.

It has to be considered that regulatory mechanisms for controlling fishing efforts may also result in increased benefits to one group while another group is subject to economic loss and the consequent negative social impacts. In addition, both short- and long-term benefits need to be considered. Restrictive regulations in the short-term could result in long-

term increased economic benefits; but short-term social and economic hardships that occur need to be immediately addressed and not dismissed because of possible long-term gains. It must be recognized that cumulative impacts, uncertainty in predicting future behavior or resource conditions, and other unforeseen events can reduce or negate long-term benefits, or even result in unexpected benefits. Good data collection and analysis of the fisheries including fish stocks, economic analysis, etc. are therefore of primary importance for improved fisheries management.

In order to introduce effective approaches for sustainable fisheries management it will be crucial to identify needs for building capacities at DFAR on all levels (national, district and sub-district) as well as among support agencies like NARA, NIFNE, CCD and CFHC. There is also the need for awareness creation at all levels including among policy-makers, political leaders, Fisheries Cooperative Societies, CBOs and fisheries officers at all levels.

7) Institutional strengthening

In order to implement the planned reconstruction and development programmes as well as to achieve competent technological standards necessary to meet modern demands in fisheries trade, research, training, etc., some of the Ministry's agencies in the sector need strengthening in terms of capacity building and provision of state of the art technology and related facilities as well as overall programme monitoring.

There is an urgent need to rehabilitate the quality control laboratory at NARA to assist the Fishery Products Quality Control Unit of DFAR and the fast growing export trade in shrimp and tuna to meet the rigorous standards in US (Country of Origin Labeling) and the mandatory traceability and labeling requirements of the EU market. Fishery planners, policy makers, fishers, fish traders, exporters, etc., may also benefit immensely by the establishment of a trade and market information system incorporating basic fisheries data.

The oceanographic and bathymetric investigations conducted by NARA have come to a complete halt with the damage to the oceanographic vessel “Sayuri”. In addition to repair and/or replacement of this vessel, laboratories and scientific equipment damaged or destroyed needs to be repaired or replaced at the earliest opportunity for the agency to resume its regular research programme, and also to undertake special investigations to assess impact of the tsunami on resources and environment. NIFNE suffered complete destruction of its fisheries training institute in Batticaloa, which needs to be re-established to meet the training requirements of the fishers in the district.

The capacity of the CCD as the state organization mandated with the responsibility of managing the coastal zone should be strengthened to undertake reconstruction activities by urgently replacing its lost or damaged equipment and machinery.

Over the years, agencies such as NARA, CCD, NIFNE and DFAR suffered loss of trained and experienced staff through retirement and/or resignations while recruitments were minimal. Capacity building, including training has become very important for these agencies to recover from the tsunami and also to fulfill their mandates. At the district level, the institutional capacities of DFAR and CCD need to be strengthened to efficiently implement and monitor fisheries management and coastal area management projects.

Cost estimates

The short-term reconstruction phase/programme as outlined above has an estimated cost of **LKR 7.84 billion (or US$ 78.43 million)**. The cost estimates for the specific activities are summarized in **Table 6**. All calculations are based on the assessments made for repair and replacement of damaged and destroyed private assets and fisheries supporting infrastructure that are given in **Appendixes 5- 8**. **Appendix 9** provides a detailed collation of single sub-activities and their estimated costs; they are meant to serve as a tool, to assist in further discussions on appropriate coordination of activities.

Table 6: Summary of cost estimates for short-term rehabilitation priority activities

Programme Activity	Year and cost (LKR million) *- if applicable -*		
	2005	**2006**	**Total**
Repair and Replacement of Fishing Craft and Gear	3043	2641	5 684
Re-establish private fish retail outlets and municipal fish markets	10	44	54
Re-establish the Fish Landing Facilities at Fishery Harbours, Anchorages and Landing Sites	10	21	31
Rehabilitate damaged coast protection structures and coastal habitats	40	900	940
Re-establish essential institutional support Services and Facilities		822	822
Capacity building in support of district-level planning and implementation		128	128
Promotion of sustainable fisheries management		141	141
Institutional strengthening		43	43
Total	**3 103**	**4 740**	**7 843**

4.4 Medium / Long-term

In addition to continuing short-term reconstruction activities, the medium to long-term development programme will focus on improving livelihoods of fishing communities beyond the pre-tsunami levels by promoting economic diversification and sustainable utilization and management of coastal resources. The assistance will tackle needs for fisheries co-management, the protection of the marine environment, construction and

modernization of public fisheries infrastructure, and strengthening of government capacity at various levels. It is envisaged that this phase will be completed in 2009.

However, some of the medium- and long-term activities should commence during the short-term phase.

1) Strengthening communities and their productive activities

In addition to the replacement of damaged private assets coastal communities need to be assisted in bringing about necessary urgent improvements to ensure catch-up in the growth and sustainable long-term development of the sector as a whole. This is of paramount importance if the tsunami shattered industry is to re-establish itself in a well-structured manner and contribute towards national development and socio-economic upliftment. As the scope for further increases in marine catches is limited, the focus has to be in the following areas:

- value addition through improved onboard and onshore post-harvest practices and fish processing;
- increased profitability of the fish harvesting sector through effective fisheries management that prevents economic waste due to fleet overcapacities and redundant fishing effort
- better designs for multi-day boats (including 3 ½ t boats) that allow for better operational efficiency and product quality, and greater safety at sea
- prevention of over-fishing, restoration of fish stocks and protection of critical fish habitats
- promotion of economic diversification in areas such as aquaculture development and tourism-related services

Fisheries cooperatives will be strengthened through provision of facilities and training in order to enhance their capabilities, particularly in encouraging introduction and promotion of alternative income generating activities. This will include civil works and essential equipment for improving and developing offices and fish handling facilities. It will also include skills development, transfer of appropriate technology, and credit

schemes. The programme to help fishing communities and cooperatives' staff to improve their technical and organizational skills and access to credit would give priority to women and would be organized through the DFAR and agreements with competent NGOs and other private organizations.

Specific training provided to coastal communities would promote value-added fish products and better handling and processing of fish and the utilization of fish waste to prepare marketable products such as poultry feed, handy craft, etc., particularly by women's groups. It is important to highlight that simple post harvest operations such as washing with clean water, cleaning the products from extraneous matter, size/quality grading, icing and appropriate packing can add value to the products, enabling the processors to demand a better price for their produce. Often, processed products are purchased in bulk by the traders and export-processors that reprocess, grade and repack the products prior to marketing and export. Improving the quality of the processed products not only enables the processors to demand a premium price, but also could open up avenues for direct domestic marketing and export of the products.

Prior to the disaster very little aquaculture was being practiced along the coast and it is assumed that there is potential for expanding brackish water and marine aquaculture activities. Considering the yet untapped areas with aquaculture potential, especially along the east coast of the country, Sri Lanka has good potential to benefit from expansion of aquaculture product exports.

For the purpose of strengthening coastal communities, interaction of their community organizations with humanitarian and technical NGOs as well as commercial private sector companies will be promoted to enable them to play important and complementary roles to MFAR. In particular, they could provide valuable support for important aspects of the medium to long-term development programme, including helping to mobilize communities and the formation of voluntary groups, e.g. fishing families at the village level, cooperatives, interest

groups, youth groups, women's groups, and disadvantaged groups, such as the disabled, widowed and orphans. They would also assist the government in organizing community surveys and assisting them to specify and plan priority activities. Assisting in the settlement of persons within and outside the 100m zone in conformity with the government policy will be an important area of community involvement.

2) Reconstruction and modernization of anchorages and fishery harbours

The Ceylon Fishery Harbours Corporation has prepared a detailed list and cost estimate for re-establishing 37 anchorages and rebuilding of 10 fishery harbours. The details of these requirements are summarized in **Appendix 8**. The reconstruction of anchorages and associated facilities (net mending and auction halls, cooperative's buildings, sanitary facilities, water supply and electricity) is considered as a priority activity that falls under the medium-term reconstruction process to allow for modernization of these structures while at the same time revitalizing key structures for marketing. A master plan for the reconstruction of anchorages and landing facilities will be developed and implemented with the fishing communities. The management of anchorages should ideally be handed over to the local administration, i.e. the Pradeshiya Sabhas. The reconstruction of harbours and their physical infrastructure will stretch over several years with CFHC as the responsible government entity. Several donors have already taken on responsibility for the repair of damaged harbours. Each contractor shall be required to prepare a master plan for repairing the harbour which will also include necessary improvements to breakwaters, floating docks, waste water processing facilities and community facilities. A strategy for improving the management of fishery harbours needs to be explored, in particular through exploring public-private partnerships.

3) Sustainable fisheries management

Whereas during the short-term phase the focus will have been on awareness creation and the avoidance of inadvertently re-building an excessive fleet size, the medium and long-term activities will focus on the strengthening of appropriate institutional structures and capacities for routine fisheries management including vessel registration, fishing licensing and community-based management systems. Current monitoring, control and surveillance (MCS) initiatives are considered ineffective. In addition to replacing lost assets, there is an urgent need to strengthen and expand MCS capabilities through the provision of more patrol boats and other equipment and infrastructure facilities, and upgrading of manpower skills, etc.

High priority will be accorded for a rapid assessment of fish resources after the tsunami and to the proposed comprehensive fish resources survey to be funded by Swedish International Development Cooperation (SIDA) and Norwegian Agency for International Development (NORAD). This survey is expected to generate information regarding maximum sustainable yields of the main commercial stocks on a district/regional basis. A comprehensive evaluation of fishing practices in each district will be carried out so that management needs/strategies can then be determined on the basis of the findings of the resources survey.

To reduce resource waste and to minimize pressure on fishery resources, priority will also be given to the introduction of technologies aiming at reduction of post harvest losses through improved onboard and onshore handling practices as well as through development of value-added products also from under-utilized fish species and discards from the fish filleting industry.

Participatory fisheries management, involving fishers and the major stakeholders shall be promoted for coastal fish resources and/or areas. Fisheries management plans, with clear objectives and responsibilities for stakeholders need to be developed for each of the managed fisheries. In the case

of the offshore fishery, such participatory management needs to be through a management plan developed for the whole country that would also be compatible with the regional management needs.

5) Sustainable coastal area management

Many natural coastal habitats such as mature sand dunes, mangrove belts, coral and sandstones reefs, undisturbed by human activity, had been able to function as effective barriers to reduce the tsunami effect. Participation of coastal communities will be enlisted to protect these coastal habitats from destructive human activity. Awareness creation programmes need to be implemented, targeting different stakeholder groups such as fisher communities, other coastal communities, school children, local authorities, etc.

CCD has identified a number of critical sites to be managed under Special Area Management (SAM) plans, with the active participation of coastal communities and other stakeholders. Assistance is needed to initiate the SAM process in 65 identified sites. In addition, support needs to be provided for coastal zone research, in areas such as risk and vulnerability assessment, shoreline planning, etc.

A complete survey of the coastal areas of the east coast shall be undertaken for identification of potential sites for future development of aquaculture.

6) Capacity building in support of planning and implementation

Activities will build on and complement ongoing work that started during the short-term phase. The building up of the mid-level cadres of the MFAR and the DFAR is also a high priority. At the district level, officers of DFAR, CCD and other fisheries agencies need to be supported with logistics, transport and communication facilities. In addition, provincial fisheries officers as well as fisheries corporative organizations will also be strengthened. Due emphasis will be placed on more effective use of communication systems and dissemination of information at the district level.

Cost estimates

The medium to long-term reconstruction phase/programme as outlined above has an estimated cost of **LKR 8.89 billion (US$ 88.85 million)**. The cost estimates for the specific activities as outlined above are summarized in **Table 7**. **Appendix 9** provides a detailed collation of single sub-activities and their estimated costs; they are meant to serve as a tool, to assist in further discussions on appropriate coordination of activities. The cost estimates will be regularly updated during programme implementation.

Table 7: Summary of cost estimates for medium to long-term development

Programme Activity	Year and cost (LKR million) *- if applicable -*			
	2007	**2008**	**2009**	**Total (preliminary)**
Strengthening communities and their productive activities	96	228	91	415
Reconstruction and modernization of fishery harbours and anchorages	1 827	1 450	420	3 697
Sustainable coastal area management	1 000	1 000	560	2 560

Sustainable fisheries management (cont. from short-term programme)	146	113	-	259
Sustainable fisheries management (cont. from short-term programme)	146	113	-	259
Capacity building in support of planning and implementation (cont. from short-term programme)	218	218	118	554
Re-establish private fish retail outlets and municipal fish markets (cont. from short-term programme)	663	360	10	1 033
Re-establish the fish landing facilities at anchorages and landing sites (cont. from short-term programme)	174	82	61	317
Institutional strengthening (cntd. from short term programme)	41	6	3	50
Total	**4 165**	**3 457**	**1 263**	**8 885**

5 IMPLEMENTATION

Overall Coordination

The implementation of the *Strategy and Programme for Post-Tsunami Reconstruction and Development of the Marine Fisheries Sector* will involve all relevant government agencies, the private sector, civil society and non-governmental organizations, with active participation of the affected people and the support of international partners. For smooth

implementation, effective coordination will be required for channelling of official and private funds for reconstruction and development of the fisheries sector. Improved communication among the various agencies will be critical as will be the establishment of an efficient information system and effective monitoring and evaluation mechanisms. The reconstruction and development programme needs to follow a results-based log frame.

Foreign assistance funds for reconstruction and development are often managed by the donor agencies in accordance with their specific procedural and accounting requirements. Therefore, it will be crucial to guide them in designing and implementing specific projects and/or sub-programmes that will address the activities, both short-term and long-term as presented within this programme in order to avoid redundancies and mal-investments especially in respect to the reconstruction of the fishing fleet. Efforts will be made to streamline financing procedures where possible to minimize administrative burdens.

Implementing Structure

As the responsible line ministry, MFAR will provide leadership and coordination for the *Strategy and Programme for the Post-Tsunami Reconstruction and Development of the Marine Fisheries Sector*. Since the overall objective of the programme is to facilitate and coordinate the inflow of donor assistance for the affected fisheries sector of the country, MFAR in cooperation with other government ministries and central authorities will guide the international community in designing and implementing specific projects and/or sub-programmes that will address the activities, both short-term and long-term as presented within this strategy.

MFAR will establish a central Progamme Coordinating Unit (PCU) whose tasks will include the following:

- Needs assessment and update
- Reconciliation of the current assessment estimates
- Liaison with other government ministries, central authorities and donor agencies for the identification,

development and implementation of reconstruction and development projects/sub-programmes;

- Formulation of more detailed profiles for specific needs and proposed activities
- Setting up a programme monitoring information system at both the district and national levels in order to ensure that the programme stays on course, is timely and results-oriented
- Establishment of project monitoring and evaluation guidelines
- Convening of regular consultations with districts and communities on programme progress and on ways to improve its implementation

The Programme Coordinating Unit will be supported, as needed, by the entities having a mandate in the development and management of fisheries, aquaculture and coastal resources, namely the following:

- Department of Fisheries and Aquatic Resources (DFAR)
- Department of Coast Conservation (CCD)
- National Aquatic Resources Research and Development Agency (NARA)
- National Aquaculture Development Authority (NAQDA)
- National Institute of Fisheries and Nautical Engineering (NIFNE)
- Ceylon Fisheries Corporation (CFC)
- Ceylon Fishery Harbours Corporation (CFHC)
- Cey-Nor Foundation Ltd.

Appendixes

Appendix 1: Fishing Craft and Major Gear in Sri Lanka's Marine Fisheries

a. Fishing Craft

Non-motorized traditional craft
1) Log rafts ("*teppam*" on the north west coast and "*kattumaram*" on the northern coasts), 3-5m length, propelled by oars and operated within 2-3 kilometers from the shore.
2) Outrigger canoes ("*oru*" on the southern and western coasts, or "*thoni*" or "*vallam*" largely on the northern and eastern coasts), 3-11metres dug out hull with an outrigger attached by a pair of arms and single hull canoes ("*vallams*") of 7-12 meters length. While many log rafts are now being made of FRP, almost all outrigger canoes and "*vallams*" are made of FRP.

Motorized traditional craft
Traditional crafts (Outrigger canoes and Log rafts) propelled by 8-15Hp Out Board Motor engines.

Fibreglass Reinforced Plastic (FRP) boats
6-7m open deck, flat bottom boats made out of FRP and propelled by 8-30Hp kerosene Out Board Motor engines. The clinker type (round bottom type) of FRP boats developed by CEYNOR is popular in north, north east and east. Some of the 19ft FRP boats in the east are also used for beach seine fishing.

3 ½ ton boats
3.5 GT, 9m boats made of FRP and powered by 30 Hp inboard engines, manned by 3-4 fishers. These boats normally carry out single day fishing activities.

Offshore multi-day boats
Ranging from 34 – 50 ft in length, made of FRP and powered by 40-220 Hp inboard engines. Manned by 4-5 fishers and having crew accommodation, with built-in insulated fish holds,

navigation and communication equipment etc. for offshore fishing. Facilities to carry large quantities of water and fuel allow fishing trips of 7 to 20 days.

Beach seine craft
Large (10 –12m), flat-bottomed, planked craft; propelled by oars and used exclusively in the beach seine fishery. Many of these traditional crafts have now been replaced by round bottom FRP traditional craft "*vallams*" of 10-12m length.

b. Fishing Gear

Net fishing	**Craft type**
Gillnetting for anchovy in NW, W, E and NE	Traditional craft and FRP boats
Gillnetting for sardines in all areas	Traditional craft and FRP boats
Gillnet fishing for Indian mackerel in all areas	Traditional craft and FRP boats
Gillnet fishing for flying fish in NW, W, E, NE and S	FRP boats, 3 ½ t boats and multi-day boats
Gillnet fishing for smaller tuna in all areas	FRP boats, 3 ½ t boats
Gillnet fishing for tuna (skipjack, yellow fin) in all areas except N.	FRP boats, 3 ½ t boats and multi-day boats
Trammel net fishing for shrimp in NW, W, S, SE and N	Traditional craft and FRP boats and 3 ½ t boats
Bottom set gillnets for finfish and skates in all areas	Traditional craft and FRP boats and 3 ½ t boats
Bottom set gillnets for lobster in S, SE	FRP boats
Line fishing	**Craft type**
Hand line fishing for demersal fish in all areas	Traditional craft and FRP boats and 3 ½ t

	boats
Bottom longline for finfish in all areas	Traditional craft and FRP boats and 3 ½ t boats
Troll fishing for smaller tuna with in S, SW, E and NW	FRP boats and 3 ½ t boats
Drift longline for sharks in all areas except N	3 ½ t boats & multi-day boats
Tuna longline in W, E, NE, NW, S and SW	FRP boats, 3 ½ t boats & multi-day boats
Surrounding net fishing	**Craft type**
Beach seine fishing in all areas	Beach seine craft
Ring net for frigate tuna in S, SW and E	Traditional craft and 3 ½ t boats
Ring net for Russel's scad in S, SW, NW, E and NE	Multi-day boats
Drag net fishing	**Craft type**
Shrimp trawling in N, NW and W	Traditional crafts and 3 ½ t boats

Appendix 2: Estimate of Damaged and Destroyed Fishing Boats by District

District	No. of vessels		Multi-day boats		3 ½ t Day boats		6-7m FRP boats		Traditional crafts		Beach seine	
	Before Tsunami[1]	Affected by Tsunami[2]	Des.	Dam.	Des.	Dam.	Des.	Dam.	Des.	Dam.	Des.	Dam.
Ampara (Kalmunai)	1 754	2 592	01	01	43	196	358	94	1 479	256	110	54
Batticaloa	3, 070	3 385	0	0	04	278	494	189	2 107	264	119	0
Colombo	467	344	0	14	02	09	05	102	45	144	12	11
Galle	1 221	1 478	61	98	58	28	173	149	549	286	63	13
Gampaha	3 198	472	05	85	05	36	14	124	50	153	0	0
Hambantota	1 841	1 890	54	112	44	34	387	216	649	334	39	21
Jaffna	3 927	3 100	0	0	41	47	887	694	1 318	0	64	49
Kalutara	1 075	798	24	62	07	17	47	137	301	165	26	12
Kilinochchi	737	186	0	0	0	0	0	0	168	18	0	0
Mannar	2 064	11	01	0	0	0	0	08	03	0	0	0
Matara	1 563	1 878	30	211	70	106	156	283	507	505	09	01
Mullaitivu	906	2 140	0	0	0	0	848	0	936	0	356	0
Puttalam	7 007	246	09	75	0	05	14	76	12	55	0	0

(Chilaw)												
Trincomale e	2 833	5 594	02	18	02	27	109 7	1139	3 034	255	20	0
Total	**31 663**	**24 114**	**187**	**676**	**276**	**783**	**4 480**	**3211**	**11 158**	**2 435**	**818**	**161**

Abbreviations and Notes:

FRP – Fiber Glass Reinforced Plastic
DS – Destroyed
DM – Damaged

[1] Source- Statistical Unit / MFAR
[2] In some districts the number affected is higher than the number before the tsunami due to:

- Boats fishing in estuaries and destroyed by the tsunami in some districts, which were not included in the marine fishing fleet earlier, have been counted
- Traditional crafts that were used as service boats for large boats at anchorages and destroyed by the tsunami have also been counted
- Many traditional crafts were not registered, providing opportunities for fishers to have even their old, discarded crafts also counted as affected by the tsunami
- All non-registered crafts may not have been counted under operating crafts at the beginning of the year
- Difficulty in getting reliable data and data validation from un-cleared areas in some districts

Appendix 3: Estimate of Damages to Institutions Connected to Fisheries

Institution*	Damage	Damage Estimate (1 000 US$)
National Aquatic Resources and Research Agency (NARA)	- Repairs to damaged buildings and equipment (fisheries museum, laboratories, auditorium and stores, excluding damages to Hydrographic Survey Boats)	3 840
Coast Conservation Department (CCD)	- Coast protection and conservation structures; heavy vehicles, etc.	3 550
Department of Fisheries and Aquatic Resources (DFAR)	- Repairs to buildings - Replacement and/or repairs to equipment and radio communication system - Replacement of the surveillance boat	1 500
National Institute of Fisheries and Nautical Engineering	- Repairs to buildings - Repairs to training boats and demonstration equipment	890
Total	**-**	**9 780**

* Institutions not included: Ceylon Fisheries Corporation and Ceylon Fishery Harbours Corporation (CFHC)

Appendix 4 – Estimate of Lost Fish Production in 2005 due to Tsunami Damaged/Destroyed Boats

Boat type	Mean annual production per boat (t) [1]	No. of Boats DS	No. of Boats DM	Production lost (t) due to DS Boats	Production lost (t) due to DM Boats
Offshore multi-day boats	62.4	187	676	11 669	10 546
3 ½ ton Day boats	21.8	276	783	6 017	4 267
6-7m FRP boats	10.2	4 480	3 211	45 696	8 188
Motorized Traditional crafts	5.2	-	-	-	-
Non-motorized Traditional crafts	1.5	11 158	2 435	8 369	913
Beach seine crafts	35.0	818	161	14 315	1 409
Total		**16 919**	**7 266**	**86 066**	**25 323**

Abbreviations and Notes:
[1] Source: Statistical Unit / MFAR
FRP – Fiber Glass Reinforced Plastic
DS – Destroyed
DM – Damaged
"-" not available

Appendix 5 – Estimated cost of repairs to damaged fishing fleet

District	Multi-day Boats		3 ½ t Day boats		6-7m FRP boats		Traditional crafts		Beach seine crafts	
	No. of Boats DM	**Repair cost (LKR Million**)	No. of Boats DM	**Repair cost (LKR Million)**	No. of Boats DM	**Repair cost (LKR Million**)	No. of Boats DM	**Repair cost (LKR Million)**	No. of Boats DM	Repair cost (LKR Million)
Ampara (Kalmunai)	1	00.60	196	52.92	94	04.23	256	01.54	54	01.94
Batticaloa	0	0	278	75.06	189	08.51	264	01.58	0	0
Colombo	14	08.40	9	02.43	102	04.59	144	00.86	11	00.40
Galle	98	58.80	28	07.56	149	06.71	286	01.72	13	00.47
Gampaha (Negombo)	85	58.8	36	09.72	124	05.58	153	00.92	0	0
Hambantota	112	67.20	34	09.18	216	09.72	334	02.00	21	00.76
Jaffna	0	0	47	12.69	694	31.23	0	0	49	01.76
Kalutara	62	37.20	17	04.59	137	06.17	165	01.00	12	00.43
Kilinochchi	0	0	0	0	0	0	18	00.11	0	0
Mannar	0	0	0	0	8	00.36	0	0	0	0
Matara	211	126.60	106	28.62	283	12.74	505	03.03	1	00.04
Mullaitivu	0	0	0	0	0	0	0	0	0	0

Puttalam	75	45.00	5	0	76	03.42	55	00.33	0	0
Trincomalee	18	10.80	27	7.29	1139	51.26	255	01.53	0	0
Total	**676**	**413.4**	**783**	**210.06**	**3211**	**144.52**	**2435**	**14.62**	**161**	**5.8**

Abbreviations and Notes:
Source: Statistical Unit / MFAR
FRP – Fiber Glass Reinforced Plastic
DM – Damaged

Estimated Cost of repairs to damaged boats are based on the following assumptions:

Cost of Repairs of a damaged boat (LKR)			
Boat type	**Hull**	**Engine**	**Total**
Multi-day boat	300 000	300 000	600 000
3 ½ t boats	120 000	150 000	270 000
FRP boat	20 000	25 000	45 000
Traditional craft	6 000		6 000
Beach seine craft	36 000		36 000

Appendix 6 – Estimated cost of replacement of destroyed fishing fleet

District	Multi-day Boats		3 ½ t Day boats		6-7m FRP boats		Traditional crafts		Beach seine crafts	
	No. of Boats DS	**Replacement cost (LKR Million)**	No. of Boats DS	**Replacement cost (LKR Million)**	No. of Boats DS	**Replacement cost (LKR Million)**	No. of Boats DS	**Replacement cost (LKR Million)**	No. of Boats DS	**Replacement cost (LKR Million)**
Ampara (Kalmunai)	01	03.90	43	77.40	358	93.08	1479	44.37	110	19.80
Batticaloa	0	0	04	07.20	494	128.44	2107	63.21	119	21.42
Colombo	0	0	02	03.60	05	01.30	45	01.35	12	02.16
Galle	61	237.90	58	104.40	173	44.98	549	16.47	63	11.34
Gampaha	05	19.50	05	09.00	14	03.64	50	01.50	0	0
Hambantota	54	210.60	44	79.20	387	100.62	649	19.47	39	07.02
Jaffna	0	0	41	73.80	887	230.62	1318	39.54	64	11.52
Kalutara	24	93.60	07	12.60	47	12.22	301	09.03	26	04.68
Kilinochchi	0	0	0	0	0	0	168	05.04	0	0
Mannar	01	03.90	0	0	0	0	03	00.09	0	0

Matara	30	117.00	70	126.00	156	40.56	507	15.21	09	01.62
Mullaitivu	0	0	0	0	848	220.48	936	28.08	356	64.08
Puttalam	09	35.10	0	0	14	03.64	12	00.36	0	0
Trincomalee	02	07.80	02	03.60	1097	285.22	3034	91.02	20	03.60
Total	**187**	**729.3**	**276**	**496.8**	**4480**	**1164.8**	**11158**	**334.74**	**818**	**147.24**

Abbreviations and Notes:
Source: Statistical Unit / MFAR
FRP – Fiber Glass Reinforced Plastic
DS – Destroyed

Costs estimates of replacement of destroyed fishing fleet are based on the following assumptions:

Cost of a new boat (LKR)			
Boat type	**Hull**	**Engine**	**Total**
Multi-day boat	2 000 000	1 900 000	3 900 000
3 ½ t boats	800 000	1 000 000	1 800 000
FRP boat	110 000	150 000	260 000
Traditional craft	30 000		30 000
Beach seine craft	180 000		180 000

Appendix 7 – Estimate of fishing gear requirements and cost

Boat type**: Offshore multi-day boats**

Gear type: **1000x120 mesh, 24-27ply, 152mm mesh net at LKR 20,000 per net (fully rigged)**

No. of nets / boat: **40**

District	No. of boats DS	No. of boats DM	**Total**	**Total No. of Nets required**	**Cost of nets** (LKR Mill)
Ampara (Kalmunai)	01	01	02	80	1.60
Batticaloa	0	0	0	0	0
Colombo	0	14	14	560	11.20
Galle	61	98	159	6360	127.20
Gampaha (Negombo)	05	85	90	3600	72.00
Hambantota	54	112	166	6640	132.80
Jaffna	0	0	0	0	0
Kalutara	24	62	86	3440	68.80
Kilinochchi	0	0	0	0	0
Mannar	01	0	01	40	0.80
Matara	30	211	241	9640	192.80
Mullaitivu	0	0	0	0	0
Puttalam	09	75	84	3360	67.20
Trincomalee	02	18	20	800	16.00
Total	**187**	**676**	**863**	**34520**	**690.40**

Appendix 7 (cont'd)

Boat type: **Coastal 3 ½ t Day boats**

Gear type: **1000X100 meshes, 21-24 ply, 140-152 mesh net at LKR 18 000 per net (fully rigged)**

No. of nets / boat: **25**

District	No. of boats DS	No. of boats DM	**Total**	**Total No. of Nets required**	**Cost of nets** (LKR Mill)
Ampara (Kalmunai)	43	196	239	5975	107.50
Batticaloa	4	278	282	7050	126.90
Colombo	2	9	11	275	4.95
Galle	58	28	86	2150	38.70
Gampaha (Negombo)	5	36	41	1025	18.45
Hambantota	44	34	78	1950	35.10
Jaffna	41	47	88	2200	39.60
Kalutara	7	17	24	600	10.80
Kilinochchi	0	0	0	0	0
Mannar	0	0	0	0	0
Matara	70	106	176	4400	79.20
Mullaitivu	0	0	0	0	0
Puttalam	0	5	5	125	2.25
Trincomalee	2	27	29	725	13.05
Total	**276**	**783**	**1059**	**26475**	**476.55**

DM – Demaged
DS – Destroyed
"-"data not available

Appendix 7 (cont'd)

Boat type: **Coastal 17-23 ft FRP boats**

Gear type: **For Sardine / I. Mackerel gillnet[1] at LKR 2 200/net)**

No. of nets / boat: **20**

District	No. of boats DS	No. of boats DM	**Total**	**Total No. of Nets required**	**Cost of nets** (LKR Mill)
Ampara (Kalmunai)	358	94	452	9040	19.89
Batticaloa	494	189	683	13660	30.05
Colombo	05	102	107	2140	04.71
Galle	173	149	322	6440	14.17
Gampaha (Negombo)	14	124	138	2760	06.07
Hambantota	387	216	603	12060	26.53
Jaffna	887	694	1581	31620	69.56
Kalutara	47	137	184	3680	08.10
Kilinochchi	0	0	0	0	0
Mannar	0	08	08	160	0.35
Matara	156	283	439	8780	19.32
Mullaitivu	848	0	848	16960	37.31
Puttalam	14	76	90	1800	03.96
Trincomalee	1097	1139	2236	44720	98.38
Total	**4480**	**3211**	**7691**	**153820**	**338.40**

[1] Sardine gillnet - 1500X330 meshes, 2 ply, and 19-38mm mesh net

Indian mackerel gillnet – 1500X150 meshes, 2-3 ply and 51-57mm mesh net

Appendix 7 (cont'd)

Boat type: **Coastal Non-motorized Traditional crafts**

Gear type: **For sardine or Anchovy gillnet fishery**[1]

No. of nets / boat: **10 (LKR 2 000 per net)**

District	No. of boats DS	No. of boats DM	**Total**	Total No. of Nets required	**Cost of nets** (LKR Mill)
Ampara (Kalmunai)	1479	256	1735	17350	34.70
Batticaloa	2107	264	2371	23710	47.42
Colombo	45	144	189	1890	03.78
Galle	549	286	835	8350	16.70
Gampaha (Negombo)	50	153	203	2030	04.06
Hambantota	649	334	983	9830	19.66
Jaffna	1318	0	1318	13180	26.36
Kalutara	301	165	466	4660	09.32
Kilinochchi	168	18	186	1860	03.72
Mannar	03	0	03	30	0.06
Matara	507	505	1012	10120	20.24
Mullaitivu	936	0	936	9360	18.72
Puttalam	12	55	67	670	01.34
Trincomalee	3034	255	3289	32890	65.78
Total	**11158**	**2435**	**13593**	**135930**	**271.86**

[1] Sardine gillnet: 1500X330 meshes, 2 ply, and 19-38mm mesh net

Anchovy gillnet: 1500X500 meshes, 2 ply and 16 mm mesh net

Appendix 7 (cont'd)

Boat type: **Beach seine crafts (Madel paru/ vallam)**

Gear type: **Beach seine (LKR 250 000 / net)**

No. of nets / boat: **1**

District	No. of boats DS	No. of boats DM	**Total**	**Total No. of Nets required**	**Cost of nets** (LKR Mill)
Ampara (Kalmunai)	110	54	164	164	41.00
Batticaloa	119	0	119	119	29.75
Colombo	12	11	23	23	05.75
Galle	63	13	76	76	19.00
Gampaha	0	0	0	0	0
Hambantota	39	21	60	60	15.00
Jaffna	64	49	113	113	28.25
Kalutara	26	12	38	38	09.50
Kilinochchi	0	0	0	0	0
Mannar	0	0	0	0	0
Matara	9	01	10	10	02.50
Mullaitivu	356	0	356	356	89.0
Puttalam	0	0	0	0	0
Trincomalee	20	0	20	20	05.00
Total	**818**	**161**	**979**	**979**	**244.75**

Appendix 8 – Cost of Rehabilitation and Reconstruction of Harbours and Anchorages

Harbours	**Estimated Cost** (LKR million)		**Anchorages** [1]	**Estimated Cost** (LKR million)
Kirinda	167		Point Pedro	TBC [2]
Tangalle	104		Kankasanthurei	
Kudawella	147		Kokilai	
			Thondamannar	
Puranawella	142		Buttua	
Mirissa	127		Batticaloa	
Galle	101		Kattankudy	
Hikkaduwa	152		Kalumnai	
Beruwala	148		Sainthamaruthu	
Panadura	147		Pothuyil	
Cod bay	41		Panama	
			Patanangala	
Sub Total	***1 276***		Kalametiya	
			Rekawa	
Harbour facilities [3]	827		Unakuruwa	
			Welipatanwila	
			Nilwella	
Heavy machinery [4]	250		Kottegoda	
			Gandara	
			Thotamuna	
			Polathumodara	
			Kapparathota	
			Kathaluwa	
			Dodanduwa	
			Haraspola	
			Maradana	
			Beruwala South	
			Payagala	
			Kalutara	
			Pitipana Negombo	

			Kammalmoya	
			Wellamankara	
			Palliyawatte	
			Thoduwawa	
			Serakkuliya	
			Kandakuliya	
			Arnolda canal	
Total	**2 353**		**Total**	**2 402**

Source: Ceylon Fishery Harbours Corporation

1 including mini-harbours
2 yet to be assessed in detail; estimated cost range LKR140 million (east - most damaged) and 40 million (west – least damaged)
3 constructions of handling, packing/processing and equipment storage infrastructures
4 moving equipment, cranes, dredgers (2) etc.

Appendix 9 - Summary of Costs by Activities of the Programme for Reconstruction and Development of the Marine Fisheries Sector (2005 - 2009)

- Based on assessments and government draft plans - (as of November 2005)

Year and Cost (LKR million)												
Activity	Total Target Units x Unit Price (Rs)	2005		2006		2007		2008		2009		Total Cost
		No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	LKR million
Repair and replacement of fishing craft and gear			3043		2641							**5684**
Sustainable fisheries management					141		146		113			**400**
Re-establish private fish retail outlets and municipal												
fish markets			10		44		663		360		10	**1087**

Re-establish fish landing facilities at fishery												
harbours, anchorages and landing sites			10		21		174		82		61	**348**
Rehabilitate damaged coast protection structures and												
coastal habitats			40		900							**940**
Re-establish essential institutional support services												
and facilities					822							**822**
Capacity building in support of planning & implementation					128		218		218		118	**682**
Strengthening communities and their productive activities					3		96		228		91	**418**

Reconstruction and modernization of anchorages												
and fisheries harbours					1067		1827		1450		420	**4764**
Institutional strengthening (training and research)					43		41		6		3	**93**
Sustainable coastal area management					90		1000		1000		560	**2650**
Total Costs			**3103**		**5900**		**4165**		**3457**		**1263**	**17888**

Tsunami Damage

Tsunami Rehabilitation