



**Sri Lanka Tsunami Reconstruction Program (SLTRP)**  
**USAID Contract # 386-C-00-05-00166-00**

# Environmental Assessment

## Mirissa Fishery Harbor

February 2006

SLTRPR-007



*In association with EML Consultants, Chemonics International, DEVTECH, FNI, Engineering Consultants Ltd., Lanka Hydraulic Institute, MICD and Uni-Consultancy Service*

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## Abbreviations

ADB	Asian Development Bank
A/L	Advanced Level
CBO	Community Based Organization
CCA	Coast Conservation Act
CCD	Coast Conservation Department
CEA	Central Environmental Authority
CFHC	Ceylon Fisheries Harbour Co-operation
DS	Divisional Secretariat
EA	Environmental Assessment
EMAP	Environmental Management Action Plan
EPL	Environmental Protection License
IEE	Initial Environmental Examination
ITI	Industrial Technology Institute
GDP	Gross Domestic Product
GN	Grama Niladhari
GOSL	Government of Sri Lanka
GSMB	Geological Surveys and Mines Bureau
LA	Local Authority
LHI	Lanka Hydraulics Institute
NARA	National Aquatic Resources Research and Development Agency
NGO	Non-Governmental Organization
O/L	Ordinary Level
PS	Pradheshiya Sabha
REG 216	22 CFR 216 (Regulation 216)
SLTRP	Sri Lanka Tsunami Reconstruction Project
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency

## **Executive Summary**

### **Project background**

The coastal and marine belt of Sri Lanka was one of the worst affected by the tsunami that hit the country's shores in December 2004. The loss of lives and livelihoods took a heavy toll on the area, which at present is being gradually resurrected by the post-tsunami rebuilding efforts of the Government of Sri Lanka along with assistance of international partners. The USAID-funded Sri Lanka Tsunami Reconstruction Project (SLTRP) contributes to the effort of post-tsunami rebuilding through interventions to improve damaged infrastructure in a number of sectors. In the fisheries sector, SLTRP will rehabilitate and improve infrastructure in three fishery harbors, namely Puranawella, Mirissa and Hikkaduwa, which were affected by the tsunami.

### **Project description**

In Mirissa the proposed harbor rehabilitation work will consist of: (a) repairing the damaged breakwaters; (b) extending the existing quay wall; (c) constructing a new pier for small boats; (d) constructing a new revetment and repairing the existing one. The main objective of the proposed work is to enhance the overall productivity of the harbor by carrying out urgently needed rehabilitation and improvement work and thereby facilitating greater economic and social benefits for its users.

The present document is the Environmental Assessment (EA) Report for the Mirissa harbor rehabilitation project, which fulfills the environmental safeguard requirements of USAID as set out in 22 CFR 216 (Regulation 216). The purpose of the EA is to provide information to decision makers with respect to enhancing the environmental sustainability of the proposed project through the identification and mitigation of possible adverse impacts.

### **Project alternative**

In the evaluation of alternatives, three options have been considered: (a) the proposed project; (b) alternative location for the new quay wall and new pier for small boats; and (c) no action. Mirissa harbor will benefit greatly from the proposed project, which will address urgently needed rehabilitation and improvement work. Hence, the no action alternative is unacceptable. Evaluation of alternative locations for the new quay wall and pier indicates that the proposed location of extending the existing quay wall is anticipated to be optimal, pending the completion of investigations being carried out by LHI.

### **Description of the environment**

**Physical Environment** - Mirissa is a coastal fishing village located at a distance of 154 kilometers from Colombo towards the eastern end of the Weligama Bay in the Matara district. The Mirissa harbor was established in 1966 and has a basin area of approximately seven hectares.

The major surface watercourse in the Mirissa area is the Polwatta Ganga. It drains a watershed of 232 square kilometers and traverses nearly 32 kilometers before it discharges to the Weligama bay, north of the Mirissa harbor. During the dry season, saline intrusion takes place in the river up to at least eight kilometers inland, resulting in the salinization of cultivated land. Groundwater data for the area is not available; however, data reflecting poor groundwater quality in nearby areas suggest that a similar situation may exist in Mirissa.

Annual average ocean current velocity recorded in the Weligama bay is 22 cm/s. The direction of the surface water mass inside the bay is west to east. This water mass joins the discharge from the Polwatta Ganga on the western side of the bay and releases to the open sea at Mirissa point. The weaker bottom currents flow in almost the opposite direction. However, due to the presence of submerged rocks and corals the water flow in the bay is not smooth.

The Weligama bay exhibits a net sediment loss, which is increased during the south-west monsoon period. Certain stretches such as the eastern side of the Polwatta Ganga and the area behind the fringing coral reef exhibit remarkable accumulation while certain stretches at the center and west of the coral reef show erosion.

**Biological environment** – Two types of coral habitats occur in the Weligama bay. The rock reefs with coral growth occur on the Mirissa side of the bay while a fringing coral reef occurs on the Weligama side (Kapparatota) of the bay. The rock reefs extend up to about two kilometers offshore and have patchy coral growth, particularly in the shallow waters close to the shore. In 1997, a coral cover of 13% was recorded on the shallow rock boulder reef located approximately 100 meters offshore on the southern side of the Mirissa headland.

The fringing coral reef has two sections, namely the coral reef with the reef lagoon and the seaward reef slope with scattered coral colonies. Patches of sea grass occur in the reef lagoon. In 1997 the reef had a coral cover of 80%, although the diversity of corals was low.

The Indian Ocean coral bleaching event in 1998 had a serious impact on coral reefs in Sri Lanka including the southern coast. The live coral cover, which was about 80% in 1997, was reduced to about 28% in the Kapparatota reef. However, rapid recovery was noted with coral banks reaching 54% in 2002. The tsunami caused further mechanical damage to the fringing coral reef, which reduced the live coral percentage to 52.12%. Reef fish communities were also badly damaged. On the contrary, damage to rock reefs in the bay due to the tsunami was observed to be minimal.

**Social environment** – The fisheries industry plays a vital role in the local economy of the project area as indicated by the high percentage (70%) of families engaged in it. Out of this, 77% of families are completely dependent on fisheries while the others have supplementary income from other sources. The Mirissa harbor plays a dominant role in this fisheries based local economy. It is the source of multiple livelihood activities and sustains a large network of beneficiaries, both direct and indirect. The income levels reported indicate that 60% of the fisheries families in the project area earn more than Rs.10,000 a month.

The Mirissa harbor supports three different fishing systems: 1) fishing in shallow seas using small-mechanized boats and traditional crafts; 2) fishing using one-day mechanized boats; and 3) fishing using multi-day boats. The multi-day boat owners earn approximate net incomes of Rs. 475,000 per month, and operation involves five crew members. Small boat owners fishing in shallow seas earn a net average income of about Rs. 50,000 per month and involve two people in each operation. These relatively high returns in the fisheries industry attract people to the trade. Most of the employable male members in fisheries families in Mirissa take to fishing or a related activity. On the

contrary, women in the area do not get actively involved in fisheries activities beyond drying of fish and hence the industry tends to be male dominated.

In Mirissa, education level up to grade six to ten are relatively satisfactory with about 36% reaching this standard (as compared to 28% in the Matara District). However, there are a high percentage of school dropouts after reaching this standard and the number pursuing education beyond ordinary level (O/L) is low.

Consultations held with local stakeholders of the harbor revealed a number of issues and problems with the functioning of the harbor for which intervention is sought. These issues are largely related to harbor infrastructure, institutional capacity, ancillary facilities, and marketing. The following points have been raised as priority needs through these consultations: (a) establishment of separate jetties for small and large boats; (b) establishment of an effectively operating boat repair shop; (c) establishment of an effectively operating ice plant; (d) relocation of the auction hall; and (e) increased efficiency of fueling points.

### Anticipated environmental impacts and mitigatory measures

The key impacts associated with the construction stage and proposed mitigatory measures are summarized in the table below:

	Activity	Issue	Significance	Mitigatory measures
1	Use of equipment and machinery	Deterioration of air quality  Noise  Vibration	Low  Low  Low	
2	Quarrying	Worker safety, deterioration of air quality, noise, vibration	Identified quarry is an established one operating with GSMB approval and CEA EPL license. Therefore, it is reasonably assumed that safeguard measures are already in place. Hence, impact is considered low.	
3	Increase in vehicular traffic inside the harbor	Hindrance to harbor operations  Risk of accidents	High  Moderate - high	(a) Demarcate construction areas; (b) restrict vehicular movement during busy hours of the harbor; (c) educate harbor users on planned construction activities and timing of those activities.

In addition to the above, the harbor reconstruction activities will create short-term employment opportunities for the local people during the construction period, which is a positive impact.

In terms of the operation stage of the rehabilitated harbor, the main impacts will be: (a) increase in employment opportunities and income due to better facilities in the harbor; (b) possible escalation of social conflicts between native and migratory fishermen who will be attracted to the Puranawella harbor due to increased capacity; (c) potential increased marginalization of small-scale fishermen due to unequal distribution of benefits. Strengthening the existing harbor committees and implementing an effective social mobilization and empowerment program for the fishermen are among activities that would minimize social tensions and help improve equity in the distribution of benefits from the present project as well as other welfare programs.

### **Conclusions**

The findings of the EA indicate that adverse environmental impacts of the project are minor and mitigatable, as long as the recommended measures in the EMAP are implemented. In conclusion, it is evident that the proposed project will be greatly beneficial for the harbor users and will a boost to the harbor based economy of the area.

# 1 Introduction

## 1.1 Project background

The Indian Ocean tsunami triggered by a massive earthquake off the coastline of Sumatra in 2004, wreaked havoc in the region claiming over 200,000 lives, displacing hundreds of thousands and destroying billions of dollars of property. In Sri Lanka, twelve coastal districts were affected in one of the worst natural disasters in the country's history.

The coastal region of Sri Lanka hosts about 34% of the country's population. The economic and environmental value of this region is reflected in the country's dependence on its rich coastal habitats; these habitats support many industries and livelihoods, comprising a substantial portion of the economy. The tsunami devastated coastal livelihoods and hit hard at the local economic base. Fishing, the predominant coastal economic activity in Sri Lanka, was one of the worst affected.

The coastal and marine fisheries sector in Sri Lanka is of major social and economic importance. The sector earned Rs 9.5 billion in 2003 through export of fish and aquatic products and accounts for more than 90% of the total fish production in the country. Its contribution to the country's GDP was estimated at 2.6% at that time. The sector provides considerable direct and indirect employment, which directly impacts about a million households. Almost 75% percent of beach areas are used by fishermen, and fish from coastal and marine fisheries provide 65% of the animal protein consumed within the country.

The fisheries sector suffered a severe blow from the tsunami. A high death toll of fishermen was reported. Around 41% of fisher houses were affected and nearly 67% of marine fishing crafts were destroyed or damaged (NARA, 2005). Loss of employment due to damaged equipment and infrastructure was estimated at around 24% (NARA, 2005). Nine harbors, 34 anchorages and 200 landing sites were damaged along with their facilities, causing severe constraints on fisheries operations in the post-tsunami period. Foreign exchange earnings from fish exports will be greatly reduced this year due to the tsunami.

Restoration and recovery of the fisheries sector is of utmost economic and social importance to the country. In the post-tsunami restoration and recovery efforts, the GOSL has made a commitment to 'building back better' with the funding assistance extended by the international community. The United States Agency for International Development (USAID) will contribute towards this objective in the post-tsunami reconstruction and rehabilitation through SLTRP. SLTRP will improve the physical infrastructure in a number of sectors, including fisheries. In the fisheries sector, the project will rehabilitate and improve the infrastructure of the fishery harbors of Hikkaduwa, Mirissa and Puranawella. This report discusses activities relating to the proposed rehabilitation work in the Mirissa fishery harbor in the southern district of Matara.

## **1.2 Project overview and objectives**

The Mirissa fishery harbor serves a large fleet of boats of varying sizes and acts as a hub of economic activity. However, the harbor is overcrowded and many problems are encountered due to lack of berthing capacity (USAID, IEE 2005) and other basic facilities. The Mirissa fishery harbor rehabilitation project aims to restore harbor structures and improve harbor facilities to overcome some of the problems encountered.

In summary, the proposed harbor rehabilitation activities in Mirissa will include rehabilitation of damaged breakwaters, quay wall extension, construction of a new pier for small boats, and construction/rehabilitation of revetments inside the harbor, all of which will contribute to improved livelihood opportunities to users of the harbor. A more detailed description of the project description is provided in Chapter 2.

In addition to physical rehabilitation of the harbor, SLTRP will be involved in skills capacity building for improved environmental management through the project's Participatory Coastal Management (PCM) component. Activities to be carried out by the PCM component are being identified in a number of ways, including through community consultations, environmental management needs assessments, and environmental assessments for construction and rehabilitation (including this document), and will include public awareness building, basic skills training, and linkages to SLTRP's vocational education component. As activities are developed to complement the rehabilitation and construction activities described in this document, SLTRP expects to leverage enthusiasm generated by this improved harbor infrastructure to motivate stakeholders to adopt new skills and organizational mechanisms to improve their management of natural resources.

Recommendations developed through such assessments and any other SLTRP documents, including harbor master plans and the fisheries management action plan, will be prioritized and determined to be feasible or not feasible in the Coastal Development Action Plan (CDAP) to be submitted by SLTRP in April 2006. At that time, any activities that may require further assessment to establish potential environmental impacts will be identified. However, it is anticipated that all PCM activities will fall into the area of capacity building and improved environmental management, which was given a categorical exclusion in the SLTRP IEE (USAID 2005).

## **1.3 Government Policy**

The GOSL policy for the fisheries sector states the need to develop fishery harbors to increase productivity of the sector through the development of the offshore fishery. The harbor rehabilitation activities of SLTRP conform to the requirements of the GOSL policy framework and recognize the principles of long-term sustainability of the fisheries sector.

Thus, the objectives of the project are as follows:

- Contribute to the government's objective of 'building back better' in the fisheries sector through the provision of improved harbor infrastructure and facilities.
- Improve potential of the harbor for increased fish production.
- Alleviate some of the difficulties faced by fishermen through better planned and improved facilities.

#### **1.4 Purpose of the report**

Both the GOSL and the USAID have set forth specific procedures to conduct environmental screening as a pre-requisite to commencement of a development activity.

In terms of the GOSL regulation, provisions in the Coast Conservation Act (CCA) (as the project falls within the purview of the coastal zone regulated by the Coast Conservation Department (CCD)) are applicable. Accordingly, as the project is associated with rehabilitation work as opposed to new construction, a full report on environmental impacts will not be needed. Instead, the CCD will be consulted on a regular basis for their guidance and approval in making environmentally critical decisions. This arrangement will be described in greater detail in a subsequent chapter.

In keeping with the USAID regulations on environmental safeguards, governed by the 22 CFR 216 (Reg. 216), an Initial Environmental Examination (IEE) was prepared for the entire SLTRP, which included the sub-projects on fishery harbors. The IEE was completed prior to the commencement of project implementation. Per the IEE, all key sub-projects of SLTRP received a positive determination and thus require separate EAs. A *positive determination* (or positive threshold decision) following an IEE establishes that an action is likely to cause a significant impact or a reasonably foreseeable chance of significant harm to the environment, and that preparation of an EA will be required

The present document fulfills the EA requirement for the Mirissa fishery harbor. It presents potential environmental and social impacts arising out of project activities in the area and recommends measures to implement the project with minimum adverse impacts on the environment.

#### **1.5 Definition of project impact area**

The region of influence for determining environmental impacts is defined as the Mirissa harbor and a surrounding area of one kilometer in radius, including both the marine and landward sides. The region of influence for social impacts that has been considered includes the six Grama Niladhari (GN) divisions in the Weligama Divisional Secretariat (DS) division located around the Mirissa fishery harbor.

#### **1.6 Methodology of the EA**

The physical, biological and social environment has been defined by data collected by a variety of methods as described below:

- A literature survey was conducted of all available and relevant physical and biological environmental information. Communication with experts was conducted to supplement the literature survey as needed.
- Collection of socio-economic data was done through a short survey from sources such as statistics available at the GN offices and local CBOs, interviews with agency officers who support livelihood programs, and focus group discussions with target communities and other relevant stakeholders (such as the fishing community, traders, fishing vessel repairers, service providers, etc.).

- Consultations with harbor users were carried out to obtain their input on the proposed project and to gain insight into problems and issues faced during use of the harbor. A list of people met during the EA preparation is given in Annex 5.

Environmental impacts and mitigation measures have been identified based on a scoping session carried out by the EA preparers (See Annex 1) with contributions from team managing the construction planning. Potential environmental impacts were identified through a discussion among the EA team members (based on past experience of similar projects, expert opinion and field knowledge of the harbor environmental setting). Classification of impacts as 'low', 'moderate' and 'high' has been based on appropriate environmental criteria such as threshold values, standards and expert opinion. Where possible, measures suggested in the EMAP take an approach of adopting necessary safeguards to avoid impacts rather than to mitigate impacts. For example, congestion inside the harbor due to construction vehicles operating during busy hours, such as the morning auction time, is considered significant by the EA team based on feedback from the harbor users. The EMAP suggests ways and means to avoid this situation through consultative planning of construction work with the harbor users and the harbor management.

## **2 Project description**

The major construction activities planned at Mirissa Harbor are:

- Repairs to the damages to the breakwaters
- Construction of new quay wall of an approximate length of 25 meters
- Construction of quay wall for small boats by converting the small breakwater
- Construction of new revetment
- Repairs to damaged revetment near the small breakwater.

### **2.1 Breakwater Repairs**

There are several damaged sections of both long and short breakwaters. The work includes reconstruction of the toe, core and armor layers where necessary. The toe and core material are rubble from 100 kilograms up to two ton boulders. The armor layer will consist of boulders of four to eight tons in size. The rock material is proposed to be brought from an operating quarry site located at Kekunadura, about 20 kilometers from the site. New concrete pavement will be constructed over the breakwater.

### **2.2 Quay Wall Extension**

A new quay wall, approximately 100 meters in length, will also be constructed, and will lay parallel to the long breakwater. The proposed location of the quay wall is shown in the project layout plan, attached as Annex 2. The type of quay wall (caissons, gabion, concrete blocks, or sheet-pile) will be determined after the field investigation is completed. The work will include the construction of the quay wall, back filling and compaction, and lying of concrete pavement.

### **2.3 Construction of Pier for Small Boats**

A quay wall for small boats is proposed to be located near the existing small breakwater/groin area (Annex 2). This quay wall depth will be 1.5 meters. The required depth in this area is already available; therefore no dredging is required for this task.

### **2.4 Construction of New Revetment and Repair of Existing Revetments**

Annex 2 shows the areas of both existing and proposed revetments. The damages to existing revetments after the tsunami have already been carried out. However, minor improvements to these revetments are required at some locations. A section adjoining the existing revetment, approximately 75 meters in length, requires soil support to prevent erosion damage. A new revetment will be constructed at this section using the same design of the existing revetment. The work will include construction of a rubble-packed revetment, earthwork, and construction of drains around the area.

### **2.5 Construction Duration**

Construction work is expected to commence in July/August 2006 and will be completed within months (by July 2007). The detailed planning of the construction program will be a

responsibility of the contractor. Considering the volume of work involved, most construction activities mentioned above are likely to start simultaneously and last the duration of twelve months. However, with regard to sections of the breakwaters where toe repair is needed, work will commence after the south-west monsoon (after October).

### 3 Project Alternatives

The commissioning of the fishery harbor at Mirissa was undertaken in 1966 by the Government of Sri Lanka considering the pressing demand for such a facility in the area. As part of these planning studies, suitability of the location and several alternative layouts for the harbor were considered prior to finalization of the present location and arrangement. Therefore, the present location and lay out has been decided upon after consideration of alternative options.

The proposed project is related to rehabilitation and improvement to the existing Mirissa harbor, which are essential for the efficient and optimal functioning of the harbor. The rehabilitation work is needed due to damage from tsunami. The improvement work, such as the extension of the quay wall and the addition of a small pier, are required to accommodate the increased number of multi-day boats and to create more order in the docking system. At present, there is over-crowding of the harbor and many delays occur due to the lack of adequate berthing capacity. At present, the large and small boats are tied together, which results in damage to small boats when waves move the anchored boats. The extension to the existing revetment is needed to stabilize the shore inside the harbor that is subjected to high erosional forces. In this context, the proposed project activities are an important and urgent need in the Mirissa harbor.

In the absence of location and major layout alternatives, only three alternatives are considered in this study. These are:

- The proposed project
- Alternative locations for proposed extension to quay wall and new pier for small boats
- No action

The alternative location of having a new quay wall and a new pier for small boats projecting into the basin will reduce the available basin area and hinder navigation, which is not considered optimal in the present context. Detailed investigations of this alternative are underway. However, changes to the locations of the quay wall and pier for small boats are unlikely based on currently available data.

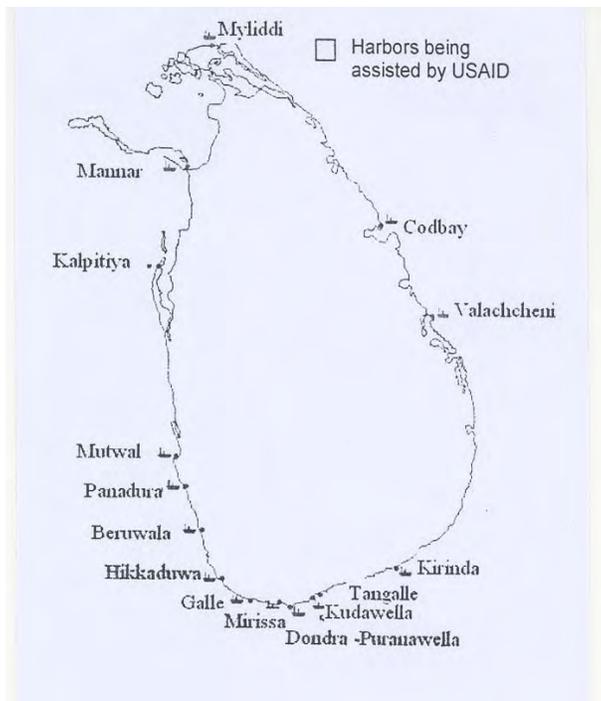
The project is needed to prevent further deterioration of harbor structures, such as breakwaters, and to increase the potential of the harbor. Without such an intervention taking place at present, the condition of the harbor will continue to deteriorate, further reducing its capacity and usefulness to the fisher community. In this context, the 'no action' alternative is unacceptable. The no action alternative would also affect the growth of the local fishery sector and thereby deprive the fishermen and their families of greater economic benefit. By making the harbor more user-friendly through the proposed harbor rehabilitation and improvement work, greater social and economic benefit would result than if the no action alternative were chosen.

## 4 Description of the existing environment

### 4.1 Physical environment

#### 4.1.1 Topography and Land Use

Mirissa a fishing village in the Southern Province of Sri Lanka, and is located at a distance of about 154 kilometers from Colombo towards the eastern end of the Weligama Bay. Mirissa is characterized by a large rocky headland. The Mirissa Fishery Harbor is located inside the bay to the north of the headland. The administrative district is Matara, and the DS is Weligama (Figure 1). The Mirissa harbor is one of Sri Lanka's well-established fishery harbors, with a land area of 1.54 hectares and a basin area of approximately seven hectares. The main breakwater in the harbor is about 450 meters long, and the depth of the harbor varies between 2.5 and three meters (NARA, 1993; Dassanayake et al., 2000; USAID, 2005).



**Figure 1** - Location of Mirissa in the Southern Province of Sri Lanka

#### 4.1.2 Hydrology

##### Rainfall

The project area receives heavy rains during the southwest monsoon, which occurs from May to July. The dry season occurs from August to October. The period of December to February is regarded as an intermediate season (NARA, 1993).

## **Surface Water and Ground Water**

The major surface watercourse in the Mirissa area is the Polwatta Ganga, which discharges its water in to the Weligama Bay at a point called Polwatumodera. During the dry season, the Polwatta Ganga is subjected to saline water intrusion at least eight kilometers upstream, which results in salinization of cultivated land. At the mouth of the Polwatta Ganga, fresh water flows out on the top of the underlying ocean water, thus forming a salt wedge. Upward mixing of saline water into the outflowing river water has been reported. Normally tides dominate estuarine mixing and cause more or less vertical homogeneity. In the Polwatta Ganga, however, where the mouth is narrow and shallow, tidal influences is notably weak, since mixing energy is insufficient for homogeneity (NARA, 1993).

Polwatta Ganga has its source above Nakiyadeniya and has a catchment area of 235 square kilometers. It traverses nearly 32 kilometers and flows across relatively populated and urbanized Weligama area before flowing in to the sea at Weligama Bay. The upper reaches of the basin are planted with rubber trees. The lower reaches of the Ganga flows through stretches of paddy fields of about 1135 acres. An important development work is the Polwatta Ganga inundation regulator, which is supplemented by a diversion anicut at Tottegedora (NARA, 1993).

Site-specific information on groundwater quality is not available. The closest area to Mirissa where groundwater quality data are available is Matara/Goadagama, which is about five kilometers from Mirissa and three kilometers inland. The information indicates poor groundwater quality due to acidity, high BOD and fecal contamination. Considering the basic parameters that govern the groundwater quality in the area, similar status can be expected for Mirissa. The other parameter that can be high in groundwater in Mirissa is salinity due to its proximity to the sea.

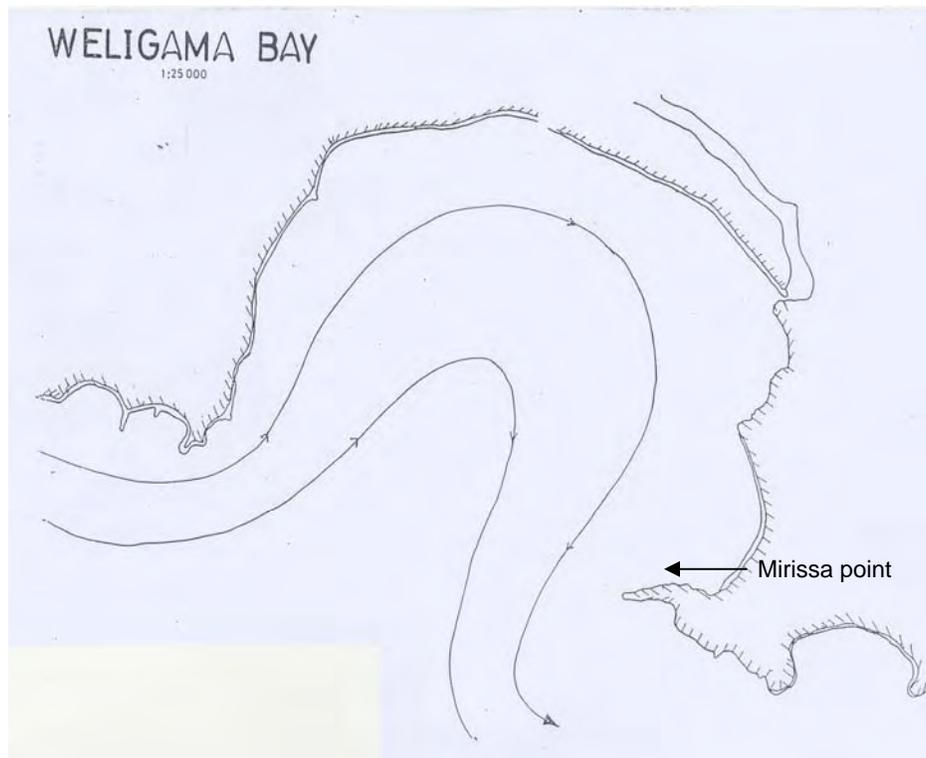
### **4.1.3 Geology**

The broad coastal plains of southwestern Sri Lanka are developed on basement rocks (mainly basic igneous intrusives), on the lower margin of a broad syncline which tilts downwards to the southwest (ECL, 1997).

### **4.1.4 Coastal Dynamics**

#### **Hydrodynamics**

In the Weligama Bay area the annual averaged current velocity is around 22 cm/s. Surface water mass enters the bay through the western end and is released through the eastern end (Figure 2). Since the bay is scattered with rock outcrops and submerged coral reef, the water circulation in the bay is not smooth. The direction of the weaker bottom water current is almost in the opposite direction of the surface water current. Fresh water enters at the eastern part of the bay, remains as a surface layer with substantial mixing, and travels via the closest sea opening to the open sea at the Mirissa point. Submerged corals act as a barrier to the water, which enters into western part of the bay due to the tide, hence piling up of water in the western part of the coast (NARA, 1993).



**Figure 2** – Surface water circulation in Weligama Bay

The above mentioned tidal water mass joins with the Polwatta Ganga water mass and is released out to sea at the Mirissa point. Hence, the less dense freshwater during its travel picks up the high-density salt water lying below. To compensate for the water mass loss due to the surface water current, a weaker bottom layer current develops in almost the opposite direction (NARA, 1993).

### **Bathymetry and Sediment Transport**

Studies carried out by NARA revealed the following with reference to beach profiles in the Weligama Bay area (NARA, 1993).

- Weligama Bay shows a tendency for net loss of sediment. Each of four kilometer stretch of shore shows about 29,410 m<sup>3</sup> and about 35,300 m<sup>3</sup> of erosion. The net sediment loss during the northeast monsoon is 5890 m<sup>3</sup>; this period is considered to exhibit calm sea conditions. Hence during the southwest monsoon the net sediment loss could be much more severe.
- The entire two kilometer of eastern stretch from Polwatta Ganga, as well as the two kilometer stretch behind the coral reef and the existing granite stone islands, shows moderate to remarkable accumulation. The sources of sediment supply for this accumulation are Polwatta Ganga and the debris of dead coral reef. The deposition on the eastern side of the Polwatta Ganga is possibly due to the Mirissa harbor, which is located at the far eastern side of the bay and the Red Cliff, located at the Wera Point, acting as sediment trap. The sediment deposition

on the two kilometer stretch at one kilometer east of Kapparatota point could be due to the shadow zonal effect of the Peri Duwa island.

- The three kilometer stretch at the center and one kilometer stretch at Kapparatota shows remarkable to moderate erosion. This phenomenon could be due to the direct wave hitting at the center and water pile up at the shore due to the wave action and back flow block due to the coral reef generating a strong easterly current.

#### 4.1.5 Physical Resources

The generally uneven bottom of the bay is scattered with five small islands made up of crystalline rock. The western side of the Weligama Bay is covered with living and non-living coral beds mainly comprising *Acropora* spp (see section below on biological environment). However, the death and bleaching of a considerable amount of coral bed has been reported (NARA, 1993).

## 4.2 Biological environment

### 4.2.1 Reef habitats in the area

There are two types of coral habitats found in Weligama Bay and the surrounding sea environment: (a) rock reef habitats with coral growth found mainly on the eastern side of Weligama Bay; and (b) fringing coral reef with a reef lagoon found on the western side of Weligama Bay and known as the 'Kapparatota reef'.

#### Rock reef habitat

Rock reef habitats are common at Mirissa. These are mainly rock boulders and ridges of varying sizes. A study carried out by Rajasuriya and others (1998) showed that the Mirissa rock reefs were similar in structure and substratum composition to most other reefs in the southern coast. The rock reefs of Mirissa extend from the coast to more than two kilometers offshore to depths exceeding 50 meters. Patchy coral growth can be found on these habitats, especially those that are close to shore and in shallow waters up to about eleven meters deep. In 1997, the coral cover was 13% on the shallow rock boulder reef located approximately 100 meters offshore on the southern side of the Mirissa headland. A total of 14 coral genera (Table 1) were recorded on Mirissa rock reefs at that time, of which the main coral genera were *Acropora*, *Montipora* and *Favites*. Other common coral genera were *Echinophyllia*, *Pocillopora*, *Symphyllia* and *Pavona*. The rock surface constituted about 75% of the reef substrate. Patches of sand and coral rubble were also present as well as soft coral communities (Rajasuriya et al. 1998).

Genera	Mirissa Rock Reef	Kapparatota coral reef within the reef lagoon	Kapparatota limestone reef on seaward reef slope
<i>Acantastrea</i>	*	-	*
<i>Acropora</i>	*	*	*
<i>Echinophyllia</i>	*	-	*
<i>Echinopora</i>	*	-	*
<i>Favia</i>	*	*	*
<i>Favites</i>	*	*	*

Genera	Mirissa Rock Reef	Kapparatota coral reef within the reef lagoon	Kapparatota limestone reef on seaward reef slope
<i>Galaxea</i>	*	*	*
<i>Goniastrea</i>	-	-	*
<i>Hydnophora</i>	*	-	*
<i>Leptoria</i>	-	*	*
<i>Leptoseris</i>	*	-	-
<i>Millepora</i>	-	*	*
<i>Montipora</i>	*	*	*
<i>Pavona</i>	*	*	-
<i>Platygyra</i>	*	*	*
<i>Plesiastrea</i>	-	-	*
<i>Pocillopora</i>	*	*	*
<i>Porites</i>	-	-	*
<i>Stylophora</i>	-	-	*
<i>Symphyllia</i>	*	-	*
<i>Turbinaria</i>	-	-	*

\* : Presence of a species  
- : Absence of a species

**Table 1** - Coral genera recorded at Mirissa and Kapparatota/Weligama

Source: Rajasuriya A, Ohman MC, Svensson S (1998) *Coral and Rock Reef Habitats in Southern Sri Lanka: Patterns in the Distribution of Coral Communities*. *AMBIO* 27: 8: 723-728

### Fringing coral reef

The fringing reef in Kapparatota has two sections, namely the coral reef within the reef lagoon and the seaward reef slope, which is of limestone (coralline rock) and scattered coral colonies. The depth within the reef lagoon varies from zero to three meters. Patches of sand and seagrass also occur within the reef lagoon. Live coral cover was about 80% in 1997. Coral diversity was comparatively low, with ten coral genera observed (Table 1). The low coral diversity was due to the dominance of branching *Acropora* species and large stands of *Pocillopora* and *Montipora*. Large *Millepora* bommies were also common within the reef lagoon (Rajasuriya et al. 1998).

The seaward reef slope extends about 100 meters from the reef crest to a maximum depth of about six meters. The reef has a spur and groove formation wherein sandy areas exist between ridges. These formations are due to the scouring action of monsoon waves on the seaward reef slope. The main substrate is coralline rock (limestone), which makes up 39% of the substrate. The live coral cover was 23% with 19 coral genera (Table 1). The dominant genera were *Echinopora*, *Acropora*, *Leptoria* and *Favites* (Rajasuriya et al. 1998).

The abundance and diversity of butterfly fish (Chaetodontidae) are considered indicators of habitat type and composition of corals. Kapparatota reef lagoon had the highest number of species (six) per 50 meter transect, while Mirissa rock reef and the Kapparatota reef slope had four species per transect at each site. The most abundant

trophic group at both the Mirissa rock reef and Kapparatota reef slope was plankton-feeding damselfish (Pomacentridae), while the reef lagoon at Kapparatota had more herbivores (Acanthuridae) (Ohman et al. 1998).

Reef habitats outside the bay support few hard corals. However, due to the high structural relief of these reefs, they are excellent habitats for reef fish and invertebrates such as spiny lobsters. The common reef fish families on the offshore reefs are fusiliers (Caesionidae), surgeonfish (Acanthuridae), snappers (Lutjanidae), emperors (Lethrinidae), groupers (Serranidae), sweetlips (Haemulidae), damselfish (Pomacentridae), jacks and trevallies (Carangidae), wrasses (Labridae), parrotfish (Scaridae) and goatfish (Mullidae). Occasionally searfish (*Scomberomorus* spp) and dogtooth tuna (*Gymnosarda unicolor*) may be seen on deep reef habitats around 20 to 30 meters. Shoals of the Indian mackerel (*Rastrelliger kanagurta*) can be seen seasonally on offshore reefs. Similarly, sardines (Clupeidae) are present at certain times of the year among inshore reef habitats.

### **Present status of the reef habitats**

The Indian Ocean coral bleaching event in 1998 had a serious impact on coral reefs in Sri Lanka, including along the southern coast. The live coral cover, which was about 80% in the Kapparatota reef in 1997 (Ohman et al. 1998), was reduced to about 28% (Rajasuriya and Karunarathna 2000). Compared to other reef sites in Sri Lanka, there was early recovery of some of the bleached branching *Acropora* at Kapparatota, resulting in relatively rapid reef recovery. The coral cover among the *Acropora* coral banks reached 54% by 2002 (Rajasuriya 2002). Some coral patches and individual massive coral colonies were damaged and overturned by the tsunami, and much of the coral rubble left after the 1998 bleaching event was redistributed, causing more damage to live corals. The live coral cover in the Kapparatota reef was 52.12% after the tsunami (Rajasuriya, 2005).

Structural damage to rock reef habitats such as in Mirissa area by the tsunami was not evident, although some colonies of branching and tabulate corals were damaged. However this damage was very limited compared to the overall damage to coral reef habitats, including in the Kapparatota reef lagoon. Consequently there was almost no change in the reef structure of rock reefs in the Mirissa area. Their fish communities were hardly affected because the structure of the reefs remained intact. In contrast, the reef fish communities on the coral reefs in Kapparatota were seriously affected due to this damage, and the most significant impact was seen among the corallivorous species such as butterfly fishes (Chaetodontidae).

### **Management issues of the reef habitats**

The marine habitats in Weligama Bay and the surrounding area are heavily impacted by destructive fishing methods, including blast fishing (occurring in offshore areas) and other uncontrolled resource exploitation. The coral reef at Kapparatota is constantly disturbed and damaged by the use of 'moxy nets' to capture ornamental fish. Large anchors used for fishing boats have completely destroyed the northeastern section of the coral reef, and this area is now covered by coral rubble and *Halimeda* algae. Moreover, bilge water contaminated with diesel and engine oil and waste from fish holds are dumped directly into the waters at Kapparatota and within the Mirissa harbor, causing considerable pollution in and around these locations. In addition, highly polluted water enters the bay through large drains that flow through the Weligama town.

## 4.2.2 Turtle nesting areas

According to the survey conducted by NARA in 1997 (see Chapter 8) on turtle hatcheries and nesting beaches along the Sri Lankan coastline, the sandy beaches of Kapparatota and Weligama modera are visited by turtles, although only occasionally.

## 4.3 Socio-economic environment

### 4.3.1 Demographic condition in the region

Mirissa fishery harbor is located in the coastal zone of the Weligama DS division of Matara District. The significance of the fisheries sector in terms of livelihoods and the economy of the Weligama DS division is highlighted in Table 2.

Demographic characteristics (indicators)	Indicator values
Total families in the DS division	13,810
Fisheries families in the DS division	4,419
Percentage of fisheries families of the total families in DS division	32%
Total population in DS division	68,110
Fisheries population in DS division	22,196
Percentage of fisheries population of the total population in DS division	32%

**Table 2** - Significance of fisheries sector in Weligama DS division  
*Source: Resource profile of Weligama DS office (2004)*

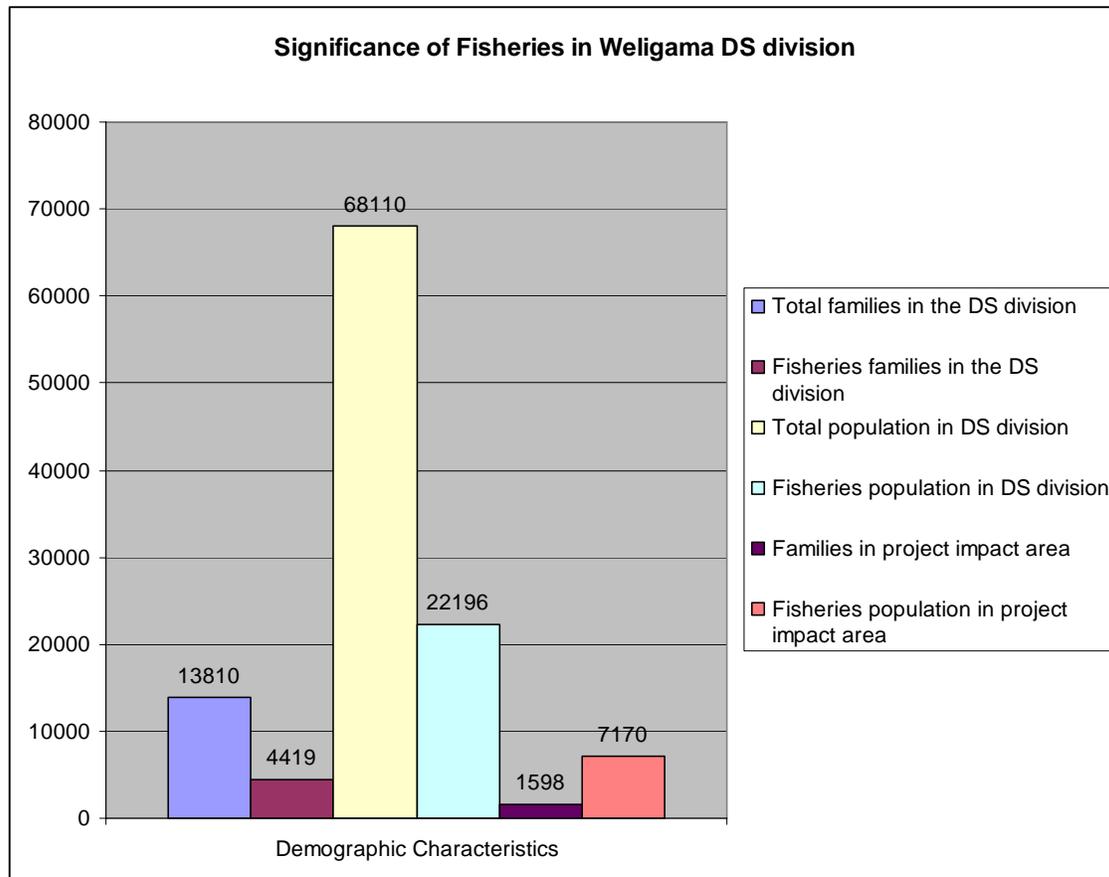
### 4.3.2 Demographic conditions in the project area

The total population in the six GN divisions that comprises the project area is about 11,074, reported from 2255 families. (*Note: the project area is defined as the six GNs located around the harbor as mentioned in Chapter 1. It is taken that geographically this area would have the maximum influence of the harbor*). The fisheries industry plays a significant role in the livelihood system/local economy of the project area. The degree of significance occupied by fisheries industry in the project area is demonstrated in Table 3 and Figure 3.

Demographic feature ( Indicators)	Indicator values
Total fisheries families in Weligama DS division	4,419
Number of families living in project impact area	1,598
Percentage of total fisheries families of Weligama DS division living in project impact area	36%
Total fisheries population in Weligama DS division	22,196
Total population in the project area	11,074
Fisheries population in project area	7,170
Percentage of fisheries population in project area	65%
Percentage of fisheries population in Weligama DS living in the project area	32%

**Table 3** - the significance of fisheries industry in the project impact area

Note: The migrant fishing population to Mirissa harbor area is not included in the Table 3  
Source: Respective GN offices



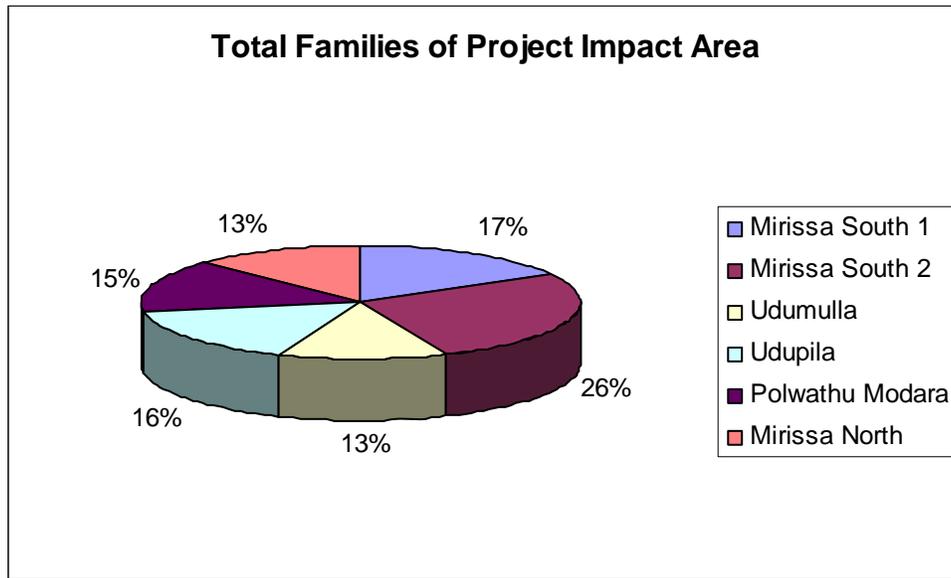
**Figure 3** - Significance of Fisheries in Weligama DS division and the project impact area

The distribution of families among the six GN divisions is shown in Figure 4. About 70% of these families are involved in fishery related livelihood activities as shown in Table 4.

GN division	Total families	Fisheries families	% of fishery families of total families
Mirissa South 1	376	225	60
Mirissa South 2	608	552	90
Udumulla	283	178	63
Udupila	365	125	34
Polwathu Modara	332	300	91
Mirissa North	291	218	75
Total	2,255	1,598	70

**Table 4** – Distribution of total families and fisher families in the project area

Source: Respective GN offices



**Figure 4** - The distribution of total families in the Project Impact Area

Information in Table 4 indicates that with the exception of one GN division – Udupila – fisheries dominate the livelihood system.

Distribution of fishery and non-fishery population in the six GN divisions, along with gender distribution, is shown in Table 1, Annex 3.

#### 4.3.3 Educational levels in the fishery population

As indicated in Table 5, educational levels in Mirissa are relatively satisfactory. A higher percentage attends school up to about grade six to ten when compared with the general situation in the Matara district. However, there is a high percentage of school dropouts after reaching grade ten, and comparatively (with Matara district) a lesser number pursues education beyond grade ten.

Education levels among the fisher families are unique to its sub-culture. Certain norms, beliefs and perceptions that are prevalent in the fishery sub-culture are believed to be contributing to this situation. Some of the dominant cultural factors include:

- The fishing communities in the Southern Province belong to a caste called 'Karawe', who strongly believe that they are fishermen by tradition and hence do not need a higher level of education. This belief remains strong even under rapidly changing socio-economic circumstances.
- Pre-occupation of the head of the families (usually the father) with their profession and prevalence of alcoholism has created a situation of low family cohesiveness and lack of parental guidance for children to pursue education.

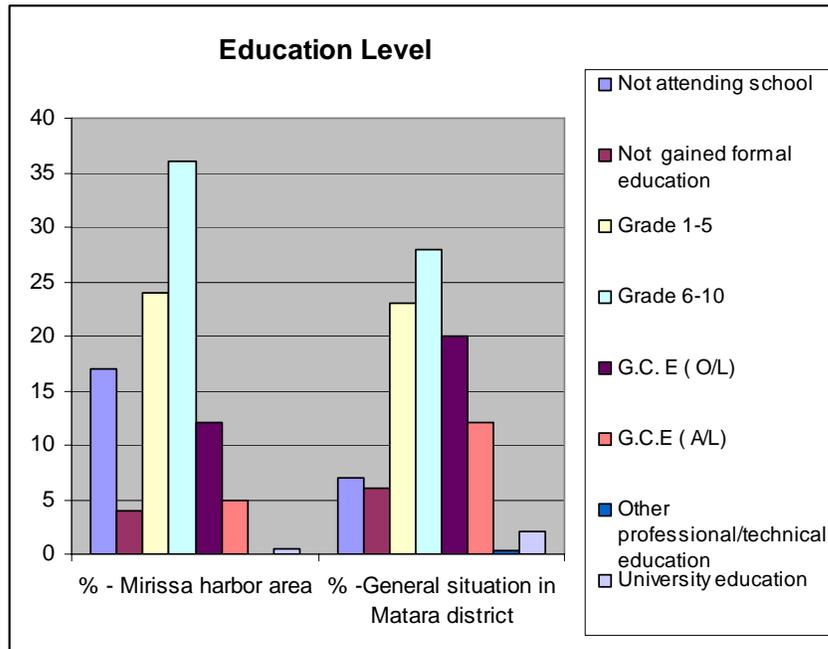
- Expectations of fishermen to receive support from their families, especially male family members, for various activities related to their livelihood. Children are also accustomed to earning money from a very young age, which attracts them to the trade as soon as they are old enough.

The statistics included in Table 5 and also Figure 5 depict the comparative picture of education among fishing communities in the Mirissa fishery harbor area and the general education levels in the Matara district. Statistics on educational levels among communities in the six GN divisions of the project area are shown in Table 2 in Annex 3.

Education level (Indicator)	% - Mirissa harbor area	% -General situation in Matara district
Percentage not attending school	17	7
Not receiving formal education	4	6
Grade 1-5	24	23
Grade 6-10	36	28
G.C. E ( O/L)	12	20
G.C.E ( A/L)	5	12
Other professional/technical education	no	0.3
University education	0.5	2

**Table 5** - Education level among communities in Mirissa fisheries harbor area and other communities in Matara district.

Source: GN offices in Mirissa harbor area and Wilbur Smith Associates/ RDC 2000



**Figure 5** - Education levels in Mirissa fisheries harbor area and Matara district

#### 4.3.4 Livelihoods and income

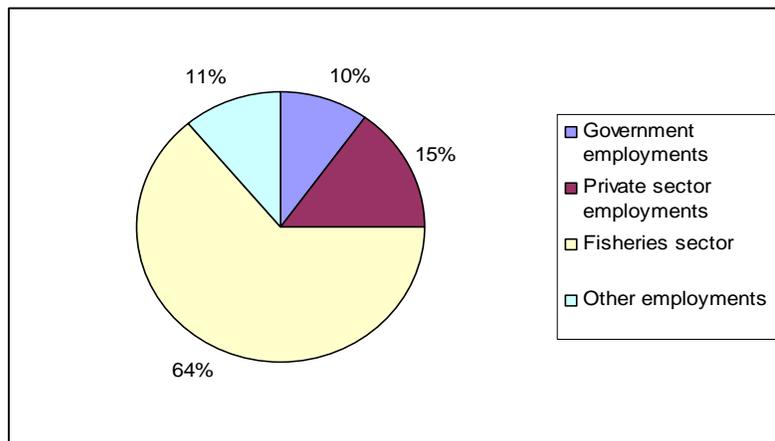
##### Livelihoods:

In comparison to other livelihood sectors, the fisheries sector shows a clear trend of increase in the population involved in the trade. This is due to the high percentage of employable children of fishing families choosing employment within the fishing industry. This is a unique situation to fisheries communities. For example, in the agricultural sector there are serious problems in retaining the second generation in the sector to adopt the agricultural activities of its parents. The main reason for this situation is the quick returns experienced in the fishing trade that gives the people a daily/weekly disposable income. It was observed during the focus group discussions with local stakeholders that in Mirissa most of the employable family members of fishing families are engaged in fishing activities. Other than in families such as vessel owners, trawler owners and other relatively more privileged groups, rarely do the members of fishing families engage in other jobs. The majority of the people engaged in non-fishery sector employments in Mirissa are from families that do not depend on fishing as the main income source.

The different livelihood sectors in the project area are shown below. The extent of dependence on each sector indicates the relative importance of fisheries in the local economy.

- Government employment – 375 persons (10%)
- Private sector employments – 542 persons (15%)
- Fisheries sector – 2,339 persons (64%)
- Other employment (daily paid labor, self employment, etc.) – 388 persons (11%)

The distribution of figures mentioned above among the six GN divisions is shown in Table 3 in annex 3.



**Figure 6** - Distribution of types of employment in the project area

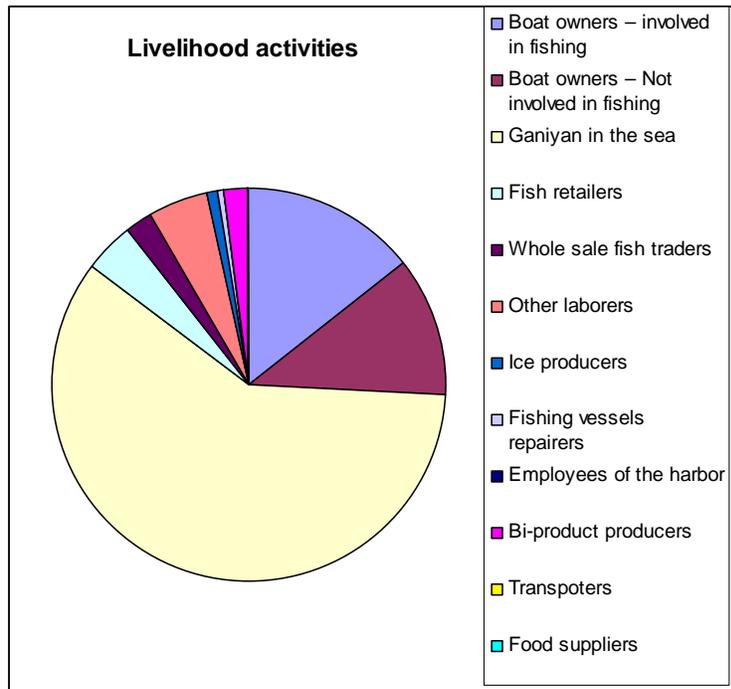
### Multiple livelihood activities related to fisheries in Mirissa harbor project area

The following table attempts to explain the types of fishery-related livelihood activities generated by the harbor-based economy. This information was obtained through group discussions with target communities. There is a discrepancy between the population information given by the target groups during the discussions and statistical data collected by the GNs. Nevertheless, the information is presented here to create an understanding of the employment opportunities provided by the harbor and the importance of it in sustaining of the local economy.

Type of livelihood	Direct		Indirect		Total	
	Number	%	Number	%	Number	%
-						
Boat owners – involved in catching fish	140	14	-	-	140	11
Boat owners – Not involved in catching fish	106	11	20	6	126	10
Helpers of the fishing boats in the sea ( Ganiyan in local term)	560	58	122	35	682	52
Fish retailers	40	4	20	6	60	4
Whole sale fish traders	22	2	-	-	22	2
Other laborers	50	5	50	14	100	8
Ice producers	8	0.8	-	-	8	0.6
Fishing vessel repairers	4	0.4	12	3	16	1
Employees of the harbor	-	-	26	7	26	2
Middle men in fish marketing	6	0.6	15	4	21	2
Bi-product producers ( dry fish etc)	26	2	30	8	56	4
Transporters	-	-	35	10	35	2
Food suppliers	-	-	15	4	15	1
<b>Total</b>	<b>962</b>	<b>100</b>	<b>345</b>	<b>100</b>	<b>1307</b>	<b>100</b>

**Table 6** – Fishery related livelihood activities in the project impact area (six GN divisions).

Note: Direct beneficiaries of the harbor are defined as those who are involved in income generation activities directly linked with the harbor. Indirect beneficiaries are those who depend on income generating opportunities created by the direct beneficiaries. For example: (a) fish sellers who depend on buying fish from retailers (without visiting the harbor) who purchase fish directly from the harbor premises; (b) food sellers who serve visitors to the harbor; (c) three wheeler drivers providing transportation to the harbor; and (d) laborers who help in the production of dry fish and other by-products.



**Figure 6** - Livelihood activities of project impact area

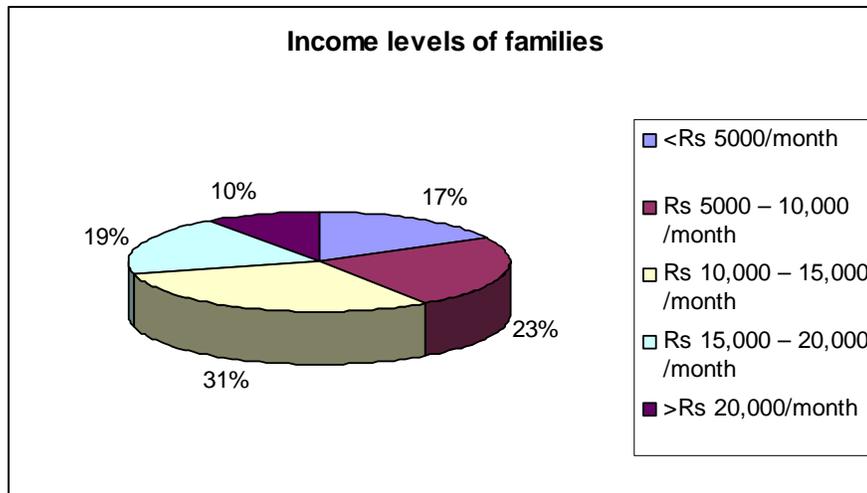
**Income of fisheries families**

Accurate data on income of fisheries families is not available and is also difficult to obtain due to reasons such as:

- High fluctuation of income (daily, weekly) due to variations in the size of the fish catch.
- Fluctuation of fish prices which are determined by supply and demand factors.
- Unwillingness of fishermen to reveal their level of income.

In this context, information available with the GNs on income levels of fishermen may not be entirely accurate, but is indicative of the general picture. The income levels reported, which indicate that nearly 60% of the families in the project area earn more than Rs 10,000 a month, are as follows:

- Families drawing less than Rs 5000/month – 269 (16.8%)
- Families drawing Rs 5000 – 10,000 /month – 376 (23%)
- Families drawing Rs 10,000 – 15,000 /month – 483 (30%)
- Families drawing Rs 15,000 – 20,000 /month – 315 (19%)
- Families drawing more than Rs 20,000/month – 155 (9.6%)



**Figure 7** - Distribution of income levels of families in project impact area

The distribution of different income groups in the six GN divisions is shown in Table 4 in Annex 3.

Mirissa harbor supports three types of fishing systems. They are:

- **Production system 1** – Fishing in shallow sea using canoe, small mechanized boats or traditional wooden boats
- **Production system 2** – Fishing using one day mechanized boats.
- **Production system 3** – Fishing using multi-day boats.

The details (summary) of income and expenditure of each system are included in Table 7. The information (basis) used for these calculations is shown in Table 5 in Annex 3.

Activities/ items	Production system 1	Production system 2	Production system 3
Number of persons involved	2	4	5
Catch- Kg/month	3,000	6,000	5,000 raw fish and 2,000 dry fish
Average sale price-Rs/KG	30	50	75 Raw fish and 150 dry fish
Gross income-Rs/month	90,000	300,000	675,000
Cost-Rs/month	40,000	70,000	200,000
Net income – Rs/month	50,000	230,000	475,000

**Table 7** – Average income of three production systems existing in Mirissa fishery harbor

#### 4.3.5 The dependency of communities on Mirissa fishery harbor

Prior to the establishment of a formal harbor in the 1960s, the communities in the local area used the current location of the harbor for sailing traditional fishing vessels.

According to accounts of elderly persons in the area, about 20 families used the formally established harbor in 1980s. In later stages, number of families depending on the Mirissa Harbor increased due to several factors:

- The increased capacity of the harbor (supported by an ADB-funded project in 1990)
- Government efforts to mobilize the growth of the fisheries sector
- Relatively high income opportunities that attracted a number of young people
- Multiple livelihood activities offered by the harbor.

At present the communities in the local area as well as neighboring areas are heavily dependent on the harbor in Mirissa. The degree of community dependency on the harbor is reflected by the following observations made in the fishing communities:

- High percentage of families (70%) depending on harbor related income generation
- Fishing is the main income generation activity. Nearly 77% of fishing families in the area are completely dependent on the harbor. Only 23% of fishing families have supplementary income generation sources. (See Table 6 in Annex 3)
- Large number of modern fishing vessels used in the harbor. About 266 different fishing vessels are being used in the harbor. The Table 7 in Annex 3 includes the types of boats being used in the harbor.
- Opportunities to draw high income from fishing: Rs 50,000/month earning potential from a small boat, Rs 230,000/month from a one-day boat and Rs 475,000/month from a multi-day boat. Details on the income and expenditure are shown in Table 5 in Annex 3.
- Dependence on migrant fishermen on the Mirissa harbor: about 48 fishermen frequently migrate to Mirissa from Palana and Bandaramulla. Their fleet includes seven multi-day boats and ten one-day boats.

#### **4.3.6 The involvement of women in fishery activities**

The common perception in Mirissa is that fishing is a livelihood activity for men, and hence the industry is male dominated. The fishermen do not like women folk to engage in the fishery industry, and women are not encouraged to visit the harbor. This situation differs from that in the Western Province, where women are actively involved in fish marketing. However, a small number of women in Mirissa (approximately 150) are involved in the production of dry fish in their home gardens for about three months of the year, thereby earning about Rs. 5000/month. According to information obtained from community leaders and GN officers, about 40 families in project area are women-headed households. In these families, the male children are involved in fishing activities, but their mothers and other female members are not involved in fishery activities.

#### **4.3.7 Existing institutional network and its performance**

There are four types of institutions that are active in the harbor area. They are:

- Government organizations that include CFHC, Fisheries Cooperation, NARA, Fisheries Department and Government Banks entrusted with the tasks of mainly maintenance of harbor and facilities, marketing, research, community welfare and providing credit facilities, respectively.

- Private sector organizations that are involved in providing services such as ice, boat repairs, and credit facilities.
- Formal community-based organizations (CBOs), such as the fisheries cooperative that has been established with the participation of fishermen. The main role of this CBO is to facilitate the availability of services (credit, welfare, and marketing) from relevant sources to the fishermen.
- Informal community organizations that reflect accepted norms, procedures, and customs. For example, helping each other in their times of need, while engaged in the job or in personal matters, is common practice among fishermen, which helps to keep cohesion among the community alive to some degree.

The opinion and experience of fishing communities on the performance of these institutions are shown in Table 8.

Institution	Opinion/experience
CFHC – harbor management office	The services could be improved and the harbor management could play a stronger role in distributing its services equally. The maintenance of the harbor premises is also not satisfactory.
Fisheries cooperation	There is no formal arrangement to intervene in fish marketing. Therefore, the middlemen exploit the situation and take a larger share of the profit.
NARA	Generally, the communities are satisfied with services of NARA. The research and some training provided by NARA help the fishermen to locate/identify high fish population spots in the sea.
Government Banks	Most of the fishermen are not eligible for bank loans as they have defaulted on earlier loan schemes.
Private Banks	Access to private banks is difficult for poor fishermen
Fishing vessel repairers	Services are not perceived to be effective or timely
Ice producers	Prices are not fair and also quantities supplied are not adequate. Supply on time is also not guaranteed always.
Fisheries cooperative	At present it is not effective and the powerful elements exploit the opportunities. As a result the needs of the small scale fishermen are always neglected.

**Table 8** - Community opinion and experience on the performance of the institutions

#### 4.3.8 Cultural aspects of the fishing community in Mirissa

The culture prevailing in fishing communities is unique and can be categorized as a sub-culture specific to the coastal area of the country. The following cultural features have been observed with respect to the Mirissa fishing community:

- *Low level of education among members of the fishing community.* This is an important factor contributing to many social conflicts.
- *Low levels of family cohesion.* Although Mirissa is not an isolated community, the fishermen and their families lead very different lifestyles, isolating them in some senses from the surrounding socio-economic environment. The men are away at

sea in the night for periods from one to 30 days at a stretch, and attend to repairs and maintenance of fishing equipment and vessels during the day time when on land. There is also widespread addiction to alcohol. As a result families often receive little attention from the head of the family and children are neglected.

- *Poor management of money.* Routine money circulation in the community is very high. Fishing leaves a substantial amount of money in the hands of fishermen but there is no culture of saving and planned spending. Spending is mostly unplanned and hence there is no gradual economic upliftment.
- *Law of the jungle culture.* Organized groups within the fishing community have created a situation of social tensions between the members of the same community. These groups earn money from other fishermen under duress and act as the middlemen between one-day fishermen and fish traders, and earn large profits in highly unreasonable and unpleasant ways. People are afraid to seek legal mediation for this prevalent situation due to fear for their lives and livelihoods. The principle of 'survival of the fittest' applies to the fish trading inside the harbor premises.
- *Imbalance of power.* There is also a culture of control over community organizations and welfare assistance in the hands of a powerful few. They bear office titles in these organizations and exploit the opportunities provided by the government to help the poor fishing households. In the absence of a systematic way to mobilize the community, these powerful elements gain access to all benefits and are also recognized as community leaders by service delivery organizations. This is an unhealthy situation for the marginalized sections of the community.

#### **4.3.9 Problems experienced by the local stakeholders in the Mirissa harbor**

The following information on problems and issues encountered by the harbor users was obtained through: (a) the preliminary community consultation held in November 2005 with the harbor users in the Mirissa harbor premises; and (b) focused group discussions held in December 2005 with key stakeholders of the harbor during data collection for section 4.3 of this report.

##### **Institutional/infrastructure problems**

The harbor consultations (with the community and harbor management) early in SLTRP implementation and at the time social impacts were studied have brought out the following issues.

- An inadequate number of laborers is available to attend to maintenance of harbor premises. The present monthly income of the harbor is about Rs 200,000 – 300,000, which is approximately half of the income needed to carry out satisfactory harbor management.
- Lack of ice production in the harbor (ice plant was made inoperable by the tsunami)
- Inadequate capacity of the fuel station and water taps. This will be even more inadequate with the increasing number of boats using the harbor consequent to the proposed harbor improvement work.
- Lack of a facility for small boat owners to obtain kerosene oil.

- Lack of a boat repair shop inside the harbor
- Non-availability of cool house facilities to store fish in the harbor
- Lack of training for community empowerment and harbor management
- Lack of a Fisheries Department office within the harbor to provide services (the nearest regional office is in Tangalle)
- Lack of preventive barriers on the jetty to prevent breakage of boats.

### **Problems with obtaining fishing vessels**

- There is a lack of a financing system to purchase fishing vessels as the cooperative credit scheme that existed for fishermen is now defunct. This situation causes significant difficulty for poor fishermen.
- The fishermen are compelled to wait for at least one year after placing purchase orders to receive the ordered boats.
- The harbor does not have required crane facilities to support the multi-day boat repairs.

### **Problems with anchoring fishing vessels**

- A lack of space exists in the basin to anchor fishing boats
- There is an inadequate area to anchor boats after filling fuel.

### **Marketing problems**

- The fisheries cooperation has no established mechanism for fish marketing
- The capacity of fish auction hall is not adequate
- Since there are no adequate facilities to store the fish catch overnight, fishermen are compelled to sell the fish to middlemen at unreasonable prices.
- There is no mechanism established to process fish when the fishermen cannot sell the whole catch on the same day.

### **Problems related to facilities in the harbor**

- The access roads to the harbor are dilapidated and require serious improvements.
- There is no proper system to drain wastewater out of harbor premises.
- There is no system for collection and disposal of fish wastes and other solid wastes, which pollutes the harbor environment.
- There is no signal system to provide navigational direction for the fishermen reaching the harbor during night time
- There is no proper and effective security system in the harbor

The following were selected as the main priorities by the fishermen (in order of priority):

- Separate jetties for large and small boats to establish a more order in the docking system

- Establishment of a effectively operating boat repair workshop
- Establishment of a effectively operating ice plant
- Relocation of the auction hall from its present location as it blocks the entry of vehicles for loading
- Increase efficiency of fuelling points by either a better system of management or by adding more fuelling points

## **5 Impact Assessment**

### **5.1 Anticipated Construction Impacts**

#### **5.1.1 Impacts on Air Quality**

During construction there will be an increase in emission of air pollutants, such as suspended particulate matter (dust and cement) and exhaust emissions from construction vehicles. This, however, is not a significant impact due to: (a) construction activities being rather small-scale; (b) calm wind conditions that are prevalent most part of the year, which will prevent the spread of air pollutants; and (c) sensitive receptors such as houses in residential areas being located reasonably far from the construction sites. However, safeguard measures are necessary to prevent unwarranted release of dust due to wind and vehicle movement. These measures are explained in the Environmental Management Action Plan (EMAP).

#### **5.1.2 Noise Levels and Vibration**

Noise due to construction machinery and equipment can exceed 75 dBA or over, which is the maximum allowable limit for residential areas. However, this will not be a significant impact as the construction area is away from sensitive receptors, such as houses, etc. The prevailing noise in the harbor is high during busy hours such as mornings and evenings. During these hours a large number of boats arrive and depart the harbor daily. The noise generated by these boats is comparable with machinery and equipment that would be used in construction. The general safeguard measures would be adequate for addressing the noise issue caused by construction machinery and equipment.

#### **5.1.3 Impacts of waste generation from worker camps**

At present, waste and wastewater management at this harbor is poor. Solid waste as well as liquid waste is discharged into the harbor basin. As such, significant quantities of floating waste matter can be observed at stagnant corners and along the quay wall. Lack of a waste management system for the worker camps can add to this situation during the construction period and should be avoided at all costs. Worker camps should be provided with bins to collect garbage and regularly emptied at a safe location. Latrines should be properly sited and designed so that pollution of watercourses does not occur.

#### **5.1.4 Impacts from quarrying operations**

The rock material will be obtained from an already operating quarry at Kekunadura (Annex 4), which is 20 kilometers inland from the harbor location. The quarry already has Geological Surveys and Mines Bureau (GSMB) approval and the Central Environmental Authority (CEA) has issued a current Environmental Protection License (EPL). Therefore it is reasonable to assume that the environmental safeguard measures are already in practice at this quarry. The route from this quarry to the harbor site has already been used for transport of rock material. Therefore, the overall impact of trucks carrying rock material for work in the present project on traffic and road condition is considered low. It is incorporated into the EMAP that any damage to road, road structures, and side furniture caused by transport vehicles used by the contractor be rectified by the contractor.

### **5.1.5 Inconvenience to fishery activities**

During the construction there will be frequent movement of heavy trucks carrying construction material. Therefore setting up of storage areas for boulders, labor will restrict the land space and movement of trucks could interfere with normal harbor operations. Accidents are likely consequence in these circumstances. There for it is important that construction areas to be clearly identified and demarcated with due consideration to harbor operations. Also construction vehicle movements may have to be restricted during morning hours when the harbor is busiest due to fish auctioning. Also large number of vehicles belonging to fish buyers will come to the harbor during this time. It is recommended to identify and demarcate areas for construction activities in consultation with the harbor manager prior to commencement of work. Additionally, movement of construction vehicles should be restricted during morning hours (auction time) and this should again be determined in consultation with the harbor manager. The fishermen should be educated about construction activities and appropriate safety measures.

### **5.1.6 Employment opportunities**

There will be short-term employment opportunities for the local population in the construction phase, which will bring a short-term positive impact for individuals and a secondary positive impact to the local economy.

## **5.2 Anticipated Operation stage impacts**

### **5.2.1 Harbor pollution**

The project itself will have minimum to no impact on water quality during operations. However, it is important that harbor management addresses the current problem as a priority. Through the Harbor Master Plans to be prepared under SLTRP, recommendations for improving waste management for this harbor will be prepared.

It is recommended that harbor management (CFHC) provide basic infrastructure necessary for waste management, such as waste bins at appropriate places, containers for collection of waste oil, provide wastewater collection system and at least primary treatment such as sedimentation. The CFHC shall commence an awareness program among the fisher community on waste management and environmental aspects. The Fishery Harbor Committee can take the lead in carrying out cleaning activities in the harbor. The CFHC should take initiative to get the Harbor Committee involved in such activities. Application of 5S system is useful. The CFHC should provide the members of the committee knowledge on such management approaches on routine basis.

### **5.2.2 Increase in employment opportunities and income**

The project will facilitate higher capacity operations at the harbor than currently in place. This will encourage new boats to be added to the existing fleet and will create employment opportunities for the unemployed members of the community. This will be a positive impact. Improved harbor facilities will also facilitate higher income among various stakeholders in the harbor community, as explained in the table below.

<b>Stakeholder</b>	<b>Project components</b>	<b>Income increase</b>
Harbor management	Improvements in physical facilities	Higher income from Tariff due to more number of boats using the harbor.
Fishermen	Establishment of new piers and quay walls, more space for berthing of vessels.	Increased income through adding new boats to the existing fleet.
Service providers	Opportunities to expand services (fuel, ice, cool room, workshop)	Increase in income
Local communities	Increase in migrant people to the local area (fish traders, fishing vessel repairers) will increase	Income of shop owners, food suppliers etc may increase ( may not be so significant but there will be moderate impact on overall local economy)

**Table 11** - Impact on potential income increases due to project activities

### **5.2.3 Potential conflicts between migrant fishermen and the local fishing communities**

There is a community perception that improvement of services in the Mirissa harbor will attract more migrant fishermen. Given the existing social background and conflicts between local and migrant fishermen, it is possible that this could lead to escalated social tensions.

### **5.2.4 Marginalization of small-scale fishermen**

There is a possibility that increased fish production due to improved harbor facilities may increase supply to the point that fish prices drop. This would marginalize the small-scale fishermen who depend on the sale of smaller quantities of fish. Furthermore, possible increases in the fleet of small boat owners may diminish the fish population and result in low catches, which will once again, marginalize the small-scale fishermen. In general, the large-scale fishermen will receive larger share of the benefits.

### **5.2.5 Possibility of escalation of existing social conflicts in the harbor**

It is anticipated that improved facilities within the harbor will attract more people to the industry leading to more money circulation and increased activity in and around the harbor. In the absence of a proper community mobilization and law enforcement program, this may create an opportunity for the organized gangs of youth who informally control the fishery community to exploit the new situation by their strong-arm tactics.

Sections 5.2.3 - 5.2.5 explain several potential social problems that may arise as a result of the proposed harbor rehabilitation and development work. The issues are connected with equity, social conflicts with migrant fishermen as well as with keeping law and order. In these circumstances the Harbor Committee should be strengthened to play an important role in the harbor management. The harbor committee represents both fishermen and the CFHC and headed by the Harbor Manager. However, currently the harbor committee is not actively involved in the management of the harbor. It is

recommended that CFHC devises a plan to ensure that: (a) all stakeholders are reasonably well represented in the committee; and (b) the committee actively functions in an advisory capacity in the harbor management. The CFHC should also allocate resources for training and capacity building of individual committee members in areas like: leadership skills, environmental management, harbor operations, etc.

In addition, an effective social mobilization and empowerment program for the fishermen will also be able to minimize social tensions and help improve equity in the distribution of benefits from the present project as well as other welfare programs.

## 6 Environmental Management Action Plan

The Environmental Management Action Plan (EMAP) presented below will minimize adverse environmental/social impacts that could arise out of project activities for the Mirissa harbor rehabilitation activities. The EMAP should form part of the bid documents and shall be considered alongside the construction specifications. The prescriptions detailed in the EMAP are mandatory in nature and contractually binding. The EMAP will be equally applicable to sub-contractors including nominated sub-contractors, if any. CH2MHill will be responsible for the subcontractor (including nominated subcontractors) compliance with the requirements of the EMAP. The “Engineer” on behalf of the Employer will enforce and monitor the compliance of EMAP by the contractor.

Environmental monitoring in construction projects falls into two areas: effect monitoring and compliance monitoring. This section explains the consultants’ proposal for environmental monitoring of rehabilitation and improvement works of the Hikkaduwa Harbor.

The EA proved that both long and short term negative effects of this project are mostly negligible. However, the blasting effects on nearby structures, particularly older structures, may be significant if the contractor fails to take control measures. Therefore, it is recommended that blasting impacts be monitored during the construction. If blasting is involved in the harbor dredging, it is recommended that the contractor be asked to submit a program for monitoring the blasting impacts to the engineer for approval. The contractor must submit its plan prior to commencement of blasting work. The contractor’s monitoring plan/program shall establish the monitoring parameters, baseline conditions, measurement procedure and frequency of measurements.

The compliance monitoring will enforce the implementation of environmental safeguards as specified in the EMAP. The overall responsibility of enforcement of the compliance of environmental safeguards will rest with the Engineer. However, the effectiveness of compliance regime can be strengthened by participation of other stakeholders, mainly the community in monitoring. Therefore the consultants recommend that an “Environmental Monitoring Committee” be established under the direction of the harbor manager. This committee shall be comprised of the CH2MHill Engineer or site representative, the contractor’s senior resident engineer/manager, Local Authority representative, Divisional Secretary and three members from the harbor committee representing the community. The committee should meet regularly to review the effects and compliance with environmental safeguard measures. The committee decisions shall be implemented within the framework provided by the contract agreement and as directed by the Engineer.

Environmental Issues		Protection And Preventative Measures To Be Taken By The Contractor	
1.	Earthwork and Soil Conservation		
	1.1	Disposal of Debris and Spoil	
		(a)	All debris and residual spoil material including any left earth shall be disposed only at locations approved by the Engineer for such purpose. If directed by the Engineer the contractor shall obtain the approval form the relevant Local Authority for disposal of debris and spoil at the specified location.

Environmental Issues		Protection And Preventative Measures To Be Taken By The Contractor	
		(b)	The debris and spoil shall be disposed in such a manner that (i) drainage paths are not blocked (ii) the disposed material will not be washed away by runoff/floods and (iii) will not be a nuisance to the public.
		(c)	If consented to by the Engineer, contractor can dispose the debris and spoil as a filling material provided that the contractor can ensure that such material is used for legally acceptable purposes and disposed of in an environmentally acceptable manner.
<b>1.2</b>	<b>Protection of Ground Cover and Vegetation</b>		
		(a)	Construction vehicles, machinery and equipment shall be used and stationed only in the areas of work or other areas as designated by the Engineer.
		(b)	Contractor shall provide necessary instructions to drivers and operators so as not to destroy ground vegetation cover unnecessarily.
<b>1.3</b>	<b>Prevention of Soil Erosion</b>		
		(a)	Work that leads to heavy erosion shall be avoided during the rainy season. If such activities need to be continued during rainy season, prior approval must be obtained from the Engineer by submitting a proposal on actions that will be undertaken by the contractor to prevent erosion.
		(b)	The work, permanent or temporary, shall consist of measures as per design or as directed by the Engineer to control soil erosion, sedimentation and water pollution to the satisfaction of the Engineer. Typical measures include the use of berms, dikes, sediment basins, fiber mats, mulches, grasses, slope drains and other devices. All sedimentation and pollution control works and maintenance thereof are deemed as incidental to the earthwork or related work and no separate payment will be made for their implementation.
<b>1.4</b>	<b>Contamination of Soil by Fuel and Lubricants</b>		
		(a)	Vehicles/machinery and equipment used for project purposes shall be used only in designated locations/service stations approved by the Engineer.
		(b)	Waste oil, other petroleum products and untreated wastewater shall not be discharged on ground so that it causes soil pollution. Adequate measures shall be taken against pollution of soil by spillage of petroleum products from storage tanks and containers. All waste petroleum products shall be disposed of in accordance with the guidelines issued by the CEA or the engineer.
		(c)	Sites used for vehicle and plant service and maintenance shall be restored back to their initial status. Site restoration will be considered as incidental to work.
<b>1.8</b>	<b>Disposal of Harmful Construction Wastes</b>		
		(a)	Prior to the commencement of work, the Contractor shall provide to the Engineer a list of harmful, hazardous and risky chemicals/materials that will be used in the project work. The Contractor shall also provide the list of places where such chemicals/materials, their containers or other harmful materials will be dumped as waste at the end of the project.
		(b)	New disposal sites shall not be created as part of this project. Disposal of such waste shall be to the sites designated by the CEA or the Engineer.
		(c)	The contractor shall at their own cost and as directed by the Engineer, clean up any area including water-bodies affected/contaminated (if any) by the project.
<b>1.9</b>	<b>Quarry Operations</b>		
		(a)	Rock quarries from where metal aggregate is obtained shall have approval from the Geological Survey and Mines Bureau as well as the current EPL. It is recommended that quarries involved in an ongoing dispute with local communities not be considered as sources.
		(b)	The maintenance and rehabilitation of the access roads in the event of damage by the Contractor's operations shall be a responsibility of the Contractor.
<b>2.</b>	<b>Water – Protection of Water Sources and Quality</b>		
<b>2.1</b>	<b>Contamination of Water from Construction related wastes</b>		
		(a)	The discharge standards promulgated under the National Environmental Act shall be strictly adhered to. All waste arising from the project is to be disposed of in a manner that is acceptable to the Engineer and as per the guidelines/instructions issued by the CEA.
<b>2.2</b>	<b>Contamination from Fuel and Lubricants</b>		
		(a)	All vehicle and plant maintenance and servicing stations shall be located and operated as per the conditions and/or guidelines issued by the Engineer/Central Environmental Authority. In general these should be located away from the harbor basin and wastewater shall be disposed in accordance with the disposal standards of the CEA. Wastewater from vehicle and plant maintenance and servicing stations shall be removed of oil and grease and other contaminants to meet the relevant standards before being discharged to the environment.
<b>2.3</b>	<b>Locating, Sanitation and Waste Disposal in Construction Camps</b>		

Environmental Issues		Protection And Preventative Measures To Be Taken By The Contractor	
		(a)	Location of labor camps shall have the Engineer's approval and comply with any guidelines/recommendations issued by the CEA/LA. Construction workers' camps, if located outside the harbor shall not be located within 60 meters of waterways, near to a site or premises of religious, cultural or archaeological importance, school or any other sensitive area. Construction camps, if located inside the harbor should take into consideration harbor operations and should not cause any inconvenience thereto.
		(b)	Labor camps shall be provided with adequate and appropriate facilities for disposal of sewage and solid waste. The sewage systems shall be properly designed, built and operated so that no pollution to ground or adjacent water bodies/watercourses takes place. Garbage bins shall be provided in the camps and regularly emptied. Garbage should be disposed off in a hygienic manner, to the satisfaction of the relevant norms. Compliance with the relevant regulations and guidelines issued by the CEA/LA shall be strictly adhered to.
		(c)	Contractor shall ensure that all camps are kept clean and hygienic. Necessary measures shall be taken to prevent breeding of vectors.
		(d)	Contractor shall report any outbreak of infectious disease of importance in a labor camp to the Engineer and the Medical Officer of Health (MOH) or to the Public Health Inspector (PHI) of the area immediately. Contractor shall carry out all instructions issued by the authorities, if any.
		(e)	Contractor shall adhere to the CEA recommendations on disposal of wastewater. Wastewater shall not be discharged to ground or waterways in a manner that will cause unacceptable surface or ground water pollution.
		(f)	All relevant provisions of the Factories Act and any other relevant regulations aimed at safety and health of workers shall be adhered to.
		(g)	Contractor shall remove the labor camps fully after its need is over, empty septic tanks, if instructed by the engineer, shall be closed, all garbage and debris shall be removed and the area shall be cleaned and restored back to its former condition.
	<b>2.4</b>	<b>Wastage of Water and Waste Minimization</b>	
		(a)	The contractor will minimize wastage of water in the construction process/operations.
		(b)	The contractor shall educate and made employees aware on water conservation, waste minimization and safe disposal of waste.
	<b>2.12</b>	<b>Extraction of Water</b>	
		(a)	The Contractor is responsible for arranging adequate supply of water for the project purpose throughout the construction period. Contractor shall not obtain water for his purposes including for labor camps from public or community water supplies without approval from the relevant authority.
		(b)	The Contractor shall not extract water from groundwater or from surface water bodies without permission from the Engineer. If directed by the Engineer contractor must obtain approval from relevant agency for extraction of water prior to the commencement of the project.
		(c)	The Contractor may use the natural sources of water subject to the provision that any claim arising out of conflicts with other users of the said natural sources of water shall be made good entirely by the contractor.
	<b>3.</b>	<b>Prevention of Water Logging</b>	
	<b>3.1</b>	<b>Blockage of drainage paths and drains</b>	
		(a)	Contractor's activities shall not lead to water logging as a result of blocked drainage paths and drains. The Contractor shall take all measures necessary or as directed by the Engineer to keep all drainage paths and drains clear of blockage at all times.
		(b)	If water logging or stagnation of water is caused by Contractor's activities, the Contractor shall provide suitable means to (a) prevent loss of access to any land or property and (b) prevent damage to land and property. The contractor shall compensate for any loss of income or damage as a result.
	<b>4.</b>	<b>Air Pollution</b>	
	<b>4.1</b>	<b>Generation of Dust</b>	
		(a)	The contractor shall effectively manage dust-generating activities such as earthwork during periods of high winds
		(b)	All stockpiles of material generating dust shall be located sufficiently away from sensitive receptors
		(c)	All vehicles delivering materials shall be covered to avoid spillage and dust emission;
		(d)	The contractor shall avoid, where possible and take suitable action to prevent dirt and mud being carried to the roads (particularly following wet weather);
		(e)	The contractor shall enforce vehicle speed limits to minimize dust generation

Environmental Issues		Protection And Preventative Measures To Be Taken By The Contractor	
		(f)	The contractor shall spray water for dust suppression on all exposed areas as required (note: the use of waste water / waste oil for dust suppression is prohibited);
		(g)	All cleared areas shall be rehabilitated progressively.
		(h)	All earthworks shall be protected to minimize generation of dust.
		(i)	All existing highways and roads used by vehicles of the contractor, any of his sub-contractors, or suppliers of materials; and similarly roads which are part of the works shall be kept clean and clear of all dust/mud or other extraneous materials dropped by such vehicles or their tires.
		(j)	Clearance shall be effected immediately by manual sweeping and removal of debris, or, if so directed by the Engineer, by mechanical sweeping and clearing equipment, and all dust, mud and other debris shall be removed satisfactorily. Additionally, if so directed by the Engineer, the paved areas/road surfaces shall be hosed or watered using appropriate equipments.
		(k)	Plants, machinery and equipment shall be so handled (including dismantling) so as to minimize generation of dust.
		(l)	The Contractor shall take precaution to reduce the level of dust emission from the batching plants up to the satisfaction of the Engineer and in accordance with the relevant emission norms.
<b>4.2</b>	<b>Emission from Batching Plants</b>		
		(a)	The batching plants shall be sited in accordance with Engineer's guidelines. It is recommended that batching plants be located sufficiently away from sensitive sites, if located outside the harbor. Sensitive sites include vulnerable habitats, religious, cultural and archaeological sites, residential areas, schools and industrial areas.
<b>4.3</b>	<b>Odor and Offensive smells</b>		
		(a)	Contractor shall take all precautions to prevent odor and offensive smells emanating from chemicals and processes applied in construction works or from labor camps. In a situation when/where odor or offensive smell does occur Contractor shall take immediate action to rectify the situation. Contractor is responsible for any compensation involved with any health issue arising out of bad odor and offensive smells.
		(b)	The waste disposal and sewerage treatment system for the labor camps shall be properly designed, built and operated so that no odor is generated. Compliance with the regulations on health and safety as well as CEA guidelines if any shall be strictly adhered to.
<b>4.4</b>	<b>Emission from Construction Vehicles, Equipment and Machinery</b>		
		(a)	The emission standards promulgated under the National Environment Act shall be strictly adhered to.
		(b)	All vehicles, equipment and machinery used for construction shall be regularly serviced and well maintained to ensure that emission levels comply with the relevant standards.
<b>5.</b>	<b>Noise Pollution and Vibration</b>		
<b>5.1</b>	<b>Noise from Vehicles, Plants and Equipment.</b>		
		(a)	All machinery and equipment should be well maintained and fitted with noise reduction devices in accordance with manufacturer's instructions.
		(b)	All vehicles and equipment used in construction shall be fitted with exhaust silencers. During routine servicing operations, the effectiveness of exhaust silencers shall be checked and if found to be defective shall be replaced. Notwithstanding any other conditions of contract, noise level from any item of plant(s) must comply with the relevant legislation for levels of sound emission. Non-compliant plant shall be removed from site.
		(c)	Noise limits for construction equipment used in this project (measured at one meter from the edge of the equipment in free field) such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws shall not exceed 75 dB(A).
		(d)	Maintenance of vehicles, equipment and machinery shall be regular and proper, to the satisfaction of the Engineer, to keep noise from these at a minimum.
		(e)	Workers in vicinity of strong noise, and workers working with or in crushing, compaction, batching or concrete mixing operations shall be provided with protective gear.
<b>5.2</b>	<b>Vibration</b>		
		(a)	Contractor shall take appropriate action to ensure that construction work does not result in damage to adjacent properties due to vibration.
		(b)	Prior to commencement of any activity that generates vibration the Contractor shall undertake a condition survey of existing structures within the zone of influence, as agreed with the engineer.

Environmental Issues		Protection And Preventative Measures To Be Taken By The Contractor	
		(c)	Contractor shall carry out monitoring at the nearest vibration sensitive receptor during blasting or when other equipments causing vibration are used.
		(d)	The contractor shall modify the method of construction until it is in compliance with the criteria, if vibration levels exceed the relevant vibration criteria.
<b>6.</b>	<b>Impact on Flora</b>		
	<b>6.1</b>	<b>Loss or Damage to Trees and Vegetation</b>	
		(a)	All works shall be carried out in a manner that the destruction to the flora and their habitats is minimized. Trees and vegetation shall be felled / removed only if they impinge directly on the permanent works or necessary temporary works. In all such cases contractor shall request prior approval from the Engineer.
		(b)	Contractor shall make every effort to avoid removal and/or destruction of trees of religious, cultural and aesthetic significance. If such action is unavoidable the Engineer shall be informed in advance and carry out public consultation and report on the same should be submitted to the Engineer.
		(c)	Contractor shall adhere to the guidelines and recommendations made by the Central Environmental Authority, if any with regard to felling of trees and removal of vegetation.
<b>7.</b>	<b>Impact on Fauna</b>		
	<b>7.1</b>	<b>Loss, Damage or Disruption to Fauna</b>	
		(a)	All works shall be carried out in such a manner that the destruction or disruption to the fauna and their habitats is minimized.
		(b)	Construction workers shall be instructed to protect fauna, aquatic life as well as their habitats. Hunting, poaching and unauthorized fishing by project workers is not allowed.
<b>8.</b>	<b>Disruption to Users</b>		
	<b>8.1</b>	<b>Loss of Access</b>	
		(a)	At all times, work in the harbor basin and shore areas shall be planned and carried out in a way that will minimize obstruction to the activities of fishermen (vessel movement, loading, unloading, fuelling, auctioning, boat repairing etc). The contractor shall, in close consultation with the representatives of the fishing community, develop a time chart of construction work and display it for purpose of public information.
		(b)	At all times, the Contractor shall provide safe and convenient passage for vehicles, pedestrians and livestock to and from side roads and property accesses connecting the access road. Work that affects the use of access roads and existing accesses shall not be undertaken without providing adequate provisions to the prior satisfaction of the Engineer.
		(b)	The works shall not interfere unnecessarily or improperly with the convenience of public by use and occupation of public or private roads, railways and any other access footpaths to or of properties whether public or private.
		(c)	On completion of the works, all temporary obstructions to access shall be cleared away, all rubbish and piles of debris that obstruct access shall be cleared to the satisfaction of the Engineer.
	<b>8.2</b>	<b>Traffic Jams and Congestion</b>	
		(a)	Contractor shall assess the impact of his activities on traffic in access roads and plan for minimizing traffic related inconvenience to public shall be submitted to the Engineer for approval. If directed by the Engineer the contractor shall obtain the consent for the traffic re-arrangement from the Local Police.
		(b)	Any temporary diversion of traffic to facilitate construction work shall have the approval of the Engineer. If directed by the Engineer the Contractor shall obtain the consent for the traffic re-arrangement from the Local Police.
		(d)	The contractor shall ensure that the running surface is always properly maintained, particularly during the monsoon so that no disruption to the traffic flow occurs.
		(e)	The temporary traffic detours shall be kept free of dust by frequent application of water, if necessary.
		(f)	Personnel used for traffic control by the contractor shall be properly trained, provided with proper gear including communication equipment and luminous jackets for night use. All signs, barricades, pavement markings used for traffic management should be to the standards and approved by the Engineer/ Police.
	<b>8.3</b>	<b>Traffic Control and Safety</b>	
		(a)	The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect, and maintain such barricades, including signs, markings, flags, lights and flagmen as may be required by the Engineer for the information and protection of traffic using the access roads.
<b>9.</b>	<b>Accidents and Risks</b>		

Environmental Issues		Protection And Preventative Measures To Be Taken By The Contractor	
	<b>9.1</b>	<b>Public and Worker Safety</b>	
		(a)	All reasonable precautions will be taken to prevent danger to the workers and the public from accidents such as fire, explosions, blasts, falling rocks, falling to excavated pits, breaking flood diversions, chemical sprays, unsafe power supply lines etc.
		(b)	The Contractor shall comply with requirements for the safety of the workmen as per the <u>international labor organization (ILO) convention No. 62</u> and Safety and Health regulations of the Factory Ordinance of Sri Lanka to the extent that those are applicable to this contract. The contractor shall supply all necessary safety appliances such as safety goggles, helmets, masks, boots, etc., to the workers and staff.
	<b>9.2</b>	<b>Prevention of Risks of Electrocution</b>	
		(a)	All electrical wiring and supply related work should conform to relevant Sri Lankan Standards. Adequate precautions will be taken to prevent danger of electrocution from electrical equipment and power supply lines including distribution boards, transformers, etc. Measures such as danger signboards, danger/red lights, fencing and lights will be provided to protect the public and workers. All electric power driven machines to be used in the construction shall be free from defect, be properly maintained and kept in good working order, and be regularly inspected to the satisfaction of the Engineer.
	<b>9.3</b>	<b>Risk at Hazardous Activity</b>	
	(a)	All workers employed in hazardous activities shall be provided with necessary protective gear. These activities include mixing asphalt material, cement, lime mortars, concrete, etc., welding work, work at crushing plants, blasting work, operators of machinery and equipment such as power saws, etc.	
	(b)	The use of any toxic chemical shall be strictly in accordance with the manufacturer's instructions. The Engineer shall be notified of toxic chemicals that are planned to be used in all contract related activities. A register of all toxic chemicals delivered to the site shall be kept and maintained up to date by the Contractor. The register shall include the trade name, physical properties and characteristics, chemical ingredients, health and safety hazard information, safe handling and storage procedures, and emergency and first aid procedures for the product.	

<b>10.</b>	<b>Health and Safety</b>		
	<b>10.1</b>	<b>Prevention of Vector-born Diseases</b>	
		(a)	Contractor shall take necessary actions to prevent breeding of mosquitoes at places of work, labor camps, plus office and store buildings. Stagnation of water in all areas including gutters, used and empty cans, containers, tires, etc. shall be prevented. Approved chemicals to destroy mosquitoes and larvae should be regularly applied.
		(b)	Contractor shall keep all places of work, labor camps, plus office and store buildings clean and devoid of garbage to prevent breeding of rats and other vectors such as flies.
	<b>10.2</b>	<b>Workers Health and Safety</b>	
		(a)	Contractor shall comply with the provisions in Health and Safety regulations under the Factory Ordinance with regard to provision of health and safety measures and amenities at work place(s).
	<b>10.2</b>	<b>First Aid</b>	
		(a)	At every workplace, first aid kit shall be provided as per the regulations. At every workplace an ambulance room containing the prescribed equipment and nursing staff shall be provided.
	<b>10.3</b>	<b>Potable Water</b>	
		(a)	In every workplace and labor camp potable water shall be available through out the day in sufficient quantities. Water should be easily accessible. In general cold potable water is acceptable.
	<b>10.4</b>	<b>Hygiene</b>	
		(a)	The contractor shall provide and maintain necessary (temporary) living accommodation and ancillary facilities for labor to standards and scale approved by the resident engineer.
		(b)	At every workplace and labor camp a sufficient number of bathing facilities, latrines and urinals shall be provided in accordance with the Health and Safety regulations and/or as directed by the Engineer. These bathroom and toilet facilities shall be suitably located within the workplace/buildings. Latrines shall be cleaned at least three times daily in the morning, midday and evening and kept in a strict sanitary condition. If women are employed, separate latrines and urinals, screened from those for men and marked in the vernacular shall be provided. There shall be adequate supply of water, within and close to latrines and urinals.
		(c)	The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place. Compliance with the relevant legislation must be strictly adhered to
		(d)	Garbage bins must be provided in the camp and regularly emptied and the garbage disposed off in a hygienic manner. Construction camps shall have a clean hygienic environment and adequate health care shall be provided for the work force.
		(d)	Unless otherwise arranged for by the Local Authority, the contractor shall arrange proper disposal of sludge from septic tanks. The contractor shall obtain approval for such disposal from the Public Health Inspector of the area.
<b>11</b>	<b>Protection of Archaeological, Cultural and Religious Places and Properties</b>		
	<b>11.1</b>	<b>Chance-found Archaeological Property</b>	
		(a)	All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest etc. discovered on the site and/or during construction work shall be the property of the Government of Sri Lanka, and shall be dealt with as per provisions of the relevant legislation.
		(b)	The Contractor shall take reasonable precaution to prevent his workmen or any other persons from removing and damaging any such article or thing and shall, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the Engineer's instructions for dealing with the same, awaiting which all work shall be stopped in the respective area.
		(c)	If directed by the Engineers the Contractor shall obtain advice and assistance from the Department of Archaeological of Sri Lanka on conservation measures to be taken with regard to the artifacts prior to recommencement of work in the area.
<b>12</b>	<b>Environmental Enhancement</b>		
		Handling Environmental Issues during Construction	
		(a)	The Contractor will appoint a suitably qualified Environmental Officer following the award of the contract. The Environmental Officer will be the primary point of contact for assistance with all environmental issues during the pre-construction and construction phases. He/She shall be responsible for ensuring the implementation of EMAP.

		(b)	The Contractor shall appoint a person responsible for community liaison and to handle public complaints regarding environmental/social related matters. All public complaints will be entered into the Complaints Register. The Environmental Officer will promptly investigate and review environmental complaints and implement the appropriate corrective actions to arrest or mitigate the cause of the complaints. A register of all complaints is to be passed to the Engineer within 24 hours after they are received, with the action taken by the Environmental Officer on complaints thereof.
		(c)	Contractor shall develop suitable method to receive complaints. The complaint register shall be placed at a convenient place, easily accessible by the public.
		(d)	The contractor shall be responsible in reporting the implementation of the EMAP to the employer based on an agreed reporting format either monthly or periodically, as agreeable. The report should carry observations of the 'Engineer' who will be monitoring compliance with EMAP continuously. Periodic field supervision shall be undertaken by the employer (or representatives) to make observations on the implementation progress of the EMAP.

## **7 Conclusions**

The findings of the EA clearly indicate that potential adverse environmental and social consequences of project activities on the surrounding environment are minor and mitigable, provided that the recommended measures in the EMAP are properly implemented. In addition, from an economic and social point of view, the proposed project will be a boost to the local economy and provide stimulus for the growth of the fisheries sector. The harbor rehabilitation activities have been long awaited by its users and will greatly help overcome some of the operational and functional difficulties faced at present.

Therefore, it is concluded that the proposed rehabilitation work in Mirissa harbor will have a significant positive impact to the community and environment as long as precautionary measures are adopted to minimize the potential adverse impacts identified.

## 8 References

1. Rajasuriya A, Ohman MC, Svensson S (1998) Coral and Rock Reef Habitats in Southern Sri Lanka: Patterns in the Distribution of Coral Communities. *AMBIO* 27: 8: 723-728
2. Ohman MC, Rajasuriya A, Svensson S (1998) The Use of Butterflyfishes (Chaetodontidae) as Bioindicators of Habitat Structure and Human Disturbance. *AMBIO* 27, 8: 708-716
3. Rajasuriya A, Karunaratne MMC (2000) Post bleaching status of coral reefs in Sri Lanka. In: Souter D, Obura D, Linden O (eds.) *Coral Reef Degradation in the Indian Ocean: Status report 2000*. CORDIO/SAREC Marine Science, Sweden, pp 54-63
4. Rajasuriya A (2002) Status Report on the Condition of Reef Habitats in Sri Lanka 2002. In: Linden O, Souter D, Wilhelmsson D, Obura D (eds.) *Coral Reef Degradation in the Indian Ocean: Status Report 2002*. CORDIO, Department of Biology and Environmental Science, University of Kalmar, Sweden, pp 139-148
5. Rajasuriya A (2005) Status of coral reefs in Sri Lanka in the aftermath of the 1998 coral bleaching event and 2004 tsunami. In: Souter D, Linden O (eds.) *Coral Reef Degradation in the Indian Ocean: Status Report 2005*. CORDIO, Department of Biology and Environmental Science, University of Kalmar, Sweden, pp 83 – 96
6. Dassanayake, D.M.H.P., N.A.I. de Silva and D.T.I. Munasinghe, 2000. Review of Fishery Harbour Planning, Designing and Management. Department of Civil Engineering, University of Moratuwa, Sri Lanka.
7. ECL, 1997. Fishery Harbour Project at Hikkaduwa – Environmental Impact Assessment Report. Engineering Consultants Limited, Sri Lanka.
8. Garg, S.K., 1979. Sewage Disposal and Air Pollution Engineering – Environmental Engineering (Vol. II). Khanna Publishers, Dehli-110006, India
9. Guhathakurta, H. and A. Kaviraj, 2004. Effects of salinity and mangrove detritus on desorption of metals from brackish water pond sediment and bioaccumulation in fish and shrimp. *Acta Hydrochimica Hydrobiologica*, 32: 411-418.
10. Hopley, D., 1989. *Australian Geographical Issues: The Great Barrier Reef: Ecology and Management*. Longman Cheshire, Coventry Street, Melbourne, Australia.
11. NARA, 1993. Investigation of the Hydrological Processes in Weligama Bay. National Aquatic Resources Agency, Sri Lanka.
12. Paul, J., 2002. Microbial degradation of the poly chlorinated biphenyls (PCBs) present in the environment. A critical approach. In: Markandey, D.K. and

- Markandey, N.R. (Ed.), *Microorganisms in Bioremediation*. Capitol Publishing Company, New Delhi, India, pp. 127-138.
13. Sotheeswaran, S., 2001. *Environmental Organic Chemistry – Monograph 11*. Institute of Chemistry, Ceylon.
  14. *Standard Methods for the Examination of Water and Wastewater* (1995). 19<sup>th</sup> edn., American Public Health Association/ American Water Works Association/Water Environment Federation, Washington DC, USA.
  15. USAID, 2005. USAID, Sri Lanka Tsunami Reconstruction Program (TRP) – Initial Environmental Examination (IEE) Report. USAID Sri Lanka.
  16. 22 CFR 216 Agency Environmental Procedures - USAID

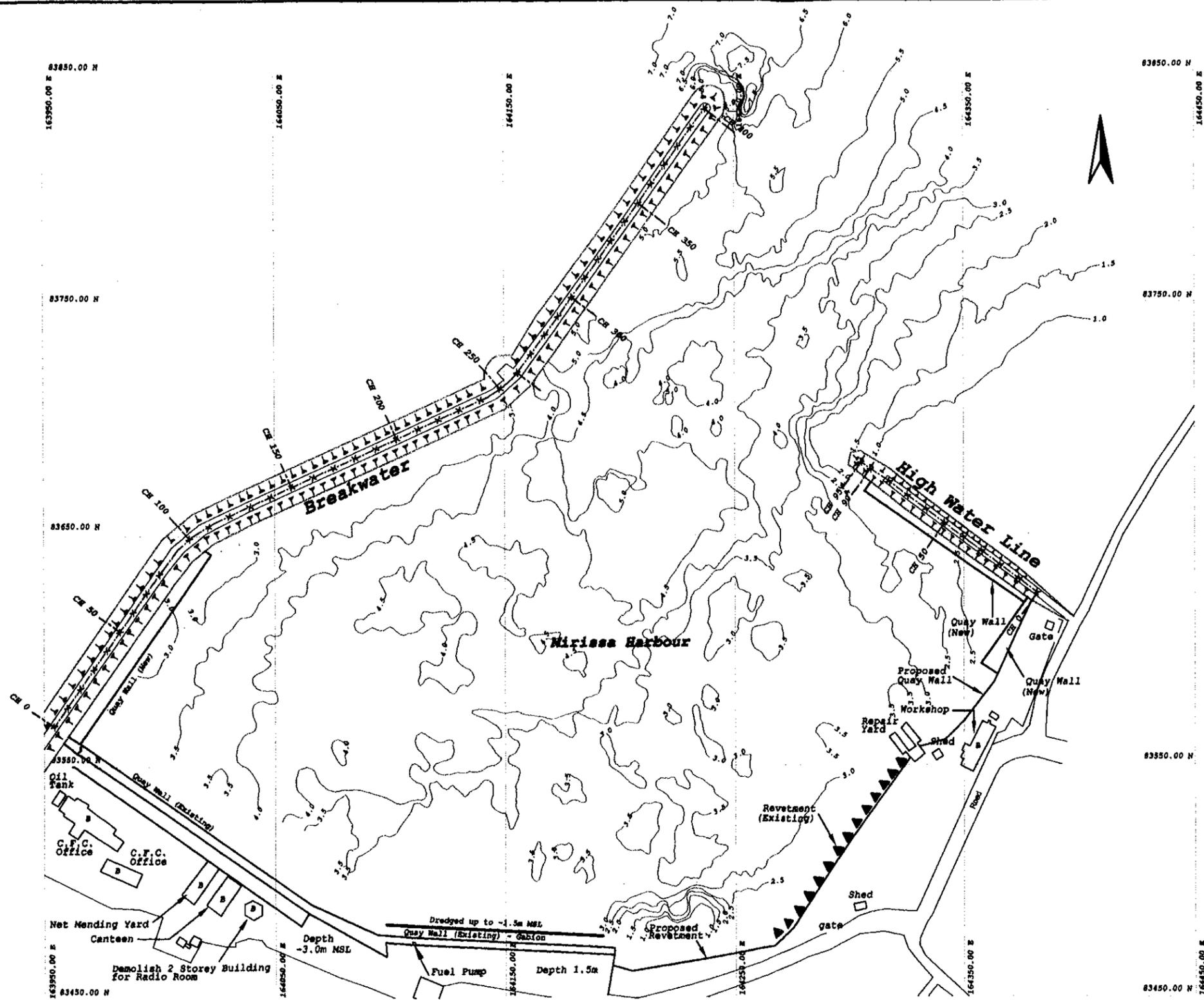
### Annex 1 – Members of the EA team

<b>Name</b>	<b>Position</b>	<b>Responsibility</b>
Ms. Nadeera Rajapakse	Lead Author and Coordinator	Co-ordination, compilation, editing and final presentation of report
Dr. Mahesh Jayaweera	Environmental Engineer	Compiling the physical environment of Mirissa
Mr. Arjan Rajasuriya	Marine Ecologist	Compilation of the biological environment of Mirissa
Mr. K. Jinapala	Social Scientist	Compilation of the socio-economic environment of Mirissa
Dr. Vasantha Sriwardhane	Environmental Engineer	Compilation of the project description and reviewing the final report
Ms. Amy Bodmann	Participatory Coastal Management Lead	Review of the final report
Socio-economic survey team	Data collectors	Collection of socio economic data for the EA

In addition to the responsibilities mentioned above, the entire team participated in the identification of possible impacts and in proposing suitable mitigatory measures.

## Annex 2 - Layout plan of proposed harbor rehabilitation work in Mirissa

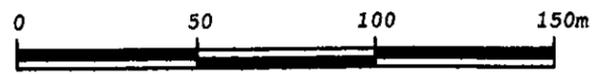
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**Work Proposed under this Contract**

<u>Main Breakwater</u>	
1). Primary repair - Seaside	-33 - 0
2). Widen turning circle	85 - 115m
3). New armour in Seaside of 2 <sup>nd</sup> turning circle	250 - 275m
4). Re-arrangement of armour - Seaside slope	0 - 400m
5). Primary armour layer in harbour side	0 - 400m
6). No of armour for reuse (6-8T)	60 Nos
<u>Secondary Breakwater</u>	
1). Head repair	15m from circle center
2). Slope maintenance and conversion to a quay wall at harbour side	0 - 95m
<u>Quay Wall (Existing)</u>	
1). Dredging along gabion wall - 1.5m depth	120m
<u>Quay Wall (New)</u>	
1). Quay wall length near main breakwater	100m
2). Quay wall length near secondary breakwater	42m
<u>Revetment (Existing)</u>	
1). Slope maintenance	100m
<u>Dredging</u>	
1). Dredging near existing quay wall (-1.5m depth)	120m

*Draft*



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Project : Sri Lanka Tsunami Reconstruction Program	Design By: -	Drawn By: TMS	Date: 08-12-2005
Title: Mirissa Fishery Harbour - Layout of Proposed Work	Scale: As shown	Drawing No: Mir 1	

### Annex 3 - Socio-economic statistics in Project impact area (six GN divisions)

GN division	Population by gender		Total population	Fisheries population by gender		Total fisheries population	% of fisheries population of total population
	Female	Male		Female	Male		
			-			-	-
Mirissa South 1	967	893	1,860	568	547	1,115	60
Mirissa South 2	1,294	1,138	2,432	1,153	1,065	2,218	91
Udumulla	638	617	1255	413	382	795	63
Udupila	1,867	1,333	3200	586	521	1,107	34
Polwathu Modara	621	558	1,179	543	522	1,065	90
Mirissa North	584	564	1,148	452	418	870	76
Total	5,971	5,103	11,074	3,715	3,455	7170	65

**Table 1** - Population in project impact area (six GN divisions)

Educational level	Mirissa South 1		Mirissa south 2		Udumulla		Udupila		Polathumodara		Mirissa North	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Not attending school	315	17	517	21	201	16	348	11	275	23	271	24
Not gained formal education	68	4	73	3	82	6	96	3	80	7	42	4
Grade 1-5	490	26	587	24	298	23	798	25	321	27	232	20
Grade 6-10	631	34	841	35	406	32	1,360	42	392	33	393	34
G.C. E (O/L)	262	13	311	12	173	15	392	12	74	6	117	10
G.C.E (A/L)	88	5	93	4	81	7	188	6	35	3	81	7
University education	06	1	10	1	14	1	18	1	2	0.5	12	1
Total	1,860	100	2,432	100	1,255	100	3,200	100	1,179	100	1,148	100

**Table 2** - Educational levels among communities in project impact area (six GN divisions)

Type	Mirissa South 1		Mirissa south 2		Udumulla		Udupila		Polathumodara		Mirissa North	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Government sector	61	10	82	7	49	13	77	15	41	7	65	16
Private sector	98	16	138	12	61	16	91	18	80	14	74	18
Fisheries sector	383	62	817	71	230	60	279	55	414	72	216	52
Other activities	71	12	116	10	42	11	62	12	40	7	57	14
Total and percentage	613	100	1153	100	382	100	509	100	575	100	412	100

**Table 3** - Employment in six GN divisions (the project impact area)

Income levels – Rs /month	Mirissa South 1		Mirissa south 2		Udumulla		Udupila		Polathumodara		Mirissa North	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 5000	36	16	72	13	39	22	28	22	47	15	47	21
5001-10,000	43	19	146	26	46	26	25	20	74	25	42	19
10,001-15,000	54	24	196	36	52	29	31	25	90	30	60	28
160001-20,000	62	28	112	20	22	12	29	23	51	17	39	18
More than 20,000	30	13	26	5	19	11	12	10	38	13	30	14
Total	225	100	552	100	178	100	125	100	300	100	218	100

**Table 4** - Income levels among families in project impact area (6 GN divisions).

Production system	Information on expenditure and income
1	<ul style="list-style-type: none"> <li>• <b>Type of boats used</b> – Small canoe, Small mechanized boat or wooden traditional boat</li> <li>• <b>Number persons involved</b> – Two</li> <li>• <b>Varieties of fish normally caught</b> – <i>Alaguduwa, Hurulla, Linna, Bolla, Makaruwa, Salaya, Sudaya</i></li> <li>• <b>Daily catch</b> – 150 Kg</li> <li>• <b>Sale price (average)</b> – Rs30/kg</li> <li>• <b>Gross income/day</b> – Rs 4,500</li> <li>• <b>Daily gross cost</b> – Rs 1500 for fuel, Rs. 300 for meals, Rs 200 for other expenses, totaling Rs 2,000/day</li> <li>• <b>Net income/day</b> – Rs 2,500</li> <li>• <b>Distribution of the net income</b> – Rs 1,250 (50% of the total net income accrues to the boat owner)</li> <li>• <b>For two helpers</b> – Rs 650 each (balance after deduction of the boat owner's share)</li> </ul>
2	<ul style="list-style-type: none"> <li>• <b>Type of boats used</b> – One day mechanized boats</li> <li>• <b>Number persons involved</b> – Four</li> <li>• <b>Varieties of fish normally caught</b> – <i>Alguduwa, Teliya, Gal malu and Talapath</i></li> <li>• <b>Daily catch</b> – 300kg/day</li> <li>• <b>Average sale price</b> – Rs 50/kg</li> <li>• <b>Gross income/day</b> – Rs. 15,000</li> <li>• <b>Daily gross cost</b> – Rs 2,300 for fuel, Rs. 600 for meals, Rs 600 for other expenses, totaling Rs 3,500/day</li> <li>• <b>Net income/day</b> – Rs 11,500/day</li> <li>• <b>Distribution of the net income</b> – Rs 5,750 (50% of the total net income accrues to the boat owner)</li> <li>• <b>For four helpers</b> – Rs 1,437 each (balance after deduction of the boat owner's share)</li> </ul>
3	<ul style="list-style-type: none"> <li>• <b>Type of boats used</b> – Multi-day mechanized boats</li> <li>• <b>Number of persons involved</b> – five</li> <li>• <b>Varieties of fish normally caught</b> – <i>Balaya, Talapath, Kelawalla, Moru, Madu, Linna, Sapparu</i></li> <li>• <b>Monthly catch</b> – 5000 (for raw fish), 2000kg (for dry fish)</li> <li>• <b>Average sale price</b> – Rs 75/kg raw fish and Rs 150/kg dry fish</li> <li>• <b>Gross income/month</b> – Rs. 675,000</li> <li>• <b>Monthly gross cost</b> – Rs 120,000 for fuel, Rs. 40,000 for meals, Rs 10,000 for water, Rs 20,000 for ice, Rs 10,000 for salt, totaling Rs 200,000/month</li> <li>• <b>Net income/month</b> – Rs 475,000/month</li> <li>• <b>Distribution of the net income</b> – Rs 237,500 (50% of the total net income accrues to the boat owner)</li> <li>• <b>For five helpers</b> – Rs 47,500/month each (balance after deduction of the boat owner's share)</li> </ul>

**Table 5** – Details of cost of production and income of three fish production systems

GN division	Completely depend on fisheries as income		The families having other supplementary income sources		Total families
	No.	%	No	%	
					-
Mirissa South 1	159	71	66	29	225
Mirissa South 2	474	86	78	14	552
Udumulla	110	62	68	38	178
Udupila	81	65	44	35	125
Polwathu Modara	240	80	60	20	300
Mirissa North	166	76	52	24	218
Total	1,230	77	368	23	1,598

**Table 6** - The composition of income sources of harbor beneficiary families

Type of boat	Number	%
Small boats	65	24
One day boats	36	14
Multi-day boats	110	42
Mechanized canoe	30	11
Traditional wooden boats	25	9
Total	266	100

**Table 7** - type of boats being used in the Mirissa harbor

Boat size	Amount (Rs/month)
Oru	50
OBM	115
28-29 feet	230
30-34 feet	460
35-39 feet	690
40-44 feet	920
45-49 feet	1150
50-54 feet	1380
55-60 feet	1800

**Table 8** - Monthly registration fees collected from the fishermen (prevailing tariff system)

Annex 4 - Map showing the location of rock quarry

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Scale

### Annex 5 - List of people interviewed in the preparation of the EA for Mirissa harbor

<b>Name</b>	<b>Position and address</b>
Assistant divisional secretary	Weligama- Divisional secretary office
Manager	Mirissa Fishery harbor
Grama Niladhari ( GN)	Mirissa South-1
GN	Mirissa North
GN	Polathumodara
GN	Mirissa South-2
Fisheries Inspector	Mirissa Harbor
Wasantha Kumuduni	Weheragolla, Mirissa
M. Leelarathna	Weheragolla, Mirissa
N.N. Abedeera	Weheragolla, Mirissa
M. Lasanga Leelarathna	Weheragolla, Mirissa
Ranjani Kusumalatha	Weheragolla, Mirissa
M. Sarath Chndrasiri	Weheragolla, Mirissa
N. Kumarasingha	Weheragolla, Mirissa
H. Abewickrema	Weheragolla, Mirissa
N.N. Dayasiri	Harbor Road, Mirissa
R. Chandrani Weerasingha	Harbor Road, Mirissa
K.P. Kaluthotage	Harbor Road, Mirissa
R.H. Chndrasiri	Harbor Road, Mirissa
Daya Gunathilaka	Harbor Road, Mirissa
Liyanage Anurasiri	Harbor Road, Mirissa
K.W.P. Silva	Harbor Road, Mirissa
H.P. Hetti Archchi	Weheragolla , Mirissa

## Annex 6 – Consultations in Fishery Harbor Communities

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**Sri Lanka Tsunami Reconstruction Program (SLTRP)**  
**USAID Contract # 386-C-00-05-00166-00**

# Harbor Consultations Report

December 22, 2005



*In association with CHEMONICS, DEVTECH, FNI, Engineering Consultants LTD., EML  
Consultants, Lanka Hydraulic Institute, MICD and Uni- Consultancy Service*

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  - B. Mirissa
  - C. Hikkaduwa
- IV Lessons Learned and Next Steps

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Annex 7 – Newspaper article on team’s harbor visits, 6<sup>th</sup> Dec 2005, Divaina (sinhala paper).

## **Section I. Executive Summary**

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### **Project Background**

The Sri Lanka Tsunami Reconstruction program (SLTRP) was implemented in response to devastation inflicted by a tsunami that swept over more than 700 miles of the Sri Lankan coastline on December 26, 2004. The program has three aspects which includes physical reconstruction, vocational education and coastal management components. The SLTRP adopts a cross cutting participatory in these components that aims to promote community ownership of the project interventions.

### **The Harbor Consultations**

In the start up stage, the project looked at the community consultations and meetings as a way to kick start the participatory component of the project. Concurrently observations were made towards developing a strategy to take the participatory approach forward in this project that would potentially play a role in setting in place the longer term goals of the project. This report provides an overview of the outcomes of these initial consultative meetings by the Sri Lanka Tsunami Reconstruction Project (SLTRP) team in the harbors and highlights the priorities the fishing community selected for consideration in the harbor reconstruction components of the project.

The consultations were carried out early in the project assessment phase to allow stakeholders an opportunity to provide input to fishery harbor reconstruction. Additionally, the intention was to solicit information that would provide the groundwork for catalyzing a participatory coastal resource management and planning exercise, which will be defined as work progresses in collaboration with USAID.

For reasons of proximity the first series of consultations were organized in the harbors with the “Harbor Fishery Committees” (comprised of a membership of the fishermen using each harbor) through the facilitation of the harbor managers with support from the project. Due to the presence of a wider fishing community outside the harbors, some meetings were conducted with fishing community, women’s groups and families outside the harbors, to solicit information on the prevailing context to support a participatory coast management plan in the future. Notes from these discussions have been presented in Annex 4 of this document, so as not to detract from the issues raised inside the harbors necessary for the reconstruction component. .

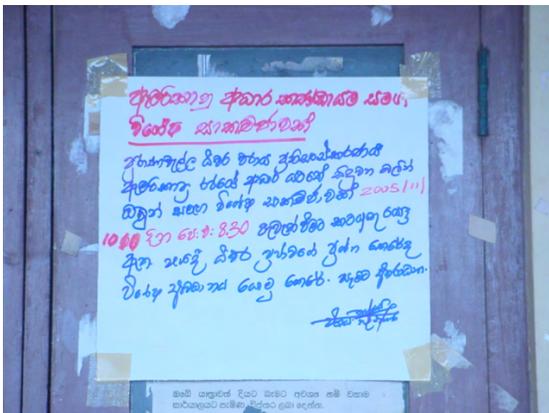
The team from CH2MHill carrying out these meetings consisted of Mr. Anil Premaratne, Participatory Coast Management consultant, Ms. Nadeera Rajapakse, Environmental lead, Ms. Tania Weerasooria, Outreach and Public Awareness consultant and Ms. Amy Bodmann, Coastal Zone Management consultant. The team concludes that, although these initial meetings were a valuable first step, further arrangements to bring tangible benefits to community needs to occur in the short term as the construction develops. In-house team discussions to identify ways to do this have taken place and will get formalized as the project evolves. Through these strategies it is intended to promote user community ownership of the construction process.

The consultative process indicated that three fundamental needs exist in all three sites with regards to harbor infrastructure; these include: 1) safe access and entry into the harbor; 2) dredging to allow for more effective use of the harbor space; and 3) addition, extension, or rehabilitation of quays, jetties (anchoring facility), and breakwaters to secure the safety of boats docked within the harbor, and improve efficiency of services (i.e. reduce turn around time of boats). The unique issues identified in each harbor by the groups consulted, both multi-day boat and small boat owners, are described in more detail within this report.

## Section II: The Approach

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With the endorsement of the Ceylon Fisheries Harbor Corporation (CFHC) HQ in Colombo, the project contacted the harbor manager in each respective harbor selected for reconstruction under this project. On an initial visit to these sites the harbor managers agreed to organize consultation sessions to solicit feedback from fishermen in the harbor with involvement from the project team to lead the discussions.



- Annoucement and Gathering at Puranawella

Among other meetings held by the SLTRP team in preparation for the consultations, a meeting was held in Colombo with the USAID Transparent and Accountable Local Governance (TALG) Project. The result of this meeting was an agreement to collaborate, specifically through the use of officers in the Local Authorities who were trained by the Asia Foundation as facilitators to assist in the consultation activities. An intention here was also to build linkage with another USAID intervention in the area and facilitate synergies that would benefit the overall impact of the projects in the longer term.

The planned agenda for each session was to identify and discuss the issues in each harbor, allow time for facilitated group work under the headings – a) infrastructure, b) management, c) social d) economic e) environment; and finally to review and prioritize issues in plenary sessions. However in practice, the group work only partially followed this format, and that too only at two of the locations, with the dominant voices, mainly multi-day boat owners taking control of the discussions. A second round of consultations through focus group meetings with small boat operators were also carried out for each harbor . Given what the fishermen expected from the project, the discussions

were mainly around the issues of the subject of infrastructure, and the other topics were only marginally addressed. For the construction component this has been deemed sufficient at this stage of the project, and it is believed that an initial sense of involvement has been created within the fishermen in the project planning process.

### **Section III: Priority Issues Identified at each Harbor Consultation**

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Provided in this section are the issues and requirements that emerged from the harbor consultations in general at each locality, and below that the specific issues prioritized at each locality. Annex I to III presents the issues at each site listed in the order that they were raised, with the issues selected as priority during the last stage of discussion given a ranking number. In the main body of the text only the priority list has been provided.



- Meeting in progress, Mirissa

The informal discussions following the closure of the meeting and during the walk-about with the fishermen inside the harbor with volunteers identified during the session, point to three main cross cutting issues in all three harbors. These are -

- a) Access to the harbor from the sea, (especially at Hikkaduwa);
- b) Depth of the harbor; and
- c) The need to extend quay /and anchoring facility in a manner that protects boats from various risks of damage, and basic facilities such as fuel, drinking water, etc.

As stated, the full lists of issues identified at each harbor are provided in annexes to this report.

In the case of the small boat owners, the three main issues highlighted were as follows -

- a) The reconstruction to provide a separate area for anchoring of small boats
- b) In proximity to this anchoring area, provide a lower pier so that the larger boats would not encroach into that area.
- c) Provide a kerosene oil pumping station within the harbor in proximity to the small boat anchorage. These three services, if provided, would encourage payment of the harbor

fee to the Corporation, they said. Presently very few small fishermen are registered within the harbor as services to them are limited.

The above sets of factors were highlighted by multi day boat owners and small boat owners respectively. The first round of consultations at each harbor site with the Harbor Fishery committees, highlighted the harbor requirements for multi-day boat, but many of these are of relevance to the small boats as well. The general concerns of the small boat owners which were captured separately, have been presented in boxes below the priority list for each harbor as stated by the fishermen.

### **Puranawella Harbor**

The following issues were identified and flagged as priorities by the Harbor Fishery Committee at Puranawella Harbor:

- **Priority No. 1:** The need to deepen the harbor basin, including removal of boulders, was a main issue prioritized by the fishermen in this harbor. An underlying qualification to this request was to make the access to the harbor safer. The depth in this harbor in some places is as low as one meter. For the proper utilization of this harbor a depth of three meters in the harbor basin was requested.
- **Priority No. 2:** Inadequate anchoring facilities in the harbor for securing the boats were highlighted by the fishermen. Extension to the existing pier facility has been suggested along the breakwaters and/or even in the middle of the harbor water as a floating jetty, in a manner that protects boats from damage due to boat congestion and wave action in the harbor. At present there area wave actions and currents that comes into the harbor that jostles the anchored boats and cause damage.
- **Priority No. 3:** The need to extend quay facilities specifically to enable unloading and refueling, loading water, supplies, etc. The fishermen consulted suggested that this could be added along the breakwater, if feasible.
- **Priority No. 4:** Boat repair facilities are lacking inside the harbor, and the need for crane and slipway facilities was presented.



- Group work at Puranawella

- Priority No. 5: There is a need to relocate the toilet facility. The participants expressed concern over the fact that there was yet a handful among them using the beach for their toilet purposes. This was due to both the inconvenient location of the existing toilets, as well as the habit of living close to the elements as the fishermen are used to. There was interest to have the toilet relocated and expanded facilities combined with interventions from the Public Health Inspector to motivate and enforce use of the toilets. (it is our view that this should be together with the Harbor Fishery Committees if to obtain results)

The attendant list of this meeting records 65 fishermen participating in this meeting, many of them multi-day boat owners/users. The meeting was conducted with a notable enthusiasm on the part of the fishermen present to express their concerns. The full list of concerns expressed demonstrated acceptance of the environmental issues in the harbor, for fish waste and other refuse. Garbage bins and other solutions were requested.

Notes on the general concerns of the small boat owner fishermen:

*Puranawella:*

“Our small boats break when the larger ones knock against them. The harbour is filling...it needs to be dredged. We badly need pier facility separated out for our boats. Also, there is no place for boat repair when engines break down and we are forced to transport it to distant workshops, another expense. Inside the harbour there is no place for resting. We need a place to keep an engine safe inside the harbor so that we don't have to carry them all the way to our homes. The Sanasa and the Ceylinco small credit schemes for women are operating in this area. Our women folk take these loans and help us with buying nets and other fishing equipment we need”.

### **Mirissa Harbor**

The following issues were identified as priorities by the Fishery Committee at Mirissa Harbor:

- Priority No. 1: The committee identified the need for three jetties to anchor day boats and multi-day boats separately to prevent damage (two piers for large boats, one for small boats). At present large and small boats can be seen tied into together at the piers. There is a need to introduce more order and efficiency into the docking system, in addition to extending the existing docking facilities.
- Priority No. 2: No suitable location currently exists in the harbor for boat repair and improvement. It seems that boat damage occurs frequently in this harbor. There had previously been a boat repair facility which had been leased out to a private operator on a 33-year plan. This facility was not functioning or was operating very poorly, even leading to further damage of boats, and consequently not being used by the fishermen.
- Priority No. 3: The ice plant was damaged by the Tsunami, and no longer produces ice. There is a building in this harbor that had housed an ice plant previously. As in the case of the boat repair facility, this had been given on a 33-year lease to a private operator. But this too remains non-operational (not clear if this was the case even before Tsunami; will have to check from Harbor Managers).
- Priority No. 4: The auction hall at the edge of the pier is blocking the entry of vehicles for loading; therefore the participants expressed a desire to relocate to another position. An auction

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hall had been built by the Harbor Corporation at a location against the wishes of the fishermen. This building is sited very close to the quay and restricts the fish unloading activities.

- Priority No. 5: The speed of the fuel machines is very slow, and an increased number of fueling points would improve efficiency. There were several complaints due to the delays experienced at unloading, refueling and loading points. This was the rationale behind this complaint (and the following point). A keen management look at this operation was requested to make this process more efficient.
- Priority No. 6: Water availability for both washing of fish and drinking purposes (water pipe connections) is not meeting demand.
- Priority No. 7: There was an expressed need for slipway or mobile crane (cheaper maintenance option) for repairs. This point is connected to the request for a repair workshop facility (Priority No. 2)

The attendant list of this meeting records 46 fishermen participating in this meeting, many of them multi day boat owners/users.

#### Notes on the general concerns of the small boat owner fishermen:

##### *Mirrissa*

“We need a clearly demarcated area for the small boats. It would really help if an area is construct to get on and off the boats, and a place to hang (anchor) the boats. The places where the rock wall is falling needs to be secured. The method of fishing we mainly practice in our small fishing boats is *course-line*. (Anil is this correct) About 8-10 persons go in a course line boat”.

### Hikkaduwa Harbor



- Drawing of harbor brought by the fishermen. Issues raised during discussion being noted down by facilitator (trained by the USAID/TALG project)

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The following issues were identified as priorities by the Fisheries Committee at Hikkaduwa Harbor:

- Priority No. 1: The entrance to the harbor from the sea is treacherous. This needs to be made safer, for example by shifting out the breakwater. The issue of safe passage was expressed in various ways at each harbor discussion, and was most emphasized at Hikkaduwa.
- Priority No. 2: Deepening the harbor. This again was a recurrent issue in each harbor with the most acute appearing to be experienced in Hikkaduwa.
- Priority No. 3: Reconstruct jetty from northern side. Another recurring issue, this request was to extend the boat docking facilities, either using a breakwater in a dual role, or in another manner as the engineers find feasible through their investigations.
- Priority No. 4: Security within harbor is an issue; there was a request for the construction of a security wall around the harbor. (Note: This request was made by the UC Chairman, and it was not clear how much the fishermen request this.)
- Priority No. 5: Extend breakwater in north to the length of the southern breakwater. (There is some lack of clarity and consensus on what the true issue is with regard to this point; however keen interest was shown on this matter (connected to Issue 1 on safe access to harbor from the sea). The fishermen gathered for the meeting had come with a colored drawing of the break water locations in the harbor to illustrate how they perceive the structures would best support the safety factor. The SLTRP team made clear to the participants that these matters will get decided upon following the hydraulic and engineering investigations. It is recommended the designs – once closer to finalization – are presented by the project engineers directly to the fishermen, to appeal directly for the latter's buy-in and understanding prior to finalization and construction.
- Priority No. 6: A crane to lift multi day boats is needed. Again, a lack of repair facilities is a recurring issue in all three harbors. This point and the following relate to this concern.
- Priority No. 7: A workshop to repair engines.

The attendant list of this meeting records 45 fishermen participating in this meeting, many of them multi-day boat owners/users.



- Discussion in progress at Hikkaduwa

Notes on the general concerns of the small boat fishermen

*Hikkaduwa*

“We badly need anchoring and pier facility separated out for our small boats. In doing this it would be very useful if the piers demarcated for us are constructed at a lower level than for the multi-day boats. This would deter the big boats encroaching into our pier facility area. An ice plant would be of great help to improve the marketing and the price we can get for our fish catch. If these matters can be addressed it would very helpful”.

At Hikkaduwa a discussion with the Harbor Manager pointed to security issues in the Galle harbor prompting the navy point there to disallow Hikkaduwa registered boats to dock in Galle, even in case of emergency. This prompts the fishermen of this harbor to register their boats in Galle, which results in the income collection at the Hikkaduwa being negatively affected.

In regard to the request for a wall around the harbor, which was prioritised with some inputs by the local authority chairman, the harbor manager states that this is useful for the fishermen (as even for the Corporation) as it would help to keep their boat equipment safe. The length of the wall is approximately 1000 meters.



**Section IV: Lessons Learned and Next Steps**

The lessons learned through these initial discussions is that these were challenges faced due to the short time frame this process was allowed given the requirement to have input from these consultation before the construction work started. Further, it is now clear that some level of in-situ mobilization and facilitation of these Harbor Fishery Committees would be required to bring more voices to the process on an on-going basis and promote the fishery community ownership of the construction process. As an initial activity this two tired consultation has demonstrated to the harbor user community the project interest in helping to make their voices heard.

Additionally, discussions were held with fishermen operating in the surrounding fishing area, families, some women's group CBOs that have proved sustainable in the area. Notes from these discussions have been presented in Annex 4 to be considered as initial ground breaking in regard to developing participatory coastal resource management plans. The fishing community and the coastal community in tourist areas have tasted the fruits of hard work, and likely to be a dynamic and entrepreneurial group to work with if presented with the right signals and opportunities.

All groups met had no objections to the harbors and were keen that the issues of the fishermen were met. In Hikkaduwa however, there were some apprehension expressed by the Hotelier group at the recent phenomena of sand deposits in the marine sanctuary area (independent of the tsunami). The hotelier community acknowledge that the fishermen have to operate and pursue their livelihood, but steps need to be taken to study the reasons behind the sand depositing process, and find a way to clear sand depositing on the coral.

It should be noted that government policy is to promote use of the harbors for multi-day boats more so than for day boats. In addition to analyzing the demographic composition of stakeholder groups at our sites, we also need to come to firm agreement with GoSL and USAID about who our target beneficiaries will be, and how the project proposes to deliver services to them. It may just be the reality that those services may not be delivered uniformly among different groups. For example, in terms of benefiting directly from use of the harbors, the multi-day boat owners may continue to be the dominant group. However, plans to benefit other stakeholders (e.g., small businesses, shore fishermen, women and youth, marginalized groups) through other project investigations, i.e. promotion of on-shore livelihood activities, vocational training, coastal resources management, and awareness-raising activities are envisaged.

Towards building community ownership of the construction process itself and an appreciation of the benefits they will get from the harbor through the reconstruction, several team members have suggested that small visible achievable activities be handed to them. Further, identifying mechanisms to have fishermen's involvement in the construction supervision has been recommended. These interventions will be discussed through with the counter part agency, in this case the Ceylon Fishery Corporation, and suitable operational methods formulated.



## **Annex I: Puranawella Harbor Consultation**

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Unabridged List of Issues Identified by Puranawella HFC Consultative Group – Presented in order in which they were raised and subsequent prioritization.- 10<sup>th</sup> Nov 2005.

- Deepening harbor basin, including removing boulders (for safer access). Presently the depth is as low as 1 meter in some areas of the harbor; ideally it should be 3 meters. **(Priority 1)**
- 2/3rds of the space in the harbor is not utilized due to heavy siltation and rocky substratum.
- A current that comes from under the pier and breakwater causes significant jostling of boats.
- Inadequate pier facilities exist in the harbor. Extensions to the existing pier facility have been suggested along the breakwaters and/or in the middle of the harbor **(Priority 2)**
- Pier facilities for docking are desired along the breakwater **(Priority 3).**
- Inadequate anchorage facilities for tying up boats
- Fishery auction hall is not large enough to fulfill requirements.
- The point of entry to the harbor from outside is narrow and scattered with rocks and boulders. They need the passageway to be safer, and indicated that hundreds of deaths have occurred at entrance over the last several decades for this reason.
- Want a beacon placed on the rock outcrops for guidance, basic navigation and safe entry. The name of the rock Galkelawaragala.
- The access road onto the breakwater was damaged by the Tsunami
- A Boat repairing location and facility is needed inside the harbor, including slipway. **(Priority 4)**
- Two slipways (one large, one small) are needed, along with crane facilities
- Ancillary facilities for fisherman (e.g. for washing, bathing, toilets)
- Relocate toilet facilities. Existing facilities are insufficient (only two) and improperly placed **(Priority 5)**
- Access road to the harbor needs to be rehabilitated – Bandaranayuka and Bunapala Mavata.
- The netting hall is not big enough, also during rainy weather work has to stop because the rain beats in.
- There is a planned road for Velamadema to the harbor that hasn't been constructed.
- Add another level to the auction hall and make it a rest area for fishermen.
- Need an ice plant.
- Fuel pumping stations need to be increased in number; currently only one.
- Need more water taps; currently only have two
- Want electricity supply within the harbor to be improved. Regular power cuts occur, which prevent radio, pumps, etc. from functioning.
- Generator for when power is cut.
- Security – there is no security system. Fencing harbor and building security huts are suggestions. Equipment isn't secure in the harbor.
- Radio signaling facility isn't strong enough. This is a security issue.
- Need improved facility for unloading the boats.
- No proper waste disposal is available to dispose of fish waste, solid waste, burnt oil, etc.

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- Garbage bins are needed.
- The tax to use the harbor is too high
- Right now the trolleys for raising/lowering boats are being hired out by the private sector at a high cost; preference for the harbor to have this facility.
- Prices attained for fish catch are too variable, e.g. when fish catch is high or low

## **Annex II: Mirissa Harbor Consultation**

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Unabridged List of Issues Identified by Mirissa HFC Consultative Group – Presented in order in which they were mentioned and subsequent prioritization. - 11<sup>th</sup> Nov 2005

### **Infrastructure**

- Insufficient space on the jetty
- Harbor basin has filled up with sediment
- Need for a protective barrier on the jetty to prevent breakage of boats (rubber tires and sandbag barriers – currently used for this purpose – break off easily)
- Large and small boats are being parked together, and this causes damage
- No location for boat repair and improvement (**Priority 2**)
- The auction hall at the edge of the jetty is blocking the entry of vehicles for loading; therefore would like to relocate to another position (**Priority 4**)
- There is water collecting in certain spots in the auction hall
- The speed of the fuel machines is very slow, and an increased number of fueling points would help (**Priority 5**)
- Water availability (water pipe connections) are insufficient (**Priority 6**)
- The ice plant was damaged by the Tsunami; does not produce ice (**Priority 3**)
- Need for three jetties to park day boats, multi-day boats separately (two piers for the big boats, one for small boats) (**Priority 1**)
- The netting hall is insufficient (too small; rain enters)
- Need for slipway or mobile crane (cheaper maintenance option) for repairs (**Priority 7**)
- Need for a workshop
- Toilet facilities are too far away and insufficient in number
- Would like resting rooms for the fisherman
- High rate cost water
- Beacon lights in two locations (marked on map)
- Electricity system in the harbor is not working properly
- The signaling station doesn't have a proper building, e.g. with telephone and rest facilities

### **Environment**

- No place for putting fish refuse and waste
- The water in the drainage system stagnates; doesn't flow out properly
- The drainage from some of the surrounding homes enters the harbor water and collects in the harbor (waste from the community, human waste)
- The refuse generated in the harbor (plastic, fish heads, etc.) don't have a location for collection
- Sanitary facilities are insufficient

### **Management Issues**

- Lack of management committee
- Non-availability of a boat for common purposes

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- After fueling, difficulty of pulling out boats (i.e. fueling system is not efficient)
- Because of all the fishing equipment (netting, etc.), there is not enough space to unload fish and conduct auction in the auction hall
- Certain other harbors bring their fish loads to Mirissa to sell, driving down prices.

**Social and Economic Issues**

- Unfair prices for fish catch (due to dumping by outside fishers)
- No selling place for fishery equipment (can't buy equipment there)
- Want to export dried fish; believe there is a market for exporting dry fish

### **Annex III: Hikkaduwa Harbor Consultation**

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Unabridged List of Issues Identified by Hikkaduwa HFC Consultative Group – Presented in order in which they were raised and subsequent prioritization. – 12<sup>th</sup> Nov 2005

#### **Infrastructure**

- The opening to the harbor from the sea is treacherous. Make it safe, by shifting out the breakwater. **(priority one)**
- Deepen the harbor basin **(priority 2)**
- Reconstruct Jetty from northern side **(priority 3)**
- Provide fueling facilities for kerosene oil
- Facilities for ice making within harbor
- Long time required for collection of drinking water; find a way to address this problem
- Security within harbor is an issue; construct a wall **(priority 4)**
- Relocate and expand toilet facilities
- Provide place to store fishing equipment.
- Electricity supply within harbor not sufficient
- To light up harbor mouth, provide a beacon lamp
- Set up another pier on the northern side of harbor
- Construct an auction hall for selling of fish
- Extend breakwater in north to the length of the southern breakwater **(priority 5)**
- A crane to lift multi-day boats **(priority 6)**
- A workshop to repair engines **(priority 7)**

#### **Environment**

- Fish refuse is put into the harbor
- Town waste is dumped in harbor at times

#### **Economic and Social**

- Not enough facilities to sell the fish (no auction hall)
- No icing facilities, and that which is available outside being very expensive.

#### **Annex 4: Discussions Outside the Harbors with Fishing Community, CBOs and Families**

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##### **Puranawella**

Location: Kaisawella – A discussion with small holder fishermen (one day boat operators). A location within distance of 1.5 km of the harbour.

##### **Summary of issues**

- break water/ rocky outcrop to make their bay safe
- rock blasting to chart a course for the fishing boats
- Help to start up their society with some project intervention.
- Home based income generating activity for women
- Employment for second generation

The participants were mainly one day boat owners, or poor fishermen working on big boats as well as carrying out near shore fishing activity. The average age of this group of fishermen was in the range of 40 to 50 years. Over 27 fishermen participated at this group meeting, having gathered at a coastal community building located close to their boat docking area.

This was a natural small bay, conducive for a fishing harbor, but having issues of strong current and rocks in the bay that made the launching of boats out into the open sea a risky activity. Due to lack of any other means of a livelihood these fishermen continued to operate in this area. Although our discussion began around the harbor, the concern of these fishermen were to make this area more secure for fishing boats and enable a safe access to the sea. This location was convenient for them as this was close to their homes and they could ensure the safety of their boats.

They requested that a rocky outcrop be constructed near the light house at visible distance from the shore, and thereby find a way to make the strong wave current into that small bay area manageable for the launching and access of their fishing boats. Other concerns included looking into the possibility of rock blasting to enable safe access of fishing boats. The CCD is going to look into the possibility of the government taking up the matter of a break water and clearing the rocks.

##### **CBO Activity of above group**

A community grouping by the name of “Sustainable Fishing Society” (Thirasara Deevara Samithiya), had been founded some years back in the area. This CBO was formed in association with a government programme for the fishing community that was taking place in the area some years back. Due to the lack of clear achievable objectives to be worked towards on an on-going basis this society was not fully operational at present. However the members, constituting of the fishing community in that locality, did come together on common issues. Recently they had obtained the assistance of a politician to reconstruct the community hall/ rest area that had got damaged after the Tsunami.

Two persons made reference to being family members of the Sanasa Credit Society. Their wives were the members. The women folk engaged in the preparation of dried fish when there was excess stock in the fish catch.

Following the discussion with the project team there was renewed interest among the fishermen to reform their society. They inquired into any programs that they could get involved in that this project may bring to their area. As the scope of work within the Coastal Zone Management component is still under formulation the fact they could have a role in that component was not presented at this stage.

**Discussion with a typical family in the area:**

On this occasion the project team also visited a home of one of the fishermen living in close proximity to this site. The occupants included the fisherman, his wife, 4 children, and his lame brother. They related the story of how they faced the Tsunami and how every one had been saved including his brother, because he had carried his brother to safety. The woman seemed an active housewife. When excess catch was available she prepared dried fish for sale. That was the extent of her income generation at present. She expressed interest to take up sewing and inquired into the possibility of obtaining a sewing machine. Three of the children were schooling and the eldest was trying to get an opportunity for computer training. The parents requested for a job for their eldest – a daughter of 19 years.

Location: Kiralawella – A group of small holder fishermen near Puranawella

Summary of Discussion/Issues

- break water/ rocky outcrop to make their bay safe
- rock blasting to chart a course for the fishing boats
- assistance to find a way to provide safe anchoring for their boats
- a building for the safe storage of the engines
- A beacon light to identify the location and light up the water at night (separate from lighthouse)

This was the next bay from the previous one, Kaisawella. The fishermen at the meeting were mostly young men in the age group of 20 to 30 years. Their main issue was also regarding the treacherousness of their bay during most of the year, making the ply of boats difficult. They reiterated the request of the previous group for a break water and rock blasting that would help both these bays. They further mention the difficulty of finding safe anchoring area for their boats. At present they are pulling their boats up on to the shore, and sometimes on the private lands of accommodating persons. They requested a more formalized system where they can safely anchor their boats. The safety of their engines is also an issue. They requested a storage structure/ or building, where they can store their engines safely.

Another request was for a beacon light (not a flasher light; the function of which is met by the light house nearby) to identify the location and light up the water way in the night into that area. The jurisdiction for such a beacon light would have to be taken up by the Divisional Secretary's office in

the area. They estimate that over 600 families are making a living from fishing in their village alone. The

participants at this discussion mostly practiced the course line method of fishing. About 7-8 persons go in a boat.

Their hopes for the future is to find opportunities for progress. In regard to operations on multi-day boats, they are confident that they have some understanding. However if training is made available in an accessible way they are interested to get a more systematic training on the use of the various types of equipment on those boats.

#### **Discussion with Family**

The mother and wife of the young fisherman in whose home the above discussion was held in were met with. The father had died prematurely of a cancer. The mother was making all efforts to augment the family income by preparation and sale of dried fish. The wife was pregnant. She had become a member of the Ceylinco bank community credit scheme, a scheme for women, and obtained Rs.5000/- as loan to help her husband buy nets for his fishing activity.

**Discussion with CBO:** – No 8 Grama Sanwardene Samithi, Gandara West.

#### **Summary of discussion**

- interested to obtain rope (lanu) making machines
- to be trained in some income generating activity, e.g. making bags from rope; use of 'vatakeya' (a cane plant) growing in the area, lace making, other handi crafts, etc. along with help to access market;
- Provide facility for their men folk to protect their boats
- There is a beautiful spot on the coast in close proximity to their village, make that into a park area, where not only the young boys, but families and girls can go to safely.
- Training for the pre-school teachers running their village preschool.

This village society was registered with the DS Office of the area. The village consisted of families who had developed through the fishing industry. It was a housing scheme carried out in the later 1980s/ early 90s. Discussion was conducted with the 3 office bearers, chairperson, secretary and treasurer. The treasurer is engaging in a small business running a village grocery shop. The society is operating a pre-school in the area community center. They have hired a pre school teacher and an assistant to conduct these classes. They would be interested to get training for these teachers.

The society further carries out a small credit scheme supported by funds raised within the membership. They were also the main leadership of the village funeral society, ensuring a payment of Rs. 5000/- was received by the family of the deceased.

The bearing and manner of the office bearer ladies of this group displayed a level of confidence and enthusiasm achieved through the experience and exposure to society through their group activity. They had a membership of 38 members.

**Discussion with CBO:** Gandara Ekamuthu Deewara samithiya (near Puranawella)

Summary of discussion

- This society is presently engaged in income generation activities, and conducting classes on school lessons (i.e. English, maths, etc), dance and music, health; and leadership/ personality training programs.
- They carry out an ongoing pre-school program.
- They carry out a micro-credit schemes
- Their membership is already mobilized and interested to participate in any livelihood or community development program that is proposed.

An active CBO, the chairperson of this group had extended her own property for the pre-school activity as well as NGO assisted programmes. The chairperson, secretary, treasurer and one ordinary member participated in the discussion.

Many Government and NGO agencies work with this group. The following INGOs have assisted them in various programs in the post Tsunami period – Oxfam, World Vision, TSF, SLCDF, ICUN the focal point in the area for implementation of various program activities in this area.

**Mirissa**

Miriya-mada wella – (located on out skirts of Mirissa fishery harbor). A meeting with small holder fishermen

Summary of discussion / issues -

- Severe shortage of pier facilities inside as well as outside harbor
- It is difficult getting in and out of the boats
- Separate an area within the harbor for small boats, and
- Secure the embankments and anchorage
- Provide a kerosene pumping station.
- Strengthen the marketing system so as to enable a better rate for fishermen.

According to these fishermen, there are over 150 small boats in the area, an increase from last year in the post Tsunami period. The small boat owners confessed they do not register their boats in the harbor as they felt they do not get any services from them. The social conditions among this group seemed lower than in the other harbor sites of the project. There was evidence of high incidence of alcohol consumption, indicating need for social work programs.

**Discussion with a family**

Meeting with a fisher family home located in proximity to the above group discussion conducted in a boat yard area, there were signs of some prosperity such as a cassette radio, tile floors and sturdily built house. The male elder of the household had died prematurely (not at sea), the elder son was engaging in fishing activity and that was the main source of their income. (course line fishing)

This family was participating in the Arthacharya solid waste management initiative and were members of the Sanasa credit society. Recently they were also involved in the Asia Foundation project with the Waligama UC (Local Authority) and had received 20 handcraft lace making machines in their area. The eldest daughter of this household was a recipient of one of these machines. Once prepared these lace items were being taken by a dealer for sale in the Galle tourist area. Despite a certain level of participation by this household in local level community activity, the need for social interventions in improved household management, personality and leadership development for the second generation, training and linking to employment, etc. were evident.

#### Discussion with a woman leader of the Mirissa Sarvodaya Shramadana Samithiya and Agromart Foundation

##### Summary of discussion -

- society membership consists of 75 persons
- as a member of the Sarvodaya group she had engage in psycho-social, spiritual and health programs
- as a member of the Agromart foundation she had received training in carrying out a small business.

The discussion was with the chairperson of the above mentioned two societies, (effectively, she was wearing a double hat). Her home was located in the tourist area in Mirissa and she was running a small tea restaurant, letting out rooms to foreigners, and in the front end of her home running a clothes shop. She had received training from the Agromart Foundation, a NGO providing book keeping and business skills training to village level women entrepreneurs.

In the post Tsunami period the Sarvodaya women's group had received training in trauma counseling to assist their community. Monthly programs were being conducted by Sarvodaya resource persons in meditation and discussion of other issues on special psycho-social and spiritual topics to help cope with sadness and loss from the Tsunami.

#### **Hikkaduwa**

- The Divisional Secretary – Ms. Kusum Piyaratne. She assured that the DS office will give the necessary cooperation to support the project implementation.
- District Manager, Arthacharya district office – Ms. Renuka Jayasinghe. This NGO is implementing environmental, community development and training programmes in the area. These include a solid waste management initiative, small group credit scheme, computer training courses, and other community development activities. They informed that a fishery anchoring site is being constructed in the Doddanduwa area, located approx 3 kilo away, where one of their credit societies were functioning. A visit to that society was arranged for the next day.
- Arthacharya CBO in Dodanduwa – Ms. Ruwanthi, the Artharcharya field coordinator facilitated a group meeting of the Dodanduwa Women's group to meet with the project team. Thirty three women attended the meeting. Nearly all the families were living off the fishing industry. The

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women folk were engaged in a solid waste management activity mobilized by Arthacharya.

They were keen to obtain skills in hand crafts for income generating purposes, and requested sewing machines and *beeralu* (a lace making device which has evolved from the Dutch period in the area) tools.

- President, Hikkaduwa Hoteliers Association – Mr. Siri Goonewardene - A pioneer in planning and lobbying for the protection of the Marine Sanctuary in the area, this person provided a history of the formation of the Fishery harbor in this locality. He observed that the construction of the fishery harbor was a big achievement for the hoteliers in the area, as it cleared the marine sanctuary area of fishing boats and confined them within the harbor. But an alarming impact is being observed in the last 3-5 years, where the coral areas are getting covered with sand deposits, and it is widely believed that this has developed as a consequence of the harbor. He said he has been lobbying with both government and donor agencies on this matter, but to this date no action has been taken. He indicated commitment to keep lobbying on this issue. Another matter he was lobbying for was a by-pass road of the Colombo-Galle highway that would allow for the spread of the hotel enclave in the Hikkaduwa, and reduce the high transport traffic and noise levels in the area.
- Glass Bottom boat owners - President of this association – Mr. M. V. Jayaweera (Sunil). He informed that since the Tsunami the local tourist to the area has severally dropped. And from among the 50 boats that were previously operating, only around 8 are operating at present. Another contributory factor was that a locally run Zoo in the area had been a draw for local tourists. This institution had run into some regulatory issues and been compelled to close down.
- President, Hikkaduwa Protection Society – Mr. Pial Gunarathna. His hotel establishment was most popular among surfers. The sea in front of his hotel was good for this, and he is not affected by the sand deposits on coral. But he said this has been coming up as an issue in the area in the last 5-6 years.
- President, Small hotels and restaurants – Mr. A.B.Jayasundara – He was not available in Hikkaduwa that day, however obtained his name card from his office for future reference.
- The Chief monk, Jananda-ramaya, Hikkaduwa – He was supportive of the Harbor and was especially keen that the mouth to the harbor from the sea be made safer as he personally is aware of the danger the fishermen face even in moderate bad weather coming from the sea into this harbor. He related the case of the large boat which was awash on top of one the breakwaters, how it had first crashed on the rocky outcrops just outside the harbour prior to the Tsunami. But later got washed inland and on to the breakwater as a result of the Tsunami.
- Educational Zonal officer for Environment –Ms. N. Kalansuriya. She has been involved in teachers training programs for the area as a master teacher for three years. And during this time she also has organized several beach cleaning programs and environmental education programs with the participation of teachers and students in the area. She indicated interest to carry out environment education programs for fishermen in the Hikkaduwa fishery harbor on environment education together with students, if technical guidance is provided through “training of trainer” inputs to conduct such programs.

## **Annex 5 – Persons met during the field visits**

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- **Harbor Managers**

Mr. P. Hettiarachchi – Puranawella  
Mr Isuru Gunawardene – Mirissa  
Mr Niroshan – Hikkaduwa

- **Fisheries Corporation**

Mr. Shelton – Assistant Fishery Director, Matara  
Mr. N.H Gamage – Coordinating Officer, Fisheries Dept, Matara  
Mr. Weerasooriya, Fishery Inspector, Mirissa  
Mr. Ranjith Jayasinghe – Fishery Inspector, Puranawella

- **Representatives from other Government Agencies, NGOs and Associations**

### Puranawella

Mrs. Vidanagama-Arachchi – Divisional Secretary, Devinuvara (Dondra)  
Mr. I. Liyanagama – Assistant Divisional Secretary – Devinuvara/(Dondra)  
Mr. H P G Sumanasiri, Grama Sevaka, Welegoda, Devinuwara,  
Mr. S D K Palikkara – Development Officer, Dondra DS (AGA)  
Mr. N H Gamage – Coordinating Officer, Fishery Ministry, Matara,  
Mr. L H S Hemantha – Acting Assistant Director (Planning), Divisional Office  
Mr. Ranjith Jayasinghe, Fishery Inspector  
Ms. Siriya, Development officer, Tangalle Urban Council  
Ms. Kamala, (- do -) Office phone  
Ms. H.A.P. Somawathi, President, No 8 Grama sanwardene samithiya, Gamagodra  
Ms. H.L. Padmawathi, Secretary, - do -  
Ms. K.B.Nandawathi, Treasurer, - do -  
Ms. T.M. Chandraleka, President, Gandara Ekamuthu Deewara Samithiya  
Ms. Swineetha Amadoru, Treasurer, - do -  
Ms. M.L.Chandrika, Secretary, - do -  
Ms. Dayawathi, Member, - do -

### Mirissa

Mr. Sarath, Divisional Secretary – Weligama DS  
Ms. Dahanayake – Asst Planning Director  
Mr. Generable Sirisena – Admin Officer, Weligama DS Officer.  
Mr Sham, Grama Sevaka – Mirissa South 1  
Mr. Gamini, Grama Sevaka – Mirissa South 2  
Ms. Priyanthika Rajapakse – Weligama UC  
Mr. Pushpa Kumara – Galle UC

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Hikkaduwa

Ms. Kusum Piyaratne - The Divisional Secretary, Hikkaduwa.  
Mr. Manoj Krishantha – Chairman, Hikkaduwa PS (the LA)  
Mr. Karunananda, Additional Divisional Secretary, Hikkaduwa  
Mr. Anthony, Grama sevaka, Hikkaduwa Town  
Mr. Samaradeera, Public Health Inspector, Hikkaduwa Town  
Ms. Renuka Jayasinghe - District Manager, Arthacharya Foundation district office  
Ms. Ruwanthi - Field coordinator, Arthacharya district office  
Ms. Mallika, Development Officer, Hikkaduwa PS (trained by the TALG-USAID Project)  
Ms. Neelamani – Environment officer, Hikkaduwa PS( -do -) Office  
Mr. Siri Goonewardene\_ - President, Hikkaduwa Hoteliers Association  
Mr. M. V. Jayaweera (Sunil) – President of the Glass Bottom Boat Owners Association  
Mr. Pial Gunarathna - President, Hikkaduwa Protection Society  
Chief monk, Jananda-ramaya Temple, Hikkaduwa

Matara District Secretary Office

Mr. J Pathirana – Director Planning (DP)  
Ms Hema – DP’s Secretary  
Mr. Chandima – Development Assistant  
Ms. Dhammika – Assistant Director

- **USAID Transparent and Accountable Local Governance(TALG) Project, (in the field)**

Mr. Dhammika Mahendre – Program Officer

**Annex 6: Attendance at the Harbor consultations**

**Attendance Record – Puranawella – 10<sup>th</sup> Nov 2005**

පුරානවෙලා වරාය චරිත - 10/11/05

කම	නම (සිංහල/අක්ෂර)	දුරකථන
1.	A.H. සේනාරත්න	011-252-1234
2.	M.A. සේනාරත්න	011-252-1234
3.	P.A.P. සේනාරත්න	011-252-1234
4.	T.S. සේනාරත්න	011-252-1234
5.	T.B. සේනාරත්න	011-252-1234
6.	W.N.R.P. සේනාරත්න	011-252-1234
7.	S.H. සේනාරත්න	011-252-1234
8.	M.P. සේනාරත්න	011-252-1234
9.	P.M. සේනාරත්න	011-252-1234
10.	W.N.R.P. සේනාරත්න	011-252-1234
11.	W.P. සේනාරත්න	011-252-1234
12.	K.H. සේනාරත්න	011-252-1234
13.	A.H. සේනාරත්න	011-252-1234
14.	T.B. සේනාරත්න	011-252-1234
15.	M.A. සේනාරත්න	011-252-1234
16.	N.H. සේනාරත්න	011-252-1234
17.	සේනාරත්න	011-252-1234
18.	A.W.P. සේනාරත්න	011-252-1234
19.	K.H. සේනාරත්න	011-252-1234
20.	P.M. සේනාරත්න	011-252-1234
21.	A.H. සේනාරත්න	011-252-1234
22.	N.H. සේනාරත්න	011-252-1234
23.	P.A.P. සේනාරත්න	011-252-1234
24.	A.B. සේනාරත්න	011-252-1234
25.	W.N.R.P. සේනාරත්න	011-252-1234
26.	M.A. සේනාරත්න	011-252-1234
27.	W.P. සේනාරත්න	011-252-1234
28.	M.H. සේනාරත්න	011-252-1234
29.	A.H. සේනාරත්න	011-252-1234
30.	T.H. සේනාරත්න	011-252-1234
31.	සේනාරත්න	011-252-1234
32.	S.H. සේනාරත්න	011-252-1234

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Contd:

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33. N.H. Arambam	අරාමි පාලක	අරාමි
34. A.W.P. Arambam	අරාමි පාලක	අරාමි
35. K.A.H. Arambam	අරාමි පාලක	අරාමි
36. A.L. Arambam	අරාමි පාලක	අරාමි
37. W.H. Arambam	අරාමි පාලක	අරාමි
38. M.A. Arambam	අරාමි පාලක	අරාමි
39. M. Arambam	අරාමි පාලක	අරාමි
40. P.M. Arambam	අරාමි පාලක	අරාමි
41. P.P. Arambam	අරාමි පාලක	අරාමි
42. A.L. Arambam	අරාමි පාලක	අරාමි
43. A.L. Arambam	අරාමි පාලක	අරාමි
44. S.H. Arambam	අරාමි පාලක	අරාමි
45. P.M. Arambam	අරාමි පාලක	අරාමි
46. M.P. Arambam	අරාමි පාලක	අරාමි
47. S. Arambam	අරාමි පාලක	අරාමි
48. W.G.M. Arambam	අරාමි පාලක	අරාමි
49. P.A. Arambam	අරාමි පාලක	අරාමි
50. T.H. Arambam	අරාමි පාලක	අරාමි
51. M.H. Arambam	අරාමි පාලක	අරාමි
52. A.L. Arambam	අරාමි පාලක	අරාමි
53. M.H. Arambam	අරාමි පාලක	අරාමි
54. W.N.R. Arambam	අරාමි පාලක	අරාමි
55. B.A. Arambam	අරාමි පාලක	අරාමි
56. P.M. Arambam	අරාමි පාලක	අරාමි
57. F.M. Arambam	අරාමි පාලක	අරාමි
58. A.L. Arambam	අරාමි පාලක	අරාමි
59. S.H. Arambam	අරාමි පාලක	අරාමි
60. P.A. Arambam	අරාමි පාලක	අරාමි

61 N.H. Arambam, Comptroller of  
 62 G.A.L. Shanthi, Deputy B/M

N.H. Arambam,  
 Comptroller



**Attendance Record – Hikkaduwa – 10<sup>th</sup> Nov 2005**

හික්කඩුව වරාය වර්ධන - 12/11/05

නම	සමාජ මණ්ඩලය (කුලය, වංශය, ප්‍රදේශය, භූමි පිටි)	අත්සන
1. ඩී ඩී සිල්වා	සමුදාය	ඩී ඩී සිල්වා
2. M. A. M. M. M.	සමුදාය	ඩී ඩී සිල්වා
3. එම් එස් සමුදාය	සමුදාය	ඩී ඩී සිල්වා
4. එම්. එස්. එස්.	සමුදාය	ඩී ඩී සිල්වා
5. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
6. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
7. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
8. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
9. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
10. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
11. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
12. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
13. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
14. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
15. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
16. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
17. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
18. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
19. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
20. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
21. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
22. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
23. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
24. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
25. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
26. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
27. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
28. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
29. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
30. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
31. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
32. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා

33. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
34. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
35. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
36. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
37. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
38. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
39. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
40. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
41. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
42. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා (0777 644607)
43. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා (0777 22)
44. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා (09112/46362)
45. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
46. ඩී. ඩී. ඩී. ඩී.	සමුදාය	ඩී ඩී සිල්වා
47.		
48.		

Annex 7 – Newspaper article on team’s harbor visits, 6<sup>th</sup> Dec 2005, Divaina (sinhala paper).

සමාජයේ  
 විභවය වූ  
 දිනෙකට

# හික්කඩුව බිවර වරායේ නවීකරණ කටයුතු ඇරඹෙයි

## දිවයින හෙළිදරව්ව ඉතා ප්‍රසංශනීයයි

අවුරුදු මැද යළි මහ මංගල  
 වසරකට බිවර වරායේ සහ  
 මුහුදේ 2006 අගෝස්තු 15 දින  
 "දිවයින" පුවත්පතෙහි පසු වූ  
 විශේෂාංග ලිපියෙන් පසු වරාය  
 නවීකරණ කටයුතු කඩිනමේ  
 කිරීමට  
 යයි.

අමෙරිකා රජය විසින්  
 ප්‍රභාසියෝ නැගී වූ හික්කඩුව  
 බිවර වරාය නවීකරණයට  
 ඉදිරිපත්ව ඇත. එහි  
 විශේෂිතයන්ගෙන් සමන්විත  
 විශේෂඥ කණ්ඩායමක් ඉහළින්  
 හික්කඩුව බිවර වරායේ නිරීක්ෂණ  
 වාර්තාවක් සිටිනු ලබයි.

වැලපිටියේ පිටි ඇති වරාය  
 පිහිටීමෙන් වැඩි ඉඩමකට නගන  
 විය. නැගී වී ඇති දිවයිනට,

**වරාය කළමනාකාර පී. එම්. ඒ. නිරෝෂන්**



හික්කඩුව බිවර වරාය

හොට්ලාගිලි, ආරක්ෂිත තාපය නොවිචලිත පිහිටි විශේෂාංග ලිපියේ හෙළි කර තිබීම පිළිබඳව ඉවහලයා යොමු කළ විශේෂිත පිරිස් බිවර කණුවේ සංවිධානය කොට වරාය නැගී නොවිචලිත වීමට බිවර ආදායම් මීට පෙර

බිවර ආදායම් මීට පෙර

වරායේ ඉදිකිරීම හෝ අලුත්වැඩියා කිරීමේදී බිවර ජනතාවගේ ආදායම ඉතා වැදගත් වන බව අමෙරිකන් විශේෂිත පිරිස පැවසූහ. ඉදිරි මාස කිහිපය තුළ

බිවර ආදායම් මීට පෙර

වරායේ ඉදිකිරීම හෝ අලුත්වැඩියා කිරීමේදී බිවර ජනතාවගේ ආදායම ඉතා වැදගත් වන බව අමෙරිකන් විශේෂිත පිරිස පැවසූහ. ඉදිරි මාස කිහිපය තුළ

විවර කළමනාකාර පී. එම්. ඒ. නිරෝෂන් සමඟ සාකච්ඡා කොට වරායේ ඉහළ මට්ටමින් වරාය නවීකරණය කිරීමට බිවර නගර සභාව සමඟ සාකච්ඡා කළ බවටත්, මහා රජයේ විශේෂිත අවස්ථාවක් බවත් "දිවයින" පුවත්පතේ කළ හෙළිදරව්ව ඉතා ප්‍රසංශනීය බව වරාය කළමනාකාර පී. එම්. ඒ. නිරෝෂන් මතක පැවැසීය.

පාසාගල - විවර කාර්යාලය - අපිත් නිරෝෂන්