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FISHERIES TRAINING PROGRAMME

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OPPORTUNITIES FOR SUSTAINABLE MANAGEMENT OF LANDING FACILITIES IN THE ANCHORAGES NILWELLA AND KOTTEGODA IN THE MATARA REGION OF SRI LANKA

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ABSTRACT

Infrastructure facilities of landing sites, which are the core of the fishing industry in Sri Lanka, were severely damaged by the tsunami in December 2004. Currently these facilities are being rebuilt in association with various non-governmental organisations. At present there are large numbers of small anchorages which require development of facilities and these involve relatively high investment costs and would then need to be maintained properly. One of the problems, at present, is that these landing centres are not maintained by any agency. In view of the high cost factor in the construction, maintenance and management of these fishery landing centres, it will become necessary to consider seriously how these could be managed in a sustainable way with added value for fishermen and their families. For this purpose, two anchorages were selected and related primary and secondary data together with both qualitative and quantitative analysis were used to evaluate the present situation and to identify opportunities and needs for the future. This research paper shows that all the facilities required in a fishery landing complex have to be operated through a proper sustainable system of management. It should become the responsibility of all the stakeholders in the fishing industry to develop the industry in a sustainable way. This is a challenge and a formidable task. For this purpose rebuilt facilities should be developed as a function of a community based management system through the local fisheries association under the direction of the government.

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1 INTRODUCTION

The fisheries policy of the Sri Lankan Government focuses on the pursuit of sustainable exploitation of the country's aquatic resources, improvement of the quality of fish and enhancement of the living standards of the fishing communities. Sustainable development of effective fisheries policy and management initiatives requires strong understanding of various aspects of the fisheries systems including the social and cultural characteristics of the people and communities within the systems. For generations, fishing has been a major source of food for humanity and a provider of employment and economic benefits to those engaged in fisheries. Prior to World War II, the wealth of aquatic resources in the oceans tended to be viewed as an infinite gift of nature. The dynamic development of fisheries since the early 1950s has led people to believe that these resources need to be properly managed, if their contribution to the nutritional, economic and social well-being of the world's growing population is to be sustained.

Adoption of appropriate fisheries techniques is important to fishery sustainability and must be implemented in co-operation with all stakeholders. Unsustainable fishing practices have led to the depletion of resources and urgent corrective action is necessary in order to ensure that future fishing operations and related activities are rationalised for the benefit of our own and future generations.

The Sri Lankan fishing industry needs to lay a foundation to increased productivity, especially in the field of infrastructure development thereby benefiting the fishing community and the country as a whole. It is therefore necessary to have planned sustainable fisheries development both on the government and industry level. One of the first steps needed is to formulate a system of managing landing facilities in a sustainable way. In a technologically complex industry like fisheries, substantial work has to be undertaken for such a sustainable development.

In Sri Lanka the fisheries sector was the most affected economic sector by the tsunami on 26 December 2004. The damage caused to fishery harbours and other infrastructure facilities, government service facilities and coast conservation structures, is estimated at be around USD 275 million. Repair and replacement costs of the damaged fishing fleet is USD 60 million (MFAR 2007)

After the tsunami the Ministry of Fisheries in Sri Lanka in co-operation with foreign development co-operation agencies and NGOs has been rebuilding and improving fishery harbours, anchorages and fish landing sites. The aim is that after having been rebuilt these operations should be managed in a sustainable way with added worth and better living conditions for the local fishermen. It is an urgent need to identify a balance between development and optimal utilisation of resources.

1.1 Objective

The aim of this project is to do a study on how these rebuilt facilities can be managed in a sustainable way, including a stakeholder analysis to evaluate the present situation and the opportunities and needs for the future. Two selected landing sites will be used as reference sites for this work, i.e. Nilwella and Kottegoda in the region of Matara in the southern part of Sri Lanka.

The following research question relates in part to finding answers to the question of how to manage in a sustainable way the operations of the rebuilt landing facilities:

What opportunities for sustainable management of landing facilities lie in the rebuilding of the anchorages Nilwella and Kottegoda in the Matara region in Sri Lanka?

The outcome of this study should add to the understanding of future possibilities for added worth and better living conditions of the local fishermen by running sustainable operations at the two anchorages. The findings of this research should also be useful for improving other landing sites in Sri Lanka.

The work necessary for the information gathering, analysis, idea generation, generation of alternatives and selection falls into four different stages:

a) The situation of the anchorages before the tsunami
b) The situation of the anchorages after the tsunami
c) The current situation after the rebuilding of facilities by ICEIDA
d) Suggestions for effective future development

1.2 Methodology

This study is mostly based on secondary data. Primary data from interviews are also used. The secondary data were mostly collected by using electronic and written sources. Stakeholder analysis, need analysis, and analysis of operation and management are used to identify new technologies and alternatives.

1.3 Damages caused by the tsunami and rebuilding of fisheries sector

1.3.1 Areas affected by the tsunami

Out of 12 fishery harbours in Sri Lanka, 10 were affected by the tsunami in December 2004. Most affected areas were rebuilt with assistance from various donor agencies. Additional infrastructure was not needed for the fishery harbours. This however did not apply to the anchorages and landing sites as 37 anchorages and 200 landing sites were damaged or destroyed by the tsunami. The repair of the damaged structures or installation of new structures to replace those totally destroyed was therefore urgent. At the same time it was pertinent to aim for improvements in facilities at these sites in the spirit of “Building for Better” proposed in the strategy document from the Sri Lankan Ministry of Fisheries and Aquatic Resource (MFAR 2007)

The Sri Lankan Ministry of Fisheries and Aquatic Resources proposal includes some fish landing centres which were not affected by the tsunami. The reason for this is justified by their relative importance in the fisheries sector as highlighted in the master plan report prepared for *MFAR/FAO* (Sigurdarson and Wickramasooriya 2006).

"There are about 970 fishing villages around the coast, each comprising one or more fish landing centres. Many of these consist merely of unprotected sandy beaches without any shore facilities and are not operational during the monsoons. Fishing crafts are generally beached or anchored outside the surf zone at these centres. In some areas naturally protected anchorages are available in lagoons, e.g. Negombo, Jaffna, Chilaw, Puttalam, and Batticaloa" (BOBP 1984).

To varying degrees, several of the large fishing harbours and small boat landings in the sates of Hambantota, Matara, Galle, Kalutara and Trincomalee have been destroyed. The damage to marine structures and service facilities and equipment of the harbours (including shore structures, dredgers and heavy mechanical equipment, ice plants, buildings, breakwater boulders, ice plants, boat repair yards, and pumps and distributor systems) is enormous. Most of these components are beyond repair. All of the severely damaged fishery harbours and small boat landings may require extensive dredging and removing of debris and sand from the basins. The total estimated cost of the damage to infrastructure of the fishery harbours/ports is USD 275 million. (World Bank 2005)

Extensive damage has been caused to 10 fisheries harbours, 37 anchorages and around 200 landing sites as well as to the associated fish handling facilities, fishery co-operative buildings and fish transport vehicles in the affected areas (MFAR 2007).

1.3.2 Planning of rebuilding

"The Ministry formulated and implemented short term, mid term and long-term plans to rehabilitate and reconstruct the fisheries sector giving priority to several areas. One is rehabilitation and modernisation of fishery harbours, anchorages and fish landing sites" (MFAR 2005:14).

The reconstruction and recovery efforts should be carried out in two phases. In the short-term phase (1-12 months) a coordinated national effort should be made to bring the industry back to operation as early as possible. Commencement of the rebuilding and renovating the urgently needed infrastructural facilities (such as ports and anchorages, boats, small port landings, etc.) is absolutely essential. However, the completion of the reconstruction would extend beyond the short-term phase (World Bank 2005).

This opportunity should be used to rationalise and modernise the sector with a long-term vision. An essential element of such a vision should be to make the sector more productive and efficient. In this regard, strategies should be adopted for improving the fishing vessel design, fish handling and packaging techniques, quality assurance, fishery information management, licensing and regulating fishing crafts and use of fishing gear, surveillance fishing zones and boundaries and providing vocational training to fishermen. Sri Lanka has a long history of heavy investment in shore-

based facilities (including ports and boats) but catches per boat and vessel income have been modest, as fish resources have been excessively exploited. This situation will require a closer analysis of the ideal fleet size, composition of fleets, design of the fishing vessels, and the shore-based fishery infrastructure that would lead to a sustainable balance between the resource base and the fish harvests while optimising the catches per boat. A longer term rebuilding of the sector and its physical and economic infrastructure should be based on a detailed technical study. With regards to fishery harbours, a strategy should be adopted to improve their management, in particular through exploring public-private partnerships (ADB 2006).

1.3.3 Future vision

Development and improvement of fisheries landing sites is important and will be both beneficial for the people in the areas as well as the population in general as it will contribute towards increased supply of quality fish products for export and domestic consumption (Bandara and Helgason 2006). "In the fisheries sector the indiscriminate replacement of boats and fishing gear with new and high-quality equipment could easily result in over-exploitation of the marine environment. Similarly, welfare, relief and reconstruction programmes, unless well managed, could lead to wasteful consumption. Poor targeting, over-design of facilities and wasted investment will result in higher resource demand, depletion of natural resources and the generation of wastes, all having direct and indirect impacts on the environment. Impacts of reconstruction demand on natural resources, including new land and changes of land use, will naturally increase during the reconstruction process. Initiatives to impose a resettlement zone, to re-plan, re-develop and relocate cities, and to introduce new roads, railways and port developments can only aggravate these pressures. Government initiatives to undertake a series of "mega" projects in the wake of the recovery will add to this demand, all heating up the construction market with inevitable consequences for the exploitation of natural resources." (UNEP 2007)

Future development plans for Ceylon Fishery Harbours Corporation is as shown in Table 1.

Table 1: Short-term strategic plans (CFHC 2007)

STRATEGIC PLAN - SHORT-TERM

STRATEGY	ACTION PLAN	RESPONSIBILITY
Setting–up of Anchor sites	The prioritisation of the anchorage s already identified to be developed v each harbour. Identify and assign the boats to e anchorage site based on the "E Register" Prioritise the infrastructure facilities resource requirements for e anchorage site (fish auction facilit fuel, lubricants, electricity, wa repairs)	GM / DGM-Operations / Harb Managers

Source: Ceylon Fishery Harbour Co-operation

"Our concern is not to reproduce the problems of over-fishing and wastage of the past. Our aim is to help create a new, sustainable fishing industry in close co-operation and coordination with the government and local people" (UN News Centre 2007).

2 FISHERIES OF SRI LANKA

Sri Lanka is situated in the Indian Ocean to the south of India between the latitudes 6-10 degrees North and the longitudes 80-82 degrees East. It is a multi-ethnic, multi-religious country with a diverse and rich culture with a total population of 20 million. The city of Colombo is the administrative centre (World fact book 2007). The coastline of Sri Lanka is about 1,770 km long and contains several bays and shallow inlets. Sri Lanka has an Exclusive Economic Zone (EEZ) of 517,000 km^2. The continental shelf, which is comparatively narrow with an average width of 22 km, covers an area of 30,000 km^2 of the EEZ. (Figure 1) (FAO 2006)

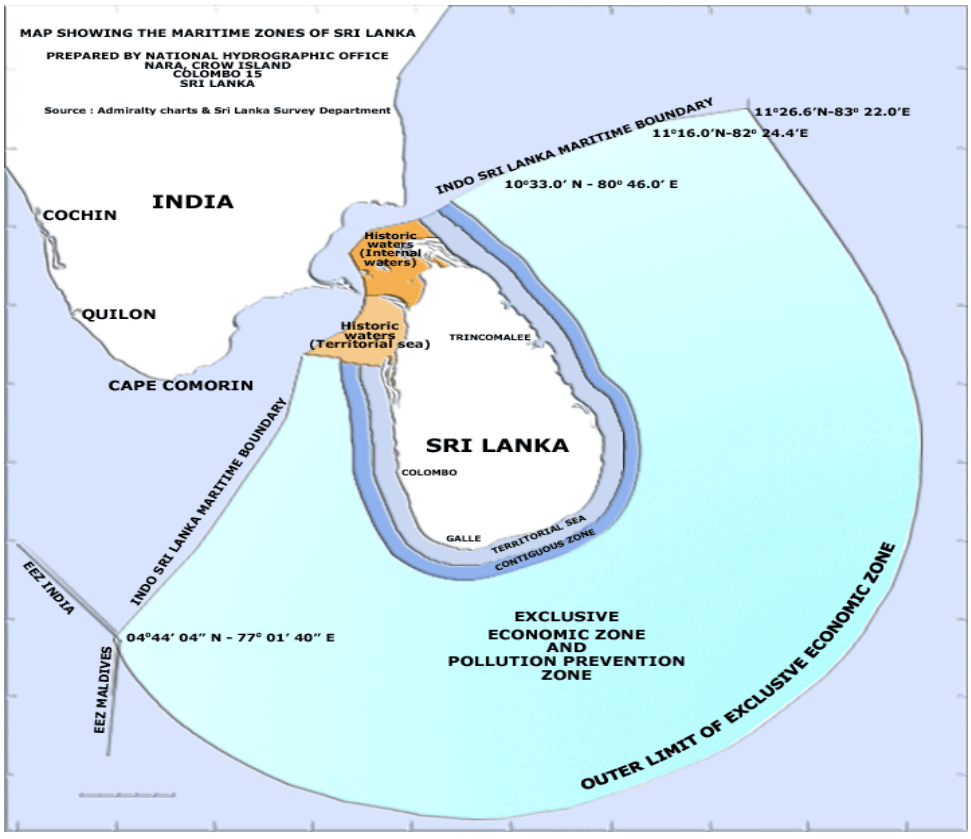

Figure 1: Sri Lanka territory and Exclusive Economic Zone (MFAR 2007)

The fishery sector in Sri Lanka is important in the economy of the country for the following reasons:

1. It contributes a substantial portion of the animal protein consumed by the population. According to the Food Balance Sheet fish contributes 65% of the animal protein consumed in Sri Lanka (FAO 2003).

2. The fishing industry provides around 800,000 direct and indirect employment opportunities (fishing, fish trade, fish processing, production of dry fish, supply of inputs, etc) (MFAR 2005).

3. The industry contributed close to 3% of the Gross National Production (GNP) of Sri Lanka in 2005 (Central Bank 2005).

4. Exports of high value fish and aquatic products such as tuna, shrimp, lobster, shark fins, ornamental fish etc., earned the foreign exchange sector approximately USD 100 million in 2005. This was 1.1% of the total non-traditional export earnings of the country.

In Sri Lanka generally the fishing seasons are associated with two monsoons, the southwest monsoon from June to September and the northeast monsoon from November to March (Joseph 1999). Five of the nine provinces of Sri Lanka have a maritime boundary and 14 out of the total 25 administrative districts are located within these five provinces (BOBLMEP 2006).

One of these five sea provinces of Sri Lanka is the southern province that includes the districts of Galle, Matara, and Hambantota. Farming and fishing is the main source of income for the vast majority of the people of this region (Sri Lanka 2006).

2.1 Landing sites

Fishing activities take place around the entire coast of the country. Marine fisheries are supported by a network of production oriented infrastructure including 12 fishery harbours, several large and small anchorages and about 700 village level fish landing centres (FAO 2005).

According to Fernando (2005) The anchorages and landing centres with their meagre facilities played a key role in the success of the fishing operations by the smaller vessels both motorised craft and non-motorised traditional craft. This infrastructure played a vital role in the country's total landings of 254,680 tons of marine fish in 2003 and the gainful employment of over 250,000 persons as fishers and those in post harvest related activities.

Many sites function as landing places and have been identified as anchorages for fishing crafts. Many of these sites are in fact beach landing sites where canoes with outriggers and 17½ to 21 ft. FRP boats powered with outboard motors are beach landed.

Very few anchorages have 3½ ton boats (numbers of which are fast dwindling) while the larger multi-day boats of the fishermen in the areas use fishery harbours in the

vicinity, with adequate shore facilities. Occasionally, multi-day boats, though in very small numbers are also seen in anchorages such as at Weligama bay and Kapparatota. It is pertinent to mention that at most of these landing sites/anchorages, fishermen are very critical of the different governments having promised to construct harbours at almost all these anchorages, even laying foundation stones to build breakwaters, jetties, auction/net mending halls and community centres, and then having done nothing.

Before the tsunami in 13 anchorages a common building served as a net mending/auction hall, for washing, icing of fish, storing and as a community centre, sometimes with toilets too. Of these, 10 buildings including at Nilwella, had been in reasonably good condition. Two buildings are very old and one building is on high ground and needs proper care and maintenance.

Some anchorages in sheltered waters did have small jetties or quay walls. In four of the anchorages in the Eastern province, structures such as quay walls and jetties had been provided for. Kalmunai was being developed as a harbour with jetties, ice plants cold rooms etc. But now the focus is no longer there. It has been a general pattern that development projects in some areas get activated on a priority basis but later dwindle if there had been a change of ministers and vice versa.

In 10 of the anchorages/landing places including Kottegoda, there had not been any buildings or facilities at all.

2.2 Fish catch and fish farming

The fishery resources of Sri Lanka fall under two principal categories, namely Marine, and Inland (FAO 2006). Marine fishing is categorised into coastal and offshore fisheries. The coastal fishery is the most important sub-sector and provides over 67% productions of the marine fishes (Wijayaratne 2001). Coastal fish production has remained more or less stagnant over the past few years and it is now generally believed that the Sri Lankan coastal fishery has reached optimal levels of production although there are a few identified under utilised resources. Therefore, if Sri Lanka is to have sustainable development of the marine fisheries sector, the management of these resources is of prime importance (Dayaratne 1994).

The offshore fishery utilises resources beyond the edge of the continental shelf to the outer limit of the EEZ and beyond. The resources are mainly migratory tuna such as yellow fin and skipjack and species such as sharks, marlin, and swordfish and sail fish.

Production during 2005 was 40% less than during the corresponding period in 2003 and 2004 (Figure 2).

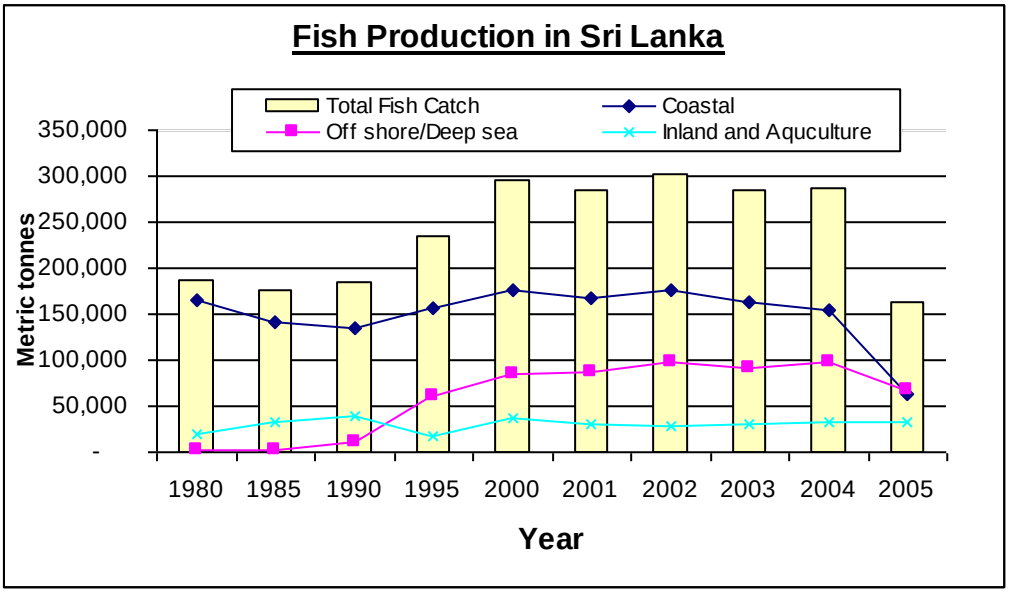

Figure 2: Fish production in Sri Lanka (MFAR 2007).

The inland fishery of Sri Lanka is based almost exclusively on reservoir capture fisheries. In 1999 the production was about 27,000 tons/year and was still in recovery after a period of decline starting in the early 1990s resulting from the removal of governmental patronage (Amarasinghe and De Silva 1999).

2.3 The fishing community

In 2005 there were 2637 fishing villages in Sri Lanka of which 1337 were marine fishing villages and the other 1300 inland fishing villages. Approximately 200,000 people were engaged as fishers in marine, inland and lagoon fishing, and 600,000 in fish trade services and input supply. The bulk of fish production in 2005 came from the coastal fishery which employed around 160,000 fishermen.

2.4 Fishing fleet and fishing methods

The fishing fleet of Sri Lanka in 2004 consisted of around 30,500 vessels of which 15,000 were motorised. The marine fishing fleet consists mainly of small- to medium sized crafts, owned and operated by private individuals (FAO 2006). The breakdown of the marine fishing fleet by major type of craft in 2004 was as follows:

The fishing fleet (pre-tsunami situation)

Non-mechanised traditional crafts	15,260
Mechanised traditional crafts	674
Fiberglas crafts with outboard motors	11,559
Single-day vessels with inboard engines	1,493
Multi-day vessels	1,581
Beach seines	1,052
Total	30,567

There were 16,899 vessels destroyed by the tsunami and 12,328 had been replaced in 2005 (MFAR 2005).

Like most maritime countries in the tropics, Sri Lanka's fisheries sector has evolved into what it is now a multi-gear and multi-species fisheries. The primary fishing gear in the past was the beach seine, considered the backbone of the industry (Sivasubramaniam 1995). The most popular gear used today includes the large and small meshed gillnets designed to catch tunas and sardines, respectively. Beach seine fishermen still continue with their traditional gears. Some gears have lost their popularity while others are only deployed in limited areas. Because of their destructive effects, bottom-set gillnets and trammel nets are not allowed in coral reef areas. Because of the migratory nature of pelagic stocks, pelagic fishing gears are operated in wider areas, targeting specific species. Motorisation and improvement of hull design have enhanced the capability of fishing crafts to operate in offshore fishing grounds. This development has significantly altered the mode of pelagic fishing operations. (Samaranayake 2006)

3 THE ANCHORAGES NILWELLA AND KOTTEGODA

The Matara district is in the southern province with a land area of 1,270 km^2 (Table 3) has a coastline of 55 km and was one of the 12 coastal administrative districts severely affected by the tsunami (ADB 2005). Matara is the region's main city, 160 km from Colombo. It is one of the largest cities in Sri Lanka. The selected anchorages for this research, Kottegoda and Nilwella, are both in the Matara district where fishing is an important economic activity. The Matara coastal district is quite significant in the marine fisheries sub sector of Sri Lanka (Table 2).

Table 2: Basic information on the marine sector in Sri Lanka.

	Matara	Sri Lanka	% of total
Land area (sq. km)	1,2	62,7	2.(
Inland waters (sq. km)		2,9	0.4
Population ('000) (Census 2001)	7	18,7	4.1
Active fishers (as of June 2004)	7,9	173,0	4.(
Active fishers in 2005	8,6	160,3	5.4
Fishing households 2004	7,2	137,3	5.2
Fishing households pop. 2005	34,2	641,7	5.3
Fish production 2004 (Mt)	28,0	253,1	11.1
Fish production 2005 (Mt)	17,0	130,4	13.1

Source: Statistical Unit of the Ministry of Fisheries and Aquatic Resources

Table 3 shows the breakdown of the catch into main groups of species both for Matara district as well as for the island as a whole.

Table 3: Marine fish production by major commercial groups 2005 (mt)

	Matara	Sri Lanka	% of total
Thora (seer)	190	2,970	6.4%
Paraw (carangids)	340	5,950	5.7%
Balaya (skipjack)	6,640	28,540	23.3%
Kelawalla (yellowfin)	5,980	18,230	32.8%
Tuna like fishes (blood fishes)	1,890	17,560	10.8%
Mora/maduwa (sharks/skates)	820	6,430	12.8%
Rock fish (mullets)	470	11,170	4.2%
Shore seine (small fish)	380	26,390	1.4%
Prawns	-	4,980	0.0%
Lobsters	-	240	0.0%
Others	380	7,940	4.8%
Total	17,090	130,400	13.1%

Source: Statistical Unit of the Ministry of Fisheries and Aquatic Resources

About 8,500 fishermen are estimated currently to be operating from two fisheries harbours, four anchorages and 28 fish landing sites in the Matara District (ADB 2005). Table 4 describes the effects of the tsunami and the damage it caused on the fishing industry in Matara and also on the island as a whole.

Table 4: Information on fisheries affected by the tsunami (26 December 2004).

	Matara	Sri Lanka
Fishing households affected by tsunami	7,147	74,596
Partially damaged houses	1,135	13,329
Completely damaged houses	739	164,343
Total damaged houses	1,874	29,763
Fishing houses within 100 m limit	2,292	21,196
Fishing household population	30,117	304,136
Fishermen	6,461	66,801
Fishing related persons	2,280	20,185
Value of damaged fishing gear, boats, equipment etc.	1,229.36	11,696.10
Deaths and missing persons in fishing families	401	5,006
Damage of fishing boats	1,105	7,105
Destroyed fishing boats	763	16,101

Source: Statistical Unit of the Ministry of Fisheries and Aquatic Resources

About one third of the tsunami affected industries in the district are related to fishing. Livelihood support had to include assistance for the re-establishment of all aspects of the fisheries sector. The immediate rehabilitation needs included psychological rehabilitation for traumatised families, provision of fishing crafts and equipment, plus the reconstruction of related physical infrastructure such as harbours, anchorages, ice plants and other public utilities. Grant and loan programmes have been administered through the fisheries organisations (ADB 2005).

After the tsunami fisheries harbours location are safe in the Matara district and damages were less than in most other harbours in the southern part, but the two anchorages, Kottegoda and Nilwella, were heavily damaged especially the Kottagoda site. After the tsunami the catch in these two affected areas was greatly reduced. The tsunami moved material and coral beds on seabed at these locations changing fish

breeding grounds and coral reefs. Before the tsunami the total catch stock was enough for the whole region but after the tsunami those catches could only be used for consumption for that site area. Especially in the waters around Kottagoda there has been a decrease in quantity of fish which has increased prices. The markets in both sites are not well developed and the auction takes place in the open beach area, generating main income for families.

The common perception is that fishing is a livelihood activity for men and hence the industry is male dominated. The fishermen do not like their women to engage in the fishery industry and women are not encouraged to visit the anchorages but boys of the families are involved in the fishing activities. This situation is little bit different in Kottegoda where the women are actively involved in fish marketing and a small number of them are involved in the making of dry fish in their home gardens in the months of the year that it is possible (Pubudu 2007).

In the anchorages mostly small boats, with a crew of five or six fishermen, are used. The main fishing gear is long line, drift gillnets and pole line. Normally the boats go out twice a day, in the early morning from 5 to 11 am and in the afternoon from 5-6 pm to midnight. The fishermen use phones to contact buyers and find out about prices and the possibility of selling their catch. If the catch is big, especially in the evening and after midnight, it can be a problem finding a way for a buyer to fetch or receive and preserve it (Pubudu 2007).

In Puranawella and Kudawella, the fishery harbours next to the two anchorages, education level from grade six to ten is relatively satisfactory with about 30% reaching this standard (slightly above the average of 28% in the Matara District). However, a high percentage of students drop out after reaching this standard. The number pursuing education beyond Ordinary Level Examination (Grade 10) is rather low (12%). The situation for Kottegota and Nilwella is in general similar, due to the closeness to the harbour areas.

The opinion and experience of fishing communities on the performance of government institutions are shown in Table 5 through focus group discussions held with the harbour users in Puranawella. In general this conclusion can be assumed to be similar in these two sites.

Table 5: Community opinion and experience on the performance of existing institutions (USAID 2006).

Institution	Opinion /experience
CFHC-harbour management office	The services could be improved and made available for all equally. The maintenance of the harbour premises also is not satisfactory.
Fisheries corporation	There is no formal arrangement to intervene in fish marketing. Therefore, middlemen exploit the situation and take a larger share of profit.
NARA	Generally, the communities are satisfied with the services of NARA. The research and some training of NARA help the fishermen to locate/identify high fish population spots in the sea.
Government banks	Most of the fishermen are not entitled to 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 effective and timely
Ice producers	Prices are not fair and also quantities supplied are not adequate. Supply on time is also not always guaranteed.
Fisheries cooperative (CBO)	At present it is not effective and the powerful elements exploit the opportunities. As a result the needs of the scale fishermen are always neglected.

The CFHC has identified that both the Kottegoda and Nilwella anchorages almost immediately needed to be repaired and improved after the tsunami. This also includes the construction of required marine structures to provide safe berthing facilities and also a building for net mending, fish auctioning, to serve as a community centre as well as for the storing of nets, engines and ice.

3.1 Kottegoda anchorage

Kottegoda is 177 km from Colombo, approximately 2 km from the Colombo-Hambantota main road (A 2 road) (Appendix 2 - Site map). According to Bandara and Helgason (2006) Kottegoda has three naturally formed bays, Edandawella, Kapparawella and Suduwella. Suduwella and Edandawella are well sheltered and most boats are anchored in these two bays. Suduwella which is the safest of the three is characterised by its rocky headland on the southwest and large number of rock outcrops at the middle of the basin. The shoreline on the left of the bay is covered with a long revetment to prevent erosion of the beach and damage to the Matara Kataragama main road. The rock outcrops in the bay prevent high waves from penetrating directly into the basin and create calmness in the basin. This encourages the fishers to anchor their boats in this basin. Detracted waves from the rocks at times penetrate into the basin and cause some disturbances to the fishing activities. It has long been desired by the fishers to have a breakwater constructed over the existing rock outcrops but it has only partly been constructed. The approach road to the breakwater was partially completed some time ago, but the work has since been abandoned due to lack of funds.

This request was taken into consideration by the government in 2001 and the design for the development of this anchorage into a level of a fully fledged harbour was entrusted to the University of Ruhuna (2003a). The design reports are available at CFHC. The Government of Sri Lanka has already made plans for a harbour to be developed at Kottegoda Anchorage. The harbour will have the following facilities (Table 6) (University of Ruhuna 2003a).

Table 6: Physical characteristics of the harbour at Kottegoda

Harbour basin area	25 Ha
Harbour entrance width	70m
Depth at the entrance	6 m LWOST
Length of the beach inside the harbour	1000 m
Length of the quay wall	100 m

The costs for this harbour are estimated as follows (Table 7).

Table 7: The cost estimates for a harbour at Kottegoda

Main break water	310 M.Rs
Secondary break water	200 M.Rs
Quay wall	43 M.Rs
Total	**553 M.Rs or 5.53 M.USD**

Fishing is the main livelihood in Kottegoda village and the small number of boats reported at the location is mainly due to the above two reasons. The development of the Kottegoda anchorage into a harbour will solve these problems, raise the number of fishing boats that can use the site and relieve the congestion the Kottegoda are presently causing at other fish landing centres.

Kottegoda is a primitive anchorage and the nearby Puranawella fishery harbour is only around 30 minutes drive away. All facilities for buying and selling fish are found there and from there the fish is mostly sent to Colombo (Pubudu 2007).

The Kottagoda fisheries inspector area covers six villages in the Matara DFEO Division, and in 1999 the total population was 1913 people but had decreased to 1800 after the tsunami.

The main species that can be purchased in Kottegoda are tuna (skipped jack tuna, yellow fin tuna), seer, barracuda, bill fishes and squires. There is no proper registration system for the catch in the anchorage and there are no ice holding facilities but the catch is estimated to be around 1000-2000 kg/day (Pubudu 2007).

After the tsunami there were no facilities at all at this anchorage. Still there are over 100 boats that use this anchorage and among them there are 40 multi-day boats. The fishermen say that the tsunami destroyed eight 3½ ton fishing vessels completely. For this reason few of the fishermen like to use this anchorage now. Their main request is that this anchorage is made into a harbour because of the large number of boats there. Designs have been done by the University of Ruhuna. However, while this cannot be in done in the next few years the following investments were recommended necessary at once.

Investments planned:

1.	Community centre and net mending hall	Rs.3.0m
2.	Auction shed ice holding room	Rs.3.5m
3	Toilets and water availability	Rs.0.5m
	Total	**Rs.7.0m**

According to the ICEDA Report (Bandara and Helgason 2006), Kottegoda vehicles cannot pass the access road on rainy days as it becomes slippery with the soil placed on the road damaged by the tsunami. ICEIDA will provide a fuel outlet, toilet block and an access road of 1 km at a cost of USD 90,000. The cost for basic infrastructure at Kottegoda anchorage including a fuel supply facility is estimated at 2.1 M.Rs. or USD 21.000. The cost of repairing the access road to the landing site is estimated at 10.0 M.Rs. or USD 100.000.

Currently FAO has provided basic shore facilities at Kottegoda, including an auction hall, gear stores, engine stores and an office building. A net mending building is being constructed by an NGO, and ICEDA is providing the fuel tank with a dispensing unit, a toilet block and building the access road to provide a better service to the fishers. The approach road to the breakwater was partially completed some time ago, but the work has since been abandoned due to lack of funds.

Table 8 sums up the number of the total population in Kottegoda, and that out of the total 468 are fishermen and the number of fishing gears and types of boats they use.

Table 8: Kottegoda - number of boats and fishermen 2005

The total population around the anchorage including fishers	1800
Fishermen	468
Multi-day boats	16
FRP boats	44
Traditional craft	123

Source: Statistical Unit of the Ministry of Fisheries and Aquatic Resources

3.2 Nilwella anchorage

The Nilwella anchorage is located 193 km from Colombo, and about a 1 km distance from the Colombo-Hambantota main road (A 2 road). It is located, in a sheltered bay, with a breakwater, close to the Kudawella fishery harbour (Appendix -site map). It is also only approximately 1 km off the Matara-Tangalle main road in Dickwella DS Division in Matara district right opposite the Kudawella fishery harbour. The surrounding is characterised by a rock headland on one side and a large bay on the northern side. The hinterland is hilly except for a small extent immediately behind the anchorage. This anchorage is exposed to the northeast and it is therefore extremely difficult to anchor the boats during the NE monsoon period.

As Nilwella anchorage is located in a very sheltered bay it has the possibility of being developed into a fishery harbour. The MFAR commissioned the design for the harbour to the University of Ruhuna in 2003 and the design report is available with CFHC. According to the University of Ruhuna the future harbour will need the facilities outlined in Tables 9 and 10 (University of Ruhuna 2003b).

Table 9: Physical characteristics of the Nilwella harbour.

Harbour basin area	8.7 Ha
Harbour entrance width	59 m
Depth at the entrance	6 m LWOST
Dredging volume	20,000 m^3
Length of the beach inside the harbour	350 m
Length of the quay wall	100 m

The costs for this harbour are estimated in Table 10.

Table 10: The cost estimates for the harbour

Main break water	236 M.Rs
Secondary breakwater	16 M.Rs
Quay wall	20 M.Rs
Dredging	10 M.Rs
Total estimated cost	**282 M.Rs or 2.82 M.USD**

During the difficult NE monsoon period, the fishermen tend to take their boats into the closest harbours like Kudawella, Tangalle and Puranawella, and this has created congestion in these harbours. The congestion would be eased if Nilwella harbour was completed and further encourage expansion in fisheries operation in the area. The government constructed a breakwater of 175 m as a first stage of developing the anchorage as a fishery harbour. However, harbour construction work was not continued due to lack of funds, but after the construction of the breakwater the number of boats operating is increasing.

In Nilwella the catch is mainly small pelagic species of sardines, anchovies, and mackerels except tuna fishes, and there are no ice holding facilities (Pubudu 2007).

Nilwella fisheries inspector area is covers five villages in Matara DFEO division in 1999 the total population was 1828 people in 2005 it increased 2800 (Table 11).

Table 11: Marine fisheries in Nilwella – 1999.

Villages	Fishing h'hold	Population of fishing h'hold	Mean h'hold size (persons)	Fishers	Mean no. of fishers per h'hold	Fishing boats
	3	1,8	5.	4	1.	

Source: Census of Marine Fisheries in Sri Lanka 1999

The tsunami, which arrived from the NE direction, penetrated directly into the basin and destroyed almost all the boats anchored there. It also damaged the auction hall which was the only building available there and which was also used as a community hall for the fishing community. The building that used to serve as community centre/net mending hall/ auction place and storage for nets and ice/fish was damaged severely. While in most places the damage had been severe and what remains cannot be used for fear of danger to life and property. Nilwella, before the tsunami, had been provided with protective/service facilities such as breakwaters, groins jetties etc.

The auction hall which is used as a resting place and a community hall has suffered fairly extensive damage, and it is not in a condition safe enough to be occupied without risk of injury/death and damage to property. It has to be replaced with a new building. Incorporating an auction hall, net mending place, store, toilets

Needs assessment and estimate

1. Construction of community centre cum net mending hall Rs 3.0 m.
2. Fish auction ice holding room Rs 3.5 m
3. Toilets and availability of water Rs.1.0 m

Total **Rs.7.5 m**

After the tsunami, FAO has constructed basic facilities that include an auction hall, fishing gear stores, engine stores and office. An NGO is building net mending facilities.

ICEIDA will provide a fuel outlet, facility complex (main building), toilet block and a radio room at a cost of USD 70,000. The facilities being developed and their cost estimates are as follows:

Fuel outlet	300 sq. ft	USD 15,000
Facility complex (auction, net mending, office, etc)	1960 sq. ft	USD 31,000
Toilet block	375 sq. ft	USD 5,000
Radio room	1000 sq ft	USD 19,000

The bay is now much more sheltered with the construction of the breakwater and an increasing number of new boats are operating from the anchorage, but the site is in need of more infrastructure. The Nilwella anchorage supports three different fishing systems: fishing in shallow sea using small mechanised boats and traditional crafts; fishing using one-day mechanised boats; and fishing using multi-day boats. The statistics on the area given in Table 12 show the total population and that 694 of them are fishermen and also the number of fishing gears and types they are using.

Table 12: Nilwella - number of boats and fishermen 2005.

Total population getting livelihood from the anchorage	3,800
Fishermen	694
Single-day inboard engine boats	6
Multi-day boats	43
FRP boats	20
Traditional craft	176

Source: Statistical Unit of the Ministry of Fisheries and Aquatic Resources

3.3 Future visions for the two anchorages

Fishermen have resumed normal fishing activities now. It has been observed that a large number of fishing boats, especially FRP boats, have been issued to fishers particularly by NGOs and it has become a threat to fishing resources. Currently the Ministry of Fisheries is doing a complete boat census to count the boats operating from each harbour, anchorage or fish landing site. This census will be over by 31 January 2007 and until that time no new boats will be registered (MFAR 2007). Expected fish catch (tons) by type of boats from the two anchorages are shown in Table 13.

Table 13: Expected fish catch (tons) by type of boats.

	Multi-day boats	Single day boats	FRP boats	Traditional craft	Total
Kottegoda	960		660	738	2,348
Nilwella	2,580	150	300	756	3,736

Source: Statistical Unit of the Ministry of Fisheries and Aquatic Resources

In Table 14 below fishery related opportunities are compared for the two anchorages.

Table 14: Other fishing related employment opportunities in the two anchorages

	Fish trade	Ice supply	Fishing gear	Miscellaneous supplies (food and beverages, etc)
Kottegoda	235	5	10	10
Nilwella	375	8	10	10

Source: Statistical Unit of the Ministry of Fisheries and Aquatic Resources

If plans for the harbours in both anchorages will be realised an increase in the number of boats can be expected as below (Table 15).

Table 15: Increased number of vessels expected after construction of each harbour

	Kottegoda	Nilwella
Inboard engine boats	75	75
Outboard engine boats	100	75
Traditional craft	100	40

Source: University of Ruhuna (reports are not published documents) summary of layout

Currently MFAR subsidies for vessels in these tow anchorages. All fishermen irrespective of the area can apply for subsidy to buy multi-day fishing boats. The amount of subsidy paid is as follows.

For multi-day boats less than 55 feet in length	Rs. 1.0 million
For multi-day boats over 55 feet in length	Rs. 2.5 million

The subsidy works out to around 25% of the total cost.

4 STAKE HOLDER ANALYSIS

According to Pubudu (2007) the main stake holders of these two sites are fishermen and buyers. During his work in this area, the main problems that he faced regarding these two sites were the lack of ice, dealing with inquiries of the fishermen in the evening and night time and the instability of the fish catch. The suggestions for improvement of these two sites will have to include a solution for supplying the fishermen with main requirements (ice, water, etc.), proper handling and the possibility of selling the catch at all times. Regarding the rebuilding of facilities in these two sites the government authorities will, according to Pubudu, have to be a part of the solution. For sustainable operations of the two sites a steady supply of good quality ice is needed and a better knowledge of operations has to be offered through a training programme for the fishermen and the people handling the fish. Kindergarten provided for those two sites would also be very beneficial as it would make the fisherwomen free to spend more time on value added activities.

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For the Nilwella and Kottagoda anchorages the following stakeholders have to be looked at separately (Figure 3).

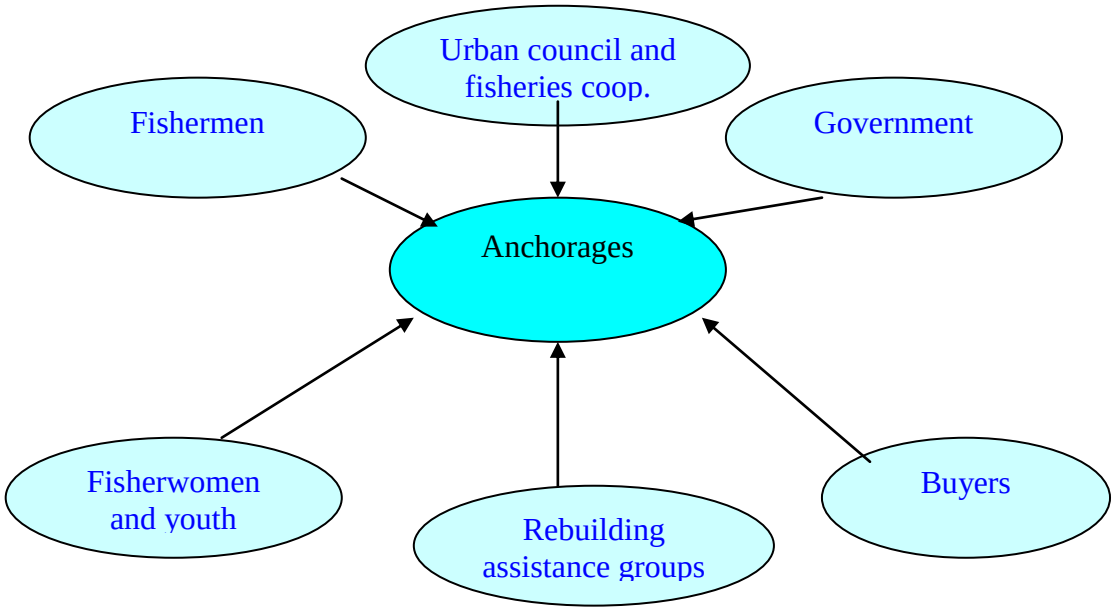

Figure 3: Stakeholders in anchorages.

4.1 Fishermen

Rebuilding of facilities was assessed using qualitative methodology in two locations with similar ecological settings and comparable socio-economic characteristics of the population. The communities of both research locations are requesting to expand these sites as fishery harbours.

Problems experienced by the local stakeholders in the landing site infrastructure are listed below.

At present there is no management structure for the anchorages:

- The anchorages lack an ice plant. For these two sites closest harbour management seems to be at variance with this requirement wanted by fishermen. The harbours closed to the two sites are not able to supply the fishermen of the anchorages with ice and other needs.
- Capacity of the fuel station and water taps will be increased number of boats using the anchorages in Matara.
- There is a lack of a boat repair shops; however, closest harbour management does not support the idea of providing such a facility as boat repair services provided are from outside the harbour.
- Cool house facilities to store fish at the sites are not available.
- Training for community empowerment and landing sites management would be beneficial.
- Accommodation problems exist for migrant fishing vessels and repair staff.
- Inadequate toilet facilities and lack of ancillary facilities for washing and bathing.
- The access roads to the landing sites are in poor condition.

Problems with obtaining fishing vessels:

- The fishermen find difficulties in purchasing spare parts for boat engines, fishing nets and other equipment due to high prices maintained by private traders.
- The fishery management does not have a mechanism to address these types of problems and thereby assist small-scale fishermen.

Marketing problems:

- Since there are inadequate facilities to store fish catch overnight, fishermen are compelled to sell the fish to middlemen if the auction is over by the time they arrive.
- Lower income earned due to low quality of products.
- Inability to compete and obtain a fair price due to the lack of inputs such as ice and transport facilities.
- There is no mechanism established to process fish when the fishermen cannot sell the whole catch on the same day.

Entrepreneurship development:

- Fisheries co-operative societies are not being strengthened towards self-management business ventures.
- Lack of entrepreneurship skills of the members of the fisheries co-operative society members.
- Lack of access to finance.

Issues related to post harvest technology and low quality:

- High level of post harvest loss
- Safety problems
- Technology transfer is very slow and there is a big communication gap (especially in the fishing, handling, storage and value addition) between related government organisations.

4.2 Fisherwomen and youths

Issues identified:

- Lack of knowledge in opportunities existing for the participation of women in the fisheries development.
- Creation of opportunities for active women's participation.
- Lack of opportunities prevailing for women in coastal fisheries families to earn alternative income.
- Lack of recognition for women in leading and motivating of community.

4.3 Government

There are four types of institutions that are active in these two research areas located in the Matara region. They are:

- Government organisations that include mainly CFHC, Fisheries Corporation, NARA, Fisheries Department and government banks. These are entrusted with the tasks of maintenance of harbour and facilities, marketing, and research, community welfare and providing credit facilities respectively.
- Private sector organisations involved in providing certain services such as ice, boat repairs and credit facilities.
- Formal community based organisations (CBOs) such as the fisheries cooperative 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. Two other CBOs also have been established with the help of local NGOs (Sanasa and Sarvodaya) to provide credit and welfare facilities to the fishing community, which became more active after the tsunami.
- Informal community organisational structures that consist mainly of accepted norms, procedures and customs that play a decisive role in the functioning of the two anchorages. For example the large-scale fishermen assume a powerful role in the fishing community and have control over fish prices as well as in the distribution of welfare assistance. The smaller-scale fishermen basically have little power or authority and are often victims of the informal authority assumed by the richer fishermen. There are also reports of unpleasant activities that take place as a result of this balance of power.

4.4 Rebuilding assistance groups

After the tsunami, with the assistances of various NGOs, rebuilt infrastructure facilities in both research locations, are the auction hall, net mending hall engine stores, fishing gear stores, office room, fuel tank with two dispensing units (fuel outlet), toilet facilities and access roads. In Sri Lanka the responsible organisation for the servicing of the landing sites is Ceylon Fishery Harbour Corporation, but currently these anchorages are not maintained by any agency. The use of these facilities will generate waste according to what is shown in the following table (Table 16).

Table 16: Waste streams

Zone	Source	Waste generated
Anchorage basin	Fishing vessels	Bilge water
		Lube oil
		Sewage
		Toilet waste
		Kitchen waste
		Deck washing
		Fish hold cleaning
	Fishing vessels and current	Floating garbage
Landing jetty/marketing	Auction hall	Fish waste
		Blood water
		Trash fish
		Hose down water
	Gutting area	Fish offal
		Hose down water
	Fuel pump	Oil leaks
Main complex	Toilets	Sewage
		Waste from wash areas
	Canteen	Kitchen waste
		Waste from wash area
		Litter and food scraps
	Boat repair	Oil and grease
		Paint cans, paint
		Anti-fouling paint cans
		Used batteries
		Torn nets and rope
		Wood shavings, steel scrap
		Offices
	Offices	Toilets and garbage

As mentioned before regarding the ice supply there are no communication processes or dealing systems between the anchorages and the two nearby harbours. ICEIDA and FAO assist these for rebuilding the facilities but there are no proper maintaining systems for those and there is a lack of system for continuous monitoring of the impacts of the projects.

According to Fernando (2005) during discussions at the sites, people voiced their disappointment and anger that other than the assistance that had been forthcoming from the NGOs and the private sector organisations and individuals, nothing tangible had trickled down from the state sector, to improve their livelihoods.

4.5 Buyers

There is no established mechanism for fish marketing, and the fish marketing mechanism is totally out of the control and live participation of the fish catchers. There are variations in fish prices due to lack of a proper price controlling mechanisms. Marketing is a very important aspect in fisheries, particularly since fish is a highly perishable commodity. Marketing has a critical place in a small-scale fishermen dominated fishery as in these sites. If fishermen do not get a fair and reasonable price their economic conditions will be further aggravated. On the other hand fish is an important commodity in the daily diet of the people and it is of

paramount importance that fish of high quality is made available at agreeable prices for buyers and sellers.

4.6 Urban council and fisheries co-operative societies

There are urban councils in both areas, but they are not responsible for the anchorages maintenance. Arrangements should be made with these local bodies to ensure their participation in the proper maintenance of these sites, with special emphasis on the environmental impact and in addition they could plan a system enabling them to earn some income from the use of these facilities.

According MFAR (2007) there are two fishermen's associations in these two sites Nilwella fisheries co-operative society and Kottegoda fisheries co-operative society.

Analysis of stakeholders in the two anchorages have revealed a number of issues and problems with the functioning of the anchorages for which intervention is sought. These issues are largely related to anchorages infrastructure, institutional capacity, ancillary facilities, marketing facilities, etc.

5 SUSTINABLE OPERATIONS

The Brundtland Report (1987) defined "sustainable development" as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs". It contains within it two key concepts: The concepts of needs, in particular the essential needs of the worlds poor, to which overriding priority should be given, and the idea of limitations imposed by the state of technology and social organisation on the environment's ability to meet present and future needs.

In this report the sustainability was discussed using three dimensional models.

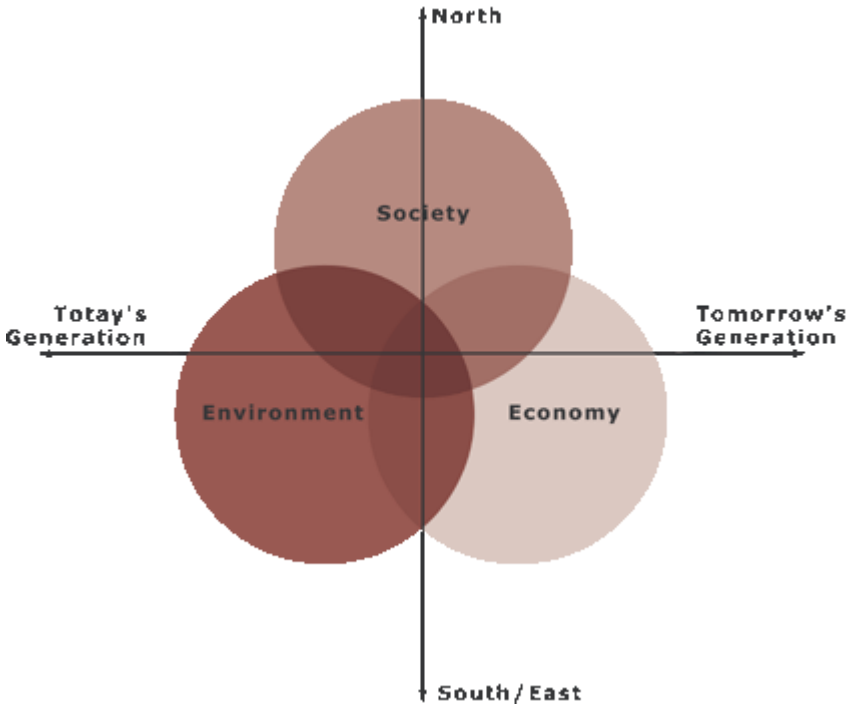

Figure 4: The three-dimensional model (Brundtland Report 1987).

Nowadays, sustainable development is often depicted schematically using three circles for the target dimensions of environment, economy and society, to which are added the time and north-south dimensions. The diagram illustrates that:

- Economic, social and environmental processes are interlinked. Public and private agents alike cannot be permitted to act one-dimensionally and in isolation. Instead, their actions must take into account the interplay between the three dimensions of environment, economy and society.
- Sustainable development goes beyond environmental conservation. In order to satisfy our material and immaterial needs, we require economic prosperity and solidarity in our society.
- The implications for the future of the actions of today must be factored in (the intergenerational aspect) so that future generations are also able to satisfy their needs.

- Sustainable development calls for long-term structural change in our economic and social systems, with the aim of reducing the consumption of the environment and resources to a permanently affordable level, while maintaining economic output potential and social cohesion.
- Global interdependencies must also be considered (the north/south aspect). From the environmental standpoint, the current lifestyle in industrialised countries cannot be spread around the globe. Sustainable development aims to bring about a long-term improvement in the quality of life of the majority of the human race, which lives in bitter poverty and inhuman conditions.

The 2002 World Summit on Sustainable Development expanded this definition identifying the "three overarching objectives of sustainable development" to be (1) eradicating poverty, (2) protecting natural resources, and (3) changing unsustainable production and consumption patterns.

The Food and Agriculture Organization has identified considerations for technical co-operation that affect three types of sustainability:

- Institutional sustainability. Can a strengthened institutional structure continue to deliver the results of technical co-operation to end users? The results may not be sustainable if, for example, the planning authority that depends on the technical co-operation loses access to top management, or is not provided with adequate resources after the technical co-operation ends. Institutional sustainability can also be linked to the concept of social sustainability, which asks how the interventions can be sustained by social structures and institutions;
- Economic and financial sustainability. Can the results of technical co-operation continue to yield an economic benefit after the technical co-operation is withdrawn? For example, the benefits from the introduction of new crops may not be sustained if the constraints to marketing the crops are not resolved. Similarly, economic, as distinct from financial, sustainability may be at risk if the end users continue to depend on heavily subsidised activities and inputs.
- Ecological sustainability. Are the benefits to be generated by the technical co-operation likely to lead to a deterioration in the physical environment, thus indirectly contributing to a fall in production, or well-being of the groups targeted and their society.

The United Nations has declared a Decade of Education for Sustainable Development starting in January of 2005. A non-partisan multi-sector response to the decade has formed within the U.S. via the U.S. Partnership for the Decade of Education for Sustainable Development. Active sectors teams have formed for youth, higher education, business, religion, the arts, and more. Organisations and individuals can join in sharing resources and success stories, and creating a sustainable future.

5.1 Proposals for sustainable future operations

As a pilot project, it is necessary to establish new and strong area fishermen associations and strengthen the already existing ones in order to build up these two sites. For improvements to be sustained implementation of this project should come from the Ministry of Fisheries in association with NGOs. The main partner of this should be the Fishery Harbour Co-operation because in Sri Lanka all landing sites belong to the CFHC. This fishermen's association should include the following officers: an area fisheries inspector, one officer from research institute (area research officer), training institute (assistance director), Fishery Harbour Co-operation, Ceylon Fishery Corporation, municipal council member, officer from the Ministry of Fisheries, and one member from donors or/and NGOs. All these members should identify and support the needs to plan, manage, administer and upgrade the facilities of the fish landing sites to cater to the needs of the expanding fishing industry. This association management should be responsible for the below mentioned groups.

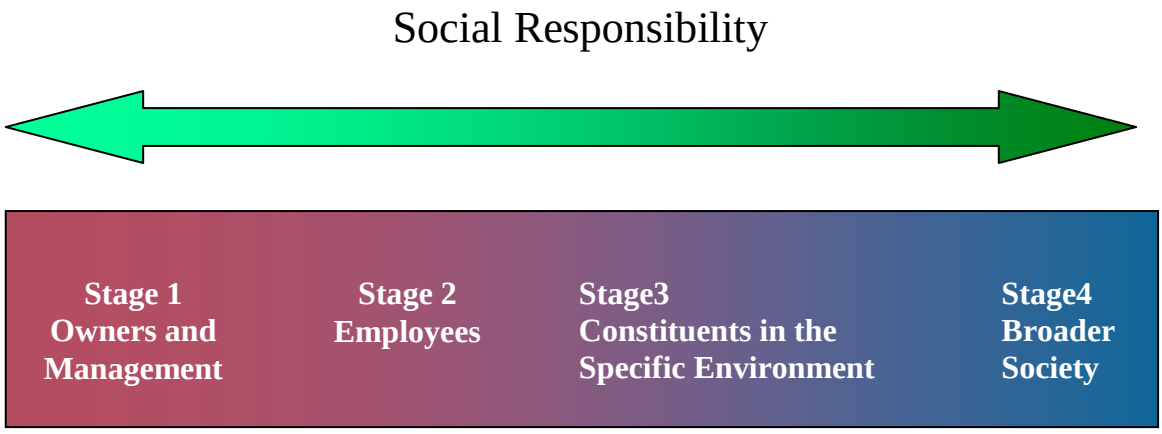

Figure 5: Social responcibility

Government members to ensure the existence of efficient and systematic management control, supported by a reliable and updated information system.

This project should develop, demonstrate and promote new technologies, methodologies and ideas to help to improve the conditions of small-scale fishermen communities. This pilot project should confirm two important facts.

1. The overall development objective of the project was to demonstrate environmentally sustainable operation of rebuilt facilities in two anchorages which offer socioeconomic benefits to the community.

2. Create awareness among users of the importance of a clean environment and the need for them to cooperate with the authorities in the up keep of the anchorages by proper use of the facilities provided.

All the facilities provided at the two anchorages could be included in a fish landing complex (Table 17). These facilities supervise, manage and administrate the fishermen association.

These facilities will help to sustainable conservation and management of coastal marine resources and habitats through strengthening of community based management.

Table 17: Fish landing complex

Administration	Complex management office
Landing	Jetty, porting
Handling	Trolley, ice boxes
Marketing	Auction hall, storing hall, wholesale market, seller officer
Storing	Cold room
Maintenance	Repairing, work shop
Input stock	Ice, water, fuel
Downstream industry	Fisheries processing factory, ice factory
Welfare	Canteen, rest room

All government officers related to the association should inspect the landing sites once a month and keep a record over their observations according to their field of business. Key points in these reports should be discussed during the association meetings, held once a month. This will be helpful to keep proper recording system regarding sites.

Create a distribution channel among all.

In the process of developing these two anchorages it is essential to create information for sharing, education and communication strategies that will appropriately communicate the polices, processes, lessons learnt and significant change stories to the association priority stakeholders. The main objective of the proposed work is to enhance the overall productivity and sustainability of the anchorages by carrying out urgently needed work, and thereby enabling greater economic and social opportunities and benefits for users. The diagram below (Figure 6) explain distribution channels among the government office and associations.

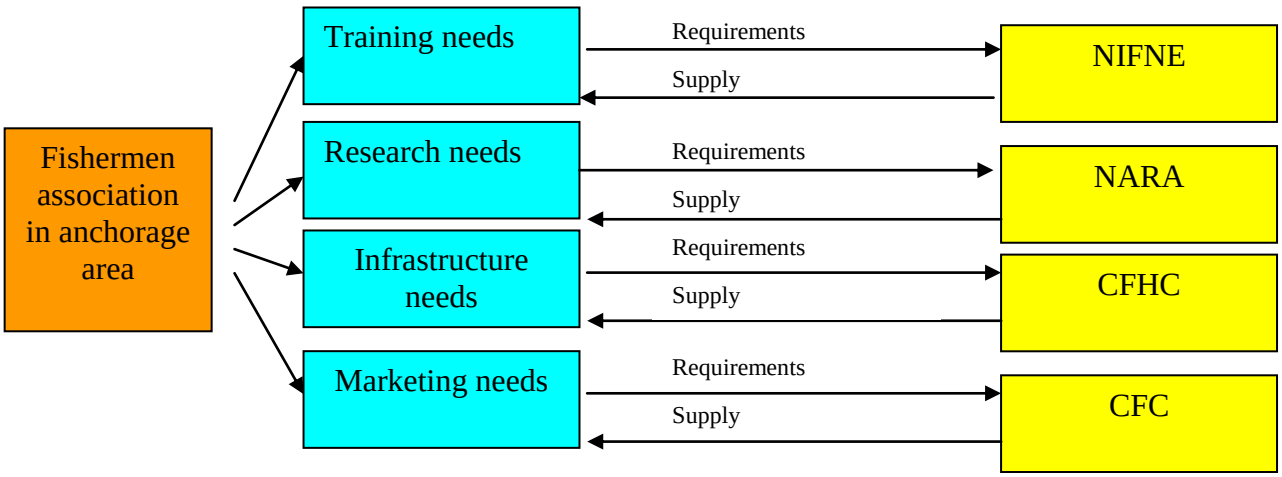

Figure 6: Distribution channels

For development of these associations below key factors must influence development in sustainability.

5.1.1 Participation and ownership

Association participation and ownership are important. Get the stakeholders (fishermen and their wives) to genuinely participate in design and implementation. Build on their initiatives and demands. Get them to monitor the rebuilt facilities and periodically evaluate it for results. For this proper training is a key factor.

This approach has the endorsement of the Ceylon Fisheries Harbour Corporation (CFHC) HQ in Colombo, this project should be contracted to the harbour manager in each respective anchorage area. On an initial visit to these sites the harbour managers should agree to organise consultation sessions to solicit feedback from fishermen in the anchorages with involvement from the project team to lead the discussions.

Expected results of this meeting is an agreement to collaborate, specifically through the use of officers in the local authorities and all users, with the support of funding agency as facilitators to assist in the consultation activities. An intention here is also to build a linkage between all related members intervention in the area and facilitate synergies that would benefit the overall impact of the projects in the long-term.

This planned agenda for each session is to identify and discuss the issues in each anchorage, allow time for facilitated group work under the headings a) infrastructure, b) management, c) social d) economic e) environment; and finally to review and prioritise issues in plenary sessions. Given what the fishermen expected from the project, get through the discussions.

5.1.2 Capacity building and training

Training stakeholders to take over should begin from the start of and continue throughout the duration of the project. The right approach should both motivate and transfer skills to people. The National Institute of Fisheries and Nautical Engineering, which is the training institution of the Ministry of Fisheries, should be take responsibility for conduct awareness programmes using appropriate communication material among landing facilities – users on the need to maintain a sustainable way. These programmes should be aimed to build up attitude of landing facilities administrators and users. All users of this landing sites should be educated to change their perceptions and attitudes with regard to managing the facilities in a sustainable way. For this, the below mentioned users (Table 18) are the main target group.

Table 18: Training programmes for main target group

Target group	Training programme
All management related to landing sites. (harbours, anchorages)	Management of hygiene and sanitation conditions in landing sites (Annexure)
Fishermen	Fish handling practices (Annexure)
Fisherwomen and youth	Extra income generate activities-production of fibreglass products (Annexure)
Fishermen/fisherwomen/youth	Leadership and communication

And also other main requirements are to build up their organisational, professional and leadership capacity.

According to Bjarni (2007) fisheries professionals in the industry have to increase the level of their knowledge and adaptation multidisciplinary approaches to increase efficiency and quality.

5.1.3 Government policies

This development project should be aligned with local government policies. The current GOSL policy for the fisheries sector identifies the need to develop fishery landing sites in a planned manner to increase production, namely through offshore fisheries. In terms of the fisheries policy, the landing sites rebuilding project conforms to the requirements of the policy framework and recognises the principles of long-term sustainability of the fisheries sector. For this purpose:

1. Government should provide favorable and great support.
2. Supplied knowledge of services and technological innovations that are pertinent to the changing needs.

5.1.4 Financial support

In some fishery sectors, financial sustainability is difficult in the medium term. Training in local fundraising is a possibility, as is identifying links with the private sector, charging for use and encouraging policy reforms.

Increase in employment opportunities and income:

- This project will allow the anchorages to operate at a higher capacity than at present. This will encourage new boats to be added to the existing fleet and create employment opportunities for unemployed members of the community, with a positive impact.
- Sustained landing facilities will also facilitate higher income among the different stakeholders in the anchorage community (Table 19).

Table 19: Impact on potential income increases due to project activities.

Stakeholder	Project components	Income increase
Harbour management	Improvements in physical facilities in landing sites	Higher income from tariffs due to a greater number of boats using the landing sites
Fishermen	Establishment of new facilities more space for berthing of vessels.	Increased income for new entrants to the existing fleet.
Service providers	Opportunities to expand services (fuel, ice, cool room, workshop)	Increase in income for new and existing service providers
Local communities	Immigrants to the local area will increase (fish traders, fishing vessel repairers)	Income of shop owners, food suppliers etc may increase moderately

5.1.5 Management and organisation

Activities that integrate with or add to local structures may have better prospects for sustainability than those which establish new or parallel structures. For this association to better management:

1. Need to know local and trends of development of landing sites facilities.
2. Build on members and their needs-involve them in planning / implementation / control / training.
3. Support of self-help initiatives.
4. Take in to account community needs.
5. Co-operate with other related government offices.
6. Monitor and adjust.

According to Bjarni (2007) proper co-operation in fishing and specialisation of specific tasks e.g. number of vessels that fish at the same location could collect their daily catch in one boat that ships transits it to habours, such co-operation could increase the quality and freshness of landings and reduce post harvest losses.

5.1.6 Social, gender and culture issues

The introduction of new ideas, technologies and skills requires an understanding of local decision-making systems, gender divisions and cultural preferences.

Everyday human beings are not one-dimensional entities, they are excitingly multi-dimensional and indeed very colourful. Their emotions, beliefs, priorities, behaviour patterns can vary. This association should help the fishermen to get out of poverty and achieve dreams, such as good income and proper education for their children. Since educated decision-making is essential to the association's success, the association should also teach new skills varying from adult literacy to business operations. Association empower individuals by giving them a chance to participate in decisions which have an impact on them. The association should be capable of engaging in entrepreneurial activities to create the value for it is members.

Supporting activities for the fisherwomen members in these two sites should start as soon as possible. These supports should be in technical, managerial and financial aspects. For this purpose, the association could introduce the Grameen bank system which has now been successfully created in Bangladesh. The Grameen bank system is based on the potential of persons and helps them to achieve their objectives through creating/supporting sustainable business enterprises. Provision of knowledge, skills and awareness to strengthen the association as successful business ventures, implementation of business plans that could minimise the involvement of middlemen.

This business plan proposed is for generating extra income for the fisheries communities in the two anchorages. The main purpose of this report is fisheries community development and to make income generating opportunities in the Nilwella and Kottegoda for women and youths who are members of fishing communities.

5.1.7 Technology

All outside equipment must be selected with careful consideration allowing for the local finance available for maintenance and replacement. Cultural acceptability and the local capacity to maintain equipment and buy spare parts are vital. If we expect sustainable management of these landing facilities we must provide technological innovations and technology packages to the relevant sections.

According to Bjarni (2007) landing sites should use the opportunities that they have to adopt new techniques e.g. folk lifts and easily cleaned plastic containers on wheels to move big fishes around instead of cutting fishes in to peaces to make them more transportable. Such simple devices would reduces contact of fish to unwashed surfaces and improve fish handling to process.

5.1.8 Environment

Poor rural communities that depend on natural resources should be involved in identifying and managing environmental risks. Urban communities should identify and manage waste disposal and pollution risks.

A booklet could be published (guidelines for cleaner landing sites) to highlight pollution aspects typical of fishery landing sites and possible ways and means of dealing with the various pollutants. The purpose of the booklet should be to create awareness not only among landing site users, but also among sites' administrators and policy-makers. The intention is to provide site managements with the basic knowledge to initiate remedies through appropriate national agencies.

One of the serious effects of fishery landing sites pollution is its effect on the quality of fish handling systems. The common practice of washing fish with polluted water due to inadequate supply of clean fresh water results in bacterial contamination of the fish. Not only does this pose a health hazard, but it also results in quicker spoilage and consequent economic losses. A monitoring programme to check bacterial contamination of fish prior to landing and after should be initiated.

5.1.9 External political and economic factors

In a weak economy, projects should not be too complicated, ambitious or expensive. The fisheries community should be empowered to receive welfare from their own organisation.

5.1.10 Realistic duration

A short project may be inadequate for solving entrenched problems in a sustainable way, particularly when behavioural and institutional changes are intended. A long project may, on the other hand, promote dependence. To begin with, the duration of this project should be 6 months. The outcome should be discussed with the aim to develop it and improve it further with the aim to generate higher income for the fishing community using the landing facility and technical assistance provided and convert anchorages as separate cost centres. Donated facilities should boost the profits and help to fetch a high price for good quality fish.

6 DISCUSSION AND SUGGESTIONS

Looking towards the future in sustainability of fishery infrastructure facilities, there are several constraints and issues to contend with in development of the sector in order to realise its full potential. The major issues are that there are no proper systems for management of these landing sites and no evaluation on the importance of these for the sector.

Ownership and user-rights of resources have assumed significance for these coastal resources. The government could consider partly developing management responsibility to appropriate levels in the user groups. However, for user-rights to contribute to management success they have to be both equitable in their allocation and seen to be a fair means of controlling effort by the wider group of stakeholders.

Institutions are critical to fishery sustainability; the institutional arrangements include legislative frameworks, policy processes, inter-sectoral co-operation institutions and mechanisms for information collection, analysis and dissemination. The institutional capacity to carry out these tasks is also an important consideration. This is often lacking in these two sites and impedes the implementation of management processes. Fisheries management cannot be carried out in isolation. It has to take into account a multi- sectoral approach, which recognises the interests and impact of related sectors. Pollution from point and non-point sources damage fishery habitats, and yet, groups outside of the fishery sector can only address these. As part of this holistic approach, stakeholder participation is critical. Strengthening the fishermen's association is the best solution for this purpose.

A sustainable management approach would be to create de facto property rights first to harvests and then to resources. A sincere beginning could be made with individual harvest quotas followed by community based fisheries management schemes. The objectives are to create a system where fishermen investing in the resource are assured of enjoying the benefits of such investments. Similarly single or multi-species management may be no longer seen as adequate to managing the resource. The ecosystem approach, which provides a more holistic picture is also an accepted approached for management of fisheries resources.

Finding widespread acceptance of the concept that sharing of authority between the government and community is important for effective fishery resources management. This concept has various forms, ranging from participatory approach to fisheries management to community-based fishery management to co-management. These management approaches basically lead to decentralisation of authority and control of the resources.

7 CONCLUSION

In Sri Lanka sustainability of fisheries management has traditionally been seen as a function of the governments, who frame rules and regulations and then enforce them. This top down approach is adopted because managing fisheries has proved to be costly and unsuccessful, especially in fisheries that are small-scale, operating mostly at subsistence level. The government performs the dual functions of providing financial assistance (subsidies, grants, etc.) to promote fish production on one hand and wield the law to conserve and manage the resources on the other hand. These dual functions with contrasting objectives often prove to be counter-productive to the objectives of sustainable management practices. Currently decentralisation of fisheries management with greater involvement of stakeholders is visible in some countries. To be able to manage the industry in a sustainable way, we have to overcome the problems and challenges faced by the fishing community as well as the fisheries industry.

The efficiency of the fishing industry would depend to a large extent on the availability of the fisheries infrastructure. The main items of fisheries infrastructure are the harbours and anchorages. Using all these facilities the Sri Lankan fisheries community needs organisation to up-lift their livelihood by the way of increasing income through their own organisation. For this, The fishermen's associations really need leadership that can effectively lobby the government and obtain concessions and staff that can carry out the essential technical, managerial and operational tasks. This will lead to processes for securing resources, raw materials, capital, personal, ideas and technology.

There is no panacea for ultimate and comprehensive desirable sustainable management, as long as fisheries are a part of human actives. In order to rectify various problems that occurred in connection with the fisheries industry, one of the best ways is to leave the solution to the stakeholders by giving them a forum with a democratised and fair decision-making mechanism. Of course, to secure a fair decision-making process and induce discussion to appropriate direction, government intervention is essential. It is necessary since sustainable management schemes require strong political will. Since the government and authorities cannot always intervene, it is helpful to stakeholders, to some extent, autonomous authorities including exclusive rights. It is also essential that the execution of autonomous authority provided to stakeholders and government authorities shall be in the democratised decision-making mechanism. Finally appropriate monitoring, intervention and support by government are essential in implementation of any scheme and programme to archive the goal.

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NARA- National Aquatic Resources Research and Development Agency
CFC -Ceylon Fisheries Corporation
CFHC- Ceylon Fishery Harbours Corporation

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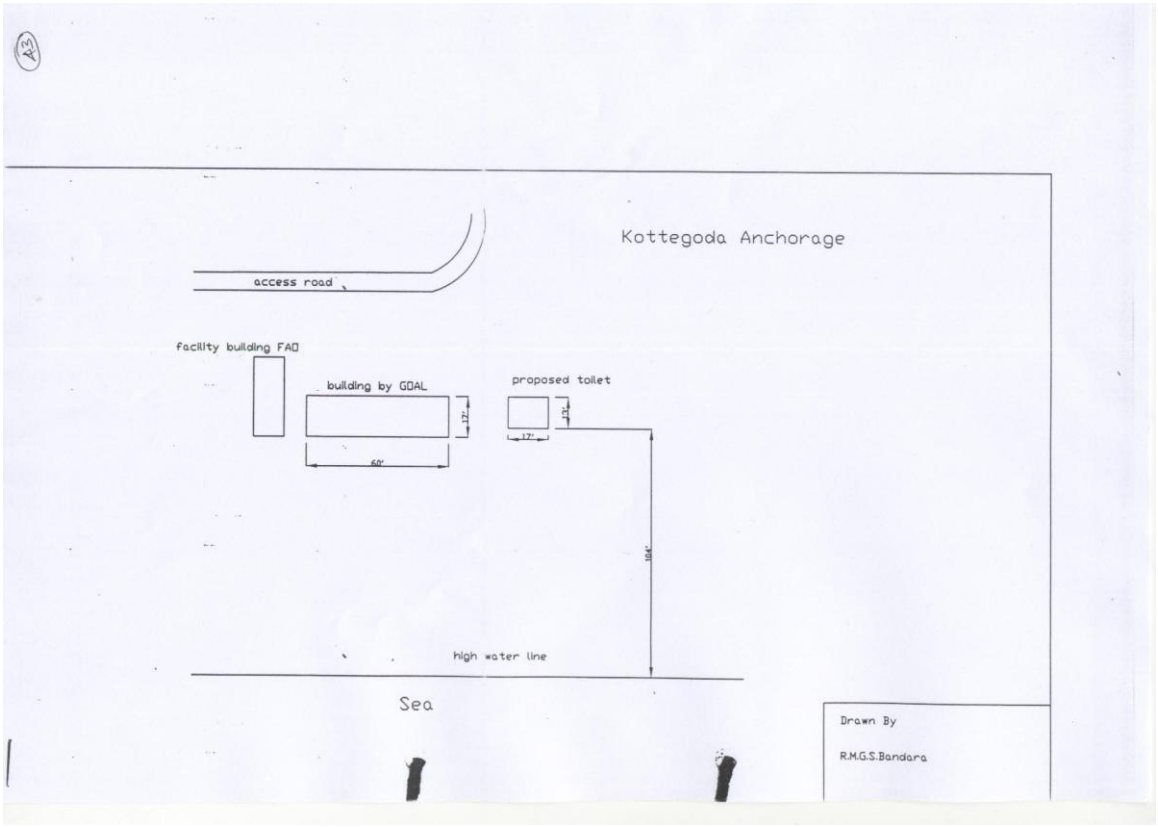
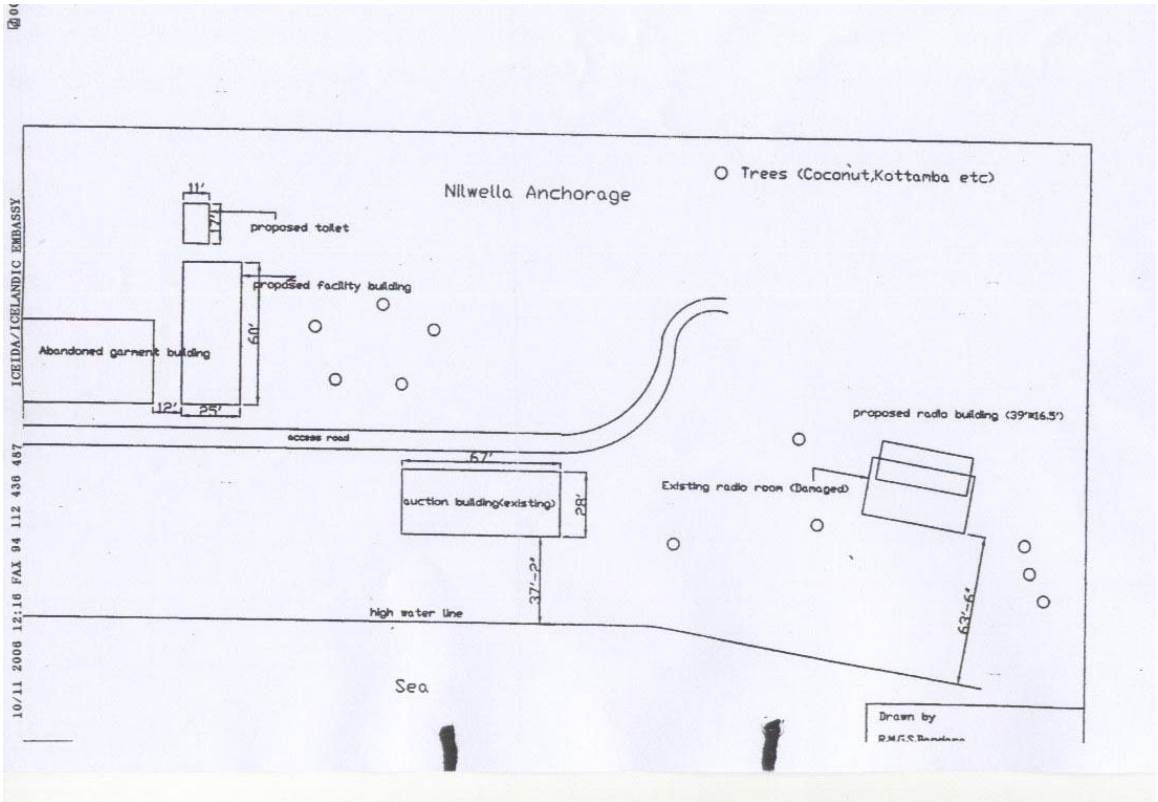
Bjarni 2007. Personal comments from Bjarni Eiriksson, University of Akureyri Iceland.

APPENDIX 1


Kottegoda Anchorage
access road
facility building FAO
building by GOAL
proposed toilet
60'
high water line
Sea
Drawn By
R.M.G.S.Bandara


Nilwella Anchorage
Trees (Coconut,Kottamba etc)
proposed toilet
proposed facility building
Abandoned garment building
access road
auction building(existing)
proposed radio building (39'x16.5')
Existing radio room (Damaged)
high water line
Sea
Drawn by
ICEIDA/ICELANDIC EMBASSY
10/11 2006 12:16 FAX 94 112 436 487

APPENDIX 2

Opportunities for Sustainable Management of Landing Facilities in the Anchorages Nilwella and Kottegoda in the Matara District of Sri Lanka

A Semi-Structured Interview with Mr Pubudu Parakrama Midipolawatta Kankanamge, manager for at Ceylon Fisheries Corporation

01. Job Title and Job description at the Ceylon Fisheries Company

02. Your work experience with doing business in the Matara District

03. Main duties related to Matara and the two sites.

04. Observation of pre Tsunami – Matara and the two sites

05. Observation of post Tsunami- Matara and the two sites

06. According to your observation which are the main stakeholders at these two sites

07. Management activities undertaken and constraints faced in doing business in Matara and the two sites

08. Suggestions for improvement of those two sites

09. Suggestions for managing the rebuilt landing facilities in a sustainable way

10. Need assessments for sustainable operations of the two sites

11. Any other relevant information regarding Matara and the two sites

APPENDIX 3

Opportunities for Sustainable Management of Landing Facilities in the Anchorages Nilwella and Kottegoda in the Matara District of Sri Lanka

A Semi-Structured Interview with Mr Bjarni Eiriksson
Project Manager
University of Akureyri

01. Job Title and Job description at the University of Akureyri

02. Main Purpose of the visit Sri Lanka

03. Main places visited in Sri Lanka

04. What are the main issues Experienced with that trip

05. Need assessments and Suggestions for managing the landing facilities in a sustainable
Way

06. Any other relevant information regarding trip

APPENDIX 4

Name of the course	Subjects of the covering
Management of hygiene and sanitation conditions in landing sites.	Landing site management Practices. Seafood Quality Assurance(HCCP and ISO 9000) Quality and Safety Issues in Fish Handling Traceability of fisheries products Sanitation and waste management Landing site Maintenance practices
Fish handling practices,	Fish landing and marketing Ice and cooling methods Preservation handling and storing fish onboard fishing craft at sea and in landing site Unloading and handling at landing sites Quality Control Fish handling and distribution Sanitation and waste management Equipment and facilities for fish marketing Landing site Maintenance practices
Manufacture of fiber glass products.	-Repairs to boats in the village and surrounding areas, Flower pots and Lamp Shades
Leadership and communication	Develop skills to serve the community and environment. Develop the ability of dealing with Person's needs desires, perceptions, knowledge, or affective states.

APPENDIX 5

BUSINESS PLAN TO
MANUFACTURE OF FIBER GLASS PRODUTS











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Fiber Glass

Means Glass Reinforced Plastic, which constitutes of Glass Fiber and Plastic.
Raw materials which comprise of Gel coat, Resins, Catalyst, Accelerators, Pigments and Acetone are prepared into the correct compounds and applied onto the fiberglass mould and allowed to dry and set.

Market Demand

The manufacture of several products using “Fiber Glass Technology” has been in use in Sri Lanka for the past 30 years. As the technology is fairly simple to introduce, several small scale enterprises have commenced in several parts of Sri Lanka where various items are manufactured catering to industrial and domestic use.

With the high prices of timber-based products and the quality of life improving for people, the demand for various new products for use in homes and workplaces is ever increasing

Present situation
Products presently manufactured with fibre glass include the following

Product Description	Market opportunities
Fiber Glass Boats	Fishing Industry, etc.
Tables, Chairs, Sanitary ware	Hotel Industry, Hospitals, Schools, etc.
Roofing Sheets	Industrial Buildings, Warehouses
Lamp Shades and Lighting Fittings	Homes, High, Apartment Buildings.
Water Tanks	Households, Interior Décor.
Flower Pots, Stands	Motor vehicle Repair shops
Vehicle Parts	Motor cyclists, safety Gear for Industrial
Helmets	and Construction Site use.

Product
As an entry strategy it is suggested that the proposed venture at Nillwella and kottagoda commence with the manufacture of the following products.
-Repairs to boats in the village and surrounding areas, where a captive market is available.
Flower pots and Lamp Shades for sale in the nearby towns roadside shop and the immediate villages.
Obtain sub-contract orders from other severs for sale by them in the market elsewhere in the country for this NGO can assist buildup a market distribution.
Once the entrepreneurs have overcome the “learning curve” prevalent in any new venture or industry’ they could expand their product rang and invest in more sophisticated designs and moulds.

Current Local Market Demand
The larger manufacturers of fiber glass products include boat manufacturers, water tank manufacturers and parts for motor vehicle assembly plants in Sri Lanka.
Several enterprises are involved in the manufacture of chairs and Tables for Hospitals, Schools and Sports Stadiums.
Specialty manufacturers are designers of outdoor garden décor items and lamp shades inlaid with dried flowers.

International Market
While applications of fiber glass technology is advanced in several countries overseas which include fishing boats and luxury boats, the Sri Lankan enterprises that have been successful in the international markets are manufacturers of lamp shades and lighting fittings, inlaid with dried flowers.

Distribution
The sales and distribution of water tanks and other construction site products are through hardware shops and Dealers Island wide.

Lamp shades and lighting fittings are sold in specialty shops that are maintained by the manufacturer in leading shopping plazas in the major city centers.

Investment Levels
Since investment in machinery is not required, the entry cost of venturing into fiber glass manufacture is easy. Investment will only be required for manufacturing premises, working capital requirements and costs of selected moulds.
At the proposed level of operations and as an entry strategy, the Equity contribution is estimated at Rs.96, 000 with Bank Loans of approximately Rs224, 000.

Human Resources Involvement and Skills
Technical training in establishing and operating an industry manufacturing fiber glass products could be obtained from the following:

National Institute of fisheries and Nautical Engineering
No.15, Crow Iseland, Colombo 15, Sri Lanka.

Operating Costs
The major item of operating costs would be the purchase of Raw Materials, consumable items such as hacksaw blades, cotton waste, brushes and polishing cloth. In the event sales are made on credit terms as is prevalent in the industry and in trade in general, considerable cash would be tied up working capital.
The management would have to operate the facility keeping in mind the need for cash to meet purchases of raw materials and payment for utilities.

Additional Income Generation
The operation of a Fiber Glass products manufacturing plant should be run on a full time basis. The proposed venture at the investment levels envisaged could be operated by an about 5 persons.

Legal/Environmental Aspects
Steps would have to be taken to store all raw materials in a safe place. Since the risk of fire is there, care should be taken in the manufacturing process and storage of materials.

Risk Factors
The risks in venturing into a business of manufacturing fiber glass products are the competition in the market place and management of working capital. The products manufactured should be of superior design and quality.
The proposed entrepreneurs should divide the workload to include some persons to handle marketing and finance, in order to ensure that the venture remains operational and profitable.

Raw Material Availability
The raw materials required for a manufacturing unit engaged in fiber glass production are presently imported in to Sri Lanka and are available from several suppliers in Colombo.

Evaluation of the Project

Profitability analysis model using Excel Microsoft has been built up take a decision this project profitable or not .In the case used in this description assumed one year of construction and investment, and after that 10 years of operational lifetime.
Assumptions and Results.
The case study is based on the following assumptions regarding investment costs and operation costs.

Breakdown of Total Costs

Breakdown of Investment costs

Buildings			
	Building with ½ wall in cement	140	SkRs
	Water well ect	25	"
	Buildings Total	165	"
Equipment			
	Machinery(Drill,Weighing Scale,Hygrometer,Tools)	30	"
	Moulds(Lamp Shades,Flower Pots,Statues,Other)	10	"
	Equipm Total	40	"
Other Investment			
	Traning/Design	10	"
	Contingency	5	"
	Other Total	15	"
Total Investment Cost		220	"

Breakdown of Operation costs

Variable Costs			
	Cost of Raw Materials	176	SkRs/Year
	Electricity	30	"
	Variable O/H'S	16	"
	Total Variable Costs	222	"
Fixed Costs			
	Selling Costs	60	"
	Administrative Costs	40	"
	Insurance	36	"
	Total Fixed Costs	136	"

Product Mix and Projected Sales

Sales Quantity		
Lamp Shades	200	Quan/Year
Flower pots	200	“
Statues	500	“
Other	100	“
Total	1000	“

Sales Price	
Price-Wholesale (Rs.)	700
Price-Wholesale (Rs.)	375
Price-Wholesale (Rs.)	375
Price-Wholesale (Rs.)	100
Total	1550

Gross Sales		
Lamp Shades	140000	SkRs
Flower Pots	75000	“
Statues	187500	“
Other	10000	“
Total Gross Sales	412500	“

The Summary of Assumptions and Results of model calculations.

This sheet contain with the main numerical assumptions and main results.

Assumptions and Results

		2007			Discounting Rate	15%			
Investment:		SKRs			Planning Horizon	10	years		
Buildings		165							
						Total Cap.	Equity		
Equipment	100%	40			NPV of Cash Flow	401	403		
Other		15			Internal Rate	36%	50%		
Total		220							
Financing:									
					Capital/Equity(Internal value of share)			13.4	
Working Capital		100			after 10 years				
Total Financing		320							
Equity	100%	30%							
					Minimum				
Loan Repayments	100%	6	years		Cash Account	7			
Loan Interest	100%	14%							
Operations:			2008		2009	2010	2011	2012	
Sales Quantity	100%		1.0		1.0	1.0	1.0	1.0	Quantity/year
Sales Price	100%		408		496.0	603.0	603.0	603.0	SKRs/ton
Variable Cost	100%	222	SKRs/ton						
Fixed Cost	100%	136	SKRs/year						
Inventory Build-up			45						
Debtors	25%	of turnover							
Creditors	15%	of variable cost							
Income Tax	10%	of taxable profit							
Dividend	30%	of profit							
Depreciation Buildings	4%	of buildings							
Depreciation Equipments	15%	of equipment for 6 years							
Depreciation other cost	20%	of other cost							
Loan Management Fee	2%	of loan							

Investments and Financing

This Investment Sheet detailing investment costs broken into major components with associated depreciation. Also it included will be a statement of funding needs and payments of taxes.

		Investment											
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	To
Investment and Financing			1	2	3	4	5	6	7	8	9	10	
Investment:													
Buildings		165	158	152	145	139	132	125	119	112	106	99	
Equipment		40	34	28	22	16	10	4	4	4	4	4	
Other		15	12	9	6	3	0	0	0	0	0	0	
Booked Value		220	204	189	173	158	142	129	123	116	110	103	
Depreciation:													
Depreciation													
Buildings	4%		6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	66
Depreciation													
Equipm.	15%		6	6	6	6	6	6					36
Depreciation													
Other	20%		3	3	3	3	3						15
Total Depreciation			15.6	15.6	15.6	15.6	15.6	12.6	6.6	6.6	6.6	6.6	11
Financing:		320											32
Equity	30%	96											96
Loans	70%	224											22
Repayment	6		0	37.3	37.3	37.3	37.3	37.3	37.3				22
Principal		224	224	186.7	149.3	112.0	74.7	37.3	0	0	0	0	
Interest	14%		31.4	31.4	26.1	20.9	15.7	10.5	5.2	0	0	0	14
Loan													
Managem. Fees	2%	4.5											

Operating Statement

This sheet including revenues from sales and cost of raw materials, personnel, energy consumptions and other operational related costs, and calculation of taxes.

Operations

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Tota
Operations Statement													
Sales			1	1	1	1	1	1	1	1	1	1	10
Price			408	496	603	603	603	603	603	603	603	603	
Revenue			408	496	603	603	603	603	603	603	603	603	5728
Variable Cost	222		267	222	222	222	222	222	222	222	222	222	2265
Net Profit Contribution			141	274	381	381	381	381	381	381	381	381	3463
Fixed Cost	136		136	136	136	136	136	136	136	136	136	136	1360
Diverse Taxes	0.000%												0
Operating Surplus(EBITDA)			5	138	245	245	245	245	245	245	245	245	2103
Inventory Movement			45										45
Depreciation			15.6	15.6	15.6	15.6	15.6	12.6	6.6	6.6	6.6	6.6	117
Operating Gain/Loss			34	122	229	229	229	232	238	238	238	238	2031
Interest+Lon Man.Fee		4.48	31.4	31.36	26.13	20.91	15.68	10.45	5.227	0	0	0	145.
Profit before Tax		4.48	-3.04	91.04	203.3	208.5	213.7	221.9	233.2	238.4	238.4	238.4	1885
Loss Transfer	0	-4	-1	0	0	0	0	0	0	0	0	0	
Taxfree Dividend	0%												0
Taxable Profit		0	0	90	203	208	214	222	233	238	238	238	1885
Income Tax	10%	0.0	0.0	9.0	20.3	20.8	21.4	22.2	23.3	23.8	23.8	23.8	188.
Net Worth Tax	0.00%												0
Profit after Tax		-4.5	3.0	82.1	182.9	187.6	192.3	199.8	209.9	214.6	214.6	214.6	1697
Dividend	30%	0.0	0.9	24.6	54.9	56.3	57.7	59.9	63.0	64.4	64.4	64.4	510.
Net Profit/Loss		-4.5	2.1	57.5	128.1	131.4	134.6	139.8	146.9	150.2	150.2	150.2	1186

Balance Sheet

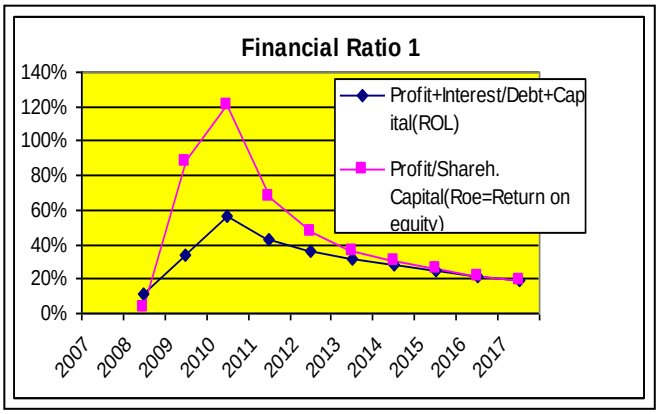
This sheet detailing the assets and liabilities for the projected period. Also major financial ratios calculated.

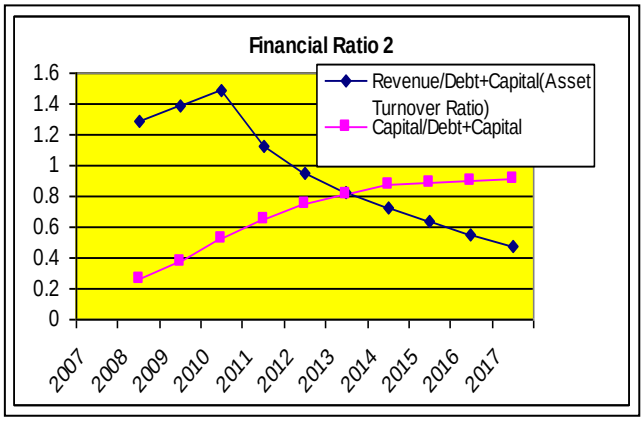
Balance Sheet		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Assets												
Cash Account	0	96	7	47	168	280	394	513	633	792	948	1105
Debtors	25%	0	102	124	150.8	150.8	150.8	150.8	150.8	150.8	150.75	150.
Stock	0	0	45	45	45	45	45	45	45	45	45	45
Current Assets		96	154	216	364	475	590	708	829	987	1144	1301
Fixed Assets		220	204	189	173	158	142	129	123	116	110	103
Total Assets		316	359	405	537	633	732	838	951	1104	1254	1404
Debts												
Dividend Payable		0	0.912	24.62	54.9	56.3	57.7	59.9	63.0	64.4	64.4	64.4
Taxes Payable		0	0	8.96	20.33	20.8	21.4	22.2	23.3	23.8	23.8	23.8
Creditors	15%	0	40.05	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3
Next Year Repayment		0	37.3	37.3	37.3	37.3	37.3	37.3	0	0	0	0
Current Liabilities		0.0	78.3	104.2	145.8	147.8	149.7	152.8	119.6	121.5	121.5	121.
Long Term Debt		224	186.7	149.3	112	74.67	37.33	0	0	0	0	0
Total Debt		224.0	265.0	253.6	257.8	222.4	187.0	152.8	119.6	121.5	121.5	121.
Equity	0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0
Profit & Loss Balance	0	-4.5	-2.4	55.1	183.2	314.5	449.2	589.0	735.9	886.1	1036.3	1186
Total Capital		91.5	93.6	151.1	279.2	410.5	545.2	685.0	831.9	982.1	1132.3	1282
Debts and Capital		316	359	405	537	633	732	838	951	1104	1254	1404

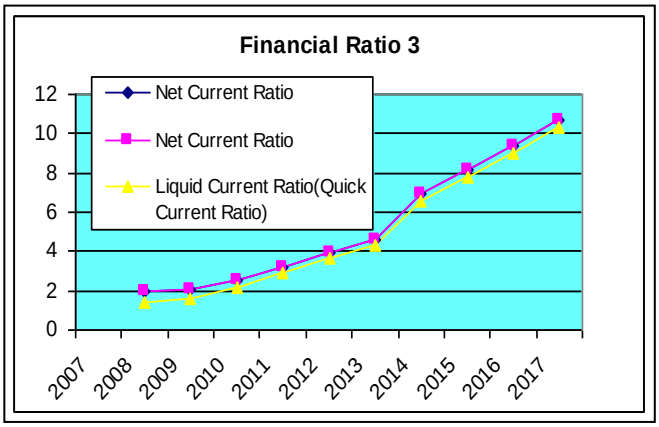
Financial Ratios

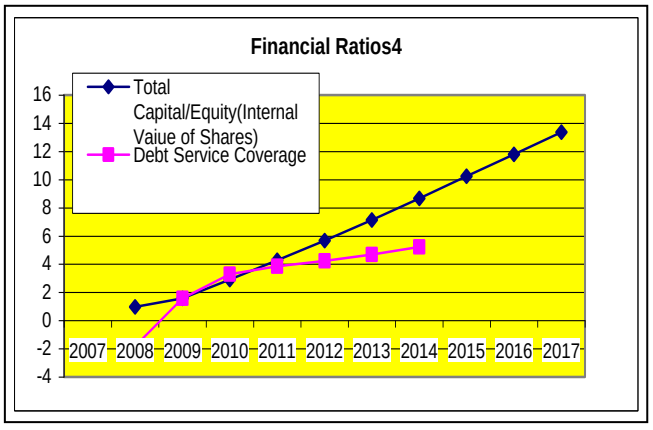
These ratios point out a good economic health about the project.

Profit+Interest/Debt+Capital	11%	34%	57%	43%	36%	32%	28%	25%	22%	19%
Profit/Shareh. Capital	3%	88%	121%	67%	47%	37%	31%	26%	22%	19%
Revenue/Debt+Capital	129%	138%	149%	112%	95%	82%	72%	63%	55%	48%
Capital/Debt+Capital	26%	37%	52%	65%	74%	82%	87%	89%	90%	91%
Net Current Ratio	2.0	2.1	2.5	3.2	3.9	4.6	6.9	8.1	9.4	10.7
Liquid Current Ratio	1.4	1.6	2.2	2.9	3.6	4.3	6.6	7.8	9.0	10.3
Total Capital/Equity	1.0	1.6	2.9	4.3	5.7	7.1	8.7	10.2	11.8	13.4
Debt Service Coverage	-1.8	1.6	3.3	3.9	4.2	4.7	5.2			





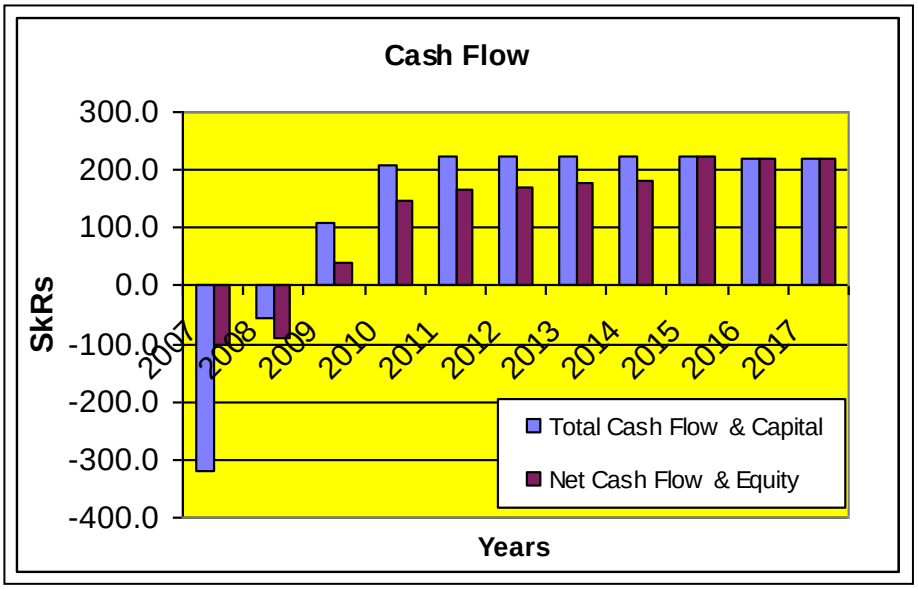




Cash Flow

This sheet including cash generated by operations, tax payments, interest, repayments of loans est. Summing up the projected cash flow over the planning horizon.

	2007	2008	2009	2010	2012	2013	2014	2015	2016	2017	1
Cash Flow											
Operating Surplus	0	5	138	245	245	245	245	245	245	245	2
Debtor Changes		-102	-22	-26.8	0	0	0	0	0	0	-
Creditor Changes		40.05	-6.75	0	0	0	0	0	0	0	3
Cash Flow before Tax	0	-57	109.3	218.3	245	245	245	245	245	245	1
Paid Taxes		0.0	0.0	9.0	20.8	21.4	22.2	23.3	23.8	23.8	1
Cash Flow after Tax	0.0	-57.0	109.3	209.3	224.2	223.6	222.8	221.7	221.2	221.2	1
Interest+Loan man.Fee	4.48	31.36	31.36	26.13	15.68	10.45	5.227	0	0	0	1
Repayment	0.0	0.0	37.3	37.3	37.3	37.3	37.3	0	0	0	2
Net Cash Flow	-4.5	-88.3	40.6	145.8	171.1	175.8	180.2	221.7	221.2	221.2	1
Paid Dividend		0	0.912	24.62	56.3	57.7	59.9	63.0	64.4	64.4	4
Financing - Expenditure	100										1
Cash Movement	95.5	-88.3	39.6	121.2	114.8	118.1	120.3	158.7	156.8	156.8	1

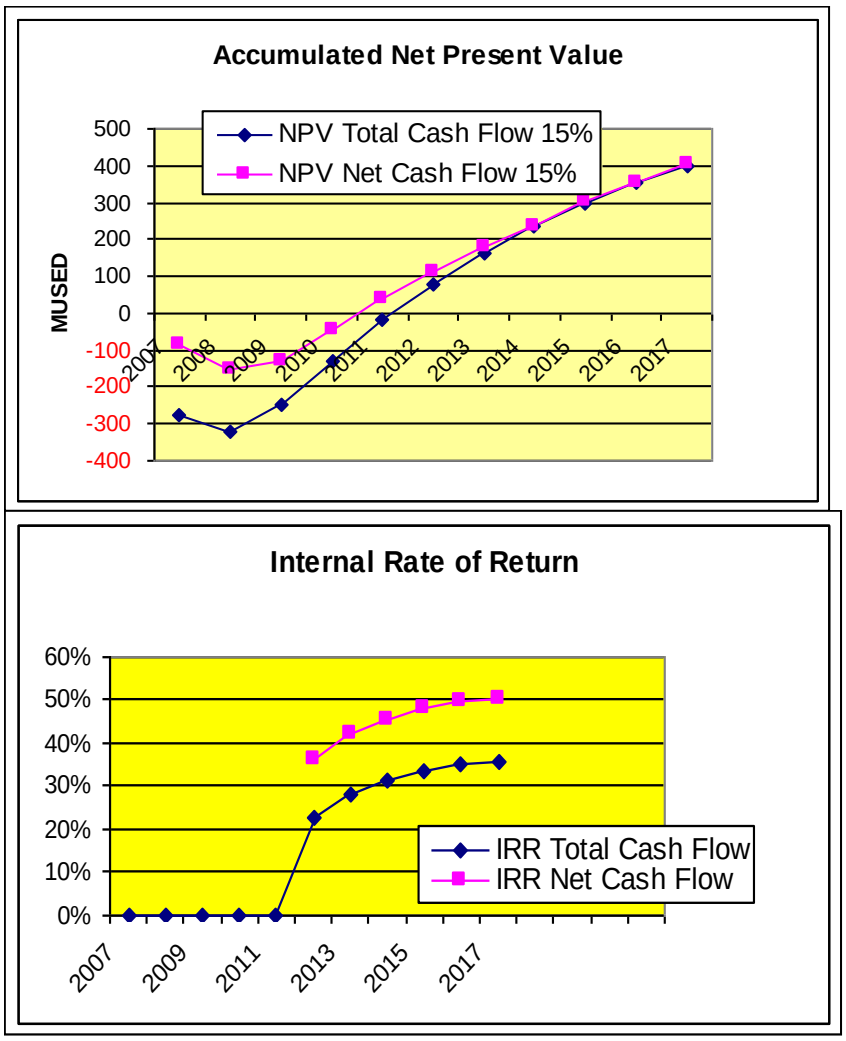


Profitability Calculations

This sheet includes capital expenditures and cash flow over the planning period-year by year, and calculates Net Present Value and Internal Rate of Return of the investment.

		Profitability									
		2007	2008	2009	2010	2012	2013	2014	2015	2016	2017
Profitability Measurements											
NPV and IRR of Total Cash Flow											
Cash Flow after Taxes		0.0	-57.0	109.3	209.3	224.2	223.6	222.8	221.7	221.2	221.2
Loans		-224									
Equity		-96									
Total Cash Flow & Capital		-320.0	-57.0	109.3	209.3	224.2	223.6	222.8	221.7	221.2	221.2
NPV Total Cash Flow	15%	-278	-321	-249	-130	79	163	236	299	353	401
IRR Total Cash Flow						23%	28%	32%	34%	35%	36%
NPV and IRR of Net Cash Flow											
Net Cash Flow		-4.5	-88.3	40.6	145.8	171.1	175.8	180.2	221.7	221.2	221.2
Equity		-96									
Net Cash Flow & Equity		-100.5	-88.3	40.6	145.8	171.1	175.8	180.2	221.7	221.2	221.2
NPV Net Cash Flow	15%	-87	-154	-127	-44	113	179	238	301	355	403
IRR Net Cash Flow						36%	42%	46%	48%	49%	50%

These analyzed results figures positive mean this project is profitable. The NPV is very high, meaning that the cash flow has increased its value, the IRR shown that it is better to carry out the investment than depositing the money in a bank account since the return is much greater than the interest the bank would provide.

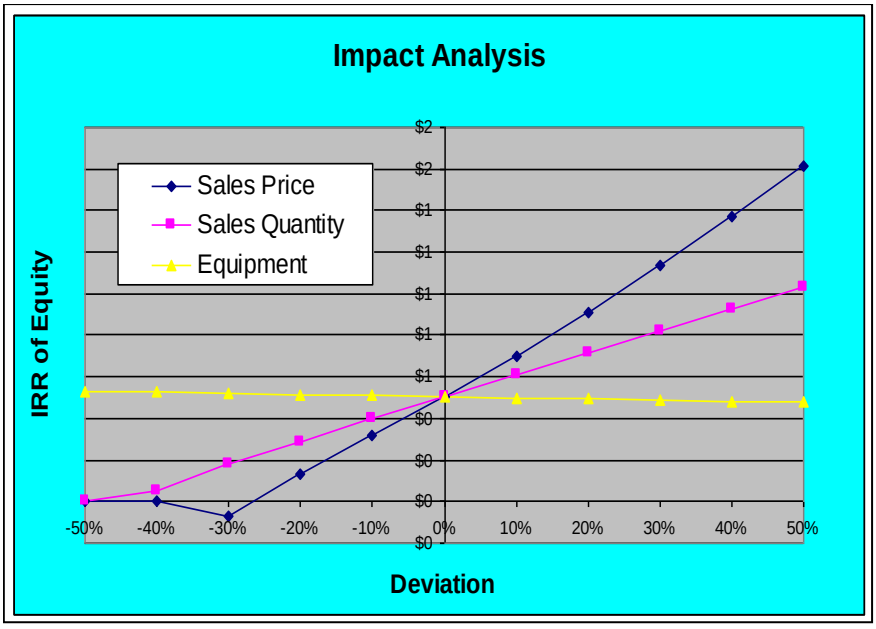

Accumulated Net Present Value
MUSED
500
400
300
200
100
0
-100
-200
-300
-400
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
NPV Total Cash Flow 15%
NPV Net Cash Flow 15%
Internal Rate of Return
60%
50%
40%
30%
20%
10%
0%
2007
2009
2011
2013
2015
2017
IRR Total Cash Flow
IRR Net Cash Flow

Sensitivity Analysis

Used three methods 1.Impact Analysis
2.Scenario Analysis
3.Monte Carlo Simulation

Impact Analysis on IRR of Equit

		Sales Price		Sales Quantity		Equipment
		50%		50%		50%
-50%	50%	#DIV/0!	50%	####	50%	53%
-40%	60%	#DIV/0!	60%	5%	60%	53%
-30%	70%	-7%	70%	18%	70%	52%
-20%	80%	13%	80%	29%	80%	51%
-10%	90%	32%	90%	40%	90%	51%
0%	100%	50%	100%	50%	100%	50%
10%	110%	70%	110%	61%	110%	50%
20%	120%	91%	120%	71%	120%	49%
30%	130%	113%	130%	82%	130%	49%
40%	140%	137%	140%	92%	140%	48%
50%	150%	162%	150%	103%	150%	48%



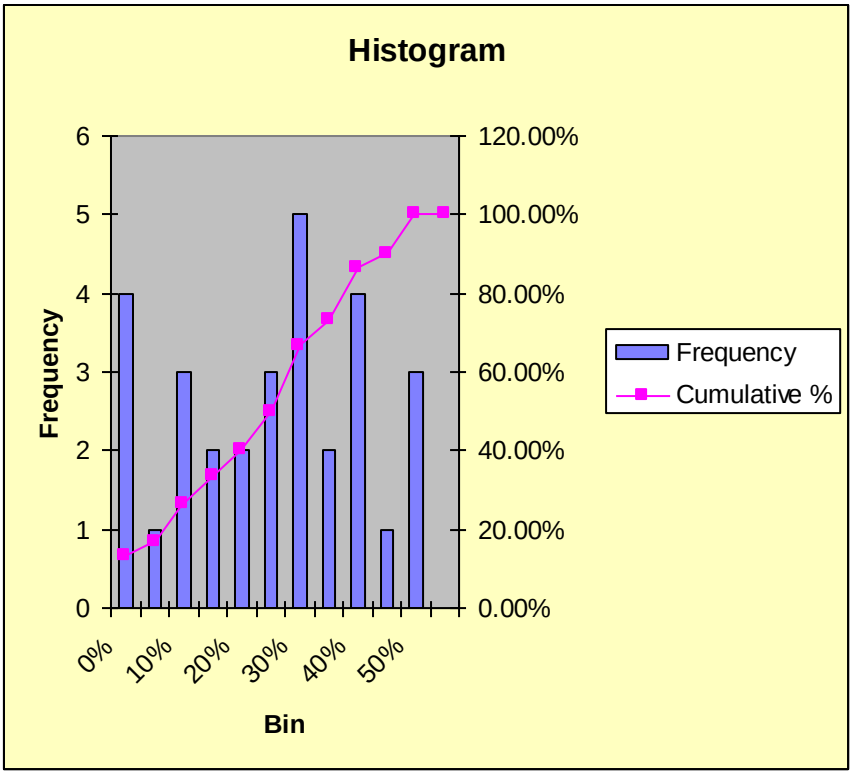
The impact analysis was prepared by changing the sales price, sales quantity and equipment, one at the time. Even if the sales price or the sales quantities are reduced in a 10%, the IRR of Equity would still be a positive value, meaning that the company can counteract some adverse effect.

Scenario Analysis

The Scenario Analysis was done by changing the same items as in the previous analysis and defining a pessimistic and an optimistic scenario. Nevertheless NPV In the pessimistic scenario is not fine the IRR is positive and in the optimistic scenario all the results are good.

Scenario Summary	Current Values:	Pessimistic	Optimistic
Changing Cells:			
Equipment	100%	130%	70%
Sales_Quantity	100%	80%	100%
Sales_Price	100%	90%	120%
Result Cells:			
NPV_Equity	148	-76	344
IRR_Equity	26%	9%	41%

Monte Carlo Simulation



Final Comments

Evaluation of this project strongly recommended to invest it and certified the loan is safe and it can be recovered in the frame time period.

Since the investment is not very heavy, it is possible to replicate this project in other communities.
In Matara with the availability of fishing boats and a large village home base it is expected that there would be a captive market for several products. This factor has to be assessed in other communities.

Once the entrepreneurs establish themselves and produce quality products of superior design, it is possible for them to obtain sub-contract orders and even export their products to overseas markets in the future.