

# Strategy for Integrating Environmental Concerns into District Level Post-Tsunami Recovery: District of Matara

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Sri Lanka Country Office

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## List of Abbreviations

CADREP	—	Capacity Development for Recovery Programme
CBO	—	Community Based Organization
CCD	—	Coast Conservation Department
CEA	—	Central Environmental Authority
CEB	—	Ceylon Electricity Board
CZMP	—	Coastal Zone Management Plan
DEC	—	District Environment Committee
DEO	—	District Environment Officer
DivEC	—	Divisional Environment Committee
DS	—	Divisional Secretariat
EIA	—	Environmental Impact Assessment
FAO	—	Food and Agriculture Organization
GN	—	Grama Niladhari
GoSL	—	Government of Sri Lanka
IEE	—	Initial Environmental Examination
INGO	—	International Non Governmental Organization
IUCN	—	The World Conservation Union
MSL	—	Mean Sea Level
NARA	—	National Aquatic Resources Research and Development Agency
NGO	—	Non Governmental Organization
NPPD	—	National Physical Planning Department
RADA	—	Reconstruction and Development Agency
RDA	—	Road Development Authority
SDC	—	The Swiss Agency for Development and Cooperation
SLLR & DC	—	Sri Lanka Land Reclamation and Development Corporation
SMI	—	Small and Medium Scale Industries
STAART	—	Sri Lanka Tsunami Affected Area Recovery and Take-off project
SWHRU	—	Southwest Housing Reconstruction Unit
TAFREN	—	Task Force for Reconstruction
TAP	—	Transitional Accommodation Project
THRU	—	Tsunami Housing Reconstruction Unit
UC	—	Urban Council
UDA	—	Urban Development Authority
UNDP	—	United Nations Development Programme

## Foreword

The aftermath of the tsunami demanded speedy response. Consequently, most of the exigency measures adopted to deal with the initial impacts of the tsunami were unorthodox and devoid of proper planning initiatives causing secondary environmental impacts. In these initiatives, the environment and its sustainability were not a priority.

The need for swift action led to sub-standard construction work, which resulted in poor sanitary facilities, pollution, and soil erosion where soil stability was of a lower order. The urgency in mobilizing physical resources led to destructive extraction of natural resources such as timber, sand and coralline lime, from natural habitats and ecosystems, thereby causing significant damage to the normal ecological functions. The shifts in priorities resulted in physical restoration of the devastated coastal belt being a secondary issue, thereby exacerbating its degradation and erosion, and also aggravating the efforts in restoring the livelihoods of a large segment of the affected population dependent on marine resources. The unintelligible dumping of tsunami debris and solid waste into vulnerable wetlands not only led to degradation of the natural environment, but also caused severe economic losses. The efforts at indiscriminate rehabilitation of the coastal vegetation with inappropriate plant species, in segments of the coastline, not only distorted the scenic effects, but also made the coastline more vulnerable to erosion.

Thus, to ameliorate the secondary effects of the post-tsunami rehabilitation efforts and to contain wherever possible or to reverse the destructive consequences of unplanned and hasty rehabilitation efforts, this strategy was developed for the District of Matara. It was prepared as a part of a comprehensive, concerted, and an integrated effort at the local level through an extensive field survey carried out by a team of experts and a series of consultative workshops with key stakeholders. This strategy has drawn upon the expertise, resources and commitment of the people in the District. It encourages coordination and cooperation amongst the various sectors involved in the management of the environment. We hope that this strategy will help in integrating environmental concerns into reconstruction and rehabilitation efforts in the District of Matara in the context of both post-tsunami and possible future natural disasters.

The World Conservation Union (IUCN)  
Sri Lanka

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## Executive Summary

The magnitude of the destruction that resulted from the harbour waves generated by the Tsunami of December 2004, which struck the Eastern, Southern and South Western coasts of Sri Lanka, awakened the Nation to the stark reality of seeing the unpreparedness of the country to face such a calamity.

In the District of Matara alone, the wave penetration inland had exceeded 100m with a maximum wave height of 6.2 m (MSL) at Kottegoda. About one third of the 203 Grama Niladhari Divisions of Matara were caught up in the disaster.

Out of the District population of about 788,000 persons, 82,067 were reported to have been directly affected, with the death toll standing at 1,321 and another 600 persons missing. In the four affected Divisions of Devinuwara, Dikwella, Matara and Weligama, over 6,000 out of 16,080 housing units were either damaged or destroyed with the initial surge of tsunami waves. The other initial consequences included widespread damage to the coastal road network, damage to 12 schools and 11 healthcare centers, disruption of electricity supply to 11,900 subscribers, irreparable damage to the natural ecosystems of the coast, extensive damage to the fishery industry and other sources of livelihood along the coastal belt, and the disruption of the network of physical and service infrastructure that linked and sustained the well being of District population.

Although disaster management had been a much discussed subject even before the December 2004 tsunami, and humanitarian relief was not slow to arrive, the stark reality was that an effective country-wide coordinated communication and delivery system for emergency relief and disaster mitigation was not in place. As a consequence, unplanned, unorthodox and ad hoc measures had to be deployed, which though effective in ameliorating partially the unprecedented shock, damage and trauma, resulted in adverse secondary impacts, with the living environment being the worst affected. The relocation of the displaced persons initially in refugee camps, followed by phase by phase relocation in transitional shelter, and finally in permanent housing led to much damage to the natural and living environment due to many causative factors. Firstly, it was the question of unsanitary living conditions in refugee camps with very poor services in the supply of water, absence of any measures for waste water, storm water or solid waste disposal, encroachment into natural habitats, and destructive and unsustainable extraction of natural resources.

Secondly, the selection of locations and sites for house construction without considering the topography and nature of the ground situation, and with total disregard to adverse consequence and to the natural environment, caused significant damage to waterways, riverine vegetation, watersheds, wetlands, lagoons and estuaries, which in some instances were irreversible.

There is thus an urgent need to draw up emergency strategies and action plans, in order to contain, and wherever possible to reverse the adverse impacts on the environment, while at the same time continuing reconstruction work to restore livelihoods and infrastructure of the District.

In order to identify constraints and issues, and finally to formulate strategies through a participatory consultative process, a Task Group was instituted, which planned and guided a field survey to collect and collate on-site information. Based on such a situation analysis, strategies and actions for implementation were formulated for integrating environmental concerns into post-tsunami reconstruction efforts in the three major areas of rehabilitation: Livelihood recovery of displaced persons; restoration of housing, schools, road networks, and other infrastructure; and finally the restoration of the physical, aesthetic, protective and conservation needs of the coastal zone of Matara District.

It is expected that authorities concerned would give due consideration to the constraints and issues identified, and schedule the proposed strategies and actions for early implementation.



# Strategy for Integrating Environmental Concerns into Post Tsunami Reconstruction and Rehabilitation in the District of Matara

## 1. In Retrospect

The calamity that befell Sri Lanka as a result of the Harbour waves (tsunami) of December, 2004 left a deep seated mark on the lives and property of the people living in Eastern, Southern and South-Western coastal belts of the country. Despite the unexpected swiftness and magnitude of the disaster, the nation was not slow to respond actively to provide emergency relief to those in desperate need.

The District of Matara, which has been generally not prone to major natural disasters other than floods, was one of the worst affected.

It is on record (Sessional Paper IV of 1884) that though the strong tidal waves of 1883 had affected the entire coastal belt of the country, the impact of these waves in Matara District had been of a lower order compared to the reported impacts on the neighbouring Districts of Galle and Hambantota.



Damaged dwelling near Nilwella; Bhagya Gunasekera © IUCN

The recorded sequence of events that took place on the 26<sup>th</sup> of December 2004 indicate, that the initial alarm of an unprecedented rise of coastal waters had been received by the Help Desk of the Ministry of Public Security, Law and Order at around 8.30am, although the major thrust of the tsunami waves had been around 9.15am.

The median depth of wave penetration on that day, along the shores of Matara had been 110m, while the maximum height of the wave level had been 6.2m (MSL) at Kottegoda (Source: Institute of Fundamental Studies, 2005), and 4.9m (MSL) at Dikwella (Pattiarachchi, 2005).

Matara was one of the 13 coastal administrative districts affected by the tsunami. Although substantial resources were generated and swift action taken by State agencies as well as by international and national non-governmental organizations, for rapid post-tsunami reconstruction, environmental factors vital to sustain a harmonious living environment, and for mitigation of any future hazardous event, were sidelined. The reasons attributed to this are many, but evidently one contributory factor has been the political and socio-economic expediency to come to grips with a crisis that had never been experienced before. Nonetheless, the consequences are critical enough to call for immediate and concerted effort to reverse or ameliorate the adverse effects on the living and natural environment of communities, and ensure that such concerns are addressed in all current and future post-tsunami restoration efforts.

This study therefore seeks to evaluate the current ground situation, and formulate strategies for addressing the post-tsunami environmental concerns of the Matara District.

## 2. The Mission and Objectives of the Study

A key objective of this study is to identify policy measures to support the Government of Sri Lanka (GOSL), as well as the Local Authorities in their efforts to promote co-ordination and dialogue on environmental matters related to post-tsunami rehabilitation amongst different sectors and stakeholders. In consequence, it has been proposed that a district level strategy should be developed to integrate environmental concerns into all post tsunami reconstruction and rehabilitation efforts. This means, it is envisaged that a mechanism to coordinate environmental projects undertaken by various organizations in the district would emerge. However, the long term aim of this initiative is to ensure that environmental aspects would be integrated into post-tsunami rehabilitation work, in order to mitigate or reduce vulnerability of the coastal zone with its characteristic habitats and communities from any future natural disasters.



Women beating wet coconut husks, one of the initial processes in the coir industry;  
Bhagya Gunasekera © IUCN

### 3. The District Profile of Matara

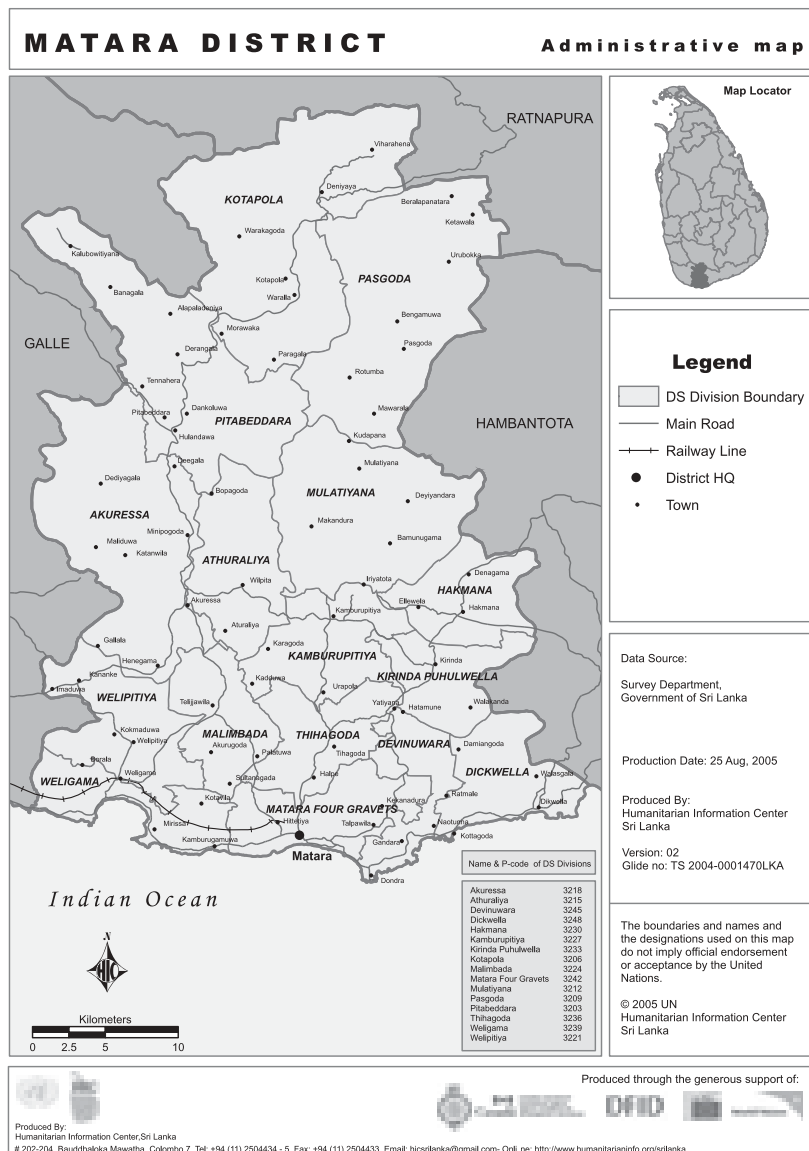
Matara district with a land area of 1,282.5 sq km and a coastline of 55 km represents 1.96 % of the land mass of the country and 23.14 % of the Southern Province. The main topographical feature of the land form of the district is its gradual ascending slope from sea level. Ecological and geo-physical sites of importance such as wetlands, tropical rain forests and watersheds are situated in the interior of this district. The two major rivers flowing through the district are Polwathu ganga and Nilwala ganga. As the district lies within the low country wet zone, the annual average rainfall is between 1500 - 2500 mm. with precipitation experienced throughout the year.

The coastal belt of Matara is significantly replete with long beaches, sand spits, riverine estuaries, tidal inlets, barrier built estuaries, lagoons, sand dunes, mangroves, sea grass beds, coral reefs and beach rock reefs.

According to the Household Income and Expenditure Survey of 2001, the population of the district had been 761,236, and was estimated to be 788,564 in 2004. Density of population in the district is between 500-750 persons /sq km. The Physical Quality of Life Indices for the District shows Maternal Mortality rate to be 20.8, Crude Birth rate at 18.46, and Crude Death rate at 6.04 per 1000 population. The poverty head count ratio is 27%, while unemployment is estimated to be 10.5%. The district literacy rate is 89.8%, while total school enrolment is 168,134 students. The rural population comprises 91% of the total district population.

The major economic activity in the coastal divisions is fishery in which 27,440 households are involved. Others include tourism, small and medium scale industries (SMI), and services.

The District Secretariat is responsible for administration at the District level with 16 Divisional Secretaries, while 650 Grama Niladharis serve at village level.



## 4. Aftermath of Tsunami of December 2004



Damaged houses and destroyed vegetation near Nilwella;  
Bhagya Gunasekera © IUCN

### 4.1 Initial (Primary) Impact of the Disaster

#### 4.1.1 Affected Zone and Social Displacement

The most adversely affected coastal segments in the District of Matara included 72 of the 263 Grama Niladhari Divisions situated in the four Divisional Secretariat (DS) Divisions of Matara, Weligama, Devinuwara and Dikwella.

The affected coastal zone included urban as well as suburban nodes and clusters of human settlements bordering the Matara-Hambantota highway. The estimated pre-tsunami population in the urban town of Matara, which is the main commercial and administrative centre of the district, was 57,734, with a population density of about 600 persons per sq.km. Inclusive of the urban town of Matara, 6 urban townships were adversely affected by the tsunami.

A total of 82,067 persons from 20,675 families were recorded to have been affected, with the death toll standing at 1,321. Another 601 persons were reported missing, while 6,652 people have sustained injuries. The District Secretary's Report indicates that some 9,508 persons had been displaced, of whom 1,060 were from Devinuwara, 2,793 from Matara town, and 3,132 from Weligama. In addition, four children were found unaccompanied, 52 had been separated from their parents, and 335 children had lost one parent (source: UNICEF, 2005).

## 4.1.2 Physical Infrastructure and Services

A summary of the number of housing units affected by the tsunami is given in Table 1, while the numbers of housing and non-housing units affected at Divisional levels are summarized in Tables 2 and 3 respectively.

Table 1: Population and number of housing units in affected divisions.

DS Division	Population	No. of occupied housing units
Devinuwara	18,791	4,130
Dikwella	20,396	4,629
Matara Town	57,734	7,103
Weligama	30,733	7,083
Total	127,654	22,945

(Source: Census and Statistics Department - 2005)

Table 2: Number of Housing Units of Affected by Divisions

DS Division	GN Divisions			Housing units			
	Total number	Affected number	Before the disaster	Completely damaged	Partially damaged and cannot be used	Partially damaged and can be used	Not damaged
Devinuwara	41	15	2,074	86	64	243	1,679
Dikwella	48	16	2,904	276	136	518	1,975
Matara Town	66	18	5,583	559	252	1,449	3,329
Weligama	48	21	5,519	737	282	1,627	3,034
Total	203	70	16,080	1,658	734	3,837	10,017

(Source: Census and Statistics Department - 2005)

Table 3: Number of Non-housing Units of Affected by Divisions

DS Division	Number of GN Divisions			Non-housing units			
	Total	Affected	Before the disaster	Completely damaged	Partially damaged and cannot be used	Partially damaged and can be used	Not damaged
Devinuwara	41	15	201	42	8	32	119
Dikwella	48	16	672	83	27	204	358
Matara Town	66	18	1,920	124	46	326	1,424
Weligama	48	21	1,251	117	71	308	755
Total	203	70	4,044	366	152	870	2,656

(Source: Census and Statistics Department - 2005)

The water supply systems in Weligama, Denipitiya, Matara Gandra, Kottegoda, Dikwella, Palapola and Unakuruwa were heavily damaged, while all fresh water sources in the affected zone were polluted. The estimated costs of repair and replacement of pipes was Rs.39mn, restoration costs of dug wells and sanitation were Rs.136.7 mn and Rs.87.5 mn. respectively.

On the other hand, the network of feeder roads for transport which linked the hinterland, needed urgent repairs. While some of these roads were the responsibility of the Road Development Authority (RDA), others were maintained by the Local Authorities. In addition, the coastal railway line was also damaged and required quick repairs (Report of the District Secretariat – Matara, May 2005).

Electricity supplies to 11,900 subscribers were disrupted due to damage caused to high tension and low tension lines, service centers and vehicles, which needed immediate attention (CEB, 2005).

The damage suffered by the Telecommunication office in Matara included its buildings, the boundary wall, office equipment, furniture, vehicles and the service lines.

#### **4.1.3 Education and Health**

The following schools were reported to have been affected by the tsunami waves:

- 1 Denuwala Kanishta Vidyalaya
- 2 Talalla South Maha Vidyalaya
- 3 St Mary's Convent
- 4 Kottegoda Balika Kanishta Vidyalaya
- 5 Mahamaya Balika Vidyalaya
- 6 Mirissa Madya Maha Vidyalaya
- 7 Mirissa Methodist Kanishta Vidyalaya
- 8 Pelane Sri Vajiragnana Maha Vidyalaya
- 9 Polhena Maha Vidyalaya
- 10 St Servatius College
- 11 Sri Sumangala Balika Maha Vidyalaya
- 12 Batheegama Maha Vidyalaya

Out of these, the students of 8 schools had to be relocated. Five schools were totally damaged directly by the tsunami waves and 10 were partially damaged. Among these schools, three had a student population of over 2000 in each, while two were designated national schools.

Among others, 3 vocational training centers and the Ruhuna University were the educational institutions affected by the tsunami. (Source: Report of the District Secretary - Matara, May 2005)

In the health sector, the number of health facilities affected by the tsunami was eleven.

These are as follows:

- Dental Clinic Mirissa
- Regional Drug Store Matara
- Deputy Provincial Director of Health Services office at Matara
- General Hospital Matara , First Aid, Emergency Wards and Blood Bank
- Gramodaya Health Clinic Wattedagama
- MOH Office Matara
- GHC Pelana
- GHC Kamburugamuwa
- District Hospital Batheegama
- GHC Thalaramba
- GHC Kumbalgama

(Ministry of Health, RADA, 2006)



Of the above, the Regional Drug Store and the Deputy Provincial Director of Health Services office at Matara, were totally damaged, while 3 Gramodaya Health Clinics, office of the Medical Officer of Health and the Matara General Hospital, were partially damaged. (Source: Report of the District Secretary - Matara, May 2005).

However, it is significant to note that despite these damages, the general health services were managed and kept active thereby averting any epidemic scale calamity of water borne infectious diseases.

#### 4.1.4 Coastal Resources, Fishery and Livelihoods

The National Aquatic Resources, Research and Development Agency (NARA) has reported that Polhena beach lost its small reef fishes such as damselfish, butterfly fish, and wrasse where the reef substrate and habitat had been destroyed (NARA, 2005). Severe damage to coral patches had resulted in the loss of fish at Kapparatota/ Weligama, which were already degraded by destructive exploitation compounded by bleaching in 1998. The impact of bleaching on live corals in Weligama Reef had been 92% before 1998, 28.0.% during 1999-2000, 54.0% during 2001-2002, and 70.6% during 2003-2004 (Rajasuriya *et al*, 2005). Consequently the damage to corals by the tsunami aggravated the situation. Erosion was evident along Polathumodara beach, Polhena beach and Talalla beach. Casuarina green belts appeared to have acted as natural barriers, significantly. This was clearly evident in the Weligama bay casuarina plantation.

The coastal belt was strewn with debris, while the beaches and coral reefs were extensively polluted. With the damage to the drainage systems, and the breakdown in waste disposal operations, pools of stagnant water appeared, while garbage and massive heaps of debris had accumulated on the beach front, most of which had subsequently been dumped in places like Weligama Kapparatota UC land and near Weligama Mirissa Kanda.

The dominant fishery sector and its ancillary services suffered extensive damage, which included damage to several fishing harbours, anchorages and fish landing sites. A total of 1,489 fishing vessels were in operation in the district before the tsunami, out of which 130 multi-day boats and 97 three and a half ton vessels were fully or partially put out of action. According to reports available, one harbour, 2 anchorages, 1,237 houses of fishermen were damaged, while another 739 were destroyed. (Source: Report of the District Secretary - Matara, May 2005, TAFREN, 2005, People's Commission, 2006). In addition, the People's Commission has among other matters, provided the following data:

Collecting ornamental fish, a livelihood in Weligama; Bhagya Gunasekera © IUCN



- 220 multi-day vessels destroyed
- 35 multi-day vessels damaged
- 304 crafts with outboard motors destroyed
- 121 crafts with outboard motors damaged
- 141 traditional crafts powered by outboard motors destroyed
- 94 traditional crafts powered by outboard motors damaged

The Matara District had supported a host of entrepreneurial activities for tourism and the hospitality trade. However, as a consequence of the tsunami, tourist establishments, markets, banks and other enterprises, which served not only the populace in the four directly affected divisions, but also in the hinterland, suffered extensive damage. Seven tourist hotels were adversely affected (Source: TAFREN, 2005)

In the industrial sector, while one third of the affected industries were related to fishing, the informal sector with a range of small scale household businesses was also affected. These included the coir industry, carpentry, industrial workshops, handlooms, lace making and a range of food processing and catering enterprises. It is also significant that many of these enterprises were key to the livelihoods of women (Source: Report of the District Secretary - Matara, May 2005).

In the agriculture sector it was not only the thrust of the tsunami waves that affected the crops and cropping systems, but also the enduring effects of enhanced salinity of the soils. The Agrarian Services Centre at Talalla was also damaged. The damage to the Livestock industry was estimated at Rs.3.17m. (Source – Report of the District Secretary – Matara, May 2005). The data summarized below (Table 4) illustrates the extent of damage to the agriculture sector in the District of Matara.

Table 4: Damage to Agricultural Crops

Division	Paddy (ha)	Coconut Seedlings	Cinnamon (ha)	Banana Clumps	Vegetable (ha)
Dikwella	51.70	970		2,933	3.90
Devinuwara	7.40	283		815	0.60
Matara	19.37	1,511	0.23	5,250	12.84
Weligama	28.36	2,259	1.05	10,628	14.75
Total	106,842	5,023	128	19,626	32.09

(Green Movement of Sri Lanka, 2005)

## 4.2 Exigent Reconstruction Efforts and Resultant Secondary Impacts

The unprecedented devastation that followed the tsunami demanded exigency life and property saving measures that were inevitably devoid of a planning model that would have been possible under normal circumstances. First and foremost was the need to relocate the displaced population, which also meant assisting in unifying families, search for the missing, consoling those under trauma, and providing food, water and sanitary facilities.

Initially such displaced persons had to be assembled in refugee camps in the neighbouring villages, which were mainly the unaffected school premises, places of religious worship, and public buildings.

The second dilemma was the search for suitable sites and lands, to facilitate relocation of displaced persons in what have been described as transitional shelters, where semblance of organized services, comforts and facilities could be provided.

Thirdly, since international assistance in various forms was pouring into the country, there was an urgent need to mobilize persons and institutions to absorb this aid and utilize such humanitarian aid meaningfully. However, it was quite clear that co-ordination and integration in the acceptance, distribution and deployment of such external resources through a national planning process was not a feasible option at that point of time. Consequently, the resulting confusion and melee in how external assistance should be equitably and systematically utilized for the widest possible segment of affected persons apart from being a very difficult task was destined to create new problems of a secondary nature.

#### **4.2.1 Resettlement and Infrastructure Development**

The search for new settlement sites, under pressure from beneficiaries, donors and others who wanted quick action, posed a serious threat to ecologically sensitive habitats and economically important locations. Thus ecosystems such as wetlands, mangroves, scrublands and even river basins and forests were in danger of being cleared for housing and infrastructure development, contravening several national and international laws and conventions (e.g. Ramsar Convention on wetlands). In addition, viable and productive agricultural lands comprising coconut, rubber and cinnamon plantations were not spared in the search for building sites. The building sites were of two categories. The first category was of transitional shelters, which were a make-shift arrangement prior to final settlement in permanent housing schemes.

There was certainly difficulty in finding suitable lands for construction of houses. Consequently lands which were unsuitable for housing or lands of economic and ecological importance were the options for construction sites.

In Puwakwatte B scheme for example, the houses were constructed on hilltops, while at Kandapamulawatta in the Weligama Division, housing was in a swampy area. At Kirihandeniawalle, trees of timber and medicinal value such as Nelli, Liyan, Katakala, Milla, Mara and Domba were uprooted and cleared for construction work, while at Kanattawatta, in Dikwella, the Mahogany plantation was cleared for housing disregarding laws related to forestry and wildlife, and ignoring regulations such as the Felling of Trees (Control) Act.

A high yielding coconut plantation called Labeemawatta as well as the Elagorakagahawatte coconut grove in Weligama, were subjected to clearing. Likewise the Charlie Mount Housing Scheme in the Weligama Division was established in a productive rubber property. There is also an example from Arahena, Dikwella, where houses have been built under high tension power lines, posing a serious threat to life and property.

Soil erosion was seen to be rampant in several sites such as the one at Liyanapathiranagewatta where housing schemes have come up on sloping terrain and where no adequate measures such as contour drains or contour bunds have been taken in compliance with the Soil Conservation Act. In the Walana Ceyline Housing project, due to the absence of plot boundaries, even the beneficiaries were not able to adopt soil conservation measures.

Apart from the disregard to the environmental protection laws of the country, housing programmes had no proper drainage systems or landscape plans. This situation is clearly evident in the Housing Scheme at Nupewela, Godahamanduwa, and the KPMG Village in the Matara Division, and at Labeemawatta in the Dikwella Division.

Although many residents in the tsunami affected areas previously practiced home garden cultivation, some of the new housing schemes in Tudawegallagewatte and Godapamanduwa in the Matara Division had no provisions for such home gardens.

In the Matara Division, apart from sub-standard dwellings, there were no sanitary facilities or drainage systems. Solid waste disposal was an issue for which adequate provision had not been made in many of the construction sites.

There are two housing schemes in Kandagodella in the Devinuwara Division, which had been partly constructed and abandoned by the sponsors.

#### 4.2.2 Rehabilitation of the Coastal Zone

While the major initial thrust of post-tsunami reconstruction had been on the humanitarian issues such as house construction, resettlement, provision of sanitation and health facilities, and livelihood recovery, the restoration efforts on the physical aspects of the devastated coastal landscape had inevitably been considered secondary. Consequently the erosive forces resulting from the inclemental weather patterns as well as storm surges since the tsunami have continued to damage the coastline as well as its scenic landscape.

Further, in addition to the debris already accumulated from the tsunami, more litter and refuse have been dumped by visitors and others who travel along the coastal highway. As a consequence, river banks such as that of the Polwathumodera Ganga, and canals running to the sea at Suduwella Bay, Kottegoda, Kemagoda lagoon, Lunukalapuwa and Thal Aramba as well as canals in the Weligama town, and the canal near Batheegama Vidyalaya are constricted or blocked. At Wellamadama, contravening the environmental laws of the country, solid waste matter is disposed into the ecologically sensitive wetlands and mangrove habitats.

Already tonnes of litter have been disposed of, but much more remains to be cleared, to ensure a healthy beach environment.

In order to meet the emergency needs of the construction industry, illegal sand mining along rivers is rampant, posing a serious threat to beach enrichment and stabilization functions thus exacerbating coastal erosion. This is clearly evident at Wellamadama.

Although some attempts have been made to restore the coastal vegetation along the coast from Browns Hill to the bus station at Matara, the choice of inappropriate plant species is bound to affect the effectiveness of ecosystem functions in the area. This situation is also seen in the restoration work at Ginigasmulla.

In addition, as a result of the absence of appropriate breakwater structures and protective reef, coastal erosion is seen to continue along the beach front of the District. Despite the existence of regulatory measures, coral mining has continued in Polhena and Madihe in the Matara Division causing much damage to the coral reefs.

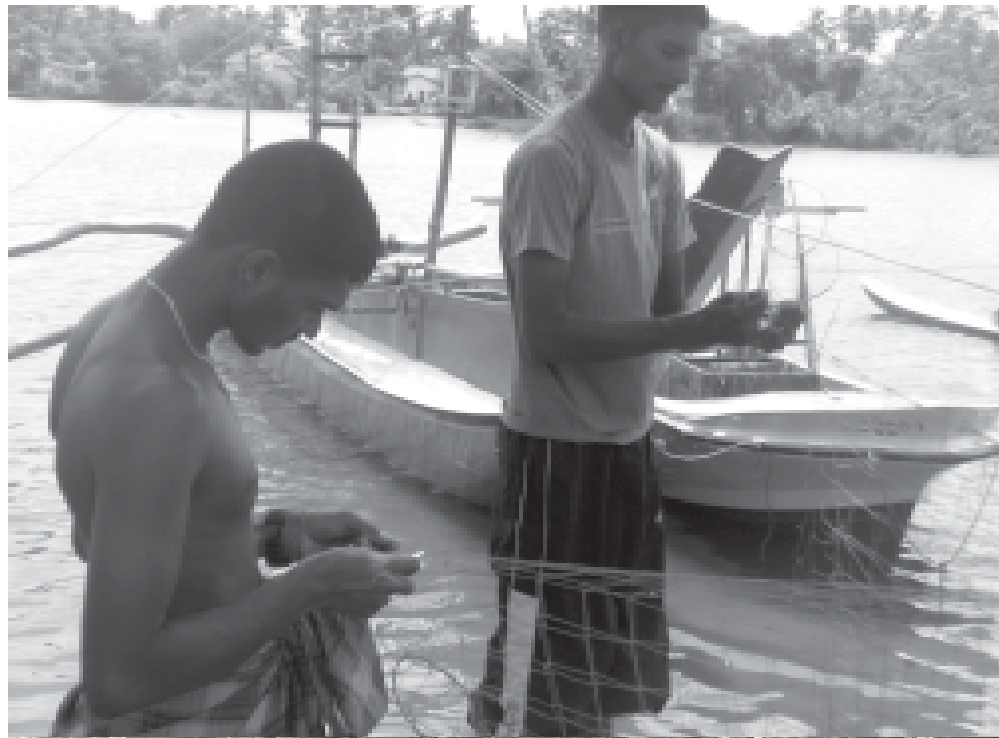
Amidst all these secondary impacts, the rapid spread of Invasive Alien species into the paddy fields at Pallewelayaya, Totamuna in the Matara Division and Talallawela in Devinuwara, has placed additional burden on the development agencies in the Matara District.

**Building coastal barriers against erosion; Bhagya Gunasekera © IUCN**



### 4.2.3 Livelihood Recovery

The major secondary impact on livelihoods and the rural economy has been the stop-gap and somewhat dislocated arrangements to restore roads, boat landing sites, fish storage and selling facilities, as well as providing various categories of fishing vessels. The attempts to enforce a fixed set back zone, which did not meet the needs of the sea-faring fishing community, was a cause for disharmony and distrust, which in turn affected the economic activities of the coastal settlements.



Coastal livelihoods,  
Fisheries (Top) / Coir (middle) /  
Coral mining (bottom);  
Bhagya Gunasekera © IUCN

## 5. Action Taken

### 5.1 Infrastructure and Schools

Rehabilitation and repair of the roads and bridges damaged or destroyed by the tsunami was undertaken through the World Bank assisted Sri Lanka Tsunami Affected Area Recovery and Take-off (STAART) Project, which had a number of sub-projects to address these infrastructure issues. One of the main activities under this project was the early rehabilitation of the main Colombo-Galle-Hambantota-Wellawaya highway inclusive of the Matara Beach Road (Source: TAFREN, 2005).

Among the townships identified for early attention were the Matara and Weligama town centres (UDA, 2005).

Among the schools affected by the tsunami in the Matara District, the Denuwala Kanishta Vidyalaya, St Mary's Convent, Kottegoda Balika Kanishta Vidyalaya, Mahamaya Balika Vidyalaya, Mirissa Madya Maha Vidyalaya, Mirissa Methodist Kanishta Vidyalaya, St Servatius College and Batheegama Maha Vidyalaya had to be relocated. The Swiss Agency for Development and Cooperation (SDC) assisted 7 schools, while the Norwegian Refugee Council assisted one school, the Federal Republic of Germany assisted two, and World Vision assisted one. However, St Mary's Convent is still awaiting assistance of a donor. Reconstruction work on two schools commenced in 2005, while work on six others commenced in 2006. Construction work on four schools have not commenced as yet.

### 5.2 Housing and Resettlement of the Displaced

Immediately after the tsunami the affected persons were provided with temporary shelters, which had to be maintained for some time because there were difficulties of putting up transitional accommodation and permanent houses.

Transitional Accommodation Project (TAP) was required because construction of permanent houses takes time, and public buildings had to be vacated sooner or later. Tents and emergency camps were meant to provide only a temporary solution, because the expected monsoon rain and high temperature conditions were likely to be unbearable in the temporary shelters.

However, there were standard specifications for temporary shelters, viz., floor area of approximately 200 sq. ft, with a minimum height of 6 ft, and set on a cemented floor that rises 6 inches above ground. Transitional accommodation provided subsequently was associated with a host of environmental and health issues. These included water supply, sanitation, toilet facilities, bathing, drainage, garbage disposal and public health.

The Lead Agency in the Matara District for TAP was IOM assisted by CHF, Italian NGO Team and LEADS. The number of TAP sites was 24 for 1074 affected families. The total number of shelters required was 2401. However, by the end of year 2005, this number was exceeded as shown in data summarized in Table 5.

Table 5: Progress in the provision of Temporary Accommodation

DS Division	No. of units required	No. of units completed
Devinuwara	152	320
Dikwella	414	771
Matara Town	814	824
Weligama	1,021	1,319
Total	2,401	3,234

(Source: TAP Report, UNCHR, 2005)

Transitional accommodation sites were dismantled when the permanent houses started coming up. By end September 2006, the numbers of shelters decommissioned and the families settled in permanent houses, are summarized in the Table 6 below:

Table 6: Progress in provision of Permanent Housing

DS Division	No. of Constructed Transitional Shelters	No. of Transitional Shelters Decommissioned	No. of Families Settled in Permanent Houses	No. of Shelters Remaining
Devinuwara	320	282	282	38
Dikwella	771	712	712	59
Matara	824	664	664	160
Weligama	1319	1119	1119	200
Total	3234	2777	2777	457

(RADA, Oct, 2006)

The donor assistance for the housing and resettlement work is summarized in Table 7:

Table 7: Summary of Donor Assistance for Housing

Division	Houses assigned to donors	No. of donors	No. of sites awaiting donors
Devinuwara	576	15	1
Dikwella	563	8	
Matara	985	15	1
Weligama	1874	25	2
Total	3998	15	4

### 5.3 Reconstruction of the Coastal Belt

The first major concern in the reconstruction of the coastal zone was the defining of the set-back standards, the implications of which were many. Ultimately, based on the Coastal Zone Management Plan (CZMP) of 1997, the following set-back standards for the Matara District were defined:

<u>Segment No.</u>	<u>Area</u>	<u>Total set back</u>
<i>Segment 28</i>	<i>Kataluwa Bridge to Midigama</i>	<i>55 m</i>
<i>Segment 29</i>	<i>Midigama to Walliwala East</i>	<i>35 m</i>
<i>Segment 30</i>	<i>Walliwala East to Palana</i>	<i>60 m</i>
<i>Segment 31</i>	<i>Palana to Madihe East</i>	<i>35 m</i>
<i>Segment 32</i>	<i>Madihe East to Devinuwara</i>	<i>55 m</i>
<i>Segment 33</i>	<i>Devinuwara to Goyambokka Peace Haven Hotel</i>	<i>35 m</i>
<i>Segment 34</i>	<i>Goyambokka Peace Haven Hotel to Kapuhena</i>	<i>60 m</i>
<i>Segment 35</i>	<i>Kapuhena to Henagahapugala</i>	<i>40 m</i>

In order to mitigate coastal erosion, appropriate engineering structures were constructed by the Coast Conservation Department (CCD). These included revertments at Talalla, rehabilitation of the beach parks at Weligama, Matara and Totamune, reconstruction of revertments at Edandawella, and the restoration of groynes at Kapparatota.

In the meantime, with the assistance of the Sri Lanka office of the World Conservation Union (IUCN), CCD jointly with the Urban Development Authority (UDA), have drawn up a set of best practice guidelines for the establishment of a



greenbelt in the coastal zone. As an initial step in the restoration and establishment of the greenbelt, the Survey Department undertook a survey covering 51 km. in order to demarcate and establish a permanent boundary for the benefit and guidance of those organizations and individuals who were keen to be involved in greening the coastal belt.

IUCN has also through the Small Grants facility of the Green Coast Project, undertaken a number of initiatives which include rehabilitation of mangrove ecosystems, rehabilitation of sand dunes, rehabilitation of the coastal greenbelt, protection of coral reef ecosystems, greening of resettlement sites, restoration of home gardens, and bio-remediation.

Among other major international initiatives was the FAO planting programme, which was carried out through the regional and district level offices of the Forest Department. In the Matara District, this programme resulted in coastal afforestation in 5.5ha and rehabilitation of 5ha of mangroves. In addition FAO assisted in the repair and renovation of 1,000 homestead units and also constructed 200 new homesteads, apart from avenue planting of 4 km, and urban planting of 3ha.

The overall objective of the *“Forest Programmes for Early Rehabilitation of Asian Tsunami Affected Countries”* of FAO was to restore the livelihoods of the tsunami displaced persons, and to contribute to their improvement and long term security through forest rehabilitation and reforestation (FAO, 2006). What was essentially envisioned by this activity was to address the immediate needs for sustained supply of wood, non-wood, and environmental services from forest for improved household incomes, while at the same time setting a good foundation for medium and long term reforestation.

*“The Effect of Tsunami on the Coastal Ecosystems, One and a Half Years After”*, was the theme of another study commissioned recently by FAO. Among the main scientific observations is the high electrical conductivity of soil moisture in the Matara District compared to the neighbouring districts of Galle and Hambantota. This indicates the levels of salinity in the District. The percentage of soil carbon in the Matara District in the first 50 meters from the coastline, was twice as high as that of Hambantota, showing the levels of organic matter that had accumulated.

## 5.4 Towards Restoration of Livelihoods

An abandoned boat near Talalla beach; Bhagya Gunasekera © IUCN





TAFREN played a lead role in coordinating the restoration efforts of livelihoods, which aimed at assisting recovery of incomes of affected households to pre-tsunami levels. The TAFREN strategy was set out under the Income Recovery Programme (IRP), and implemented with the assistance of the international community, under the “*Restore Livelihoods Activity*”

The strategy for income recovery involved coordination in the delivery of integrated services to meet the livelihood situation and needs of people affected by the tsunami. It included three instruments: 1) Cash transfer on a temporary basis, 2) Offer of cash for work or other employment, and 3) Rebuilding local economic activities. It is significant to note that female-headed households had become a new phenomenon after the tsunami.

The livelihood enhancement activity operationalized by the Livelihood Team of RADA was meant to establish and stabilize partner arrangements with various organizations such as the private sector, INGOs/NGOs, UN Agencies, government agencies and banks.

Cash transfer schemes of the government helped affected people to cope with the critical shortage of financial resources to meet their daily needs. Later with the implementation of schemes like Susahanaya, these schemes helped people to increase their earnings without being dependent on food and cash relief. Some displaced persons were able to get back to their humble means of living, by reviving the coir industry, and engaging in food processing, lace handlooms, pottery, other handicrafts, and retail trading in primary produce such as fish, agricultural products and consumer goods.

Other livelihood recovery activities included the provision of grants and micro financing, which were for economic recovery through self employment and micro enterprises, social support for human rights, land relocation for housing etc, in all affected divisions. The implementation of these schemes were facilitated by Sewa Lanka Foundation, IMO, UNDP and IFRC. The mechanism for implementation was through the formation of small community groups, which received credit through revolving loan funds advanced by CBOs (e.g. Gandara West, Sahana Foundation, Devinuwara), which conducted needs assessments, capacity development exercises, business development training, preparing legal documents to obtain lost documents, providing machinery for coir production and sewing (e.g. Dikwella, Devinuwara), as well as for rehabilitation of vegetable plots (Sobha Kantha Foundation, Weligama).

Since over 75% of the displaced persons were engaged in the fishery sector, and the destruction caused to fishery harbours, other infrastructure and fishing gear of all types was immense, rehabilitation problems were large in size. Providing employment or opportunities for employment were the major aspects of the rehabilitation process. Rebuilding and ensuring facilities for this segment of the affected population to resume their previous employment through maintaining and sustaining development activities in tandem with the rest of the economy of the district, were the urgent necessities. Partially damaged fishing equipments were however, repaired with donor assistance, and subsequently many affected persons resume were able to resume fishing.

In the agriculture sector, the thrust of rehabilitation for livelihoods was the restoration of paddy fields, desalination, prevention of water logging, replanting of diverse vegetation types, establishment of green belts, and project identification for enhancement of livelihoods by way of environmentally benign aquaculture interventions. These activities had to be undertaken in the Matara Dikwella cluster and in the Matara Talalla Cluster.

## **5.5 Relevant Policies, and Legal and Institutional Frameworks in the District**

A number of policy matters on housing for the disaster zone were discussed and formulated to respond swiftly to meet the immediate mid term and long term needs of the displaced.

The policy for housing assistance and township development announced by the Presidential Secretariat on June 1, 2005 encouraged Household-Driven Housing Programmes. Consequently Damage Assessment Teams, Village Rehabilitation Committees, Divisional Grievance Committees and District Grievance Committees were established while giving due consideration to the issue of the buffer-zone, and the UDA guidelines on construction. These guidelines



were further elaborated by the Ministry of Finance and Planning on July 14, 2005 and additional technical specifications and monitoring and reporting procedures were included. One important recommendation in this circular for environmental concern was that the Divisional Secretaries/Divisional Managers of Tsunami Housing Reconstruction Unit (THRU), and South West Housing Reconstruction Unit (SWHRU) were required to maintain a summary of the social and environmental impact assessment reports in their documents list.

In the meantime, in November 2005, Guidelines for Housing Development in Coastal Sri Lanka were issued by the National Housing Development Authority of the Ministry of Housing and Construction. These guidelines provided technical details of housing for affected areas.

Finally, RADA prepared the revised policy on the Tsunami Housing Programme in May 2006, which covered all district and divisional housing projects. This programme was to be operationalised with effect from March 2005 under the overall responsibility of the relevant District Secretary, in consultation with affected parties, donor organizations, state agencies and relevant stakeholders. THRU was placed under the District Secretary, and in terms of the revised policy, all tsunami housing projects were to be owned and implemented by the District Secretary and Divisional Secretaries.

The theme and guiding principle for the Tsunami Housing Policy Revision 2006 was phrased as 'House for a House'. Regularization/relocation of encroachers was another aspect in the revision.

The main features of the revised policy are regulation/relocation of encroachers, arrangements for equity, ensuring the philosophy of being back home by end 2006, providing location specific solutions, ensuring transparency, identifying choices of the people, and operational flexibility.

In respect of urban planning and development, the UDA assumes this role, in terms of its mandated functions under the UDA Planning and Building Regulation, of 1986, while NPPD formulates national physical policies, plans and strategies to ensure their implementation through regional and local development plans. Its primary mission is to promote and regulate integrated planning of social, physical and environmental aspects of land and territorial waters of Sri Lanka. It has also to be noted that where special Development Areas are located in Urban and other local government institutions, the UDA can delegate specific regulatory provisions to the respective Local Authorities, to ensure integrated development.

The CEA through its mandated function, protects and enhances the quality of the environment through pollution control, natural resources management, and environmental education. It is also empowered to implement EPLs and IEEs/EIAs through its decentralized provincial, district and divisional offices as well as through the sub-national branches of central government ministries, departments, statutory boards and corporations.

CCD has the Coastal Zone Management Plan (CZMP) of 1997 as its policy framework which was revised in 2004. The Coast Conservation Act defines clearly the coastal zone, and a critical belt of it is further divided into a

reservation area and a restricted area. No development activity other than coastal protection infrastructure is permitted in the reservation areas, while specified limited development activities are allowed in the restricted areas. The Planning Committee of CCD reviews development activities through the CCD checklist, where EIA is not required.

SLLR&DC has the responsibility to ensure flood free habitats to improve the environment by rehabilitating, re-creating and maintaining pollution free inland water bodies, while Local Authorities are also vested with authority through respective Ordinances and Acts, to ensure adherence to environmental laws. The National Environmental Act also has a number of authoritative provisions for environmental protection.

The Livelihood Team of RADA, successor to TAFREN, works with government agencies, development partners, INGOs and NGOs, service providers, etc., to provide integrated services, for the recovery of local economies devastated by the tsunami, through planning, developing policy, coordinating, facilitating, fast tracking, and evaluating and monitoring livelihood recovery activities across the affected districts and divisions. Its key mission is to revive tsunami affected local economies by rebuilding sustainable livelihoods through the introduction of the Divisional Livelihood Development Plans (DLDPs), a concept developed through organized participatory efforts of many stakeholders in the sphere of reconstruction and development, and which is expected to move people out of poverty and dependency in a structured and expeditious manner. Its focus is on social protection, establishing community infrastructure, and local economic development.

District Teams of RADA actively liaise with development partners and service providers in educating potential beneficiaries in the respective districts, by disseminating information in relation to accessing loans and grants, the collateral required for such grants and available programmes and schemes to build back micro and small enterprises.

## 6. The need for a Strategy

It is clear from the foregoing that the nature of the post-tsunami ground situation in the District of Matara required action that would not have been necessary under normal circumstances. Consequently, most of the exigency measures adopted to deal with the initial impact were unorthodox and devoid of proper planning initiatives, causing serious secondary impacts, of which the effects on the environment and its sustainability were less.

In the first place, the need for swift action led to sub-standard construction work, which resulted in poor sanitary facilities, pollution, and soil erosion where soil stability was of a lower order.

Secondly, the urgency in mobilizing physical resources led to destructive extraction of natural resources such as timber, sand and coralline lime, from natural habitats and ecosystems, thereby causing much damage to the normal ecological functions.

Thirdly, the shifts in priorities resulted in physical restoration of the devastated coastal belt becoming a secondary issue, thereby exacerbating its degradation and erosion, and also aggravating the efforts in restoring the livelihood of a large segment of the affected population dependent on marine resources.

Fourthly, the injudicious dumping of tsunami debris and solid waste into wetlands and productive paddy fields not only led to degradation of the natural environment, but also caused severe economic losses.

Finally, the efforts at indiscriminate rehabilitation of the coastal vegetation with inappropriate plant species, in segments of the coastline of Matara District, not only distorted the scenic effects, but also made the coastline more vulnerable to erosion.

It is clear that the secondary effects of the post-tsunami rehabilitation efforts are serious enough to call for a strategic action plan, to contain and wherever possible, to reverse the destructive consequences of unplanned and hasty rehabilitation efforts. The current study is designed to evolve a strategy for integrating environmental concerns in post-tsunami reconstruction and rehabilitation in the District of Matara.

District Secretary, Matara, addressing a consultative meeting; Bhagya Gunasekera © IUCN



## 7. Methodology

The planning process was launched with a consultative workshop held in the Matara District for key stakeholders, which included senior officers of the District Secretariat, District Planning Secretariat, Divisional Secretariats, Coast Conservation Department, Forest Department, Central Environmental Authority, Department of Agrarian Services, Reconstruction and Development Agency, Department of Fisheries and Aquatic Resources, and CADREP. The workshop was chaired by the District Secretary.

The primary objective of the workshop was to identify and prioritize key tsunami related environmental issues and lapses in integrating environmental concerns into on-going reconstruction and rehabilitation activities in the district. In order to embark on this task, it was necessary to design a framework to collect and collate ground level information, and thereby evolve a format to draw up a strategy to integrate environmental concerns.

Initially the participants identified the key issues and gaps in the District, and then submitted their views on the proposed operational mechanism in developing the strategy. A Special Task Group comprising of the district heads of the Central Environmental Authority, Forest Department, Coast Conservation Department, Department of Fisheries and Aquatic Resources, District Planning Secretariat, and the heads of two key Non-Governmental Organizations, was formed under the overall direction of the Additional District Secretary. Under the guidance of this Special Task Group, a field survey was carried out for collecting and collating ground level site specific information in three thematic areas of impacts, namely, 1) environmental issues pertaining to major reconstruction sites, 2) direct damage to coastal belt by the tsunami, and 3) disruption and alteration of livelihoods of the tsunami affected people dependent on key natural resources.

The survey itself was preceded by, another series of consultative meetings, which were held in each Divisional Secretariat with the divisional level field officers, to gain a better understanding of the divisional environmental profile related to issues pertaining to post-tsunami activities, and the direct impact of the tsunami. The survey was undertaken jointly by the assigned field officers, and guided by the members of the Special Task Group, and the field officers of respective Divisional Secretaries' Divisions. The information collected was collated on a format agreed upon by the Special Task Group.

While the survey was in progress, the Special Task Group met on several occasions to discuss the progress. The outcome of the consultative workshops and meetings were carefully analyzed and subjected to further investigation in the survey. Every location that was characterized by environmental factors was photographed. Based on the survey findings, the basic structure of the strategy was formulated. The data so utilized was validated, and the draft strategies were discussed at a key stakeholder consultative meeting chaired by the District Secretary, where the outcomes were reviewed for the purpose of incorporating any new stakeholder views. Finally the strategy was subjected to another round of consultations with the key stakeholders.

Survey team in action, Wellamadama; Bhagya Gunasekera © IUCN





## **8. Strategies for Integrating Environmental Concerns**

### **8.1 Construction of Houses for Resettlement**

#### **8.1.1 Current Situation**

In the previous sections, the primary and secondary impacts of the post-tsunami scenario have been reviewed in brief based on the information generated through a structured field survey. It has been clearly shown that the unique circumstances of the December 2004 tsunami had generated unorthodox operational systems, which had consequently caused serious environmental concerns. Although it is presumed that failings and short-comings at the very inception of the rehabilitation process could be considered inevitable due to the unprecedented and unforeseen nature of the circumstances. The focus continues to be devoid of any concern for environmental issues. The current situation therefore calls for urgent measures to contain and possibly reverse adverse trends in environmental degradation.

This study is therefore designed to develop and formulate strategies and policy measures to support the Government as well as Local Authorities in their efforts to promote coordination and dialogue on environmental matters related to post-tsunami rehabilitation with relevant stakeholders.

#### **8.1.2 Issues**

The key issues identified include the following:

- Need for suitable locations for house construction
- Identification of criteria for the selection of construction sites
- Selection of sites based on specific criteria which include the topography of the land, aspirations of the communities, access to markets, schools and health centers, availability of roads, transport services, electricity, water, and telecommunication services.
- Take into consideration the set-back boundary demarcation for coastal resettlements.
- Need for land preparation taking into consideration the site-specific environmental issues.
- Need for normal practicing standards in engineering and land management.
- Need to ensure environment friendly landscape plans.
- Ensure proper sanitary services, storm water discharges, and provision for solid waste disposal.
- Ensure the maintenance of the ecological balance to sustain the delivery of ecosystem functions. There is a need to ensure that restoration of the vegetation should be with the most appropriate plant species, and to be in tandem with the need for conservation of biodiversity.
- Provide sloping building sites with appropriate soil conservation measures such as contour bunds and drains.
- Prevention of indiscriminate and destructive extraction of earth, sand, timber, lime, clay etc.
- Strict avoidance of landfills and solid waste disposal for land development purposes in natural and man-made wetlands.
- Ensuring compliance with standard engineering practices in road building, and surfacing, and storm water discharges, to prevent land degradation and soil erosion.
- The low capacity of local government authorities in solid waste management due to lack of facilities and resources creating environmental concerns.
- Some displaced persons especially self employed women folk need the type of housing that does not hinder their traditional small scale vocations, such as coir work, reed work and other small scale cottage industries.
- Ensure non-interference with natural resources such as streams, ponds and canals, which would otherwise lead to pollution and formation of pools of stagnant water.

### 8.1.3 Strategies

- The sponsors of housing constructions should, in accordance with practicing standards initially carryout a ground survey of the site to ascertain its suitability for house construction, and to assess the manner in which environmental issues could be addressed. Such a ground survey would cover basic observations on the soil structure and stability of the sub-soil, the topography, the existing natural or introduced vegetation, the water table, and more importantly the aspirations of the potential beneficiaries.
- If the selected location is found to meet the basic requirements of housing as well as the aspirations of the beneficiary community in terms of location, availability of infrastructure, access to markets, schools, health centers and transport, a landscape plan and a construction plan must be prepared. These plans must take into consideration the land use, soil conservation and the environmental laws of the country.
- The landscape plan as well as the construction plan must be submitted to the Local Authority, and where appropriate to the Urban Development Authority and the Coast Conservation Department for approval.
- Work should commence only after approval has been obtained from the relevant state agency, which will be required to monitor the progress of work, and ensure that construction work is done according to the approved plan, and in compliance with standard construction practices. Involvement of the local community in such construction and resettlement work is vital.
- It is necessary for state agencies and Local Authorities to ensure that specific welfare measures as well as basic needs are provided to settlers. For this purpose, project approving agencies should endeavour to negotiate or persuade sponsors to include resettlement plans in their applications for approval.
- Ensure that landscape development as well as laying out of drainage systems and other infrastructure, are done with proper timing to prevent pollution and degradation of the natural environment in and around house construction locations.
- With the co-operation and coordination efforts of the Local Authorities, an integrated solid waste management or disposal system should be developed, taking into consideration the possibilities for composting and generation of bio-fuels.
- As a part of the house construction package, sponsors must also be requested to arrange other related measures, which could include development of home-gardens, landscape planning with appropriate tree and plant species, and provision of basic household necessities to settlers, most of whom have been left with nothing after the tsunami. Such welfare measures should be part of the resettlement package.

## 8.2 Rehabilitation of the Coastal Belt and Infrastructure

### 8.2.1 Current Situation

Precedence and priority considerations for resettlement and livelihood recovery of the post-tsunami displaced persons, inevitably placed restraints on the intensity of restoration efforts of the coastal belt of the District. Further, the decision to impose a controversial set-back zone, that was in conflict with the operational interests of the fishery, industrial and hospitality industries in and around the coastal belt impeded any early action on the devastated coastal zone. As a consequence, the erosive forces continued to cause further damage to the beach front. In addition, the unabated mining of river sand in the District could have had adverse consequences on beach enrichment functions, causing further damage to the coast.



Dikwella beach; Bhagya Gunasekera © IUCN

It is thus clear that an exigency strategy and a plan of action are necessary to reconstruct and restore the coastal zone, which provides employment opportunities and economic gains to a considerable section of the population of the Matara District.

In terms of action taken so far, it must be mentioned that the Colombo-Galle – Matara-Wellawaya highway has been largely restored by the Sri Lanka Tsunami Affected Area Recovery and Take-off (STAART) Project (TAFREN 2005). The rehabilitation work on schools commenced in 2005 and is being continued. Work on 6 schools commenced in 2006, while 4 others are yet to commence reconstruction. One school is still seeking and awaiting donor assistance.

The Green Coast Project of IUCN/Wetlands International/Both Ends/WWF has supported small grant projects to strengthen livelihood-ecosystem link to provide security for the affected people in the long run, while FAO has initiated a tree planting programme, which involves afforestation of 5.5ha, avenue planting of 4 km, and urban planting of 3ha (FAO,2006).

In the meantime, with the support of IUCN, the Coast Conservation Department in collaboration with the Urban Development Authority and a group of University Academics, have developed Best Practice Guidelines for Establishment of a Coastal Greenbelt.

## **8.2.2 Issues**

### *Beach areas*

- The coast and the coastal belt have been polluted with debris, as well as with litter disposed by passers-by and people living along the belt.
- Direct impact of tsunami waves has reduced the width of the coastline in most locations.
- The beaches, plant and animal life, natural and artificial water ways and water bodies have been severely affected.
- Coastal ecosystems such as mangroves, lagoons, estuaries, bays, coral reefs have been damaged and restoration efforts are *ad hoc*.
- Coastal structures including fishery harbours, breakwaters and beach roads have been destroyed, and restoration efforts are marginal.
- Capacity of the harbours / boat anchorages / landing sites has been reduced.
- Heavy extraction of raw material for development / construction purposes from the coast, and over extraction of ocean resources like coral, fish, sea-sand and coastal vegetation is a matter of grave concern.

### *Inland*

- Banks along inland waterways have been eroded.
- River mouths are constricted or blocked, and siltation of canals has reduced their depths.

### *Waste disposal and pollution*

- Absence of a proper solid waste disposal system due to inadequate resources and commitment.
- Diverting drainage and sewage wastes of houses to the beach, thereby polluting the near-shore marine environment.
- The coir industry, though a major source of livelihood for the people, is responsible for coastal pollution

### *Loss of biodiversity*

- Major habitats along the coastal belt including coral reefs are dwindling due to destructive extraction of biological material.
- Mangrove habitats have been damaged.
- The natural coastal vegetation, including mangrove habitats have been severely affected.
- Lagoon flora and fauna are facing serious stress conditions due to changing water quality.



### **8.2.3 Strategies**

- The District Environmental Committee should be strengthened and facilitated to handle environmental issues
- A- 5 year Environment Management Plan for the affected area incorporating all sensitive ecosystems and habitats in the district should be developed and implemented at the district and divisional levels with the participation of relevant agencies, communities and NGOs.
- Survey, and demarcate set-back areas so that encroachments could be curtailed and the community is made aware of the boundaries.
- Narrow coastal stretches should be acquired and maintained as scenic areas.
- Promote scientific studies to develop measures for protecting coral reefs in accordance with the location, degree of vulnerability, sustainability, density and impact on the coastal environment.
- Promote conservation of biodiversity and sustainability in the use of mangroves and other biological resources in coastal habitats, focusing on species and ecosystems under threat.
- Assist local authorities to adopt appropriate solid waste and waste water disposal techniques for collection, storage, transport and disposal through sanitary landfill, recycling or other suitable means.
- Strengthen the capacities of industries to treat and monitor industrial effluents, and test the efficacy of waste disposal systems.
- Ensure that agencies responsible for improving the environment, work with a commitment in fulfilling their mandated functions.
- Mobilize greater stakeholder participation in resource management activities as well as in resource management planning and review

## **8.3 Rehabilitation of Livelihoods Related to Environment**

### **8.3.1 Current Situation**

The restoration of livelihoods was initially undertaken by TAFREN, which played an important role in coordinating activities related to the Income Recovery Programmes implemented with donor assistance.

Presently, livelihood activities are being carried out under the guidance of the Livelihood Team of the RADA. The types of assistance provided includes grants and micro financing in many instances. They are in fact meant for economic recovery through self employment and micro enterprise development, social support for human rights, land allocation for housing etc. in all affected divisions.

### **8.3.2 Issues**

- The worst effects of the tsunami are being experienced by the weaker segments of the communities, and these include women and children who had lost their bread-winners, and by those who are living with marginal incomes in dilapidated and unplanned settlements close to the shore.
- Fishing communities lost their fleets of boats, and lost hope of speedy recovery of livelihoods.
- Damage to coastal infrastructure led to reduction of facilities, which has forced people to encroach into other areas which included sites of aesthetic value.
- Damage to the agricultural sector was again multi-faceted. Apart from destruction and wash-away of economically important crops, agricultural lands were inundated with sea water creating salinity problems for those dependent on farming.
- Many small-scale business activities and informal trading, which include water sports, souvenirs, and handicrafts shops that catered to the tourist industry have not been able to recover speedily.

- People dependent on natural resources for a living through coral mining, sand mining and timber extraction are now a major threat to environmental conservation, because of their desperate need to supplement household income.
- The enforcement of set-back standards created difficulties for the fishermen, when relocated in an area where the normal livelihood of fishing was difficult to be practiced. In such situations, there was a tendency to exploit natural resources that had a market, thereby contributing to environmental degradation.

### **8.3.3 Strategies**

In the context of a situation that had caused immense distress and trauma, there is a need for non-deleterious strategies in the provision of income generating measures to ensure that livelihood recovery process would not cause damage to the living environment. In the first place therefore, implementers must be prepared to employ psycho-social techniques in introducing livelihood supporting programmes. Some pertinent broad-based and specific strategies are presented below:

- Provide guidance on sustainable extraction of resources from the sea and create awareness of the dangers and limitations in the use of illegal fishing techniques.
- Provide the necessary wherewithal for offshore and deep sea fishing for those who have the capability and capacity to embark on higher income generating opportunities.
- State agencies such as NARA which have undertaken ocean resource surveys, should enable the resource poor fisherman to identify the productive fishing sites.
- Alternative employment opportunities need to be explored for the youth in the fishing communities through skills development programmes.
- Taking some of the well known success stories where micro credit for small-scale household enterprises have been successful, special programmes should be drawn up to catalyze such best practices
- Promote home gardening and handicrafts in the limited spaces available in new settlements and organize link programmes for waste management and compost fertilizer preparation.
- Encourage eco-lodge and small-scale guest-house projects with minimal impact on the environment.
- Promote social protection for those who cannot be in employment through cash for work programmes.
- Participatory community activities should be identified and implemented with the participation of such different groups in order to prevent conflicts and differences among fishery communities.

## 9. Coordinating Strategy

A strategy for coordination of reconstruction and rehabilitation work at the district and divisional levels is set out as follows.

- The District Environment Committee (DEC) under the Chairmanship of the District Secretary should be revived as the apex body, with sufficient authority and resources to coordinate activities related to the integration of environmental concerns into construction of houses for resettlement, for rehabilitation of the coastal belt, and for rehabilitation of livelihoods. This Committee should be instituted in the District Planning Secretariat. The Additional District Secretary may deputize the District Secretary.
- Resuscitate Divisional Environmental Committees (DivEC) created under CEA and revive them in a similar manner as relevant to the Divisions, with the Divisional Secretary as the Chairperson of this Committee.
- An effective integrated coordination mechanism should be developed at the divisional and the district levels for win-win options to ensure that the use and the allocation of natural resources is efficient and sustainable (Eg. prevention of dumping of excess soil in one place, whilst cutting of hillocks for landfills at another place).
- The composition of the DEC and DivEC should ensure representation from all agencies that are linked to construction of houses for resettlement, rehabilitation of the coastal belt, and rehabilitation of livelihoods related to environment.
- The role of the Committee should include the following:
  - To ensure integration of environmental concerns into the construction of houses for resettlement, rehabilitation of coastal belt, and rehabilitation of livelihoods.
  - The Divisional Environmental Committees should operate at the divisional level as tiers of the DEC in matters related to construction of houses for resettlement, rehabilitation of coastal belt, and rehabilitation of livelihoods in relation to environmental conservation.
  - To ensure that all projects/activities and programmes related to construction of houses, rehabilitation of coastal belt, and rehabilitation of livelihoods are registered in the District and Divisional Secretariat offices and the District Planning Secretariat, while the District Planning Secretariat should compile and maintain a database.
  - To assess the demand of all projects for building materials, the extraction of which has an impact on the natural resources, and to facilitate the project proponents to obtain these requirements from lawful sources.
  - Otherwise, to find out the sources of supplies of building materials, the supply of which has an impact on the natural resources, and develop measures to supply these requirements without, or minimizing adverse impacts on the sources – coordinating the supplies centrally. [The reconstruction of houses, other infrastructure and repair of wooden boats require large quantities of timber and wood products. There is also a heavy demand for material such as sand, stones, rubble, and bricks, the extraction of which has a direct impact on natural resources. These needs must be quantified and the activities must be strategically planned and regulated.]
  - To assist Local Authorities in resolving the problems of management of debris, solid waste and other waste.
  - To liaise with project proponents in resolving the issues related to construction of houses for resettlement, rehabilitation of coastal belt and for rehabilitation of livelihoods in relation to environmental conservation.
  - To link the central head offices and provincial offices with the district and divisional secretariats in relation to the construction of houses for resettlement, rehabilitation of coastal belt and rehabilitation of livelihoods in relation to environmental conservation.
  - To ensure that all relevant agencies follow the policies, strategic plans, guidelines, and best practices in construction of houses for resettlement, rehabilitation of coastal belt and rehabilitation of livelihoods in relation to environmental conservation.
  - To minimize the use of destructive fish harvesting methods.
  - To identify site specific environmental problems as and when they arise, and propose remedies.
  - To monitor compliance of sponsoring agencies and contractors in relation to best practices in construction of buildings, roads and other infrastructure, and waste management, pollution control, and energy generation.

- To monitor compliance of local authorities in relation to best practices in construction of buildings, roads and other infrastructure and waste management and disposal, pollution control, and energy generation.
  - To monitor compliance of government agencies and other implementing agencies in relation to best practices in construction of buildings, roads and other infrastructure, and waste management, pollution control and systems, energy generation.
- Develop a project screening and reviewing procedure through the District Environmental Committee (DEC), with the major responsibility for evaluation given to the District Environmental Officers (DEO) at the District and Divisional levels using information based on project documents and site visits. Ensure that DEC recommendations are incorporated into the project. The objective of this arrangement is not to obstruct implementing projects, but to ensure incorporation of recommendations for environmental integration. This procedure will make it mandatory to incorporate financial provisions for integrating environmental aspects into projects at the project writing stage.
  - A fund should be established exclusively for environmental monitoring of tsunami related construction, rehabilitation and other projects. A certain percentage of the funds required for this purpose should be allocated in the project proposal.
  - Develop an integrated natural resource management plan for the District
  - Establish a District Environmental Information Center to function as a coordination center and information hub center. This center can provide information relevant to project development and screening. For example it can provide best practice guidelines, existing policies and institutional mechanisms, procedures, and guidelines for restoration of the green belt, and areas identified for mangrove rehabilitation, etc.
  - Develop peoples' trust towards existing institutions through implementation of projects in accordance with procedures, and enforcement of the existing laws
  - The district arrangement should be a mechanism for multiple agencies working with overlapping mandates and tasks
  - Local authorities should be an integral part of the district and divisional level mechanisms in this exercise
  - CBOs should be represented in their district and divisional level committees.

Ignoring environment problems may jeopardize the long term recovery in the tsunami affected areas, and undermine future livelihood security and socio-economic development.

Post-tsunami recovery efforts have the potential to effect significant improvements to the social, economic and environmental welfare of coastal populations, and for long term development.

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**Annex**

Matara: Plan of action

Dikwella Divisional Secretariat – Constructions

(1) Location	(2) Key Environmental Issues	(3) Impacts	(4) Remedial Action
Ratmale - Kirihandeniawatta	Prime dry-mixed evergreen forest type almost totally cleared for first phase. Another three phases to go; more clearing anticipated. Sp. Nelli, Liyan, Katakola, Milla, Mara, Domba evident	Extensive soil erosion due to denudation causing infertility & loss of species.  Common problems include poor drainage & Water supply, no waste disposal and access roads.	Biological resource survey and a landscape plan should be prepared before clearing the site for construction.  Infrastructure development should be included in the master plan
Labeemawatte	High yielding coconut land <sup>1</sup> almost totally cleared for project. Soil exposed	Long term economic loss	Encourage home gardening
	Waste management <sup>2</sup> problems when households are occupied	Pollution related issues	Promote home gardening & composting. Provide local authorities with infrastructure & equipment as part of development programme
	Drainage outlet not specified <sup>3</sup> as per site supervisor.	Health issues	Drainage connection to the current main system or optional plans should be studied at planning & approval stages
	Inappropriate phasing of the overall project	There is a possibility of non-completion due to financial problems. If there isn't a landscaping plan in each phase, end result would be catastrophic	Landscaping should be an essential component of any property development plan. Monitoring and evaluation (M&E) is required before final settlement of payments for contractors.

<sup>1</sup> The long term economic implications of such capitulating should seriously be considered

<sup>2</sup> Waste management after handing over houses would require several times the current capacity of most respective local authorities

<sup>3</sup> The problem of drainage system within the site & especially its main outlet seems to have been neglected in the emergency humanitarian construction & planning. Most sites being located further inland results in polluted waterways because their main outlets are opened to them

Arahena – Dodampahala East G.S. div	Hi-tension power line over several houses of the site  A home gardening component is included in the initial plan with seeds also provided	Accidents involving the power line and tall trees	IEE should be a requirement in high risk areas.
Minikirula Temple land	Houses spread-out in a large area  A new low-cost brick type used in construction <sup>4</sup>		Landscaping with planting of trees to be encouraged
Mudiyansegewater	Totally cleared land plot even before supplies coming in	Loss of vegetation. Land degradation not at the end of project but even before actual construction begins	Local Authority (LA) initiative necessary for prioritization or sequencing of activities, and for M&E of work.
Kurunduhena	Slow progress of construction resulting in degradation	Degradation of land	LA's should set strict timeframes
	Under-developed infrastructure	Encroachment high due to community going for un-guided supplements	Infrastructure in place before commissioning of construction activities
Liyanapathiranagewatte (Y – village)	Severe erosion due to absence of a retaining wall	Land degradation	Ensure retaining walls, culvert and gullies are in place

<sup>4</sup> Innovations should be used as much as possible in construction

(1) Location	(2) Key Environmental Issues	(3) Impacts	(4) Remedial Action
Suduwella bay	Lot of debris piled up <sup>5</sup> . blocking water canal.	Polluted water bodies. Economically and biologically useful land space remain in the degraded state	Dispose debris into identified sites where proper earth-filling can be done.
Kiriketiya	Mouth of lagoon which is the lowest lying area with high mangrove species diversity is blocked	Biodiversity affected Coir – the main industry and income source in the region is adversely affected. Potential tourist sites are degraded & no longer attractive	Need for awareness campaigns Facilitating coir industry in a way to relieve pressure on habitats Open lagoon mouth partially to maintain a minimum water level.
Canal by the 180 km mile post	Blocked by waste	Water quality affected. Health hazard for the town	Clear regularly the canal mouth opening <sup>6</sup>
Canal near Batheegama Vidyalaya	Blocked by waste	Water quality affected. Health hazard for the town	Clear regularly the mouth opening
Batheegama lagoon and the feeding canal	Erosion of banks	Canal narrowed and silted, causing increased surface run-off of polluted water Prawn fishing and coir industry affected	Reinforce embankments of major canals

<sup>5</sup> Debris in areas still inhabited after tsunami are more or less cleared. But in areas where most of the inhabitants are either permanently relocated or dead due to the catastrophe remain un-attended, possibly because there is no one to make a complaint.

<sup>6</sup> Canals – at least the ones to which most wastewater are released - should regularly be cleared by the respective authorities. Capacity of these authorities should be developed to do so.



Pallewelayaya paddy field	Fast spreading <i>Typha angustifolia</i> species invading paddy lands	Loss of yield and land available for cultivation Health hazard by the dispersed particle / fine-fibre of the flower	Take necessary measures to eradicate invasive species
	Waste from the adjoining garment factory released to the paddy field	Species loss. Yield reduced. Hazardous working conditions.	Legal action and awareness creation
	Salt water intrusion into the paddy land during the Tsunami. Low lying than sea level	Yield reduced. Encroachment high	Seek expert treatment for desalination or adopt alternative farming practices.
Canal by the Kottegoda shed	Blocked by waste and debris	Polluted water body	Repeated clearing on identified seasons
Pehembiya beach	Debris and waste dumped on beach Infrastructure under-developed forcing inhabitants to encroach	Pollution prevents tourism - a possible livelihood given the conditions in the area.	Waste management & disposal in properly constructed dumping sites
Dikwella lagoon / Wattedagama	Waste disposal into the large mangrove habitat	Pollution	Assign protected status
Kemagoda	Small lagoon and adjoining marsh affected by debris	Polluted and trapped water body affects livelihoods such as prawn farming	Open the mouth of the lagoon
Lunukalapuwa	Degraded wetland / Mangrove / bird habitat. Coir pits causing pollution	Water quality lowered	Effect controlling over location of coir pits, and provide alternate livelihoods
Nilwella	Destroyed infrastructure forcing encroachment.	Harbour surroundings degraded	Infrastructure (road, fish auction storage facility, net mending shelter etc.), as well as ongoing fisheries harbour development programme should be completed

Matara Divisional Secretariat - Coast / Ecosystem / Livelihoods

(1) Location	(2) Key Environmental Issues	(3) Impacts	(4) Remedial Action
Wellamadama – from Matara / Dondra limit (bridge) to near University premises	Small scale sand mining	Not significant currently, but could be a threat given the developing market for sand.	Awareness creation Law enforcement
	Coastal erosion due to lack of breakwaters or protective reefs	Width of coastal stretch reduced	Construct artificial breakwaters
	Unsuitable species (Pihimbia) selected for replanting along the beach	Almost all plants dead.	Plant suitable plant combinations taking into consideration the site conditions
	Waste disposal onto a wetland / mangrove habitat approx. 100m inland from the bridge	Water polluted Species habitat lost Air pollution due to open burning	Manage waste in reinforced pits in low sensitive areas
Coastal stretch from Browns hill to Matara bus stand	The on-going development activities are leading to vegetation (casuarinas etc.) loss	Ecosystem degradation	Integrate replanting strategies to beach related development plans
Ginigasmulla	Ongoing development / restoration work resulting in ecosystem degradation	Ecosystem degradation	Integrate replanting strategies to beach related development plans
	Debris of Tsunami waves and post-Tsunami clearing dumped along the banks, & specially near the quayside, and the jetty is destroyed	Boat landing sites obstructed, hence fishing related livelihoods affected	Clearing operations involving heavy machinery, is necessary given the heavy loads to be lifted out of water Jetty reconstructed.
	Sand filled in the river mouth to make a large island possibly supported by debris beneath & unlikely to be cleared in the rainy season	Flow hindered. Possibility of upper-Nilwala area being flooded in the monsoon	Clearing operations involving heavy machinery is necessary, given the heavy loads to be lifted out of water

Thotamuna end	Severe degradation of coastal vegetation / IAS spreading / destroyed buildings left debris largely		A highly suitable site for a beach park given the river mouth & the recently constructed barrier.
Polhena	Coral mining	Coastal erosion	Awareness creation Law enforcement
	Lack of management application to the popular recreational / tourist site on common issues (waste etc.)	Degradation of coast / beach rendering it unpopular leading to loss to the tourism industry	Formulate & implement a proper management plan
	Coconut husk pits	Degradation of habitat	Awareness creation Law enforcement
Madihe	Encroachment by tourists	Degradation of beach / habitat	Management plan / Awareness creation
	Coral mining	Coastal erosion	Awareness creation Law enforcement

Weligama Divisional Secretariat – Coast / Ecosystems / Livelihoods

(1) Location	(2) Key Environmental Issues	(3) Impacts	(4) Remedial Action
Thal Aramba – Garandu Ela (canal) near David Peiris Motor Company premises	Canal blocked both from the seaside by sand bar and by a rusted, non-operating floodgate on the land side	Polluted water possibly leading to inland water pollution. Mosquito breeding could lead to epidemics	Make sluice gates operational
Canals in the town	Canal blocked both from the seaside by sand bar	Polluted water	Open mouths as suitable during dry seasons
Mirissa fisheries harbour	Waste even from outside the harbour is put in the coast inside the harbour	Polluted surrounding ecosystems and human habitats	Develop harbour and habitats separately
	Debris piled-up		Clearing of debris
	Under developed infrastructure leading to exploitation		Infrastructure development
Polwathumodara	Significant sedimentation along the river	Prawn fishing affected. Inland water quality could be lowered	Manage river mouth during dry season
	Over exploitation, encroachment and illegal constructions for tourist sector.	Ecosystem degradation	Law enforcement
Giragala	Blocked canal by sand bar	Polluted water body. Possibly linked with Giranduwa lagoon. Health problems	Sand bar should be removed to clear path of canal, but officials should make sure this wont lead to initiation of a sand extraction by people
Kapparithota	Coral bleaching – observed by fishermen & ornamental fish gathering community	Coral degradation. Fish habitat loss. Lowering of fish species abundance	
	Damaged, un-usable boat lying along the beach & road	Ecosystems pressurized as a result of aggregation of debris in the area. Accidents have also been reported as a result of wreckage.	Awareness creation Law enforcement Clearing operations

Weligama Municipal waste dump	Wetland, mangrove habitat used as the dump.	Water quality affected. Habitat lost. Recycling plan now in operation but ecosystem already partly destroyed	Manage waste in reinforced pits
Kalukanda	Tsunami damaged cliff on beach	Further erosion because of the steepness	Breakwater
Denuwala / Goviyapana	Un authorized resettlements in the no-build zone	Vegetation affected	Awareness creation and law enforcement
	Debris pile-up	Ecosystem degradation	Clean-up operations. Cash for work programmes. Revival of tourism

Weligama Divisional Secretariat – Constructions

(1) Location	(2) Key Environmental Issues	(3) Impacts	(4) Remedial Action
Sundar Vinayagar watta	Soil erosion, waste problem and drainage problem not addressed until all construction is over	Land degradation and biodiversity loss	Main plan <sup>7</sup> should address the issues Progress on housing and infrastructure should closely be monitored
	Have tried to address the issue of space surrendered for construction in a different manner. The total number of houses (25) is to come-up as blocks of five houses each. Less overall land extent used than if individual houses (25) were built	Lesser impact but social issues are to be anticipated	
Thewatta - Midigama	Clearing of large extent of land. Un-retained cuts in very steep and long slopes – highly vulnerable	Erosion – sometimes on a scale of a landslide could result given the enormity	Stepwise completion of construction or planned phasing in larger construction projects of this scale with land management issues addressed in each phase
	Long road network within site still with only exposed soil	Soil erosion	Roads in larger sites to be completed at least with gravel added prior to construction of houses
	No drainage system or solid waste management plan until 95 % of housing is completed. Main outlet is planned to be connected to a currently unpolluted stream	Severe pollution problem	Prepare a drainage and solid waste management plan
Kongashena / Midigama north / Puwakwatta – a site about which authorities knew little until almost complete	Authorities were unaware of the sites' existence until it was just to be completed	No action could have been taken due to the secrecy in the project	All construction projects should be registered with the government as a legal requirement, thereby enabling authorities to monitor

<sup>7</sup> The architectural design should include drainage and sewage system for the whole site and solid waste dumps or temporary storage pits

	Very low building standards (timber etc.) seems to be a corrupt contractor or a middleman involved	Wastage of resources	A set of standards should be set-up on emergency / humanitarian constructions if possible (not for transitional shelters due to impracticability)
Pathegama – Udawatte (Surendra Niwasa)	Sub-standard houses despite new concept being used. Possibly because of contractor / sub-contractor non-performance	Wastage of resources	Contractor/s should be monitored separately. Selection of contractor/s, designer/s or consultant/s to be based on past performances
Walana (Ceyline housing project)	Soil erosion is not taken care of even by the beneficiaries because the plot boundaries aren't yet disclosed to them by means of a deed. Two houses especially are vulnerable but unable to retain due to high cost	Collapsed walls and houses	Retaining or at least turfing the slopes Providing deeds to recipients on handing over without delay <sup>8</sup>
Gurubabila	Good and informed contractor	Measures taken	
Charlie Mount (two sites in one)	Common problem of soil erosion and lack of drainage plan	Land degradation	Retaining wall and gullies constructed as needed
Charlie Mount (proposed rubber estate to be cleared)	Productive rubber plantation to be cleared	Long term economic loss	Regulations should be made in order to spare as much economically valuable plantations as possible regardless of short term income to the owner
Elagorakagahawatte	Small-scale coconut cultivation area replaced by construction site	Economic loss	Evaluations prior to assigning and acquisition
Kandapamulawatta	A swamp (that has been filled even before Tsunami) has been used for construction Condominium / apartment type housing project that suits more an urban area is in construction	Ecosystem degradation / loss, possible submergence of canal banks	Wetlands / Mangroves / Sand dunes / Identified special habitats should be excluded from consideration for construction sites

<sup>8</sup> Alternatively, in smaller sites it is possible to assign landscaping to the recipients even prior to handing over houses. Boundaries should clearly be shown for them to be confident of their ownership.

Baddagonawilawatta	Totally cleared site, which is a small hill <sup>9</sup> as in most cases in Matara Turfing and replanting seems to be taking place before major construction begins	Possible soil erosion. Part of vegetation could have been left un-cleared initially, if the sequence of development was properly planned. This would in-turn have made the replanting unnecessary.	Replanting and turfing
Epitawatta – Thal Aramba	Lack of infrastructure leading to frustration of beneficiaries that in turn has led to pressure on natural resources	Ecosystem and land degradation	Providing proper infrastructure to reduce pressure on environment
Dewagiri - Kamburugamuwa	The small (12) housing site is located amidst an existing village <sup>10</sup> without any key issue evident	Low impact on the environment	
Kandagodella (two separate sites) – Kamburugamuwa	Occupants are said to be illegal. Forced occupancy – some are beneficiaries identified and some are not. Hence administration find it hard to implement regulations of any kind	Environment related issues cannot be dealt with because of the status of occupancy	Law enforcement
Kotawila	Common issues	Soil erosion	Land management
	Long distance from beach.	If beneficiaries' income had been one that involved coastal resources, there is possibility of encroachment at the current site	Resettling in sites farther from beach is to be done only for beneficiaries who's livelihood is not significantly affected as a result of moving inland
Mirissa - Digana	Unregistered site as per local authorities	Administrative impacts on implementation and law enforcement	Make registration a legal requirement.
	Lower slopes retained and planted but not the larger upper slopes	Soil erosion	Proper land management

<sup>9</sup> Due to the lack of proper planning, a considerable amount of elevated landscapes are seen surrendered for construction. Flat lands are a better option provided that there aren't any other preventive reasons

<sup>10</sup> A small housing site in an existing village does not need many new facilities developed. Such a site and beneficiaries can blend-in easily with the community while using basic facilities the village already has in place. A large site in a previously un-inhabited area needs specific facilities newly developed and creates more unforeseen ecological & social problems even after assigning.



Devinuwara Divisional Secretariat – Coast / Ecosystems / Livelihoods

(1) Location	(2) Key Environmental Issues	(3) Impacts	(4) Remedial Action
Wellamadama – Devinuwara division	Unauthorized sand extraction though in an early / moderate stage	Erosion	Law enforcement
	Unauthorized fish market on some days, with neither infrastructure nor supervision. Leftovers end-up in nearby canal and mostly on site itself	Severe pollution level in surroundings	Providing a dedicated site for the practice identifying it as a need. Law enforced to prevent beach from being used for such activities
Devinuwara Fisheries Harbour	Number of Tsunami destroyed multi-day boats lying inside the premises	Space that could be utilized for basic harbour facilities lost and have become polluted	Collective dumping site or a mass recycling programme should be established
	Waste disposal facilities insufficient	Unmanaged dumps inside and outside harbour premises polluting surroundings	Proper waste management plan
	Basic infrastructure insufficient to cater to the capacity required	Encroachment of natural environment by the community who are desperate due to being deprived of the facilities	Development of drainage, waste, boat repair, net mending and storage facilities. Providing ice plants would resolve many problems by increasing the income of fishermen thereby reducing encroachment
Kiralawella	A canal opening to the sea is blocked by destroyed boats and other debris creating a highly polluted slow running water body	Highly polluted canal	Clearing operation with dumping site identified, given the amount to be cleared being considerable
	Temporary solid waste storage pit that virtually is in the beach is insufficient. Local authorities according to residents, remove waste only after weeks	Highly polluted beach and habitat. Biological degradation	Build capacity and awareness of both community and local authority on the site

	Under-developed infrastructure leading to severe encroachment. Boat landing site highly insufficient	Sever encroachment of environment	Assess & assign alternate landing sites. A breakwater <sup>11</sup> from one side of the bay would be a good option as per the experienced fishing community interviewed
Thalalla beach	Destroyed <i>Pandanus</i> and other vegetation by heavy impact of Tsunami	Biodiversity degradation. Vulnerability to further erosion. Main usage of beach could shift from being a recreational site to being a landing site	Replanting of identified species. Recreational facilities should be developed since this is one of the widest beaches and has been popular among visitors
Thalalla lagoon (approx. 50 acres)	The lagoon has been changed by the Tsunami. The previously isolated (seasonally opening) water body is now permanently opened to sea. Polluted water is no more but the natural (pre-Tsunami) ecosystem may have and will undergo changes	Ecological changes taking place due to salinity change of the lagoon	Restoration of mangroves, clearing operations, de-silting
	Due to the opening of lagoon mouth, main canal bank is eroding	Land level of paddy fields and surrounding wetlands is sinking. This has led to more salt water intrusion, crop loss and severe ecological degradation	Retaining of canal bank up to a level more than the current level (this would make more abandoned cropland viable) Sluice gates rebuilt
Naorunna beach	Surrounding cliffs beginning to be encroached for building purposes	Soil erosion	Integration of environmental aspects into land owners development plans made essential
Thalalla Wela	Severe case of invasion of <i>Typha angustifolia</i> on paddy field	Wetland ecosystem and paddy land fast degrading	Eradication of Invasive Species
Gandara fisheries harbour	A severe case of under-developed harbour infrastructure (road, drainage, sewage, boat landing, net mending, fish storage, fish selling facilities) leading to encroachment	Highly polluted environmental conditions worsening due to desperate community	Develop infrastructure as the first priority. Developing Bodawatte road as a small (100m approx.) but urgent project

<sup>11</sup> There are many places along the coast of Matara that need new breakwaters to be built not only to prevent erosion but also to provide extra space for boats by increasing beach width / length

(1) Location	(2) Key Environmental Issues	(3) Impacts	(4) Remedial Action
Abimanpura / Kandagodella – Gandara East	High ground site near the shore. Gravel earth resistant somewhat to erosion, but exposed at some parts of the site in which landscaping has been undertaken	Soil erosion	Retaining most vulnerable places
Kandagodella 2	Half constructed site adjoining Abimanpura. Abandoned lines of houses having been partly completed	Wasted cleared land and environmental resources. Soil erosion	Commence building construction. Government intervention may be needed
Kandagodella (Small Fisher Federation Houses)	Partially completed houses and totally cleared plots of land	Economic loss and waste of natural resources. Soil erosion	Ensure the implementation is supported by sufficient finances and a possible contingency plan in the approval stage
Gedarawatta – Kapugama East (contributed by Jathika Weera Padanama, Dankotuwa, Airport & Aviation Authority)	Land totally cleared and exposed. Retaining and drainage systems and roads not built	Soil erosion	Supervision by government on stepwise completion of infrastructure parallel to housing
Narangahahena	Exposed land and considerable amount of coconut cultivation fell. Still to complete retaining walls and drainage system. Concerns on main outlets for the site is of considerable size	Soil erosion till the on going retaining is completed. Pollution of surrounding environment	Conceptual and practical solutions <sup>12</sup> from initial stages
Gamagewatta - Thalalla	There is a drainage plan in the site. But the main drainage system outlet opens in to a private cinnamon cultivation and to a paddy field thereafter	Possible crop losses	Systematic disposal implemented

<sup>12</sup> A holistic approach from the very beginning of the project (site selection, acquiring, design and executing) is needed. The bulldozer driver should not be the first person that visits the site. In most cases there is evidence that the engineer/architect was shown a cleared site instead of taking their advice on how best can the environment be preserved.

Kanattawatta - Thalalla	A mahogany plantation removed for the access road	Economic and biological unsuitability of the action	Best alternatives and practices must be used
	Although retained and drainage system in place, the main outlet opens to a high slope	High vulnerability of soil erosion	There should be a definite alternative for the main outlet considering the vulnerability
Kongahahena	A severe case un-restrained land clearing is to be seen	High vulnerability of landslide. Possible destruction of houses on site and lying below it	A holistic approach in site selection, design and construction



The World Conservation Union (IUCN) was founded in 1948 and brings together nearly 1,100 members (States, government agencies, NGOs and affiliates) and some 10,000 scientists and experts from 181 countries in a unique worldwide partnership. Its mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. Within the framework of global conventions IUCN has helped over 75 countries to prepare and implement national conservation and biodiversity strategies. IUCN has approximately 1,000 staff, most of whom are located in its regional and country offices while some 150 work at its Headquarters in Gland, Switzerland.

In the context of IUCN's mission, the role of the IUCN programme in Sri Lanka is to be a facilitator of conservation action. It plays a catalytic role, and offers effective platforms to promote dialogue and discussion among the various partners engaged in conservation work. The emphasis of the Programme is to support sustainable natural resource initiatives of the Union's members and partners in Sri Lanka, in biodiversity conservation, conservation and management of critical habitats, environmental policy support, institutional support and environmental education and awareness. It also provides opportunities for the practical application of methodologies developed through the Union's scientific networks to support the conservation initiatives of members and partners of IUCN in Sri Lanka.

The in-country operations of IUCN in Sri Lanka commenced in 1988. In addition to the country office in Colombo, the programme has now expanded with four regional offices operating from the southern, eastern and central parts of the country.

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