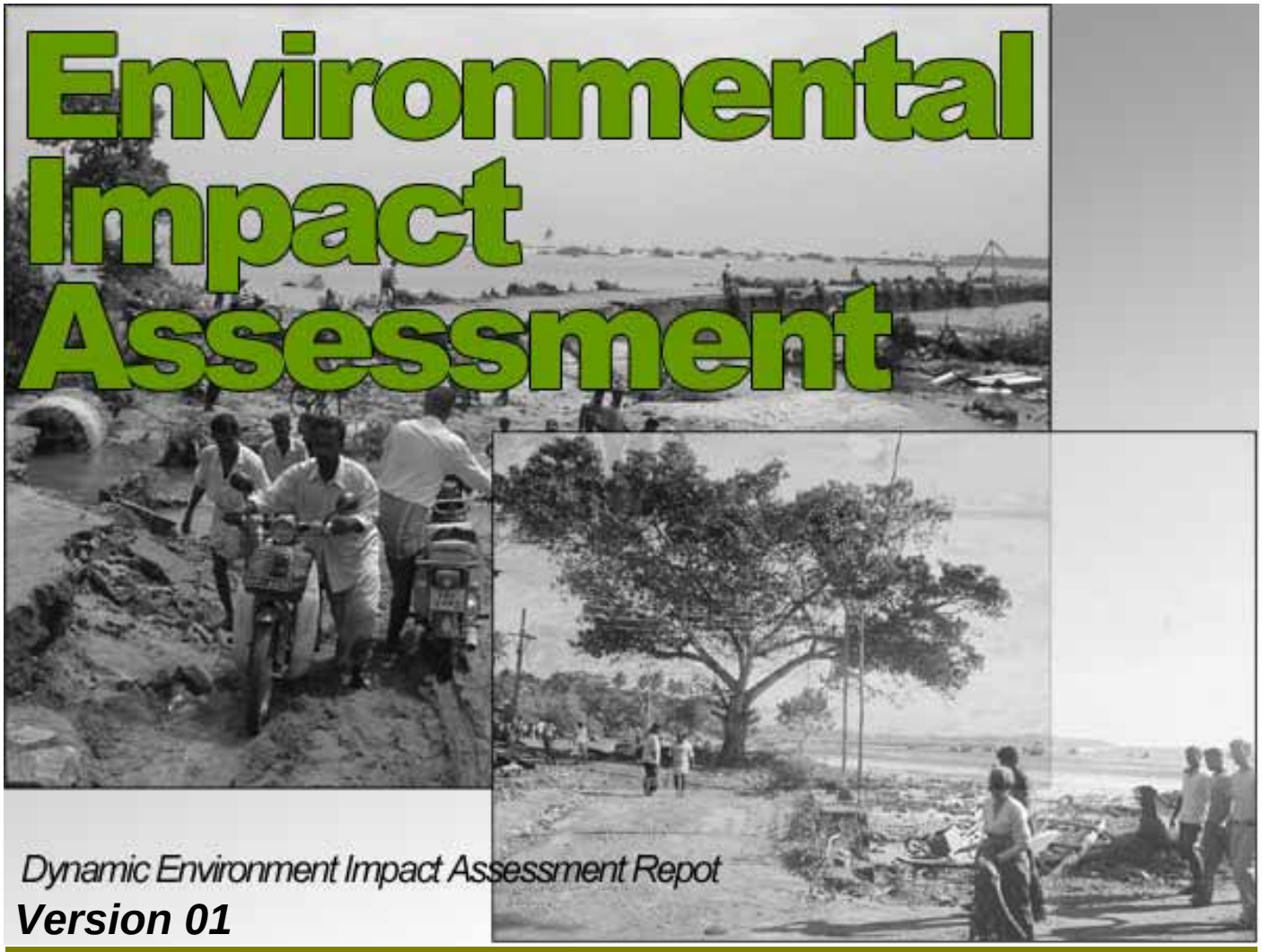
Environmental Impact Assessment



Dynamic Environment Impact Assessment Repot

Version 01

Disaster Management and Information Programme

10th March 2005

Green Movement of Sri Lanka

The Green Movement of Sri Lanka (GMSL) is a consortium of 131 local NGOs and CBOs in 22 districts in Sri Lanka. GMSL collaborates with 78 international organizations, universities, and government ministries including the Norwegian Development Fund (NDF) and UN agencies. Our work focuses on environmental conservation, consumer rights and sustainable development in Sri Lanka. Established in 1998, the Green Movement of Sri Lanka is motivated to achieve natural resource based sustainable development through empowerment of the poorest and conservation of the environment through environment-friendly lifestyles. While focusing on current environmental problems, we provide solutions through collective effort. We devise effective measures for the conservation of flora and fauna while protecting the country's national wealth and natural resources from being exploited by multinationals. We endeavour to promote the health of the people and provide support for the development of conventional and sustainable agriculture, while ensuring bio-diversity conservation. Activities launched by GMSL with people's participation envisage the emergence of vibrant, environment-friendly communities throughout the island.

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Summary

This first version of Green Movement of Sri Lanka's environmental impact assessment covers tsunami struck coastal stretches from Galle district in south-west to Jaffna district in the north. The assessment is based on observations and communications with the local communities in the affected areas.

The initial phase of the environmental assessment exposes three main categories of environmental issues in relation to the tsunami disaster:

1. Pre-tsunami protection vs. vulnerability to the disaster: It has become common wisdom that areas where the natural barriers to the tsunami, such as coral reefs, mangroves and other coastal forests and sand-dunes, were degraded by human activities the effects of the disaster were more severe than in the areas where these barriers were intact.
2. Direct impacts: Physical damage to coastal ecosystems, salinisation of soil and lagoons, erosion, and other such ill effects imposed on nature by nature itself.
3. Indirect impacts: Post-tsunami environmental degradation incorporates the lack of waste management. During the clean-up process there are too many examples of haphazard dumping of rubble and waste with little or no sorting for reuse and recycling. Landfills are made in pristine and vulnerable habitats such as lagoons and marshlands. In addition, the planning process for resettlement, both for transitional and permanent housing, is not guided by environmental considerations. Unsustainable pressure on natural resources, sand for bricks and trees for construction is already an issue of concern and with the prospect of 80 000 permanent houses to be constructed in the coming months the pressure on such resources will surely increase. There is also a risk of having more people forced by poverty to shift into unsustainable livelihood practices such as coral- and shell-mining, after the loss of previous livelihoods. Migration and urbanization of people who lost their rural livelihood is a known phenomenon from other disasters.

The scope of this assessment is to estimate the scale of damage to natural ecosystems in the tsunami affected areas. Other agencies have been, and are, out on the same mission and we have tied to be complimentary to the other studies both in geography and issues raised. We refer the reader to the reference list for other reports on the matter. We hope that the assessment can provide a background for interventions and implementation of environmental recovery projects.

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Introduction

This environmental impact assessment is dynamic and ongoig process. The Green Movement of Sri Lanka initiated a survey of the affected coastal zone in mid January 2005. Our aim is to contribute to long term sustainable development and security for the coastal communities. Like so many other concerned citizens we in GMSL immediately turned our focus into relief and recovery for the victims of the Tsunami. GMSL are currently working through its Disaster Management and Information Programme (DMIP) in the districts from Kalutera to Trincomalee with the help and collaboration of our local member organizations, partner organizations and the invaluable effort from hundreds of volunteers. GMSL is still most concerned about the tsunami as a *humanitarian* disaster. In the document 'Determination for a Better Future' released by GMSL on the 29th of January 2005 we outline the plans for extending the relief effort into the next phases of recovery and reconstruction. Central concerns for GMSL in the coming months are the recovery of livelihoods in the agricultural and fisheries sector, housing and psychosocial wellbeing for severely hit communities. In all our activities we pursue sustainable development, both ecologically and socially, endeavoring to integrate environmental sensitiveness and social justice with participatory aproaches.

Comunities depend on the goods and services provided by the surrounding natural and agricultural ecosystems. This environmental impact assessment is based on observation in the affected areas to natural ecosystems in the terrestrial and inter tidal coastal zone. It is complimentary to the larger Agricultural Damage and Need Assessment published on a conference on the 28th of February. This first version covers most of the affected coastal strip by providing some snapshots of the state of the coastal environment.

It is our hope that this assessment can become interactive and your observations and suggestions from the field and suggestions for the assessment are welcomed. We have learned from experience in the disaster affected areas that the effects of the tsunami are still evolving and therefore our assessment will evolve over time as well be a dynamic one. This report concludes with comments on some of the long term effects to the environment both direct and indirect in nature.

Methodology

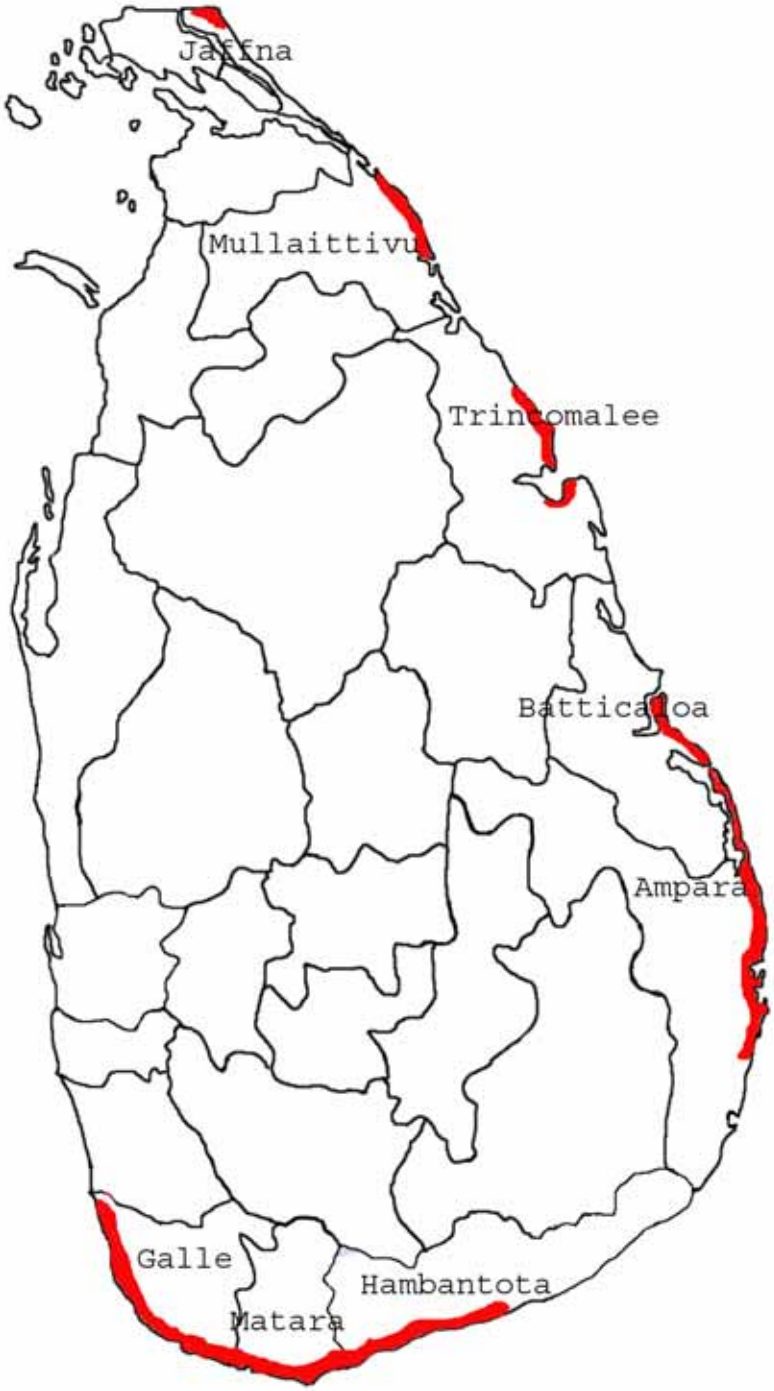
Green Movement of Sri Lanka emphasizes a participatory and public-minded approach to environmental issues. This approach can be seen in previous publications from our side, most notably in the joint Green Network report 'Peoples Report on Sustainable Development' published for the RIO+10 World Summit on Sustainable Development in Johanesburg 2002.

The framework for this environmental impact assessment was obtained from the 'Handbook for Estimating the Socio – Economic and Environmental Effects of Disasters' published by Economic Commission for Latin America and the Caribbean (ECLAC). The effects of the disaster were assessed on physical, biotic and perceptual environmental assets. The method was largely qualitative, with a narrative reporting style backed up by photographic documentation. We ultimately classify the environmental effects area wise using pre-defined qualitative categories.

Baseline information was gathered from the public in the affected areas, our member network, bibliographic sources and meetings with experts.

Fieldwork for this assessment was initiated mid January 2005 and it is still ongoing. It is conducted as a geographical survey in the affected coastal stretch with observations and photographical documentation of the damages, in close dialog with local population and expertise.

Areas covered (marked in red) by this version of GMSL's Environmental Impact Assessment after the December 2004 Tsunami.



Background on Coastal Ecosystems

The coastal region includes inshore waters, inter-tidal areas and extensive tracts of adjacent land. According to the Sri Lankan Coast Conservation Act the coastal zone is defined as a 2 km wide band of ocean and an adjoining strip of land extending 300 m. inland (Sri Lanka, State of the Environment 2001). The total length of the Sri Lankan coastline is 1,600 km, out of this approximately two thirds was affected by the Southeast Asian tsunami, December 2004. The total extent of important coastal habitats in Sri Lanka is given below.

Habitat	**Extent**
Estuaries and Lagoons	158 017 ha
Mangroves	12 500 ha
Salt Marshes	23 819 ha
Sand Dunes	7 606 ha
Beaches	11 788 ha
Marsh	9 754 ha
Other Water Bodies	18 839 ha
Coral Reef	68 000 ha

Sources. Sri Lanka, State of the Environment 2001,After the Tsunami: Rapid Environmental Impact Assessment 2005

Coral Reefs These tremendously diverse ecosystems face a wide range of threats that were present also prior to the tsunami; the coral bleaching in 1998, coral mining, dynamite fishing, pollution etc. Preliminary surveys by NARA and IUCN showed a highly varied impact ranging from largely unaffected (Rumassala, Galle) to extremely damaged (Dutch Bay, Trincomalee).
Mangroves The unique mangrove ecosystems was also vulnerable habitat prior the tsunami. Unmanaged prawn farm industry brought havoc to large areas of mangroves in the 1990s. Further threats include felling for wood and construction of houses, hotels and establishment of dumping sites etc within mangrove forests. Preliminary studies of the mangroves shows highly varied damage; from severe physical damage to stands in Panama, Ampara, to very little impact in Kogalle, Galle.
Estuaries and Lagoons These brackish water bodies contain highly diverse flora and fauna, Sri Lanka has 45 estuaries and 40 lagoons, these represent the breeding ground for many marine species. Construction of infrastructure, such as roads imposed artificial constraints on the natural outflows, and after the tsunami salinisation of lagoon water and examples of extensive siltation is observed (e.g.Tambotte lagoon, Ampara and Malele lagoon, Hambantota).
Sand Dunes These natural barriers to rough or disastrous ocean events faced a lot of pressure in the form of mining and settlement development before the tsunami. The aggravation of the mining problem was observed in many places in the aftermath of the tsunami (e.g. Polehena, Matara).
Marshland Vital ecosystems for the rich Sri Lankan wader-bird fauna and a natural absorber of flood water. Extensive land filling and destruction of marshland was happening during resettlement process after the tsunami (e.g. Kalmunai, Ampara).
Beaches The beautiful Sri Lankan beaches serves as important habitats for a wide array of species, including five species of sea turtles and many crustaceans. Extensive migration of sand was caused by the tsunami wash-out (e.g. Tangalle, Hambantota and Uppuveli, Trincomalee)
Coastal forest Natural forest along the coast is largely classified into Thorn forest and Dry Evergreen forest, and the above mentioned mangroves. These ecosystems also experienced a severe local damage due to the tsunami caused by the brute force and the salt water intrusion.

Environmental Impact from place to place

Panama

Division	District	Informants
Lahogala	Ampara	Grama Nilhadari and group of villagers

Background

Panama village is situated at the banks on the mouth of the Wila Oya River. Closest village to the North is Arugam Bay (15km), and closest to the south is Okanda (11km) at the border of the Yala East national Park. The Panama village was saved due to protection from sand dunes. The sand dunes are approximately 500 meters wide and 15-20 meters high. Only one place did the wave burst the dune and seawater intruded to wetlands behind dunes. Only one person died in the village of Panama. There are five lagoons in the vicinity of Panama, they are; Solambe, Hellawe, Kunukala, Panakale, and Panama lagoons.

Observations

- Lotus flowers in the wetlands behind the dunes died. Probably due to increasing salt level.
- Sand dune vegetation Habberegass, Pattok*(Euphorbiaceae sp*), Hirasse, Wara (*Calatropis gigantea*), Niayangala (*Glorieoso superba*), Tamburu (*Ipomea sp*) *Bahonia* species. -Still thriving at the dunes.
- Inside the lagoon there is a brown grey strip of vegetation. This strip of mangrove and coastal forest is dead due to mechanical damage from the tsunami and heavy salinisation.
- Only the Palu (*Manilkara hexandra*)survived of the shore close coastal trees
- Increasing human-elephant conflict. Okande wildlife office had elephant crackers to cope with the elephant trampling. Now that office is gone and it is impossible to cope with the problem. Many elephants are now creating problems in the farmer's fields.
- Extensive erosion and shifting of shoreline in the estuarine area.
- Peanut fields; first dead due to salinisation, secondly trampled by elephants.
- Paddy fields affected.
- Bird life in lagoons normal for the season: Migrating birds like Ambalakoka, Sera, Ballal Sera, Mohodulihynia, Olleya, Mahadiekawa

Panama: Human-elephant conflict aggravated. The fields are left unprotected. This peanut field was already dead because of salinisation

Information

- Okande wildlife office destroyed.
- 500 acres of mangrove forest destroyed in the Panama lagoon. Trees broken and washed out.
- Thousands of acres of coastal forest succumbed due to the wave.
- 1385 families in the Panaman area. Fisheries families 300, 85 families depend on lagoon fisheries.
- Lagoon fishermen catch the following species: Isso, Kakulo, Goddeya, Parau, Red Tallou, Korrale, Marando, Ollajo, Pendo,
- Tsunami destroyed five hundred acres of paddy land and 100 acres of chena cultivated land. 50 cattle died in Panama north GN division.
- The curd industry collapsed because the collecting centre in Arugam Bay was washed out.

- The sea turtles have resumed their nesting habit on the beach. The problem of egg harvesting is continuing.

Main Concerns

- The damage caused to the mangroves and lagoon vegetation
- Increased salt level might affect the populations of fish. What will be the consequence of the breeding ground of fish and prawns, crabs, with salt level increased?
- Clogging of mangrove tree pores due to siltation.
- Changes in estuarine topography might affect ecosystem overall when it comes to inflow and outflow of salt and fresh water.
- Mud and sand from the tsunami. Rotten biological debris might affect the marine fauna.

Potuvil

Division	District	Informants
Potuvil	Ampara	Fishermen organization, Villagers.

Background

Potuvil is severely hit in its coastal end. STF camp on the peninsula washed out and so is the bridge to Arugam Bay. The famous surfing beach and village in Arugam bay experienced devastation by the Tsunami.

Observations

- Sand and rubble washed inland about five hundred meters,
- Palmeyra palm shows clear indication of dying. Leaves are withering and it is probably just a matter of time before dying. More than 100 palms examined
- Coastal vegetation in southern end of the bay are heavily affected within the Tsunami stricken area (at least 150 inland from shore) In total 750 sq M.
- Dying trees includes Gansuria, Pattok (*Euphobia sp*.), Wara (Calotropis giagantiea), Dang (Syzygium carryophyllatum), Katu andara (Accacia leucopholea),Heen karamba (Carissa spinarum),
- Palu (*Manilkara hexandra*) still green and viable Wetakeya (*Pandanus kaida*)
- Coconut along the beach seems viable and green
- Casuarina sp. plantings have acted as barrier in one place.
- According to local inhabitant the seashore has changed. Possibly due to fluctuation of sand. The landscape change in the southern end of the bay is reported to be a loss of beach, the shore has encroached the land.
- A may concern is the sand layer that has thoroughly affected the soil and vegetation inland.
- No common waste management. Some people sort the usable materials, other places the landfills are completely unsorted.
- 600 humans died in Arugam bay. 400 were children

Dead coastal vegetation. Arugam Bay

In the foreground: Dying Palmeyras(Borassus flabellifer). In the background: One of the few standing structures at the Arugam Bay beach protected by casuarinas.

Main Concerns

- Damage to mangrove ecosystems
- Damage to coastal forest
- Extensive erosion of beach and shoreline
- Waste management

Komari

Division	District	Informants
Tirukkovil	Ampara	Local villagers

Background

Devastation is high due to the location of the village. The village is situated on a 500 – 700 meters narrow strip of land between the sea and the lagoon.

Observations

- Many coconut trees tilted.
- Sand intruded at least five hundred meters, covers the soil layers
- Extensive soil erosion
- Lagoon full of debris, very much biomaterial rotting, color change and bad smell
- The village itself is completely flat and devastated
- Palmeyras at the wedge of dying
- Neem trees wilting
- Camps on very little suitable places. Will depend on water browser supply and not sustainable for long term settlement (socially and environmentally unsustainable places).
- Forest slashed down to give room for temporary settlement.
- Garbage dumping on open grasslands.

Extensive erosion. Komari

Tirukkovil

Division	District	Informants
Tirukkovil	Ampara	Local villagers

Background

A densely populated area hard hit by the Tsunami. Water intruded 800 meters.

Observations

- IDP camps are very unsustainable. Dirt roads extending over large area. Waste management very limited
- All newly established camps on virgin land. Encroaching forest and grassland.
- A lot of relief waste in the landscape, such as dirty clothes and plastic bag.
- Dieback of reeds (Pan)
- Drinking wells completely filled by sand
- Biological debris covering large stretches of the beach.

Wambotta

GN – Division	District	Informants
Tirukkovil	Ampara	Local villagers

Background

Narrow strip of land between sea and lagoon. Pre-tsunami terrestrial vegetation limited.

Observations

- Massive soil erosion
- Siltation of lagoon

Siltation of the Wambotta lagoon

Sinnamotuwarame

Division	District	Informants
Akkaraipattu	Ampara	Local population

Background

Narrow strip of land, 500 – 800 meters broad. First causeway from Akkaraipattu to Pottuwil.

Observations

- Reeds (*Cyperus*)used for handcraft is withering
- Mud and silt in lagoon
- Paddy fields dead on the strip.

Dead paddy. Sinnamotuwarama.

Akkaraipattu

Division	District	Informants
Akkaraipattu	Ampara	Local population

Observations

- Biological debris. The lagoon surface changed color to brown.
- Home gardens washed out, and topsoil covered by sand inhibiting regeneration.

Topsoil covered by sand with high salinity.

Olluwil

Division	District	Informants
Addalachchenei	Ampara	Local villagers

Background

Village little affected due to marine topography and wide belt of mature coconut palms along the shore.

Observations

- Wide beach and wall of coconut palms
- Coconut trees of tall heights all escaped, but mid level trees often uprooted.
- Also lagoons left less affected.

Kalmunei

Division	District	Informants
Kalmunei	Ampara	Local inhabitants

Observations

- Extensive damage
- Sand in the paddy fields, probably from tsunami, could be due to flood.
- Inland in the Mandur area we observed severe silting in the near lagoon paddy fields. This silting seems to be deposited by the lagoon

Dangerous waste. Asbestos rubble poses a great health risk.

Maradamunei

Division	District	Informants
Poraitivu	Batticaloa	Local population. Agricultural department.

Observation

- Extensive erosion.
- Damage to croplands and natural terrestrial vegetation as much as 1,5 kilometer inland.

Kaludawali – Mankadi

Division	District	Informants
Batticaloa	Batticaloa	Local population. Agricultural department.

Observations

- Casuarina plantation on the shore heavily affected. The young plants along a stretch of several miles are largely dead and uprooted.

Casuarina sp. plantation devastated

Poddukodurippi

Division	District	Informants
Batticaloa	Batticaloa	Local population

Observations

- Dessert like landscape.
- Tsunami had reached up to 2 kilometer inland
- Palmeyra natural forest is dying back.

Batticaloa

Division	District	Informants
Batticaloa	Batticaloa	Local population

Observations

- Wide belt of coastal terrestrial vegetation dead. As usual the mature coconut stand seems to survive while the Palmeyras are withering.
- A huge waste problem. The waste and rubble is largely uncleared as most other places along the east coast. In the places where some clearing has taken place there is now sign of sorting the waste. The only re-use seen is that of poor people sorting out the metal for sale.
- In Batticaloa in particular there is reason to be alarmed by the resettlement plans suggesting filling of marshland. There is no proper environmental impact assessment in place for such a resettlement scheme.

Waste are either not managed at alll or just piled up without sorting. Kalladi, Batticaloa.

Kalkudha – Passikudha

Division	District	Informants
Korale Pattu North	Batticaloa	Local villagers

Background

The area has changed into a ghost peninsula. Constructions, roads and other infrastructure are heavily destroyed.

- The natural shrubland is killed either by mechanical destruction of the wave or by salinisation.
- Large chunks of corals are washed ashore. (It is known that the inner part of this reef was severely damaged by the bleaching in 1998 and it is therefore likely that much of the coral ruble originate from already dead corals.)
- Scuba diving in the lagoon revealed some mechanical damage to corals, but the underwater sight was extremely limited.

Shrubland turned into a wasteland of dead shrubs and garbage. Passikudha.

Corals washed ashore. Kalkudha.

Trincomalee

Division	District	Informants
Kuchuweli	Trincomalee	Fisher folk

Background
The beaches to the north of Trincomalee town, Uppuveli and Nilaveli were severely affected by the disaster.

Observations
- According to the fishermen the bottom conditions outside Uppuvelli beach are changed in an alarming way: “Before the tsunami we had to be very careful when putting out our nets outside this beach because there was so much corals and stone structures to get stuck on. Now after the tsunami the bottom appears smooth as a if everything is covered by sand.” This can be the tale of massive coral reef destruction as was also found in an other impact assessment on the Dutch Bay reef in Trincomalee harbor (See joint NARA/IUCN report).
- Extensive erosion and shift in beach topography. The Uppuvelli beach is markedly thinner than before. According to the local population the beach was virtually gone just after the tsunami and now the sand is slowly being washed up on the beach again.

Mullaitivu

Division	District	Informants
Mullaitivu	Mullaitivu	Local population. Agricultural faculty Jaffna University

Background
Severely damaged areas. Mullaitivu town are among the worst hit settlemts along the coast. We traveled from Mulaitivu and further down south to Chemalai.

Observations
- The Tsunami has reached as much as 2-3 kilometer inland in certain areas.
- Damaged paddyfields are found far inland with saltwater still standing in field after one month.
- Homegardens and natural terrestrial flora is destroyed all along the coast.
- Sand dunes have acted as natural protection in certain areas.
- The lagoon fauna is according to the local fishermen still normal.
- The spread of mines due to the tsunami still poses a danger to both humans and animals

Mines are spread in the landscape, Mulativu

According to the fishermen in Nayaru lagoon, Mulativu, the catches are still normal

A catch from the Nayaru lagoon.

Point Pedro

Division	District	Informants
Point Pedro	Jaffna	Local population. Agricultural faculty, University of Jaffna

Background

The Tsunami washed 800-1000 meters inland and did extensive mechanical damage to coastal vegetation.

Observations

- Groundwater said to be affected by tsunami. It is a possibility that the water masses have intruded into the limestone aquifers of the Jaffna peninsula.

In the farmers field there is an apparent dieback line for the crops. Point Pedro, Jaffna

Hambantota

Rekawa

Division	District	Informants
Ambalantota	Hambanthota	GMSL staff, vilagers

Background

Rekawa was severely hit by the tsunami wave. Settlements and environment damage was very high. An important ecosystem of Rekawa was place in between lagoon and sea. There is a famous natural nesting habitat for turtles and few organizations of turtle conservation implemented, many project in last decade in this area.

Observations

Soil eroded very heavily. Some holes made by the wave were around 5m wide and 1.5m deep, Wave washed down to mangroves land. Siltation can be seen. Many of the coastal lands belong to small hoteliers.

Pandanus hedgerows were in costal belt. Some places of the Pandanus hedge barriers broken down some are alive. Some places were without Pandanus barriers were heavily damaged by Tsunami.

Post Tsunami activities of the area. Some companies from the capital city, caterpillars, and other heavy earth machineries brought to the area and bulldozed, removing the remaining top soil layer, filling, and leveling the area. It also remaining green cover, grass, hedges small trees also uprooted and removed by machineries. As a result disturbed soil will case for heavy soil erosion in next rainy season. It will lead to siltation in mangroves and will damage for mangroves ecosystem.

Small tank was situated in middle of the village. People of the village used the fresh water to bath and for other purposes from it and affected by tsunami wave and fill with salt water. Few weeks later one of a hoteliers company from Colombo, reached to village, settled some group of people to pump water out of the tank to mangroves land through home gardens by purposely cut channel, used 6 water pumping motors in 10 days. Many fishes dead, during the water pumping process. Salt level of the tank was increased due to Tsunami water. The salt levels of the mangroves also change due to tank water it will affect the mangrove eco systems.

Sea sand will case for the soil of the land. Many tons of sand come to land and make a coat over the remaining top soil, it will affect the green cover, grass and other weeds, and salinize the soil.
Many coconut trees had fallen down of force by the wave but many people abandoned their land; some people started to harvest woods from fallen and newly cutting coconut trees in above mention area.

Biological debris scattered in seashore, beaches still not cleaned; there was no proper program to remove rubbles scattered around village. It will be an other post Tsunami environmental damage.

Rekawa Tank. Garbage and salinization of tank gave rationale for project of emptying tan - to the detriment of its aquatic life.

Bulldozing land, eroding toppsoil

Madilla

Division	District	Informant
Tangalle	Hambantota	Villagers

Madilla

Background

Madilla is a coastline village but costal lands belong to foreign small scale hoteliers Village also associates with lagoons and the coastal lands. Tsunami hit very fiercely to Madilla. Hotels and houses are largely damage.

Observations

The wave has gone about 400m in side of the country.
Pandanus thick hedges were there.
Many of thick hedges of Pandanus on the coastal line were up rooted or crack down and washed away.
Soil of the costal area was highly eroded.
Thick sand carpet covered the topsoil of the Hotel gardens and home gardens in coastal belt of total village area.
Regenerations can be seen in dead open sand grasslands.
There was main three stratum of costal green belt before Tsunami, First stratum was in costal grass beds, second was in Pandanus grows, and third stratum was highest, mainly coconut and other high trees.
These natural sand barriers destroyed by humans several decades in many of the areas.
Many acres of mangroves partly damage by tsunami.

Pandanus stand along shoreline hit down.

Kappuhenwela

Division	District	Informants
Tangalle	Hambantota	Local population

Background

Kapuhenwala village situated southern direction of, not far away from Tangalle town ship. Village lying with lagoon associated with sand dune, many hotels were built close to sand dune and many of them were crack down .Village also affected. The wave gone over 500 m in side of the village.

Observation

Mangroves of the lagoon were heavily affected (cracked, uprooted, by the wave). Huge amount of derbies, such as polyethylene and other artificial and biological derbies washed out and deposited on many acres of mangroves.
Lagoon mouth was blocked by sand brought by Tsunami wave. New lagoon mouth was opened in opposite water flowing direction of the lagoon. Change the pattern of flowing water.
A sand dune of the shore was washed out and shorter.
Kapuhenwala toTangalle in along side of the main road, many tons of rubbles dumped in marshland.

Kapuhenwela. Mangrove stand along the fringes of the lagoon destroyed

Coastal protection barrier. The three typical strata in the south;i) Sedges and herbs, ii)Pandanus,iii) Coconut

Tangalle

Division	District	Informant
Tangalle	Hambanthota	Citizen

Background

Tangalle is one of the most southern townships of Sri Lanka. Hit hard by the tsunami. The fisheries harbor of Tangalle was highly affected, Hundreds of people died in town it self. The mechanical damage of Tsunami wave was very high in this area.

Observations

Many types of rubble scattered in shore still in harmful manner, the Wave damage to harbor, wave height was about 12 to 20 feet high. Some multi day fishing boats still in land or hills of the Navy camp in Tangalle .

The coral reef of Tangalle was highly affected; tons of live and dead pieces of corals can be seen on the beach.

Shore reach to land and some places of beach disappeared. Costal sea is getting deeper.

Tangalle. Corals, dead and alive, turned into rubble on the beach.

Kudawella

Division	District	Informants
Wellebadapathuwa East	Mathara	Villagers

Background

Kudawella is situated in inner part of a small bay. This village has a very good local and foreign tourist attractive place of blowhole, called Hummanaya. It is a totally fisheries

village. One part of the village border covered by hill barriers saving many human settlements from the wave.

Observation
Total beach area covered by human settlements before the wave. So many housing rubbles can be seen of the area.

Devinuwara

Division	District	Informants
Wellabadapattuwa (west)	Mathara	Villagers

Background
Much type of costal eco systems spread out, in this area such as Lagoons coral reefs sand dunes salt marshes etc. Human settlements in beach side has damage

Observations
Gin pol is a special lagoon ecosystem plant. It spread out as huge colonies. These colonies are now severely damaged.

The pandanas hedges spread out in coast line, from Tangalle to Mathara it denseness not in continuously, also many places of this area, still remaining of coral reefs and rock chains along side of the sea.
And some places not affected by wave that coast line from Tangalle to Mathara.

I. Long and wide coral reefs are remaining.
II. Natural stone barriers cover the costal sea.
III. Dikkwella to Mathara land starting from beach as hilly formation.
IV. Thick hedges of pandanas can be seen in coast line.
V. In few places notify that artificial stone barriers help to control of soil erosion and minimizing affect of the wave.

the Beaches were very narrow and sand washed away due to power of Tsunami wave. Hambupan varieties was withered in some places of marshland of the area. It also can be seen in Thalle area.

The team observed that not much of bird life in Lagoons, but reasonable amount birds monitored in paddy fields and marshlands. However this is the late part of the Migration season and it is most birding time of the southern lagoons.

Tsunami garbage, such as rubbles and other construction material is a biggest problem in affected areas. But mechanical damage was very high in human settlements and townships. Recycling of rubbles and other Tsunami garbage was done in very small scale. However, there were many possibilities to re use of many reusable things within rubbles. Dumping of waste done by non-systematic and unsustainable manner. That was a biggest problem of post Tsunami activities.

Mathara Township and its suburbs

Division	District	Informants
Matara	Matara	GMSL staff and volunteers, Villagers

The population density of Mathara Township was very high, including its suburbs and Commercial centers. The hart of the Mathara town ship highly affected by Tsunami.

Observations

After one-month time period of Asian Tsunami day, Mathara town ship has still garbage and rubbles scattered many parts of the township.

Many tons of rubbles and garbage dumping along side of the coastal line as walls.

Many places of Polhena beach excavated big holes, filled with rubbles and covered by excavated sands.

Recycling of damage the resources very less. However, many pieces of iron rods, aluminum sheets, and other iron-associated parts already collected by local collectors.

Polhena, Matara.Rubble and waste dumped along the beach and coral reefs.

Polhena, Matara. Digging on beach, preparing for unsustainable garbage dumping.

Underwater exploration of coral reefs in Polhena beach in Mathara

A part of long reef of Polhena explored by the GMSL team. Mud or silt deposited on coral reef and many of them were dead by warm water affection in 1998. Fish populations were very little inside of the reef. Still some corals alive, but many pieces of broken corals scattered on beach and in side of the land. However, it would not seem to be a major damage to coral reef by Tsunami. Sand had done the little damage to reef. Beach is getting narrow in some places due to sand migration.

Kaburugamuwa

Division	**District**	**Informant**
Matara	Matara	Villagers

Background

Kaburugamuwa was situated in Mathara - Galle high way. Wave affected heavily on human settlement

The Wave gone over 400m or more inside of the land area.

Sand carpet was over the top soil, it covered inland vegetation in some places.

Regeneration of grasses observed. Many pandanus hedges were damage.

Nevertheless, regeneration started in sand grasslands, sand grasses, (Ipomea sp.) etc .Rubbles, garbage are the major problem of the area.

Thalaramba

Division	District	Informants
Weligama	Matara	Villagers and victims

Background

Thalaramba is situated on Galle, Mathara high way. Many hoteliers invested for hotel industry in this area. Tsunami wave affected the land heavily eroded due to the wave's destructive speed. Many tons of sand deposited on top soil.

Unspoiled sea grass bed

Mirrissa

Division	District	Informants
Weligama	Mathara	Villagers , GMSLVolunteers

Background

Mirrissa beach is a famous tourist destination, with fringing coral reefs.

Observation

Sand of the beach is narrow after Tsunami wave but coral reefs remaining. Thanks to natural rock barriers effects of wave was minimal. Effects of destruction of the wave were minimal due to remains of natural wave protectors.

Weligama

Division	District	Informants
Weligama	Mathara	Vilagers, Fishermen

Background

Weligama situated in northern direction of Mathara, in bay of Weligama. The Human settlements of the area were highly affected.

Observations

This flat area was affected heavily. Many trees withered, Jack (*Artocarpus heterophyllus*), Bread fruit(*Artocarapus alitilis*), Banana (*Musa sp*), Lime (*Citrus aurantifolia*), Mango,(*Mangifera indica*), Pomegranate, Areca nut(*Areca catechu*), Margosa(*Azadirachta indica*), and other home garden plants.

Kapparathota Reef, **In Weligama**

Underwater exploration

Reef situated from northward of hill to towards center of Weligama bay
There are many died corals observed in many parts of the reef
Mud silt, garbage can be seen the reef. Many live corals spread in western part of the reef.
Ornamental fish population was very low in the reef.
Coconut trees are still remaining very healthy shape.

Koggala and Kathaluwa

Dvision	District	Informants
Habaraduwe	Mathara	Villagers

Background

Big lagoons laid in between Kathaluwa and Koggala area and 11 islands in lagoon, environment makes many type of wealth's of nature.

Observation

At the bridge of Kathaluwa deep of the water was about 8 feet but now it filled with white sand is about 2 to 3 feet, deep of the bay it change to 15 to 6 feet. Many hundred of thousands of tons of sands silted in lagoon. Lagoon water is salted than before Tsunami, it change the lagoon environment and the life composition. A type of shell reached to lagoon with seawater, and the settled down and its wide spreading the lagoon, it prefers salt waste, it indicated that salt present was increased in lagoon water before tsunami wave. Wide spreading of shell is threatening to lagoon fishery, many lagoon fisher men.

practicing the traditional fishing systems that they are going in to water, in that practices many people injured by shells (cut).
Polyethylene, ruble, heavy logs, and other biological debris observed in lagoon areas, now many biological materials rotting and it will affect micro environment, of lagoon water in short and long term. The disaster is said to have nefgative impact on the lagoon fisheries. Mangroves are already regenerating. The fisherman's noticed that increase of jelly fishes of the lagoon water. The sand dunes of beach were washed out in mouth of lagoon.

Habaraduwa

Division	**District**	**Informants**
Habaraduwa	Galle	Vilagers

Observations
Many pandanas trees or hedges thickly spread out in coastal areas that observed destruction was minimal. In other places, mechanical damage was very high.

Unawatuna

Division	**District**	**Informants**
Galle	Galle	Vilagers

Observations
It was tourist destination. Mechanical damage was very high. Beach of the Area was narrow due to sand migration.

Kogalla Lagoon. Siltation under the Kattalue railway bridge.

Roomassala

Division	District	Informants
Galle	Galle	Vilagers

Background

Roomassala situated in southern tip of Galle harbor bay. Roomassala hill associated with coast as a big stony barrier on the shore. Many places of the area, beaches are not visible, hills directly descending to sea. It is historically valuable biological hot spot, diversified ecosystems adding the values to Sri Lankan coast. Roomasala is one of the most diversified coral reef in the world.

Coast or beach of Roomassala was not much affected from Tsunami wave.
But observed many pieces of live or dead corals were scattered on the beach area. Roomassala reef is partly damage, but western part of the reef was still alive, but some amount of ornamental fishes decreased its population. Many artificial derbies, little amount of mud and sand were over reef.

Galle

Division	District	Informant
Galle	Galle	GMSLVolunteers, Fishermen

Observation.

Galle city and its suburbs were hit by Tsunami very badly, and garbage is a massive problem. Many thousand of tons of rubles dumping in open areas and Mangroves lands in Dadalle is a very high environmental problem of the area.

Hikkaduwa

Division	District	Informants
Hikkaduwa	Galle	Vilagers

Observations

Hikkaduwa, a southern town was not heavily damaged, but some places around this area were very severally damaged; Akurala, Seenigama, Thelwaththa, etc, Specially Akkurala, Thelwaththa coastal area was extensively mined for corals in many decades. So some places of the area very severally hit by tsunami, wave has gone 2 to 3 km in side of the land. It made massive disaster for the area and the wave up-rooted the big coconut trees of the area, huge amount of soil erosion. It affected many type of trees in home gardens such as Kos (Jakfruit; *Artocarpus hetrophyllus*), Del (Bread fruit; *Artocarpus altilis*), Mango (*Mangofera indica*), Areca nut (*Areca catcheu*), Neem (*Azadirachta indica*), Cinnamon (*Cinnamomum verum*), Vegetables, Betel, Pepper (*Piperaces*), other crops. Salinisation of inland water bodies that impacted Fresh water fishes,Amphibians,water plants and other bio diversity recourses. This is one of the most destructive places of Asian Tsunami wave struck Sri Lanka.

Qualitative classification of impacts (Impact classified as low, medium, high or extreme)

District	Division	Ecosystems/ Features	Impact on local ecosystems
Ampara	Lahugala	Mangroves, Lagoons, Thorn Forest, Sand Dunes	Medium
	Pottuvil	Lagoons, Thorn Forest	High
	Tirukkovil	Lagoons, Sand Dunes, Marshlands	High
	Akkaraipattu	Lagoons, Marshlands	High
	Addalachenai	Lagoons, Pockets of Mangroves	Low
	Kalmunei	Marshland, Lagoons	High
Batticaloa	Porativu	Marshlands Lagoon	High
	Batticaloa	Mangroves, Sand Dunes, Marshlands, Lagoons	Medium - High
	Korale Pattu North	Coral reevs, Lagoon, Evergreen Dry Forest	High
Trincomalee	Trincomalee	Coral reevs	Medium
	Kuchchaveli	Corals, Lagoons, Mangroves	Medium
Mullaitivu	Mullaitivu	Dry Evergreen Forst, Lagoons, Marshland	High
Jaffna	Point Pedro	Sand Dunes	Low
Hambantota	Ambalantota	Lagoons, Mangroves, Coral reves	Medium
	Tangalle	Lagoons, Mangroves, Coral reves, Sand Dunes	High
Matara	Wellabadapathuwa East	Lagoons, Marshland, Corals	Low
	Wellabadapathuwa West	Corals, Marshland, Lagoons	Low
	Matara	Corals	Low
	Weligama Korale West	Corals	Low
Galle	Habaraduwa	Sand Dunes, lagoons	Medium
	Galle	Corals, Coastal Forest	Low
	Hikkaduwa	Marshland, Lagoons	Medium

CONCLUDING REMARKS

Overall Concerns

Direct effects

2. A gigantic waste problem. Garbage and rubble from towns and villages is spread along the coast in enormous volumes. Renewable and non renewable materials are mixed and the task of sorting is discouraging, yet necessary.
3. Frontline of coastal vegetation damaged with large local variations.
4. Mechanical damage to coastal forest ecosystems. Mangroves and coastal forest uprooted, broken and withering. Notable difference in resilience between species; e.g the coconut palms withstand the high salt levels while the palmayra palms are withering in large numbers.
5. Extensive erosion of beaches and other shoreline topography.
6. Mechanical damage, tilting and smothering of some coral reefs. The extent is yet to be explored.
7. Stalinization of soil and ecosystems causing death of crops and natural vegetation.

Indirect effects

1. The demand for building materials to rebuild houses, boats and infrastructure is likely to put a hard pressure on the **coastal forest and the mangroves**. This pressure would further aggravate the damage caused to the coastal ecosystems.
2. Similarly the demand for materials for rebuilding will put a pressure on the **sand resources**. Sand dunes are already severely depleted along the Sri Lankan coast because of extensive use of sand in construction.
3. Demand for **fuel wood** puts a similar pressure on the coastal wood.
4. The loss of other livelihood such as fishing, agriculture and business enterprises along the coast might shift people into **unsustainable money generating activities** such as **coral- and shell mining**.
5. It has already been reported that **sea turtles are slaughtered** for sale as a consequence of the low marked demand for fish in the aftermath of the tsunami.
6. In the process of resettling, the affected people according to the resettlement plan with an incorporated buffer zone and restricted areas there will be encroachment of virgin land. It is already seen in many places that **forest is slashed down** to give place for r**esettlement** without taking due environmental considerations.

The conclusion of all these points of concern is that the natural barriers to disasters such as tsunamis and cyclones coming in from the ocean stands the risk of becoming even further weakened by human activities in the following months.

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