

Assessments

Assessment -Overview

In response to the tragic events of the December 26 th Tsunami, Both ENDS, Wereld Natuur Fonds (WWF-The Netherlands), Wetlands International and IUCN Netherlands Committee, developed a joint project funded by Novib through the SHO (public charity funds) for the recovery of coastal ecosystems. Additionally, this project also supports local livelihoods (Green Coast)

The goals of the Green Coast project are to restore the biodiversity and services provided by coastal ecosystem and enhance the livelihoods of local communities in tsunami-affected regions.

The WWF and IUCN team conducted survey to assess the affected areas in Had Tai Maung and Koh Pra Thong in Phang Nga province. The purpose of the assessment is to provide guidance on the identification of high priority areas for rehabilitation and restoration through small grant interventions.

The analysis was a synthesis of data collected prior to the tsunami, a review of assessment data collected by organizations after the tsunami, and a gap analysis of information needed for the identification of grants. These reports summarize the available information on ecosystems damaged in , with a focus on Had Tai Muang and Koh Phra Thong

Assessed issues;

The assessments covered several issues in the coastal area:

- Coral reef
- Seagrass
- Mangrove forest
- Sea Turtle
- Costal communities

Environmental Damage Assessment: Above the Waterline

Beach Ecosystems Unlike coral reefs, no extensive surveys have been carried out on beach environments with the exception of sea grass beds.

The wave appears to have caused serious erosion damage to many beaches along the Andaman coastline, including important turtle nesting sites which lost 30-70cm of their sand layer - greatly reducing the total sand area that remains useable for turtle egg-laying above the high tide mark.

Beach damage has been further exacerbated by destructive post-tsunami related building works - for example, the construction of a concrete sea-wall at the high tide mark on a beach adjoining the Had Tay Muang National Park - one of the few remaining turtle nesting spots on the Andaman coast and the one place in all Thailand where 4 different species of marine turtle nest side by side!

Sea Grass Beds Sea grass beds are an important nursery ground for marine life, notably dugongs and green turtles, and escaped from the Tsunami relatively unscathed.

A DMCR survey of approximately 70% of sea grass beds along the Andaman coast (80 sq.km in total) revealed that only 5% of the beds were damaged by the tsunami and only 1.5% suffered total habitat loss.

Importantly, the presence of sea grass beds in the inter-tidal zones prevented the erosion of beaches during the tsunami; this is clearly evident in such places as Kuraburi in Phang-nga Province.

Mangroves Mangroves are another important nursery ground for marine life and also an important source of livelihood for many local people.

There is evidence that healthy mangroves and coral reefs often reduced the impact of the wave on the coastline (UNEP Report: After the Tsunami: Rapid Environmental Assessment).

Only 300 hectares (or less than 0.2%) of the mangrove forests were damaged by the tsunami, almost all in Phang-nga Province, and these areas have been replanted.

While intact mangrove forests clearly withstood the tsunami, they have faced a harder time withstanding the onslaught of road construction, coastal settlement, tourism development and the rapid expansion of coastal aquaculture. **Beach Forests** Beach forests were significantly more affected than mangroves and continue to be an area of concern. Many areas of beach forest were lost due to the impact of the wave itself.

Salination resulting from seawater intrusion has subsequently become a primary cause of a further dying off of beach forest. This dying off is particularly apparent in Phra Thong and other coastal areas of Phang-nga Province.

The loss of beach forest in turn has a negative effect on other ecosystems as beach forest acts as a stabilising presence preventing further beach erosion and the consequent sedimentation of mangroves and sea grass beds.

Although almost all impacted beach forests have now been replanted, they may take many decades to recover due to the low fertility and high salt-content of the soil. Of the newly planted trees only a small percentage will survive. Often, as is the case at Laem Pakarang, these replanted forests have not been properly maintained since the publicity of the initial planting has faded. Saltwater Intrusion Freshwater systems including swamp and marsh ecosystems, a haven for small fish and bird species, are usually located behind a protective band of sand dune and beach forest. The sudden influx of saltwater into these sensitive ecosystems had an immediate negative impact on their biodiversity. Even though most of these freshwater systems have subsequently been cleaned and restored, salt left behind will continue to have an adverse effect in delaying their recovery for an indefinite period. In some cases, wells have had to be re-drilled to provide fresh water supply for local consumption. Infrastructure Damage to the infrastructure of the 13 marine national parks as well as the numerous research stations and hatcheries in this region added up to over US\$5 million.

The turtle breeding and conservation center at Tap Lamu Naval Base in Phang-nga was totally destroyed. At this one location the wave swept away over 2000 turtle eggs and hatchlings.

The turtle hatchery at Had Tay Muang National Park, the only location in Thailand where four species of marine turtle nest side by side, was also seriously damaged.

The Naucrates Turtle Conservation project on Phra Thong Island, and the Wild Animal Reserve project in Ranong were both also badly damaged.

Environmental Damage Assessment: Below the Waterline

Marine Life:

Fish and other life appear generally unscathed, apart from benthic (bottom dwelling) organisms that have disappeared, along with fine sand exposing rubble. However, the wave did affect at least some of the larger marine animals:

At least 37 marine turtles were found stranded ashore. Of these 6 perished but 26 were rescued and have been subsequently released. Another 5 were so badly injured they had to be transferred to the Phuket Marine Biological Center for long term care.

A number of turtle projects were impacted including the Royal Thai Navy Base at Thap Lamu (completely destroyed with the loss of 2000 turtles); the turtle hatchery Had Tay Muang National Park (partially destroyed); the Naucrates Project on Phra Thong (with the lives lost of three Marine Park Rangers); and the Wild Animal Rescue (WAR) Turtle Project in Ranong.

Three dolphins were discovered washed ashore, including a 120 kg female humpback dolphin (*Sousa chinensis*) that was successfully released back into the wild. Two other dolphins, a bottlenose (*Tursiops aduncus*) from Phang Nga and an unidentified small-sized toothed dolphin from Phuket, both perished.

At Thap Lamu in Phang Nga, a large male dugong sea cow weighing 310kg and measuring 2.75 meters in length was found over 1km inland, a clear indication of the force of the wave. The sea cow appeared to have sustained only minor injuries and was released back into the wild; unfortunately it too perished and washed ashore close to where it was released less than 3 weeks later .

Coral Reefs

A Haven for Marine Life

Although the Andaman Sea region contains only one third of Thailand's coastline it accounts for over half of its coral reefs. In terms of coral species alone it is richer than the Great Barrier Reef. These reefs are in turn home to a huge array of coral and reef fish species, which contribute significantly to the Thai economy through tourism activities, including such world famous diving sites as Richelieu Rock, renowned for its whale sharks. Two major surveys of coral damage were undertaken immediately following the tsunami. The first is an informal set of surveys conducted by members of the Dive Operators Club of Thailand (DOCT); the second is a set of formal surveys coordinated by the Department of Marine and Coastal Resources (DMCR). The two surveys defined damage categories using different percentage levels but the end results of the two surveys corresponded very closely. According to the DOCT surveys, 27% of coral sites showed moderate to heavy damage. The DMCR survey reported medium to heavy damage to 22% of the coral sites.

Overall Findings:

Overall reef damage was considerably less than might have been expected given the extent of coastal damage.

Strong wave current caused immediate physical damage to the corals including fragmentation and overturning.

Sedimentation and the loosening of marine debris caused further destruction including the relocation of a coral head at Similan where steep reef slopes in particular resulted in the underwater avalanche of the sandy substrate.

As on land, significant damage is extremely localised with exposed shallow fringing reef suffering the most.

Corals with delicate structures (such as gorgonian fans) were most susceptible to damage.

Damage otherwise followed no discernible pattern, often being counter-intuitive (e.g. even though the wave struck the Similan Islands from the south-west, most coral damage occurred on the north of the islands).

Similan Island 9, Surin Island and Phi Phi Island suffered the most serious damage.

Damage to coral reefs south of Krabi towards Satun was fairly low.

Coral Recovery Fortunately, the recovery capacity of coral reef is fairly high under ideal environmental conditions. Fragmented or upturned coral in particular stand a good chance of survival once returned to their former positions. Some of the effects of the tsunami have therefore been countered through diver-assisted rehabilitation, including the upturning of fallen corals and the removal of marine debris. Monitoring programs, such as the "Reef Check Program" under the technical supervision of the DMCR, are being widely undertaken by many dive operators. Before the tsunami, Andaman Sea coral reefs had already suffered some degree of degradation from over-fishing, dynamite fishing, coastal erosion, pollution and coral bleaching. Compared to this ongoing destruction, the impact of the tsunami is starting to appear almost negligible.