PROJECT HIGHLIGHTS

Protecting Indian Coastal Inhabitants from Natural Hazards
Resilient Recovery from the 2004 Tsunami through Shelterbelt and Mangrove Regeneration

Overview

In the aftermath of the devastating tsunami of 2004, villages along the coast protected by shelterbelts and mangroves sustained minimal damage to life and property. In contrast, neighboring villages with no mangrove or shelterbelt buffer suffered heavy losses to life and property.

The tsunami of December 26, 2004 was the result of a 9.3 Mw earthquake off the coast of Sumatra. In addition to severe damage to coastal areas, over 230,000 people in fourteen countries in South and Southeast Asia were killed. The tsunami waves were 10 meters in height (almost the height of a three-story building) and penetrated 2 km to 7 km inland. In India, the tsunami caused extensive damage along 2,260 km of coastline (half the width of the United States) of the states of Tamil Nadu, Andhra Pradesh, Kerala, Union Territory of Pondicherry, the Andaman Islands and the Nicobar Islands. In response, the Tamil Nadu Government launched the Emergency Tsunami Reconstruction Project (ETRP) with assistance from the World Bank. Additional assistance was provided through GFDRR's Implementation Support for High Priority Disaster Risk Mitigation Program in India. The ETRP objectives were to revive livelihoods and promote recovery in the short-term, reducing the vulnerability of coastal communities and creating a more resilient environment for the long term.

Challenges

The coast of Tamil Nadu, one of the most densely populated regions of the world, is facing major issues of sea level variation, shoreline erosion, salt water intrusion and the degradation of mangroves and shelterbelts. Additionally, there is increasing pressure towards commercial development of the coast. All of these factors lead to increased vulnerability of the coast to natural hazards.

Despite efforts by the Forest Department, the shelterbelts and mangroves were perceived as competing with agriculture, grazing lands, aquaculture and other activities. Additionally, the Korayar River is no longer perennial due to the building of dams and barrages upstream. This, in turn, has lead to high salinity and unfavorable pH values, which inhibit the regeneration of mangroves. Finally, the location of mangroves coincides with high human densities, resulting in their decline and destruction.

Approach

Shelterbelts and mangroves are productive coastal ecosystems that survive in harsh environments. They buffer the land from the sea by checking erosion and containing the impact of high velocity winds, cyclonic storms, storm surges and tsunami waves. Thus, the regeneration of shelterbelts and mangroves were included as significant components in the ETRP. The main objective was to create a bio-shield along the coast that would: (i) act as a first line of defense against natural hazards providing long-term benefits to agriculture and the water supply; (ii) strengthen coastal livelihoods such as fishing; (iii) contribute to the conservation of estuarine ecosystems and the re-establishment of vegetation destroyed by the 2004 tsunami.

Selected based on precise technical data, and with the consent and participation of the owners, private lands in all thirteen coastal districts of Tamil Nadu were undertaken for shelterbelt planting.

Highlights

Protection of lives and livelihoods and reducing vulnerability to natural hazards by raising and regenerating shelterbelt and mangroves along approximately 400 km of the Tamil Nadu coast in South India.

Generated 13,000 days of direct employment for local communities and homestead planting involving 15,000 families in the vicinity of the plantations.

Provided long term benefits to agriculture and enhanced livelihood opportunities by stabilizing coastal sand dunes, conserving moisture, increasing ground water levels, improving fishing and planting trees that contribute to the local economy.

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Forest Department lands in Muthupet in the Tiruvarur district were also chosen for mangrove regeneration. Specific plant species chosen included: the Casuarina equisetifolia, which forms 90% of the shelterbelt and is favored by the local population as it provides timber and firewood that can be sold; and local species such as Cashew, Acacia planiferons, Ficus, Odina wodier and Azadirachta idica, chosen based on their ability to withstand harsh conditions near the sea.

The shelterbelt project was built upon traditional knowledge and environmental information shared with stakeholders. Through this process, stakeholders were informed of the many benefits of shelterbelts. Entry point activities including construction of roads, bus shelters, community sheds, as well the improvement of village ponds, contributed to: (i) long term livelihood opportunities; and (ii) enhanced involvement of local communities. The project also addressed the competing demands between agriculture, aquaculture and grazing. Village forest committees allowed for greater participation in the planning and implementation of the project. Additionally, the project generated 13,000 days of direct employment for local communities and the involvement of 15, 000 families in homestead planting in the vicinity of the plantations.

Similarly, ideal sites were identified for mangrove regeneration. A network of channels was formed in pre-monsoon months to flush the site with rain and floodwater, leaching the soil of its salinity. Appropriate species selection, de-silting of channels, casualty replacement and after care, all contributed to successful mangrove regeneration.

Results

During the implementation phase, the project raised 4,778 hectares of shelterbelts along 341.6 km of the Tamil Nadu coastline. To ensure the continuity of coastline protection, an additional 900 hectares of shelterbelts on private lands were raised. The regeneration of shelterbelts and mangroves resulted in a number of social benefits: the project supplied the local population with free fuel wood through the planting of the Casuarina tree; it also encouraged the creation of formal community organizations. The project sought to build a cohesive and resilient community of practice by including the poorest and the most disadvantaged, while also taking into consideration issues of gender equity and empowerment.

Mangroves over an area of 2,162 hectares in the estuarine areas of the Korayar River of the Cauvery Delta in Muthupet were regenerated using ten different mangrove species, contributing to vital ecological functions such as nutrient recycling, maintenance of hydrological regime, coastal protection and fish-fauna production. Overall, the project successfully fulfilled its several objectives. First, it promoted recovery in the tsunami-affected areas. It also reduced the vulnerability of coastal communities and promoted safer living standards across the region. Finally, it provided long term agricultural benefits and enhanced livelihood opportunities by stabilizing coastal sand dunes, conserving moisture, increasing ground water levels, improving fishing and contributing to the planting of trees.

Partnership

GFDRR and the World Bank supported the project's implementation by the Tamil Nadu Forest Department between 2005 and 2009, which continues to maintain the plantations. Village Forest Committees were established and Joint Forest Management practices were utilized, allowing for greater participation of the communities in the planning and implementation of the project, and, more generally, in the improvement of livelihoods of the coastal poor with little to no detrimental impact on natural coastal habitats.

Way Forward

Coastal shelterbelt and mangrove regeneration have successfully fulfilled the larger project objectives of reviving livelihoods, promoting recovery in tsunami affected areas and helping reduce the vulnerability of coastal communities to natural hazards.

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"Shelterbelt plantations have been able to control sand drifts that would otherwise cover parts of the East Coast Road and fill up agricultural lands. In addition, these lands have been protected from land grab and encroachment."

Ravi L. S.
Divisional Forest Officer
Social Forestry Division
Changalpattu

Lessons Learned

The shelterbelt plantations were initially taken up to the High Tide Line (HTL). However once it was realized that Olive Ridley Sea Turtles nest in the zone beyond the HTL, the Government sanctioned the removal of Casuarina equisetifolia, which forms 90% of the shelterbelt, up to a distance sufficiently away from the HTL to ensure free movement of the turtles and their nesting. The Society for Social Forestry, Research and Development was engaged to monitor movement and nesting and share recommendations with the Forest Department towards better management of these sites.

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