

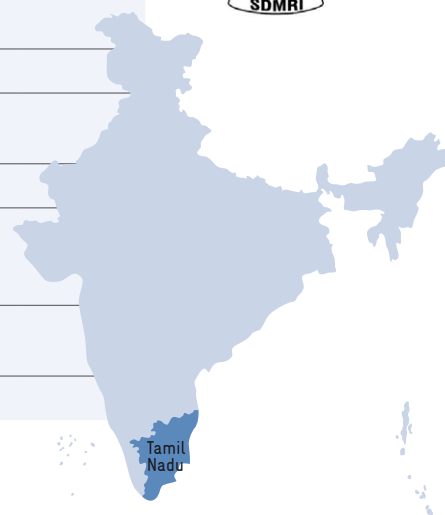


Corals growing on artificial substrate in the Gulf of Mannar Biosphere Reserve.

This demonstration project was realised under the Indo-German development project Climate Change Adaptation in Rural Areas of India (CCA RAI) which is jointly implemented by the Ministry of Environment, Forests and Climate Change (MoEF&CC), Government of India and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. CCA RAI is financed by the German Federal Ministry for Economic Cooperation and Development. For further information see: www.ccarai.org

Rehabilitation of coastal habitats

Project location	Villapathy village on the coast of Tuticorin district and the fringes of Vann Island in the Gulf of Mannar Biosphere Reserve, Tamil Nadu
Project duration	December 2012 – June 2014
Local implementation partner	Suganthi Devadason Marine Research Institute (SDMRI)
Project costs	3,443,000 Indian Rupees equalling 42,506 Euro
Geographic features	Coastal habitats with coral reefs, sea grass beds and mangroves
Climatic stresses	Increase in sea surface temperature and sea level rise
Non-climatic stresses	Coral mining, unsustainable fishing practices, industrial pollution affecting biodiversity, villagers' incomes depending mainly on fishing
Predominant livelihood sources	Marine fishing and salt pan industry
Project beneficiaries	300 families (520 individuals)



Project context and need for adaptation

The Gulf of Mannar is located on the south eastern tip of Tamil Nadu and is home to one of the main coral reef ecosystems in India. The reefs and sea grass beds in the gulf belong to the most diverse and valuable ecosystems on earth. Coral reefs, for example, support more species per unit area – including several thousands of fish species – than any other marine ecosystem. It is therefore no wonder that these rich coastal habitats and above all fishing provide the mainstay of the income for many coastal communities living in the coastal plains of the Gulf of Mannar. These habitats also act as shield from the strong waves for the adjacent shores, thereby preventing erosion, property damage and loss of life.

The ecosystems in the Gulf of Mannar have historically been under pressure due to human activities such as coral mining, destructive fishing practices like the use of trawls, dumping of untreated industrial waste in the sea and unsustainable coastal development. Climatic stress like the increase in sea surface temperature poses additional threat to the region, endangering the livelihood of the communities living on the nearby coast. Two islands in this region are already severely affected by sea level rise.

The project responded to the situation by rehabilitating the degraded coral reefs and sea grass beds at the fringes of Vann Island which are the breeding ground of numerous fish species. The use of native, temperature-resilient coral and sea grass species for rehabilitation helped to restore the ecosystem services and strengthen the overall resilience of the ecosystem. It also contributed to sustaining the livelihoods of communities dependent on fishery. Awareness raising among the village communities on the benefits of conserving coastal habitats was another important project activity.

Adaptation hypothesis

The rehabilitation of coral reefs and sea grass beds along with training of communities on the sustainable use of resources safeguards the coral ecosystem and increases its resilience to climatic stress. It allows fish species to develop and builds up the adaptive capacities of the communities.



Anthony Raj has been fishing for 35 years in the Gulf of Mannar.

Anthony Raj, 55 years
Vellapatti village, Tamil Nadu

"I have been doing small-scale fishing for 35 years. Today, I know how important the coral reef near our coast is for our society. I have gained this knowledge through various workshops and meetings arranged by SDMRI.

In the last few years, we started experiencing many new developments that negatively affected our fishing business and our livelihoods. Coral mining and unsustainable fishing methods undertaken by the people are some of them. Plus, sea temperature has risen, rainfall is less and even wind patterns have changed in recent years.

All these developments and changes have put pressure on the environment and on our community. The Vann Island which is close to our village is eroding fast and we fear that it could submerge soon, meaning that our coast would be open without any natural protection. Apart from the effects on us, the island erosion has also negative impact on corals and other fishery resources.



Learning about the importance of coral reefs: fishermen from Vellapathy village

Photo: SDMRI

Adaptation interventions

- Realisation of **biophysical and socio-economic assessments** to identify vulnerable villages as well as execution of **underwater surveys** to identify degraded reef and sea grass areas as project sites
- Realisation of **awareness campaigns** on climate variability and the need to conserve the coastal ecosystems in the area
- **Technical training** of the communities on eco-friendly fishing practices, coral rehabilitation techniques and underwater reef monitoring
- **Technical training** on how to add value to fishery resources in order to improve their market potential, e.g. on development of fish products like pickles or wafers by using underutilised fish resources and on methods to dry fish hygienically
- Construction of **artificial substrates** for coral and sea grass rehabilitation and deployment in identified degraded sites
- **Rehabilitation of corals** by transplanting native and resilient species such as *Acropora* (*A. nobilis* and *A. intermedia*) and *Montipora* (*M. hispida* and *M. foliosa*)
- **Rehabilitation of sea grass beds** by planting species such as turtle grass (*Thalassia hemprichii*)

Benefits and added value for adaptation

- **Awareness campaigns** helped in reducing the fishing activities near Vann Island during the time in which rehabilitated corals and sea grass species developed
- **Technical training** of the communities on eco-friendly fishing and rehabilitation techniques helped to increase the adaptive capacities of communities
- **Technical training** on supplementary livelihood activities like the development of value added products has resulted in an income increase by 15 per cent. Trainings on eco-friendly fishing practices and coral rehabilitation that were carried out earlier in nearby villages lead to changes in fishing and conservation practices, consequently fishermen could increase their catch up to 30 per cent. A similar impact is expected for the fishing community of Vellapathy village
- **Rehabilitation of corals and sea grass beds:** Within a degraded area of 200 hectares, corals and sea grass beds have been rehabilitated in certain pockets. This helped to reduce the depletion and migration of fish species

Cost estimates* for main interventions (in INR / EUR)

*81 INR = 1 EUR

Awareness campaigns and technical trainings (for 520 participants)	100,000 INR / 1,235 EUR
Construction of artificial substrates for coral rehabilitation (per square kilometre)	380,000 INR / 4,691 EUR
Construction of artificial substrates for sea grass rehabilitation (per square kilometre)	90,000 INR / 1,111 EUR
Deployment of substrates – labour and transport (per square kilometre)	242,488 INR / 2,994 EUR
Underwater transplantation of corals and sea grass species (per square kilometre)	226,400 INR / 2,795 EUR



Underwater deployment of artificial substrates with sea grass species.

Success factors

- With SDMRI the project had a strong **implementing organisation** with more than two decades of expertise in marine research and intervention. As one consequence, access to valuable long-term climate data from the project region was given
- The existing **climate data** and the **outcomes of the assessments** delivered a solid base for designing the right interventions and carrying them out with ease
- **Technical training and community involvement**, e.g. in monitoring the growth of corals and sea grass beds, ensured ownership, acceptance and the continuation of good practises

Recommendations for project replication in the Indian context

The Gulf of Mannar is one of the four important coral reef areas in India. Coral reefs are very sensitive to sea surface temperature. The interventions depicted could be extended to other areas in the Gulf of Mannar region. They could also be applied in regions like the Gulf of Kachchh in Gujarat or in the areas around Andaman and Nicobar Islands or Lakshadweep Islands. However, for a large-scale and successful replication of the project in other regions, building technical capacities of the stakeholders involved is a key precondition.

Further information

Department of Environment
Government of Tamil Nadu
www.environment.tn.nic.in

Suganthi Devadason Marine Research Institute (SDMRI)
www.sdmri.in

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
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