



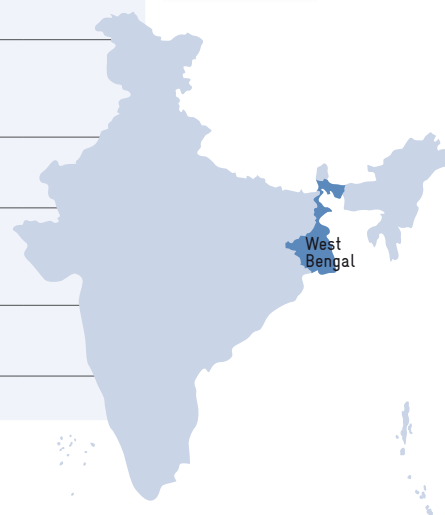
Typical rural house on Mousuni Island with fish pond and agricultural fields for paddy cultivation

Results CCA RAI demonstration project no. 6

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](http://www.ccarai.org)

## Introducing salt-tolerant species and preparing for disasters

Project location	2 villages on Mousuni Island, Sundarbans, West Bengal
Project duration	July 2012 – June 2014
Local implementation partners	West Bengal University of Animal and Fishery Sciences (WBUAFS) and World Wide Fund for Nature (WWF) India
Project costs	3,907,000 Indian Rupees equalling 48,235 Euro
Geographic features	Island encircled by rivers to the west, north-west and east and by the Bay of Bengal to the south, accelerated coastline erosion, submergence of land, salinisation
Climatic stresses	Increase in temperature and extreme weather events, sea level rise
Non-climatic stresses	Large population, economy dependent on primary production only, lack of energy, transport and healthcare services
Predominant livelihood sources	Agriculture (primarily paddy cultivation with high yielding varieties), aquaculture and coastal fishing
Project beneficiaries	165 families (884 individuals)



Ministry of Environment, Forests and Climate Change, Government of India

## Project context and need for adaptation

The mainstay of the economy in the Indian Sundarbans is agriculture, supplemented by fishing and fishery-related activities. Agriculture is dominated by paddy cultivation which is made possible by raising embankments along the periphery of the inhabited islands to check saltwater inflow. The project region of Mousuni Island faces acute problems in the form of accelerated coastline erosion due to extreme weather events such as storms and floods, which have led to the breach of embankments. With breaches in the embankment, saline water flows into farmland areas and damages crops. What has made the situation worse is that many farmers went for high yielding varieties that are not only more expensive, but unfortunately also more sensitive to brackish water. When land is entirely flooded or when flooding makes it uncultivable, small-scale farmers either turn to fishing or migrate and work as unskilled labourers, thereby accepting a lower quality of life.

Since 1969, coastal erosion has reduced the island's size by one sixth, whereas the population has tripled in the same time. Especially before and after the monsoon, when most of the storms occur, vast areas of the island are under water. Since severe storms are likely to become even more frequent, and since the sea level is expected to rise, the threat of damage to agricultural land, property, human and animal life will increase. The project responded to these critical issues by enabling communities to adapt to climatic changes by introducing suitable salt-tolerant paddy and fish varieties in flood prone areas. It also helped the population prepare to cope with extreme climatic events and disasters.

### Adaptation hypothesis

The introduction of salt-tolerant paddy and fish varieties reduces the sensitivity of communities to brackish water inundation. The improvement of community disaster preparedness enables communities to adapt better to extreme events like storms and cyclones and to climate variability.



Farmer Mostafa Khan checking his ready to harvest salt-tolerant paddy Lalgetu.

### Mostafa Khan, 56 years

#### Baliara village, Mousuni Island, West Bengal

*"Breach of embankment has become a regular phenomenon in our area. When breach occurs, the agricultural lands as well as ponds are flooded with brackish water. As a consequence, paddy cultivation with high yielding paddy varieties has become impossible. Therefore, WWF India and GIZ have provided me with seeds of Lalgetu, a salt-tolerant paddy variety, in 2011. Since then I have been cultivating this variety in a small plot of land and have started to share it with other farmers. Unfortunately, brackish water can still destroy very young seedlings. But on my plot of land the growth of paddy has been very good till date."*



Eroding embankment on Mousuni Island

Photo: A. Kalish

## Adaptation interventions

- Realisation of a **vulnerability assessment** to identify physical and social vulnerabilities of people and to locate low-lying areas on the island that are particularly prone to coastal flooding
- Realisation of **awareness campaigns** on climate variability and on the need to adapt to climate change
- **Disaster training** for community members and formation of **disaster response teams** that consist of young local volunteers who are trained and well equipped to act on relief and rescue operations before, during and after an emergency
- Establishment of **institutional arrangements** with government bodies cooperating with the project
- Formation of a **Climate Change Information and Adaptation Centre** that provides information on climate change adaptation and serves as nodal centre for disaster response teams
- Collection of **soil and water salinity data** to identify suitable indigenous salt-tolerant paddy and fish varieties
- Implementation of climate adaptive livelihood options, i.e. **salt-tolerant paddy** like *Lalgetu* and **salt-tolerant fish** like *Liza tade* and *Scatophagus argus*

## Benefits and added value for adaptation

- **Awareness campaigns** provide information on ways and means to reduce sensitivity to climate change impacts
- **Disaster response teams:** The preparedness of the villagers reduces the potential of damage to life, livelihood and property; repeated training of the teams is expected to ensure sustainability
- **Institutional arrangements** with government disaster management bodies to recognise and support the disaster response teams are expected to scale up the benefit
- **Climate Change Information and Adaptation Centre:** The centre serves as nodal point during future disasters and as a place for dissemination and exchange of information, for trainings, meetings and other activities related to the development of the village
- **Salt-tolerant paddy:** Income of beneficiaries has increased by around 23 per cent within one year as compared to high yielding varieties. However, the actual benefit is much more than this as there would be zero production of high yielding paddy varieties under brackish water inundation
- **Salt-tolerant fish:** The new fish species survived despite saline water flooding; as a consequence income of beneficiaries has increased by almost 50 per cent within one year

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

\*81 INR = 1 EUR

Awareness campaigns (per campaign of 60 participants)	3,402 INR / 42 EUR
Salt-tolerant paddy – seeds, manure and land preparation (per hectare)	19,602 INR / 242 EUR (per year)
Salt-tolerant fish species – fish seed and labour (per hectare)	144,261 INR / 1,781 EUR (per year)
Disaster training (for 120 participants)	76,788 INR / 948 EUR
Climate Change Information and Adaptation Centre (one time cost for setup)	272,875 INR / 3,369 EUR





Prone to flooding and saltwater intrusion: agricultural land close to the embankment

### Success factors

- Interventions have to be based on **local needs** and findings of the **vulnerability assessment**
- **Exchange visits** between beneficiary farmers and farmers from other parts of the Sundarbans who are experienced in traditional paddy cultivation were organised to improve knowledge on traditional salt-tolerant paddy cultivation
- **Research results and latest technical innovations** were considered, above all through technical guidance and support on fish farming that was delivered by scientists of WBUAFS for fish farmers taking part in the project
- A **trustworthy relationship** between project officers and communities was built
- **Project experiences** were documented with the aim to improve the project's implementation – this participatory review process is called *systematisation* by GIZ

### Recommendations for project replication in the Indian context

According to the Intergovernmental Panel on Climate Change (IPCC), low-lying and densely populated areas in India are highly threatened by sea level rise. 7,500 kilometres of India's coastline are vulnerable to inundation and salinisation. Thus, the introduction of the salt-tolerant paddy and fish varieties might also be effective in other parts of the country that are prone to brackish water flooding and salinisation. However, before large-scale replication an assessment of salt-tolerance levels of different paddy and fish varieties should be done to select the right varieties that match the salinity levels of an area. This should be followed by a market study that analyses demand and prices for selected paddy and fish varieties.

#### Further information

Department of Environment  
Government of West Bengal  
[www.enviswb.gov.in](http://www.enviswb.gov.in)

West Bengal University of Animal and Fishery Sciences (WBUAFS)  
[www.wbuafscs.ac.in](http://www.wbuafscs.ac.in)

World Wide Fund for Nature (WWF) India  
[www.wwfindia.org](http://www.wwfindia.org)

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH  
Natural Resources Management Programme  
[www.giz/de/india](http://www.giz/de/india) | [www.ccarai.org](http://www.ccarai.org)