Mangrove Wetland: Conservation and Management

MSSRF’s experience
1992 to 2013

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M.S.Swaminathan Research Foundation
Chidambaram
M.S. Swaminathan Research Foundation
India

Non-profit organization
Established; 1989

Founder Chairman
Dr. M.S. Swaminathan
Father of Green Revolution
Founder President of ISME
Former President of IUCN
Chairman of FAO
HQ; Chennai
Regional Centers
14 Site offices

Mandate: to link science and society for sustainable development through pro-poor, pro-nature and pro-women approach

Six major thematic areas

Coastal Systems Research
Biodiversity
Biotechnology
Ecotechnology
Food Security
IEC

Management of mangrove wetland is a flagship project of Coastal Systems Research
What are mangroves?

Mangroves are a group of plants that grow in the intertidal area in the places where river water mixes with seawater – estuarine environment.
Mangroves are called as wetlands because:

- The land supports plants, which are adapted to wet soil conditions – hydrophytes.
- The base land is predominantly undrained hydric soil – soils developed under wet condition and have developed anaerobic condition in the upper part.
- The soil is saturated with water or covered by shallow water periodically during high tide and during the monsoon seasons.
Diagrammatic representation of a Mangrove Wetlands

River

Estuary

Mangrove

Sea
MSSRF started its work on mangrove wetland in 1989……

- Hypothesized that saline tolerant crops can be developed using the genes of mangrove plants
- MSSRF started identifying Mangrove Genetic Resource Centers in 9 countries in South, South East, West Africa and Pacific Islands

Survey included three sites in India including Pichavaram

- Survey indicated degraded status of all Indian mangroves
- MSSRF divided its efforts into two aspects
  
i) Utilization of genetic resources – Biotechnology group
ii) Community based restoration and conservation - Coastal Systems Research group
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<td>Bioshield and Integrated Mangrove Fishery Farming system</td>
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Phase I 1993-1996

- Started in Pichavaram mangroves;
- Reserve Forest in 1897; managed by Forest Department – British and Indian; under the management of the Tamil Nadu Forest Department
- Working plans available since 1897; degradation started 1930s
- Attempts to restore them in the past could not yield expected result

MSSRF started working on restoration with the help of in 1993 when nearly 55% of the forest was degraded

Aim: to develop a simple and cost-effective technique to restore degraded areas
• **Analyzed Causes of degradation**

  **Consultation with two major stakeholders**

  **Perception of the Govt. agencies**

  - Exploited by local community
  - Grazing
  - Illegal felling

  **Perception of the local community**

  - No felling of green trees
  - Cattle grazing is only in the peripheral areas, mainly in dry lands
  - Degradation is severe in the core portion of mangroves
- Villagers statements verified and found true during field visits
- Observed stagnation of tidal water in the degraded areas and free flushing in healthy mangrove areas
- Came to a conclusion that microtopographical changes taken place due to the stagnation of tidal water
Tidal flushing

Microtopography

Soil and ground water Property

Mangrove health
Situation in the healthy mangrove areas

- Smooth topography
- Free flushing by tidal water
- Low salinity
- High moisture
Situation in degraded areas

- Topography trough shaped
- Stagnation of tidal water
- High salinity
- Low moisture
Development of trough shaped topography leading to development of hyper saline condition- main reason for degradation: Observation supported By Remote sensing data
What caused topography become trough shaped?

- Past unscientific management practices
- Mangrove forests clear felled under coupe system of management for revenue generation to govt.
- 20 years rotation
- Started in 1930s and continued till 1970s
- Every year about 12 to 15 ha of mangrove forest clear felled
- Exposure of wetland triggered a chain reaction
Clear felling under coupe system

Exposure of mangrove wetland

Evaporation of soil water (80% of soil)

Stagnation of Tidal water

Development of trough Shaped topography

Subsidence of sediment

Evaporation of Tidal water

Development of hyper salinity

No regeneration
Development of restoration technique

- Shared the results with the community and Forest Department
- Hypothesized that degraded area can be easily restored if facilities are provided for free flow of tidal water in and out during the high tide and low tide
- Tested this hypothesis in about 8.00 ha of degraded area
Restoration technique: Canal system for free tidal flushing
Before restoration
1994

After restoration
2003
Key lessons learnt during Phase I

- Involve key stakeholders in the process from the beginning
- Demystify science
- Device a good communication strategy
Joint Mangrove Management

- Shared the results to stakeholders
  - Exposure visits; FD, community, Scientist, managers

- A number of questions
  - Who will maintain the canals?
  - How social pressures, there is anything, can be prevented?
  - How to upscale restoration activities?

- Development of
  - Joint Mangrove Management

Phase II started
 Started in Tamil Nadu and extended to mangroves of the east coast of India

- Tamil Nadu
- Andhra Pradesh
- Orissa
- Sunderban

- Tripartite agreement between local communities, state Forest Department and M.S.Swaminathan Research Foundation
Process followed in JMM

Situation analysis

Identifying participating hamlets

Participatory Rural Appraisal

Establishment of Village Mangrove Council

Identification of Mangrove Management Unit

Preparation of a Joint perspective plan

Preparation of joint annual action plan

Joint Implementation and monitoring
Before restoration
1998

After restoration
2004
Restored about 640 ha of degraded mangroves in partnership with Forest department and local community – later Forest department extended the technique to restore entire Godavari mangroves.
Involvement and Achievement

- 33 village level institutions with ~5240 families as members
- restored 1475 ha – 6.8 millions of mangrove saplings – survival is more than 100%!!!! Due to natural regeneration
- 20000 ha of pristine mangroves brought under Joint management
- Implemented a number of poverty reduction programmes
- developed a science-based, people –centred and process oriented approach
Major weakness of the JMM project

- No integration of livelihood with mangrove management
- No direct income from the forest; felling is banned
  
  only indirect benefits: fishery

How to integrate livelihood and mangrove???
Integrated Mangrove-Fishery Farming System

- BUND
- Fish/Crab
- Zero energy
- Tidal fed ponds
- No artificial feed
- No chemicals
- Tidal water
- Halophytes can also grown as cash crops
- Inner bund with mangroves
View of the Sea water farm
Feb 2006

INNER BUND

OUTER BUND

Mangrove plantation

TIDAL OUTLET
Rhizophora plantation

Sesuvium plantation

A halophyte

Used as green by local people

Used as salad in European countries

High market value
Conclusion

A science-based, community-centered and process-oriented approach is needed for successful co mangrove management.

Community-government-NGO should work together to bring success provided duration of CMM should be longer.

For long term sustainability of the project results, attention should be given to the livelihood of people and concerns relating to mangrove conservation management.

People are more interested in strengthening current livelihood activities rather than on alternative livelihoods.

Website

www.mssrf.org; www.envfor.nic.in ; www.fsi.nic.in
Thank you