
Detailed Project Report

A toolkit for use in the National Cyclone Risk Mitigation Project

Annexure - V: Format for preparation of DPR on Mangroves & Shelterbelt Plantations



National Disaster Management Authority
Government of India

Annexure V- Format for the preparation of DPR on Mangroves and Shelterbelt Plantations

Indian coastline spreading over an approximate length of 7500 km has veritable disposition from climate, topography and other locality factors point of view. But entire coast is vulnerable to cyclone disaster to varying degrees and frequency. The open coastlines are often planted with the exotic Casuarina trees and indigenous Pandanus (eastern coast) or Prosopis (western coast) trees.

The sheltered coastlines, river estuaries and lagoons are bordered with intertidal mangrove vegetation. The eastern Indian coasts are richer in mangroves from both diversity as well as the extent point of view. Sundarban of W.Bengal comprises of 65% of the entire Indian mangroves. As an individual State, Gujarat has the largest coast line of nearly 1700 kms length.

The cyclone impact can be minimized to a good extent by maintaining a Shelterbelt of trees and mangroves often serve as a promontory against very high gales. The Shelterbelt trees can protect a patch of landward area of the width of 20 times their height.

The landward border of Shelterbelt is often fit for raising cashew plants and often cashew orchards are located in the coastal regions as great source of socio economic inputs.

Constraints of Shelterbelt Plantation is the need for watering of saplings during dry seasons and protection from grazing. While in case of mangrove vegetation, the threat is conversion to coastal aquaculture in eastern coast and camel browsing in western coast. Gujarat State having the second largest mangrove cover suffers from extensive use of mangroves as cattle fodder which is believed to increase the milk production. In fact mangrove fodder is three times costlier than the grass fodder.

Sheltered intertidal mudflats often turn hypersaline. In such cases it has been found that digging or redigging of canals can bring the tidal ration for the mangroves and induce better growth and also support natural regeneration.

Participatory management with local folk for both Shelterbelt and mangrove regeneration had been successful in West Bengal. Co-management with NGOs had been successful in raising mangrove regeneration by the Gujarat Ecology Commission.

Thus the proposals would include the following:

- Raising Shelterbelt Plantations with Casuarina, Keya (Pandanus), Cashew (where possible) on eastern coasts
- Raising Shelterbelt Plantations with Casuarina, Prosopis, Tamarix on the western coast
- Raising mangrove plantation on sheltered intertidal areas
- Raising mangrove regenerations in hypersaline mudflats

This toolkit has been divided into two sections; the first section addresses the generic information to be submitted by the State encompassing all Shelterbelt Plantation/regeneration of mangroves proposed under NCRMP. The second section addresses the information that is to be submitted for the individual Shelterbelt Plantation/regeneration of mangroves proposed by the State.

The States have to provide details on each of the sections as listed in the DPR toolkit. However, additional sections/information may also be incorporated as per requirement. The procedure for preparation of DPR outlined in this toolkit addresses various key issues in each sector and would ensure appraisal, approval and subsequent project implementation in a timely and efficient manner.

Part A

V (A).1 Proposed Shelterbelt plantation/mangrove regeneration

Prioritized need for this project in this particular region vis-à-vis the other regions as per the format provided below: (Priority area maps should be prepared)

Table 1: Proposed Shelterbelt plantation/mangrove regeneration

S.No	Blank Govt. land	Blank private land	Population density of adjacent villages	BPL % of adjacent villages	Priority level

Phase - I Plantations should be marked on map as RED, Phase - II as BLUE, Phase - III as GREEN. It is recommended that the Human Development Indices or a Block Non-Development index be calculated to assist in phasing.

V (A).1.1 Steps to raise the Shelterbelt Plantations/Mangrove Regeneration

Site Plan

The Site Plan should address, but not be limited to following details:

- Location of blank government land for Shelterbelt plantation
- Location of available blank private lands with ownership details
- Location of earlier cyclone damaged plantation areas
- Location of hypersaline patches
- Location of villages in vicinity with population density indications with colours

V (A).1.2 Soil Exploration Data (Relevant Charts and Maps should be enclosed)

The soil exploration data and suitability of soil for the Shelterbelt plantations / mangrove regenerations should be provided in this section.

Table 2: Soil Exploration Data

Locality	Top soil salinity	Soil texture	Soil pH

V (A).2 Technical Specifications

V (A).2.1 Steps for raising Shelterbelt plantations / mangrove plantations and steps for raising mangrove plantations

- Seed / propagule collection from plus trees/clonal seed orchard
- Nursery preparation
- Survey and staking of plantation sites
- Planting
- Manuring, micorhiza inoculation

- Watering, tending
- Watch and ward

V(A).2.2 Selection of species for mangrove and Shelterbelt and rationale behind the selection.

- a. Selection of Shelterbelt species for eastern coast (Successful species are *Casuarina equisetifolia*, *Pandanus spp*, *Acacia auriculiformis*, *Calophyllum sp*)
- b. Selection of mangrove species for eastern coast (Natural species are, *Avicennia spp*, *Sonneratia apetala*, *Bruguiera spp*, *Rhizophora spp*, *Ceriops spp*, *Xylocarpus spp*, *Heritiera spp*)
- c. Selection of Shelterbelt species for western coast (Successful species are *Prosopis juliflora*, *Casuarina equisetifolia*, *C. glauca*)
- d. Selection of mangrove species for western coast (Natural species are *Avicennia marina*, *A. officinalis*, *Sonneratia caseolaris*, *Bruguiera gymnorhiza*, *Rhizophora mucronata*, *Ceriops decandra*, *C. tagal*)

V (A).2.3 Spacing of Plantations:

- a. Shelterbelt plantations : 1m x 1m for the 1st 30 m width along foreshore.
- b. Shelterbelt plantations : Rest of the area 2m x 2m
- c. Mangrove regeneration : 1m x 1m spacing, in between line dibbling (15 cm apart) of *Avicennia marina* seeds along foreshore, *A. alba*, *A. officinalis* along inner shore. *Rhizophora* propagules are to be planted at 2m intervals along intertidal finger gullies.

V (A).2.4 Soil works:

For Shelterbelt plantations pits are to be dug 30 cm dia and 30 cm deep. For the mangrove plantation two types of soil works are needed. Pits 30 cm dia x 30 cm deep at 1 m intervals as well as 15 cm deep x 1m long staggered trenches (where tidal inundation is relatively less) dug at 1m intervals.

At the hypersaline areas canals are to be dug in order to bring tidal inundation inducing both natural and artificial regenerations. Depth and width of the canal will be site specific. In areas of high tidal amplitude (Gujarat) and mound plantation (0.5 m dia x 0.3m ht) is necessary.

Manuring: Organic core manuring is done in the planting pits before plantation of the saplings for the Shelterbelt plantations. Mycorrhiza inoculation in organic media is done for the *Casuarina* plants during nursery stage as well as after one month of planting at the seedling base.

Tending / Protection : Shelterbelt plantations need watering during dry periods. Watch and ward is needed to protect the planted seedlings against grazing etc. For each 2 ha one watcher is needed for first two years. Intermittent bamboo-brush wood palisades are necessary to check initial wave impact/erosion at some locations.

No tending is needed for mangrove plantation. But watch and ward is necessary at same scale as Shelterbelt plantations.

V (A).3 Project Cost

Table 3: Project Cost- Itemwise details (For All plantation patches)

[1]	[2]	[3]	[4]		
			Phase - I	Phase - II	Phase - III
1	Site survey and soil exploration				
2	Fees for consultants for preparation of survey, designs, drawings, estimates.				
3	Fees for supervision consultants				
4	Fees for agencies/ consultants for monitoring (if outsourced)				
5	Fees for committee members for quality control and assurance				
6	Cost of raising plantations (Summation of cost estimates prepared for all plantation patches -phase wise) Phase-I Phase-II Phase-III				
7	Cost of entry point activities for participatory forest management				
8	Likely escalation in cost at various stages @ xx%				
9	Costs for hiring professional services of coordination cell @ Rs. xxxx/- per annum for xx years				
10	Environmental compliance cost (e.g. brush wood palisade)				
11	Corpus fund to generate 2% of cost for maintenance				
	Grand Total				

V (A).3.1 Cost estimates:

Cost estimates should take into account following break ups.

Table 4: Break-up of Cost estimates

Location	Shelterbelt plantation		Mangrove regeneration	
	Items	Unit Cost	Items	Unit cost
	Nursery cost	Per seedling	Collection of propagules	Per 100 propagule
	Cost of soil works	Per ha	Cost of soil works	Per ha
	Cost of planting	Per ha	Cost of planting/seed dibbling	Per ha
	Brushwood Protection works	Per ha	-	-
	Tending/manuring	Per ha/year		
	Watch and ward	Per ha/year	Watch and ward	Per ha/year

V (A).4 Work Plan

Activity Schedule

The DPR should provide a schedule of activities with time-frame.

Table 5: Time-frame during DPR preparation

Sl. No.	Activity	Nos.	Target Date	Remarks
1	Finalization of site and soil exploration studies for Shelterbelt Plantation/Mangrove regeneration	xx nos.		
	Finalisation of beneficiaries, VSS, NGO for JFM and co-management of plantations.	xx nos.		
2	Assessment of site characteristics, soil exploration, hyper-salinity, geomorphologic peculiarities.	y ynos.		
		yynos.		

3	Assessment of land holdings Encroachment removal need assessment Possible patch wise phasing of the plantation / regeneration programme	xx nos. xx nos. xx nos.		
4	Selection of Agencies for implementation after choice of packages (VSS/NGO).	z nos.		
5	Working out Project Costs	1		
6	Submission of DPR to NDMA	1		

Table 6: Time-frame during implementation of Project:

Sl. No.	Activity	Nos.	Target Date	Remarks
1	Handing over or finalization of lands for raising plantation.	xx nos.		
2	Determine the extent of implementation on barren Government land, on private land and erstwhile damaged/destroyed plantation patches.	xx nos.		
3	Fix the calendar of operation for seed/propagule collection, advance soil works, brushwood palisade protection works (Shelterbelt plantations), nursery raising, planting of seedlings, time of micorrhiza inoculation, time schedule of watering for Shelterbelt plantations.	xx nos.		
	Formation of a State level committee to oversee the quality of plantations, proper selection of species. Schedule for quarterly assessment of status of plantations			
	Completion of beating up of causalities			
	Schedule for entry point activities for the beneficiaries			
	In hypersaline area digging / redigging of canals to induce mangrove regeneration.			

	Schedule of two years watch and ward of plantations [Details to be given in CPM format for each plantation patch and amalgamated in to a summary of activities]	xx nos.		
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V (A).5 Financial and Economic Analysis

V (A).5.1 Fund Flow

The DPR is to provide a flow-chart showing the budgeted Fund-Flow diagram from State Nodal agency level to the level of disbursements

Table 7: Planned quarterly fund requirements

Sl. No.	Activity	Total Cost (Rs. In Lakhs)	Quarter-wise Requirements (Rs. In Lakhs)
1.	Survey and site selection		
2.	Advance soil works, protection works and Nursery preparation		
3.	Planting and manuring/watering, beating up casualties		
4	Watch and ward arrangements		
5	Entry point activities for Participatory management		
6	Fees for consultants for preparation of estimates etc.		
7	Likely escalation cost @ xx% as per RBI price index.		
8	Fees for agencies/ consultants for quality Control and assurance		
9	Costs for hiring professional services of Coordination Cell @ Rs. xxxx/- per annum for xx years		
10	Environmental compliance cost (brush wood pallisades, digging/redigging canals)		
11	Administrative overheads of Nodal Agency including audit expenses.		

12	Corpus fund to generate 2% of cost for maintenance per annum					
	TOTAL					
	Expected overall progress of Implementation in %ages of Estimated cost.					

Table 8: Abstract for fund requirement (quarterly) from Centre and State

	Planned requirement (Rs. in Lakhs)		
	Total	Centre (75%)	State (25%)
Quarter 1			
Quarter 2			
Quarter 3			
Quarter 4			
Total			

Table 9: Activity-Wise Financial Progress Report Format (Quarterly)

(for all Shelterbelt plantation/Mangrove regeneration patches as a whole)

Sl. No.	Description	Amount planned for release expenditure (Rs.)			Actually released			Remarks
		Total	Centre (75%)	State (25%)	Centre	State	Total	
1	Survey and site selection							
2	Advance soil works and nursery preparation							
3	Planting and manuring/watering, beating up casualties							
4	Watch and ward arrangements							
5	Entry point activities for Participatory management							
6	Fees for consultants for preparation of estimates							

	etc.							
7	Likely escalation cost @ xx% as per RBI price index.							
8	Fees for agencies/ consultants for quality control and assurance							
9	Costs for hiring professional services of coordination cell @ Rs. xxxx/- per annum for xx years							
10	Environmental compliance cost (brush wood pallisades, digging/redigging canals)							
11	Administrative overheads of Nodal Agency including audit expenses.							
12	Corpus fund to generate 2% of cost for maintenance per annum							
	Grand Total							

V (A).5.2 Economic analysis:

Table 10: Benefit Analysis of the Shelterbelt plantation/Mangrove regeneration patches

Sl. No.	Plantation site ID	Net present value of plantation /regeneration	Expected value of livestock to be saved	Expected value of crop land to be saved	Expected value of buildings to be saved	Community activities		
						Social benefits of fuel wood value (Coal equivalent)	Economic - income generation value	Trainings and HRD values
1								
2								
3								
4								

TOTAL							
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(Items to be given a subjective assessment for their money value)

V (A).6 Environmental and Social Impact Assessment

This section shall derive from the environmental and social screening undertaken at the IP level. Based on the category in which the project has been classified. Appropriate impact assessment as defined in the ESMF shall be undertaken and detailed reports shall be annexed to the DPR.

V (A).6.1 Social Impact

Mangrove Plantation & Shelterbelt regeneration will have positive social impacts, immediate as well as far-reaching. Enumerate them here.

For example,

- Minimization of risks due to reduction in loss of lives - human and livestock.
- Immediate livelihood for local construction workers
- Trained construction workers to adopt safer construction practices in future, thereby reducing vulnerabilities of built environs.
- Space for promoting both children and adult Education such as schools, training centres, etc.
- Scope for immunization and health-camps in these remotely accessed villages
- Scope for income-generation programmes for women SHGs
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V (A).7 Project Sustainability

Project sustainability depends on the following and DPR should ensure the following:

- Effective implementation of policies, programmes and legal instruments by the concerned agencies
- Effective implementation and monitoring of the project (including checking of regenerated area with the help of remote sensing) activities and timely submission of progress report and utilization of funds for the respective activities
- Community participation with Joint Mangrove Forest Management approach
- Continuation of Joint Forest Management (JFM) with promulgation of suitable legal notification, specifying sharing pattern of usufructs, duties and responsibilities of the VSS and detailed trade off.
- Training and Capacity Building at institutional and individual level and placement of the trained staff in the concerned institutions at least for a considerable period so as to utilise their training to carry out respective functions for which they have been trained.
- Researches on Shelterbelt sustainability.

- Sustained source of funding and institutional arrangements for essential carry forward activities
- Possibilities of attracting corporate assistance

Part B

V (B).1 Context and Background

This section shall address the relevant aspects of Shelterbelt Plantation / mangrove regeneration and provided details of the proposed project as set out below. The States may include any other information that they perceive relevant to the current context.

The details shall indicate the following details (A sample proforma is enclosed)

1. Identification of Shelterbelt Plantation / mangrove regeneration:
2. Location of Shelterbelt Plantation / mangrove regeneration:
3. Area under Shelterbelt Plantation / mangrove regeneration-
Km:District:.....Taluka/Mandal:.....
 - a. Town/Village nearby:
4. Access to project:
5. Rail Head:.....;Road Head;.....
6. Details of Floods/inundation in the area:
7. Maximum Water Level (EL m):
8. Year of Occurrence (Date/Year):
9. Beneficiaries:
(The total number of persons/livestock expected to benefited due to this project from the revenue villages, as well as the hamlets are to be included).
10. Technical Details to be furnished for Shelterbelt Plantation / mangrove regeneration
11. Engineering design