PRELIMINARY PROJECT REPORT FOR INTEGRATED COASTAL ZONE MANAGEMENT PROJECT FOR THE U.T. OF PUDUCHERRY

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

सत्यमेव जयते
Government of Puducherry

Submitted by
Department of Science, Technology and Environment
Government of Puducherry

Prepared by
Government of Puducherry in
association with
National Centre for Sustainable Coastal Management (NCSCM)

NCSCM

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Contents

The document contains:

INTEGRATED COASTAL ZONE MANAGEMENT PROJECT FOR THE U.T. OF PUDUCHERRY

PRELIMINARY PROJECT REPORT (ABSTRACT)

1. **Name of the Project:** Integrated Coastal Zone Management Project for the U.T. ofPuducherry

2. **Sectoral area:** Environment

3. **Total Financial Outlay:** Rs. 111.9 crores

4. **Details of the external development agencies:** World Bank

5. **Financial arrangement**

in Rs. Crores

Total External Assistance	**Counterpart funds being made available for**				**Total**
	Implementing agency	**Union Territory Government**	**Central Government**	**Others, If any**	
55.95 Cr. (50% of the total project cost)	Nil	**11.19 Cr.** (10% of the total project cost)	**44.76 Cr.** (40% of the total project cost)	-	**111.9 Cr.**

6. **Project Duration:** Four Years

7. **Location of the Project:** Puducherry, Karaikal, Mahe and Yanam

8. **Previous phases, if any:** Nil

9. **Statutory clearances required:** Coastal Regulation Zone and Environmental clearances may be needed.

10. **Statutory clearances obtained:** They will be obtained during implementation of the project activities

11. **Details of feasibility studies done, if any:** Activities are being proposed and no feasibility study is contemplated at this stage.

12. **Implementing agency:** Department of Science, Technology and Environment along with concerned departments and agencies

13. Basic design of the project:

A **Project Management Unit** will be established at the Department of Science, Technology and Environment, Government of Puducherry, for coordinating current ICZM activities and extending ICZM to additional areas in the future based on lessons learnt. More details about background, design and activities are given in the base document.

Preparation of an ICZM Plan for the coast of Puducherry Union Territory to identify key issues and problems and develop integrated management solutions for the identified sectors. Projects are being proposed under three prioritized investment areas:

1) **Livelihood Security of Coastal Communities**
2) **Conservation and Protection of Coastal Resources**
3) **Pollution Management**

13.1. Activities involved

The details on activities under the project are given below:

i. Preparation of an ICZM Plan for Puducherry coastal regions to identify key issues and problems and develop integrated management solutions to solve the problems

ii. Establishment of the State Project Management Unit to coordinate current investments and plan for future investments in a phased manner towards integrated coastal zone management

iii. Activities that will address the already existing issues in three priority investment areas as given in

1) **Livelihood Security of Coastal Communities**
    a. Construction & Reconstruction of Fish Auction Hall at four places & Construction of Work Shelter at Veerampattinam in Puducherry Region
    b. Promotion of Open Sea Cage Culture for enhancing livelihood opportunities of fishermen
    c. Promotion of Livelihood opportunities through Environment friendly tourism along Puducherry coast

d. Women Collective action for sustainable livelihoods and costal conservation at fisher folk villages in Puducherry Region

2) Conservation and Protection of Coastal Resources

a. Mitigation of Climate Change impacts on Coastal areas of Puducherry, Karaikal, Yanam and Mahe through Mangrove restoration and livelihood diversification of Coastal community.
b. Sand dunes Mapping and Stabilization

3) Pollution Management

a. Establishing Faecal Sludge Treatment Facility in Puducherry.
b. Inventorization of untreated waste water discharged into the Coastal Zone of Puducherry UT and preparation of waste water management plan by adopting decentralized treatment technologies.

13.2. Goals and Objectives

The main objective of the present ICZM project is to promote adoption of the concept of ICZM in developmental and service activities without causing adverse impacts to ecology and socio-economics of the coastal zone. The specific goals are:

i. Upgrading traditional livelihoods of coastal communities, especially fisherfolk, by providing amenitiesand associated infrastructure in their villages that are modern and hygienic; building capacity for safety at sea
ii. Promoting eco-tourism to increase awareness and understanding of the coast
iii. Restoring the eroded coast to secure lives and properties, regain coastal space and protect ground water
iv. Ensuring environmental quality conducive for propagation of biodiversity and human living environment
v. Conserving, restoring and enhancing coastal resources and ecosystems
vi. Building capacities for stewardship and enrolling all constituencies for planning, decision making and action through the creation of learning in action centres.
vii. Bringing transparency and accountability among all stakeholders working towards sustainable development of the coastal region

13.3. Outputs of the project

i. An ICZM plan describing the problems along the coast, their causes and integrated management solutions to overcome the problems

ii. Priority investments that are transformative and replicable in the areas of livelihoods, conservation and pollution control.

iii. State Project Management Unit established to facilitate implementation of ICZM programmes of the project and also to serve as a long-term set up to manage future ICZM programmes of UT of Puducherry.

13.4. Outcome of the project

On completion the project will have an ICZM plan to manage the current and future activities of the coast. Besides, on completion of the priority projects proposed, the likely outcomes are:

- Environmental assessment to understand the state of the environment to identify areas where interventions are required which will improve health conditions of people
- Recovery of lost biodiversity in mangroves and enhanced sequestration of carbon
- Stabilised sand dunes enhances protection of coast from seawater inundation
- Augmentation of resources and additional livelihood opportunities to coastal communities due to development of tourism facilities
- Long-term system established for promoting and practicing ICZM

13.5. FC and TC component

Pls refer Appendix for details on Financial Component and Technical Component (overseas training arranged by funding agency).

14. Target population / groups

The target population will be the coastal communities of Puducherry, Karaikal, Yanam and Mahe especially the fishermen, rural communities and the under and unemployed personnel.

15. Detailed Action Plan (Year wise)

Please refer Appendix

16. Quantitative and Qualitative (verifiable) target indicators:

	Activity	Qualitative indicator	Quantitative indicator
1.	ICZM Plan	Availability of integrated management solutions and enhanced inter-departmental co-ordination	An ICZM plan with sub-plans
	Livelihood Security of Coastal Communities		
2.	Construction & Reconstruction of Fish Auction Hall at four places & Construction of Work Shelter at Veerampattinam in Puducherry Region	Emphasis on hygiene and sea safety for small scale traditional fishermen.	About 2000 traditional fishermen families (as per CMFRI 2010 census) in ChinnaKalapet, Pillaichavady and P.Pudukuppam, Veerampattinametc would benefit.
3.	Promotion of cage culture for augmentation of marine resources	Increase in nearshore breeding of fish due to improved habitat	Better catch closer to the shore for 250 plus small scale traditional fishermen
4.	Promotion of Livelihood opportunities through Environment friendly tourism along Puducherry coast - Development of Beach Front at Manapet in Puducherry	Diversification and increase in employment opportunities in the tourism sector, reducing pressure on the fisheries sector	Provision of employment to at least 100 youth in various supporting activities including transportation, boating etc
5.	Extension and beautification of beach promenade on the southern side in Puducherry.	Increased areas for leisure for common man and employment opportunities.	A tourist attraction with an expected turnaround of 4 lakhs visitors per year.
6.	Pondy Necklace - Promotion of	Increased areas for leisure for common man	A tourist attraction with an expected

	Activity	Qualitative indicator	Quantitative indicator
	ecofriendly tourism and livelihood opportunities to local communities in Thengaithittu Lagoon area	and employment opportunities.	turnaround of 4 lakhs visitors per year.
7.	Women Collective action for sustainable livelihoods and costal conservation at fisher folk villages in Puducherry Region	Improved value addition facilities for marketing of fish meal.	Increase in number of fisher folks organised under FPO, conservation of sands, mangroves, turtles nesting ground and Social forestry.
Conservation and Protection of Coastal Resources			
8.	Mapping And Stabilisation of Sand Dunes Along The Coast of Puducherry And Karaikal	Sand dunes mapped and stabilized using native vegetation to increase protection to coastal communities from storm surge/ tsunami	Varies depending on sand dune location and extent
9.	Mitigation of Climate Change impacts on Coastal areas of Puducherry, Karaikal, Yanam and Mahe through Mangrove restoration and livelihood diversification of Coastal communities	Restoration of mangrove vegetation helping in coastal stabilization, carbon sequestration, improved biodiversity, protection from storm surge.	Varies depending on mangrove location and extent.
Pollution Management			
10.	Establishing Faecal Sludge Treatment Plant	Improved health and hygiene of the entire population of Puducherry and the decrease in pollution load at the final disposal (land/sea).	Better pollution management opportunity brought about by improved treatment facility of the fecal sludge.

	Activity	Qualitative indicator	Quantitative indicator
11.	Inventorization of untreated waste water discharged into the Coastal Zone of Puducherry UT and preparation of waste water management plan by adopting decentralized treatment technologies.	Ecological restortation of water bodies, Improved aesthetics & clean environment	List/map of locations where untreated waste water is discharged into river/estuary/sea and development of simple effective decentralized treatment systems
Capacity building			
12.	Setting Up of A State Project Management Unit (SPMU) in DSTE	Increased capacity to deal with ICZM and a long-term institutional set up for ICZM	Number of persons trained in ICZM related activities

17. Environmental Sustainability of the project

The project activities such as pollution, conservation, fisheries and wastewater management are environment-oriented and ensure improvement of environmental quality of the coastal areas. They do not cause any damage to environment as environmental and social concerns are already incorporated in the strategies suggested to solve the identified problems.

18. Land acquisition / Resettlement and Rehabilitation involved

The project activities will be implemented largely in the land owned by the Government.

19. Linkages with similar projects:

(i) Information regarding projects in similar areas undertaken previously (add evaluation reports, if any)

Activities relating to Pollution control, Fisheries and tourism activities are being undertaken and the details are given in base document and also in Annexes 2-9.

(ii) Does the project form part of the sectoral strategy/umbrella project? If yes, who are the other partners with details of the specific activities being undertaken by them

The project activities will be implemented by the relevant sector. However concerns of related sectors will be addressed while evaluating cross impacts likely caused by the solutions developed and such impacts will be solved using alternate methods. The State Project Management Unit (SPMU) while monitoring the project activities will ensure prevalence of inter-sectoral discussions so that all the cross-sectoral impacts are solved without causing adverse or unacceptable damages to the relevant sectors. For e.g., the waste disposal sector will ensure that discharge or dumping of waste does not occur in areas of tourism activities. If the dumping/discharge at such locations is unavoidable, the method of treatment will be modified and adequate consultations will be held with tourism sector regarding their acceptability. Details of activities proposed to be undertaken by the associated departments and agencies are given below:

Annex No	Name of Project	Project Implementing Agency	Budget (Rs. in Cr.)
1.	Preparation of ICZM Plan for the U.T. of Puducherry	NCSCM	8.07
Livelihood Security of Coastal Community			
2.	Construction & Reconstruction of Fish Auction Hall at four places & Construction of Work Shelter at Veerampattinam in Puducherry Region	Department of Fisheries	4.00
3.	Promotion of Open Sea Cage Culture for enhancing livelihood opportunities of fishermen	Department of Fisheries	2.42
4.	Promotion of Livelihood opportunities through Environment friendly tourism along Puducherry coast - Development of Beach Front at Manapet in Puducherry.	Tourism Department	15.00
5.	Extension and beautification of beach promenade on the southern side in Puducherry.	Tourism Department	15.00
6.	Pondy Necklace - Promotion of ecofriendly tourism and livelihood opportunities to local communities in Thengaithittu Lagoon area	Tourism Department& PWD	18.30
7.	Women Collective action for sustainable livelihoods and costal conservation at fisher folk villages in Puducherry Region	DRDA & DSTE	2.00
Conservation and Protection of Coastal Resources			
8.	Mapping And Stabilisation of Sand Dunes Along The Coast of Puducherry And Karaikal.	DSTE, Puducherry	1.72
9.	Mitigation of Climate Change impacts on Coastal areas of Puducherry, Karaikal, Yanam and Mahe through Mangrove restoration and livelihood diversification of Coastal communities	Forest and Wild Life Department& PWD	8.08

Annex No	Name of Project	Project Implementing Agency	Budget (Rs. in Cr.)
Pollution Management			
10.	Faecal Sludge Management	PWD (PHD)	7.00
11.	Inventorization of untreated waste water discharged into the Coastal Zone of Puducherry UT and preparation of waste water management plan by adopting decentralized treatment technologies.	DSTE & PWD	18.00
Capacity Building			
12.	Setting Up of A State Project Management Unit (SPMU) in DSTE.	DSTE	12.31
		Total	**111.90**Cr.

AN OUTLINE OF MATRIX

Strategy	**Indicators**	**Sources /Means of verification**	**Assumptions / Risks**
Goal (Linked up with a Government priority /programme / policy)	Sustainable development of coastal areas (NEP 2006; Final Frontier 2009; CRZ Notification 2011)		Environmental clearances, implementation of activities as per schedule
Objective (purchase / expected benefits) Sustainable management of coastal and marine activities incorporating environmental and social concerns	Cross- sectoral impacts esp. On environmental and social sectors minimised through integrated management solutions in all major sectoral projects	Results of cross-sectoral impact analysis as detailed in ICZM plan and also in sectoral plans	Solutions recommended are implemented in full without reduction due to reasons like non-availability of adequate funds
Outputs / Results Goods / services / materials / expectedchanges, the targetpopulation will get,which they can not achieve on their own without intervention ofthe project.	Integrated management of coastal activities	Improved environmental quality, health conditions of coastal communities and increase in livelihood opportunities thro ICZM plan	Long-term in nature and needs activities to be integrated in regular planning. SPMU established with adequate manpower and holds regular meetings to evaluate progress
Livelihood Management	Infrastructure for fishing	Construction of Auction hall and	Nil

Strategy	Indicators	Sources /Means of verification	Assumptions / Risks
	community and eco-tourism facilities	shelter in fishing harbours	
Pollution Management Plan	Prioritised interventions and locations decided	Status report on current sources of aquatic pollution	Nil
Conservation Management Plan	Extent of area of degraded mangrove restored and number/area of sand dune stabilised	Mangrove maps identifying degraded areas Field data on recovery of mangroves and photos Maps on sand dunes distribution Field photos on stabilised sand dunes	Species identified for mangrove afforestation are suitable and grow with regular availability of tidal waterDeveloped sand dunes remain undisturbed. Policy changes and development pressures do not have adverse effects
Tourism Management Plan	New location developed as tourist attraction and to create additional livelihood opportunities to local communities	Report on Number of visitors Increase in number of small businesses	Area maintained well so that it is attractive for visitors. Transport facilities are available. Beach space is available and does not undergo erosion
Institutional arrangement to promote ICZM	Existence of SMPU and programmes implemented Maps on coastal resources and environment	SPMU website indicating creation and operation of SPMU, meetings of SC and STAC conducted and progress made in programmes undertaken. Reports on database development	Regular manpower available to conduct training programme

Project Preliminary Report

<table>
<tr><td>1</td><td colspan="3">Name of the Project</td><td colspan="3">Integrated Coastal Zone Management Project for the U.T. of Puducherry</td></tr>
<tr><td>2</td><td colspan="3">Sectoral area</td><td colspan="3">Coastal Zone Management – environment</td></tr>
<tr><td>3</td><td colspan="3">Total Financial outlay</td><td colspan="3">Rs. 111.9 crores</td></tr>
<tr><td>4</td><td colspan="3">Details of the external development agencies (and the amount sought fromeach)</td><td colspan="3">World Bank</td></tr>
<tr><td>5</td><td colspan="3">Financial arrangement</td><td colspan="3">Rs. in Cr</td></tr>
<tr><td rowspan="2">Total External Assistance</td><td colspan="4">Counterpart funds being made available by</td><td rowspan="2">Total</td></tr>
<tr><td>Implementing agency</td><td>UT Govt.</td><td>Central Govt.</td><td>Others, if any</td></tr>
<tr><td>55.95 Cr.(10% of the total project cost)</td><td>Nil</td><td>11.19 Cr. (10% of the total project cost)</td><td>44.7 Cr. (40% of the total project cost)</td><td>-</td><td>111.9 Cr.</td></tr>
<tr><td>6</td><td colspan="3">Project duration (dates/months/years</td><td colspan="3">4 years</td></tr>
<tr><td>7</td><td colspan="3">Location of project</td><td colspan="3">Multiple projects in Puducherry, Karaikal, Yanam and Mahe.</td></tr>
<tr><td>8</td><td colspan="3">Previous phases, if any</td><td colspan="3">Nil</td></tr>
<tr><td>9</td><td colspan="3">Statutory required</td><td colspan="3">Environmental, CRZ, PCB etc.</td></tr>
<tr><td>10</td><td colspan="3">Statutory obtained</td><td colspan="3">After project approval</td></tr>
<tr><td>11</td><td colspan="3">Details of Feasibility Studies done, ifany</td><td colspan="3">NA</td></tr>
<tr><td>12</td><td colspan="3">Implementing agency</td><td colspan="3">State agencies/ Institutions through a Project Management Unit established at the Department of Science, Technology and Environment, Government. of Puducherry</td></tr>
<tr><td>13</td><td colspan="3">Basic design of the project</td><td colspan="3">Available in Document Titled “Base Document for Integrated Coastal Zone</td></tr>
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		Management Project for the U.T. of Puducherry"
(i)	**Goals and objectives**	Promote sustainable development of coastal areas; Livelihood security, conservation, development based on scientific principles. For details refer appendix
(ii)	**Activities involved**	Preparation of ICZM Plan, Capcity Building, establishing SPMU and implementation of a set of prioritised activities under various management sub plans. For details refer appendix
(iii)	**Outputs of the project**	ICZM Plan for identified project area with implementation of prioritised projects as given in appendix
(iv)	**Outcome of the project**	Existence of an appropriate state level institutional structure for guiding and coordinating implementation of ICZM approaches Coastal space protected for use by fishing and coastal communities Improved water quality in water bodies leading to better health care and increase in biodiversity Conserved mangroves enhancing Carbon sequestration Better livelihood opportunities to fisherfolk due to augmented infrastructure

		Increased awareness on marine life
(v)	**FC and TC component**	For details on Financial Component and Technical Component (training organized by funding agency) refer appendix
14	**Target population/ groups**	Coastal communities in Union Territory of Puducherry in general and project specific locational population based on the various projects.
15	**Detailed Action Plan (Year wise)**	For details refer appendix
16	**Quantitative and qualitative (verifiable) target indicators**	Well-being of coastal communities, improved tourism, preparation of ICZM Plan. More details given at Section 1 (Refer abstract)
17	**Environmental sustainability of the project**	High as the focus is on integrated management of sectoral activities to ensure no adverse environmental impacts on each other
18	**Land acquisition / Resettlement and Rehabilitation involved**	Not envisaged at this stage
19	**Linkages with Similar Projects**	Projects on tourism, fisheries,harbour management are being undertaken since past few years under other schemes
(i)	**Information regarding similar projectsundertaken previously (add evaluationreports, if any)**	**NA**
(ii)	**Does the project form part of the sectoral project? If yes, who are the other partner with details of the specific activities being undertaken bythem**	Projects fall under Environmental, development and social sectors. Details of institutions involved are given in Appendix

20	**Finance Plus Element**	Details given in Appendix
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	Yes
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	Yes
	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	Yes, this is addressed in the pilot project plans given in Annexure
	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	Yes – integrated management as opposed to sectoral management thro' ICZM plan and cross-impact analysis
	v. Does the proposal seek to create additional choice for the citizens to access required service/ entitlements?	No
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	Yes
	vii. Are knowledge	Yes

	transfer,technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	
	viii. Does the proposal have institutional improvement measures: **e.g. (a) Accounting Reforms (movingfrom single entry cash basedaccounting system to double entryaccrual system of accounting (b) Ringfencing of finances/activities including corporatization wherever needed (c) creation and implementation ofappropriate revenue models e.g. tariffreforms or alternative revenuestructuring?**	
	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	Yes. It creates an ICZM set up to ensure sustenance of all sectoral activities without causing adverse impacts on activities of other sectors
	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	Yes from sectoral management approach to integrated management
II	**II. Innovation and Piloting of new Approaches**	
	(I) Does the proposal have innovativeelements and new approaches thathave not been tried in the sector andhave reasonable chance of changing forthe better the way things are done inthe sector and have some chance ofscalable replication?	It is expected that decentralized green wastewater management systems will be identified for implementation

	(ii) Does the proposal look at financialsustainability and O & M related issueswhich otherwise has not been the norm in the sector?	Yes. It has O & M components in pollution, livelihood and knowledge management activities
III	**Innovation in financing and Leveraging**	
	i. Does the proposal use different/ innovative financing products/ modalities?	
	i. Does the proposal involve co-financingfrom other financing agencies?	
	iii. Does the proposal catalyseprivatesector financing in different ways andespecially to create leverage?	
	iv. Does the proposal involve CDM andaccrual of carbon credits as a naturalby-product of core developmentprojects which can be a way offinancing the project?	The project includes restoration of mangroves and greenery development in eco-tourism which contribute to carbon sequestration in a marginal manner

Appendix

Activity	Project Implementing Agency	Justification	Year	Proposed Tasks	Output	Budget (Rs Cr.)
Development of ICZM Plan for Puducherry Karaikal, Yanam and Mahe	NCSCM	To promote adoption of the concept of ICZM in developmental and service activities	1st year	Identification of key issues for each sub-plan activity	Finalized key issues for each sub-plan activity	1.62
			2nd Year	Collection of data for analysis for development of solutions and preparation of sub plans	Causes for key issues determined and solutions developed	4.84
			3rd year	preparation of draft ICZM plan, stakeholder consultation and training of State staff	ICZM plan document	1.61
					Total	**8.07**
FC = Rs. 8.07 cr. TC Nil. Pls refer Annex 1						

Activity	Institution	Justification	Year	Action Plan (Tentative)	Output	Cost (Rs. Cr.)
Construction & Reconstruction of Fish Auction Hall at four places & Construction of Work Shelter at Veerampattinam in Puducherry Region	Department of Fisheries	Facilities for fishermen need to be upgraded	1st Year	Preparation of estimates & clearance from all angles and tendering process	Ready for construction	0.50
			2nd Year	Construction phase	Fish Auction Hall and work shelter completed and commissioned. Training on co-management concept provided to users	3.50
					Total	**4.00**
FC = Rs. 4 cr. TC Nil. Pls refer Annex 2						

Activity	Institution	Justification	Period	Action Plan (Tentative)	Output	Cost (Rs. Cr.)
Promotion of Open Sea Cage Culture for enhancing livelihood opportunities of fishermen	Department of Fisheries	Augmentation of fishery resources in the near shore allowing improved fish availability	0-6 months	Survey of sites, collection of secondary data on water quality and designing of cages	Site identified and design developed	0.62
			7-13 months	Fabrication and deployment of cages Capacity building to co-management group and fabrication of modules	Cages fabricated and deployed. Training provided to users	1.80
					Total	**2.42**
FC = Rs. 2.42 cr. TC Nil. Pls refer Annex 3						

Activity	Action Plan (Tentative)		Output	Cost (Rs. Cr.)
Promotion of Livelihood opportunities through Environment friendly tourism along Puducherry coast - Development of Beach Front at Manapet in Puducherry	1st year	Initiation of work on Development of beach front, Marine Park as environmental education program	Preparation of DPR and initiating the work.	11.00
	2nd Year	Completion of all tourism facilities and operating the facility	Eco-tourism facilities available and performance report	4.00
			Total	**15.00**
FC = Rs. 15.00 cr. TC Nil. Pls refer Annex 4				

Activity	Institution	Action Plan (Tentative)		Output	Cost (Rs. Cr.)
Extension and beautification of beach promenade on the southern side in Puducherry	Department of Tourism	1st year	Inviting tenders and execution of work	Preparation of DPR and initiating the work.	10.00
		2nd Year	Completion of the project and operating the facility	Completion of the tourist attraction through coastal protection.	5.00
		3rd to 5th years	Maintenance of tourism facilities	Operation and maintenance.	0.00
				Total	**15.00**
FC = Rs. 15.00 cr. TC Nil. Pls refer Annex 5					

Activity	Action Plan (Tentative)		Output	Cost (Rs. Cr.)
Pondy Necklace - Promotion of eco-friendly tourism and livelihood opportunities in Thengaithittu Lagoon area	1st year	Initiation of work on Development of Thengaithittu lagoon for eco tourism activities.	Preparation of DPR and initiating the work.	11.00
	2nd Year	Completion of all tourism facilities and operating the facility	Eco-tourism facilities available and performance report	8.30
	3rd to 5th years	Maintenance of tourism facilities	Operation and maintenance.	0.00
			Total	**18.30**
FC = Rs. 18.30 cr. TC Nil. Pls refer Annex 6				

Activity		Action Plan (Tentative) for one year	Output	Cost (Rs. Cr.)
Women Collective action for sustainable livelihoods and costal conservation at fisher folk villages in Puducherry Region – Promoting strong Social Capital with fisher folks in 5 villages and promoting fish value addition infrastructure facility for achieving sustainable Livelihoods.	Year 1	Building CBOs, skill building, exposure visit, registration, 6 Fish kiosk, field staff salary, and admin expenses etc.	750 vulnerable women will be organized and registered in Companies act.	50.00
	Year 2	Construction of Solar fish drier in all 10 villages	Solar drier will be established	30.00
		Construction of one fish meal Production unit withbuilding, Solar drier, drying yard, sand &silica separator, pulverize, mixer, packing machine, transport vehicle etc.	2 units Fish meal making unit to be constructed (1 in Karaikal and 1 in Puducherry)and installation of machine	80.00
	Year 3	Conservation Works (Sand dune) and alternate livelihood of Mud crab fattening on Backwater (floating method)	Conservation council formed/ Alternate livelihood to 4 villages with 150 fisher women	20.00
		Social forest and coastal nursery development work, Market tie up , buyers and sellers meet arrangements, fish storage Boxesand miscellaneous work	Buyers & sellers meeting, market tie up, social forest, Nursery unit, operational and Feedback report of users	20.00
			Total	**200.00**
FC = Rs. 2.00 cr. TC Nil. Pls refer Annex 7				

Activity	Institution	Justification	Action Plan (Tentative)		Output	Cost (Rs. Cr.)
Mapping and stabilization of sand dunes along the coast of Puducherry and Karaikal	Tourism Department	To conserve sand dunes to ensure protection of coast from natural hazards	1st year	Survey and mapping of sand dunes	Maps on distribution of sand dunes	0.40
			2nd Year	Choosing appropriate species of plant for stabilisation of sand dunes and planting	Initial steps for stabilization completed	0.50
			3rd year	Monitoring on growth of plant species	Monitoring report on sand dune stabilization	0.40
			4th Year	Monitoring of sand dunes continued and rectified in case of damages	Report	0.42
					Total	**1.72**
FC = Rs.1.72 cr. Technical Component = Nil. Pls refer annex 8						

Activity	Action Plan (Tentative)		Output	Cost (Rs. Cr.)
Mitigation of Climate change impact on coastal areas of Puducherry, Yanam and Karaikal thro Mangrove restoration and livelihood diversification	1st year	i. Survey and mapping of mangroves and identification of demo plots for restoration of mangroves ii. Planning for clearing of water ways and approach path for local communities at Thengathittu	Maps in distribution of mangroves and degraded areas	3.26
	2nd Year	i. Collection of data on physical and biological aspects including density and species composition of mangroves ii. Clearing of waterways	Assessment report on degradation areas	3.15
	3rd year	Establishment of mangrove nursery and aided natural regeneration and artificial regeneration in degraded areas	Nursery established and regeneration commenced	1.27
	4th Year	Assessment of effectiveness, growth, species composition and density and Capacity building and knowledge transfer on mangrove regeneration for continuation	Report on mangrove regeneration	0.4
			Total	**8.08 Cr.**
FC = Rs. 8.08 cr. TC Nil. Pls refer Annex 9				

Activity	Action Plan (Tentative) for one year		Output	Cost (Rs. Lakhs.)
Establishing Faecal Sludge Treatment Facility in Puducherry.	1st year	Baseline survey, preparing comprehensive Fecal Sludge Management and Treatment Plant design	Design, Erection and Commisioning of Treatment plant.	10.00
	1st& 2nd year	Erection and commissioning of the treatment plant.	Erection and Commissioning done	650.00
	2nd year	Capacity Building and implementation of Fecal Sludge Management Plan	Capacity Building activities done	40.00
			Total	**700.00 Lakhs**
FC = Rs.6.50 cr. Technical Component = 0.50 cr. Pls refer annex 10				

Activity	Institution	Justification		Action Plan (Tentative)	Output	Cost (Rs. Cr.)
Inventorization of untreated waste water discharged into the Coastal Zone of Puducherry UT and preparation of waste water management plan by adopting decentralized treatment technologies.	Department of Science, Technology & Environment	To ensure treatment of all sewage arising from settlement areas so as to prevent degradation of aquatic environment	Year 1	Inventorisation of sources of waste water especially domestic sewage and evaluation of performance of existing STPs and suggestions for improvement by engaging reputed scientific institution	Sources of point and non-point sources of pollution	1.0
			Year 1&2	Preparation of waste water management plan by adopting decentralized treatment technologies.	Plan for management of untreated discharge of waste water in drainage canals	1.0
			Years 2, 3 & 4	Design and Establishment of in-situ green technology pilot sewage treatment plants and capacity building to PWD officials for operation and maintenance	Pilot plant established and operated	16.0
					Total	**10.00**
FC = Rs.10.00 cr. Technical Component = Nil. Pls refer annex 11						

Activity	Institution	Justifications	Action Plan (Tentative)		Output	Cost (Rs. Cr.)
Establishment of State Project Management Unit (SPMU) along with creation and maintenance of ICZM database	Department of Science, Technology & Environment	Co-ordination of all ICZM project activities and develop a coastal database for better planning of coastal developmental and environmental activities	1st year	Organising SPMU, Recruitment of manpower and Constitution of Steering and Technical Advisory Committees. ICZM project co-ordination	SPMU established	3.10
			2nd Year	Procurement of hardware and software for database and development of software	Data centre established	3.71
			3rd year	Project data organization and monitoring through SC and STAC	ICZM project mid-term report	2.75
			4th Year	Continued database management and project evaluation	Report on project activities and bulletin on project	2.75
					Total	**12.31**
FC = Rs.12.31 cr. Technical Component = Nil. Pls refer annex 12						

BASE DOCUMENT FOR INTEGRATED COASTAL ZONE MANAGEMENT PROJECT FOR THE U.T. OF PUDUCHERRY

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

सत्यमेव जयते
Government of Puducherry

Submitted by
Department of Science, Technology and Environment
Government of Puducherry

Prepared by
Government of Puducherry in
association with
National Centre for Sustainable Coastal Management (NCSCM)

NCSCM

May 2019

BASE DOCUMENT FOR PREPARATION OF INTEGRATED COASTAL ZONE MANAGEMENT PLAN FOR UNION TERRITORY OF PUDUCHERRY

EXECUTIVE SUMMARY

The Ministry of Environment, Forests and Climate Change (MoEFCC) has an ongoing project on Integrated Coastal Zone Management (ICZM) in three states of India. Next, the MoEFCC has planned to undertake Phase II of the ICZM project. The Government of Puducherry has decided to participate in the project and submitted a brief ICZM proposal on "Stewardship for Beach Restoration and Enhancing Coastal Ecology and Livelihoods".

As requested by the MoEFCC, the nodal Department of Government of Puducherry for ICZM namely the Department of Science, Technology and Environment (DSTE) has initiated action to prepare the Preliminary Project Report and related documents in association with National Centre for Sustainable Coastal Management (NCSCM) for submission to the MoEFCC.

The Union Territory of Puducherry is constituted of two revenue districts, namely Puducherry and Karaikal, and 2 sub-taluks (Mahe&Yanam). While Puducherry and Karaikal are interwoven with the State of Tamil Nadu, Mahe are Yanam are located within the states of Kerala and Andhra Pradesh respectively. Puducherry's vision is to ensure environmental sustainability and social justice by implementing an integrated coastal zone management plan. The major problems that have been identified are coastal erosion, pollution of coastal waters especially by sewage, unplanned disposal of solid wastes, reduction in fishery resources resulting in greater (capital) inputs and effort by the fishing communities and rapid urbanization and escalation of tourism.

To address these various issues in a comprehensive manner, integrated coastal zone management is advocated by the preparation of an integrated coastal zone management plan for the two districts of Puducherry. Along with this, a total of 12 projects in the three priority investment areas have been identified. A priority for Puducherry is tourism along with pollution control and livelihood enhancement. The projects that have been identified for priority investment fall in three major categories of livelihood enhancement, conservation, and pollution control; supported by capacity building activities. The projects are planned for a four year period and the total outlay is approximately Rs 111.9 cr.

TABLE OF CONTENTS

1. INTRODUCTION

The coastal zone is of high importance due to the land-ocean interface. Apart from ecosystems that provide a variety of services, economic activities of high importance such as shipping and fishing take place in this zone. For many such activities, structures have to be built along the shore and habitats have had to be altered. These have led to loss of beaches, ecosystem degradation and the increased impact of coastal hazards. With multiple activities converging in the coastal space, for sustainable development, an integrated approach is required.

The Ministry of Environment, Forests and Climate Change (MoEFCC) has an ongoing project on Integrated Coastal Zone Management (ICZM) in the coastal states of Gujarat, West Bengal and Odisha. In order to undertake ICZM related project activities in the other Coastal States and Union Territories (UT), the MoEFCC has planned to undertake Phase II of the ICZM project. The Government of Puducherry has decided to participate in the project and submitted a brief ICZM proposal on "Stewardship for Beach Restoration and Enhancing Coastal Ecology and Livelihoods".

As requested by the MoEFCC, the nodal Department of Government of Puducherry for ICZM namely the Department of Science, Technology and Environment (DSTE) has initiated action to prepare the Preliminary Project Report and related documents in association with National Centre for Sustainable Coastal Management (NCSCM) for submission to the MoEFCC.

2. BASIC PROFILE OF THE STATE

2.1. Puducherry Union Territory

Puducherry, earlier known as Pondicherry, became an integral part of India in 1954. It is a Union Territory and hence, the administration falls directly under the Federal government. The Centre is represented by the Lt Governor. Puducherry is also one of the two UT entitled by special constitutional amendments to have an elected legislative assembly and a cabinet of ministers, thereby enjoying partial statehood powers. While the government can make laws with respect to specific matters, at least some of the legislation require assent from the President of India.

The Union Territory of Puducherry (Fig. 2.1) is constituted of two revenue districts, namely Puducherry and Karaikal, consisting of 264 census villages, 129 revenue villages, 6 taluks (4 in Puducherry and 2 in Karaikal) and 2 sub-taluks (Mahe&Yanam). While Puducherry and Karaikal are interwoven with the State of Tamil Nadu, Mahe are Yanam are located within the states of Kerala and Andhra Pradesh respectively (Fig. 2.2).

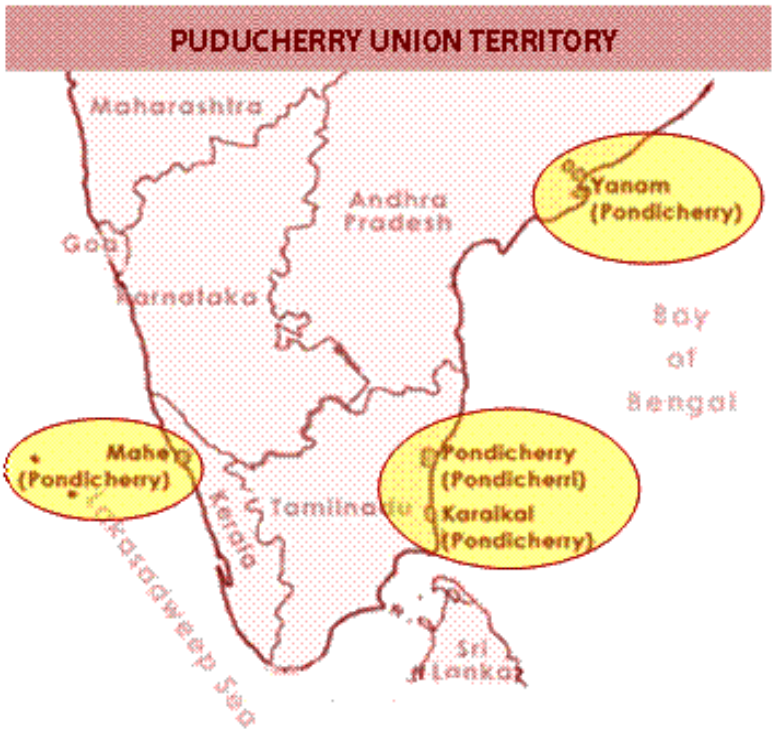

Fig. 2.1:Puducherry Union Territory

For the purpose of Development administration, the Territory is divided into six blocks namely (i) Ariyankuppam block (Karikalampakkam) (ii) Oulgaret block (Reddiarpalayam) (iii) Vilianur block (iv) Karaikal block (v) Mahe block and (vi) Yanam block consisting of 47 circles of village level units.

Puducherry Panchayats Act of 1973 & Municipalities Act of 1973 came into force in 1974. There are five municipalities, namely Puducherry, Oulgaret, Karaikal, Mahe and Yanam. There are 10 Commune Panchayats, namely, (i) Villianur (ii) Mannadipet (iii) Ariyankuppam (iv) Bahour (v) Nettapakkam (vi) Tirunallar (vii) Neravy (viii) Nedungadu (ix) Kottucherry and (x) T.R. Pattinam.

The total population of the UT is 12.48 lakhs (as per 2011 census) and the details are given in Table 2.1.

Table 2.1. Demography and Geographic details of UT of Puducherry

No	Name of District	Location	Area (sq.km)	Coastline	Population (2011) Census 2011	Population density (per sq.km)	Sex Ratio	Literacy Rate	% Growth rate (2001 to 2011)
1.	Puducherry	11.9310° N, 79.7852° E	294	24	9,46,600	3231	1031	86.13	29.23
2.	Karaikal	10.9327° N, 79.8319° E	157	20	2,00,314	1252	1048	87.83	17.23
3	Yanam	11.7011° N, 75.5367° E	30		55,616	3271	1039	80.26	77.19
4	Mahe	16.7333° N, 82.2500° E	9	1	41,934	4569	1176	98.35	13.54

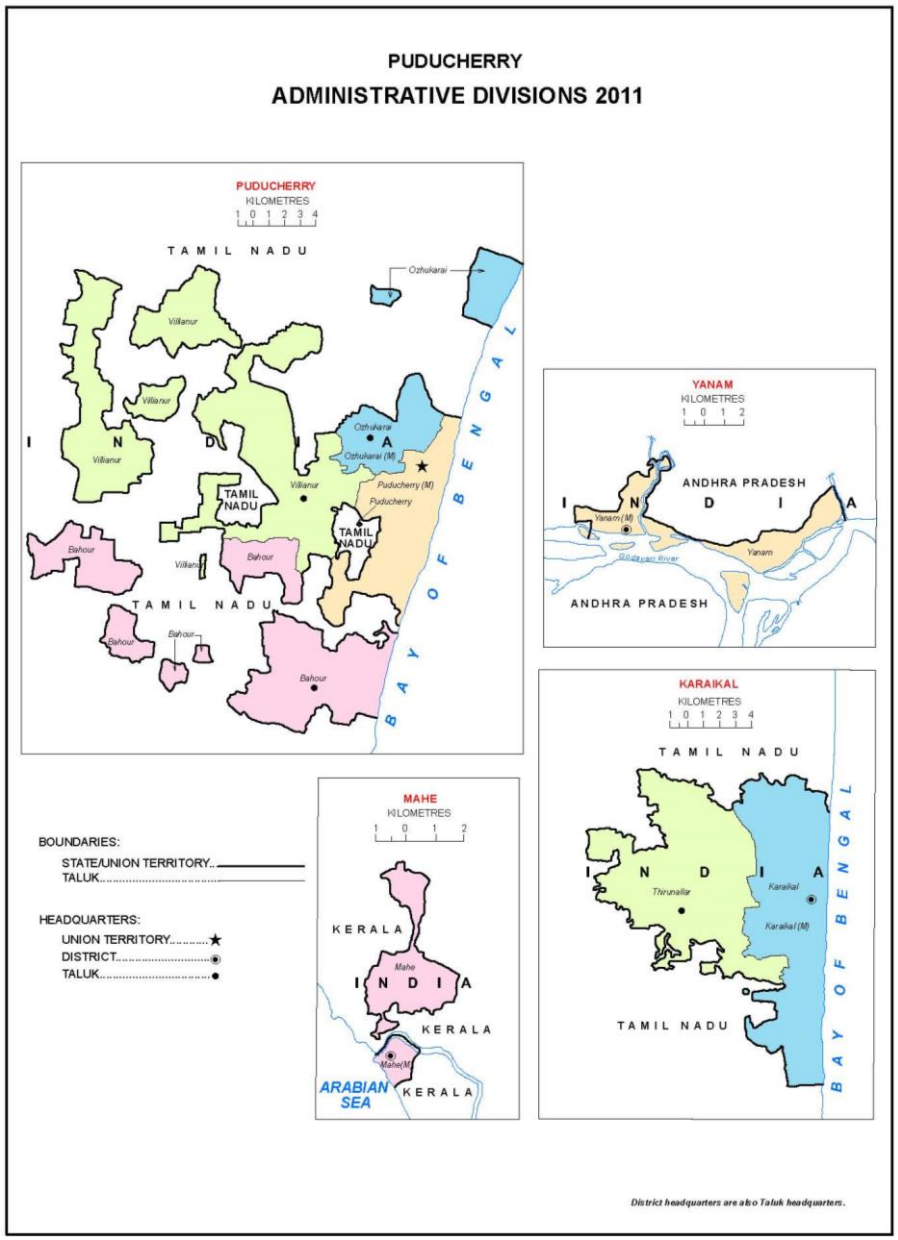

Fig.2.2 Map of Union Territory of Puducherry (Census of India, 2011)

2.2. Puducherry's Vision for ICZM

Puducherry's vision is to ensure environmental sustainability and social justice by implementing an integrated coastal zone management plan. To achieve this vision, a set of guiding principles have also been listed:

- Use of ecosystem based approach which recognizes the relationships and inter-linkages between all components of the wider ecosystem including the human/social component;

- Coordination, integration and co-management - Environmental management efforts will be integrated across all sectors and programmes that strengthen co-management of resources and stakeholder involvement will be developed and implemented.

- Use of a participatory and inclusive approach, which entails involvement of stakeholders and consensus building on matters of planning and decision making.

- Application of precautionary principle. Where information is inadequate for decision making, the precautionary principle will apply. Lack of sufficient scientific information should not prevent implementation of measures to minimize potential harm to the environment;

- Application of best available science and adaptive management systems where the best available knowledge, scientific information and data are used to support application of ICZM;

- Promotion of stewardship and societal ownership in coastal resource management to ensure sustainable development for posterity;

- Application of multiple resource use management; adopting integrated approach to manage ecosystems as a whole to jointly address impacts on both ecosystems and on the environment including the transboundary issues;

- Application of the polluter pays principle, where those who pollute or damage the coastal and marine environment, meet the cost of cleaning and the cost of the pollution to resource users. Such costings should be identified and quantified as an integral part of the earliest planning processes;

- Provision for a balance between development and conservation requirements to ensure conservation and sustainable development of the coastal zone;

3. COASTAL PROFILE

3.1. Physiography

Pondicherry Region is a flat plain with an average elevation of about 20-25 metres above mean sea level. The region however can be divided into four physiographic units viz., marine plain, fluvial plain, and uplands of limestone, and sandstone. The marine plain stretches along the Bay of Bengal for about 22 km with a width ranging from 400 to 600 metres. The sea coast has a narrow flat beach with the sea almost touching the plain land at places. The marine plain consists of gently sloping lands with sand dunes. Other characteristic coastal land forms such as creeks and lagoons are also observed in it. The tidal flats extending along the coastal stretch are narrow, except around the Ariyankuppam estuary. Along the Puducherry coast, beaches are generally narrow and are undergoing severe erosion along the northern segment whereas in the southern segment, beaches are comparatively broad and depositional. Barrier dunes are seen as continuous mounds between Ariyankuppam, Kirumambakkam, Manapattu and Narimedu areas. Dunes are also seen almost on the entire coast except at Manaveli, Pooranankuppam and Manapattu coastal blocks (Fig. 3.1).

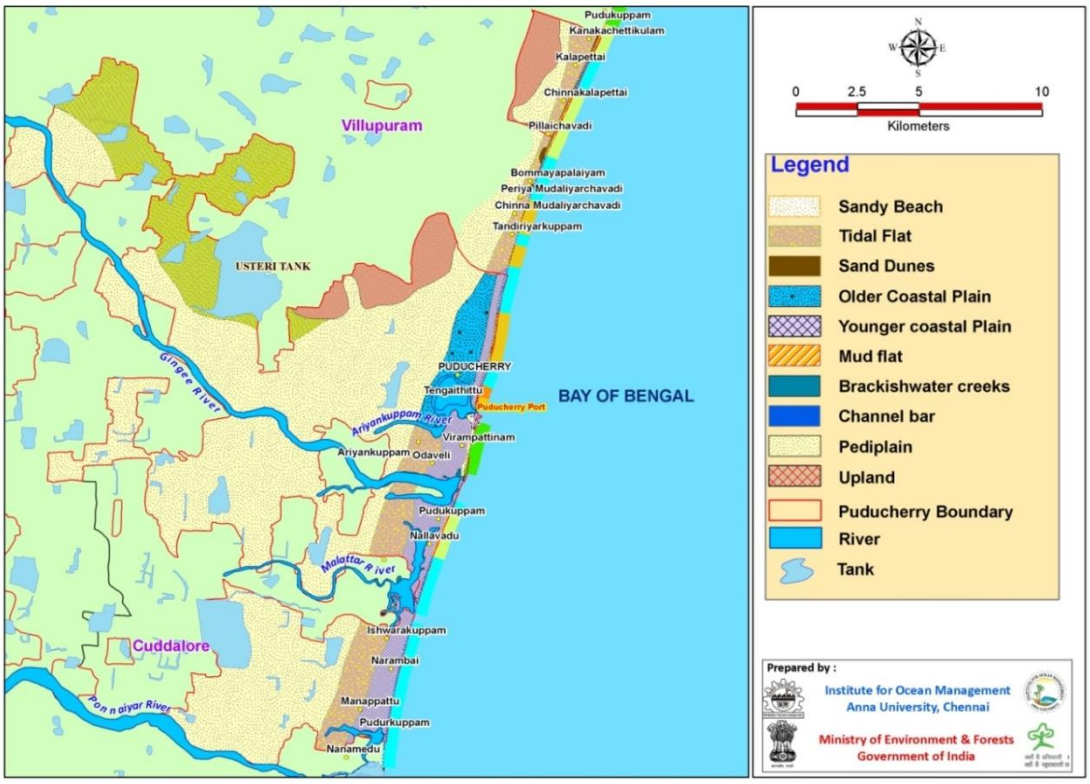

Fig. 3.1: Coastal Geomorphology of Puducherry[1]

Karaikal Region is a monotonous plain with elevation not more than four metres at any point except in sand dune areas. Effect of aeolian action is seen in the coastal area of Karaikal in the form of sand dunes. Coastal physiographic units identified are creeks and lagoons and sandy plain with sand dunes occurring on the coast (Fig. 3.2)[2].

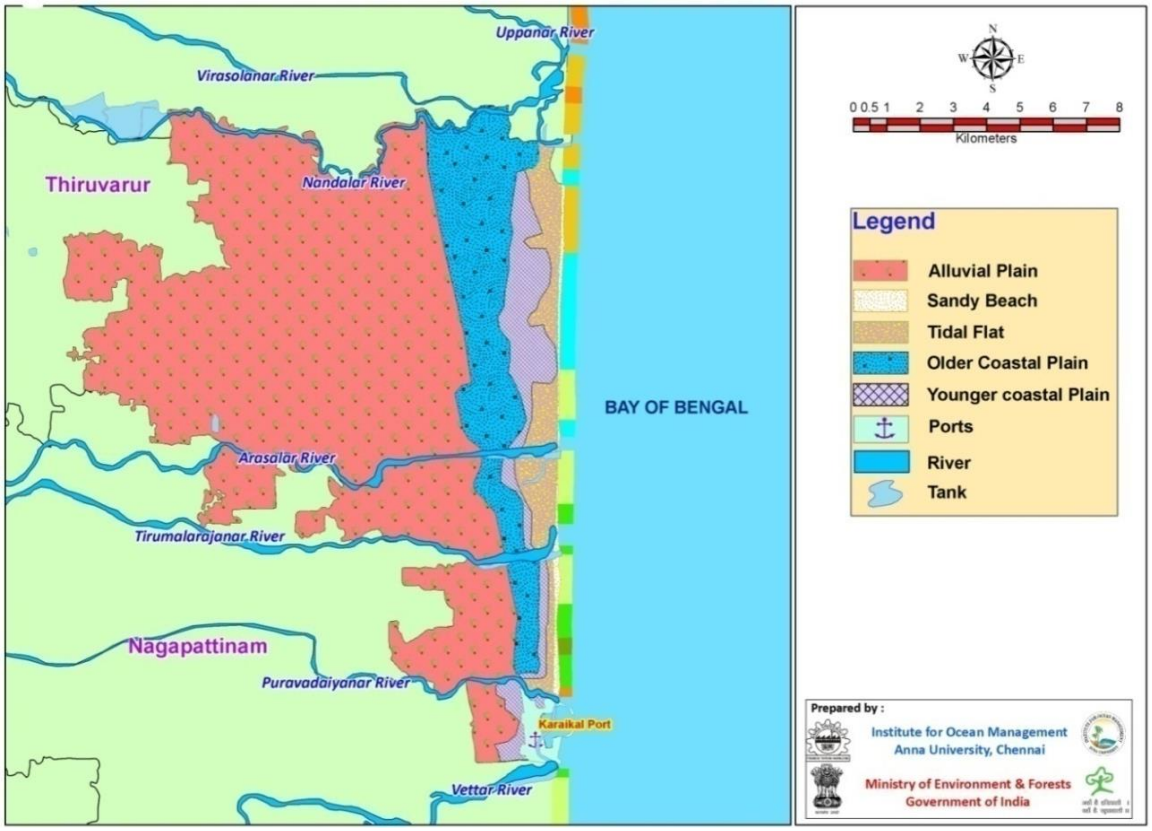

Fig. 3.2: Coastal Geomorphology of Karaikal[3]

Rivers and Water Bodies

The major rivers are Gingee River or Senji River (79 km Long) and Pennaiyar River forming the border between Tamil Nadu and Puducherry. Gingee River flows diagonally from north-western to south-eastern side, while Pennaiyar River constitutes the southern boundary of Puducherry. An arm of Pennaiyar River known as Malattar streams through the Puducherry. Arasalar, a branch of the Cauvery River below the Grand Anicut, along with its branches Nattar, Vanjiar, Nular, Nandalar, Puravadaiyanar and the Tirumalarajanar flow through Karaikal. The town of Yanam is ;located within the state of Andhra Pradesh and lies on the spot where the River Coringa (Atreya) branches off from Gauthami into two parts. The Rivers Mahe (Mayyazhi) and

Moolakadavu flow through Mahe area which is an enclave within the state of Kerala on the west coast. As the rivers form estuaries/creeks along the coast, dense to sporadic mangrove formation is found. While the mangroves of Yanam (part of Coringa mangroves of Andhra Pradesh) are spread over 1 sq.km area, the mangroves of other districts are patchy in nature.

Climate

May and early part of June constitute the hottest period of the year, with the mean daily maximum temperature of about 37°C and minimum temperature of about 27°C. Rainfall is mainly received during the northeast monsoon, from October to December averaging about 1240 mm.

During the south west monsoon between March and September, the wind blows predominantly from the west and south-west directions. From June through August, strong wind is experienced from the south-west direction in the morning, from south during afternoon and from south-east at night. The north-east monsoon begins in October. Wind first blows from the coast then changes to the northern direction in December and gradually decreases in force during January and February. The direction also changes from northeast to east. The average wind velocity during north-east monsoon is 8.7 km hr^{-1} at 08.30 hr and 12.5 km hr^{-1} at 17.30 hrs. During summer, winds blow at 10.2 km hr^{-1} at 08.30 hr and 18.1 km hr^{-1} at 17.30 hrs. The maximum wind speed is about 19km hr^{-1} in this region. The basic wind speed at 10m height for Puducherry coast[4] has been estimated to be 50 m sec^{-1}.

The annual and season-wise rainfall pattern for 2015 are given in Tables 3.1 and 3.2

Table 3.1: Annual Rainfall 2015[5] (values in mm)

Sl. No.	Month	Puducherry		Karaikal		Mahe		Yanam	
	Rainfall	Days	Rainfall	Days	Rainfall	Days	Rainfall	Days	Rainfall
1	January	1	16.0	1	10.8	-	-	-	-
2	February	-	-	-	-	-	-	-	-
3	March	-	-	-	-	1	21.4	-	-
4	April	3	105.2	3	83.5	8	97.8	2	17.2
5	May	6	115.2	6	99.6	9	205.4	1	68.6
6	June	3	9.6	3	62.7	26	688.6	10	296.6
7	July	7	57.6	1	21.1	24	804.8	7	169.2

Sl. No.	Month	Puducherry		Karaikal		Mahe		Yanam	
	Rainfall	Days	Rainfall	Days	Rainfall	Days	Rainfall	Days	Rainfall
8	August	8	148.0	1	38.8	19	314.8	14	204.6
9	September	3	114.0	2	67.6	14	322.8	6	122.0
10	October	7	80.8	6	94.5	14	290.2	5	92.4
11	November	20	834.8	14	754.7	9	126.0	7	179.2
12	December	8	900.4	11	477.6	1	5.6	-	-
	Total	**66**	**2381.6**	**48**	**1710.9**	**125**	**2877.4**	**52**	**1149.8**

Table 3.2: Season-wise Rainfall Particulars of Puducherry U.T. for the year 2014-15 (values in mm)

Sl. No.	*Month/ Season*	*Puducherry*		Karaikal		*Mahe*		*Yanam*	
		Days	*Rainfall*	*Days*	*Rainfall*	*Days*	*Rainfall*	*Days*	*Rainfall*
1	Jun-14	2	111.0	3	49.3	22	537.8	2	39.2
2	July-14	4	50.2	-	-	28	1011.6	7	127.8
3	August-14	8	74.0	3	33.3	24	723.0	5	78.6
4	September-14	8	210.0	4	79.8	16	264.6	8	122.2
	South West Monsoon	22	445.2	10	162.4	90	2537.0	22	574.0
`	October-14	15	418.0	14	429.2	16	229.4	6	144.0
6	November-14	8	209.2	13	356.4	4	60.4	3	36.4
7	December-14	6	83.6	9	132.2	1	10.4	-	-
	North East Monsoon	29	710.2	36	917.8	21	300.2	9	180.4
8	Jan-15	1	16.0	1	10.8	-	-	-	-
9	February-15	-	-	-	-	-	-	-	-
	Winter Period	1	16.0	1	10.8	-	-	-	-
10	March-15	-	-	-	-	1	21.4	-	-
11	April-15	3	105.2	3	83.5	8	97.8	2	17.2
12	May-15	6	115.2	6	99.6	9	205.4	1	68.6

Sl. No.	Month/ Season	Puducherry		Karaikal		Mahe		Yanam	
		Days	Rainfall	Days	Rainfall	Days	Rainfall	Days	Rainfall
	Hot Weather Period	9	220.4	9	183.1	18	324.6	3	85.8
	Annual Total	61	1391.8	56	1274.1	129	3161.80	34	840.2

Note : The days of Rainfall is being calculated as if Rainfall is more than or equal to 2.50 mm will be 1 day.

3.2. Natural Resources

Puducherry is devoid of any natural forest. Forest plantations have been raised in small patches (less than 10 ha) since 1980 under the Social Forestry and other programmes.

According to reports, the coastline from Marakkanam to Karaikal was once covered with thick mangrove vegetation. Their remnants as relics can be seen in the Marakkanam area, the Arasalar estuary in Karaikal and in Ariyankuppam river banks. The Ariyankuppam estuary is seasonally bar-built, it flows eastwards and empties into the Bay of Bengal at Veerampattinam carrying wastes from the adjacent agricultural lands and industries in addition to domestic municipal and industrial effluents[6].

In Puducherry, mangroves currently exist as fringing vegetation distributed along the banks of the Ariyankuppam estuary/backwaters. Though the waterway is a tributary of the river Gingee, freshwater input to this mangrove area is minimal and it receives municipal and agricultural discharges. This tide-dominated estuary opens into the Bay of Bengal. A recent study found that the channels are lined by a luxuriant vegetation of small saltmarsh plants, trees, shrubs and thickets, totalling about seven true mangrove species belonging to three families and four genera including *Avicennia, Rhizophora, Acanthus* and *Bruguiera*; and 16 mangrove associate plants belonging to12 families. A total of 76 species were recorded from four stations including molluscs 37 (bivalves 16 and gastropods 21), crustaceans (22), amphipods (7), polychaetes (6), barnacles (3) and oligochaetes(1). Five species of turtles were found in the coastal water and theOlive Ridley turtle was found to be nesting in the Puducherry coastal area[7]. The authors write that the piercing odour of Hydrogen Sulphide could be smelt during the field investigations indicating high pollution.

There are three major inland water bodies in Puducherry: Ousteri, Kaliveli Tank and Bahour Lake.

Ousteri Lake[8] is located partly in Pondicherry and partly in Tamil Nadu near Ossudu village in the Villanur commune panchayat, about 12 km from Pondicherry, north of the Kaveri River. The lake depends on its catchment for 75% of its water, the rest comes from diversion channels. The lake is fed by local run-off and an intermittent river and has a bund on its western bank. It has an average depth of 1 m and dries up completely in summer. Besides being an internationally important site for migratory birds, the lake's most valuable use is for irrigation. The lake has rich floral diversity of over 200 species of plants belonging to 60 families. Part of the bund is well protected by trees. It has extensive aquatic flora of the floating, submerged and emergent type. Ousteri is an important area for migratory waterfowl and regularly holds over 20,000 birds belonging to more than 40 species. A number of threats have been identified and include agriculture and aquaculture, biological resource use, human intrusions and disturbance, pollution, residential and commercial development.

Kaliveli Tank[9] is a semi-permanent, fresh to brackish water lagoon, which empties into the sea through a narrow channel connecting the tank with the Yedayanthittu Estuary to the northeast. The water level in the tank fluctuates according to precipitation; the tank reaches its maximum extent at the end of the Northeast Monsoon, and in years of low rainfall, dries out completely for a few months during the summer. At such times, the encroachment of paddy fields reduces the size of the tank by as much as one third. The average depth of water at the end of the monsoon is about 1 m, and the maximum after heavy rainfall, about 2 m. By the end of the monsoon, the lagoon is normally full of fresh water, from the run-off from neighbouring farmland. Subsequently, as the inflow of fresh water diminishes, there is some inflow of seawater from the estuary, and the lagoon becomes brackish, particularly at its northern end. The lagoon is occasionally flooded by seawater during cyclonic disturbances (Scott 1989). Yedayanthittu estuary lies about 3 km to the northeast of the tank. This estuary has large areas of inter-tidal mudflats, but only tiny relicts of the once extensive mangrove forests now remain. There are some 500 ha of saltpans alongside the estuary immediately to the north of the Marakkanam road bridge across the channel from Kaliveli Tank. Until about 25 years ago, the entire region was heavily forested, but almost all the forest has been cleared, and the tank and estuary are now surrounded by cultivation and scrubby thorn woodland. There are some low sand dunes by the channel linking the tank to the estuary.

The Kaliveli watershed extends from Auroville Plateau south for about 30 km and has an area of approximately 25,000 ha (Scott 1989). These sites have a wide variety of sedges and grasses, interspersed with barren sandy areas and muddy margins. As the lake fills with fresh water in November, numerous aquatic plants germinate. Amongst the many species of algae in the brackish areas, *Enteromorpha intestinalis* is particularly common. There are extensive reed beds and sedges in the less saline areas. A few straggly mangrove bushes are all that remain of what must once have been a large mangrove forest. The wetlands are situated amidst agricultural land and arid thorn scrub. The Tank and the estuary are extremely important staging and wintering areas for a wide variety of migratory waterfowl. This site easily qualifies A4i (1% of biogeographic population) and A4iii (= 20,000 waterbirds) criteria. By the presence of globally threatened and many Near Threatened species, it also qualifies A1 (Threatened Species) criteria.

Bahour Lake is a major tourist spot in Puducherry. Bahour Lake is the second largest wetland in Pondicherry. It is located near the Bahour village about 20 km from Pondicherry city, north of the Pennaiyar River. It is a seasonal freshwater wetland that receives water during the monsoon between September and March. The lake is dry for about 5 months. Threats include agriculture and aquaculture, biological resource use, pollution and natural system modification.

3.3. Socio-economic profile

Agriculture is the most important occupation in Puducherry being a source of livelihood for 32% of the population. Table 3.3 gives the worker participation in the different regions of Puducherry indicating that the agriculture sector still draws a large number of people.

Table 3.3: Workers according to Census 2011

Sl. No.	Item	Unit	Puducherry	Karaikal	Mahe	Yanam	State
1	Number of Main workers						
	Male	No.	237953	46928	8295	13233	306409
	Female	"	77617	11414	2109	2140	93280

Sl. No.	Item	Unit	Puducherry	Karaikal	Mahe	Yanam	State
2	Category of Main workers						
	Cultivators	"	8405	2052	23	283	10763
	Agricultural Labourers	"	38854	8740	57	2956	50607
	Household Industry workers	"	5203	992	60	118	6373
	Other workers	"	263108	46558	10264	12016	331946

3.3.1. Agriculture

Table 3.4 provides details on agriculture and animal husbandry in Puducherry during 2013-14.

Table 3.4: Profile of Agriculture and Animal Husbandry 2013-14

Item	Unit	Puducherry	Karaikal	Mahe	Yanam	Union Territory
Net sown area	Hectares	9812	4340	584	679	15415
Gross area	hectares	16066	4446	24	599	21135
Food grains production	MT	37066	10920	-	1912	49898
Milk production	MT	35338	10739	329	1229	47635
Egg production	In lakh no.	71.09	35.71	2.12	4.41	113.33

3.3.2. Fisheries

Puducherry UT has a fishermen population of about 95,467 of which 29,383 nos. of fishermen are actively engaged in fishing from 27 marine fishing villages and 23 inland fishing villages/hamlets scattered in and around Union Territory of Puducherry. This Union Territory is also endowed with 2052 Ha of fresh water area in the form of Ponds and Tanks suitable for both capture and culture fishery. 1209 Ha of brackishwater area are available for undertaking brackish water fish and prawn culture.

The profile for Puducherry UT generated by the 2011 CMFRI Marine Fisheries Census is given in Table 3.5.

Table 3.5: Fisheries Profile for Puducherry UT

District	Landing centres	Fishing village	Fishermen families	Traditional Fishermen families	BPL families	Fisherfolk population
Yanam	0	12	3754	3752	3618	14893
Puducherry	16	17	7088	7086	5193	25892
Karaikal	8	10	3077	3060	2072	11294
Mahe	1	1	352	350	115	2548
Total	25	40	14271	14248	10998	54627

Like in most places, women outweighed men in fishing allied activities (largely in the post- harvest sector) accounting about 75%. Among the major fishing allied activities women dominated in marketing of fish (98%), curing/processing (98%) and peeling (90%).

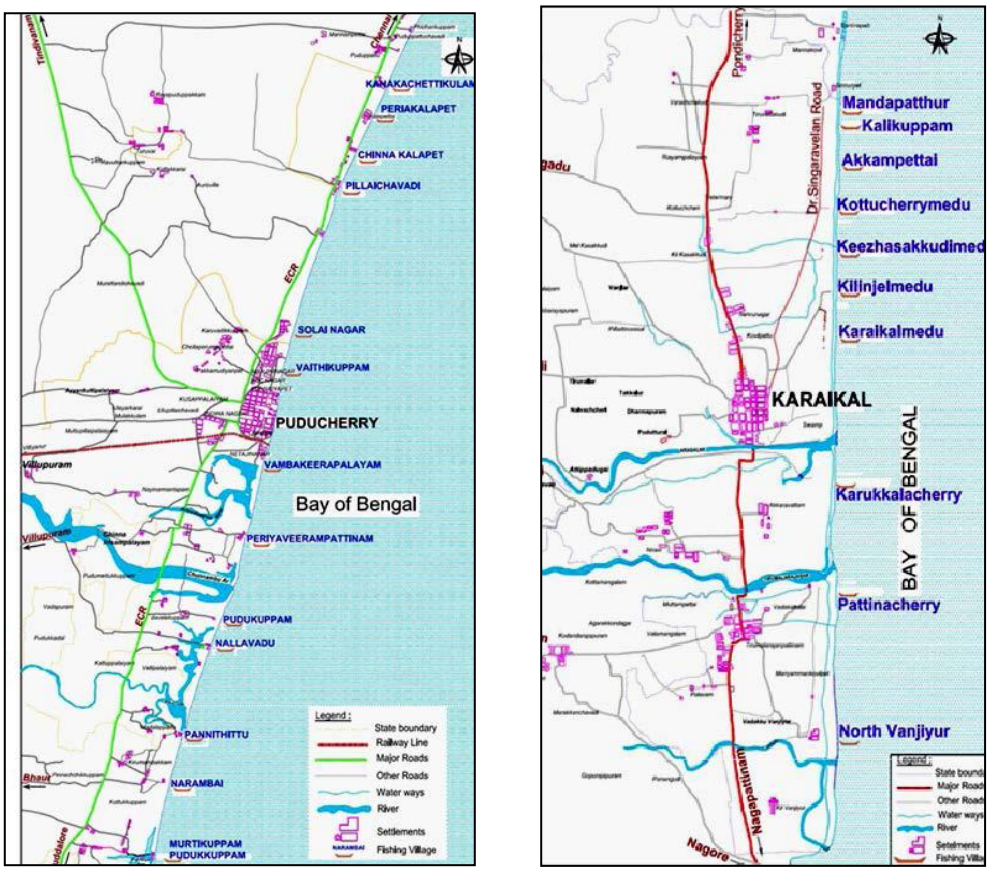

Fig. 3.3: Fishing Villages of Puducherry (left) and Karaikal (right)[10]

3.3.3. Land Use Change

Analysis of change in Land use land cover from 1970-2002 (Fig. 3.4) showed a sharp reduction in the area under crop land in Puducherry. There has been a rapid increase in the area under settlements. In the decade and a half since then, much more changes have occurred and the trend is towards rapid urbanization. Cyclones and floods of recent years also have played a role in the change in LULC.

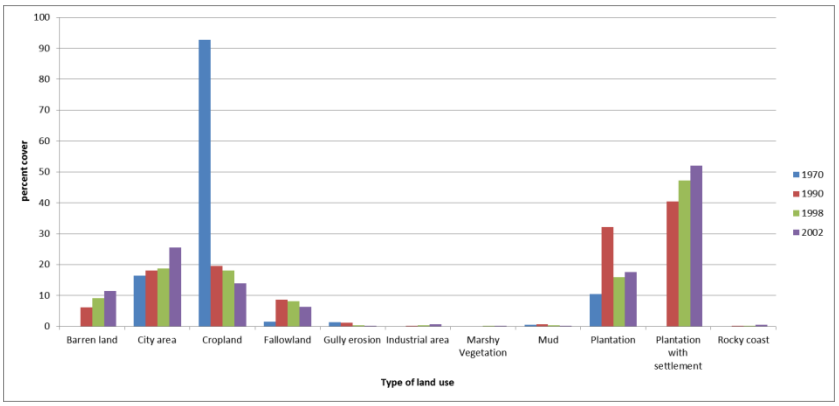

Fig. 3.4: Land Use change from 1970-2002

Source of data: Nagamani and Ramachandran (2003)[11]

4. KEY ACTIVITIES AND ISSUES

4.1. Key Activities

- **Shipping: Ports & Harbour**

The Minor Port of Puducherry is situated in the East Coast of India between two Major Ports of India namely, Chennai and Tuticorin. It is an open roadstead anchorage port situated about 170 kms south of Chennai in position 11º 56' N, Longitude - 79º 50' E and is suitable for lighterage operations during fair weather months (February to September). Various services offered include dredging, conservancy, operation and maintenance of Light Houses at Karaikal and Mahe, berthing facilities for lighters, cargo boat, fishing boats, tourist boats, storage facilities, container handling and stuffing/de-stuffing of cargo at the Inland Container Depot (ICD) at New Port Area, supply of fresh water to vessels berthed alongside pier/quay and supply of stores to ships and slipway for dry docking of vessels up to 150 tons[12].

MARG Karaikal port is located on the Eastern coast of India in Karaikal District of Puducherry state around 300 Km along the coast south of Chennai. The Port is at Vanjore Village, Karaikal Taluk, Puducherry at a latitude of 10^0 50' N and 79^0 51'.The Shoreline of the port falls between 10^0 50' 56" N and 10^0 49' 44" N. The Port is situated between the banks of Pravadayanar and Vettar rivers. Karaikal Port Private Ltd (KPPL) was awarded the concession to develop and operate the Karaikal deep-water port project by the Government of Puducherry. MARG Karaikal Port is envisaged to have a total of 9 berths capable of handling 47 MMTPA by 2018. The port is envisioned to be developed in 3 phases with the final phase getting operational in 2017. Phase - I of development, which was completed in April 2009, comprises two Panamax size general cargo berths. The Port hosts various other infrastructure facilities such as covered warehousing, open storage and Mobile Harbour Cranes. The Port has excellent evacuation facilities with 3 railway sidings and National Highways within a kilometre from the gate. An area of around 600 acres is covered by the Port boundaries[13].

4.1.2. Marine fisheries

As mentioned earlier, the Union Territory has about 2052 Ha of fresh water area in the form of Ponds and Tanks suitable for both capture and culture fishery. 1209 Ha of Brackish water area are available for undertaking Brackish water fish and prawn culture.

The total production during 2014 is reported to be 65393 tonnes[14] while it was 71193 tonnes in 2013-14 and 68726 tonnes in 2013.

The top ten species contributing to the production in 2014 are given in Table 4.1.

Table: 4.1 Top 10 species contributing to production in 2014

No.	Species/ Group	Landings
1	Silverbellies	15264
2	Other sardines	13834
3	Indian mackerel	3245
4	Penaeid prawns	2810
5	Other clupeids	2578
6	Croakers	2199
7	Threadfin breams	2118
8	Oil sardine	2029
9	Other carangids	1773
10	Thryssa	1613

The Puducherry Marine Fishing Regulation Act (PMFRA), 2008 was notified on 14th October 2008 and the Rules thereon during the year 2009 (on 6th October 2009). The Puducherry Fisheries Department has planned the following schemes for 2015-16[15]:

i. Development of Fresh Water / Brackish water aquaculture and setting up of aquarium, ornamental fish culture and breeding centre
ii. Development of marine fisheries / shore based facilities, reimbursement of sales tax on HSD oil used by mechanized fishing vessels, assistance to small scale fishermen, infrastructural facilities and quick transport facilities.
iii. Information, Publicity, Training of fishermen, fisherwomen and fisheries personnel
iv. Strengthening of Fisheries Co-operative Institutions & Supply of subsidized fishery requisites to fishermen.
v. Welfare and relief for fishermen during lean seasons and natural calamities.
vi. Construction of Fishing Harbour at Mahe and Yanam
vii. Saving-cum-Relief for Marine Fishermen

In 2011, a project called Fisheries Management for Sustainable Livelihoods (FIMSUL) carried out detailed stakeholder and livelihood analysis for Tamil Nadu and

Puducherry. The study was carried out in Puducherry by FERAL and in Karaikal by SIFFS.

Some highlights from the reports are given below that describe the major issues as well as suggestions put forth by the fisher communities on the way forward.

Puducherry[16]: There has been a significant increase in fishing capacities post- tsunami in the study area which has resulted in redundancy of fishing craft and gear in most coastal villages. Like elsewhere along the coast, the fishing community in this region also perceives a deepening crisis in production and adduces this crisis to both natural and human causes. The community is well aware of the threats of over- fishing accompanied by a drastic depletion of resources. The world outside has also changed radically in these times and the social costs of survival has resulted in longer fishing hours and greater effort in fish vending in recent times. The women of the fishing community have traditionally borne the increasing burden, not merely in the domestic sphere but also in sustaining the livelihoods of the entire community. While this is appreciated within the community, it is difficult to document and is usually missed by policy makers and local authorities.

Karaikal[17]: There have been notable changes in the ecosystem of the coastline. There is a greater involvement in deep sea fishing with expansion of fleet and the reduction in nearshore resources. A decline in catch post-tsunami was observed. Industrial pollution has impacted fishery resources. Higher earnings by large boats (mechanised sector) are offset by higher input requirements. A number of species were reported to have disappeared. Fishermen are unaware of safeguarding the valuable resources under water. According to the fishermen, every village had a 40-70m wide beach which had reduced to 10-30m. The space is insufficient for their activities and the fishers also see polluted sand in the beach with garbage and polythene products.

4.1.3. Tourism

Tourism is an important activity in Puducherry with upwards of 10 lakh tourists (50000 from overseas). Some of the important tourism related projects include Beautification of Chunambar in Puducherry, Development of Nallambal Lake in Karaikal, Development of Arikamedu and Development of Oussudu Lake in Puducherry. The list of projects under progress/ upcoming is available at http://tourism.pondicherry.gov.in/projects-under-progress.html.

The tourist arrivals in Puducherry over the last 5 years are given in Table 4.2. A graphical representation of the total tourist arrivals is given in the Fig. 4.1

Table 4.2: Tourist Arrivals (numbers) in the Puducherry UT[18]

Item	Year	Puducherry	Karaikal	Mahe	Yanam	Union Territory
Foreign	**2014-15**	82714	494	78	5	**83291**
Domestic		912561	252055	12725	10752	**1188093**
Foreign	**2013-14**	45,401	554	0	0	**45955**
Domestic		791897	192227	8755	10598	**1003477**
Foreign	**2012-13**	52,295	636	--	--	**52931**
Domestic		759409	207859	7771	6675	**981714**
Foreign	**2011-12**	52,089	209	17,796	108	**70202**
Domestic		763240	134656	176075	48651	**1122622**
Foreign	**2010-11**	50,655	309	17,434	48	**68446**
Domestic		702305	133567	175431	25930	**1037233**

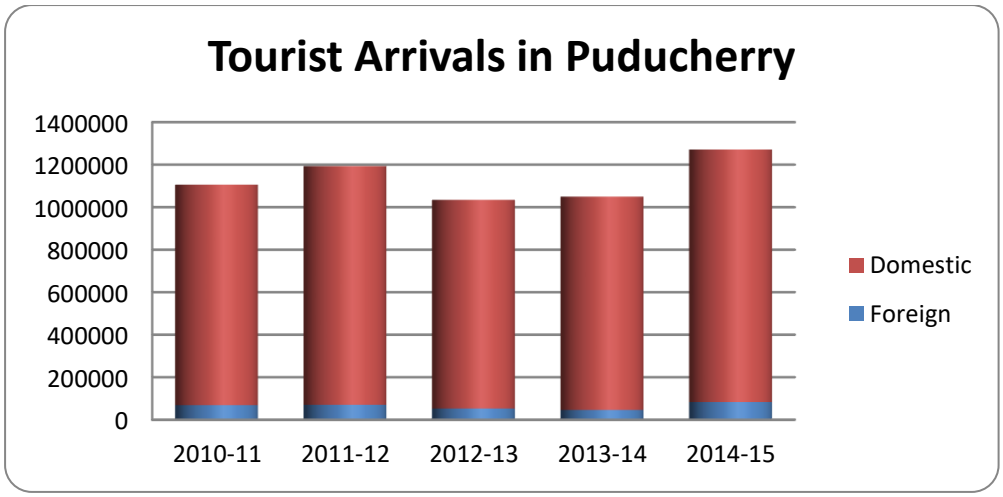

Fig. 4.1. Tourist Arrivals in Puducherry

4.2. Coastal Issues

The major issues of the coastal areas are beach erosion, pollution of water bodies, solid waste dumping, shrinkage of habitats like mangroves and geomorphic features like sand dunes, declining fishery resources, rapid growth of population and decreasing livelihood opportunities.

4.2.1. Shoreline Change

4.2.1.1. Erosion

Puducherry coast is facing the problem of shoreline erosion due to natural effects like wave force and littoral drift, and anthropogenic effects like construction of Breakwaters. In order to control coastal erosion, since 1969 the Puducherry Government constructed sea walls along the Puducherry town's coast.

The Puducherry harbour as an estuarine port was constructed in 1989 at the mouth of Ariyankuppam River with southern and northern breakwaters. The southern breakwater disturbed the littoral drift which transports sand from south to north for 9 months in a year, and as a result, severe erosion of beaches for a length of 8 km occurred on the northern side, including of the coast of adjoining Tamil Nadu (Fig. 4.2). Initially, sand bypassing was carried out by harbour authorities to prevent down drift erosion and to maintain channel free from siltation. Later, sand bypassing was discontinued due to various technical reasons. Puducherry and Tamil Nadu Governments resorted to various measures to protect the coast from erosion without conducting required studies on coastal processes which govern the movement of sediment.

A 6 km long seawall was constructed by UT Puducherry, which covers city of Pondicherry; and the coastal stretch (2 km) from Sodhanaikuppam to Thanthriyankuppam was protected by groin field combined with seawall by the Tamil Nadu government (Fig. 4.3). The erosion problem shifted further north with ChinnamudalaiyarChavadi experiencing increased erosion and losing many buildings to the sea. The fishing hamlets north of ChinnamudalaiyarChavadi and Chinnakalapettai village in UT of Puducherry were also protected by seawall. As on date, 8 km length of the coast is protected by seawall and groin field.

Only since 2000, the port department dredged 0.125 million cu m sand and nourished the northern side which marginally restored the lost beach. This situation made the Puducherry Government to find a permanent solution for protecting the coast from erosion. Since the hard structural measures to prevent erosion caused negative effects by shifting the erosion to the north, the Ministry of Earth Sciences, through the National Institute of Ocean Technology is executing a demonstration project on coastal erosion using soft engineering measures like submerged groin. The project has undertaken extensive coastal processes studies along the Puducherry coast and has designed a

submerged groin to protect 1.5 km long coast. Deployment of groin is likely to be completed by September, 2018

Fig. 4.2. Status of shoreline before and after construction of Puducherry harbour (Source: NIOT)

Fig. 4.3 Satellite image of coast of Puducherry town showing sea walls and harbour (Google Earth, 2014)

Fig. 4.4 Recovered pocket beaches north of breakwater after sand nourishment (Source: Port Dept, UT of Puducherry)

A comprehensive plan developed based on a regional coastal processes study adopting the concept of sediment cell would help address the problem in a holistic manner. NCSCM, Chennai has already demarcated sediment cell for the entire Indian coast. The Primary Cell No.14 between Palar river (TN) and Coleroon estuary (TN) covers the current problem area. Such a plan needs to be implemented *in toto* without resorting to piecemeal approach due to financial constraints. Besides, the plan also needs to take into account any future developmental activities like expansion of port or any other structure proposed to be established along the coastline. Also, all current efforts and resources of both Puducherry and Tamil Nadu will have to be taken in to account, while developing the integrated plan so that efforts and resources are pooled to avoid duplication and infructuous expenditure.

4.2.1.2. Siltation

The UT of Puducherry has Ginjee River (Chunnambar) and Ariyankuppam River in Puducherry, Arasalar (Kaveri) in Karaikkal, Godavari in Yanam and Mahe and Moolakadavu in Mahe. The river mouths experience siltation due to wave action especially during summer when the river flow which flushes the sand to the sea during

monsoon, decreases. The waves dominate the process and deposit the sand from nearshore to the coast including in river mouths. Siltation of river mouth decreases the depth; as a result the tidal flow is reduced. This causes difficulties in navigation of boats; also land based wastes accumulate in the estuaries. These wastes if not diluted by tidal water and flushed out to the sea, will result in the deterioration of the water quality affecting survival of organisms and also their diversity.

Among the river mouths, Ariyankuppam, Arasalar and Mahe are kept open for navigation of boats, but face siltation due to lack of maintenance dredging. The Godavari river mouth falls under jurisdiction of Andhra Pradesh. The Ginjee River, called Chunnambar at its lower region connecting to the Bay Bengal experiences heavy siltation as seen in Fig.4.4 Chunnambar estuary is a major tourist attraction and has considerable mangrove formation along the banks. Problems that arise due to siltation of river mouths have already been outlined. If the mouth of the estuary is kept open and maintained, it will ensure good tidal flow and improve the deteriorated water quality. It will also support good estuarine fisheries. Further, regular maintenance dredging is also necessary to keep open the mouths of these water bodies to ensure sustenance of biodiversity.

Fig. 4.5 Satellite image (2014) of Chunnambar mouth indicating heavy siltation

4.2.2. Urbanization

A very high level of urbanization is reported from the Union Territory. According to the 2011 census, while 69% of Puducherry is urban, 100% of Mahe and Yanam are urban while Karaikal reported the lowest urban population of 49.01%.

"The Puducherry Town & Country Planning Act, 1969" was brought into force on 15.09.1972 to exercise proper development control and to provide for planning the development and use of urban and rural lands in the Union Territory. Under this Act, necessary 'Rules' and 'Building Bye-laws and Zoning Regulations' were framed, and the same came into effect during the year 1972 and 1974 respectively. In order to effect development control and to discharge the duties and responsibilities conferred under the Act, Planning Authorities were constituted in each region i.e. Puducherry, Karaikal, Mahe and Yanam. Comprehensive development plans have been prepared for each of the regions except Mahe (Figures 4.6-4.8)[19].

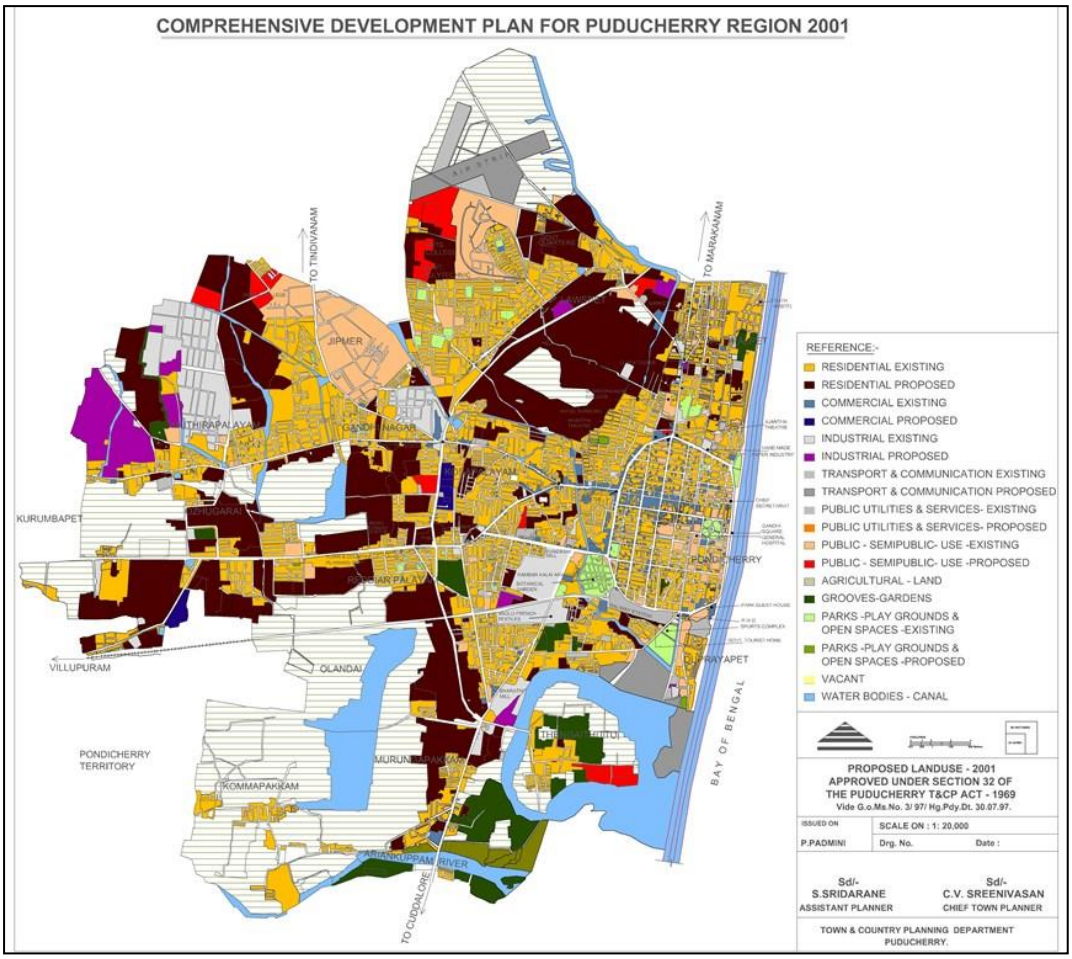

Fig: 4.6 Comprehensive Development Plan for Puducherry Region[20]

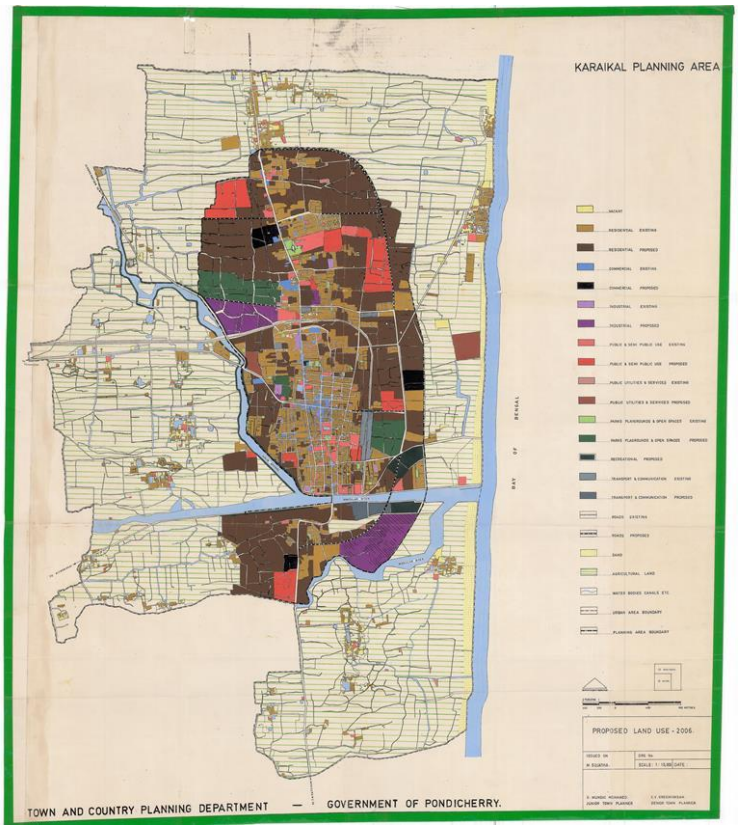

Fig. 4.7: Comprehensive Development Plan for Karaikal

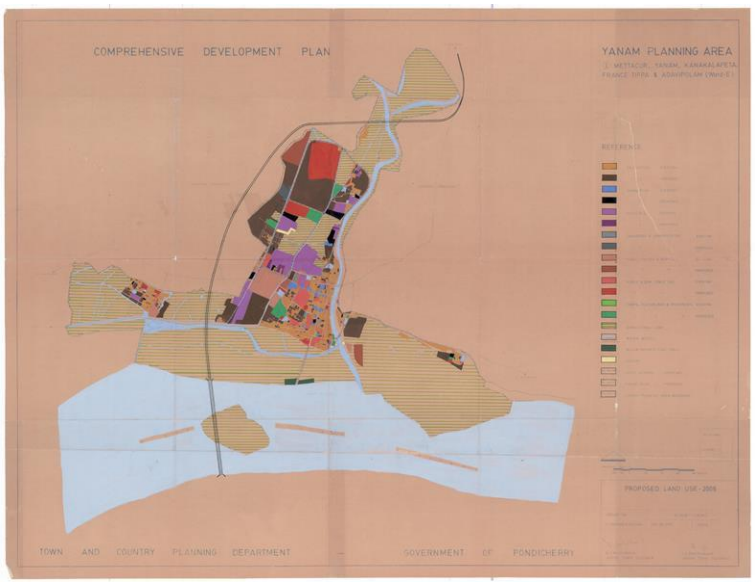

Fig. 4.8 Comprehensive Development Plan for Yanam

Recently, in 2015, a detailed land use map for every bit of land in the Union Territory has been prepared by the Puducherry Town and Country Planning Department. It is being finalized.

In the absence of a Development Authority in the Union Territory of Puducherry, the Department of Town and Country Planning undertakes certain Housing and Urban Development Schemes, which form part of the development plan proposals in the respective regions and are being executed through the implementing agencies / Parastatals. Under the Urban Development Sector, the Department is implementing the following important schemes:

- Capital Development Project / Traffic & Transportation Improvement and Management Measures in Urban areas / Town and Regional Planning
- Environmental Improvements in Urban Slums

4.2.3. Coastal Pollution

The problem of pollution in Puducherry is mainly due to disposal of solid wastes, untreated domestic sewage and industrial wastes. Besides, use of open areas as toilets in rural and semi urban areas is prevalent which is due to lack of inadequate public toilet facilities.

4.2.4. Domestic Solid Wastes

In the U.T. of Puducherry, the estimated domestic solid waste generation at present is about 750 MT per day. There are 5 Municipalities each at Puducherry, Oulgaret, Karaikal, Yanam and Mahe and 10 Commune Panchayats. All Municipalities and Commune Panchayats are collecting the solid waste and dumping in the identified/temporary dumping yards. The solid waste collected generally comprise 40% waste from households, 30% from road, and construction wastes, 2% from hospitals and remaining from commercial establishments and agriculture. About 75% of the wastes are organic and plastic constitutes 4.5%. So far, authorization has been issued to two Municipalities (Puducherry and Oulgaret) and a Government undertaking unit viz., Puducherry Agro Services and Industries Corporation (PASIC) for waste processing. Other applications are under process, as they are yet to identify proper dumping sites.

The Puducherry Urban Agglomeration area (Puducherry and Oulgaret Municipalities and part of Ariyankuppam and Villianur Communes) has an estimated waste generation of about 350 to 400 tonnes per day. The Municipality has acquired 23 acres of land at Kurumbapet village in Villianur Commune Panchayat (around 16 Kms from Puducherry city) for scientific disposal of Municipal Solid waste where bio-degradable waste is to be composted and non-bio-degradable waste will be landfilled in scientific manner. PASIC is processing and composting 15 tonnes per day of biodegradable wastes collected from hotels and the Big market.

The population of Karaikal Municipality is about 1.00 lakh (2011 census). Total solid waste generation in this Municipality is around 120 MT /day. At present the disposal of waste is done in an unscientific manner.

Yanam Municipality has a population of about 55,262 persons (2011 census). The total solid waste generation at present is about 35 MT/day. At present wastes are being dumped in the dumping yard at Farampeta.

Mahe Municipality:

This Municipality is having population of about 36,823 persons (2011 census). The total solid waste generation at present is about 25 MT/day. At present wastes are being dumped in the low lying area.

It is necessary to develop a good waste management plan for solid waste disposal in Karaikal, Yanam and Mahe and review the performance of composting in dumping yards.

4.2.5. Domestic Sewage

Data collected from the coastal waters of Puducherry by the COMAPS project[21] indicate that the dissolved oxygen level is within the permissible limits (Fig.4.9) with an overall decline during the decade 2000-2010. Increased discharge of untreated wastes through sewage canals in the coastal areas has resulted in increased O_2 stress on the coastal waters. Moderate increase in levels of nitrate and phosphate has been observed over the years with high level of bacterial contamination which are due to untreated sewage contaminating coastal waters.

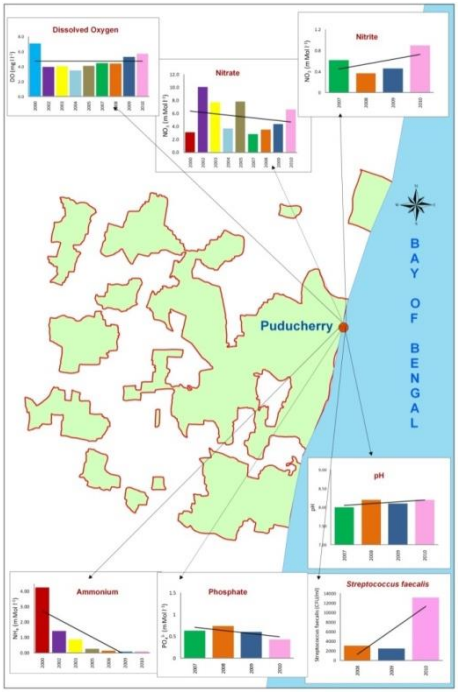

Fig. 4.9: Coastal Water quality off Puducherry based on COMAPS data[22]

The estimated sewage generation in the UT of Puducherry is about 130 MLD. Sewage treatment systems are in place/progress in Puducherry and such systems are yet to be established for Karaikal, Yanam and Mahe. The Puducherry area has been subdivided into 9 zones for providing water supply and sewerage infrastructure.

Zone 1 Puducherry Boulevard
Zone 2 Muthialpet
Zone 3 Mudaliarpet
Zone 4 Nellithoppe
Zone 5 Lawspet
Zone 6 Thattanchavady
Zone 7 Muthirapalayam
Zone 8 Moolakulam
Zone 9 Reddiarpalayam

Underground sewerage system in zones 1 & 2 and part of zones 3 & 4 have already been commissioned through State schemes. A project under JNNURM has been approved to execute underground sewerage system in the remaining areas in Zone 3 and Zone 4 and complete underground sewerage system for Zone 5 to 9. The project also includes

constructing three sequential batch reaction Sewage Treatment plants (STP) and connected appurtenances.

As per the report of CPCB 2015, the status of sewage treatment in Puducherry town is as follows:

Table.4.3 Sewage treatment scenario for Puducherry

Sl. No	Place	STP Location	STP Commissioned in (Year)	Status (Operational/ Non- Operational/ Under Construction)	STP Installed Capacity MLD	Technology (UASB / ASP / OP / SBR / MBR/ FAB etc.)
1	Lawspet, Puducherry	Sewage Farm, Lawspet, Puducherry	Information not available	Operational	12.5	Oxidation Pond
2		Sewage Farm, Lawspet, Puducherry		Operational	2.5	UASB
3		Sewage Farm, Lawspet, Puducherry		Under Construction	17	SBR
4	Dubrayapet, Puducherry	Dubrayapet, Puducherry		Operational	2.5	UASB
5		Dubrayapet, Puducherry		Under Construction	17	SBR
6	Reddiarpalyam, Puducherry	Kanaganeri, Reddiarpalyam, Puducherry		Under Construction	17	SBR

UASB = Upflow Anaerobic Sludge Blanket Reactor; SBR = Sequential Batch Reactor

Considering the present level of generation of sewage of about 100 MLD in the Municipal areas of Puducherry and Oulgaret, the total capacity of STPs i.e., 51 MLD (SBR locations) and 17.5 MLD by other methods is inadequate to treat the entire sewage collected at present for Puducherry district. Under the present project, it has been proposed to replace the Oxidation pond and UASB plant with SBR with a capacity of 18 MLD and the balance of 32 MLD will be discharged without treatment. The data by PPCC on surface water quality of most of the rivers indicate fair to good water quality at many locations and only few bore wells report low levels of Dissolved Oxygen and high levels of TDS. The details on effectiveness of treated sewage on water quality of receiving water bodies and reasons why bore wells indicate such average or poor water

quality are not clear. It may be possible that the bore wells sampled are located close to the septic tanks and leaching from septic tanks might have contaminated the bore well water too. A well networked monitoring programme conducted at least for 3 years with samples collected on monthly basis will provide status of the water quality in receiving water bodies and also effectiveness of sewage treatment.

4.2.6. Industrial Wastes

Industries generate both solid waste and effluents. Effluents are regulated under Water Act 1974 and the major industries have to treat the waste water to the stipulated standards before disposal. In case of small scale industries, establishment of a Common Effluent Treatment Plant which is normally possible in industrial estates or clusters, have to be established. Puducherry has a number of industrial estates (5 in Puducherry and 1 in Karaikal) apart from many small scale units scattered across the territory.

4.3. Disaster Management

Puducherry's average elevation is at sea level, there are a number of sea inlets, referred to as "backwaters". This coastal zone is largely low-lying with a gentle slope, thus making it highly vulnerable to inundation. Being on the path of cyclones that originate from the Bay of Bengal, they are regularly affected by cyclones and storm surges. The Figure gives an idea of the possible wind, inundation and storm surge levels for the UT.

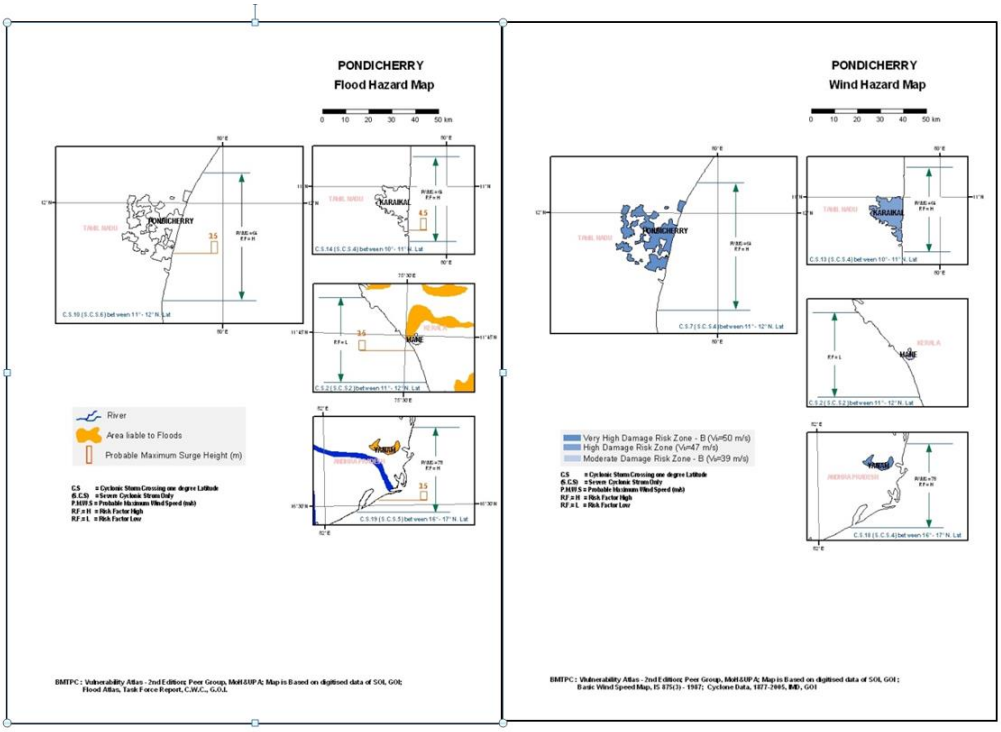

Fig.4.10: Flood Hazard Map and Wind Hazard Map[23]

The most recent severe cyclone that affected Puducherry was Cyclone Thane in 2011 which made landfall between Cuddalore and Puducherry on December 30, 2011. While 7 people died in the cyclone, the impact was very high due to the gale force winds that uprooted large numbers of trees as well as installations such as electrical transformers and communication systems in Puducherry. A study[24] indicated that a total of 1181 (20%) trees (>3.2 cm DBH) in Pondicherry University Campus were uprooted due to the Thane cyclone and these were mostly of plantation species such as *Acacia auriculiformis.*

Puducherry and Karaikal were affected by the 2004 Indian Ocean tsunami. 33 villages and about 43000 people were affected and about 600 people died with the deaths being higher in Karaikal (107 Puducherry, 492 Karaikal).

The whole of the Union Territory now figures in the moderate seismic risk zone (3) in the latest map of the Bureau of Indian Standards, upgraded from Zone 2, low seismic risk.

The Government of Puducherry has brought out a Disaster Management Action Plan for Floods and Cyclones in 2006 which contains the SOP in case of a disaster and also includes a list of low lying areas as well as nearest shelter and safe areas. This needs to be updated as it is ten years old.

Mani Murali et al[25] have prepared a comprehensive coastal vulnerability map for Puducherry (Figure 4.11) taking into account both physical–geological as well as socioeconomic parameters (a total of 11 parameters) giving them equal weight. Accordingly, the entire coastal extent between Muthialpet and Pudukuppam as well as the northern part of Kalapet is designated as high vulnerability zone, which constitutes 50% of the coastline. The region between the southern coastal extent of Kalapet and Lawspet falls in the medium vulnerability zone and the remaining 25% of the shoreline falls in the low vulnerability zone.

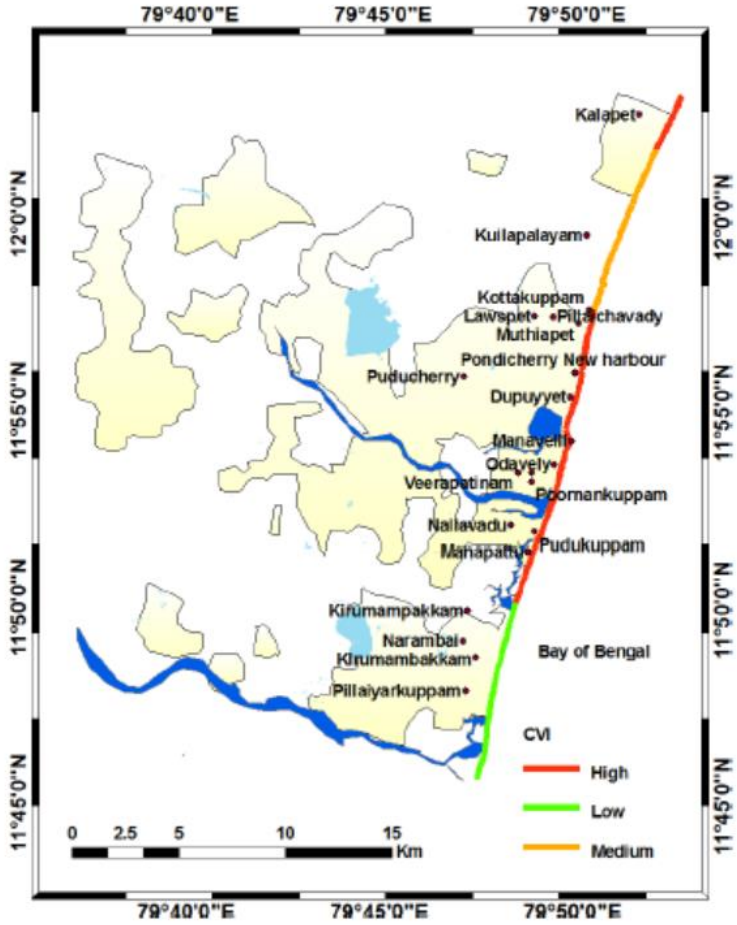

Fig.4.11 Coastal Vulnerability Index for Puducherry (Mani Murali et al., 2013)

4.4. Climate Change

As part of the National Action Plan on Climate Change, Puducherry has taken a number of steps[26]. These include provision of subsidies for solar water and air heating, cookers, street lights, Experimental Solar Pond Power project, solar lanterns, energy conservation devices, coastal clean-up, community awareness on coastal disasters etc. Under the Green India Mission, promotion of agro-forestry, conservation of wetlands and habitats, shelterbelt plantations etc. are planned. Under the National Water Mission, initiatives to provide Rain Water Harvesting Structures in Government Buildings, "Tail End Bed Dams" etc. are being constructed in order to promote ground water recharge. Desalination plants are planned in some coastal villages. Workshops and related activities are being organized to promote knowledge about climate change.

5. OBJECTIVES

The main objective of the present ICZM project is to promote adoption of the concept of ICZM in developmental and service activities without causing adverse impacts to the ecology and socio-economics of the coastal zone. Adoption of ICZM will ensure rational utilisation of resources, protection of ecosystems, restoration of degraded ecosystems, protection of coastal spaces, management of water- ways, avoiding conflicting use of coastal and marine areas and improvement of socio-economic conditions of resource dependent coastal communities. The main guiding principles are: preservation of ecology, improvement in living standards of the people through enhanced but sustained economic growth with better health care and augmentation of economic growth and related aspects in the state. These are in line with the objectives of the Coastal Regulation Zone (CRZ) Notification 2011 which are:

(i) To ensure livelihood security to fisher communities and other local communities living in coastal areas;

(ii) To conserve and protect coastal stretches, its unique environment, biodiversity and its marine area and

(iii) To promote development in a sustainable manner based on scientific principles taking into account the dangers of natural hazards in the coastal areas, sea level rise due to global warming.

Puducherry has listed the following specific objectives:

- Restoring the eroded coast to secure lives and properties and protect ground water
- Conserving, restoring and enhancing coastal resources and ecosystems
- Sustainable management of coastal activities without comprising environment and biodiversity
- Building capacities for stewardship and enrolling all constituencies for planning, decision making and action through the creation of learning in action centres
- Bringing transparency and accountability among all stakeholders working towards sustainable development of the coastal region

- Mapping this coastal region using Geographical Information System to reveal invisible factors and provide collaborative platform for decision making among all stakeholders
- Securing the cultural and heritage sites
- Providing sustainable livelihood options based on needs and improving traditional coastal livelihoods such as fishing communities
- Promoting eco-tourism to increase awareness and understanding of the coast
- Ensuring safety of fishermen and their livelihood during fishing and at the time of disaster.

6. INTEGRATED COASTAL ZONE MANAGEMENT PLAN

Integrated Coastal Zone Management (ICZM) is a concept that promotes sustainable coastal development. ICZM aids in bringing together activities of multiple sectors in a plan area and planning them in an eco-friendly manner. It evaluates the impact of one activity on other/s using cross-impact analysis. When this indicates potential negative impacts on other sectors, appropriate alternative measures/solutions are suggested.

An ICZM plan requires preparation of a number of management sub-plans based on key issues and problems identified in the plan area of Puducherry and Karaikal. Broadly, the sub-plans are likely to be related to shoreline changes, pollution, conservation of resources and biodiversity, livelihoods of resource dependent communities, recreation, disasters etc., There are cross cutting issues in each activity carried out under a sub-plan and normally these are related to livelihoods, space, environment and resources. Under the ICZM plan, all sub-plans are integrated after resolving cross impacts and an implementation mechanism is suggested for plan execution. There is an in-built component on monitoring and evaluation to enable mid-course corrections. At the end of the execution of the plan, results would be visible in the form of no or minimum damage to environment, improvement in livelihood of dependent population and sustenance of all activities.

After preparations of all sub-plans are completed, they will be integrated and final plan will be prepared and further course of action in the plan area will be recommended. While doing so, it is likely that gaps and overlaps will be identified. These will then be addressed appropriately. In addition, a Strategic Environmental Assessment (SEA) needs to be carried out for the entire plan as a whole. This is to identify potential adverse impacts and provide appropriate mitigatory/corrective measures. Various tools are used for SEA.

The Union Territory of Puducherry is blessed with a long coastline having specialized ecosystems like lagoons, estuaries and mangroves. These ecosystems are rich in biodiversity and support fisheries and other resource dependent livelihoods. At present, the activities along the coast are implemented on a sectoral basis without any interlinkage which has led to negative impacts on other sectors. There are signs of degradation of the coastal water bodies due to discharge of untreated sewage and industrial wastes. In the Puducherry town out of 12 km of coastline at least 7 km of

the coast is undergoing erosion due to man-made interventions like construction of Puducherry harbour, and has been protected by seawalls and groynes. The beaches have shrunk to minimum width. The livelihood of fishermen has become a challenge in the present scenario of declining resources. In order to promote adoption of the concept of ICZM to prevent negative impacts in planned and proposed activities and to ensure sustained livelihood and environmental quality on a long term basis, it is proposed to prepare ICZM plans for the Union Territory of Puducherry which covers geographical areas of the districts of PuducherryandKaraikal. These areas have estuaries and sporadic mangrove formation at Puducherry and Karaikal. The estuaries are one of the life lines of the plan areas primarily supporting navigation, fisheries, as a medium for recipient of wastes from land based sources and, to some extent, tourism. Detailed description of proposed activities, outcome and budget are given in **Annex 1**.

While the ICZM plan will define strategies to solve the problems in various sectors under each sub-plan, as some of the problems are well known and pressing for remedial actions, the following priority projects are proposed to be undertaken at present. The details have been given under section 8 of this document and a list of such project activities is given below. Other activities to be taken up will be suggested in the ICZM plan which can be implemented in a phased manner.

Table 6.1 gives the projects that have been finalised as priority projects to be taken up under the ICZM Programme.

Table 6.1: Proposed Priority Investment Projects

Annex No	Name of Project	Project Implementing Agency	Budget
1	Preparation of ICZM Plan for the U.T. of Puducherry	NCSCM	8.07
Livelihood Security of Coastal Community			
2	Construction & Reconstruction of Fish Auction Hall at four places & Construction of Work Shelter at Veerampattinam in Puducherry Region	Department of Fisheries	4.00
3	Promotion of Open Sea Cage Culture for enhancing livelihood opportunities of fishermen	Department of Fisheries	2.42
4	Promotion of Livelihood opportunities through Environment friendly tourism along Puducherry coast - Development of Beach Front at Manapet in Puducherry.	Tourism Department	15.00
5.	Extension and beautification of beach promenade on the southern side in Puducherry.	Tourism Department	15.00
6.	Pondy Necklace - Promotion of ecofriendly tourism and livelihood opportunities to local communities in Thengaithittu Lagoon area	Tourism Department & PWD	18.30
7.	Women Collective action for sustainable livelihoods and costal conservation at fisher folk villages in Puducherry Region	DRDA & DSTE	2.00
Conservation and Protection of Coastal Resources			
8.	Mapping and stabilization of sand dunes along the coast of Puducherry and Karaikal	DSTE, Puducherry	1.72
9.	Mitigation of Climate Change impacts on Coastal areas of Puducherry, Karaikal, Yanam and Mahe through Mangrove restoration and livelihood diversification of Coastal communities	Forest and Wild Life Department& PWD	8.08

Annex No	Name of Project	Project Implementing Agency	Budget
Pollution Management			
10.	Establishing Fecal Sludge Treatment Facility in Puducherry.	PWD (PHD)	7.00
11.	Inventorization of untreated waste water discharged into the Coastal Zone of Puducherry UT and preparation of waste water management plan by adopting decentralized treatment technologies.	DSTE & PWD	18.00
Capacity Building			
12.	Setting up of a State Project Management Unit (SPMU) in DSTE.	DSTE	12.31
		Total	**111.9 Cr.**

7. ICZM & PRIORITY INVESTMENTS

Priority projects under each management sub-plan have been summarised here.

7.1. Integrated Coastal Zone Management Plan

Integrated Coastal Zone Management Plan is a method to bring under a single umbrella various sectoral activities so that they are implemented coherently and without one activity having an adverse impact on another. Within the boundary of the area demarcated for developing an ICZM plan namely Puducherry and Karaikal, taking into the needs of the local population and also taking into consideration the current investments in the region, a plan of action is developed to identify additional activities and investments to enable holistic sustainable development of the area. This is to be done by the NCSCM at a tentative cost of Rs. 8.07 crores. Details are given in Annex 1**.**

7.2. Ensuring Sustainable Livelihoods

- **Construction & Reconstruction of Fish Auction Hall at four places & Construction of Work Shelter at Veerampattinam in Puducherry Region**

In order to develop infrastructure associated with Fisheries which is a livelihood need for fishermen, the Department of Fisheries has identified the following site for development of Fish Auction Hall on a priority basis:

a. Reconstruction of Fish Auction Hall at ChinnaKalapet.
b. Reconstruction of Fish Auction Hall at Pillaichavady.
c. Reconstruction of Fish Auction Hall at P.Pudukuppam
d. Construction of Fish Auction Hall at Pannithittu
e. Construction of work shelter at Periyaveerampattinam

The above facilities will be managed adopting co-management concept with local fishing communities of respective locations. Further details are given in Annex 2.

- **Promotion of Open Sea Cage Culture for enhancing livelihood opportunities of fishermen**

The present proposal is an attempt to carry out a rapid survey of coastal areas of the Puducherry to find out the probable environmentally safe locations for deployment of the cages and conductance of sea cage farming demonstrations. A competent attempt of this would ensure a long term large-scale production of commercial fin fishes to meet the ever increasing demand for seafood. The proposal will be implemented at two locations with deployment of 10 sea cages at each location. The project will be pilot in nature and upon successful completion it will form basis for extension to other areas. The cost of the project is Rs.2.42cr and more details are given in Annex 3.

- **Promotion of Livelihood opportunities through Environment friendly tourism along Puducherry coast - Development of Beach Front at Manapet in Puducherry**

The Tourism Department, Govt. of Puducherry is owning 100 acres of land at Manapet. The above project is planned at the land to an extent of 25 acres. The objective is to provide (i) Eco Tourism development, (ii) Utilization of the Coastal area for betterment, (iii) Community involvement, (iv) Alternate livelihood/income to the local host

community, (v) Overall improvement of the quality of life of the human community. The identified land is near to the fishing community of Manpaet and nearby. The people from the local community will be trained and utilized for operation of the project as well as beach safety and other related activities. This will provide additional income to the local community. Estimated cost of the proposed activities is Rs.30 cr. Further details are given in Annex 4.

- **Extension and beautification of beach promenade on the southern side in Puducherry.**

The city of Puducherry is known for its tourist attraction. The existing beach promenade on the northern side provides ideal atmosphere for the people of the city for leisure and recreation. The space is a natural refresher for health conscious people of the city. The growing tourist population demands increase of such facility to the southern side of the city. Accordingly it is proposed to develop the southern side with amenities for relaxation and recreation. The activities proposed to be undertaken are, Gabion Wall protection using Bolters, Cement Blocks and Sand Binder, Beach Safety facilities, construction of Pathways and placement of Street Furniture, creation of Shopping and Food Kiosks, Horticulture and Lighting, creating Photo points at beach area and ccean Specious Sculptures The cost of the project is Rs.15 cr and more details are given in Annex 5.

- **Pondy Necklace - Promotion of eco-friendly tourism and livelihood opportunities in Thengaithittu Lagoon area**

The ThengaithittuMangrove Lagoon is around 3 Kms away from the down town area and has natural backwater flow from Bay of Bengal and is accessible by small bridges from the land and by the boats. Presently, the lagoon is silted up due to blockage of lagoon water through cause ways and encroachments blockingthe exchange of sea water. The purpose of the project is to develop eco tourism within the town limit. This is the only biggest lungs space available for improvement of tourism, community and ecological education and awareness. This along with the other pilot projects like mangrove regeneration and decentralized wastewater treatment will be show case project in terms of livelihood improvement, pollution management and resource conservation. Detailed description of proposed activities, outcome and budget are given in Annex 6.

- **Women Collective action for sustainable livelihoods and costal conservation at fisher folk villages in Puducherry Region.**

The District Rural Development Agency has identified the following five sites for development of economic empowerment of fisher folks especially vulnerable women will be organized in to producer groups, and promote their Apex organization called Fishes producer Company, create infrastructure such as solar drier for making hygienic dry fish, fish meal making unit for cattle feed production, fish transporting vehicle, conserving local sand dune, alternate livelihood of mud crab fattening , social forest promotion in coastal area etc are very much essential for following villages of Nallavadu,Pannithittu,Pudukuppamm, M.Pudukuppam, and Chinnaveerampaatinam.The objective is to provide basic fish value addition infrastructure facilities for better access to market, minimize lossthrough value addition, alternate livelihoods, social forest and conservation of sand dune etc and achieving hygienic environment to improve the socio-economic conditions of the fisher folks andconservation of natural resources with community participation.Detailed description of proposed activities, outcome and budget are given in Annex 7.

7.3. Conservation of Ecosystems

- **Sand dunes Mapping**

Sand Dunes are formed by wind drift from the exposed sand areas of inter-tidal and supra tidal areas; the dunes take various shape and sizes and the height of which can go up to 10 m in undisturbed coastal areas. Puducherry being a coastal province too has moderate to good formation of sand dunes in Puducherry and Karaikal regions. The distribution of sand dunes in both the regions has not been mapped so fa. r though their occurrence is reported. Sand dunes play a vital role in disaster mitigation especially protection of other coastal features like vegetation and essentially forms as a part of the coastal ecosystem. The present proposal aims to map the dunes of the coastal areas of both the regions and take measures to stabilize them so that their geomorphic nature is well preserved to serve their purpose as wind and wave barriers. The Department of Science, Technology and Environment, Govt of Puducherry will implement the project. Estimated cost of the proposed activities is Rs. 1.72 cr. Detailed description of proposed activities, outcome and budget are given in Annex 8.

- **Mitigation of Climate Change impacts on Coastal areas of Puducherry, Karaikal, Yanam and Mahe through Mangrove restoration and livelihood diversification of Coastal communities**

Mangroves are trees and shrubs that grow in saline coastal habitats in the tropics and subtropics. Mangroves play a critical role in protecting lives and property in low-lying coastal areas from storm surges, which are expected to increase with global warming. They also stabilize shorelines and improve water quality. Mangrove ecosystems serve as breeding, feeding, and nursery grounds for many shellfish, fish, and other wildlife. Mangroves in Yanam are part of Coringa Forests and have rich biodiversity. Relatively speaking, though the Karaikal - Puducherry region is close to Muthupet, the species representation is very limited because of anthropogenic pressure. There is an imperative need for the protection and restoration of mangrove areas in Puducherry, Yanam and Karaikal areas for ecological security and livelihood opportunities of coastal communities. The present proposal is an attempt to develop site specific models for restoration of the critical mangrove habitat which are damaged due to tsunami and under threat of permanent degradation. The proposal from the Department of Forests, Govt of Puducherry, looks at collaboration with well-known research institutions to develop an effective methodology to restore the mangrove areas with the natural assemblage, structure and ecosystem function (within the bounds of natural variations) means self-sustaining. Estimate cost of the proposed activities is Rs.8.08 Crores. Detailed description of proposed activities, outcomeand budget are given in Annex 9.

7.4. Pollution Management

Management of pollution is a growing issue in the UT. The rapidly growing population, industrialization and tourist population have contributed to the various pollution sources including solid wastes, sewage and industrial waste generation. The following projects have been proposed as priority projects for addressing the pollution problem.

- **Establishing Fecal Sludge Treatment Facility in Puducherry**

The proposal of Fecal Sludge Management in the Puducherry Region is a part of pollution management and thus an essential component of ICZM. The management of fecal sludge helps in improving the functioning of onsite sanitation systems and to reduce the potential for human contact with fecal-borne pathogens and to minimize the odours and nuisances, and the uncontrolled discharge of organic matter from overflowing tanks or pits. Simultaneously, the idea would support encourage the onsite sanitation upgrading programs and would ensure safeguarding public health against indiscriminate disposal of collected fecal sludge. In addition

to the primary target of pollution management the idea of fecal sludge management can stimulate economic development, job creation and livelihood opportunities while addressing the issues of the social stigma and operator health and safety issues that continue to impact informal workers.Detailed description of proposed activities, outcome and budget are given in Annex 10.

- **Inventorization of untreated waste water discharged into the Coastal Zone of Puducherry UT and preparation of waste water management plan by adopting decentralized treatment technologies.**

The project aims at eco-health restoration of coastal water bodies by adopting low cost eco-technology based solutions for preventing discharge of untreated waste water. The project includes preparation of inventory on all untreated waste water discharged into the Coastal Zone of Puducherry UT with qualitative and quantitative assessment followed by preparation of waste water management plan by adopting modern decentralized treatment technologies, preferably in-situ green eco-technology based low cost solutions. Based on the studies a pilot scale decentralised waste water treatment plant will be designed and implemented at selected locations which could be replicated at other sites. Estimated cost of the proposed activities is Rs.18 cr. Further details are given in Annex 11.

7.5. Capacity Building & Knowledge Management

- **Establishment of SPMU**

The Government of Puducherry has decided to participate in the Phase II of the ICZM project executed by the MoEF&CC and has nominated the Department of Science, Technology and Environment (DSTE) as the nodal department. The DSTE currently does not have sufficient capacity or manpower to be able to depute internally the required staff component and hence the need to set up a fully-fledged Project Management Unit. The tasks under this proposal would be to set up a full-fledged SPMU which will coordinate the implementation of the various projects under the ICZM programme to be executed by the different Project Executing Agencies. The four activities under this project are 1) Setting up of State Project Management Unit (SPMU), 2) Creation and Maintenance of a Database, 3) Setting up of Project Steering Committee (PSC) and 4) Setting up of Scientific and Technical Advisory Committee (STAC). The establishment of a Database management system will help in decision making. Estimated cost of the

proposed activities is Rs. 12.31cr. Detailed description of proposed activities, outcome and budget are given in Annex 12.

8. INSTITUTIONAL ARRANGEMENTS FOR CO-ORDINATION ON IMPLEMENTATION OF ICZM PLANS

Below is the list of Project Execution Agencies:

i. Department of Science, Technology and Environment
ii. Puducherry Pollution Control Committee
iii. Public Works Department
iv. Forest Department
v. Department of Fisheries and Fishermen Welfare
vi. Tourism Department
vii. District Rural Development Agency
viii. National Centre for Sustainable Coastal Management

The State Project Management Unit will be located at the Department of Science, Environment and Technology, Govt. of Puducherry. The SPMU will coordinate with the other PEA in carrying out the various projects. The SPMU will be supported by a Steering Committee and a Science and Technology Advisory Committee.

9. OVERALL FINANCIAL REQUIREMENTS TO IMPLEMENT THE ICZM PLAN

Annex No	Name of Project	Project Implementing Agency	Budget
1	Preparation of ICZM Plan for the U.T. of Puducherry	NCSCM	8.07
Livelihood Security of Coastal Community			
2	Construction & Reconstruction of Fish Auction Hall at four places & Construction of Work Shelter at Veerampattinam in Puducherry Region	Department of Fisheries	4.00
3	Promotion of Open Sea Cage Culture for enhancing livelihood opportunities of fishermen	Department of Fisheries	2.42
4	Promotion of Livelihood opportunities through Environment friendly tourism along Puducherry coast - Development of Beach FrontatManapet in Puducherry.	Tourism Department	15.00
5.	Extension and beautification of beach promenade on the southern side in Puducherry.	Tourism Department	15.00
6.	Pondy Necklace - Promotion of ecofriendly tourism and livelihood opportunities to local communities in Thengaithittu Lagoon area	Tourism Department& PWD	18.30
7.	Women Collective action for sustainable livelihoods and costal conservation at fisher folk villages in Puducherry Region	DRDA & DSTE	2.00
Conservation and Protection of Coastal Resources			
8.	Mapping and stabilization of sand dunes along the coast of Puducherry and Karaikal	DSTE	1.72

Annex No	Name of Project	Project Implementing Agency	Budget
9.	Mitigation of Climate Change impacts on Coastal areas of Puducherry, Karaikal, Yanam and Mahe through Mangrove restoration and livelihood diversification of Coastal communities	Forest and Wild Life Department& PWD	8.08
Pollution Management			
10.	Establishing Fecal Sludge Treatment Facility in Puducherry.	PWD (PHD)	7.00
11.	Inventorization of untreated waste water discharged into the Coastal Zone of Puducherry UT and preparation of waste water management plan by adopting decentralized treatment technologies.	DSTE & PWD	18.00
Capacity Building			
12.	Setting Up of A State Project Management Unit (SPMU) in DSTE.	DSTE	12.31
		Total	**111.9 Cr.**

10. CONCLUSIONS AND RECOMMENDATIONS

The coast of UT of Puducherry has been facing several environmental problems like loss of beaches, degradation of environment due to dumping of solid wastes near water ways, discharge of untreated sewage and industrial wastes, salt water intrusion in coastal aquifers and resource constraint due to declining fishery resources. The present project envisages the preparation of an ICZM plan for the UT area and also suggests remedial measures to overcome the problems and progress towards a well-managed coast. The priority activities proposed under various sectors will set a beginning to deal with the problems in an integrated manner and such activities as recommended in the proposed ICZM Plan will need to be continued on a long term basis to achieve sustainable development.

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ANNEXES

BASE DOCUMENT FOR INTEGRATED COASTAL ZONE MANAGEMENT PROJECT FOR THE U.T. OF PUDUCHERRY

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

सत्यमेव जयते
Government of Puducherry

Submitted by
Department of Science, Technology and Environment
Government of Puducherry

Prepared by
Government of Puducherry in
association with
National Centre for Sustainable Coastal Management (NCSCM)

NCSCM

May 2019

List of Annexes

PREPARATION OF ICZM PLAN FOR THE U.T. OF PUDUCHERRY

Project Preliminary Report

1	**Name of the Project**				**Preparation of ICZM Plan for the U.T. of Puducherry**	
2	**Sectoral area**				Coastal Zone Management	
3	**Total Financial outlay**				Rs. 8.07 crores	
4	**Details of the external development agencies (and the amount sought from each)**				The World Bank	
5	**Financial arrangement**				**Rs. in Cr**	
Total External Assistance	**Counterpart funds being made available by**				**Total**	
	Implementing agency	**UT Govt.**	**Central Govt.**	**Others, if any**		
4.04 cr	NIL	0.81	3.22	NIL	**8.07 cr.**	
6	**Project duration (dates/months/years**				3 years	
7	**Location of project**				Puducherry,Karaikal, Mahe and Yanam	
8	**Previous phases, if any**				Nil	
9	**Statutory required**				NiL	
10	**Statutory obtained**				NA	
11	**Details of Feasibility Studies done, if Any**				NA	
12	**Implementing agency**				National Centre for Sustainable Coastal Management, Chennai and Department of Science, Technology and Environment, Government. of Puducherry	
13	**Basic design of the project**				Identification of key issues and develop integrated management solutions based on cross impact analysis and finalizing solutions in consultations with stakeholders	
-	**Goals and objectives**				To prepare ICZMplans for each district addressing sectoral issues and problems and suggesting integrated	

		management solutions along with implementation strategies to achieve the goal of sustainable management.
-	**Activities involved**	Preparation of ICZM Plan with sub-plans in the areas of Shoreline, pollution, Conservation, Livelihood, Resource and Tourism managements
-	**Outputs of the project**	ICZM Plan along with sub-plans and strategies for implementation
-	**Outcome of the project**	Coastal activities implemented in an integrated and co-ordinate manner resulting in sustenance of all activities with no damages to resources and biodiversity
-	**FC and TC component**	Refer Section 12
14	**Target population/ groups**	Planners, policy makers and project managers in the Govt of Puducherry
15	**Detailed Action Plan (Year wise)**	Refer section 12
16	**Quantitative and qualitative (verifiable)target indicators**	The qualitative indicator would be the availability of integrated management solutions and enhanced inter-departmental co-ordination. The quantitative indicator will be an ICZM plan with 6 sub-plans.
17	**Environmental sustainability of the Project**	High as the focus is on integrated management of sectoral activities to ensure no adverse environmental impacts on each other
18	**Land acquisition / Resettlement and Rehabilitation involved**	Not applicable
19	**Linkages with Similar Projects**	Since it is being an umbrella

		project it has linkage with all sub-plan activities
(i)	**Information regarding similar projects undertaken previously (add evaluation reports, if any)**	Not carried out so far
(ii)	**Does the project form part of the sectoral project? If yes, who are the other partner with details of the specific activities being undertaken by them**	Project falls under Coastal Environmental management. It interacts with sectoral project agencies on shoreline, pollution, conservation, livelihood and tourism management
20	**Finance Plus Element**	Details given in the following text
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	Yes
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	Yes
	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	NA
	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g.	Yes – integrated management as opposed to sectoral management thro' ICZM plan and cross-impact analysis

	nutrition, gender issues, livelihoods)?	
	v. Does the proposal seek to create additional choice for the citizens to access required service/ entitlements?	No
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	Yes
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	Yes
	viii. Does the proposal have institutional improvement measures: e.g. (a) Accounting Reforms (moving from single entry cash based accounting system to double entry accrual system of accounting (b) Ring fencing of finances/activities including corporatization wherever needed (c) creation and implementation of appropriate revenue models e.g. tariff reforms or alternative revenue structuring?	(c) partly
	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	Yes. It creates an ICZM set up to ensure sustenance of all sectoral activities without causing adverse impacts on activities of other sectors
	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	Yes from sectoral management approach to integrated management
II	**II. Innovation and Piloting of new**	

	Approaches	
	(I) Does the proposal have innovative elements and new approaches that have not been tried in the sector and have reasonable chance of changing forthe better the way things are done inthe sector and have some chance of scalable replication?	Cross impact analysis to minimize inter-sectoral conflicts and damages
	(ii) Does the proposal look at financial sustainability and O& M related issueswhich otherwise has not been the norm in the sector?	NA
III	**Innovation in financing and Leveraging**	Does not arise
	i. Does the proposal use different/ innovative financing products/ modalities?	
	i. Does the proposal involve co-financing from other financing agencies?	No
	iii. Does the proposal catalyse private sector financing in different ways and especially to create leverage?	NA
	iv. Does the proposal involve CDM andaccrual of carbon credits as a naturalby-product of core developmentprojects which can be a way offinancing the project?	NA

EXECUTIVE SUMMARY

Integrated Coastal Zone Management (ICZM) is a concept that promotes sustainable coastal development. ICZM aids in bringing together activities of multiple sectors in a plan area and planning them in an eco-friendly manner. An ICZM plan requires preparation of a number of management sub-plans based on key issues and problems identified in the plan area. Broadly, the sub-plans are likely to be related to shoreline changes, pollution, conservation of resources and biodiversity, livelihoods of resource dependent communities, recreation, disasters etc. After preparations of all sub-plans are completed, they will be integrated and final plan will be prepared and further course of action in the plan area will be recommended. While doing so, it is likely that gaps and overlaps will be identified. These will then be addressed appropriately.

The Union Territory of Puducherry is blessed with a long coastline having specialized ecosystems like lagoons, estuaries and mangroves. These ecosystems are rich in biodiversity and support fisheries and other resource dependent livelihoods. At present, the activities along the coast are implemented on a sectoral basis without any interlinkage which has led to negative impacts on other sectors. In order to promote adoption of the concept of ICZM to prevent negative impacts in planned and proposed activities and to ensure sustained livelihood and environmental quality on a long term basis, it has been proposed to prepare ICZM plans for the Union Territory of Puducherry which covers geographical areas districts of Puducherry and Karaikal

The major issues of the coastal areas are beach erosion, pollution of water bodies, solid waste dumping, and shrinkage of habitats like mangroves, destruction of geomorphic features like sand dunes, declining fishery resources and decreasing livelihood opportunities. The above key issues are currently dealt with in isolation because of the sectoral approach in management. This does not take into account the negative impacts that are caused to the other sectors. The ideal examples are port sector causing erosion of beaches affecting tourism and fisher space; pollution of water bodies affecting the biodiversity and tourism. As ICZM is a concept that promotes adoption of integrated management of activities and solutions provided under ICZM approach have minimal inter-sectoral impacts, it will be the most relevant practice for the UT of Puducherry to ensure sustainable development and optimal use of resources without comprising environment and socio-economics of the region.

1. Introduction

Integrated Coastal Zone Management (ICZM) is a concept that promotes sustainable coastal development. ICZM aids in bringing together activities of multiple sectors in a plan area and planning them in an eco-friendly manner. It evaluates the impact of one activity on other/s using cross-impact analysis.When this indicates potential negative impacts on other sectors, appropriate alternative measures/solutions are suggested.

An ICZM plan requires preparation of a number of management sub-plans based on key issues and problems identified in the plan area. Broadly, the sub-plans are likely to be related to shoreline changes, pollution, conservation of resources and biodiversity, livelihoods of resource dependent communities, recreation, disasters etc., There are cross cutting issues in each activity carried out under a sub-plan and normally these are related to livelihoods, space, environment and resources. Under the ICZM plan, all sub-plans are integrated after resolving cross impacts and an implementation mechanism is suggested for plan execution. There is an in-built component on monitoring and evaluation to enable mid-course corrections. At the end of the execution of the plan, results would be visible in the form of no or minimum damage to environment, improvement in livelihood of dependent population and sustenance of all activities.

After preparations of all sub-plans are completed, they will be integrated and final plan will be prepared and further course of action in the plan area will be recommended. While doing so, it is likely that gaps and overlaps will be identified. These will then be addressed appropriately. In addition, a Strategic Environmental Assessment (SEA) needs to be carried out for the entire plan as a whole. This is to identify potential adverse impacts and provide appropriate mitigatory/corrective measures. Various tools are used for SEA.

The Union Territory of Puducherry is blessed with a long coastline having specialized ecosystems like lagoons, estuaries and mangroves. These ecosystems are rich in biodiversity and support fisheries and other resource dependent livelihoods. At present, the activities along the coast are implemented on a sectoral basis without any interlinkage which has led to negative impacts on other sectors. In order to promote adoption of the concept of ICZM to prevent negative impacts in planned and proposed activities and to ensure sustained livelihood and environmental quality on a long term

basis, it has been proposed to prepare ICZM plans for the Union Territory of Puducherry which covers geographical areas districts of Puducherry and Karaikal. These areas have estuaries, sporadic mangrove formation at Puducherry and Karaikal. The estuaries are one of the life lines of the plan areas primarily supporting navigation, fisheries, as a medium for recipient of wastes from land based sources and, to some extent, tourism.

2. Project Area Description, key issues and relevance to ICZM

2.1. Project Area Description

The project area will include districts of Puducherry and Karaikal (Fig.1.).

Puducherry is the capital of the UT which has a rich tradition of French culture with unique landscape architecture. It is one of the heavily urbanised towns with a population of 9.4 lakhs and density of 3231 persons per sq km (as of 2011 census) and a literacy rate of 86%. The length of coastline of Puducherry is about 24 km.The district is agro-economy based producing rice, sugarcane and a variety of other grains. It has all weather minor port at Ariyankuppam which handles medium size cargo vessels and a fair weather offshore trestle used for lightering of cargo from large vessels. A wide range of industries belonging to large, medium and small scale, manufacturingtextiles, chemicals, drugs and finished products, are located in the district. Out of these, nearly 14 are large and 15 are are medium sized. The district has 3 major water ways namely, Ginjee (Chunnambar River), Ariyankuppam River and South Pennaiyar (bordering Cuddalore district of TN).Among the water bodies, Ariyankuppam functions as riverine port and all water bodies are mostly used for waste disposal. The district has two seasonal freshwater lakes namely Ousteri (shared with TN) and Bahour(north of Pennaiyar river) and also a brackishwater lake namely Kaliveli (shared with TN at Marakkanam). Out of these, the two freshwater lakes are home for migratory birds. The district generates a solid waste of 230tonnes per day and sewage of 55 MLD. The town has beaches that are known for tourism.

Karaikalis located 129 km south of Puducherry and a low lying area along the east coast, often affected by the cyclones and storm surges. It has a flat topography with maximum land elevation of 4 m from MSL. It is a straight coast with a length of about 18 km. It was one of the most affected locations during the the Indian Ocean Tsunami of 2004. The district derives its economy from agriculture and fisheries. A private port

is locatedinKaraikal, besides a fisheries harbourinArasalar River. The district has a population of 2 lakhs and the town proper's population is about 1 lakh as per 2011 census.Located at the tail end of the Kaveri delta, it is criss-crossed by Arasalar, a branch of the Cauvery River below the Grand Anicut, along with its branches Nattar, Vanjiar, Nular, Nandalar, Puravadaiyanar and the Tirumalarajanar. The district generates solid waste of 90 MT per day and sewage of 12 MLD.

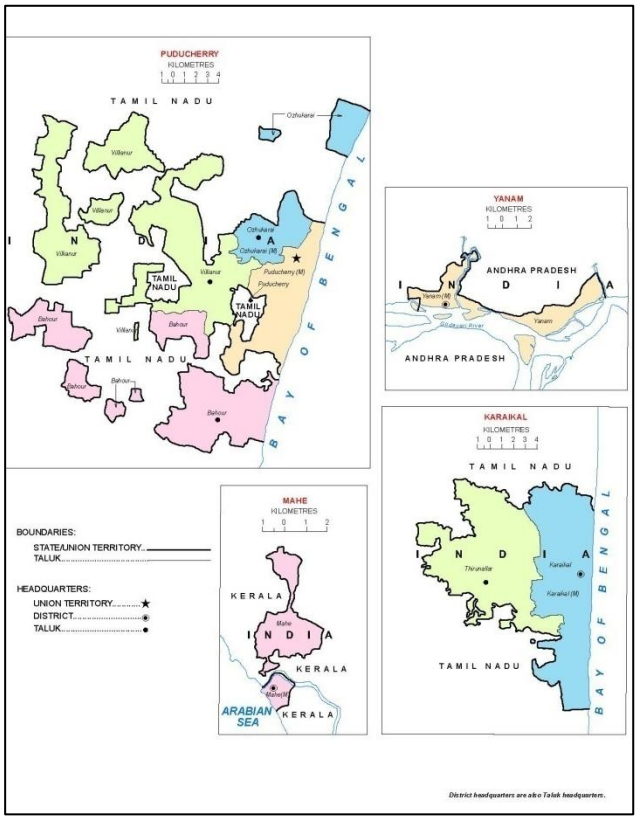


Fig.1. Map indicating ICZM plan sectors of Puducherry and Karaikal in the UT of Puducherry

2.2. Key issues and problems

The major issues of the coastal areas are beach erosion, pollution of water bodies, solid waste dumping, and shrinkage of habitats like mangroves, destruction of geomorphic features like sand dunes, declining fishery resources and decreasing livelihood opportunities.

2.2.1. Shoreline change

a.Erosion

Puducherry coast is facing the problem of shoreline erosion due to natural effects like wave force and littoral drift and anthropogenic effects like construction of breakwaters and seawalls. In order to control coastal erosion the Puducherry Government constructed sea walls along the Puducherry town since 1969. The Puducherry harbour as an estuarine port was constructed in 1989 at the mouth of Ariyankuppam River with southern and northern breakwaters. The southern breakwater disturbed the littoral drift which transports sand from south to north for 9 months in a year and as a result, severe erosion of beaches for a length of 8 km occurred on the northern side including of the coast of adjoining Tamil Nadu (Fig.2). Initially, sand bypassing was carried out by harbour authorities to prevent down drift erosion and to maintain channel free from siltation. Later, sand bypassing was discontinued due to various technical reasons. Puducherry and Tamil Nadu Governments resorted to various measures to protect the coast from erosion without conducting required studies on coastal processes which govern the movement of sediment. Seawall of length 6 km was constructed by UT Pondicherry, which covers city of Pondicherry and the coastal stretch (2 km) from Sodhanaikuppam to Thanthriyankuppam was protected by groin field combined with seawall by the Tamil Nadu government (Fig.3). The erosion problem shifted further north. ChinnamudalaiyarChavadi is experiencing increased erosion and many buildings are lost to sea. The fishing hamlets north of ChinnamudalaiyarChavadi and Chinnakalapettai village in UT of Pondicherry were also protected by seawall. As on date, 8 km length of the coast is protected by seawall and groin field. Only since 2000, the port department dredged 0.125 million cu m sand and nourished the northern side which marginally restored the lost beach. This situation made the Puducherry Government to find a permanent solution for protecting the coast from erosion. Since the hard structural measures to prevent erosion caused negative effects of shifting the erosion to the north, the Ministry of Earth Sciences, through the National Institute of Ocean Technology has planned a demonstration project on coastal erosion using soft engineering measures like geotubes. The project undertook extensive coastal processes studies along the Puducherry coast and has designed a submerged geotube to protect 1.5 km long coast. Deployment of geotube is likely to commence shortly.

Fig.2. Status of shoreline before and after construction of Puducherry harbour (Source: NIOT)

Fig.3. Satellite image of coast of Puducherry town showing sea walls and harbour (Google Earth, 2014)

A comprehensive plan developed based on a regional coastal processes study adopting the concept of sediment cell would address the problem in a holistic manner. NCSCM, Chennai has already demarcated sediment cell for the entire Indian coast and the

Primary Cell No.14 between Palar river (TN) and Coleroon estuary (TN) covers the current problem area. Such a plan needs to be implemented *in toto* without resorting to piecemeal approach due to financial constraints. Besides, the plan also needs to take into account any future developmental activities like expansion of port or any other structure proposed to be established along the coastline. Besides, while developing the integrated plan, all current efforts and resources of both Puducherry and Tamil Nadu will have to be taken in to account, so that efforts and resources are pooled to avoid duplication of efforts and infructuous expenditure.

b. Siltation of River Mouths

The UT of Puducherry has Ginjee river (Chunnambar) and Ariyankuppam in Puducherry and Arasalar (Kaveri) in Karaikkal,. The river mouths experience siltation due to wave action especially during summer when the river flow which flushes the sand to the sea during monsoon, decreases. The waves dominate the process and deposit the sand from nearshore to the coast including in river mouths. Siltation of river mouth decreases the depth; as a result the tidal flow is reduced. This causes difficulties in navigation of boats; also land based wastes accumulate in the estuaries. These wastes, if not diluted by tidal water and flushed out to the sea, will result in the deterioration of the water quality affecting survival of organisms and also their diversity.

Among the river mouths, Ariyankuppam and Arasalar are kept open for navigation of boats, but face siltation due to lack of maintenance dredging. The Godavari river mouth falls under jurisdiction of Andhra Pradesh. The Ginjee River, called as Chunnambar at its lower region connecting to the Bay Bengal experiences heavy siltation as seen in Fig.4.Chunnambar estuary is a major tourist attraction and has considerable mangrove formation along the banks. Problems that arise due to siltation of river mouths have already been explained. If the mouth of the estuary is kept open and maintained so, it will ensure good tidal flow and improve the water quality. It will also support good estuarine fisheries. Further, regular maintenance dredging is also necessary to keep open the mouths of these water bodies to ensure sustenance of biodiversity.

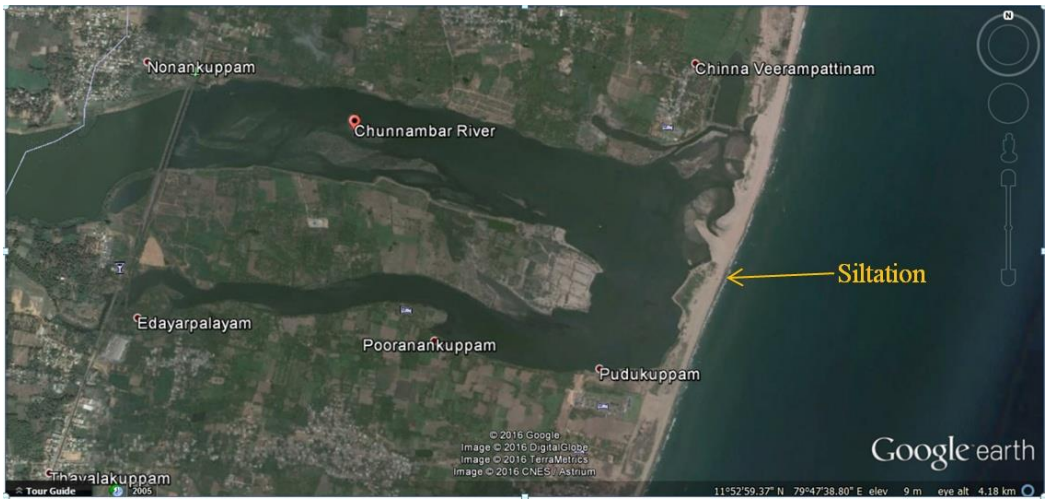


Fig.4.Satellite image (2014) of Chunnambar mouth indicating heavy siltation

2.2.2. Urbanization

A very high level of urbanization is reported from the Union Territory. According to the 2011 census, while 69% of Puducherry is urban population, Karaikal reported the lowest urban population of 49.01%. Urbanisation increases load of pollution leading to environmental degradation, if not managed appropriately.

2.2.3. Coastal pollution

The problem of pollution in Puducherry is mainly due to disposal of solid wastes, untreated domestic sewage and industrial wastes. Besides, use of open areas as toilets in rural and semi urban areas is prevalent which is due to lack of inadequate public toilet facilities.

a. Domestic Solid Waste

In the U.T. of Puducherry, the estimated solid waste generation at present is about 750 MT(@0.6kg per head). There are Municipalities each at Puducherry, Oulgaret, Karaikal, and 10 Commune Panchayats. All the Municipalities and Commune Panchayats are collecting the solid waste and dumping in the identified/temporary dumping yards. The solid waste collected generally is about 40% waste from households, 30% frrm road and construction wastes, 2% from hospitals and remaining are from commercial establishments and agriculture. Out of the wastes, about 75% are organic and plastic constitutes 4.5%. So far, authorization has been issued to two Municipalities (Puducherry and Oulgaret) and a Government undertaking unit viz.,

Puducherry Agro Services and Industries Corporation (PASIC) for waste processing. Other applications are under process, as they are yet to identify proper dumping sites. In other districts, it allowed to degrade in the landfill itself. The table 1 below gives details of solid waste generated in UT of Puducherry.

b. Domestic Sewage

The estimated sewage generation in the UT of Puducherry is about 130 MLD. Sewage treatment systems are in place/progress in Puducherry and such systems are yet to be established for Karaikal.(Table 1). Considering the present level of generation of sewage of about 100 MLD (estimated based on water supply of 135 lit/day) the total capacity of STPs i.e., 51 MLD (SBR locations) and 17.5 MLD by other methods is inadequate to treat the entire sewage collected at present for Puducherry district. Under the present project, it has been proposed to replace the Oxydation pond and UASB plant with SBR with a capacity of 18 MLD and the balance of 32 MLD will be discharged without treatment. The data by PPCC on surface water quality of most of the rivers indicate fair to good water quality at many locations and only few bore wells report low levels of Dissolved oxygen and high levels of TDS. The details on effectiveness of treated sewage on water quality of receiving water bodies and reasons why bore wells indicate such average or poor water quality are not clear. It may be possible that the bore wells sampled are located close to the septic tanks and leaching from septic tanks might have contaminated the bore well water too.A well networked monitoring programme conducted at least for 3 years with samples collected on monthly basis will provide status of the water quality in receiving water bodies and also effectiveness of sewage treatment.

Table 1.**Estimated Solid waste and Sewage generation in 4 districts of UT.**

No	**Name of Dist/unit**	**Population (2011)**	**Esti. Solid waste generated for 2016 (tonnes/day)**	**Esti. Sewage generated for 2016 (MLD)**
1.	Puducherry	9,50,289	570	100
2.	Karaikal	2,00,222	120	20

c. Industrial wastes

Industries generate both solid waste and effluents. Effluents are regulated under Water (Prevention and Control of Pollution) Act 1974 and the major industries have to treat the waste water to the stipulated standards before disposal. In case of small scale industries, Common Effluent Treatment Plants which are normally possible in industrial estates or clusters, hasve to be established.Puducherry has a number of industrial estates (5 in Puducherry and 1 in Karaikal) apart from many small scale units scattered across the territory.

2.2.4. Degradation of habitats and destruction of sand dunes

Dense mangroves are sparse in Ariyankuppam and Chunnambar (Puducherry) and Arasalar in Karaikal. The sand dunes along the beaches of Puducherry area are slowly vanishing due to human intervention and also due to beach erosion.

2.2.5. Declining resources and decrease of livelihood opportunities

At present major occupation of coastal communities other than those involved in trade and services is agriculture and fishing. With reduction in agricultural area due to urbanization and uncertainty in weather patterns, agricultural practices have been decreasing over the years. The total production during 2014 is reported to be 65393 tonnes1 while it was 71193 tonnes in 2013-14 and 68726 tonnes in 2013. The marine fish catch is also stagnant/reducing. As a result, the livelihood opportunities of resource dependent communities are decreasing gradually. This leads to increase in unemployment also causing social problems.

2.2.6 Tourism

Tourism is an important activity in Puducherry with upwards of 10 lakh tourists (50000 from overseas). Some of the important tourism related projects include Beautification of Chuuambar in Puducherry, Development of Nallambal Lake in Karaikal, Development of Arikamedu and Development of Oussudu Lake in Puducherry. The major problem due to tourism is generation of solid waste and other practices giving unaesthetic appearance of beaches and surrounding areas.

[1] http://www.cmfri.org.in/po2014.html accessed 7 March 2016

2.2.6 Disasters

Puducherry's average elevation is at sea level,and a number of sea inlets, referred to as "backwaters" are present. This coastal zone is largely low-lying with a gentle slope, thus making it highly vulnerable to inundation. Being on the path of cyclones that originate from the Bay of Bengal, they are regularly affected by cyclones and storm surges. While temporary rehabilitation measures like cyclone shelters have been constructed, the damage to vegetation, crops and infrastructure continues. The December, 2011 Thane cyclone devastated Puducherry area. As being a smaller area, the most vulnerable locations are well known. A detailed strategic plan supported by high resolution vulnerability assessment maps is necessary to cope with the impacts of disasters on human life and damage to properties.

2.3. Relevance to ICZM

The above key issues are currently dealt with in isolation because of the sectoral approach in management. This does nottake into account the negative impacts that are caused to the other sectors. The ideal examples are port sector causing erosion of beaches affecting tourism and fisher space; pollution of water bodies affecting the biodiversity and tourism. As ICZM being a concept that promotes adoption of integrated management of activities and solutions provided under ICZM approach have minimal inter-sectoral impacts, it will be the most relevant practice for the UT of Puducherry to ensure sustainable development and optimal use of resources without comprising environment and socio-economics of the region.

3. Objectives and Qualitative and Quantitative indicators

The objectives of this component would be to:

To prepare ICZMplans for each district addressing sectoral issues and problems and suggesting integrated management solutions along with implementation strategies.

The key indicators would be:

- Finalising key issues and problems
- Preparation of land use/cover, resources and activity maps
- Preparation of sub-plans
- Overlap identification

- Gap identification
- Integration of sub-plans
- Preparation of draft ICZM Plan
- Outcome from SEA studies and incorporation
- Finalising the draft ICZM Plans after user consultations

4. Input and outcome indicator (objective and direct benefits)

The main inputs will be activities performed under each sector resulting in management sub plans. The outcome indicator would be the sub plans integrated to a single ICZM plan

5. Project guiding principles and key design features

The project aims at the sustainable development and management of coastal area keeping in mind the needs for habitat protection, food security and livelihoods, water use and supply, pollution reduction and waste management and vulnerability reduction. The development of individual sub-plans and their integration ensures a holistic view of the coastal areas and hence the move to the sustainable coasts concept.

6. Earlier studies/attempts (if any), their outcomes and how the present plan fulfills gaps/overcome negative effects if any – Justifications for the project

In India, model ICZM plans for Chennai, Goa and Gulf of Kachchh were prepared in 2001 and these plans addressed key issues and problems and developed integrated management solutions to solve the problems. The components of the plan are in various stages of implementation. The present plan looks at the preparation of individual issue based sub plans to examine the requirements that are essential to address various issues in a geographic area and how they have been addressed, and the gaps that need to be filled. The development of the ICZM Plan based on integration of individual sub plans allows an inclusive understanding of the coast. Therefore, a holistic approach to planning in a coastal area is being considered rather than a piece-meal approach. This ensures that while individual sectors maintain independence in action, they do so under the single umbrella of ICZM. The SEA would help in identification of potential problems due to implementation of the plan which

could be mitigated by changing appropriate plan components. In the present project, the key issues and problems during the interactions with stakeholderswill be addressed through management sub-plans.

7. Environment, ecology and socio-economics of project area

7.1. Land

Puducherry Region is a flat plain with an average elevation of about 20-25 metres above mean sea level. The region however can be divided into four physiographic units viz., marine plain, fluvial plain, and uplands on limestone, and sandstone (Fig.5). The sea coast has a narrow flat beach with the sea almost touching the plain land at places. The marine plain consists of gently sloping lands with sand dunes. Other characteristic coastal land forms such as creeks and lagoons are also observedhere.The tidal flats extending along the coastal stretch are narrow, except around the Ariyankuppam estuary. Along the Puducherry coast, beaches are generally narrow along the northern segment whereas in the southern segment, beaches are comparatively broad and depositional.Barrier dunes are seen as continuous mounds between Ariyankuppam, Kirumambakkam, Manapattu and Narimedu areas. Dunes are also seen almost on the entire coast except at Manaveli, Pooranankuppam and Manapattu coastal blocks (Fig. 3).

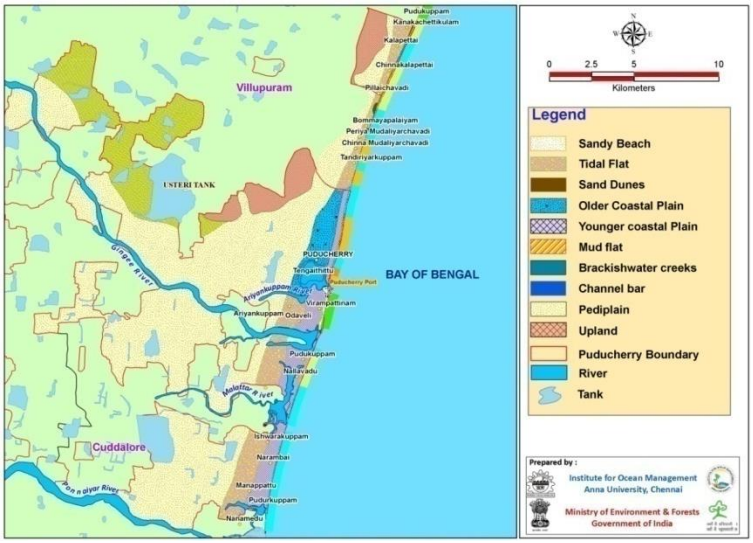


Fig 5: Coastal Geomorphology of Puducherry

Karaikal Region is a monotonous plain with elevation not more than four metres at any point except in sand dune areas. Effect of aeolian action is seen in the coastal area of

Karaikal in the form of sand dunes. Coastal physiographic units identified are creeks and lagoons and sandy plain with sand dunes occurring on the coast (Fig. 6).

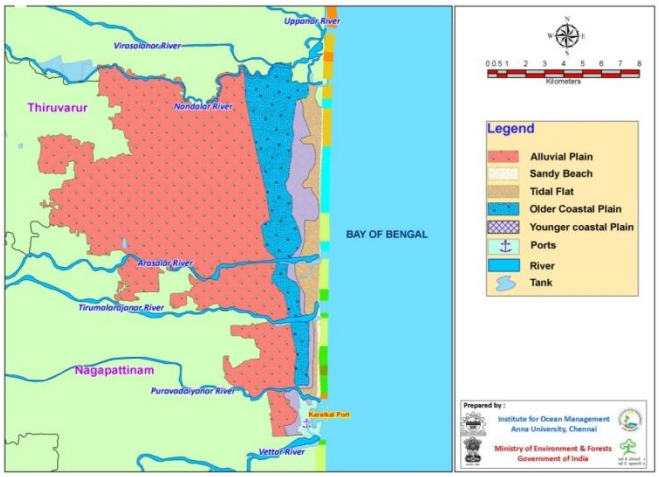


Fig. 6 : Coastal Geomorphology of Karaikal

7.2. Aquatic Environment

The major rivers are Gingee River or Senji River (79 km Long) and Pennaiyar River forming the border between Tamil Nadu and Puducherry. Gingee River flows diagonally from north-western to south-eastern side, while Pennaiyar River constitutes the southern boundary of Puducherry. An arm of Pennaiyar River known as Malattar streams through the Puducherry. Arasalar, a branch of the Cauvery River below the Grand Anicut, along with its branches Nattar, Vanjiar, Nular, Nandalar, Puravadaiyanar and the Tirumalarajanarflow through Karaikal.

7.3. Natural Resources

Pondicherry is devoid of any natural forest. Forest plantations have been raised in small patches (less than 10 ha) since 1980 under theSocial Forestry and otherprogrammes.According to reports, the coastline from Marakkanam to Karaikal was once covered with thick mangrove vegetation. Their remnants as relics can be seen in the Marakkanam area, the Arasalar estuary in Karaikal and in Ariyankuppam river banks. In Puducherry, mangroves currently exist as fringing vegetation distributed along the banks of the Ariankuppam estuary/backwaters. A recent study found that the channels are linedby a luxuriant vegetation of small saltmarsh plants, trees, shrubs

and thickets,totalling about seven true mangrovespecies belonging to three families and four generaincludingAvicennia, Rhizophora, Acanthus and Bruguiera;and 16mangrove associate plants belonging to12 families. A total of 76species were recorded includingmolluscs37 (bivalves 16 and gastropods 21),crustaceans (22), amphipods (7), polychaetes(6), barnacles (3) and oligochaetes(1). Five species of turtleswere found in the coastal waters and theOlive Ridley turtle was found to be nestingin the Puducherry coastal area. Coral reef formation has been noticed in the offshore areas of Puducherry. The extent of reef formation and types of species present are yet to be studied

There are three major inland water bodies in Puducherry namely Ousteri, and Bahour Lake which are seasonal freshwater lakes. These lakes need to be protected to ensure sustained yield of freshwater. Kaliveli is brackish at its downstream in Tamil Nadu connected with a narrow channel to the Puducherry area of the lake.

The river waters are contaminated with untreated sewage and industrial wastes especially in Puducherry district. The coastal water quality is fair except increasing nitrate levels and high population of pathogenic bacteria. Situation is similar for Karaikal too. Due to low depth of profile of mouths of rivers due to siltation, the tidal exchange is nil or minimum. As a result, flushing of land based wastes is inadequate causing high levels of degradation of water quality affecting biodiversity of the water bodies and also contamination of ground water in wells of households that are located close to these water bodies.

7.4. Socio-economic profile

Agriculture is the most important occupation in Puducherry being a source of livelihood for 32% of the population. Table 2 gives the worker participation in the different regions of Puducherry indicating that the agriculture sector still draws a large number of people.

Table 4: Workers according to Census 2011

Sl. No.	Item	Unit	Puducherry	Karaikal
1	Number of Main workers			
	Male	No.	237953	46928
	Female	"	77617	11414
2	Category of Main workers			
	Cultivators	"	8405	2052

	Agricultural Labourers	"	38854	8740
	Household Industry workers	"	5203	992
	Other workers	"	263108	46558

Decreasing agricultural area and high rate of rural migration to urban areas has increased the current unemployment problem.

8. Impact of climate change on the sector

This will be considered while preparing each management sub-plan.

9. Statement on implementing agency and their experience

The National Centre for Sustainable Coastal Management (NCSCM) will take the lead in carrying out the activities under this component. NCSCM has considerable experience in preparation of management plans, which consider multiple sectors.

10. Project tasks (task wise planned activities, their descriptions, methodology and details on execution including stakeholder consultation on solution proposed

Preparation of a draft ICZM plan involves, preparation of State project report giving detailed account of environment, ecology, coastal activities and state's vision etc.; preparation of land use and coastal habitat maps and vulnerability maps sub-plans for individual sectors to address key issues and problems and develop eco-friendly management solutions in consultation with stakeholder; analysis of cross-impacts of solutions and where needed devising strategies for alternate solution; integration of sub-plans and preparation of ICZM plans after stakeholder consultations. Under the project on preparation of ICZM plans following activities will be undertaken:

- Preparation of land use, habitat maps for marine organisms, vulnerability maps etc
- Preparation of sub-plans for various sectors based on issues and problems identified
- Strategic Environmental Assessment: Evaluation of solutions developed to address issues and problems of sub-plans; identification of gaps and overlaps and resolving them and analysis of cross-impacts and where necessary suggestion of alternate solutions
- Integration of the sub-plans and preparation of draft ICZM plans (Fig.5)
- Stakeholder consultations on draft ICZM plans and revision of plan where needed
- Preparation of the final draft of the ICZM plan for presentation to the UT Government.

Fig.5. Integration of sub- plans plans to prepare ICZM plan

1.1. Preparation of maps

Maps required for preparation of plans such as land use/land cover, resources, activity maps, maps of marine organisms, Hazard and vulnerability maps will be prepared as they are basic requirements to prepare the sub plans. If existing maps available with concerned agencies meet the requirement, they will be used and if needed they will be updated.

1.2. Preparation of sub (sectoral)plans

The sub-plans identified include Shoreline management, Pollution Management, Conservation Management, Resource Management, Livelihood Management and Tourism Management. The key issues and problems in these sectors will be identified. Discussions on these key issues and problems will be held with the sectoral executing departments/agencies to develop strategies to address the key issues and to solve the problems. Generally, departmental plans in the government are made largely in isolation so that there is invariably an overlap that can be attributed either to the area (geographic) or to the activity. When the analysis is made to bring in congruence among the plans, it is possible to find that apart from overlaps, there could be gaps in the plan. Thus, analysis for integration would evaluate:

- Areas of overlap
- Areas of cooperation: to identify areas where cooperation (in different aspects) would help in optimizing the use of resources (human and financial)
- Areas of discord (where institutions are working at cross-purposes): There could be areas where interventions by one line department / agency result in the negation or diminishing of another department's intervention in such a manner that the outcome is negative for the community.
- Gaps where no institutional intervention is available right now but has been identified as being required.

Consultation 1: Once the above desk study - internal discussion exercise is completed, meeting with key agencies/ line departments/ institutions involved in implementing projects/ programmes in the plan area. Outcome: Agreement on development of action programme to address the key issues and problems and develop management solutions. These action plans will contain solutions to solve the problems.

Preparations of individualsectoral plans require basic data on the issues and problems of the districts. For e.g., to prepare pollution management plan data on sources of pollution and their load is needed. Further, modeling studies to location safe disposal of pollutants need to be conducted. In case of Livelihood management plan socio-economic data of coastal communities especially resource dependent communities of both the sector is needed. With regard to Resource management plan details on natural resources have to be used while preparing the plan. Such a requirement is also applicable to other sectoral plans like conservation, tourism and shoreline management plan. While these data requirements will be met mostly from secondary resources based on their reliability, substantial primary data may have to be collected and analyses of data using appropriate tools including mathematical models may have to be performed. Based on the model outputs, integrated management solutions are developed to address the key issues and problems.

1.3. Strategic Environmental Assessment (SEA)

SEA is an activity designed to help in the identification of potential adverse and cross impacts. NCSCM will assess likely cross-sectoral impacts of solutions proposed (before their execution) and where cross-sectoral impacts are identified, NCSCM would suggest appropriate remedial measures/alternate solutions in consultation with experts in the field. Where technological interventions involved to solve the problem for e.g., erosion/accretion, required modeling studies will be carried out. Thereafter, the sectoral plans are finalized by NCSCM in association with the executing agencies.

1.4. Integration of sub-plans and preparation of draft ICZM plans:

The actions identified in the sub-plans are executed by the executing agencies. The sub-plans plans will be integrated and a draft ICZM plan for each district will be prepared.

Consultation 2: Finalizing thedraftICZM plans after inclusion of any requisite mitigatory measures as suggested by the stakeholders
Deliverables: Individual Sectoral plans and final ICZM Plans

11. Implementation arrangements

NCSCM will coordinate with the Project Management Unit (PMU), which in turn will work with the agencies implementing individual projects.

12. Action Plan

The project will be undertaken for a period of 3 years. The proposed implementation schedule is given below. It may be noted that longer duration has been taken for cross impact analysis of solutions developed. As this exercise will be repeated after obtaining the details on solutions developed to address the sectoralproblems, the time required to develop solutions has been made part of this step.

Activity	Action Plan		Output	Cost Rs.in cr.
Preparation of an ICZM plan	1st year	Identification of key issues for each sub-plan activity	Finalized key issues for each sub-plan activity	1.62
	2nd Year	Collection of data for analysis for development of solutions and preparation of sub plans	Causes for key issues determined and solutions developed	4.84
	3rd year	preparation of draft ICZM plan, stakeholder consultation and training of State staff	ICZM plan document	1.61
			Total	**8.07**

F.C.=8.07 Cr. T.C. = Nil.

13. Procurement of goods, works and services and Implementation plans (adopting World Bank stipulated procedures)

All relevant procedures of funding agency applicable for the above activities will be followed. NCSCM already has a procurement cell that is highly conversant with funding agency's requirements.

14. Capacity building needs

- Training for PMU and Project Executing Agency (PEA)staff on ICZM
- Training for understanding ICZM components and the need to work under the ICZM umbrella - for line departments/ agencies executing programmes under the ICZM framework

15. Evaluation and Monitoring including social audits, financial reporting and auditing

- Field level consultations as well as workshops with line departments as well as stakeholders will be carried out
- Social audit components will be carried out only for capacity building programmes as this project does not have any field level implementation component

- Financial reporting and auditing will be carried out through NCSCM based on funding agencies procedures and requirements

16. Cost estimates (year wise both capital and Operation & Maintenance for project duration) – to include state's contribution in cash and kind and is to be indicated separately

Item	Amount Rs. in lakhs
Manpower	
Consultant/Adviser – 2nos Rs.80000 pm	96.00
Project Scientists – 6 nos Rs.50000 pm and inc @ Rs.2000 per year	194.40
Project Assistants – 2 Rs.12000 pm and inc @ Rs.600 per year	15.76
Other items	
Collection of data for Pollution, shoreline, livelihood, conservation, resource and tourism management plans and data analysis	130.00
Software development for cross impact analysis and performance of modelling to identify negative impacts of solutions suggested in sub-plans	80.00
Item	**Amount** Rs. in lakhs
Travel, per diem and vehicle hire	30.00
Contingency and consumables	25.00
Expenses on expert services (India and abroad) and meetings (including TA/DA to experts)	50.00
Sub-total	**621.16**
Institutional overhead charges – 30 % (for use of manpower, field equipment, computers etc.)	186.35
Total	**807.51**

17. Post – project scenario (commitment by state to continue the project and monitoring and reporting of project performance)

On completion of preparing the ICZM Plan and the project activity, the State Government will continue the post project activities.

18. Deliverables

The deliverable will be ICZM plans for all the four districts containing Project Area details, sectoral sub-plans, cross impact analysis of solutions developed under sub-plans and solutions suggested, integration of sub plans, project implementation mechanisms and a database containing all data used to prepare the ICZM plans.

CONSTRUCTION & RECONSTRUCTION OF FISH AUCTION HALL AT FOUR PLACES& CONSTRUCTION OF WORK SHELTER AT VEERAMPATTINAM IN PUDUCHERRY REGION WITH FOCUS ON SEA SAFETY AND CO-MANAGEMENT CONCEPT

Project Preliminary Report

<table>
<tr><td>1</td><td colspan="2">Name of the Project</td><td colspan="4">Construction & reconstruction of fish auction hall at four places& construction of work shelter at Veerampattinam in Puducherry region with focus on sea safety and co-management concept.</td></tr>
<tr><td>2</td><td colspan="2">Sectoral area</td><td colspan="4">Livelihood Management</td></tr>
<tr><td>3</td><td colspan="2">Total Financial outlay</td><td colspan="4">Rs. 4.00 crores</td></tr>
<tr><td>4</td><td colspan="2">Details of the external development agencies (and the amount sought from each)</td><td colspan="4">World Bank</td></tr>
<tr><td>5</td><td colspan="2">Financial arrangement</td><td colspan="4">Rs. in Cr</td></tr>
<tr><td rowspan="2">Total External Assistance</td><td colspan="4">Counterpart funds being made available by</td><td rowspan="2">Total</td></tr>
<tr><td>Implementing agency</td><td>UT Govt.</td><td>Central Govt.</td><td>Others, if any</td></tr>
<tr><td>2.00 cr</td><td>NIL</td><td>0.4</td><td>1.6</td><td>2.0</td><td>4.00 cr.</td></tr>
<tr><td>6</td><td colspan="2">Project duration (dates/months/years</td><td colspan="4">3 years</td></tr>
<tr><td>7</td><td colspan="2">Location of project</td><td colspan="4">I. Reconstruction of auction Hall at ChinnaKalapet, Pillaichavady and P.Pudukuppam.
II. Construction of auction Hall at Pannithittu.
III. Construction of work shelter at PeriyaVeerampatinam</td></tr>
<tr><td>8</td><td colspan="2">Previous phases, if any</td><td colspan="4">Nil</td></tr>
<tr><td>9</td><td colspan="2">Statutory required</td><td colspan="4">1. Preparation of estimates by PWD
2. Environmental clearance from Competent authority</td></tr>
<tr><td>10</td><td colspan="2">Statutory obtained</td><td colspan="4">NIL</td></tr>
</table>

11	**Details of Feasibility Studies done, if any**	Does not arise.
12	**Implementing agency**	Department of Fisheries and Fishermen Welfare
13	**Basic design of the project**	Infrastructure support to fishing community and marketing of fish
	Goals and objectives	To provide basic fishing infrastructure facilities for fish auctioning and marketing and support activities to fishermen with focus on sea safety and co-management concept.
	Activities involved	1. Tendering process 2. Construction phases
	Outputs of the project	Fish auction hall, work shelter for auctioning and marketing of fish and for safe berthing of fishing crafts and tackles.
	Outcome of the project	Better infrastructure facilities with improved marketing facilities to facilitate better earning opportunities to fishermen
-	**FC and TC component**	Refer section 13
14	**Target population/ groups**	Fishing communities
15	**Detailed Action Plan (Year wise)**	Refer section 13
16	**Quantitative and qualitative (verifiable)target indicators**	Qualitative indicator would be improved infrastructure facilities for auctioning & marketing of fish and safe berthing of fishing crafts and tackles and quantitative indicator would be increase in number of fish auction halls and work shelter with basic amenities to fisher
17	**Environmental sustainability of the project**	Structures constructed designed to suit local environmental conditions
18	**Land acquisition / Resettlement and Rehabilitation involved**	Yes
19	**Linkages with Similar Projects**	Nil
(i)	**Information regarding similar projects undertaken previously (add evaluation reports, if any)**	Nil
(ii)	**Does the project form part of the**	Fisheries sector

	sectoral project? If yes, who are the other partner with details of the specific activities being undertaken by them	
20	**Finance Plus Element**	
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	NA
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	NA
	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	NA
	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	NA
	v. Does the proposal seek to create additional choice for the citizens to access required	No

	service/ entitlements?	
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	NA
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	No
	viii. Does the proposal have institutional improvement measures: **e.g. (a) Accounting Reforms (moving from single entry cash based system to double entry accrual system of accounting** **(b) Ring fencing of finances/activities including corporatization wherever needed** **(c) creation and implementation of appropriate revenue models e.g. tariff reforms or alternative revenue structuring?**	NA
	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	NA
	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	NA
II	**II. Innovation and Piloting of**	

	new Approaches	
	(I) Does the proposal have innovative elements and new approaches that have not been tried in the sector and have reasonable chance of changing for the better the way things are done in the sector and have some chance of scalable replication?	NA
	(ii) Does the proposal look at financial sustainability and O & M related issues which otherwise has not been the norm in the sector?	Yes, periodical maintenance to fish auction hall and work shelter.
III	**Innovation in financing and Leveraging**	Does not arise
	i. Does the proposal use different/ innovative financing products/ modalities?	NA
	i. Does the proposal involve co-financing from other financing agencies?	No
	iii. Does the proposal catalyse private sector financing in different ways and especially to create leverage?	NA
	iv. Does the proposal involve CDM and accrual of carbon credits as a natural by-product of core development projects which can be a way of financing the project?	NA

Executive Summary

Fishing activities are of high importance in the coastal areas of Puducherry and Karaikal. Not all hamlets have basic fishing infrastructure facilities such as fish auction hall and work shelters which forces fisher folk to find suitable place for their auctioning and the safe berthing of crafts and tackles. Once these infrastructural facilities are created they find suitable place for auctioning their fish and for safe berthing of fishing crafts and tackles. Therefore, it is absolutely essential to establish Fish Auction Hall and Work shelter.

1. Introduction

The Ministry of Environment, Forest and Climate change (MoEF&CC) has initiated phase II of the Integrated Coastal Zone Management (ICZM) project. MoEF&CC has sought a proposal to carryout ICZM related activities along the coast of Puducherry and Karaikal region from the Government of Puducherry (GOP). In this context, Government of Puducherry (GOP) has to prepare a Detailed Project Report (DPR) for the preparation of ICZM plan at identified coastal stretches of UT of Puducherry which include construction and reconstruction of fish auction hall and work shelter at Puducherry region. The ICZM plans will be prepared for both the coastal stretches, addressing key issues in the area.

In a concept note prepared and submitted to the MoEF&CC, the Department of Environment, Government of Puducherry has identified various activities and issues to be addressed under an ICZM plan. In order to develop infrastructure associated with Fisheries which is a livelihood need for fishermen, the Department of Fisheries has identified the following site for development of Fish Auction Hall on a priority basis:

a. Reconstruction of Fish Auction Hall at ChinnaKalapet.
b. Reconstruction of Fish Auction Hall at Pillaichavady.
c. Reconstruction of Fish Auction Hall at P.Pudukuppam
d. Construction of Fish Auction Hall at Pannithittu
e. Construction of work shelter at Periyaveerampattinam

2. Project Area Description and relevance to ICZM:

The fish auction hall are in the state of dilapidated condition and at Pannithittu fishing village there is no fish auction hall where as in the fishing village of PeriyaVeerampattinam, the people require are more work shelter in addition to the one presently existing for placing their fishing crafts and tackles at safe especially during adverse weather conditions. Due to increase in number of people involved in fishing activity, necessity has arisen to provide some basic infrastructure facilities for landing, berthing and achieving hygienic environment.

3. Objectives and key indicators

The objective is to provide basic fishing infrastructure facilities for auctioning, marketing and for safe berthing of fishing crafts and tackles support activities to fishermen. The key indicator is attainment of better socio-economic condition of fisher folk.

4. Input and outcome indicator (objective and direct benefits)

The input indicator plan is creation of fish auction hall and work shelter and the outcome indicator is the completed Fish Auction Hall and Work shelter. The direct benefit of establishing basic fishing infrastructure facilities is to provide fish auction hall and work shelter for auctioning, safe berthing of fishing crafts and tackles and to easy access / transport of fish to markets.

The indirect benefits are:-

(i) The fishery allied sector may get benefitted
(ii) Time and cost shall be minimized.

5. Project guiding principles and key design features

The guiding principle for the project is the need to establish four numbers of fish auction hall and one number of work shelter for auctioning, transport of fish at quick intervals and for placing their fishing crafts and tackles at safe.

6. Relevance of National policies and state plans to the proposed activities

In April 2017, Government of India has notified the 'National Policy on Marine Fisheries, 2017' (NPMF), which provides guidance for promoting 'Blue Growth Initiative' which focus on ushering 'Blue Revolution' (Neeli Kranti) by sustainable utilization of fisheries wealth from the marine and other aquatic resources of the country for improving the lives and livelihoods of fishermen and their families. The vision expressed by the Government in the policy is achievement of a healthy and vibrant marine fisheries sector that meets the needs of the present and future generations. While keeping sustainability of the resources at the core of all actions, the policy framework will meet the national, social and economic goals, livelihood sustainability and socio-economic upliftment of the fisher community and is intended to guide the coordination and management of marine fisheries in the country during the next ten years. The overall strategy of the NPMF, 2017 is based on seven pillars, namely sustainable development, socio - economic upliftment of fishers, principle of subsidiarity, partnership, inter-generational equity, gender justice and precautionary approach. These seven pillars will guide the actions of

various stakeholders in meeting the vision and mission set for the marine fisheries sector of the country. The present proposal is quite appropriate to fulfil the vision project in the fisheries policy, as it facilities to provide basic fishing infrastructure facilities for better marketing and support activities to fishermen. This will help in obtaining better income to the fisherfolk who have been facing constantly livelihood challenges due to frequent inclement weather conditions which reduces number of fishing days in a year. Improving infrastructure and other facilities in the fisheries sector is a routine activity of the Govt of Puducherry performed on need basis.

7. Earlier studies / attempts (if any), their outcomes and how the present plan fulfils gaps /overcome negative effects if any – necessity of the project

These are new projects to create basic fishing infrastructure facilities. No studies have been done earlier in this area. As these facilities are not adequately available at present in these hamlets, the fisher are forced to move migrate nearby landing centres which takes time to reach. Such delay leads to faster putrefaction of fish. As a result the fish caught often does not fetch good price. Establishment of Fish Auction Hall and Work shelter will increase market value of fish due to prevalence of better hygienic conditions and be beneficial in terms of safety. Therefore, it is absolutely essential to establish Fish Auction Hall and Work shelter in fishing villages and hamlets.

8. Environment, Ecology and socio-economics of project area

The location is in rural area with sandy beach. The surroundings possess land vegetation with human settlement. The fisher folk living in the area are mostly small scale fishermen using catamarans with or without OBM. The socio-economic status is average and requires upliftment.

9. Impact of climate change on the sector

Impact of climate change has been dealt under the ICZM plan project.

10. Statement on implementing agency and their experience

Fisheries Department will implement this project through PWD Puducherry who have vast experience in construction of fishery related infrastructural facilities.

11. Project tasks

The main tasks involved in the establishment of Fish Auction Hall and Work shelter include:

(i) Preparation of estimates by PWD.
(ii) Obtaining clearance from CRZ angle.

(iii) Tendering process.
(iv) Construction phase.

A major issue from past efforts is the maintenance of the FLC and related infrastructure. A co-management council will be evolved based on interactions with the beneficiary community so that the community has ownership over the resources created for them. The capacity of the co-management council will be built up not only for taking care of the assets created but also for overall management of fisheries and incorporating activities such as safety at sea, vessel monitoring and management of the local ecosystem. Lessons learnt from the implementation of co-management in other villages of Puducherry will be incorporated into the development of the co-management arrangements.

12. Implementation arrangements

Fisheries Department will implement this project through PWD Puducherry who have vast experience in construction of fishery related infrastructural facilities.

13. Project Implementation Schedule and periodical reporting of progress

Project implementation schedule will be prepared after obtaining Administrative Sanction from the Government. Periodical reporting will be done as per requirements. Project period in progress is for 24 months as detailed below.

Schedule of implementation and Action Plan

The following box chart will show the schedule of implementation.

Sl.No	Activity	Quarter-wise Activity							
		1st Year				2nd Year			
		1	2	3	4	1	2	3	4
1	Preparation of estimates by PWD								
2	Obtaining clearance from CRZ angle								
3	Tendering process								
4	Construction phase								

The action proposed is

Activity	Year	Action Plan (Tentative)	Output	Cost Rs.in cr.
Construction & reconstruction of fish auction hall at four places & construction of work shelter at Veerampattinam in Puducherry region.	1st Year	Preparation of estimates & clearance from all angles and tendering process	Ready for construction	0.50
	2nd Year	Construction phase	Fish Auction Hall and work shelter completed and commissioned. Training on co-management concept provided to users	3.50
			Total	**4.00**

F.C. =4.00 Cr.; T.C. = Nil

14. Procurement of goods, works and services and implementation plans (adopting World Bank stipulated procedures)

Procurement of goods and services will be made based on the instructions/ guidelines stipulated in General Financial Rules as well as by adopting procedures stipulated by the funding agency and the procurement will be made after obtaining necessary approval /sanction for the competent authority wherever / whenever required.

15. Capacity building needs:

Necessary capacity building programmes will be undertaken for various stakeholders especially in adopting hygienic conditions to be maintained in the Fish auction halls and Work shelter.

16. Evaluation and monitoring including social audits, financial reporting and auditing

A Project Steering Committee will be constituted to evaluate the progress made. Third party agency will be engaged for all audits and for evaluation and monitoring. Auditing of expenditure will be carried out using the procedures stipulated by the funding agency.

17. Cost estimates

Sl. No.	Components	Amount in (Rs.)
1	Reconstruction of Fish auction hall at ChinnaKalapet	50,00,000
2	Reconstruction of Fish auction hall at Pillaichavady	50,00,000
3	Reconstruction of Fish auction hall at P.Pudukuppam	50,00,000
4	Construction of Fish auction hall at Pannithittu	50,00,000
5	Construction of Work shelter at PeriyaVeerampattinam	**2,00,00,000**
	Total	**4,00,00,000**

18. Post –Project scenario (Commitment by state to continue the project and monitoring and reporting of project performance)

The state will continue monitoring and reporting of projects performance during the post project period. It will maintain the Fish auction halls and work shelter with its own funds.

PROMOTION OF OPEN SEA CAGE CULTURE FOR ENHANCING LIVELIHOOD OPPORTUNITIES OF FISHERMEN

Preliminary Project Report

1	**Name of the Project**				**Promotion of Open Sea Cage Culture for enhancing livelihood opportunities of fishermen**	
2	**Sectoral area**				Livelihoods Management	
3	**Total Financial outlay**				2.42 Crores	
4	**Details of the external development agencies (and the amount sought from each)**				World Bank	
5	**Financial arrangement**				**Rs. in Cr**	
Total External Assistance	**Counterpart funds being made available by**				Total	
	Implementing agency	**UT Govt.**	**Central Govt.**	**Others, if any**		
1.21 Cr.	Nil	0.24 Cr.	0.97 Cr.	Nil	**2.42 Cr.**	
6	**Project duration (dates/months/years)**				13 months	
7	**Location of project**				Puducherry	
8	**Previous phases, if any**				Nil	
9	**Statutory required**				Nil	
10	**Statutory obtained**				Nil	
11	**Details of Feasibility Studies done, if any**				Shall be carried out in due course	
12	**Implementing agency**				Department of Fisheries and Fishermen Welfare through Madras Research Centre of CMFRI (Central Marine Fisheries Research Institute).	
13	**Basic design of the project**				A rapid survey of coastal areas of the Puducherry involving GIS to find out probable locations for siting the cage farms and demonstration of open sea cage farming.	
	Goals and objectives				To enhance the livelihood opportunities of fishermen by introducing open sea cage culture and increasing large-scale production of commercial fin fishes to meet the ever increasing	

		demand for seafood.
	Activities involved	1. Collection of primary and secondary data and preparation of GIS maps on suitable sites for sea cage culture. 2. Selection of 2 sites for conducting Sea Cage Farming demonstrations. 3. Selection of beneficiaries for demonstration project. 4. Fabrication and installation of 10 sea cages at 2 sites. 5. Conductance of Cage farming demonstration
	Outputs of the project	Map indicating suitable sites for open sea cage culture prepared, open sea culture introduced through demonstration projects at 2 sites, knowledge of fishermen enhanced in cage culture techniques, increase in sea food production and increase in fishermen income.
	Outcome of the project	Enhanced livelihood support for the fishing community, augmentation of natural resources and sea food production and strengthening of government competence and management on marine aquaculture.
	FC and TC component	Refer Section 10
14	**Target population/ groups**	Fishermen
15	**Detailed Action Plan (Year wise)**	Refer Section10
16	**Quantitative and qualitative (verifiable) target indicators**	The quantitative indicator would be number of sea cages installed, number of beneficiaries trained and increase in income level of beneficiaries. Qualitative indicator would be enhanced livelihood of fishermen through demonstrated cage culture.
17	**Environmental sustainability of the project**	Conservation of fish species of commercial importance thereby

		avoiding exploitation of particular fish species and/or from a particular fishing zone.
18	**Land acquisition / Resettlement and Rehabilitation involved**	Nil
19	**Linkages with Similar Projects**	
(i)	**Information regarding similar projects undertaken previously (add evaluation reports, if any)**	Nil
(ii)	**Does the project form part of the sectoral project? If yes, who are the other partner with details of the specific activities being undertaken by them**	
20	**Finance Plus Element**	
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	-
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	Yes, the project helps in capacity building of the fisheries department and fishermen to learn and propagate open sea cage culture in the U.T. of Puducherry.
	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	Yes increased stocks of fishes.
	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	It increases natural stocks of fishs thereby enhancing the livelihood of fishermen

	v. Does the proposal seek to create additional choice for the citizens to access required service/ entitlements?	Yes, demonstartion project at 2 sites through selected benificieries among fishermen
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	Conventional shore based culture systems demands large quantities of freshwater for the culture of fishes. Whereas in cage culture, the vast unutilized areas in the sea can be brought under mariculture practices wherein production per unit (m^3) is 50 times higher than shore based fish culture.
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	NA
	viii. Does the proposal have institutional improvement measures: e.g. (a) Accounting Reforms (moving from single entry cash based accounting system to double entry accrual system of accounting (b) Ring fencing of finances/activities including corporatization wherever needed (c) creation and implementation of appropriate revenue models e.g. tariff reforms or alternative revenue structuring?	NA
	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	NA
	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	Could enable efficient, optimized fishing system over conventional sea fishing among the small scale fishermen.
II	**Innovation and Piloting of new Approaches**	

	(i) Does the proposal have innovative elements and new approaches that have not been tried in the sector and have reasonable chance of changing for the better the way things are done in the sector and have some chance of scalable replication?	Yes. Open sea cage culture is a new concept and has not been tried in Puducherry. The demonstration project will enhance the capacity of the fishing sector and there is an element of scalable replication.
	(ii) Does the proposal look at financial sustainability and O& M related issues which otherwise has not been the norm in the sector?	Yes.
III	**Innovation in financing and Leveraging**	
	i. Does the proposal use different/ innovative financing products/ modalities?	—
	i. Does the proposal involve co-financing from other financing agencies?	--
	iii. Does the proposal catalyse private sector financing in different ways and especially to create leverage?	--
	iv. Does the proposal involve CDM and accrual of carbon credits as a natural by-product of core development projects which can be a way of financing the project?	--

1. Introduction:

Sea cage farming is viewed as a major option for increasing the seafood production and has been expanding rapidly in recent years at global level. Cage culture has made possible the large-scale production of commercial fin fishes in many parts of the world and can be considered as the most efficient and economic way of producing fishes. When compared to many maritime countries, India is still in its infancy in cage culture. Recently, it has been estimated that around 1500 cages of varying sizes are installed in the inshore and brackishwater areas, with a total estimated production of around 1500 tonnes. Hence, there is tremendous scope for further expansion of cage farming in India.

It is understood that availability of suitable sites for cage culture, well established breeding techniques that yield sufficient quantity of fish fingerlings for farming, availability of supporting industries like feed and net manufacturers, strong R&D initiatives, social, economic and financial logistics are prime factors which will pave the way for expansion of sea cage farming as a commercial activity.

Site Selection

Choosing a site for cage farming is crucial because it impacts the economic viability of farming. Site selected should have optimum water quality to avoid stress conditions and achieve maximum growth of farmed fish, and ensure proper and secure installation of cages, logistic and other support for supply of inputs, harvesting and marketing of fish. Sea cage site has a direct bearing on operational cost, fish mortality, production and overall profitability of farming operation.

Exclusion of areas for cage farming: Sites which are active fishing zones and close to harbours/ fish landing centres and navigation channels, defense areas, marine protected areas, coral reefs, mangroves, areas under coastal management plan, points of industrial effluent discharge, sewage pollution, heavy freshwater discharge by rivers, presence of underwater pipelines, telecom cables, explosives dumping and areas of historic ship wreck are to be avoided during site selection.

Physical and Water Quality Parameters

Following are important parameters to be studied / recorded in order to find out the site suitability.

Depth: Culture site should have a minimum depth of 6 m at the lowest low tide. A clearance of minimum 2 m should be available between the cage net bottom and seabed. This will maximize water exchange, reduce oxygen depletion and encourage flushing-out of metabolic and feed wastes that accumulate under the cage. Depth of farming site determines mooring design and length of mooring chains, affects routine net and mooring line inspection, etc.

Current: Seawater current speed of 0.5 – 1.0 m per sec is considered ideal. Current speed above this will exert very large force on cages deforming the net cage shape or reducing volume; and mooring systems which might cause mortality of farmed fishes. Current speed influences water exchange, feed dispersion, net shape and volume, solid waste dispersal and effective monitoring.

Wind and Waves: Wind affects the wave height and when waves are high it will affect the accessibility to cages and it becomes difficult to do routine activities like feeding fish, monitoring cages, etc.

Seabed: The nature of seabed determines the mooring system and type of anchors to be used. Thick mud, clay, sand and pebbles will provide good holding for anchors. Seabed having rocks, stones, corals will require a deadweight (gravity) anchorage with Gabions (mesh boxes filled with rocks or concrete blocks).

Water Quality Criteria: Cage site should have good water quality to meet the biological requirement of the farmed species. These criteria include optimum temperature, salinity, pH and dissolved oxygen. The water should be free from excessive suspended solids, frequent algal blooms and disease causing organisms. Optimum ranges of water quality parameters are; Dissolved Oxygen: 4 – 8 mg/L; Water Temperature: 28 – 33 ^{0}C; pH: 7.9 – 8.3 and Salinity: 25 – 34 ppt.

Logistics

Distance from shore to cage site should be at the minimum to reduce operational expenses. Road connectivity for transporting cage materials, feed, harvested fish, etc., is required for a successful operation of sea cage farm.

Methodologies

A GIS map of the entire coastal area of Puducherry will be prepared incorporating digitized village boundary lines and bathymetry lines into the map. Similarly, primary / secondary data available on current, wind direction, wind

speed, significant wave height, etc., will be collected and overlaid on the GIS map. Diving, as and when required, will be conducted to ascertain the seabed characteristics. Primary data on water quality on the selected sites will be thoroughly studied and recorded.

Among the suitable sites selected, initially two sites will be selected for conducting demonstration of sea cage farming. The beneficiaries will be selected for each demonstration by the Madras Centre of CMFRI in consultation with the Department of Puducherry.

2. Project Area Description and Relevance to ICZM:

The coastline of the U.T. of Puducherry extents to 42 km, out of which 23 km lies as the coastline of Puducherry Region and 18 km as the coast of Karaikal Region and 1 km along Mahe region. Also Yanam has an extensive inland water shore to an extent of 47 km. Of these, the Region of Puducherry, Karaikal in the coast of the Bay of Bengal and Mahe in coast of Arabian Sea are priority fishing zones accounting for local and national marine trade and for sea food export.

3. Objectives and Key Indicators:

The present proposal is an attempt to carry out a rapid survey of coastal areas of the Puducherry involving GIS to find out the probable locations for siting the cage farms and conductance of sea cage farming demonstrations. A competent attempt of this would ensure a long term large-scale production of commercial fin fishes to meet the ever increasing demand for seafood.

The Key Indicators would be:

1. Survey of coastal areas involving GIS for suitable site Selection for cage culture.
2. Site Selection for conducting Sea Cage Farming demonstrations.
3. Identifying breeding techniques that yield of fish fingerlings for farming
5. R&D initiatives.

4. Input and Output Indicator (Direct and Indirect benefits):

Number of sq.km of sea/coastal area surveyed, assessment of the surveyed sites for their suitability for fish farming based on specific parameters, identification of breeding techniques that yields fish fingerlings would be the Input Indicators. The output indicator would be the implementation of sea cage farming in two locations

and the identification of the scope of expansion and implementation of the similar sea cage farming elsewhere that would help develop and sustain the livelihood opportunities of the fishing community.

5. Project Guiding Principles and Key Design Features:

The guiding principle for the project is the need to study the scope of Sea Cage Culture that could be implemented in large scale for the betterment and/or to sustain the livelihood of Fishermen community in the long term and to keep up the national trade on sea food. At the same time sea cage farming also focuses on conservation of specific marine species which are highly fished out for their demand in the global market as sea cage culture enables culture of specific species of fishes on demand for trade in the caged environment.

6. Earlier Studies/attempts (if any), their outcomes and how the present plan fulfils gaps/overcome negative effects if any – necessity of the project:

This is a new project with the idea of marine conservation and improving the financial sustainability of the coastal community. There is a small scale pilot attempt of sea cage culture being carried out in Goa and another by CMFRI in their research institute in Kochi. Hence a Survey of coastal areas of the Puducherry involving GIS to find out the probable locations for siting the cage farms and conductance of sea cage farming demonstrations would enable the scope of implementing similar attempts elsewhere in large scale.

7. Environment, Ecology and Socio-Economics of project area:

Conventional shore based culture systems demands large quantities of freshwater for the culture of fishes. Whereas in cage culture, the vast unutilized areas in the sea can be brought under mari-culture practices wherein production per unit (m^3) is 50 times higher than shore based fish culture.

8. Statement on implementing agency and their experience:

The Department of Fisheries and Fishermen Welfare will implement this project with technical assistance from the Madras Research Centre of CMFRI.

9. Project Tasks:

The main tasks involved in the Survey of Coastal regions of Puducherry and in the conductance of Sea Cage Culture are:

1. Collection of primary and secondary data on water quality and preparation of GIS maps on suitable sites for sea cage culture.
2. Selection of 2 sites for conducting Sea Cage Farming demonstrations.
3. Selection of beneficiaries for demonstration project.
4. Fabrication and installation of 10 sea cages at 2 sites.
5. Conductance of Cage farming demonstration

10. Schedule of implementation and Action Plan:

Sl. No.	*Activity*	*Responsibility*	*Time Frame*				
			Dec' 2020	*Jan – Feb' 2021*	*March'2021*	*Apr' 2021*	*May – Dec' 2021*
1.	Site visit	CMFRI	✓				
2.	Collection of primary and secondary data and preparation of GIS maps	CMFRI	✓	✓			
3.	Selection of sites in consultation with the Department of Fisheries based on the siting studies	CMFRI & Fisheries Department, Govt. of Puducherry			✓		
4.	Final report on Site selection	CMFRI			✓		
5.	Selection of cage farming demonstration sites in consultation with the Department of Fisheries, Puducherry	CMFRI & Fisheries Department, Govt. of Puducherry			✓		
6.	Selection of beneficiaries	CMFRI & Fisheries Department, Govt. of Puducherry				✓	
7.	Fabrication and installation of sea cages	CMFRI & Fisheries Department, Govt. of Puducherry				✓	
8.	Cage farming demonstration						✓

The proposed action plan is

Activity	Period	Action Plan (Tentative) for one year	Output	Cost Rs.in cr.
Rapid Survey of coastal areas of Pondicherry and deployment of sea cage farms	1st -6th month	Collection of primary and secondary data using GIS for works namely scanning of nautical charts, geo-referencing the charts, collection of data on village boundaries and digitization, preparation final site map layouts incorporating the data collected, collection of secondary meteorological and oceanographic data from government agencies; and Engagement of skilled contractual workers for assisting in data collection and cage farming demonstrations at two locations – 4 persons; for 13 months (from December 2018 to December 2019)	Site identified using technical data collection	0.62
	7th -13th month	Fabrication and installation of sea cages Cage farming demonstration	Sea Cages fabricated and demonstrations made.	1.80
			Total	**2.42 Cr.**

FC = Rs.2.42 Cr; TC = Nil

11.Procurement of goods, works and services and implementation plans (adopting World Bank stipulated procedures)

Procurement of goods and services will be made based on the instructions/ guidelines stipulated in General Financial Rules as well as by adopting procedures stipulated by the funding agency and the procurement will be made after obtaining necessary approval /sanction for the competent authority wherever / whenever required.

12. Capacity Building Needs:

Necessary capacity building programmes will be undertaken for various stakeholders especially in education and skill development of fishermen community in making the best use of an innovative seafood production technique such as sea cage culture.

13. Cost Estimates:

	Work Components	**Rate/Unit**	**Amount (Rs. In lakhs)**
1.	i) Procurement of nautical charts;	Rs. 50,000/- Lump sum	12.50
	ii) Cost for GIS and related works namely scanning of nautical charts, geo-referencing the charts, collection of data on village boundaries and digitization, preparation final site map layouts incorporating the data collected;	Rs. 2.5 lakh Lump sum	
	iii) Payment for collection of secondary meteorological and oceanographic data from government agencies;	Rs. 6.0 lakh Lump sum	
	iv) Procurement of chemicals / glassware / minor instruments for water quality studies	Rs. 3.5 lakh Lump sum	
2.	Vehicle / boat hire charges in connection with data collection for scoping studies and cage farming demonstration	Lump sum	4.00
3.	TA and DA	Lump sum	3.00
4.	Contingency	Lump sum	2.00
5.	Engagement of skilled contractual workers for assisting in data collection and cage farming demonstrations at two locations – 4 persons; for 13 months (from December 2018 to December 2019)	Rs. 15,000 / person	7.80

6.	Fabrication of HDPE sea cages, net cages (both inner and outer); mooring systems with anchors / boulders – 20 Units	Rs. 3.00 lakh/ Unit	60.00
7.	Cost of seeds (2000 nos / cage) / fingerlings and their transportation; cost of pellet / extruded feed; cost of feed supplements, vaccines, etc. – Total 20 nos. of demonstrations	Rs. 6 lakh/cage	120.00
8.	Miscellaneous expenditure		1.00
	Sub Total		**210.30**
9.	Establishment charges	@15 % of total cost	31.55
	Grand Total		**241.85**

14. Post Project Scenario (commitment by the state to continue the project and monitoring and reporting of project performance)

The state will continue monitoring and reporting of project's performance during the post project period. The state will maintain the sea cage farming with its own fund and will look to establish the sea cage farming practice in other locations in the regions of Puducherry.

PROMOTION OF LIVELIHOOD OPPORTUNITIES THROUGH ENVIRONMENT FRIENDLY TOURISM ALONG PUDUCHERRY COAST - DEVELOPMENT OF BEACH FRONT AT MANAPET IN PUDUCHERRY

Project Preliminary Report

1	**Name of the Project**	**Promotion Of Livelihood Opportunities Through Environment Friendly Tourism along Puducherry Coast - Development of Beach front atManapet In Puducherry**
2	**Sectoral area**	Tourism Management
3	**Total Financial outlay**	Rs. 15 crores
4	**Details of the external developmentagencies (and the amount sought from each)**	World Bank
5	**Financial arrangement**	**Rs.15 Cr**

Total External Assistance	**Counterpart funds being made available by**				**Total**
	Implementing agency	**UT Govt.**	**Central Govt.**	**Others, if any**	
7.5 cr	NIL	1.5	6.0	NIL	**15 cr.**

6	**Project duration (dates/months/years**	2 Years
7	**Location of project**	Puducherry (Manapet Village)
8	**Previous phases, if any**	Nil
9	**Statutory required**	Nil
10	**Statutory obtained**	NA
11	**Details of Feasibility Studies done, if any**	NA
12	**Implementing agency**	Tourism Department
13	**Basic design of the project**	Establishing Eco-tourism facilities in coastal areas
-	**Goals and objectives**	To better utilize coastal space for leisure activities by providing eco-tourism facilities and creating additional livelihood for the local community.
-	**Activities involved**	Beach development and community involvement.
-	**Outputs of the project**	Eco-tourism infrastructure and

		beautification of beach and support facilities.
-	**Outcome of the project**	Aesthetics in beach areas
-	**FC and TC component**	Refer section 14
14	**Target population/ groups**	Coastal communities
15	**Detailed Action Plan (Year wise)**	Refer section 14
16	**Quantitative and qualitative (verifiable)target indicators**	Qualitative indicator would be increased areas for leisure for common man and employment opportunities. 4 lakhs visitors per year
17	**Environmental sustainability of the project**	Structures constructed designed to suite local environmental conditions and do not cause damage to environment
18	**Land acquisition / Resettlement and Rehabilitation involved**	Not envisaged
19	**Linkages with Similar Projects**	Nil
(i)	**Information regarding similar projects undertaken previously (add evaluation reports, if any)**	Nil
(ii)	**Does the project form part of the sectoral project? If yes, who are the other partner with details of the specific activities being undertaken bythem**	Tourism sector
20	**Finance Plus Element**	Details given in Section 13
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	NA
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	Yes capacity building to fishermen and local community in hospitality support services.
	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise	NA

	has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	
	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	Yes. It provides better earning opportunities to unemployed and underemployed local community.
	v. Does the proposal seek to create additional choice for the citizens to access required service/ entitlements?	No
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	NA
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	NA
	viii. Does the proposal have institutional improvement measures: e.g. (a) Accounting Reforms(moving from single entry cash based system to double entry accrual system of accounting (b) Ring fencing of finances/activities including corporatization wherever needed (c) creation and implementation ofappropriate revenue models e.g. tariff reforms or alternative revenue structuring?	NA
	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory	NA

	framework/regulators?	
	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	NA
II	**Innovation and Piloting of new Approaches**	
	(i) Does the proposal have innovative elements and new approaches that have not been tried in the sector and have reasonable chance of changing for the better the way things are done in the sector and have some chance of scalable replication?	NA
	(ii) Does the proposal look at financial sustainability and O& M related issues which otherwise has not been the norm in the sector?	Yes on maintenance of tourism facilities and amenities needed
III	**Innovation in financing and Leveraging**	Does not arise
	i. Does the proposal use different/ innovative financing products/ modalities?	NA
	i. Does the proposal involve co-financing from other financing agencies?	No
	iii. Does the proposal catalyse private sector financing in different ways and especially to create leverage?	NA
	iv. Does the proposal involve CDM and accrual of carbon credits as a natural by-product of core development projects which can be a way of financing the project?	NA

EXECUTIVE SUMMARY

The Coastline of Puducherry U.T is about 45 Kms. of which Puducherry Region accounts for 24 Kms. The coast is endowed with picturesque backwaters, beaches etc along with tranquility which attracts tourists from all over world. The backwaters are still in considerable stage of natural beauty with ample vegetation that makes them attractive. Tourism is a major engine of economic growth of Puducherry and it is a priority sector. Around 16 lakhs tourists visit the UT ever year and the Day Tourists are around 30,000-40,000 per day. Tourism is one of the sectors to provide employment and sustainable development to the host community. Beaches and backwaters are the only resources available in Puducherry for the tourism activities. With the aim of conservation and utilizing the natural resources of Puducherry for tourism purpose and to enhance livelihood opportunities to the wide range of coastal communities, the following project is proposed for development under "Integrated Coastal Zone Management Projects": Development of Beach Front and Marine Park at Manapet in Puducherry. The estimated budget is Rs.15 Crores.

The Tourism Department, Govt. of Puducherry is owning 100 acres of land at Manapet. The above project is planned at the land to an extent of 25 acres.

Manapet is a village in Bahour Commune of Puducherry. It lies on the Southern part of Puducherry at a distance of 20 Kms. and East of NH 45A at a distance of 2 Kms. from it. Manappattu is bordered by Bahour in the west, Pillaiyarkuppam in the north, Bay of Bengal in east and Krishnavaram, Pudukuppamin the south.

Following are the villages under Manappattu Village Panchayat.

- Manappattu
- Kanniakoil
- Kattukuppam
- Varakalodaipet

The population of the Commune Panchayat is around 68,757 (2011 censes). The project proposed is not only help the local community, but also it will be an iconic spot for the 16 lakhs of tourists visiting Puducherry every year.

(I) Introduction:

In July 2004, the Ministry of Environment and Forests constituted an Expert Committee, chaired by Prof. M.S. Swaminathan, to carry out a comprehensive review of the CRZ Notification. A major recommendation of the committee was to adopt an integrated coastal zone management approach that would with people's participation, promote the livelihood security of the coastal communities, and protect the ecosystems while promoting sustainable development. As per the recommendations, the Ministry of Environment, Forest and Climate Change, Government of India is undertaking an Integrated Coastal Zone Management (ICZM) project for all the Coastal States and UTs.

Integrated Coastal Zone Management (ICZM) or Integrated Coastal Management (ICM) is a process for the management of the coast using an integrated approach, regarding all aspects of the coastal zone, including geographical and political boundaries, in an attempt to achieve sustainability. ICZM is a dynamic, multidisciplinary and iterative process to promote sustainable management of coastal zones. It covers the full cycle of information collection, planning, decision making, management and monitoring of implementation.

ICZM uses the informed participation and cooperation of all stakeholders to assess the societal goals in a given coastal area, and to take actions towards meeting these objectives. ICZM seeks, over the long-term, to balance environmental, economic, social, cultural and recreational objectives, all within the limits set by natural dynamics. 'Integrated' in ICZM refers to the integration of objectives and also to the integration of the many instruments needed to meet these objectives. It means integration of all relevant policy areas, sectors, and levels of administration.

Integrated Coastal Zone Management (ICZM) is a process that unites Government and the community, science and management, sectoral and public interests in preparing and implementing an integrated plan for the protection and development of coastal ecosystems and resources.The overall goal of ICZM is to improve the quality of life of human communities who depend on coastal resources while maintaining the biological diversity and productivity of coastal ecosystems.

The Concept Note submitted by the Govt. of Puducherry for implementation of the identified ICZM project in the UT has been approved by the Ministry. The

Department of Science, Technology & Environment, Government of Puducherry has now requested the line Departments to prepare DPR/Base document for the projects identified under ICZM.

Earlier, in October 2013, the Tourism Department furnished concept note for development of projects under ICZM to provide quality life to the host community.

The Coastline of this U.T is about 45 Kms. of which Puducherry Region accounts for 24 Kms. The coast is endowed with picturesque backwaters, beaches etc along with tranquility which attracts tourists from all over world. The backwaters are still in considerable stage of natural beauty with ample vegetation that makes them attractive. Tourism is a major engine of economic growth of Puducherry and it is a priority sector. Around 15 lakhs tourists visit the place ever year and the Day Tourists are around 30,000-40,000 per day. Tourism is one of the industrial sectors to provide employment and sustainable development to the host community. Beaches and backwaters are the only resources available in Puducherry for the tourism activities.

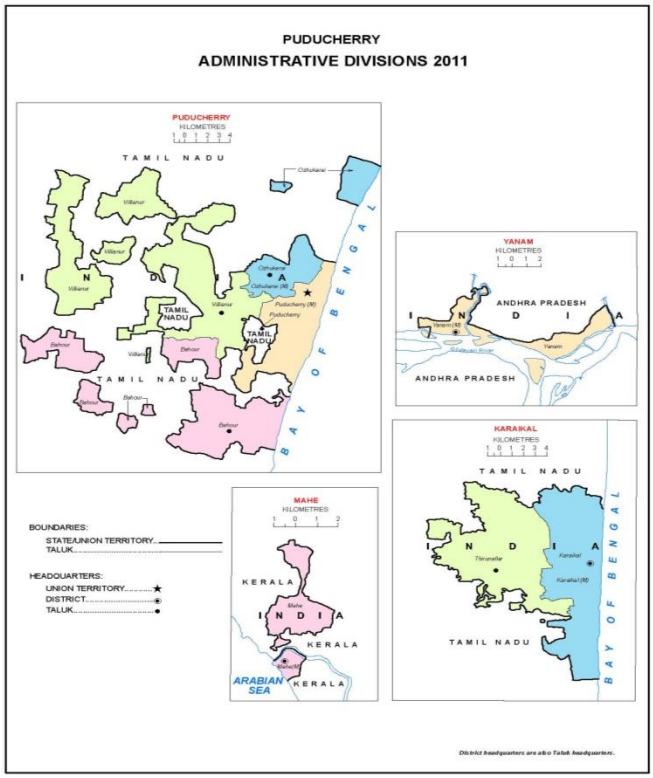


Fig.1. Map showing various divisions of UT of Puducherry

With the aim of conservation and utilizing the natural resources of Puducherry for tourism purpose and to enhance livelihood opportunities to the wide range of coastal communities, the project "Development of beach front, Marine Park at Manapet in Puducherry as environmental education program" is proposed for development in Puducherry under "Integrated Coastal Zone Management Projects" for Rs.15 Crs.

2. Project area description and relevance to ICZM:

The concept of ICZM promotes sustainable development of activities along the coast without compromising the environment and socio-economics of the area. The proposed activities only take benefit of the natural environment like beaches at Puducherry for the purpose of recreation simultaneously providing employment opportunities to the coast dependent local communities without changing the natural environment to a large extent. Since it supports livelihood enhancement of the local communities which is one of the key aspects of ICZM, the project activities are well within the ambit of ICZM.

3. Objectives and key indicators

The objective is to provide (i) Eco Tourism development, (ii) Utilization of the Coastal area for betterment, (iii) Community involvement, (iv)Alternate livelihood/income to the local host community, (v) Overall improvement of the quality of life of the human community. The key indicators are creation of tourism facilities and livelihood opportunities provided.

4. Input and outcome indicators (objective and direct benefits)

The input indicator is the eco- tourism development plans prepared considering environmental aspects with provisions for community involvement. The output indicator is eco-tourism facilities established, livelihood opportunities to the local communities provided and the direct and indirect benefits specified.

5. Project guiding principles and key design features

The guiding principle for the project is to establish basic eco-amenities and attractions by using the natural resources of the State to provide quality life to the community and improve the livelihood activities.

6. Relevance of project activities to National policies

The Environment Policy (2006) is the basic document that guides all environment related activities in the country. It emphasizes the need to protect and conserve critical ecological systems and resources, and invaluable natural and man-made heritage, which are essential for life support, livelihoods, economic growth, and a broad conception of human well-being. Tourism. The tourism policy of Government of India (2002) besides utilizing potential of various landscape, nature etc for benefit of country's tourists has also focused on employment generation and community participation in tourism development. The National Rural Livelihood Mission (NRLM)focuses on stabilizing and promoting existing livelihoods portfolio of the poor through vulnerability reduction' and 'livelihoods enhancement' through deepening/enhancing and expanding existing livelihoods options and tapping new opportunities in farm and non-farm sectors. Therefore, current project which promotes eco-tourism in a rural village of Manapet has number of avenues of livelihood opportunities to the local communities.

7. Earlier studies/attempts (if any), their outcomes and how the present plan fulfils gaps/overcome negative effects if any – necessity of the project.

The projects proposed here are with the aim to utilize the natural resources of Puducherry by establishing basic amenities to attract more tourists. No studies have been done earlier.

8. Justification for undertaking current project

Puducherry Union Territory comprises four enclaves in the States of Tamil Nadu, Andhra Pradesh and Kerala viz: Puducherry, Karaikal, Yanam and Mahe. Puducherry is the Capital of this Union Territory. It is on the east coast about 162 kms south of Chennai (Madras) located on the Coromandel Coast of the Bay of

Bengal.Tourism is a major engine of economic growth of Puducherryand it is a priority sector.

Around 15 lakhs tourists visit the place ever year and the Day Tourists are around 30,000-40,000 per day. The existing tourism facilities provide only to certain the livelihood opportunities to the local communities in the form gift and craft shops and restaurants. Due to increase in the population of the UT and also the marine fish catch has reached a plateau, unless there are new and additional livelihood opportunities to the local communities are created, the socio-economic conditions will not improve or it may increase number of people below Poverty line. The proposed eco-tourism and other facilities will draw more tourists to the UT which will ensure to achieve better socio-economic benefits. . This could become a model in coastal governance for a healthier coast and the wellbeing of the coastal communities. Therefore, developing the above tourism attractions will not only generate income to the local community and revenue to the Government but also make it a model Edutainment Center especially for Students and Children and improve the quality of life in Puducherry.

Manapet is a village in Bahour Commune of Puducherry. It lies on the Southern part of Puducherry at a distance of 20 Kms. and East of NH 45A at a distance of 2 Kms. from it. Manappattu is bordered by Bahour in the west, Pillaiyarkuppam in the north, Bay of Bengal in east and Krishnavaram, Pudukuppamin the south.

Following are the villages under Manappattu Village Panchayat.

- Manappattu
- Kanniakoil
- Kattukuppam
- Varakalodaipet

The Department of Tourism, Govt. of Puducherry owns 100 acres of land at Manapet for developing various tourism activities. The proposed project will suit to the land identified. The identified land is near to the fishing community of Manpaet and nearby. The people from the local community will be trained and utilized for operation of the project as well as beach safety and other related activities. This will provide additional income to the local community.

The population of the Commune Panchayat is around 68,757 (2011 censes). The project proposed is not only help the local community, but also it will be an iconic spot for the 16 lakhs of tourists visiting Puducherry every year.

9. Environment, Ecology and Socio-economics of the project area

The Union Territory of Puducherry has a coastline length of 45 Kms. and Puducherry region accounts for 24 Kms. The coastal areas of the town are rich in natural beauty with backwaters, beaches, greenery and well planned township. The Ariyankuppam estuary and Chunnambar waterways with greeneries and tranquillity add to the natural beauty of the coast. These water bodies have mangrove formation with other related fauna supporting a rich biodiversity. Sand dune formation at many locations adds to the geomorphic value of the coast. The coast supports the livelihoods of the local communities with a population of 10 lakhs through a number of economic activities such as ports, industries, fishing, tourism etc. The relatively mild weather of the coast with sea breeze is also a major attractive force for people.

Tourism is a major engine of economic growth of Puducherry and it is a priority sector. Around 15 lakhs tourists visit the place ever year and the day tourists are around 30,000-40,000 per day. Tourism is one of the industrial sectors to provide employment and sustainable development to the host community. Through the current projects, it has been estimated that about 10000 people will be directly benefited through employment, small trade and services besides a number of people through indirect employment

Puducherry is also affected by regular cyclones arising Bay of Bengal, the most recent being Cyclone Thane in 2011 which caused extensive damage. The sectors most affected are the fishing communities that live close to the shoreline and the fast growing tourism sector in Puducherry. Despite these natural threats, the coastal stretch remains one of the most essential areas of social occupation.If the above projects are developed, definitely it will attract more tourists and generate consideration income to the local people and also to the State.

10. Impact of climate change on the sector

Impact of climate change has been dealt separately under the ICZM Plan for the U.T of Puducherry.

11. Statement on implementing agency and their experience

The Tourism Department, Puducherry will execute the projects proposed above through Public Works Department, Puducherry with the support of the ICZM Project Management Unit. The PWD, Puducherry has rich experience and implemented fishing harbour, coastal protection activities and all the tourism projects. Some of the projects implemented include development of beach promenade in Puducherry town and boating facilities with eco-tourism in the beach in Chunnambar estuary. It has developed botanical garden in the Puducherry town and number of facilities in inland lakes to attract tourists and bird watching. The tourism department has promoted development of a number of eco friendly tourist resorts in the UT.

12. Project tasks (task wise planned activities, their descriptions, methodology and details on execution including stakeholder consultation on solution proposed)

In order to promote livelihood opportunities along the coast, activities are proposed at Manapet Coastal Village in Puducherry.

The main strength or the life line of Puducherry Tourism lies on its beaches. The beaches, lakes and backwaters are the only natural assets of Puducherry Tourism. Hence, it is proposed to develop the beach stretches for Eco Tourism activities and for revenue generation

to the local host community by their active participation and to develop the area as edutainment centre especially for Students and Children.

Puducherry has very good underwater marine scenery. Puducherry is also fast developing as a centre for Surfing activities and Scuba diving. Therefore, it is proposed to set up an Interpretation Centre and a Marine Park for sensitising people about coastal and marine ecology. This way the marine ecosystem can be conserved by educating, enlisting and enabling the local people for active participation.

Site Details

Around 25 acres of land owned by Tourism Department, has been identified for development of the project at Manapet Revenue Village. The selected site is 20 Kms. from the main town.

Proposed components of the project

- Bio Wall protection using Coconut, Casuarina, Sand Binder and other Coastal Specious.
- Log Huts
- Gabion Wall
- Rain Shelter and Change room facilities.
- Interpretation Centre.
- Beach Safety facilities.
- Pathways and Cycling Track.
- Shopping and Food Kiosks.
- Landscaping and Lighting.

- Creating Photo points at beach area.
- Approach road development.
- Providing E-Vehicle facility

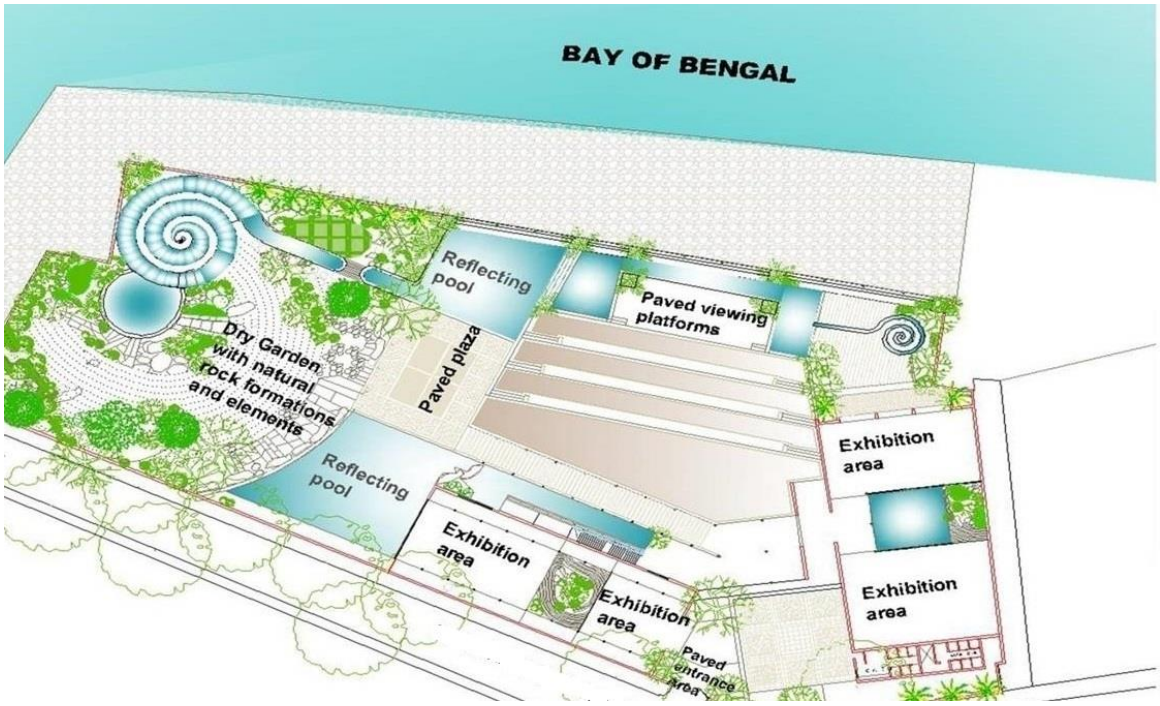
Benefits of the project

- Eco Tourism development
- Better utilization of coastal space for leisure activities.
- Community involvement.
- Marine Education.
- Capacity Building of stakeholders.
- Alternate livelihood/income to the local host community.
- Overall improvement of the quality of life of the human community.

The tentative project cost is Rs.15 Crs.

Conceptual Plan and Images

Conceptual Images



13. Implementation arrangements

The Tourism Department, Puducherry will execute the projects proposed above through Public Works Department, Puducherry with the support of the ICZM Project Management Unit. The PWD, Puducherry has rich experience and implemented fishing harbour, coastal protection activities and all the tourism projects.

14. Action Plan

The Project Implementation Schedule will be prepared after sanctioning of the project in consultation with Implementing Agency, ICZM Project Management Unit and Stakeholders. Periodical report will be done as per the requirement of the ICZM Authority. Project period is 2 ½ years. The proposed action plan is

Activity	**Action Plan (Tentative)**		**Output**	**Cost Rs.in cr.**
Development of beach front and marine park.	1st year	Initiation of work on Development of beach front, Marine Park as environmental education program	Preparation of DPR and initiating the work.	11.00
	2nd Year	Completion of all tourism facilities and operating the facility	Eco-tourism facilities available and performance report	4.00
			Total	**15.00**

FC component = Rs.15cr TC =Nil.

15. Procurement of goods works and services and implementation plans (adopting World Bank stipulated procedures).

Procurement and Implementation Plan will be prepared after sanctioning of the project in consultation with Implementing Agency, ICZM Project Management Unit. The procurement of goods, works and services will be done after duly following the codal procedures stipulated in the General Financial Rules.

16. Capacity building needs:

Capacity building for the stakeholders of the project will be done especially on eco-tourism aspects before and after completion of the project and regular intervals during the operation of the project.

17. Evaluating and monitoring including social audits, financial reporting and auditing:

This will be done as per the prevailing norms of the Government and the funding agency.

18. Cost Estimate:

Name of the Project : Development of Beach Front and Marine Park as environmental education program at Manapet in Puducherry:

(Rs. in lakhs)

Sl	Component	Estimated Cost	Year 1	Year 2
1	Pathways	150.00	150.00	
2	Cafeteria	60.00	60.00	
3	Rain Shelter, Shower, Change rooms and Admin Room.	43.00	43.00	
4	Log Huts	375.00	150.00	225.00
5	Huts for Craft Shops	40.00	40.00	
6	Landscaping and Park	300.00	200.00	100.00
7	Stage/Performance area	50.00	50.00	
8	Approach road development	60.00	60.00	
9	Toilet facilities	55.00	55.00	
10	Electrical Works	100.00	75.00	25.00
11	STP	35.00	35.00	
12	Beach Safety Equipments	50.00	50.00	
13	Watch Tower	75.00	50.00	25.00
14	Purchase of E-Vehicles	50.00	25.00	25.00
14	Contingency and consultancy	57.00	40.00	17.00
	Grand Total	**1500.00**	**1100.00**	**400.00**

19. Post-project scenario (commitment by state to continue the project and monitoring and reporting of project performance).

The Department of Tourism, Govt. of Puducherry will continue the project activities in order to retain the benefits acquired from the ICZM activities and the projects will be become self sustaining in terms of financial resources.

The entire project will be operated and maintained by the Department of Tourism, Government of Puducherry.

ANNEX 5

EXTENSION AND BEAUTIFICATION OF BEACH PROMENADE ON THE SOUTHERN SIDE IN PUDUCHERRY.

Project Preliminary Report

1	**Name of the Project**				**Extension and beautification of beach promenade on the southern side in Puducherry.**	
2	**Sectoral area**				Tourism Management	
3	**Total Financial outlay**				Rs. 15 crores	
4	**Details of the external development agencies (and the amount sought from each)**				The World Bank	
5	**Financial arrangement**				**Rs.15 in Cr**	
Total External Assistance	**Counterpart funds being made available by**				**Total**	
	Implementing agency	**UT Govt.**	**Central Govt.**	**Others, if any**		
7.5 cr	Nil	1.5 Cr	6 Cr	Nil	**15 cr.**	
6	**Project duration (dates/months/years**				2 Years	
7	**Location of project**				Puducherry	
8	**Previous phases, if any**				Yes. Completed by UT Govt.	
9	**Statutory required**				CRZ Clearance	
10	**Statutory obtained**				NA	
11	**Details of Feasibility Studies done**				NA	
12	**Implementing agency**				Tourism Department	
13	**Basic design of the project**				Creating tourist attractions through coastal protection.	
	Goals and objectives				To better utilize coastal space for leisure activities and creating additional livelihood for the local community.	
	Activities involved				Beach development and community involvement.	
	Outputs of the project				Coastal protection and tourism facilities.	
	Outcome of the project				**Aesthetics in beach areas**	
-	**FC and TC component**				**Refer section 13**	
14	**Target population/ groups**				**Coastal communities**	

15	**Detailed Action Plan (Year wise)**	**Refer section 13**
16	**Quantitative and qualitative (verifiable)target indicators**	**Qualitative indicator would be increased areas for leisure for common man and employment opportunities. 4 lakhs visitors per year.**
17	**Environmental sustainability of the project**	**Structures constructed designed to suite local environmental conditions and do not cause damage to environment in-turn it will protect the coast.**
18	**Land acquisition / Resettlement and Rehabilitation involved**	**Not envisaged**
19	**Linkages with Similar Projects**	**It is extension of the existing beach promenade**
(i)	**Information regarding similar projects undertaken previously (add evaluation reports, if any)**	**The existing beach promenade was developed by UT Government.**
(ii)	**Does the project form part of the sectoral project? If yes, who are the other partner with details of the specific activities being undertaken bythem**	**Tourismand Fishing sector**
20	**Finance Plus Element**	**Details given in Section 13**
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	**NA**

	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	Yes capacity building to fishermen and local community in hospitality support services.
	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	NA
	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	Yes. It provides better earning opportunities to unemployed and underemployed local community.
	v. Does the proposal seek to create additional choice for the citizens to access required service/ entitlements?	No
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	NA
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	NA

	viii. Does the proposal have institutional improvement measures: **e.g. (a) Accounting Reforms (moving from single entry cash based system to double entry accrual system of accounting** **(b) Ring fencing of finances/activities including corporatization wherever needed** **(c) creation and implementation of appropriate revenue models e.g. tariff reforms or alternative revenue structuring?**	NA
	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	NA
	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	NA
II	**II. Innovation and Piloting of new Approaches**	
	(I) Does the proposal have innovative elements and new approaches that have not been tried in the sector and have reasonable chance of changing for the better the way things are done in the sector and have some chance of scalable replication?	NA
	(ii) Does the proposal look at financial sustainability and 0 & M related issues which otherwise has not been the norm in the sector?	NA
III	**Innovation in financing and Leveraging**	Does not arise

	i. Does the proposal use different/ innovative financing products/ modalities?	NA
	i. Does the proposal involve co-financing from other financing agencies?	No
	iii. Does the proposal catalyse private sector financing in different ways and especially to create leverage?	NA
	iv. Does the proposal involve CDM and accrual of carbon credits as a natural by-product of core development projects which can be a way of financing the project?	NA

EXECUTIVE SUMMARY

The Coastline of Puducherry U.T is about 45 Kms. of which Puducherry Region accounts for 24 Kms. The coast is endowed with picturesque backwaters, beaches etc along with tranquility which attracts tourists from all over world. The backwaters are still in considerable stage of natural beauty with ample vegetation that makes them attractive. Tourism is a major engine of economic growth of Puducherry and it is a priority sector. Around 16 lakhs tourists visit the UT ever year and the Day Tourists are around 30,000-40,000 per day. Tourism is one of the sectors to provide employment and sustainable development to the host community. Beaches and backwaters are the only resources available in Puducherry for the tourism activities. With the aim of conservation and utilizing the natural resources of Puducherry for tourism purpose and to enhance livelihood opportunities to the wide range of coastal communities, the following project is proposed for development under "Integrated Coastal Zone Management Projects": **Extension and beautification of beach promenade on the southern side in Puducherry.** The estimated budget is Rs.15 Crores.

The population of the Puducherry Municipality is around 6.5 lakhs. The project proposed is not only help the local community, but also it will be an iconic spot for the 16 lakhs of tourists visiting Puducherry every year.

(I) Introduction:

In July 2004, the Ministry of Environment and Forests constituted an Expert Committee, chaired by Prof.M.S.Swaminathan, to carry out a comprehensive review of the CRZ Notification. A major recommendation of the committee was to adopt an integrated coastal zone management approach that would with people's participation, promote the livelihood security of the coastal communities, and protect the ecosystems while promoting sustainable development. As per the recommendations, the Ministry of Environment, Forest and Climate Change, Government of India is undertaking an Integrated Coastal Zone Management (ICZM) project for all the Coastal States and UTs.

Integrated Coastal Zone Management (ICZM) or Integrated Coastal Management (ICM) is a process for the management of the coast using an integrated approach, regarding all aspects of the coastal zone, including geographical and

political boundaries, in an attempt to achieve sustainability. ICZM is a dynamic, multidisciplinary and iterative process to promote sustainable management of coastal zones. It covers the full cycle of information collection, planning, decision making, management and monitoring of implementation.

ICZM uses the informed participation and cooperation of all stakeholders to assess the societal goals in a given coastal area, and to take actions towards meeting these objectives. ICZM seeks, over the long-term, to balance environmental, economic, social, cultural and recreational objectives, all within the limits set by natural dynamics. 'Integrated' in ICZM refers to the integration of objectives and also to the integration of the many instruments needed to meet these objectives. It means integration of all relevant policy areas, sectors, and levels of administration.

Integrated Coastal Zone Management (ICZM) is a process that unites Government and the community, science and management, sectoral and public interests in preparing and implementing an integrated plan for the protection and development of coastal ecosystems and resources.The overall goal of ICZM is to improve the quality of life of human communities who depend on coastal resources while maintaining the biological diversity and productivity of coastal ecosystems.

The Concept Note submitted by the Govt. of Puducherry for implementation of the identified ICZM project in the UT has been approved by the Ministry. The Department of Science, Technology & Environment, Government of Puducherry has now requested the line Departments to prepare DPR/Base document for the projects identified under ICZM.

Earlier, in October 2013, the Tourism Department furnished concept note for development of projects under ICZM to provide quality life to the host community.

With the aim of conservation and utilizing the natural resources of Puducherry for tourism purpose through coastal protection and to enhance livelihood opportunities to the wide range of coastal communities, the project "**Extension and beautification of beach promenade on the southern side in Puducherry**" is proposed for development in Puducherry under "Integrated Coastal Zone Management Projects" for Rs.15 Cr.

2. Project area description and relevance to ICZM:

The concept of ICZM promotes sustainable development of activities along the coast without compromising the environment and socio-economics of the area. The proposed activities only take benefit of the natural environment like beaches at Puducherry for the purpose of recreation simultaneously providing employment opportunities to the coast dependent local communities without changing the natural environment to a large extent. It will also help to protect the coast of the area. Since it supports livelihood enhancement of the local communities which is one of the key aspects of ICZM, the project activities are well within the ambit of ICZM.

3. Objectives and key indicators

The objective is to provide (i) Utilization of the Coastal area for betterment, (ii) Community involvement, (iii) Alternate livelihood/income to the local host community and (iv) Overall improvement of the quality of life of the local community. The key indicators are creation of tourism facilities and livelihood opportunities provided.

4. Input and outcome indicators (objective and direct benefits)

The input indicator is the tourism development plans prepared considering environmental aspects with provisions for community involvement. The output indicator is eco-tourism facilities established, livelihood opportunities to the local communities provided and the direct and indirect benefits specified.

5. Project guiding principles and key design features

The guiding principle for the project is to establish coastal protection, basic amenities and attractions by using the natural resources of the State to provide quality life to the community and improve the livelihood activities.

6. Earlier studies/attempts (if any), their outcomes and how the present plan fulfils gaps/overcome negative effects if any – necessity of the project.

The projects proposed here are with the aim to utilize the natural resources of Puducherry by establishing basic amenities to attract more tourists. No studies have been done earlier.

7. Justification for undertaking current project

Puducherry Union Territory comprises four enclaves in the States of Tamil Nadu, Andhra Pradesh and Kerala viz: Puducherry, Karaikal, Yanam and Mahe.Puducherry is the Capital of this Union Territory. It is on the east coast about 162 kms south of Chennai (Madras) located on the Coromandel Coast of the Bay of Bengal.Tourism is a major engine of economic growth of Puducherryand it is a priority sector.

Around 15 lakhs tourists visit the place ever year and the Day Tourists are around 30,000-40,000 per day. The existing tourism facilities provide only to certain the livelihood opportunities to the local communities in the form gift and craft shops and restaurants. Due to increase in the population of the UT and also the marine fish catch has reached a plateau, unless there are new and additional livelihood opportunities to the local communities are created, the socio-economic conditions will not improve or it may increase number of people below Poverty line. The proposed eco-tourism and other facilities will draw more tourists to the UT which will ensure to achieve better socio-economic benefits. . This could become a model in coastal governance for a healthier coast and the wellbeing of the coastal communities. Therefore, developing the above tourism attractions will not only generate income to the local community and revenue to the Government but also improve the quality of life in Puducherry.

The proposed project will suit to the land identified. The identified land is near to the fishing community and nearby. The people from the local community will be trained and utilized for operation of the project as well as beach safety and other related activities. This will provide additional income to the local community.

The population of the Puducherry Municipality is around 6.50 lakhs. The project proposed is not only help the local community, but also it will be utilized by 16 lakhs of tourists visiting Puducherry every year.

8. Environment, Ecology and Socio-economics of the project area

Any trip to Puducherry would be incomplete without a visit to its beaches. The 1.5 km long promenade running along the beach is the pride of Pondicherry. There one can relax or take a stroll at any time of the day. It is the only place available in Puducherry for relax, it is the paradise for the local people, mainly senior citizens for their wellness. Due to its potential as a long promenade for walking, jogging and relaxing the local people and the tourists prefer to use the beach promenade. This leads to heavy congestion in traffic and public movement. Hence, it is proposed to extend the beach promenade from the Old Distillery to the maximum extent.

Tourism is a major engine of economic growth of Puducherryand it is a priority sector. Around 15 lakhs tourists visit the place ever year and the day tourists are around 30,000-40,000 per day. Tourism is one of the industrial sectors to provide employment and sustainable development to the host community. Through the current projects, it has been estimated that about 10000 people will be directly benefited through employment, small trade and servicesbesides a number of people through indirect employment

Puducherry is also affected by regular cyclones arising Bay of Bengal, the most recent being Cyclone Thane in 2011 which caused extensive damage. The sectors most affected are the fishing communities that live close to the shoreline and the fast growing tourism sector in Puducherry. Despite these natural threats, the coastal stretch remains one of the most essential areas of social occupation.If, the above projects are developed, definitely it will attract more tourists and generate consideration income to the local people and also to the State.

9. Impact of climate change on the sector

Impact of climate change has been dealt separately under the ICZM Plan for the U.T of Puducherry.

10. Statement on implementing agency and their experience

The Tourism Department, Puducherry will execute the projects proposed above through Public Works Department, Puducherry with the support of the ICZM Project Management Unit. The PWD, Puducherry has rich experience and implemented fishing harbour, coastal protection activities and all the tourism projects. Some of the projects implemented include development of beach promenade in Puducherry town and boating facilities with eco-tourism in the beach

in Chunnambar estuary. It has developed botanical garden in the Puducherry town and number of facilities in inland lakes to attract tourists and bird watching.The tourism department has promoted development of a number of eco friendly tourist resorts in the UT.

11. Project tasks (task wise planned activities, their descriptions, methodology and details on execution including stakeholder consultation on solution proposed)

The main strength or the life line of Puducherry Tourism lies on its beaches. The beaches, lakes and backwaters are the only natural assets of Puducherry Tourism. Hence, it is proposed to develop the beach walkway through beach protection for revenue generation to the local host community by their active participation.

Site Details

The selected site is within the main town.

Proposed components of the project

- Gabion Wall protection using Bolters, Cement Blocks and Sand Binder.
- Beach Safety facilities.
- Pathways and Street Furniture.
- Shopping and Food Kiosks.
- Horticulture and Lighting.
- Creating Photo points at beach area.

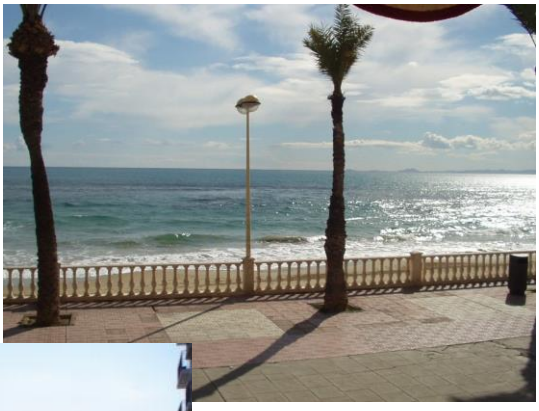
- Ocean Specious Sculptures.

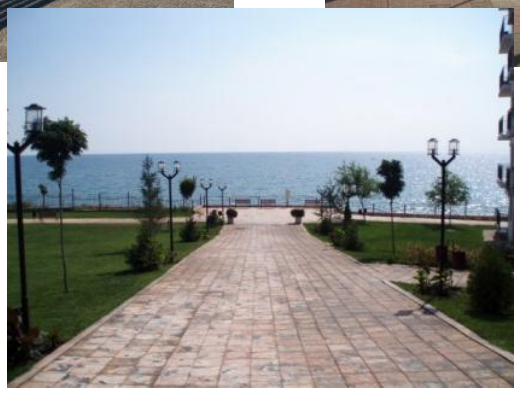
Benefits of the project

- Tourism development
- Better utilization of coastal space for leisure activities.
- Community involvement.
- Capacity Building of stakeholders.
- Alternate livelihood/income to the local host community.
- Overall improvement of the quality of life of the local community.

The tentative project cost is Rs.15 Cr.

Conceptual Plan and Images





12. Implementation arrangements

The Tourism Department, Puducherry will execute the projects proposed above through Public Works Department, Puducherry with the support of the ICZM Project Management Unit. The PWD, Puducherry has rich experience and implemented fishing harbour, coastal protection activities and all the tourism projects.

13. Action Plan

The Project Implementation Schedule will be prepared after sanctioning of the project in consultation with Implementing Agency, ICZM Project Management Unit and Stakeholders. Periodical report will be done as per the requirement of the ICZM Authority. Project period is 2 ½ years. The proposed action plan is

Activity	Action Plan (Tentative)		Output	Cost Rs.in cr.
Extension and beautification of beach promenade on the southern side in Puducherry	1st year	Inviting tenders and execution of work	Preparation of DPR and initiating the work.	10.00
	2nd Year	Completion of the project and operating the facility	Completion of the tourist attraction through coastal protection.	5.00
			Total	**15.00**

FC component = Rs.15 cr TC =Nil.

14 Procurement of goods works and services and implementation plans (adopting World Bank stipulated procedures).

Procurement and Implementation Plan will be prepared after sanctioning of the project in consultation with Implementing Agency, ICZM Project Management Unit. The procurement of goods, works and services will be done after duly following the codal procedures stipulated in the General Financial Rules.

15 Capacity building needs:

Capacity building for the stakeholders of the project will be done especially on eco-tourism aspects before and after completion of the project and regular intervals during the operation of the project.

16 Evaluating and monitoring including social audits, financial reporting and auditing:

This will be done as per the prevailing norms of the Government and the funding agency.

17. Cost Estimate

Name of the Project : Extension and beautification of beach promenade on the southern side in Puducherry.

(Rs. in lakhs)

Sl	Component	Estimated Cost	Year 1	Year 2
1	Gabion Wall protection using Bolters, Cement Blocks and Sand Binder	800.00	500.00	300.00
2	Pathways and Street Furniture.	350.00	200.00	150.00
3	Beach Safety facilities	50.00		50.00
4	Shopping and Food Kiosks	50.00	25.00	25.00
5	Creating Photo points at beach area	50.00	25.00	25.00
6	Horticulture and Lighting	125.00	75.00	50.00
7	Ocean Specious Sculptures	25.00	15.00	10.00
8	Contingency and consultancy	50.00	30.00	20.00
	Grand Total	1,500.00	870.00	630.00

18. Post-project scenario (commitment by state to continue the project and monitoring and reporting of project performance).

The Department of Tourism, Govt. of Puducherry will continue the project activities in order to retain the benefits acquired from the ICZM activities and the projects will be become self sustaining in terms of financial resources.

The entire project will be operated and maintained by the Department of Tourism, Government of Puducherry.

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ANNEX 6

PONDY NECKLACE - PROMOTION OF ECO-FRIENDLY TOURISM AND LIVELIHOOD OPPORTUNITIES IN THENGAITHITTU LAGOON AREA

Project Preliminary Report

1	**Name of the Project**				**Pondy Necklace - Promotion of eco-friendly tourism and livelihood opportunities in Thengaithittu Lagoon area**	
2	**Sectoral area**				Tourism Management	
3	**Total Financial outlay**				Rs.18.30 crores	
4	**Details of the external developmentagencies (and the amount sought from each)**				World Bank	
5	**Financial arrangement**				**Rs. in Cr**	
Total External Assistance	**Counterpart funds being made available by**				**Total**	
	Implementing agency	**UT Govt.**	**Central Govt.**	**Others, if any**		
9.15 Cr.	NIL	1.83 Cr.	7.32 Cr.	NIL	**18.30 cr.**	
6	**Project duration (dates/months/years**				3 Years	
7	**Location of project**				Puducherry Covering Thengaithittu, Ariyankuppam and Murungapakkam villages	
8	**Previous phases, if any**				Nil	
9	**Statutory required**				Nil	
10	**Statutory obtained**				NA	
11	**Details of Feasibility Studies done, if any**				NA	
12	**Implementing agency**				Tourism Department	
13	**Basic design of the project**				Establishing Eco-tourism facilities in coastal areas.	
	Goals and objectives				Conservation and utilizing the natural resources of Puducherry for tourism purpose and to enhance livelihood opportunities to the wide range of coastal communities.	

	Activities involved	Restoration of Thengaithittu Mangrove Lagoon in Puducherry by removing the obstacles and excess silt to ensure free flow of tidal water and improving the livelihood of the fisherman through tourism promotion and preventing drainage and pollutants from clogging the tidal action.
	Outputs of the project	Eco-tourism infrastructure and ecological awareness and education.
	Outcome of the project	Improvement of eco tourism activities and create alternate livelihood opportunity to the host community.
-	**FC and TC component**	Refer section 13
14	**Target population/ groups**	Coastal communities
15	**Detailed Action Plan (Year wise)**	Refer section 13
16	**Quantitative and qualitative (verifiable)target indicators**	Qualitative indicator would be increased areas for leisure for common man and employment opportunities. 4 lakhs visitors per year.
17	**Environmental sustainability of the project**	Structures constructed designed to suite local environmental conditions and do not cause damage to environment
18	**Land acquisition / Resettlement and Rehabilitation involved**	Not envisaged
19	**Linkages with Similar Projects**	Nil
(i)	**Information regarding similar projects undertaken previously (add evaluation reports, if any)**	Nil
(ii)	**Does the project form part of the sectoral project? If yes, who are theother partner with details of thespecific activities being undertaken bythem**	Tourismand Fishing sector

20	**Finance Plus Element**	
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	NA
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	Yes capacity building to fishermen and local community in hospitality support services.
	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	NA
	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	Yes. It provides better earning opportunities to unemployed and underemployed local community.
	v. Does the proposal seek to create additional choice for the citizens to access required service/ entitlements?	No

	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	NA
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	NA
	viii. Does the proposal have institutional improvement measures: **e.g. (a) Accounting Reforms (moving from single entry cash based system to double entry accrual system of accounting** **(b) Ring fencing of finances/activities including corporatization wherever needed** **(c) creation and implementation of** **appropriate revenue models e.g. tariff reforms or alternative revenue structuring?**	NA
	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	NA

	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	NA
II	**II. Innovation and Piloting of newApproaches**	
	(I) Does the proposal have innovative elements and new approaches that have not been tried in the sector and have reasonable chance of changing forthe better the way things are done in the sector and have some chance of scalable replication?	NA
	(ii) Does the proposal look at financial sustainability and 0 & M related issues which otherwise has not been the norm in the sector?	Yes, on maintenance of tourism facilities and amenities needed
III	**Innovation in financing and Leveraging**	Does not arise
	i. Does the proposal use different/ innovative financing products/ modalities?	NA
	i. Does the proposal involve co-financing from other financing agencies?	No
	iii. Does the proposal catalyse private sector financing in different ways and especially to create leverage?	NA

	iv. Does the proposal involve CDM and accrual of carbon credits as a natural by-product of core development projects which can be a way of financing the project?	NA

EXECUTIVE SUMMARY

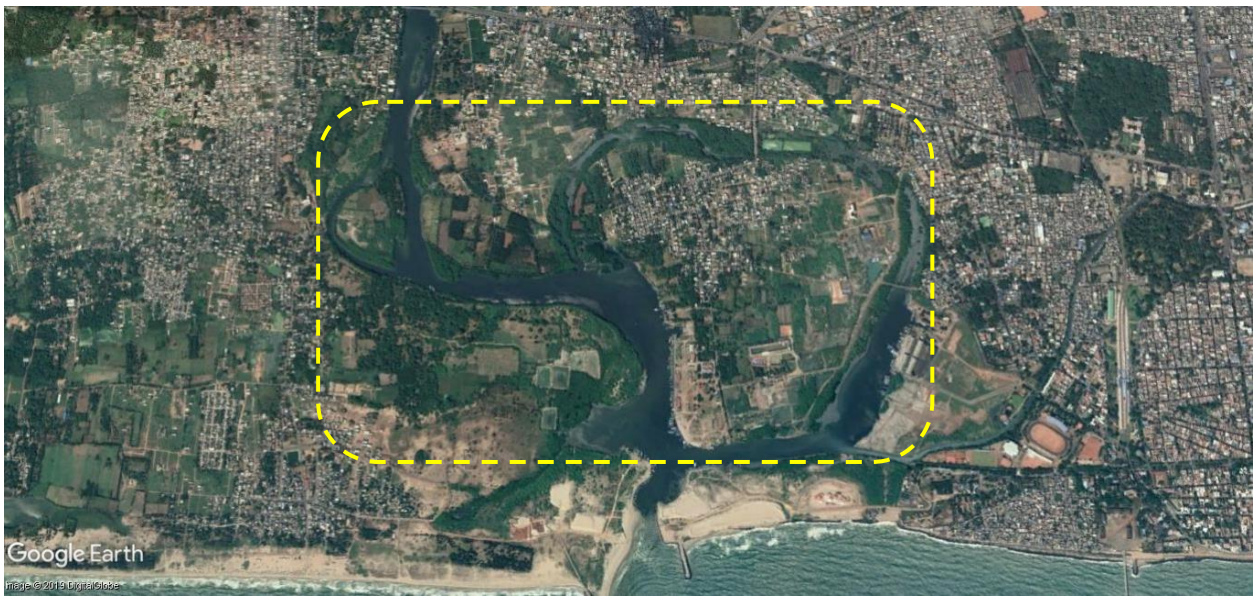
Name of the project :Pondy Necklace - Promotion of eco-friendly tourism and livelihood opportunities in Thengaithittu Lagoon areaAim of the project :

Conservation and utilizing the natural resources of Puducherry for tourism purpose and to enhance livelihood opportunities to the wide range of coastal communities.

Scope of Work :

Restoration of Thengaithittu Mangrove Lagoon in Puducherry by removing the obstacles and excess silt to ensure free flow of tidal water and improving the livelihood of the fisherman through tourism promotion and preventing drainage and pollutants from clogging the tidal action.

Location :



The ThengaithittuMangrove Lagoon is around 3 Kms away from the down town area and has natural backwater flow from Bay of Bengal and is accessible by small bridges from the land and by the boats. Presently, the lagoon is silted up due to blockage of lagoon water through cause ways and encroachments blockingthe exchange of sea water.

The purpose of the project is to develop eco tourism within the town limit. This is the only biggest lungs space available for improvement of tourism, community and ecological education and awareness.

Proposed Components in the project

Sl.No	Name of the Component
1	Board Walk or Wooden Walkway
2	Solar/Battery Boats and Row Boats.
3	Eco Huts
4	Watch Towers
5	Arch bridges
6	Bund Protection
7	Signage – Granite sculptures of wet land specious.
8	Capacity building for fisherman and woman in Tourism Livelihood Option viz. Boat Driver, Tourist Guide, Life Guard, Boat Mechanics, etc

12. Implementation arrangements

The Tourism Department, Puducherry will execute the projects proposed above through Public Works Department, Puducherry with the support of the ICZM Project Management Unit. The PWD, Puducherry has rich experience and implemented fishing harbour, coastal protection activities and all the tourism projects.

13. Action Plan

The Project Implementation Schedule will be prepared after sanctioning of the project in consultation with Implementing Agency, ICZM Project Management Unit and Stakeholders. Periodical report will be done as per the requirement of the ICZM Authority. Project period is 2 ½ years. The proposed action plan is

Activity	Action Plan (Tentative)		Output	Cost Rs.in cr.
DEVELOPMENT OFPONDY NECKLACE	1st year	Initiation of work on Development of Thengaithittu lagoon for eco tourism activities.	Preparation of DPR and initiating the work.	11.00
	2nd Year	Completion of all tourism facilities and operating the facility	Eco-tourism facilities available and performance report	8.30
	3rd to 5th years	Maintenance of tourism facilities	Operation and maintenance.	0.00
			Total	**18.30**

F.C.: 18.30 Cr.; T.C. = Nil.

14. Procurement of goods works and services and implementation plans (adopting World Bank stipulated procedures).

Procurement and Implementation Plan will be prepared after sanctioning of the project in consultation with Implementing Agency, ICZM Project Management Unit. The procurement of goods, works and services will be done after duly following the codal procedures stipulated in the General Financial Rules.

15. Capacity building needs:

Capacity building for the stakeholders of the project will be done especially on eco-tourism aspects before and after completion of the project and regular intervals during the operation of the project.

16. Evaluating and monitoring including social audits, financial reporting and auditing:

This will be done as per the prevailing norms of the Government and the funding agency.

17. Cost Estimate

l.No	Name of the Component	Approx. Amount (Rs.in Crs.)
	Board Walk or Wooden Walkway	3.50
	Solar/Battery Boats and Row Boats.	1.00
	Eco Huts	0.75
	Watch Towers	0.75
	Arch bridges	8.00
	Bund Protection	2.50
	Signage – Granite sculptures of wet land specious.	0.50
	Capacity building for fisherman and woman in Tourism Livelihood Option viz. Boat Driver, Tourist Guide, Life Guard, Boat Mechanics, etc	0.50
	Consultancy & Contingency	0.80
	Grand Total	**18.30Crs.**

ANNEX 7

WOMEN COLLECTIVE ACTION FOR SUSTAINABLE LIVELIHOODS AND COASTAL CONSERVATION IN FISHER FOLK VILLAGES IN PUDUCHERRY & KARAIKAL

Project Preliminary Report

1	**Name of the Project**	Women Collective action for sustainable livelihoods and costal conservation at fisher folk villages in Puducherry & Karaikal Regions
2	**Sectoral area**	Fisher folk Livelihood & Conservation Management
3	**Total Financial outlay**	Rs. 2.00 crores
4	**Details of the external development agencies (and the amount sought from each)**	Community Based Organisationie., Panchayat level Federation promoted by DRDA will be engaged for community mobilisation.
5	**Financial arrangement**	**Rs. in Cr**

Total External Assistance	**Counterpart funds being made available by**				**Total**
	Implementing agency	**UT Govt.**	**Central Govt.**	**Others, if any**	
1.00	NIL	0.40	0.60	NIL	**2.00 Cr.**

6	**Project duration (dates/months/years**	3 years
7	**Location of project**	Puducherry
8	**Previous phases, if any**	CBOs Promoted under NRLM with focus on farming, non-farm and off farm Livelihoods.
9	**Statutory required**	NIL
10	**Statutory obtained**	NA
11	**Details of Feasibility Studies done, if any**	NA
12	**Implementing agency**	District Rural Development Agency (DRDA), and Department of Science, Technology and Environment (DST&E), Puducherry
13	**Basic design of the project**	Fisher folk Community mobilising, training & capacity building on collective action for value addition, Infrastructure development

		support on fish meal making unit, Fish kiosk andMarketing support.
	Goals and objectives	✓ To promote CBOs among the fisher folk for promoting sustainable livelihood with the coastal conservation. ✓ To provide basic fish value addition and Marketing infrastructure facilities support to fishermen.
	Activities involved	✓ Formation of CBOs among the fisher folks. ✓ Training & Capacity Building to fisher folk on collective action, value addition, Marketing, coastal conservation aspects. ✓ Provide infrastructure facility for fish meal making unit for cattle feed production. ✓ Providing Fish kiosk for fish marketing ✓ Collective action for fish marketing ✓ Common Boat repairing centre with trained youths.
	Outputs of the project	✓ Fisher Producer Organisation (CBO), will be promoted with 100 to 500 women. ✓ Mangroves conservation and identify turtle nesting ground, sand dune etc will be conserved with fisher folk community involvement. ✓ Collective action for aggregation, value addition of fish (dry fish), making fish meal unit for marketing. ✓ Access to Productive resources from Banks and fisheries department etc.
	Outcome of the project	✓ Improved marketing skill, ✓ Improved facilities to facilitate

		better earning opportunities through fish value addition by fishermen ✓ Alternate livelihood of mud crab fattening in Backwater. ✓ Conservation of sand dune, Turtle nesting ground, Coastal social forest etc.(Neem, Pungam, Casuarinas, palm trees sapling etc)
-	**FC and TC component**	Refer Section 11
14	**Target population/ groups**	Vulnerable section of the Fisher folks: **Target beneficiaries are** ✓ Fisher women, ✓ women headed families, ✓ FRB boat holders, ✓ Women involved in fishing processing related activity, ✓ Hand fishing women in back warder etc
15	**Detailed Action Plan (Year wise)**	Refer Section 11
16	**Quantitative and qualitative (verifiable)target indicators**	Qualitative indicator would be improved value addition facilities for marketing of fish meal and quantitative indicator would be number of fisher folks organised under FPO, conservation of sands, mangroves, turtles nesting ground and Social forestry.
17	**Environmental sustainability of the project**	Structures constructed designed to suite local environmental conditions.
18	**Land acquisition / Resettlement and Rehabilitation involved**	Not envisaged
19	**Linkages with Similar Projects**	MGNREGA with NRLM &RURBAN
(i)	**Information regarding similar projects undertaken previously (add evaluation reports, if any)**	Currently undertaken for RURBAN for Economic empowerment of women through collective action.

		(There is no Evaluation report available).
(ii)	**Does the project form part of the sectoral project? If yes, who are the other partner with details of the specific activities being undertaken by them**	Fisheries sector
20	**Finance Plus Element**	
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	Yes, fisher folk is the core of the project, process oriented to build community based institution for procurement, aggregation, grading, value addition and market tie up.
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	Yes, sustainability happen through collective action, solidarity will bring the sharing of operational cost and convergence with other stake holders as well as collaboration with mainstream Institution.
	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	The proposal focus on collective action of fisher folks to access productive resources, access market information, market, value addition technologies, GBS, and creating awareness among the fisher folks on conserving the coastal resources like sand dune, mangroves, estuaries, turtle nesting ground etc through training and capacity building, optimum utilization of resources by creating awareness to CBOs and its members.
	iv. Does the proposal bring	Yes, this proposal will bring

	together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	together to one synergetic platform to address nutrition, Gender issues and coastal livelihoods.
	v. Does the proposal seek to create additional choice for the citizens to access required service/ entitlements?	Yes, CBOs will facilitate to access required services and entitlements.
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	Yes, Use solar energy for drying fishes, and other value addition unit without any harm to environment.
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	Yes
	viii. Does the proposal have institutional improvement measures: **e.g. (a) Accounting Reforms (moving from single entry cash based system to double entry accrual system of accounting** **(b) Ring fencing of finances/activities including corporatization wherever needed** **(c) creation and implementation of appropriate revenue models e.g. tariff reforms or alternative revenue structuring?**	Yes, the project will promote CBOs where double entry accounting system will be trained to adopt for field practice. Business plan preparation for their CBOs, marketing strategies, market outlet etc. So the CBOs will generate revenue on their own sustainability.
	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	NA
	x. Does the proposal have elements	NA

	that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	
II	**II. Innovation and Piloting of new Approaches**	
	(I) Does the proposal have innovative elements and new approaches that have not been tried in the sector and have reasonable chance of changing for the better the way things are done in the sector and have some chance of scalable replication?	Yes, scalable and replicable
	(ii) Does the proposal look at financial sustainability and 0 & M related issues which otherwise has not been the norm in the sector?	Yes
III	**Innovation in financing and Leveraging**	Does not arise
	i. Does the proposal use different/ innovative financing products/ modalities?	NA
	i. Does the proposal involve co-financing from other financing agencies?	No
	iii. Does the proposal catalyse private sector financing in different ways and especially to create leverage?	NA
	iv. Does the proposal involve CDM and accrual of carbon credits as a natural by-product of core development projects which can be a way of financing the project?	NA

ANNEX 7

Executive Summary

Fishing activities are of high importance in the coastal areas of Puducherry. Not all hamlets have basic fishing infrastructure facilities which forces fisher folk to travel to nearby landing centres which takes time. Such delay leads to faster putrefaction of fish. As a result the fish caught often does not fetch good price.

Establishment of fish drying yard, fish kiosk, fish meal plant and alternate livelihoods and conservation of sand dune as well as social forest will increase better socio economic condition of fisher folks and prevalence of better hygienic conditions.

In order to develop infrastructure associated with Fisheries which is a livelihood need for fishermen, the District Rural Development Agency has proposed for development of economic empowerment of fisher folks especially vulnerable women will be organized in to producer groups, and promote their Apex organization called Fishes producer Company, create infrastructure such as solar drier for making hygienic dry fish, fish meal making unit for cattle feed production, fish transporting vehicle like auto or TATA ACE vehicle,conserving local sand dune, alternate livelihood of mud crab fattening , social forest promotion in coastal area etc are very much essential for the villages of Puducherry viz. Nallavadu,Pannithittu,Pudukuppamm,M.Pudukuppam,Chinnaveerampaatinam and other villages in Karaikal to be identified.

The objective is to provide basic fish value addition infrastructure facilities for better access to market, minimize lossthrough value addition, alternate livelihoods, social forest and conservation of sand dune etc and achieving hygienic environment to improve the socio-economic conditions of the fisher folks andconservation of natural resources with community participation.

ANNEX 7

1. Introduction

The Ministry of Environment, Forest and Climate change (MoEF&CC) has initiated phase II of the Integrated Coastal Zone Management (ICZM) project. MoEF&CC has sought a proposal to carryout ICZM related activities along the coast of Puducherry and Karaikal region from the Government of Puducherry (GOP). In this context, Government of Puducherry (GOP) has to prepare a Detailed Project Report (DPR)for the preparation of ICZM plan at identified coastal stretches of UT of Puducherry which include (i) Periakalapet (ii)Nallavadu(Nallavadu,Pannithittu,Pudukuppam,M.Pudukuppam, Narambai and Chinnaveerampaatinam) of Puducherry region and (iii) Pattinacherry of Karaikal region. The ICZM plans will be prepared for both the coastal stretches, addressing key issues in the area.

In a concept note prepared and submitted to the MoEF&CC, the Department of Environment, Government of Puducherry has identified various activities and issues to be addressed under an ICZM plan. In order to develop infrastructure associated with Fisheries which is a livelihood need for fishermen, the District Rural Development Agency has identified the following five sites for development of economic empowerment of fisher folks especially vulnerable women will be organized in to producer groups, and promote their Apex organization called Fishes producer Company, create infrastructure such as solar drier for making hygienic dry fish, fish meal making unit for cattle feed production, fish transporting vehicle like auto or TATA ACE vehicle, conserving local sand dune, turtle nesting grounds, social forest promotion in coastal area etc on a priority basis:

1. Nallavadu,
2. Pannithittu,
3. Pudukuppam
4. M.Pudukuppam
5. Narambai
6. Chinnaveerampaatinam
7. Four villages in Karaikal District (to be finalized in due course)

The objective is to provide basic fish value addition infrastructure facilities for better access to market, minimize loss arrangements through value addition and achieving

hygienic environment to improve the socio-economic conditions of the fisher folks andconserving the natural resources with local community participation.

2. Project Area Description and relevance to ICZM:

Nallavadu, Pannithittu, Pudukuppam, M.Pudukuppam and Chinnaveerampaatinam Fishing villagesare located around 5-12kms away from Pondicherry town in South Direction.All these villageshave2340 families. FRP Cattamarans with OBM operating are in 430 nos.Total women populations are 3065 in which 1025 women are involved in head load fish vending activity. The people of the above villages are predominantly involved in fishing activities. These centres are not provided with basic fishing infrastructure facilities like fish drying yard, solar dryer, fish meal plant, fish processing and storage building. Due to increase in number of people involved in fishing activity, necessity has arisen to provide some basic infrastructure facilities for achieving hygienic environment and sustainable livelihoods.

Fisher Folk Villages- population/FRB boats and women involved in fish market livelihood.

S.No	Village Name	Total House holds	Women Population	FRB Boat holders	Women involved in Head load fish vending
1	Nallavadu	725	900	90	250
2	Pudukuppam	300	425	35	100
3	M.Pudukuppam	215	315	35	175
4	Narambai	450	525	70	300
5	Pannithittu	500	700	200	100
6	ChinnaVeerampattinam	150	200	0	100
Total		2340	3065	430	1025

Four villages in Karaikal district will be added during DPR / data collection work in progress

The stakeholders demanded basic fishing infrastructure facilities such as

a. Solar drier for making hygienic dry fish,
b. Fish meal making unit for cattle feed production,
c. Fish transporting vehicle like Auto or TATA ACE vehicle,
d. Conserving local sand dune,
e. Conserving turtle nesting grounds wherever possible,
f. Social forest promotion in the coastal Villages

Providing infrastructure in fisheries such as value addition unit like solar drier for dry fishmaking, fish meal making unit etc will reduce the losses and would facilitate improvement in socio-economic conditions of the fisher folk as the fish caught due to better hygienic conditions fetch better prices. As improving socio-economic need of coastal communities is one of the essential aspects of ICZM, the project activities are well relevant to ICZM.

3. Objectives and key indicators

The objective is to provide basic value addition women friendly technique and machineries and equipments to access market and get premium price for their produce. The key indicator is attainment of better socio-economic condition of fisher folk through collective action and building strong social capital.

4. Input and outcome indicator (objective and direct benefits)

- ✓ The input indicators plans developed for promotion of Fisher Producer Organization (CBO), will be promoted with 100 to 500 women.
- ✓ Mangroves conservation and identify turtle nesting ground, sand dune etc will be conserved with fisher folk community involvement wherever possible.
- ✓ Collective action for aggregation, value addition of fish (dry fish), and making fish meal to fetches premium price for their produce in the market.
- ✓ Small and medium vehicle such as Auto or TATA-ACE to access easy transport of fish to markets by small and marginal, women headed, vulnerable head load vendors.

The indirect benefits are:-

(i) The fishery allied sector may get benefitted
(ii) Time and cost shall be saved
(iii) General public may get quality fish in time

5. Project guiding principles and key design features

The guiding principle for the project iscommunity centric, process oriented building strong community based Organization.Approach would conserver natural resources, cultivation, consumption and commerce (4Cs) in sustainable fishing livelihoods of fisher folks.

6. **Earlier studies / attempts (if any), their outcomes and how the present plan fulfils gaps /overcome negative effects if any – necessity of the project**

This is a new project to create basic value addition in fishing infrastructure facilities. No studies have been done earlier in this area. Small and marginal fisher folks, vulnerable section, women headed families use to got nearby fish landing centre, bargain fishes, go to nearby villages or town for marketing it through head load vending. If not sold all the fishes need to go for value addition. Value addition may reduce the losses, as well as will increase market value of fish due to prevalence of better hygienic conditions. Therefore, it is absolutely essential to establish solar drier in each villages and hamlets which will be managed by the CBOs. Similarly the waste generated during the fish catches and processing, will be converted into dry fish and will be value added through fish meal plant, which will be used for making cattle feed as one of the raw materials for cattle and poultry feed unit.

Need Assessment Chart at village Level

S.No	Village Name	Mud crab Fattening	Solar Drier	Vehicle support for marketing	Fish kiosk	Social forest	Sand dune conservation
1	M.Pudukuppam	✓	✓	✓	✓	✓	x
2	Narambai	✓	✓	✓		✓	x
3	Panithittu	X	✓	✓	✓	✓	✓
4	ChinnaVeerampattinam	✓	✓	✓	✓	✓	x
5	Pudukuppam	✓	✓	✓		✓	x
6	Nallavadu	✓	✓	✓	✓	✓	x
7	4 villages in Karaikal yet be identified the needs		✓	✓	✓	✓	x

7. Environment, Ecology and socio-economics of project area

The five locations are rural areas with sandy beaches. The surroundings are land vegetation with human settlement. The fisher folk living in the area is mostly small scale fishermen using catamarans with or without OBM. The socio-economic status is average and requires upliftment.

8. Impact of climate change on the sector

Impact of climate change has been dealt under the ICZM plan project.

9. Statement on implementing agency and their experience

The District Rural Development Agency will implement the project through Puducherry state Rural livelihood Mission and existing PLF. During the project we also consult with main stake holders such as Fisheries Department, PWD Puducherry who have vast experience in construction of fishery related infrastructural facilities, MSSRF- NGOs, informal Panchayats in Fisher folks, Bankers and Agriculture department, forestry etcand will get the necessary guidance in completion of the project.

10. Project tasks

The main tasks involved in the project are as follow:

(v) Community Mobilization with vulnerable section and women headed families,
(vi) Promotion of strong CBO/Fisher folk Producer Company
(vii) Establishing Solar fish drier for domestic consumption of fish
(viii) Establishing fish meal making unit
(ix) Transport vehicle arrangement for fish vending
(x) Social forest promotion/develop coastal nursery
(xi) Conservation of Sand dune/ Turtle nesting ground
(xii) Access market (Distance and local market)

Implementation arrangements

The District Rural Development Agency will implement the project through Puducherry state Rural livelihood Mission and existing PLF. During the project we also consult with main stake holders such as Fisheries Department, PWD Puducherry who have vast experience in construction of fishery related infrastructural facilities, MSSRF- NGOs, informal Panchayats in Fisher folks, Bankers

and Agriculture department, forestry etc, and will get the necessary guidance in completion of the project.

11. Project Implementation Schedule and periodical reporting of progress

Project implementation schedule will be prepared after obtaining Administrative Sanction from the Government. Periodical reporting will be done as per requirements. Project period in progress for 12 months as detailed below.

Schedule of implementation and Action Plan

The following box chart will show the schedule of implementation.

S. No.	Activity	Quarter-wise Activity											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Community Mobilization with vulnerable section and women headed families												
2	Promotion of strong CBO/Fisher folk Producer Company												
3	Training and skill building to members, office bearer and field staffs												
4	Establishing Solar fish drier for domestic consumption of fish												

5	Establishing fish meal making unit												
6	Transport vehicle arrangement for fish vending												
7	Social forest promotion/develop coastal nursery												
8	Conservation of Sand dune/ Turtle nesting ground												
9	Access market (Distance and local market)												

Detailed Budget:

Activity		Action Plan (Tentative) for one year	Output	Cost Rs.in lakhs.
Promoting strong Social Capital with fisher folks in 5 villages and promoting fish value addition infrastructure facility for achieving	Year 1	Building CBOs, skill building, exposure visit, registration, 6 Fish kiosk, field staff salary, and admin expenses etc.	750 vulnerable women will be organized and registered in Companies act.	50.00
	Year 2	Construction of Solar fish drier in all 10 villages	Solar drier will be established	30.00
		Construction of one fish meal Production unit with building, Solar drier, drying yard, sand &silica separator, pulverize, mixer, packing	2 units Fish meal making unit to be constructed (1 in Karaikal and 1 in Puducherry) and	80.00

sustainable Livelihoods.		machine, transport vehicle etc.	installation of machine.	
	Year 3	Conservation Works (Sand dune) and alternate livelihood of Mud crab fattening on Backwater (floating method)	Conservation council formed/ Alternate livelihood to 4 villages with 150 fisher women	20.00
		Social forest and coastal nursery development work, Market tie up , buyers and sellers meet arrangements, fish storage Boxesand miscellaneous work	Buyers & sellers meeting, market tie up, social forest, Nursery unit, operational and Feedback report of users	20.00
		Total		200.00

FC component = Rs.2.00 cr. TC = Nil

12. Procurement of goods, works and services and implementation plans (adopting World Bank stipulated procedures)

Procurement of goods and services will be made based on the instructions/ guidelines stipulated in General Financial Rules as well as by adopting procedures stipulated by the funding agency and the procurement will be made after obtaining necessary approval /sanction for the competent authority wherever / whenever required.

13. Capacity building needs:

Necessary capacity building programmes will be undertaken for various stakeholders. Capacity building onGovernance, 4Cs approach, Solar drier maintenance, fish meal unit management, market tie up, Business plan, resource mobilization (Both internal and external resources), convergence with other stake holders, bankers and marketing as well research institution.

14. Evaluation and monitoring including social audits, financial reporting and auditing

A Project Steering Committee will be constituted to evaluate the progress made. Third party agency will be engaged for all audits and for evaluation and monitoring. Auditing of expenditure will be carried out using the procedures stipulated by the funding agency.

15. Cost estimates

S. No.	Components	Amount in (Rs.)
1	Building CBOs, skill building, exposure visit, registration, 6 Fish kiosk, field staff salary, and admin expenses etc.	5000000
2	Construction of Solar Fish drier in all 10 villages	3000000
3	Construction of one fish meal making unit with building infrastructure , Solar drier, drying yard, sand &silica separator, pulverize, mixer, packing machine, Purchase of transport vehicle etc.	8000000
4	Conservation Work (Sand dune) and alternate livelihood of Mud crab fattening in 4 villages with 150 fisher women.	2000000
5	Social forest promotion in all 10 villages and 6 coastal nursery to be developed, Market tie up , Fish storage boxes, 4 buyers and sellers meet to bearranged and miscellaneous works	2000000
	Total	**20000000**

Cost for promoting sustainable livelihoods of 500 families in 5 villages sum of Rs. 2,00,00,000/- (Rs. Two Crore only).

16. Post – Project scenario (Commitment by state to continue the project and monitoring and reporting of project performance)

The state will continue monitoring and reporting of projects performance during the post project period.

MAPPING AND STABILISATION OF SAND DUNES ALONG THE COAST OF PUDUCHERRY AND KARAIKAL

Project Preliminary Report

1	**Name of the Project**				Mapping and stabilization of sand dunes along the coast of Puducherry and Karaikal	
2	**Sectoral area**				Conservation Management	
3	**Total Financial outlay**				Rs. 1.72 crores	
4	**Details of the external development agencies (and the amount sought fromeach)**				The World Bank	
5	**Financial arrangement**				**Rs. in Cr**	
Total External Assistance	**Counterpart funds being made available by**				**Total**	
	Implementing agency	**UT Govt.**	**Central Govt.**	**Others, if any**		
0.86 cr	NIL	0.17	0.69	NIL	**1.72 cr.**	
6	**Project duration (dates/months/years**				4 years	
7	**Location of project**				Puducherry and Karaikal	
8	**Previous phases, if any**				Nil	
9	**Statutory required**				NIL	
10	**Statutory obtained**				NA	
11	**Details of Feasibility Studies done, if any**				NA	
12	**Implementing agency**				Department of Science, Technology and Environment	
13	**Basic design of the project**				Preservation, stabilisation and restoration of sand dunes through suitable vegetative cover binding	
	Goals and objectives					
	Activities involved				Planting suitable vegetation in sand dunes for their stabilization and restoration	
	Outputs of the project				Distribution of protected and stabilized sand dunes	
	Outcome of the project				Enhanced protection of the coast from seawater	

		inundation during storm surges and tsunamis
-	**FC and TC component**	Refer Section 11
14	**Target population/ groups**	Coastal communities
15	**Detailed Action Plan (Year wise)**	Refer section 11
16	**Quantitative and qualitative (verifiable)target indicators**	The qualitative indicator will be improved coverage of sand dunes and quantitative indicator would number of sand dunes preserved and stabilised
17	**Environmental sustainability of the project**	High as the focus is on preservation of coastal geomorphic feature which helps in disaster mitigation
18	**Land acquisition / Resettlement and Rehabilitation involved**	Not envisaged
19	**Linkages with Similar Projects**	Nil
(i)	**Information regarding similar projects undertaken previously (add evaluation reports, if any)**	Nil
(ii)	**Does the project form part of thesectoral project? If yes, who are theother partner with details of thespecific activities being undertaken bythem**	Project falls under Conservation Management
20	**Finance Plus Element**	Details given in the Section 10
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	NA
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	NA

	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	NA
	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	NA
	v. Does the proposal seek tocreate additional choice for thecitizens to access requiredservice/ entitlements?	No
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	NA
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	No
	viii. Does the proposal haveinstitutional improvement measures: e.g. (a) Accounting Reforms (movingfrom single entry cash basedaccounting system to double entryaccrual system of accounting (b) Ringfencing of finances/activities includingcorporatization wherever needed (c)creation and implementation ofappropriate revenue models e.g. tariffreforms or alternative revenuestructuring?	NA

	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	Yes it promotes scientific management of sand dunes
	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	NA
II	**II. Innovation and Piloting of new Approaches**	
	(I) Does the proposal have innovative elements and new approaches thathave not been tried in the sector andhave reasonable chance of changing forthe better the way things are done inthe sector and have some chance ofscalable replication?	NA
	(ii) Does the proposal look at financialsustainability and O & M related issueswhich otherwise has not been the norm in the sector?	Yes on maintenance of vegetative cover on sand dunes
III	**Innovation in financing and Leveraging**	Does not arise
	i. Does the proposal use different/innovative financing products/modalities?	NA
	i. Does the proposal involve co-financingfrom other financing agencies?	No
	iii. Does the proposal catalyse private sector financing in different ways andespecially to create leverage?	NA
	iv. Does the proposal involve CDM andaccrual of carbon credits as a naturalby-product of core developmentprojects which can be a way offinancing the project?	NA

Executive Summary

Sand dunes are formed by wind drift from the exposed sand areas of inter-tidal and supra tidal areas; the dunes take various shapes and sizes and the height of which can go up to 10 m in undisturbed coastal areas. Puducherry being a coastal province too has moderate to good formation of sand dunes in Puducherry and Karaikal regions. The distribution of sand dunes in both the regions has not been mapped so far though their occurrence is reported. Sand dunes play a vital role in disaster mitigation especially protection of other coastal features like vegetation and essentially forms as a part of the coastal ecosystem. The present proposal aims to map the dunes of the coastal areas of both the regions and take measures to stabilize them so that their geomorphic nature is well preserved to serve their purpose as wind and wave barriers. The Department of Science, Technology and Environment, Govt of Puducherry will implement the project. The proposal is for Rs 1.72 Crore.

1. Introduction

One of the gifts of nature to the coastal geomorphology is Sand dunes. Formed by wind drift from the exposed sand areas of inter-tidal and supra tidal areas, the dunes take various shapes and sizes and the height of which goes up to 10 m in undisturbed coastal areas. The dune itself forms as a habitat for plants and animals. They act as natural wind and wave barriers protecting the land and property backshore especially during cyclones, storm surges and tsunamis. The Sumatra tsunami of 2004, clearly demonstrated the key role of sand dunes. The human settlements behind the dunes had no or least inundation of seawater compared to the areas of same village without dune formation. It is a feast to human eyes to see series of dunes along the coastal areas, which is a common site in the Rameshwaram island of Tamil Nadu. Puducherry being a coastal province too has moderate to good formation of sand dunes in Puducherry and Karaikal regions. The present proposal aims to map the dunes of the coastal areas of both the regions and take measures to stabilize them so that their geomorphic nature is well preserved to serve their purpose as wind and wave barriers.

2. Project Area Description and relevance to ICZM

The project area covers 12 and 17 km of Puducherry town and Karaikal districts respectively. While considerable areas of Karaikal coast are sandy, due to severe erosion of the coast nearly 50% of the Puducherry coast is lined with seawalls. The distribution of sand dunes in both the regions has not been mapped so far though their occurrence is reported. Sand dunes play a vital role in disaster mitigation especially protection of other coastal features like vegetation and essentially form as a part of the coastal ecosystem, efforts made to map and preserve them has high relevance to ICZM.

3. Objectives and key indicators

The main objective is protection of sand dunes by planting suitable vegetation so that provides binding effect of sand and promotes further accumulation. The key indicator restored sand dunes along the coasts of Puducherry and Karaikal.

4. Input and outcome indicators (direct and indirect benefits)

The input indicator is preparation of maps on distribution of sand dunes along the coasts of both the regions and selection of suitable vegetation to facilitate protection of the dune. The outcome indicator is sand dunes stabilized with suitable vegetation. The direct benefit is increased protection of the coast against cyclonic winds and storm surges and indirect benefit is enhancement of coastal aesthetics.

5. Project guiding principles and key design features

The guiding principle is to achieve preservation of nature for the benefit of the human during natural disasters. The key design feature is the selection of suitable vegetation to facilitate stabilization of the sand dunes.

6. Relevance of project activities to National policies and state plans

The Environment Policy (2006) is the basic document that guides all environment related activities in the country. It emphasizes the need to protect and conserve critical ecological systems and resources, and invaluable natural and man-made heritage, which are essential for life support, livelihoods, economic growth, and a broad conception of human well-being. Sand dunes provide excellent protection to the coast

against natural forces like high intensity waves occurring during the monsoon seasons. The CRZ 2011 notification also has placed the sand dunes under CRZ I category which demands protection of sand dunes from human activities. The proposed activity under the present project to map and protect the sand dunes by taking suitable measures, is well in line with the objectives of Environmental policy and provisions of CRZ notification.

7. **Earlier studies/attempts (if any), their outcomes and how the present plan fulfills gaps/overcome negative effects if any – necessity of the project or Justification for the project**

No attempt so far has been made to map the sand dunes exclusively, though CRZ maps do contain foreshore dunes. Since dunes exist even beyond CRZ areas, it is necessary to map the entire coastal and adjoining areas so that their occurrence can be registered. It is proposed to prepare the dune maps in 1:4000 scales that are essential to locate the maps on dunes and plan for their restoration as well as stabilization. The need to stabilize the dunes has already been explained as they act as wind and wave barriers during cyclones and storm surges protecting vegetation and human properties back shore.

8. **Environment, Ecology and socio-economics of the project area**

The details are available in section 2 of the base document

9. **Statement on Implementing Agency and their experience**

The Department of Science, Technology and Environment, Govt of Puducherry will implement the project. Expertise required to map the dunes are available with them and to stabilize the dunes with vegetation, the assistance of Agriculture (Horticulture) Department will be taken. The department has experience on cultivation of vegetation on a variety of soil substrata.

10. **Project Tasks**

The proposed activity aims at stabilizing the coastal beaches by using sand binding plants, which do not interfere with resource use pattern of the coastal communities. The activity involves identification of suitable sand binder, mass multiplication and planting in select localities on pilotproject basis and assessing its efficacy for mass adoption.

11. Action plan

The tasks on stabilization of sand dunes would take 2 years and monitoring and maintenance would be carried out during the remaining project period of 3 years. Tentative action plan is:

Activity	Action Plan (Tentative)		Output	Cost Rs.in cr.
Mapping and stabilization of sand dunes along the coast of Puducherry and Karaikal	1st year	Survey and mapping of sand dunes	Maps on distribution of sand dunes	0.40
	2nd Year	Choosing appropriate species of plant for stabilisaiton of sand dunes and planting	Initial steps for stabilization completed	0.50
	3rd year	Monitoring on growth of plant species	Monitoring report on sand dune stabilization	0.40
	4th Year	Monitoring of sand dunes continued and rectified in case of damages	Report	0.42
			Total	**1.72**
FC = Rs.1.72 cr. Technical Component = Nil				

12. Procurement of goods, works and services and Implementation plans

The construction of building, procurement of laboratory equipment etc. will be made adopting the procedures prescribed by the funding agency. The Project Implementation Plan will be prepared after sanction of the project.

13. Capacity building needs

This component will be the training required for the project staff on maintenance of vegetation planted on sand dunes and the Agriculture department will provide the training.

14. Evaluation and Monitoring includingsocial audits, financial reporting and auditing

The progress made will be evaluated and monitored by a 3 member Technical Advisory Committee. Funding agency designated auditors will carry out the financial auditing. Social audit will be carried out using appropriate experts. Financial reporting will be made as per the requirement by the funding agency.

15. Cost estimates (for 4 years)

Designation	**per month**	**Months**	**Amount (Rs)**
Horticulture Scientist	50000	48	2400000
Field Assistants (2)	16000	48	1500000
GIS and field expert (2)	50000	48	4800000
Services of Agriculture department		48	1000000
Travel and Field expenses		48	1300000
Materials and Contingency		48	1200000
Survey equipment (DGPS, RTK)			5000000
Total			**17200000**

16. Post- project Scenario

The monitoring and maintenance of sand dunes will be continued after the project period by the DSTE through funding from the UT government.

MITIGATION OF CLIMATE CHANGE IMPACT ON COASTAL AREAS OF PUDUCHERRY, YANAM AND KARAIKAL THROUGH MANGROVE RESTORATION AND LIVELIHOOD DIVERSIFICATION OF COASTAL COMMUNITIES

Project Preliminary Report

1	**Name of the Project**	Mitigation of Climate Change Impact on Coastal Areas of Puducherry, Yanam and Karaikal Through Mangrove Restoration and Livelihood Diversification of Coastal Communities
2	**Sectoral area**	Conservation Management
3	**Total Financial outlay**	Rs. 8.08 crores
4	**Details of the external developmentagencies (and the amount sought fromeach)**	World Bank
5	**Financial arrangement**	**Rs. in Cr**

Total External Assistance	**Counterpart funds being made available by**				**Total**
	Implementing agency	**UT Govt.**	**Central Govt.**	**Others, if any**	
4.04	NIL	0.808	3.23	NIL	**8.08 Cr.**

6	**Project duration (dates/months/years**	4 years
7	**Location of project**	Puducherry
8	**Previous phases, if any**	Nil
9	**Statutory required**	NIL
10	**Statutory obtained**	NA
11	**Details of Feasibility Studies done, ifany**	NA
12	**Implementing agency**	Department of Forests and Wildlife
13	**Basic design of the project**	Development of methodology for Regeneration of degraded mangroves thro natural and artificial means and demonstration
	Goals and objectives	Development of site specific models for restoration of the critical mangrove habitat which are damaged due to tsunami and under threat of permanent

		degradation
	Activities involved	Comprehending the regeneration pattern of mangroves with associated changes in hydrology and salinity to devise appropriate restoration methods along with related aspects like mapping and demonstration in pilot areas.
	Outputs of the project	Methodology for regeneration of mangroves and site specific demonstration
	Outcome of the project	Enhanced protection of the coast from seawater inundation during storm surges and tsunamis and contribution in carbon sequestration
-	**FC and TC component**	Refer section 12
14	**Target population/ groups**	Coastal communities
15	**Detailed Action Plan (Year wise)**	Refer section 12
16	**Quantitative and qualitative (verifiable)target indicators**	The qualitative indicator will be improved coverage of mangroves and quantitative indicator would be number of hectares of mangroves restored or regenerated
17	**Environmental sustainability of the project**	High as the focus is on restoration of mangrove vegetation which helps in disaster mitigation
18	**Land acquisition / Resettlement and Rehabilitation involved**	Not envisaged
19	**Linkages with Similar Projects**	Nil
(i)	**Information regarding similar projects undertaken previously (add evaluation reports, if any)**	Nil
(ii)	**Does the project form part of the sectoral project? If yes, who are the other partner with details of the specific activities being undertaken by them**	Project falls under Conservation Management. The other partners are Pondicherry and Annamalai Universities
20	**Finance Plus Element**	
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements	NA

	of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	Yes. The local communities will be trained on conservation of mangroves
	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	NA
	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	NA
	v. Does the proposal seek to create additional choice for the citizens to access required service/ entitlements?	No
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	NA
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	No
	viii. Does the proposal have institutional improvement measures:	NA

	e.g. (a) Accounting Reforms (moving from single entry cash based accounting system to double entry accrual system of accounting (b) Ring fencing of finances/activities includingcorporatization wherever needed (c) creation and implementation ofappropriate revenue models e.g. tariff reforms or alternative revenue structuring?	
	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	Yes it promotes scientific management of mangrove vegetation
	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	NA
II	**II. Innovation and Piloting of new Approaches**	
	(I) Does the proposal have innovative elements and new approaches that have not been tried in the sector andhave reasonable chance of changing for the better the way things are done inthe sector and have some chance ofscalable replication?	NA
	(ii) Does the proposal look at financial sustainability and O& M related issues which otherwise has not been the norm in the sector?	Yes on maintenance of mangrove seedlings planted
III	**Innovation in financing and Leveraging**	Does not arise
	i. Does the proposal use different/ innovative financing products/ modalities?	NA
	i. Does the proposal involve co-	No

	financing from other financing agencies?	
	iii. Does the proposal catalyse private sector financing in different ways and especially to create leverage?	NA
	iv. Does the proposal involve CDM and accrual of carbon credits as a natural by-product of core development projects which can be a way of financing the project?	Marginally as the increase in mangrove cover contributes in carbon sequestration

EXECUTIVE SUMMARY

Mangroves are trees and shrubs that grow in saline coastal habitats in the tropics and subtropics. Mangroves play a critical role in protecting lives and property in low-lying coastal areas from storm surges, which are expected to increase with global warming. They also stabilize shorelines and improve water quality. Mangrove ecosystems serve as breeding, feeding, and nursery grounds for many shellfish, fish, and other wildlife. Mangroves in Yanam are part of Coringa Forests and have rich biodiversity. Relatively speaking, though the Karaikal - Puducherry region is close to Muthupet, the species representation is very limited because of anthropogenic pressure. There is an imperative need for the protection and restoration of mangrove areas in Puducherry, Yanam and Karaikal areas for ecological security and livelihood opportunities of coastal communities.The present proposal is an attempt to develop site specific models for restoration of the critical mangrove habitat which are damaged due to tsunami, human interventions and under threat of permanent degradation. The proposal from the Department of Forests, Govt of Puducherry, looks at collaboration with well-known research institutions to develop an effective methodology to restore the mangrove areas with the natural assemblage, structure and ecosystem function (within the bounds of natural variations) means self-sustaining.

1. Introduction

Mangroves are typically a closed evergreen forest of moderate height composed of trees specifically adapted to survive on tidal mid that is permanently wet with salt water and submerged every tide. Mangroves are trees and shrubs that grow in saline coastal habitats in the tropics and subtropics. Mangrove formations depend on terrestrial and tidal waters for their nourishment, and silt deposits from upland erosion as substrate for support. Mangrove is one of the most productive ecosystems and a natural renewable resource (Kathiresan, 2003). More than 35% of the world's mangroves are already depleted. The figure is as high as 50% in countries such as India, the Philippines, and Vietnam, while in the Americas they are being cleared at a rate faster than tropical rainforests. Mangrove forests require stable sea levels for long-term survival. They are therefore extremely sensitive to current rising sea levels caused by global warming and consequent climate change. Mangroves, like corals, are known as land builders. They prevent erosion of soil in the coastal areas. They are also the first line of defence against natural disasters like tsunamis and cyclones and act like a shelter belt.

Mangroves play a critical role in protecting lives and property in low-lying coastal areas from storm surges, which are expected to increase with global warming. They also stabilize shorelines and improve water quality. Mangrove ecosystems serve as breeding, feeding, and nursery grounds for many shellfish, fish, and other wildlife. An estimated 75 percent of game fish, and 90 percent of commercial species in South Florida depend on mangrove ecosystems. Endangered species such as the Key deer live here. The annual economic value of mangrove habitats is estimated at $80,000–$360,000 per acre.

Rising sea levels and changing salinity pose the most serious threats to these ecosystems. Where mangroves are sheltered by coral reefs killed by global warming, damage to mangroves from increased wave action is expected to rise. Loss of mangroves will have a serious economic impact on both fisheries and coastal communities. In developing countries, mangroves have proven critical for saving human lives by their dampening of the wave heights and wind speeds during coastal storms. Unable to directly control sea level, managers will need to ensure that other human stresses on mangroves are minimized to give mangroves the best opportunity to withstand the duress of global warming impacts. This may require, for example, improving land-use management and stream water quality on nearby lands. Other possible actions may include implementation or adjustment of recreational and commercial fishing regulations.

Changes in climate and other factors may also affect mangroves, but in complex ways. Global warming may promote expansion of mangrove forests to higher latitudes and accelerate sea-level rise through melting of polar ice or steric expansion of oceans. Changes in sea level would alter flooding patterns and the structure and areal extent of mangroves. Climate change may also alter rainfall patterns, which would in turn change local salinity regimes and competitive interactions of mangroves with other wetland species. Increases in frequency or intensity of cyclones in combination with sea-level rise may alter erosion and sedimentation rates in mangrove forests. Another global change factor that may directly affect mangrove growth is increased atmospheric carbon dioxide (CO2), caused by burning of fossil fuels and other factors. Elevated CO2 concentration may increase mangrove growth by stimulating photosynthesis or improving water use efficiency, but the consequences of this growth enhancement for the ecosystem are unknown.

Reduced mangrove area and health will increase the threat to human safety and shoreline development from coastal hazards such as erosion, flooding, storm waves and surges, and tsunami, as most recently observed following the 2004 Indian Ocean tsunami. Mangrove loss will also reduce coastal water quality, reduce biodiversity, eliminate fish and crustacean nursery habitat, adversely affect adjacent coastal habitats, and eliminate a major resource for human communities that rely on mangroves for numerous products and services. Mangrove destruction can also release large quantities of stored carbon and exacerbate global warming and other climate change trends.

The recent changes have prompted us to visualize that the mangrove vegetation would move landwards in the southern latitudes and towards the shoreline in the northern latitudes. As a resultant there would be climax established. Though considerable reports describe post-tsunami effects on mangroves, attempts have not been made to assess the long-term implications and efforts to restore the mangrove species.

2. Project Area Description and relevance to ICZM

The total area of mangroves in India is estimated about 4827 km^2, out of this about 27 km^2 (Approximately 130 ha) occurs in Yanam and Karaikal. In Yanam and Karaikal, 18 and 7 mangrove species presents respectively (Balachandran et al, 2009). At present situation, the areas under the mangrove in both the places are getting degraded due to various reasons.

Though the mangroves must have suffered similar damages in the past, presently they are vulnerable to geological and anthropological damages. Therefore, there is a need for human assisted and active restoration supporting the process of natural recovery. The rich diversity in Yanam could be influenced by the Coringa Mangrove Reserve, located in Andhra Pradesh, which is very close to Yanam. Though the Karaikal region is close to Muthupet, the species representation is very limited because of anthropogenic pressure. There is an imperative need for the protection and restoration of mangrove areas in Puducherry, Yanam and Karaikal areas for ecological security and livelihood opportunities of coastal communities.

3. Objectives and key indicators

The present proposal is an attempt to develop site specific models for restoration of the critical mangrove habitat which are damaged due to tsunami, human intervention and under threat of permanent degradation with the following objectives.

Restoration of the mangrove ecosystem through

1. Baseline survey and assessment of status of mangroves and dependence of local communities on mangroves.
2. To comprehend the regeneration pattern of mangroves with associated changes in hydrology and salinity to devise appropriate restoration methods.
3. To understand reproductive and regeneration constraints in rate, endangered and threatened true mangroves and develop species recovery strategies.
4. Restoration of mangroves and monitoring the growth pattern.
5. Assessing the socioeconomic and environmental benefits arising out of mangrove restoration on other allied activities for the livelihood options of the local communities.
6. Creation of livelihood opportunities viz., enhanced fishing activities, eco-tourism, apiculture, etc.

4. Input and outcome indicator (direct and indirect benefits)

Number of hectares of mangroves surveyed and mapped, sectors identified for restoration and setting up of a mangrove nursery would be the input indicators. The output indicators are the number of hectares of mangroves restored and the livelihood opportunities created.

5. Project guiding principles and key design features

Restoration of degraded habitat especially that of mangroves, provides benefits in the form of extensive ecosystem services. These include shoreline protection (from erosion), disaster mitigation (cyclones, storm surge, tsunami), habitat for commercially important species such as mangrove mud crabs and other fish and shellfish, carbon sequestration etc.

6. Relevance of project activities to the National policies and legislations

The Environment Policy (2006) is the basic document that guides all environment related activities in the country. It emphasizes the need to protect and conserve critical ecological systems and resources, and invaluable natural and man-made heritage, which are essential for life support, livelihoods, economic growth, and a broad conception of human well-being. One of such ecosystems is the mangroves which form as an ecosystem by providing to shelter to variety of marine animals and also a habitat for their spawning and breeding. The mangroves also form as CRZ 1 category under the CRZ notification. The present project aims to conserving of the mangroves address the National policy on Environment in protection of the habitats. Conservation of mangroves is one of the long-term programmes of Govt of Puducherry

7. Earlier studies/attempts (if any), their outcomes and how the present plan fulfills gaps/overcome negative effects if any – necessity of the project or Justification for the project

Mangrove restoration is a fairly well known activity. The collaboration with scientific organisations that are extensively involved in mangrove restoration and mangrove biology will help overcome negative effects. This is a very important activity that will help in conservation of sensitive ecosystems, improved livelihoods, disaster mitigation etc.

8. Environment, ecology and socio-economics of project area

Detailed information provided in the Base document.

9. Statement on implementing agency and their experience

The Forest Department has carried out afforestation in mangrove areas.

10. Project tasks

The proposed project will develop an effective methodology to restore the mangrove areas with the natural assemblage, structure and ecosystem function (within the bounds of natural variations) means self-sustaining. Mangroves absorb excess nitrates and phosphates thereby preventing contamination of near shore waters. Mangroves protect the shore line from wave action, currents, winds and prevent erosion by acting as buffers and catch alluvial materials, thus stabilizing land elevation by sediment accretion that balances sediments loss. Studies in Asia indicate that Forest Genetic Resources are on a rapid decline trend and in some regions their future looks jeopardized. In India, it is estimated that mangroves have been the fastest disappearing forest assets. This project will help in recovery of mangrove species that are rare, endangered and threatened. Mangrove restoration will improve sustainable fisheries in the area. This project concerns with taxa that are undergoing localized extinction in Puducherry, Yanam and Karaikal and replenishment of the species in the region will be done using conventional species recovery methods

Technical programme

The study will be conducted in the Puducherry, Yanam and Karaikal areas. Stratified random sampling method will be adopted and the area will be stratified into three classes for vegetation assessment. Collection of quantitative data on the physical and biological features of the mangrove systems, the slope and height of the mud substratum, the distribution of freshwater inputs, the species composition, abundance and size structure of mangrove stands. The vertical zonation patterns will also be recorded. The soil samples will be collected at different depth and analysed for various parameters. Activities like clearing water ways will be undertaken to facilitate tidal flow in mangrove areas especially in Thengathittu where mangroves to the extent of 0.38 sq km facing degradation at certain locations due to reduced tidal water and other human related interventions (Fig.1)

Fig.1. Mangroves of Thengathittu island of Puducherry town (yellow lines show mangrove areas)

The mangrove stands will be surveyed for natural regeneration and for restoration of the areas in the sample sites, species presents in the area will be raised in the nursery and used for restoration. Mangrove nursery will be established in two locations for supplementing the natural regeneration and use in artificial regeneration.

Two types of treatment will be adopted in the restoration of mangrove areas viz., supplementing the natural regeneration and artificial regeneration. The techniques include reintroduction of seeds or propagules and transplanting of nursery raised seedlings.

Restoration of mangroves will be done by following the Ecological Restoration Methods (Lewis, 2005) which involves studying the individual species ecology of the mangrove species at the site particularly the patterns of reproduction, propagule distribution and successful seedling establishment. The normal hydrologic pattern that controls the distribution and successful establishment and

growth of targeted mangrove species will be ascertained. The modifications of the original mangrove environment that currently prevent natural secondary succession.

The rate of stabilization and the rate of growth of seedlings will be assessed and if found the natural recruitment is inadequate, planting of propagules, collected seedlings or nursery raised seedlings will be done (Lewis and Marshall, 1977). Restoring mangroves is only a partial solution and efforts to improve the protection.

Strategy for Restoration

The restoration strategy is adopted based on the tidal amplitude. Consequently, the entire coastal area is divided in to two categories viz.,

1. High tidal amplitude area, and
2. Low tidal amplitude area. (Kathiresan, et al., 2009)

High tidal amplitude areas: In the high tidal amplitude areas, it is suggested that the existing planting technique of direct seed sowing and planting seedlings in the mud flats should be continued. Tamil Nadu has dispensed with the nurseries practice and has adopted direct propagule planting with very good results. This technique can also be adopted by other States as it would save on the cost of operating nurseries.

Low tidal amplitude areas: In the low tidal amplitude areas, it is suggested that to develop a planting technique called "Canal Bank Planting' for restoration of mangroves and the 'Fish bone' design has been the most successful of all the canal bank planting designs tried so far, and it happens to be the latest improved design for the canal bank planting. This technique involves formation of the feeder canal; 3 m top, 1 m-bottom and 1 m-deep; and the distribution canals of 2 x 0.75 x 0.75 m dimension in the mud flats and planting propagules directly in the inter-tidal zone of the canals. Along the banks of the canals, planting is made. The Biodiversity enrichment, however, is left to the nature to take care and nature does it very efficiently.

In a nutshell, wherever tidal amplitude is low, the preference for restoration should be the canal bank planting technique with fish bone design; and, wherever tidal amplitude is high, the technology adopted should be seedling planting and direct seed sowing in the mud flats.

Compared to other mangrove wetlands of the east coast of India, the tidal amplitude of the Pichavaram and Muthupet mangroves is very low, MSL is about 0.34 m, MHHW is about 0.67 m, and MLHW is about 0.03 m (Selvam, 2003).

A fishbone technique will be implemented for restoration purpose and in order to facilitate easy inflow and outflow of tidal water. The main canals will be dug at an angle of 45o to the natural creek and the side canals were dug at an angle of 30o to the main canal. The canals will be dug in a trapezoidal shaper in order to plant the propagules at the mid-level of the canal.

This is to ensure that the propagules receive tidal water but at the same time they are not submerged. After a buffer period, nursery raised mangrove saplings will be planted all along the trapezoid shaped canals in the degraded areas. The planting will be carried out in the months of September to November, after the southwest monsoon as the influx of rainwater during this period reduces the salinity of the soil. Well grown propagules will be planted all along the slopes of the canals (20-25 cm from the top) with a gap of 2 m.

Under the capacity building activities, the local peoples will be trained in restoration techniques and in participatory approaches for community mobilization and mangrove management. Providing an alternative employment and income generation activities to the local people depending directly on mangroves will an important aspect of this proposed project.

1. Field survey, identification and establishment of demo plots for eco-restoration of mangroves. Assessment of water quality and extent of tidal water flow in mangrove areas esp at Thengathittu Island in Puducherry and facilitate smooth flow of tidal waters, treatment of water to ensure flow of good water quality thro waste treatment and associated measures like construction of approach pathways for local population at Thengathittu to access mainland during disasters
2. Collection of quantitative data on the physical and biological features.
3. Assessment of density, species composition of mangroves in the selected areas.
4. Establishment of mangrove nursery.
5. Aided natural regeneration and artificial regeneration.
6. Assessment of restored areas in terms of density, species composition, growth performance, recording of associated mangrove species, etc.

7. Capacity building and knowledge transfer on mangrove restoration.

11. Implementation arrangements

The Project is to be done in collaboration with Institute of Forest Genetics and Tree Breeding, Coimbatore, Center of Advance Study in Marine Biology, Annamalai University, Parangipettai and Dept. of Ecology and Environmental Sciences, Pondicherry University, Puducherry.

12. Action Plan

The tentative action plan is

Activity	Action Plan (Tentative)		Output	Cost Rs.in cr.
Mitigation of Climate change impact on coastal areas of Puducherry , Yanam and Karaikal thro Mangrove restoration and livelihood diversification	1st year	iii. Survey and mapping of mangroves and identification of demo plots for restoration of mangroves iv. Planning for clearing of water ways and approach path for local communities at Thengathittu	Maps in distribution of mangroves and degraded areas	3.26
	2nd Year	iii. Collection of data on physical and biological aspects including density and species composition of mangroves iv. Clearing of waterways	Assessment report on degradation areas	3.15
	3rd year	Establishment of mangrove nursery and aided natural regeneration and artificial regeneration in degraded areas	Nursery established and regeneration commenced	1.27
	4th Year	Assessment of effectiveness, growth, species composition and density and Capacity building and knowledge transfer on mangrove regeneration for continuation	Report on mangrove regeneration	0.4
			Total	**8.08**

FC = Rs.8.08cr ; TC = Nil

13. Procurement of goods, works and services and Implementation plans (adopting World Bank stipulated procedures)

Will be done following World Bank Norms

14. Capacity building needs

Under the capacity building activities, the local people will be trained in restoration techniques and in participatory approaches for community mobilization and mangrove management.

15. Evaluation and Monitoring including social audits, financial reporting and auditing

As per norms of the Coordinating agency

16. Cost estimates (year wise both capital and Operation & Maintenance for project duration)

Sl. No	Activities	Budget (Rs. lakhs)
1.	Fellowships (Field assistants/JRF)	14.00
2.	Establishment of nursery and production of seedlings	12.00
3.	Establishment and restoration of mangrove demo plots	25.00
4	Clearing of water ways	700.00
4.	Monitoring and maintenance of established demo plots	10.00
5.	Capacity building	20.00
6.	TA/DA	10.00
7.	Analysis of soil and water samples	5.00
8.	Contingency	10.00
9.	Equipment	2.00
	Total	**808.00**

17. Post – project scenario (commitment by state to continue the project and monitoring and reporting of project performance)

The Union Territory Government is committed for monitoring and reporting of Project performance during Post Project period. If any further improvements are required on the aspects of latest technologies, the same may be established / provided.

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ESTABLISHING FECAL SLUDGE TREATMENT FACILITY IN PUDUCHERRY

Project Preliminary Report

1	**Name of the Project**	Establishing Fecal Sludge Treatment Facility in Puducherry.
2	**Sectoral area**	Pollution Management
3	**Total Financial outlay (Rs in Lakhs)**	7.00 Crores
4	**Details of the external development agencies (and the amount sought fromeach)**	World Bank
5	**Financial arrangement**	**Rs. 7 Cr.**

Total External Assistance	**Counterpart funds being made available by**				**Total**
	Implementing agency	**State Govt.**	**Central Govt.**	**Others, if any**	
3.5 Cr.	Nil	0.35	3.15	Nil	**7.00 Cr.**

6	**Project duration (dates/months/years)**	24 months
7	**Location of project**	Puducherry
8	**Previous phases, if any**	Nil
9	**Statutory clearances required**	Pollution Control Committee
10	**Statutory clearances obtained**	NA
11	**Details of Feasibility Studies done, if any**	NA
12	**Implementing agency**	Public Works Department (Public Health Division)
13	**Basic design of the project**	Setting up of Faecal Sludge treatment plant in the existing STP at Lawspet.
-	**Goals and objectives**	Establishing a holistic system of Faecal Sludge Management by establishing Faecal Sludge treatment facility.
-	**Activities involved**	Establishing Faecal sludge treatment plantin existing STP at Lawspet Establishing effective mechanism to ensure all septage waste reaches the treatment plant. Arrangements for disposal of treated sludge as manure / co-

		processing in cement plant
-	**Outputs of the project**	1. Improvement in the functioning of onsite sanitation systems and the reduction in the potential for human contact with faecal-borne pathogens. 2. Safeguard public health against indiscriminate disposal of collected faecal sludge. 3. Increased treatment efficiency of the existing treatment plant. 4. Increased awareness for the public towards defecation hygiene through capacity building programmes.
-	**Outcome of the project**	1. Betterment of environmental health and hygiene of the general public. 2. Deriving agricultural and energy products, including soil conditioner from composting or co-composting and energy products such as biogas, charcoal pellets, industrial powdered fuel etc. 3. Reduction of pollution load to the sea where the treated wastewater is disposed. 4. Stimulate economic development, job creation and livelihood opportunities while addressing the issues of the social stigma and operator health and safety issues that continue to impact informal workers.
-	**FC and TC component**	Refer Section 8
14	**Target population/ groups**	General public of Puducherry.
15	**Detailed Action Plan (Year wise)**	Refer Section 8
16	**Quantitative and qualitative (verifiable)target indicators**	Quantitative indicator would be the improved health and hygiene of the entire population of

		Puducherry and the decrease in pollution load at the final disposal (land/sea). Qualitative indicator will be the better pollution management opportunity brought about by improved treatment facility of the faecal sludge.
17	**Environmental sustainability of the project**	Reduction in pollution load to the sea where the treated wastewater is disposed and mitigation of the adversities caused by the disposal of faecal sludge in remote areas or other inland water bodies. Conservation of Hygiene of the environment and the community.
18	**Land acquisition / Resettlement and Rehabilitation involved**	Nil
19	**Linkages with Similar Projects**	Vacuum Tankers for emptying septage are purchased under Amrut Scheme by the local bodies
(i)	**Information regarding similar projectsundertaken previously (add evaluationreports, if any)**	NA
(ii)	**Does the project form part of the sectoral project? If yes, who are the other partner with details of the specific activities being undertaken bythem**	NA
20	**Finance Plus Element**	
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	NA
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	NA

	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	NA
	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	NA
	v. Does the proposal seek to create additional choice for the citizens to access required service/ entitlements?	No
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	Yes.
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	NA
	viii. Does the proposal have institutional improvement measures: e.g. (a) Accounting Reforms (moving from single entry cash based accounting system to double entry accrual system of accounting (b) Ring fencing of finances/activities including corporatization wherever needed (c) creation and implementation of appropriate revenue models e.g. tariff reforms or alternative revenue structuring?	NA
	ix. Does the proposal address issues of	Yes, in wastewater management

	real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	
	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	Management of faecal sludge
II	**Innovation and Piloting of new Approaches**	
	(i) Does the proposal have innovative elements and new approaches that have not been tried in the sector and have reasonable chance of changing forthe better the way things are done inthe sector and have some chance of scalable replication?	Refined approach in waste treatment.
	(iil Does the proposal look at financial sustainability and 0 & M related issues which otherwise has not been the norm in the sector?	No
III	**Innovation in financing and Leveraging**	NA
	i. Does the proposal use different/ innovative financing products/ modalities?	NA
	i. Does the proposal involve co-financingfrom other financing agencies?	NA
	iii. Does the proposal catalyse private sector financing in different ways and especially to create leverage?	NA
	iv. Does the proposal involve CDM andaccrual of carbon credits as a naturalby-product of core developmentprojects which can be a way of financing the project?	NA

1. Introduction

Proper treatment and management of fecal sludge is integral to safe sanitation practices which ensure health and well-being of people. In Puducherry, many households depends on on-site sanitation solutions for safe waste water disposal since the underground drainage network coverage is limited. Hence there is a need for proper collection, treatment and disposal of sludge from such on-site installations. The local bodies are not able to effectively monitor the regular cleaning and maintenance of septic tanks and pits. The local bodies provide septic tank and pit cleaning as a municipal service under Amrut Scheme and has procured vacuum trucks. Also private players are providing the septage emptying service for a fee. However the disposal of the waste water and sludge is often not regulated and the sludge is dumped in storm water drains and open areas posing considerable health and environmental risks. Recognizing the growing importance of safe fecal sludge management practices, the Ministry of Urban Development (MoUD) has released National Policy on Faecal Sludge and Septage Management (FSSM) in February 2017 to provide guidance to states and cities on policy, technical, regulatory and monitoring aspects of fecal sludge management.

2. Project area description and relevance to ICZM

The project location is in the Puducherry region of the U.T. of Puducherry.Puducherry District comprises 71 Village Panchayats, five communes and two blocks. The Ariyankuppam Block consists of three communes namely Ariynkuppam Commune comprising 11 Village Panchayats, Bahour Commune with 15 Village Panchayts, Nettapakkam Commune with 11 Village Panchayats, Villianur Block with 2 communes comprising 18 Village Panchayats, Mannadipet Commune with 16 Village Panchayats.

The region of Puducherry has three dedicated Wastewater treatment plants with a 32 MLD Treatment plant with Oxidation pond, UASB, SBR treatment facilities at Lawspet, and a 19.5 MLD treatment facility using SBR and UASB technology at Dubrayapet and another 17 MLD plant with SBR facility at Kanaganeri which is under construction.

The proposal of Faecal Sludge Management in the Puducherry Region is a part of pollution management and thus an essential component of ICZM. The management of faecal sludge helps in improving the functioning of onsite sanitation systems and to reduce the potential for human contact with faecal-borne pathogens and to minimize the odours and nuisances, and the uncontrolled discharge of organic matter from overflowing tanks or pits. Simultaneously, the idea would support encourage the onsite sanitation upgrading programs and would ensure safeguarding public health against indiscriminate disposal of collected faecal sludge. In addition to the primary target of pollution management the idea of faecal sludge management can stimulate economic development, job creation and livelihood opportunities while addressing the issues of the social stigma and operator health and safety issues that continue to impact informal workers.

3. Objective and key indicators:

Setting up of additional facility (Solar Sludge Drying System) for Faecal Sludge Management in the existing STP at Lawspet from pollution management perspective with objectives of better treatment and disposal of Faecal sludge which improves public health.

The Key Indicators would be:

1. Improvement in the functioning of onsite sanitation systems and the reduction of the potential for human contact with faecal-borne pathogens.

2. Safeguarding public health against indiscriminate disposal of collected faecal sludge.

3. Increased treatment efficiency of the existing treatment plant.

4. Increased awareness for the public towards defecation hygiene through capacity building programmes.

5.Deriving agricultural and energy products, including soil conditioner from composting or co-composting and energy products such as biogas, charcoal pellets, industrial powdered fuel etc.

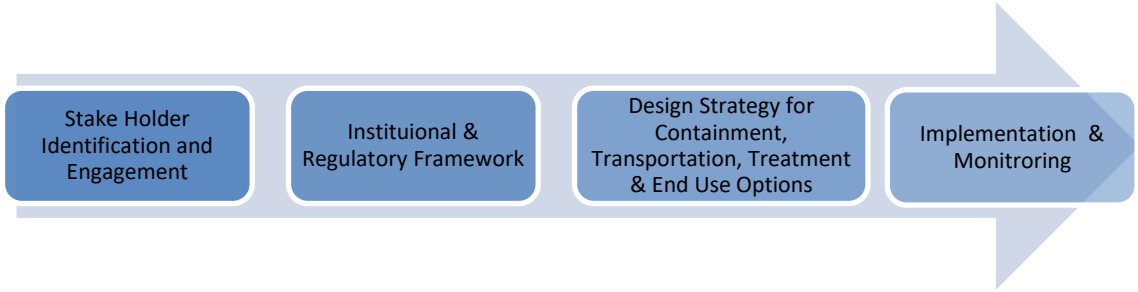
6. Reduction of pollution load to the sea where the treated wastewater is disposed.

7. Stimulating economic development, job creation and livelihood opportunities while addressing the issues of the social stigma and operator health and safety issues that continue to impact informal workers.

4. Project guiding principles and key design features:

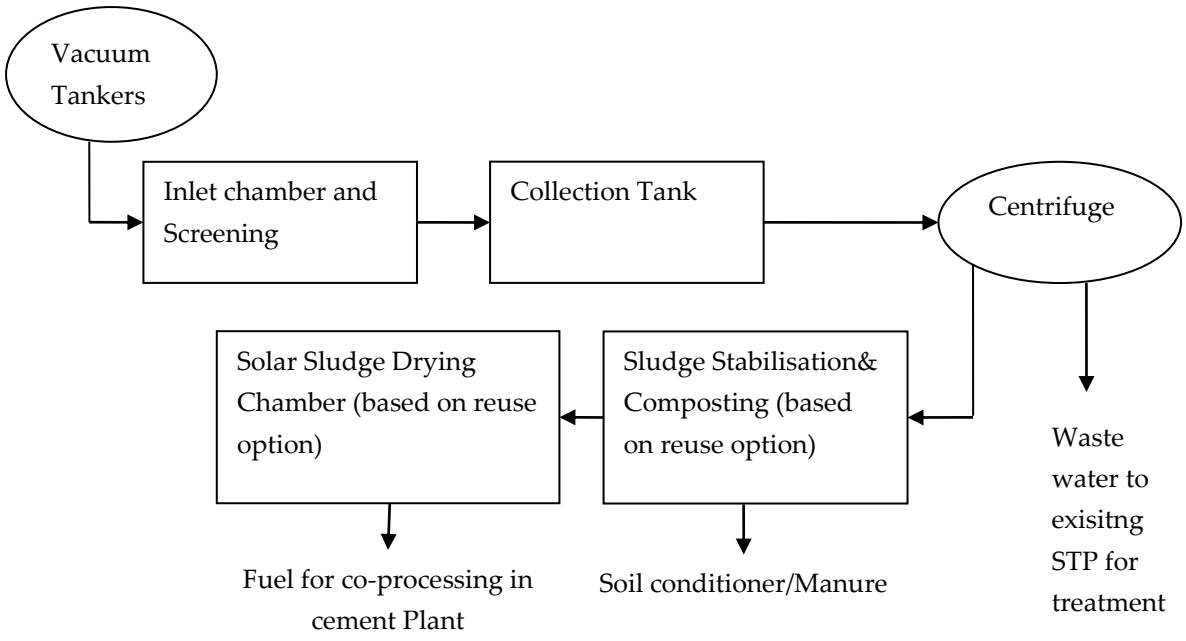
Fecal Sludge Management is a process and requires attention at every stage of the sanitation chain. It needs to be comprehensive and requires a step-wise approach, beginning from systematic planning to ensuring availability of infrastructure and human resources for collection, transportation and treatment of septage. It has to be sustainable and must take into consideration the socio-economic aspects of the region. Safe disposal or end use in a scientific manner is the main goal of septage management.

Steps for Fecal Sludge Management :



The gaps in the existing system of Septage Managmet will be identified in this project and a comprehensive management plan will be implemented. Also since there is no Fecal Sludge Treatment Facility functional in the region, a Fecal Sludge Treatment facility will be established in the exiswitng Sewage Treatment Plant by utilizing the existing facilties in this plant and creating additional facilties required.

The treatment scheme shall be as follows:



End Product

After treatment the sludge shall be converted into a granulate of bio-solid which is easy to handle and which can be stocked in bags and disposed for use as for co-processing in cement plant or as manure for farmers.

5. Relevance of project activities to National policies, legislation etc

Recognizing the growing importance of safe fecal sludge management practices, the Ministry of Urban Development (MoUD) has released National Policy on Faecal Sludge and Septage Management (FSSM) in February 2017 to provide guidance to states and cities on policy, technical, regulatory and monitoring aspects of fecal sludge management. The present project aims to fulfil the objective of protecting environment, by establishing an effective fecal sludge management systems so that they are not recklessly emptied on open lands and water bodies causing detoriarioan of l0and and waterbodies. The project is quite relevant to environment related national policies and notifications like National Envieronmental Policy, 2006 and the various Environemntal Protection Acts.

6. Implementing agency, arrangements and project tasks

The implementation agency is the Public Works Department (Public Health Division), Govt. of Puducherry.

7. Evaluation and monitoring

Project management provides for monitoring at various levels of project completion based on which payments are released since this is a construction project.

8. Action Plan, Project implementation schedule

Sl. No.	Activity	Action Plan	Cost (Rs. in Lakhs)
1	Baseline survey, preparing comprehensive Fecal Sludge Management and Treatment Plant design	1st year	10.00
2	Erection andcCommissioning of the treatment plant.	1st& 2nd year	650.00
3	Capacity Building and implementation of Fecal Sludge Management Plan	2nd year	40.00
		Total	**700.00 Lakhs**

F.C.: 6.50 Cr.; T.C.: 0.50 Cr.

9. Procurement of goods, works and implementation plan

The required materials etc will be procured adopting the guidelines and procedures stipulated by the funding agency.

10. Capacity building

Implementing FSM initiatives and achieving safe sanitation in Puducherry, demands that all stakeholders – government officers at all levels, de-sludging tanker operators, etc. are equipped with latest knowledge and required skills.

11. Post-project scenario

The FSTP maintenance will be by appropriate budget allocation from the PWD and ULB after the post project period.

INVENTORIZATION OF UNTREATED WASTE WATER DISCHARGED INTO THE COASTAL ZONE OF PUDUCHERRY U.T.AND PREPARATION OF WASTE WATER MANAGEMENT PLAN BY ADOPTING DECENTRALIZED TREATMENT TECHNOLOGIES

Project Preliminary Report

1	**Name of the Project**	**Inventorizationof untreated waste water discharged into the Coastal Zone of Puducherry U.T. and preparation of waste water management plan by adopting decentralizedtreatment technologies.**
2	**Sectoral area**	Pollution Management
3	**Total Financial outlay**	Rs. 18.00 crores
4	**Details of the external development agencies (and the amount sought from each)**	World Bank
5	**Financial arrangement**	**Rs. in Cr**

Total External Assistance	**Counterpart funds being made available by**				**Total**
	Implementing agency	**UT Govt.**	**Central Govt.**	**Others, if any**	
9.00cr	NIL	1.80	7.20	NIL	**18.00 cr.**

6	**Project duration (dates/months/years**	4 years
7	**Location of project**	Puducherry, Karaikal and Mahe Regions
8	**Previous phases, if any**	Nil
9	**Statutory required**	NOC from Puducherry Pollution Control Committee& CRZ Clearance for implementation of Pilot Project - Decentralized Waste Water Treatment Plants
10	**Statutory obtained**	NA
11	**Details of Feasibility Studies done, if any**	NA
12	**Implementing agency**	Department of Science, Technology and Environment will prepare the Inventory and Management Plan through reputed scientific institutes in

		consultation with Public Works Department; PWD will implement the pilot scale project on decentralized waste water treatment plant at selected locations.
13	**Basic design of the project**	Preparation of inventory on all untreated waste water discharged into the Coastal Zone of Puducherry UT with qualitative and quantitative assessment followed by preparation of waste water management plan by adopting modern decentralized treatment technologies, preferably in-situ green eco-technology based low cost solutions. Based on the studies a pilot scale decentralised waste water treatment plant will be designed and implemented at Thengaithittu Lagoon and other selected locations which could be replicated at other sites.
	Goals and objectives	Protecting the quality and restoring the eco-health of coastal and inland water bodies
	Activities involved	i) Assessment of waste water quantity and characteristics discharged into open drains in the coastal line within 2 kilometer from the coastline and preparing an inventory of all such sources. ii) Performance evaluation of exiting sewage treatment plant (STP) in operation with respect to their design & waste water characteristics iii) Suggestion for improvement of STPs, if any iv) Preparation of scientific

		management plan for the waste water entering into open drains in the coastal zone by evolving suitable methods to prevent the discharge and treat them through modern decentralized low cost treatment technologies, preferably, in-situ green eco-technology. v) Capacity Building of Government Agencies on low-cost decentralized eco-technology based treatment systems. vi) Designing and implementing pilot scale decentralized waste water treatment plant at Thengaithittu Lagoon and other selected locations in U.T.
	Outputs of the project	i) Inventory of untreated waste water discharge into coastal zone available for planning ii) Waste Water Management Plan available with low-cost green solutions for implementation iii) Pilot small scale treatment plant established which can be replicated at other sites. iv) Enhanced capacity of Executing Agencies.
	Outcome of the project	Water quality improved and eco-health restored in the coastal and inland water bodies
-	**FC and TC component**	Refer section 11
14	**Target population/ groups**	Coastal communities
15	**Detailed Action Plan (Year wise)**	Refer section 11
16	**Quantitative and qualitative (verifiable)target indicators**	The qualitative indicator will be cleaner coastal water bodies.
17	**Environmental sustainability of**	High as the focus is on

	theproject	improvement of water quality and restoring the eco-health of coastal water bodies.
18	**Land acquisition / Resettlement and Rehabilitation involved**	Not envisaged
19	**Linkages with Similar Projects**	Nil
(i)	**Information regarding similar projectsundertaken previously (add evaluationreports, if any)**	Invetorisation of non point sources of coastal water pollution and evolving suitable management plan is first of its kind project for Puducherry.
(ii)	**Does the project form part of the sectoral project? If yes, who are the other partner with details of the specific activities being undertaken bythem**	Project falls under Pollution Management
20	**Finance Plus Element**	
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	Yes, the proposal will result in management of untreated waste water discharge into the coastal zones by application of decentralized eco-technology based low cost solutions.
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	Yes
	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	The project aims at eco-health restoration of coastal water bodies by adopting low cost eco-technology based solutions for preventing discharge of untreated waste water.

	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	Prevention of water pollution from non point discharge sources is a challenging task that remains largely unattended. The project will provide eco-technology based solution to protect the inland and coastal water quality which will enhance the livelihood and health of local community and promote tourism apart from ecological restoration.
	v. Does the proposal seek to create additional choice for the citizens to access required service/ entitlements?	No
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	The project aims at eco-health restoration of coastal water bodies by adopting low cost eco-technology based solutions for preventing discharge of untreated waste water. Apart from the environmental benefits, eco technology based solutions are energy efficient than the conventional mechanical waste water treatment plants.
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with adequate long term engagement for ensuring sustainability in Indian context?	The study involves identification of modern eco-technology based low cost technology in line with the international best practices for ensuring long term sustainable solution to prevent coastal pollution from non point sources.
	viii. Does the proposal have institutional improvement measures:e.g. (a) Accounting Reforms (movingfrom single entry cash basedaccounting system to double entry accrual system of accounting (b) Ringfencing of finances/activities includingcorporatization wherever	NA

	needed (c) Creation and implementation ofappropriate revenue models e.g. tariffreforms or alternative revenuestructuring?	
	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	Yes it promotes scientific management of untreated waste water to prevent coastal pollution
	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	Yes ; shift from capital and energy intensive mechanical treatment plants to decentralized eco-technology based treatment solutions.
II	**II. Innovation and Piloting of new Approaches**	
	(I) Does the proposal have innovativeelements and new approaches thathave not been tried in the sector andhave reasonable chance of changing forthe better the way things are done inthe sector and have some chance ofscalable replication?	Yes, the project involves developing eco-health improvement of coastal water bodies by decentralized low cost treatment plants rather than the centralized capital intensive mechanical treatment plants. The pilot scale plant developed under the project could be replicated at other sites.
	(ii) Does the proposal look at financial sustainability and O& M related issueswhich otherwise has not been the norm in the sector?	Yes, the pilot project evolved will be eco-technology based low coast decentralized treatment plant with minimum O&M requirements.
III	**Innovation in financing and Leveraging**	
	i. Does the proposal use different/ innovative financing products/ modalities?	NA
	i. Does the proposal involve co-financingfrom other financing agencies?	No
	iii. Does the proposal	NA

	catalyseprivatesector financing in different ways andespecially to create leverage?	
	iv. Does the proposal involve CDM andaccrual of carbon credits as a naturalby-product of core developmentprojects which can be a way offinancing the project?	Indirectly. Improved water quality in water bodies will increase population of phytoplankton which sequesters carbon

1. Introduction

Discharge of untreated waste water and sewage is the single major source of deterioration of coastal and inland water bodies and ground water. As a result of discharge of untreated sewage, the levels of dissolved oxygen depletes in the water bodies, depending on the quantity of release, the water often becomes unfit for survival of living organisms especially the fish larvae. Further the beaches too give unaesthetic appearance affecting the growth of tourism and pleasure visit to beaches by people. The coastal water, rivers, lakes and streams are used by human beings for various needs. The pollution of these water bodies has adverse impacts on the health of the human beings as well as the aquatic life. Hence, prevention of discharge of untreated waste water and sewage into the coastal and inland water bodies is absolutely necessary for the health of the aquatic eco system and human well being.

The Coastal Regulation Zone (CRZ) Notification, 2011 stipulates that the discharge of untreated waste water and effluent and dumping bodies. The Environment (Protection) Rules, 1986 stipulates the standards for discharge of waste water into the inland and marine water bodies and also evolved use based water quality criteria for inland and marine water bodies. Hence it is absolutely necessary that the States should be geared up to comply with these legal aspects. of city or town solid wastes in CRZ shall be phased out in time bound manner. The Water (Prevention and Control of Pollution) Act, 1974 prohibits the disposal of polluting matter into the water

The estimated waste water generation in Puducherry U.T is 130 MLD. Sewage Treatment Plants are in place in Puducherry region and yet to be established in Karaikal, Mahe and Yanam regions.

Puducherry town generates 100 MLD of sewage. The status of present STPs are as follows:

Sl. No.	Location	STP Type	Capacity	Status
1	Lawspet	Oxidation Ponds	12.5 MLD	Commissioned in 1980; Operational
2	Lawspet	UASB	2 .5 MLD	Commissioned in 2006; Operational
3	Lawspet	SBR	17 MLD	Commissioned in 2015; Operational
4	Dubrayapet	UASB	2 .5 MLD	Commissioned in 2006; Operational
5	Dubrayapet	SBR	17 MLD	Commissioned in 2017; Operational
6	Kanaganeri	SBR	17 MLD	Under construction
Total STP capacity			51 MLD	

Considering the present level of sewage generation of about 100 MLD in the Puducherry region the total capacity of STPs i.e. 51 MLD is in adequate. Some of this waste water are subject to decentralized way of treatment like septic tanks and soak pits, while some of this waste waters enter into the surrounding water bodies causing non point source of pollution. The waste water entering in to the drainage canals finds its way into the estuarine and coastal water bodies.

Disposal of untreated waste water could be seen at Vaithikuppam Canal, Kurichikuppam Canal, Grand Canal, Uppanar Drain, PallaVaikkal and other Canals which finally drains into the backwaters and sea causing pollution of the coastal waters. Locations of some of the canals are given in Figs 1 and 2.

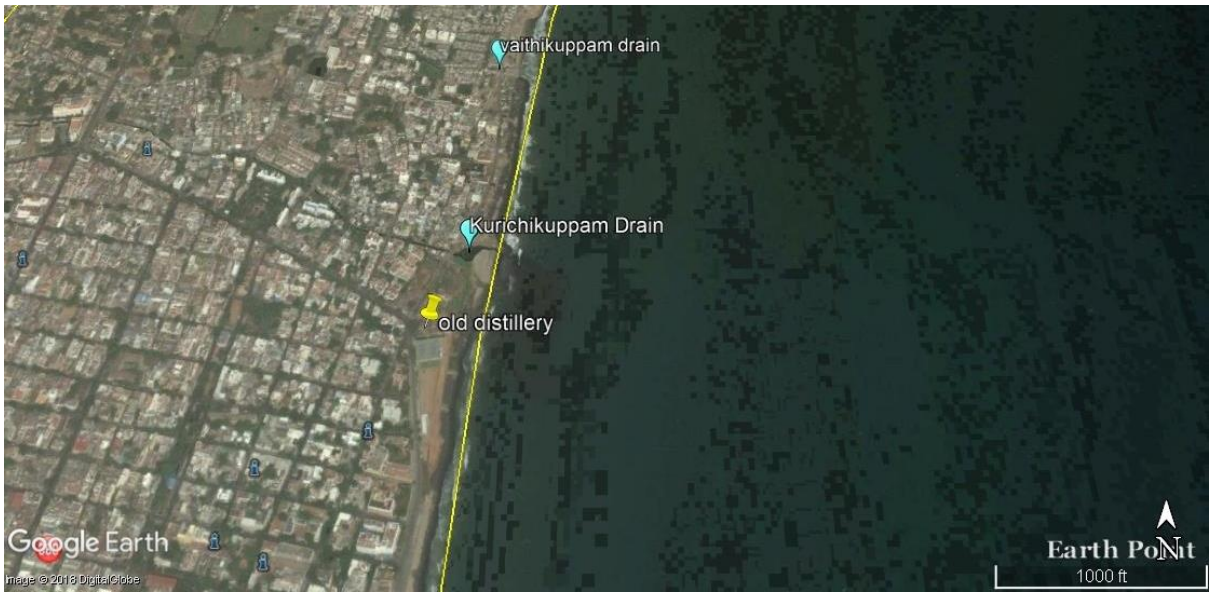


Fig.1. Map indicating locations of Vaithikuppam drain and Kurichikuppam drain

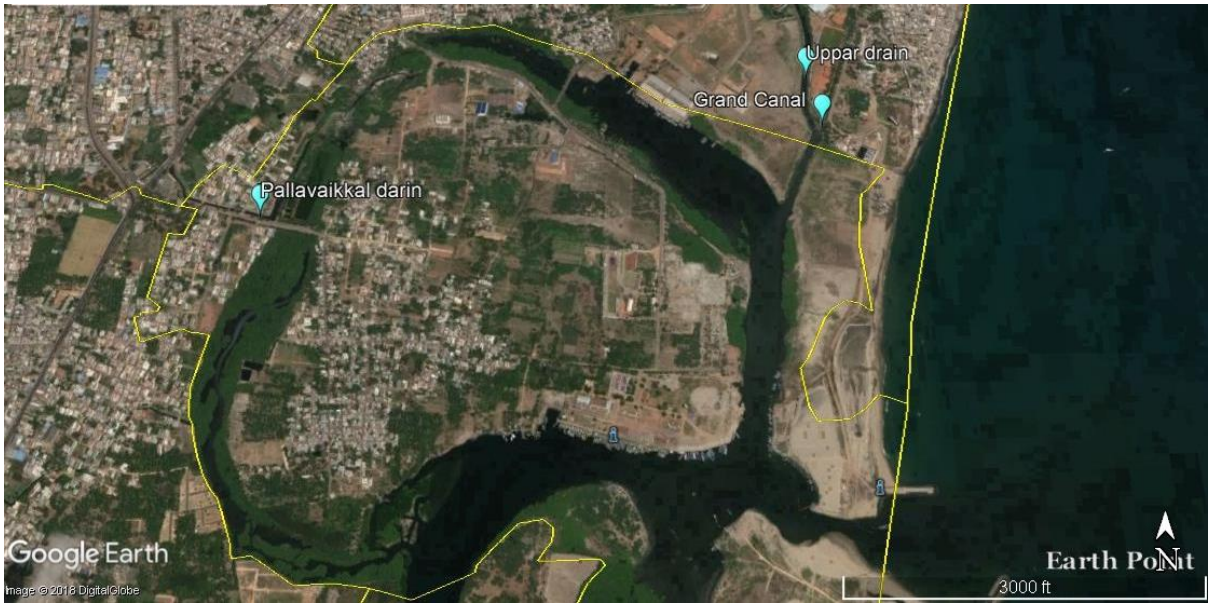


Fig.2. Map indicating Pallavaikkal drain, Uppar drain and Grand canal

With this background, the present proposal envisages preparation of an inventory of the untreated waste water sources entering into the coastal and inland water bodies. Qualitative and Quantitative assessment of these untreated waste water sources would be carried out. Once, this is done a management plan would be prepared by evolving suitable methods to prevent the discharge of untreated waste water into the inland and coastal water bodies and to treat them through modern decentralized low cost treatment technologies, preferably, *in-situ*green eco-technology. As a pilot scale project a decentralized waste water treatment plants

would be established at one or more selected locations which could be replicated in other areas.

2. Project Area description and relevant to ICZM

Inventorisation of untreated waste water discharge will be carried out for the entire U.T. Pilot Project on decentarlised green technology based treatment option will be implemented at the channels draining waste water in the Thengaithittu Lagoon and other locations identified during the study.

The planned activities under the project are relevant to Pollution management from non-point sources, which are an essential part of the ICZM, as the management of sewage problem helps in prevention of degradation of aquatic water bodies that are connected with the sea. Further, it prevents depletion of dissolved oxygen in the coastal waters and reduction in levels of land based pollutants.

3. Objectives and key indicators

The main objective of the project is to ensure clean water quality in the inland and coastal water bodies to facilitate existence of a conducive ambient conditions for survival of aquatic life. The key indicator is achievement of 100% treatment of waste water especially from domestic sources and maintains water quality conditions as per the stipulated standards.

4. Input and outcome indicators

The inputs are details on sources of land based pollution and outcome would be a plan for scientific management of pollution including demonstration of pilot scale insitu waste treatment plant to treat the raw domestic sewage.

5. Relevance of project activities to the National policies and legislations

The Environment Policy (2006) is the basic document that guides all environment related activities in the country. It emphasizes the need to protect and conserve critical ecological systems and resources, and invaluable natural and man-made heritage, which are essential for life support, livelihoods, economic growth, and a broad conception of human well-being. Further, Environment Protection Act (1986) which is an umbrella act for all environment related legislations, has strictly prohibited contamination of environment due

to dumping of solid waste and discharges of untreated wastes in rivers and coastal water bodies. This is mainly aiming at protecting marine biodiversity as it plays a vital role in fishery production of the country which is dependent on by the millions of people. The project aims to fulfill the objective of protecting marine environment, by identifying sources of sources to facilitate treating of the sewage collected from households through a drainage system and therefore, they do not leach from soak pits and pollute the ground water. It proposes to identify cost effective technology to be operated in a de-centralised manner to treat the sewage and for safe disposal. Therefore, the project is quite relevant to environment related national policies and notifications. Treatment of sewage containing putrefied organic matter is the long-term programme of Govt of Puducherry.

6. Earlier studies, outcome, gaps and justifications for the proposed activities

The problem of sewage treatment has been dealt with by establishing STPs. Out of the 100 MLD of sewage generated from known sources in Puducherry only 51 MLD is being treated and remaining 49 MLD is drained in inland canals that are connected to the sea. While the point sources are directed to the STPs to their capacity and remaining are drained into the inland waters, there are several non-point sources along the inland canals which are not accounted under the sources of sewage generation. An inventorisation of these non-point sources of untreated waste water entering into the coastal zone and the proposed management plan would be useful for the concerned agencies like PWD and Local Bodies in formulating action plan / strategies for management of untreated waste water and improving the quality of coastal and inland waters.

7. Project guiding principles and key design features

The project guiding principle is need for clean water quality for propagation of aquatic life and to ensure the ground water surrounding the waste water canals are free from contaminants including pathogens. The design feature is prepare a scientific management plan for sewage treatment which would provide a holistic approach to solve the problem of sewage pollution in the UT of Puducherry.

8. Ecology and Environment of the UT

The Union Territory of Puducherry includes Puducherry town, Karaikal, Mahe and Yanam. These locations are physically separate with Puducherry town and Karaikal are location adjoining Tamil Nadu, Mahe and Yanam are adjacent to Kerala and Andhra Pradesh respectively. All are coastal locations having

backwaters, rivers and sand dunes. Mangroves exist at Ariyankuppam and Chunnambar rivers in Puducherry and near Coringa in Yanam. Puducherry is known for coastal tourism and one of the developed UTs in the country. The coastal waters of the UT are rich in biodiversity and fishing is one of the major activities of the coastal communities.

9. Implementing agency

The Department of Science, Technology and Environment (DSTE) will prepare the Inventory and Management Plan through reputed scientific institutes in consultation with Public Works Department. PWD will implement the pilot scale project on decentralized waste water treatment plant at selected locations. The DSTE is responsible for regulation of pollution related activities in the UT and has technical expertise in the survey and identification on sources of pollution and preparation of overall management plan. PWD is responsible for planning, designing and operation of Sewage Treatment Plants and has executed similar projects in the past in the UT.

10. Project tasks

The proposed activities under the project would be as follows:

i) Assessment of waste water quantity and characteristics discharged into open drains both from point and non-point sources in UT of Puducherry and preparing an inventory of all such sources.
ii) Performance evaluation of exiting sewage treatment plants (STP) in operation with respect to their design & waste water characteristics
iii) Suggestion for improvement of STPs, if any
iv) Preparation of scientific management plan for the waste water entering into open drains in the coastal zone by evolving suitable methods to prevent the discharge and treat them through modern decentralized low cost treatment technologies, preferably, in-situ green eco-technology.
v) Capacity Building of Government Agencies on low-cost decentralized eco-technology based treatment systems.
vi) Designing and implementing pilot scale decentralized waste water treatment plant atThegaithittu Lagoon and other selected locations.

Among the above tasks, more details on in-situ green technology waste water

treatment techniques which have been carried out to a reasonably good level of success in other parts of the country are given below:

i. Green Bridge technology

This has been demonstrated in Ahar River, Pune and Udaisagar lake Udaipur. The technique involves following aspects:

- Placement of Bar screen before green bridge to trap garbage and other floating materials
- Waste water to pass through green bridges placed in a Zig-zag manner.
- The green bridges made of boulder provided with microbial doses and aquatic plants grown over it.
- Microbial doses released from the Green Bridge and also from bottom of hydro-cells
- Regular monitoring of water quality
- Regular cleaning of Green bridges and maintenance of aquatic plants.

The claimed results are given in Table 1.

Table 1. Water quality status before and after treatment

Parameters	Quality before treatment	Reduction	After Treatment
BOD	85 to 165 mg/l	55- 70%	25 to 50 mg/l
COD	387 to 526 mg/l	55- 70%	115 to 150 mg/l
TSS	201 to 398 mg/l	55- 80%	40 to 80 mg/l
Cr+	0.46 mg/l	55- 60%	0.18 mg/l
Pb+	0.21 mg/l	55-60%	0.08 mg/l
Ni+	0.47 mg/l	55-60%	0.18 mg/l
Zn+	2.40 mg/l	55-60%	0.96 mg/l

The cost of the project at above locations was Rs.15.28 cr including operation and maintenance for one year

ii. Eco-Bio-Block (EBB) technology

This has been demonstrated at Mayur Vihar Phase I drain, Delhi and Alandur, Chennai. The technique requires civil work in drains and rivers.

The technique involves:

- EBB contains "fermented soya bean bacillus"

- Made of porous volcanic rock, cement, beneficial bacteria and nutrients that released regularly in water
- EBB structure designed according to hydrodynamics and placed
- Number of EBB requested is based on pollution load

The working principle is:

- Pre-analysis of water quality for Block Placement
- Installation of Bar screen to check floating materials
- Installation of EBB reactor and bottom lining
- De-silting of the drain at regular intervals
- EBB bacteria degrade organic matters into carbon dioxide and water and helps in rapid oxidization (anaerobically) converting ammonia into nitrite and nitrate, nitrates are naturally absorbed by plants and microbes and release nitrogen gas
- EBB bacteria in contact of water, propagate and multiply every half an hour to cleanse water

The details on field level activities are given in Fig.3.

Fig. 3. Construction and Placement of EBB in river

Details of results obtained using the technique are given in Table 2

Table 2. Water quality status before and after treatment

Parameters	Before	After
DO	0.5 mg/l	0.5 mg/l
BOD	110 mg/l	50 mg/l
COD	240 mg/l	110 mg/l
TSS	326 mg/l	130 mg/l
Faecal Coliform	-	5-55% reduction

Cost of the project at one location was Rs.2.24 cr for 21 MLD including maintenance for one year.

11. Action plan

Activity		Action Plan (Tentative)	Output	Cost Rs. in cr.
Inventorization of untreated waste water discharged into the Coastal Zone of Puducherry UT and preparation of waste water management plan by adopting decentralized treatment technologies.	Year 1	Inventorisation of sources of waste water especially domestic sewage and evaluation of performance of existing STPs and suggestions for improvement by engaging reputed scientific institution	Sources of point and non-point sources of pollution	1.0
	Year 1&2	Preparation of waste water management plan by adopting decentralized treatment technologies.	Plan for management of untreated discharge of waste water in drainage canals	1.0
	Years 2,3 & 4	Design and Establishment of in-situ green technology pilot sewage treatment plant and capacity building to PWD officials for operation and maintenance	Pilot plant established and operated	16.0
		Total		18.00

F.C.: 10.00 Cr.; T.C.: Nil

12. Procurement of goods, works and services and implementation plans (adopting World Bank stipulated procedures)

Procurement of goods and services will be made based on the instructions/ guidelines stipulated in General Financial Rules as well as by adopting procedures stipulated by the funding agency and the procurement will be made after obtaining necessary approval /sanction for the competent authority wherever / whenever required.

13. Capacity building needs:

Necessary capacity building programmes will be undertaken operation and maintenance of the Pilot STP

14. Evaluation and monitoring including social audits, financial reporting and auditing

A Project Steering Committee will be constituted to evaluate the progress made. Third party agency will be engaged for all audits and for evaluation and monitoring. Auditing of expenditure will be carried out using the procedures stipulated by the funding agency.

15. Cost estimates

The following components are included in the project and the details of cost estimates are given below:

S. No.	Components	Approx. Amount in (Rs. In crores)
1	Engagement of reputed scientific institutions	1.50
2	Consultation workshops / meetings	0.30
3	Travel & Contingency	0.40
4	Capacity Building	0.30
4	Design and establishment of Pilot project on decentralized treatment plant.	15.50
	Total	**18.00**

16. Post –Project scenario (Commitment by state to continue the project and monitoring and reporting of project performance)

The state will operate and maintain the STP from its own financial resources.

SETTING UP OF A STATE PROJECT MANAGEMENT UNIT (SPMU) IN DSTE UNDER ICZMP, GOVERNMENT OF PUDUCHERRY

Project Preliminary Report

1	**Name of the Project**				**Setting up of a State Project Management Unit (SPMU) in DSTE under ICZMP, Government of Puducherry**	
2	**Sectoral area**				Coastal Zone Management	
3	**Total Financial outlay**				Rs. 12.31 crores	
4	**Details of the external developmentagencies (and the amount sought fromeach)**				World Bank	
5	**Financial arrangement**				Rs. in Cr	
Total External Assistance	**Counterpart funds being made available by**				**Total**	
	Implementing agency	**UT Govt.**	**Central Govt.**	**Others, if any**		
6.16cr	NIL	1.23	4.92	NIL	**12.31 cr.**	
6	**Project duration (dates/months/years**				4 years	
7	**Location of project**				Puducherry	
8	**Previous phases, if any**				Nil	
9	**Statutory required**				NIL	
10	**Statutory obtained**				NA	
11	**Details of Feasibility Studies done, ifany**				NA	
12	**Implementing agency**				Department of Science, Technology and Environment, Government. of Puducherry	
13	**Basic design of the project**				Institutional arrangement to facilitate adoption of ICZM practices for coastal activities	
-	**Goals and objectives**				To set up a SMPU with appropriate governing and advisory to facilitate implementation of ICZM project and also to facilitate adoption of ICZM practices in the coastal areas of the country	
-	**Activities involved**				Setting up of State Project Management Unit (SPMU) Setting up of Project Steering Committee (PSC)	

		Setting up of Scientific & Technical Advisory Committee (STAC) Steering and implementation of ICZM Project and development of data base containing ICZM and relevant coastal data
-	**Outputs of the project**	Project reports on implementation of ICZM activities and recommendations for future activities
-	**Outcome of the project**	Coastal activities implemented in an integrated and co-ordinate manner resulting in sustenance of all activities with no damages to resources and biodiversity
-	**FC and TC component**	Refer section 8
14	**Target population/ groups**	Planners, policy makers and project managers in the Govt of Puducherry
15	**Detailed Action Plan (Year wise)**	Refer section 8
16	**Quantitative and qualitative (verifiable)target indicators**	The qualitative indicator would be the availability of integrated management solutions and enhanced inter-departmental co-ordination. The quantitative indicator will be an ICZM plan with 6 sub-plans containing multiple activities. A database on ICZM
17	**Environmental sustainability of the project**	High as the focus is on integrated management of sectoral activities to ensure no adverse environmental impacts on each other
18	**Land acquisition / Resettlement and Rehabilitation involved**	Not applicable
19	**Linkages with Similar Projects**	Since it is being an umbrella project it has linkage with all sub-plan activities

(i)	**Information regarding similar projectsundertaken previously (add evaluationreports, if any)**	Not carried out so far
(ii)	**Does the project form part of thesectoralproject? If yes, who are theother partner with details of thespecific activities being undertaken bythem**	No
20	**Finance Plus Element**	Details given in Section 8
I	**Systemic or Transformational Impact**	
	i. Does the proposal have elements of sustainable systems re-engineering and or sustainable process re-engineering which would lead to improved systems, business processes or delivery mechanisms?	Yes
	ii. Does the proposal involve capacity building/institution building that can foster better outcomes on a long term sustainable basis?	Yes
	iii. Does the proposal have focus on service delivery/improvement (rather than only asset creation) in a sustainable manner-which otherwise has not been the norm in the project implemented in the sector-e.g. focus on levels of reduction of water loss, focus on number of hours power/water is available per day, reduction in waterborne diseases?	NA
	iv. Does the proposal bring together otherwise disparate attempts/schemes to one synergetic platform, which has not been possible hitherto (e.g. nutrition, gender issues, livelihoods)?	Yes – integrated management as opposed to sectoral management thro' ICZM plan
	v. Does the proposal seek tocreate additional choice for thecitizens to access requiredservice/ entitlements?	No
	vi. Does the proposal involve energy efficiency and environmental benefits without making the project/outcomes expensive?	NA
	vii. Are knowledge transfer, technology transfer and best practices transfer from international experience envisaged with	NA

	adequate long term engagement for ensuring sustainability in Indian context?	
	viii. Does the proposal haveinstitutionalimprovementmeasures:e.g. (a) Accounting Reforms (movingfrom single entry cash basedaccountingsystem to double entryaccrual system of accounting (b) Ringfencing of finances/activities includingcorporatization wherever needed (c)creation and implementation ofappropriate revenue models e.g. tariffreforms or alternative revenuestructuring?	(c) partly
	ix. Does the proposal address issues of real sector reforms e.g. Development of sectoral policies, development of institutional structures, setting up of regulatory framework/regulators?	Yes. It creates an ICZM set up to ensure sustenance of all sectoral activities without causing adverse impacts on activities of other sectors
	x. Does the proposal have elements that are transformational in nature - which if implemented could transform the way systems function or the way delivery of services are done?	Yes from sectoral management approach to integrated management
II	**II. Innovation and Piloting of new Approaches**	
	(I) Does the proposal have innovative elements and new approaches that have not been tried in the sector and have reasonable chance of changing for the better the way things are done in the sector and have some chance of scalable replication?	Cross impact analysis to minimize inter-sectoral conflicts and damages
	(ii) Does the proposal look at financial sustainability and O & M related issues which otherwise has not been the norm in the sector?	NA
III	**Innovation in financing and Leveraging**	Does not arise
	i. Does the proposal use different/innovative financing products/modalities?	No
	i. Does the proposal involve co-financing from other financing agencies?	No

	iii. Does the proposal catalyse private sector financing in different ways and especially to create leverage?	NA
	iv. Does the proposal involve CDM and accrual of carbon credits as a natural by-product of core developmentprojects which can be a way offinancing the project?	NA

Executive Summary

This proposal is being submitted by the Department of Science, Technology and Environment for the establishment of the State Project Management Unit in the DSTE under the ICZM Programme of the Govt of India. The Government of Puducherry has decided to participate in the Phase II of the ICZM project executed by the MoEF&CC and has nominated the Department of Science, Technology and Environment (DSTE) as the nodal department. The DSTE currently does not have sufficient capacity or manpower to be able to depute internally the required staff component and hence the need to set up a fully-fledged Project Management Unit.

The tasks under this proposal would be to set up a full-fledged SPMU which will coordinate the implementation of the various projects under the ICZM programme to be executed by the different Project Executing Agencies. The four activities under this project are 1) Setting up of State Project Management Unit (SPMU), 2) Creation and Maintenance of a Database, 3) Setting up of Project Steering Committee (PSC) and 4) Setting up of Scientific and Technical Advisory Committee (STAC). The establishment of a Database management system will help in decision making. The total value of the proposal is Rupees 15.38 Crore.

1. Introduction

The Ministry of Environment, Forests and Climate Change (MoEFCC), has an ongoing project on ICZM in the coastal states of Gujarat, West Bengal and Odisha. In order to undertake ICZM related project activities in the other Coastal States and Union Territories, the MoEFCC has planned to undertake Phase II of the ICZM project.

The Government of Puducherry has decided to participate in the project and has nominated the Department of Science, Technology and Environment (DSTE) as the nodal department. The DSTE is headed by a Director and has six divisions including the Puducherry Coastal Zone Management Authority.

2. Objectives of the proposal:

In order to have an effective implementation of the ICZMP in Puducherry, it is proposed to have the following institutional arrangement

1. Setting up of State Project Management Unit (SPMU)
2. Setting up of Project Steering Committee (PSC)
3. Setting up of Scientific and Technical Advisory Committee (STAC)

3. Earlier studies/ attempts.

Puducherry government has no earlier attempt in preparing an ICZM programme. Recently, in 2012, there was a study titled "Exploratory Overview for analyzing and understanding the problems/ issues on evolving ICZM Strategies in Puducherry region"[2].

The current proposal is under the World Bank funded National ICZM Programme. The DSTE currently does not have sufficient capacity or manpower to be able to depute internally the required staff component and hence the need to set up a fully-fledged Project Management Unit.

[2] G. Poyyamoli. Exploratory Overview for analyzing and understanding the problems/ issues on evolving ICZM Strategies in Puducherry region. Submitted to ADER, 2012.

4. Environment, ecology and socio- economics of Project area:

Puducherry, earlier known as Pondicherry is a Union Territory and hence, the administration falls directly under the Federal government. Puducherry is also one of the two UT entitled by special constitutional amendments to have an elected legislative assembly and a cabinet of ministers, thereby enjoying partial statehood powers. Puducherry UT is made up of four constituent units: Puducherry and Karaikal which are enclaves within the state of Tamil Nadu, Yanam in Andhra Pradesh and Mahe in Kerala on the west coast; with a total coastline of about 45 km (Puducherry 24 km, Karaikal 20 km and Mahe 1 km). The total population of the UT is 12.48 lakhs (as per 2011 census).

Puducherry and Karaikal are flat plains. There is no forest cover.While the mangroves of Yanam (part of Coringa mangroves of Andhra Pradesh) are spread over 1 sq.km area, the mangroves of other districts are patchy in nature.Agriculture is the most important occupation in Puducherry being a source of livelihood for a third of the population. Tourism is another important industry with upwards of 10 lakh tourists (50000 from overseas) visiting on an annual basis. 27 marine fishing villages and 23 inland fishing villages/hamlets are scattered in and around Union Territory of Puducherry. Most fishermen belong to the traditional fishing families.

The major issues of the coastal areas are beach erosion, pollution of water bodies, solid waste dumping, shrinkage of habitats like mangroves and geomorphic features like sand dunes, declining fishery resources, rapid growth of population and decreasing livelihood opportunities. In order to control coastal erosion, since 1969 the Puducherry Government constructed sea walls along the Puducherry town's coast; this was exacerbated by the construction of the harbour in Puducherry in 1989. Erosion of the Tamil Nadu coast adjoining Puducherry resulted in the construction of seawalls to protect the coast and transferred the problem to the adjacent area. Disposal of sewage into the rivers and siltation of river mouths has resulted in stagnation of waste in the rivers and hence, the need to desilt the channels. The huge tourist influx also generates a considerable amount of solid wastes which need to be disposed in a proper manner. Puducherry, Karaikal and Yanam are also in the highly disaster-prone coast affected by cyclones and flooding. Puducherry and Karaikal were affected by the 2004 Indian Ocean tsunami and subsequently by Cyclone Thane in 2011.

5. Statement on implementing Agency and their experience

The DSTE has under it, the Puducherry Pollution Control Committee (PPPC) enforcing the provisions of Rules and Acts pertaining to environment protection; Puducherry Council for Science and Technology (PCST) which inter alia, works on science popularization; Puducherry Coastal Zone Management Authority (PCZMA) which is the regulatory body for protecting and improving the quality of the coastal environment and preventing and abating coastal environmental pollution in the coastal areas of Puducherry U.T.; State Level Environmental Impact Assessment Authority (SEIAA) and ENVIS -the Environmental Information System. There is good understanding of the coastal and other environmental issues but there is insufficient capacity to take up integrated coastal zone management or large sized project without additional manpower.

6. Project tasks

6.1. Setting up of a State Project Management Unit (SPMU)

The State Project Management Unit (SPMU) will be the focal point of all ICZM related activities carried out in the coastal areas of Puducherry. It will help in coordinating the projects carried out by the different line departments/ institutions in implementation of the appropriate projects.

The State Project Management Unit will have two major divisions: 1) Administration and Finance and 2) Technical and Training. The SPMU will ensure prudent financial management, quality assurance, monitoring and evaluations of the initiatives undertaken as part of the project. The SPMU will collaborate with the various government departments or specialized agencies (the Project Executing Agencies) that have jurisdiction, demonstrated capacity and expertise in management and execution of the proposed projects.

The suggested structure for the SPMU is given in Fig. 1.

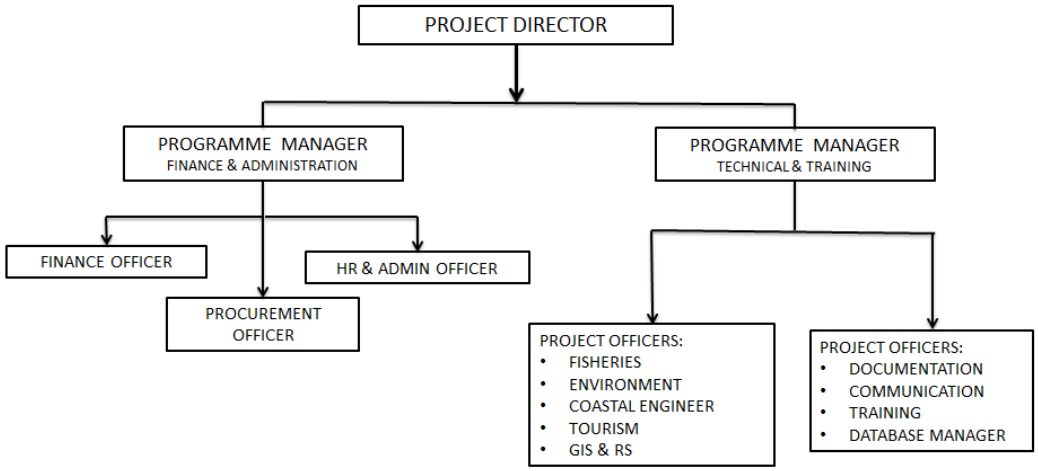


Fig. 1: Suggested Structure of SPMU

The SPMU will be involved in collaborating and seeking support from and partnering with a range of other agencies to strengthen the capacity of the main Project Executing Agencies. These include international, national and local knowledge centers, academic and research institutes, private sector business houses and industries, urban and rural local government bodies, civil society groups, NGOs, community-based organizations and other government departments responsible for coastal zone development and protection.

The SPMU will act as the secretariat to the project steering committee charged with the day-to-day coordination and implementation of the ICZM activities in the state.

The staff/ Officersrequired for the SPMU will fall into three major categories. The first deals with finance and administration of the project and also the procurement which will have to be carried out as per World Bank Guidelines. They will be assisted by one person each. The second division would be subdivided into technical and training. The technical group will deal with technical aspects of the project and hence would need specialists in the individual sectors who can liaise with the Project Executing Agencies to ensure that all planned activities are carried out as per plan and schedule. The training group will deal with capacity building and communication. ICZM being a new concept, the staff at the SPMU, various PEA and government officials and other stakeholders will require extensive training in the concepts of ICZM as well as CRZ and EIA. In addition, contractual staff such as accountants and office assistants would need to be hired on a need basis. There will

be separate arrangement for hiring of experts as individual or as company though customized consultancies.

6.1.1. Functions of SPMU

The main functions of the SPMU is to monitor the projects to be implemented under ICZMP, maintain a database on data collected under the ICZM project and to coordinate with implementing agencies with reference to their connected projects such as

- Coordinate and Monitor all projects being implemented under ICZM
- Coordinate and monitor SPMU will also conduct review meetings periodically on the progress of works by the implementing agencies.
- SPMU will coordinate with funding agencies for the implementation of the above projects to be implemented under ICZMP.
- SPMU will send Physical and Financial Progress of Works to Funding agencies on a regular basis.
- SPMU will coordinate with the Government in getting necessary Government Orders for the implementation of ICZMP.
- SPMU experts will inspect Field works carried out under the ICZMP and necessary reports will be furnished to the concerned Departments.
- The Accounts Section of SPMU will monitor expenditure to be incurred by the concerned Departments in the ICZM Project.
- Procurement of Goods, works and services as per World Bank Procedures will be guided by Procurement Consultant of SPMU in Coordination with World Bank.

6.1.2. Roles and Responsibilities of Officers/Experts of SPMU

6.1.2.1. Project Director:

a) Project Director shall be responsible for overall implementation, monitoring and evaluation of ICZM project in the state.
b) Project Director shall report to the Chairman of Project Steering Committee and appraise the functioning of the ICZM project
c) Project Director shall be responsible for administration and financial management of the project and will be supported by Programme Manager (Finance and Administration) and Programme Manager (Technical and Training).

6.1.2.2. Programme Manager (F&A)

a) Programme Manager (F&A) will ensure all administrative, accounting and procurement procedures are followed and all financial transactions are maintained in a transparent manner. Programme Manager (F&A) will liaise with the funding agency and State Government in ensuring that fund transfer and disbursement are timely.
b) PM (F&A) will be supported by HR & Admin Officer, Finance Officer and Procurement Officer
c) They will be supported by up to one assistant each.

6.1.2.3. Programme Manager (Technical and Training)

a) Programme Manager (Technical and Training) will oversee the implementation and monitoring of all projects and will also oversee communication, information dissemination and training programmes and will be assisted by a group of project officers
b) Project Officers - Technical - will deal with various fields such as fisheries, environment (especially pollution control), tourism, etc. The Programme Officer will have to ensure that the project officers liaise with the respective programme executing agencies to ensure the timely implementation of the various components and continuously monitor the progress of the project to ensure any mid-project corrections are undertaken
c) Project Officers - Communications will be responsible for communicating the progress of the project to the Programme Manager, Project Director and the Steering Committee as well as to the other stakeholders including beneficiaries of the project; conduct training programmes to build capacity of relevant stakeholders in ICZM and also maintain a database.

6.2. Establishing Project Steering Committee (PSC)

A high level Project Steering Committee (PSC) will be constituted to oversee the progress of the project as well as to provide directions for the successful implementation of the project. The tentative composition of the PSC is as follows:

i. Chief Secretary - Chairperson

Members:

ii. Secretary to Govt.,(Science, Technology and Environment)
iii. Secretary to Govt.,(Finance)
iv. Secretary to Govt.,(Fisheries & Fishermen Welfare)

v. Secretary to Govt.,(Ports)
vi. Secretary to Govt.,(Forests and Wildlife)
vii. Secretary to Govt.,(Public Works)
viii. Secretary to Govt.,(Local Administration)
ix. Secretary to Govt., (Revenue and Disaster Management)
x. Secretary to Govt., (Tourism)
xi. Director (DSTE) – Member Secretary

6.3. Constituting Scientific & Technical Advisory Committee (STAC)

A Scientific & Technical Advisory Committee (STAC) will be constituted to endorse the Terms of Reference (ToR) of the project tasks and oversee and facilitate the implementation of the tasks. The members of the STAC will be:

i) Principal Secretary (DSTE) - Chairman
ii) Project Director (DSTE) - Member Secretary

Government Line Departments

iii) Director of Fisheries
iv) Chief Engineer, Public Works
v) Director, Ports
vi) Director, Tourism
vii) Director, Local Administration

Research Institutes

viii) Director, NCSCM, Chennai
ix) Representative, NIOT
x) Representative, French Institute, Puducherry
xi) Representative, ICMAM
xii) Representative - Department of Ecology and Environmental Sciences - Puducherry University

Representatives of Private Organizations and NGOs/ Local Communities

xiii) 2 Representatives of NGOs
xiv) 2 Representatives from Local communities
xv) 2 representatives from Private Organizations

Creation and Maintenance of a Data base

The data collected under various scientific programmes and data collected under the ICZM programmes are essential for analysis of conditions of environment of the UT. In order to establish a long-term data base on ICZM, it is proposed to carry out following activities

- preparation socio-ecological and Disaster Vulnerability web atlas of the coastal region. Of UT
- maintenance of spatial and non-spatial coastal data;
- carry out research and studies,
- build GIS based Spatial Decision Support Systems (SDSS) to support ICZM planning, monitoring and decision making and document the entire ICZM process.

The work elements involved on the above aspects are:

Collation of data in a standard format

Entire data collected by different project executing departments will be collected in a standard format developed

Data base design and development of data base software

Database software to store, analyse and retrieve the data will be developed and the interactive software will be dovetailed to facilitate generation of user desired outputs.

Preparation and updating of land use, land capability, land and social vulnerability, land sustainability, HTL & LTL maps

HTL & LTL maps prepared by DSTE, ESA and erosion maps prepared by NCSCM and other maps like tsunami hazard maps prepared by ICMAM Project Directorate will be integrated in the database. The land use, land and social vulnerability and sustainability will be prepared under the ICZM project at a scale of 1:5000. These maps provide baseline information but regular updating of the information should be carried out. It is envisage that Land use and Land Capability maps be updated on a 5 year interval while land and social vulnerability, land sustainability, HTL and LTL maps to be updated every 3 years. Some of the map products are:

Land use amongst others comprises the following land use layers representing their spatial distribution along the coast:

- Wetlands including mudflat/tidal flat, beach / patch, bar/barrier/ island, rocky coast, mangrove, salt marsh, mud with vegetation, sand with vegetation, scrub and coral reef.
- Water bodies including estuary, creek, lagoon, bay, pond/lake, oxbow lake, cooling pond, water treatment plant, river/stream, canal, waterlogged area and reservoir/tank.
- Barren land including rock outcrops and sandy area
- Shore land including saline area and costal dunes with and without vegetation
- Built-up land including habitation, habitation with vegetation, open/vacant land, industrial area and transportation (road and rail networks)
- Agricultural including agricultural land and agricultural plantation
- Social forest, plantation
- Other features including aquaculture pond, salt pan, and seawall/ embankment.
- Special features including district, village and cadastral boundaries and landmarks
- Land capability should amongst others comprise separate layers on spatial distribution of the following features along the UT coast:
- Soil type , Slope, Land erodability , Land capability class etc.

Water quality data of estuaries and coastal waters

Data on water quality collected under the project in both the sectors will be organized to generate health report card for the sectors.

Data on coastal processes

Data collected under the Regional coastal processes project especially on wave, tide, currents, bathmetry , beach profile, LEO observations etc will be stored in the data base. Data products in the form of wave climate, sediment budget and sediment transport in web based GIS maps will be produced.

Data on mangrove, coral reefs, coastal vegetation and associated activities

Data on mangrove, coral reef, seagrass restoration and associated activities of the project area will be collected; stored and required ecosystem and their health maps will be generated. Where reliable secondary data is available, they will be used.

Quality assurance and consistency checking.

This activity aims at controlling the quality and consistency of the data collection on various parameters by various concerned agencies. The data once collected will go through the quality assurance check before being uploaded into the database.

Integrated data base development

All the individual components of data base will be organized and integrated and multiple query development will be done to obtain data on various factors for a particular site.

Development of Interactive module and processing tools

It will have capability to generate several scenarios of land use/cover changes due to urbanization or other activities, variation in seawater inundation levels during storm surges etc. through an interactive module equipped with a processing tool/s. For e.g., the DEM generated using beach profile data collected under the Regional Coastal processes project will be used to assess the impact of harbor/coastal project that is being considered for approval. The interactive module will use resources like land use, cover, resources, water bodies data and will indicate the extent of changes that will occur to these categories in the event of erosion that may occur if the project is operated at site. The changes will be indicated in an Web GIS interactive map. Also the data base can be used to develop DSS.

Development of ICZM website at DSTE, database hosting and constant updates.

This activity focuses on the development and maintenance of an interactive ICZM

website for Puducherry and the entire database will be hosted in the website of DSTE.

7. Justification

Since this DSTE has been appointed as the nodal agency by the Government of Puducherryfor the preparation of ICZMP, theDPR and the implementation of ICZMP, it is essential to set up of State project Management Unit (SPMU), Project Steering Committee (PSC) & Scientific & Technical Advisory Committee (STAC) for effective implementation and monitoring. Further, as the data and results generated under the ICZM project is of long term use, it is essential to create a data base structure to ensure proper organization of data.

8. Action Plan

Activity	**Action Plan (Tentative)**		**Output**	**Cost Rs.in cr.**
Establishment of State Project Management Unit (SPMU) along with creation and maintenance of ICZM database	1st year	Organising SPMU, Recruitment of manpower and Constitution of Steering and Technical Advisory Committees. ICZM project co-ordination	SPMU established	3.10
	2nd Year	Procurement of hardware and software for database and development of software	Data centre established	3.71
	3rd year	Project data organization and monitoring through SC and STAC	ICZM project mid-term report	2.75
	4th Year	Continued database management and project evaluation	Report on project activities and bulletin on project	2.75
		Total		12.31

FC component = Rs.12.31 cr; TC = Nil

9. Fund requirement for the project Tasks proposed.

The break-up of costs is given in Table 1. Detailed Cost estimates for setting up of SPMU are given in Tables 2 & 3.

Table 1: Break-up of Costs

Rs. in lakhs

1	State Project Management Unit (SPMU)	851.70
2	Creation of Database	329.60
2	Project Steering Committee (PSC)	25.00
3	Scientific and Technical Advisory Committee (STAC)	25.00
	Total	**1231.30**

Table 2. Manpower of SPMU

Designation	**per month**	**Months**	**Amount (Rs)**
Programme Manager (A&F) Tech (2)	70000	48	6720000
Finance Officer	60000	48	2880000
HR Officer	60000	48	2880000
Procurement Officer	60000	48	2880000
Project Officers (7)	60000	48	20160000
			3,55,20,000

Table 3: Operations of SPMU

SPMU	Rs (Lakhs)
Hiring of building space	72
Manpower	355.2
Furniture & other accessories	25
Telephone	1.5
Ac(4)	2
COMPUTER System(20)	20
Software	40
internet	10
Server(1)	5
printers (3)	5
Operational expenses	150
Travel	50

Training Programmes	50
Meetings	21
Vehicle (1)	10
Fuel	10
other contingencies	25
Total	**851.7**

Table 4: Creation of Data base

	Rs. in lakhs
Item	**Total**
Database Administrator - 1 Rs.50000 pm	24
Web Manager -1 Rs.40000 pm	19.2
Project Scientists – 2nos @ Rs.50000 pm	48
Project Assistants - 4 nos Rs.20000 pm	38.40
Procurement of database, GIS and interactive software	75
Consumables, Server, computers, printers , computer accessories and contingency	75
Engagement of consultant for development of Web GIS and DSS	50
Total	**329.6**

The total cost of the project is **Rs. 12.31 crores** and proposed to be implemented in 4 years from 2019 with ICZM financial assistance.

10. Post Project Scenario

After completion of the project, efforts will be made by the UT Government to continue the SPMU structure for implementation of several coastal zone management and related activities including implementation of CRZ notification.