

**ASSESSMENT OF LIVELIHOOD-ECOSYSTEM INTERDEPENDENCIES FOR  
INTEGRATED MANAGEMENT OF “POINT CALIMERE RAMSAR SITE”,  
TAMIL NADU, INDIA**



*Submitted by*



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On behalf of:



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of the Federal Republic of Germany

## Executive Summary

Wetlands are one of the most productive ecosystems that have played a major role throughout human history by providing crucial services to dependent living beings. India has a wealth of wetland ecosystems that support diverse habitats and has recently designated its 42nd Wetland of international Importance (Ramsar Site).

Despite their values and the potential policy synergies, wetlands have been, and continue to be, lost or degraded by various factors. It is estimated that nearly one-third of Indian wetlands have been lost and converted for alternate uses for the last three decades. This has triggered biodiversity loss, changes to ecological functions and changes to ecosystem service flows with subsequent impacts on the health, livelihoods and wellbeing of communities and economic activity. The integrated wetland management plan is necessary to have multi-sectoral and stakeholders action plan to balance ecosystem conservation with that of supporting livelihoods of wetland-dependent communities.

Point Calimere Wildlife Sanctuary along with the Great Vedaranyam Swamp was declared as a RAMSAR Wetland Site (No.1210) at the 8th meeting of the Conference of the Parties (COP 8) held at Valencia from 18-26th November 2002. The total area of the Point Calimere Wetland Complex is 38500 ha situated in Nagapattinam, Thiruvarur and Thanjavur Districts. Point Calimere Wetland Complex is a mixture of Tropical Dry Evergreen Forests, tidal mudflats, tidal creeks, lagoons, swamps, backwaters and mangroves.

The wetland ecosystem of Point Calimere provides many services to the people living in the area. Acting as a breeding ground for the fishes, habitat for many birds and animals, it protects the coastal line from soil erosion and other natural disasters. People indulge in many livelihood activities such as in-land fishing, agriculture, aquaculture, herbs collecting, salt making, etc.

### Objectives

The Point Calimere wetland provides various ecosystem services but due to a variety of factors the significance of the wetland is getting deteriorated over time. Due to anthropogenic activities, the wetland complex is under serious threat. With the overall goal of securing and enhancing wetland biodiversity and ecosystem services, DHAN Foundation, in collaboration with GIZ has initiated the study on **“assessment of ecosystem services of Point Calimere Ramsar site and people’s interdependence on them, and to recommend management measures for sustaining the wetland-dependent livelihoods and maintaining ecological character of Point Calimere Ramsar site”**

There are 33 Gram Panchayats constituting the periphery of the Ramsar Site, 15 villages or hamlets were chosen from these. The criteria for selecting the sample villages included the diversity of the ecosystem and the higher dependency of the livelihood activities on the

wetland. The villages were studied in great detail in order to get an exhaustive understanding with the following objectives:

- Assessment of ecosystem services provided by Point Calimere wetland site
- Documenting the socio-economic profile of communities' dependent on Point Calimere wetland site
- Assessment of governance and institutional arrangements in the selected villages
- To assess the livelihoods dependence, trends in livelihood dependence (last 20 Years) and impact of the livelihoods due to changes in the wetland and ecological character on the site
- Drivers of change impacting wetland-dependent livelihoods
- Recommendations for integrated management and institutional arrangements for effective management of Point Calimere Ramsar site

## **Methodology**

The study methodology included extensive study of the present literature and research on the wetland followed by physical exploration of the Point Calimere Wetland Landscape. Stakeholder Mapping and Future Search Conference were conducted with due community and stakeholders' participation. A number of FGDs, transect walks, and interactions with the community and the stakeholders were conducted followed by Rapid Assessment of Wetland Ecosystem Services. Case studies, surveys and PESA were then further analyzed and documented into the report.

## **Socio-Economic Status**

The primary occupation in the selected villages is farming, fishing, salt production, salt work, aquaculture, and labor in addition to which considerable number of people are working in gulf countries as laborers. Being coastal districts, these areas are prone to various natural disasters posing high risks to the lives and livelihoods of the dependent community. From the available and collected data, inferences are made to understand the socio-economic status of the community in the site.

## **Analysis of Ecosystem Services**

The Point Calimere Wetland can be divided into four ecosystems or zones. Zone-1 Alam or mudflat lies in the northern parts of the Complex. The mudflat spreads over Muthupet Mangroves reserve forest, Vedharanyam swamps and in Thalainayiru reserve forest. These mudflats remain dry except when the sea water rises during high tides or when the river flows in monsoon season. The depth of water in the alam during the wet period varies from 0.1 m to 1 m. This is the zone where the freshwater from drainage arteries of River Cauvery interacts with high tidal sea water. This interaction creates a brackish zone that favors proliferation of Mangroves. This is reflected in the presence of mangroves in Muthupet and Thalainayiru region.

Zone-2 Thottam is a trough shaped mudflat, next to Alam in a falling gradient towards the shoreline. The water level in the Thottam is high during the monsoon and southern winds. Apart from Mangroves and degraded Thottam, lagoons, sand dunes, manmade fishing canals,

saltwater channels, manmade boat canals and Brine reservoir are the other land cover components of the Thottam.

Zone-3 Shoreline next to the Thottam, from Athirampattinam to Kodyakarai, which has linear vegetation. This shore line has natural creeks in which Mullipallam creek, Chellakannaicreek are the major creeks that resulted in formation of lagoons.

Zone-4 the Coastal plain is located between the Vedharanyam Swamps and the Point Calimere, falling towards south east. The coastal plain has a mixture of Tropical dry evergreen forest, mudflats, grasslands, storm water drains that act as backwater channels and sand dunes.

The communities living adjacent to these ecosystems, are highly dependent on these for their livelihoods. They involve in various types of fishing, salt works, aquaculture, farming, forest collection etc, depending on the services provided by the ecosystems. The details of the ecosystem services provided by the PCWC have been collated with the help of active community participation through discussions and surveys.

Provisional services from the wetland include availability of freshwater, food, fuel, genetic resources and natural medicines. The different ecosystems provide these at different scales ranging from local, regional to global. The PCWC also is responsible for providing regulatory services including air quality regulation, local and global climate regulation, water regulation, flood hazard regulation, erosion and salinity regulation etc. Cultural services by the wetland include heritage, recreation, tourism, inspirational value, and research etc. The complex also supports soil formation, nutrient cycling and habitat provision among other services. These services by the wetland not only sustain human lives but also of the thousands of migratory birds, marine and mammal species, dependent on the ecosystem.

### **Livelihoods Dependency on Point Calimere Wetland Complex**

Various livelihoods practiced by the communities around the Ramsar Site were assessed based on their dependency on the wetland for resource utilization, extraction, access of livelihoods, seasonality, competing uses, impacts of disasters and existing market of resources. This enabled in an exhaustive understanding of the wetland and how natural and anthropogenic changes have affected the wetland and related livelihoods.

Further impacts of major livelihoods on the wetland were studied. These included extraction of groundwater for agricultural uses, effect of salt production, impacts of aquaculture, fishing, livestock rearing, and other infrastructural works carried out in the Cauvery delta in the form of construction of barrages. Spatio-temporal trend analysis was followed. This facilitated in the understanding of human and wetland interactions, along with natural and anthropogenic externalities contributing to the dynamic.

### **Drivers of change**

Drivers of change like land distribution, intensification of agriculture, centralization and urbanization, mechanization, migration to foreign lands, tourism, firewood demand, livestock

rearing, market forces, social dimensions, extreme events, environmental regulation and changes in administration have been discussed in detail.

Management and institutional roles of various bodies governing the wetlands and areas around the wetland have been discussed further, with their roles and interest in conservation and protection of the wetland and concerned biodiversity. These institutional stakeholders include Forest Department, Fisheries Department, Coastal Aquaculture Authority, PWD, TWAD, Railways Department, Marine Police/ Coast Guard/ Indian Navy, Revenue Department, Horticulture Department, Revenue Department, Tourism Department, Salt Corporation among other public, private and Non-governmental organizations. Each institute's role, responsibilities and interests in regards to the wetland have been assessed and discussed.

### **Recommendations**

Recommendations based on the all the dynamics, analysis, management and administrative constraints have been proposed. The recommendations are specific to the communities dependent on each ecosystem. The various management measures for sustaining the wetland-dependent livelihoods and maintaining ecological character of Point Calimere Ramsar Site have been discussed.



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# 1. Point Calimere Wetland

## 1.1. Introduction

Wetlands are one of the most productive ecosystems that have played a major role throughout human history by providing crucial services to dependent living beings. India has a wealth of wetland ecosystems that support diverse habitats and has recently designated its 42nd Wetland of International Importance (Ramsar Site). Wetlands have been under constant threat of environmental degradation due to natural as well as anthropogenic activities. The wise use of the rapidly depleting wetland resources is a global concern today. During the past few decades, many efforts have been made world over to prevent exploitation of these ecosystems. Holistic and integrated planning for the conservation and preservation of wetlands resources is gaining momentum. Being diverse, the conservation measures for each wetland vary accordingly. Ramsar Convention and Convention on Biological Diversity (CBD) are the two global landmark initiatives for wetland conservation.

Considerable efforts have been put in by the Government of India to evolve institutional mechanism for conservation of wetlands. Some of these are National Committee on Wetlands, National Committee on Mangrove and Coral reefs. These committees advise the Government on policy guidelines, identification of priority wetlands for intensive conservation and monitoring, implementation of management action plans, research and preparation of an inventory of wetlands. In addition, for the coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action in the landward side up to 500 m from the high tide line and the land between low tide line and high tide line are covered under the Coastal Regulation Zone Notification, 1991 under the provisions of Environment (Protection) Act, 1986 (MoEF, 1991).

Despite their values and the potential policy synergies, wetlands have been, and continue to be, lost or degraded by various factors. It is estimated that nearly one-third of Indian wetlands have been lost and converted for alternate uses for the last three decades. This has triggered biodiversity loss, changes to ecological functions and changes to ecosystem service flows with subsequent impacts on the health, livelihoods and wellbeing of communities and economic activity. **The integrated wetland management plan** is necessary to have multi-sectoral and stakeholders action plan to balance ecosystem conservation with that of supporting livelihoods of wetland-dependent communities.

In Tamil Nadu, POINT CALIMERE WILDLIFE AND BIRD SANCTUARY is one of the coastal wetlands designated as a Ramsar site in 2002. The GIZ (Indo German Biodiversity Program, Wetland Management for Bio-Diversity and Climate Protection) has extended support to DHAN Foundation for taking up a detailed study for Point Calimere wetland site to support the respective site managers to prepare an integrated management plan.

## 1.2. Point Calimere Wetland

Coastal wetlands are one of the most pristine ecosystems on earth as they supply many environmental services for coastal protection and also play an essential function for climate

change adaptation. One such coastal wetland is the Point Calimere in Tamil Nadu. Point Calimere Wildlife Sanctuary (10°18'N; 79°51'E), (Est.1967) along with the Great Vedaranyam Swamp covering an area of 22436.91 ha was declared as a RAMSAR Wetland Site (No.1210) at the 8th meeting of the Conference of the Parties (COP 8) held at Velancia from 18-26th November 2002. The total area of the Point Calimere Wetland Complex is 38500 ha situated in Nagapattinam, Thiruvarur and Thanjavur Districts. The sanctuary derives its name from the term 'Point Calimere' the spot in the sanctuary where the coast takes a 90 Degree turn from the Bay of Bengal towards Palk Strait in Southern India. The Point Calimere Wetland comprises, Point Calimere Wildlife Sanctuary (2250.17 Ha), Muthupet Mangroves (11885.91 Ha), Panchanathikulam Wetlands (8096.96 Ha), Un-Surveyed Salt Swamps (15030.19 Ha) and Thalainayar Reserve Forests (1236.77 Ha), (TNSWA, 2020) as whole the entire site covers 38500. Ha. Point Calimere Wetland Complex is a mixture of Tropical Dry Evergreen Forests, tidal mud flats, tidal creeks, lagoons, swamps, backwaters and mangroves. Point Calimere Wildlife Sanctuary forms the eastern limit of the Ramsar Site. This Tropical Dry Evergreen Forests of the sanctuary is considered to be the best in the country, both in terms of species richness and conservation status. Muthupet area within the wetland complex is the largest mangrove wetland in Tamil Nadu covering an area of 11,900 hectares including 1700 ha lagoon. It constitutes the western limit of the Ramsar Site. *Avicennia marina* is the dominant mangrove species in the Muthupet Mangrove Forest. The Point Calimere Wildlife and Bird Sanctuary along with the great Vedaranyam Swamp, Panchanathikulam Wetland and the mangrove forests of Thalainayar Reserve Forest play an important role in disaster management by acting as a bio shield against natural disasters, Tsunami, storm, floods and cyclones. The Ramsar Convention recognizes the interdependence of people on wetlands for their important economic, cultural, scientific and recreational values. Growing understanding of the economic benefits of wetlands has resulted in significant expenditure in some countries on wetland restoration and rehabilitation of lost or degraded hydrological and biological functions of wetlands. However, concerted action at a global scale shall be needed if we are to avert the worst consequences of global climate change and increased pressure on water resources. The wetland ecosystem of Point Calimere provides many services to the people living in that area. The wetlands act as a habitat for many birds and animals, breeding ground for the fishes, protects the coastal line from soil erosion and other natural disasters. People indulge in many livelihood activities such as in-land fishing, agriculture, aquaculture, herbs collecting, salt making, etc.

### 1.3. The Bio Diversity in Point Calimere Wetland



Map 1-1 Point Calimere factsheet illustrating wetland values and threats. (GIZ & Wetland Internationals, 2020)

Point Calimere is rich in its bio-diversity with a variety of vegetation available due to diversity in ecosystems. These are dry evergreen forests, mangrove forests, lagoon, mudflats, swamp, Seruthalaikadu creek, and seashore vegetation. About 317 species of plants have been recorded in the dry evergreen forest, (48% herbs, 33% climbers and shrubs, 19% arborescent species). The seashore hosts, 28 species of herbs, of which 9 species are grass, 5 sedges and 16 herbs. The commonly found species are *Cynodon dactylon*, *Cyperus* species and *Sporobolus tremulus*. In the islets, 3 species of trees, 12 species of shrubs and 21 species of herbs are found. Common plants are *Salvadora persica*, *Prosopis chilensis*, *Suaeda maritima*, *Salicornia branchiata*, *Sporobolus tremulus* and *Cyperus bulbosus*. In the mangrove forest, 9 species of trees and seven species of shrubs are found. *Avicennia marina* is the dominant species of this area. The other two common mangrove species are *Excoecaria agallocha* and *Aegiceras corniculatum*. There are 70 fish species found in the wetland. As far as avifauna, 257 species of birds have been recorded, 119 of them are water birds. Every year around 100000 water birds migrate to the site during winter. Globally threatened species such as Spoonbill Sandpiper (*Eurynorhynchus pygmaeus*) and Grey Pelican (*Pelicanus philippensis*) can be spotted in the wetland areas of the sanctuary. Every year, about 30,000 greater and lesser flamingos visit the wetland. This wildlife sanctuary harbors 14 mammal species and the

largest populations of (400 – 500) blackbuck in South India are reported. The other mammal species found are spotted deer, wild boar, jackal and flying fox. The wetland in the sanctuary is a breeding ground for many species of prawns, crabs and fishes. Point Calimere coast receives thousands of Olive Ridley turtles every year. Apart from this around 50000 families are directly dependent on the wetland-based livelihoods such as, fishing, salt production, shrimp farming, agriculture and allied activities etc. (GIZ & Wetland Internationals, 2020)

#### **1.4. Relevance of the Study**

The Point Calimere wetland provides various ecosystem services but due to a variety of factors the significance of the wetland is getting deteriorated over time. Due to anthropogenic activities, the wetland complex is under serious threat. Aquaculture farms, salt pans, encroachments, industrialization in Great Vedaranyam Swamp, exploitative fishing, cattle grazing, collection of firewood, poaching and agriculture are some of the activities which have led to a decline in the population of migratory birds, as their habitat and diversity have been affected (Prabhadevi & Reddy, 2012). On the other hand, the site is prone to natural disasters like Tsunami, storms, Cyclones, floods etc. The project area is highly sensitive to human activities and climate change.

The Point Calimere Wildlife Sanctuary measured to around 46 sq. km in 1997 and while only 38 sq. km in 2017 indicating a drastic decline, compared to 1997 in Nagapattinam district (Sakthivel, Vijayakumar, & Priyadharshini, An Analysis of Coastal Wetland Ecosystem and Climate Change: With Special Reference to Point Calimere Wildlife Bird Sanctuary in Nagapattinam District, 2019). Subsequently, the researchers have confirmed the decline in the area.

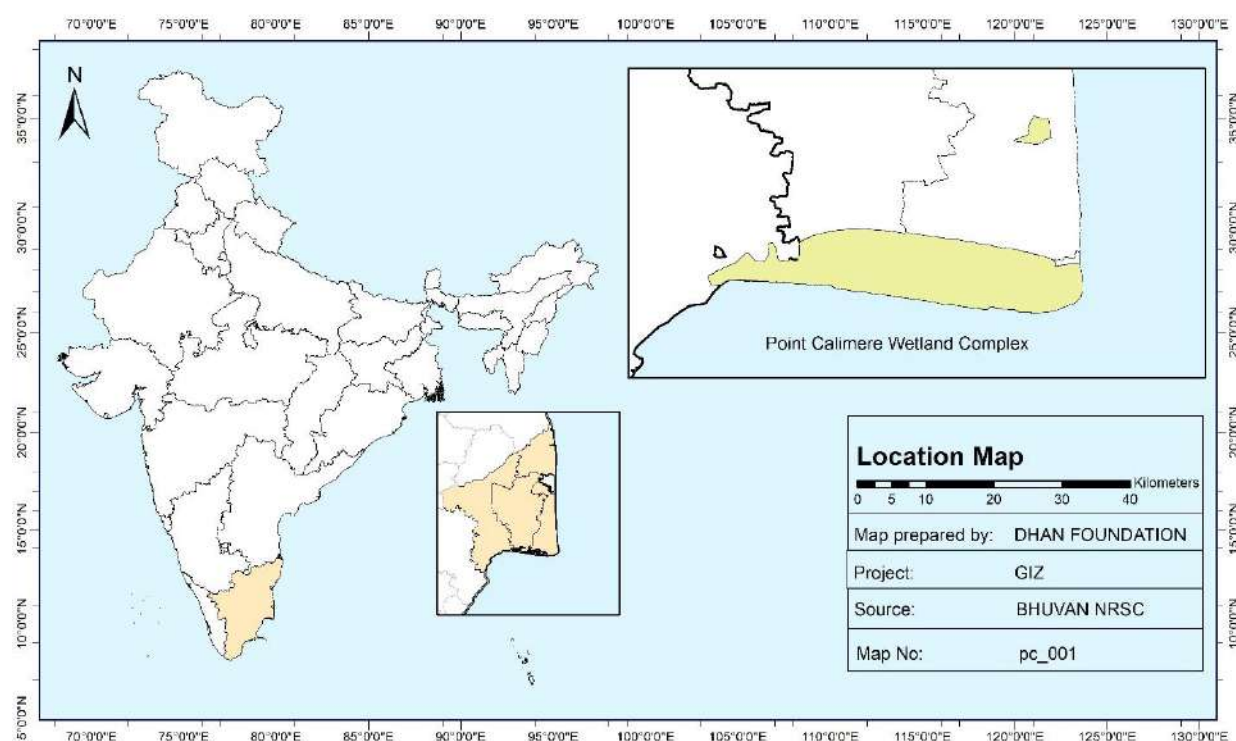
Livelihoods like fishing, salt pan, agriculture and aquaculture etc. are highly dependent on the Point Calimere wetland ecosystem. Therefore, it is mandatory to involve the wetland dependent community as part of protecting the wetland and its ecosystem. It is essential to have integrated and systematic management plan for the Point Calimere site, to secure the sustainability of the wetland.

With the overall goal of securing and enhancing wetland biodiversity and ecosystem services, DHAN Foundation, in collaboration with the GIZ has initiated the study on **“assessment of ecosystem services of Point Calimere Ramsar site and people’s interdependence on them, and to recommend management measures for sustaining the wetland-dependent livelihoods and maintaining ecological character of Point Calimere Ramsar site”**

## 2. Study Area and Study Design

### 2.1. Study Area

The Study is carried out in Point Calimere Wetland Complex, which spreads in to 3 districts, 3 administrative taluks and 4 development blocks by covering 60 Km stretch in PalkBay from Adirampattinam to Kodiayakarai and extends up to Thalainayar.



Map 2-1: Study Area Map

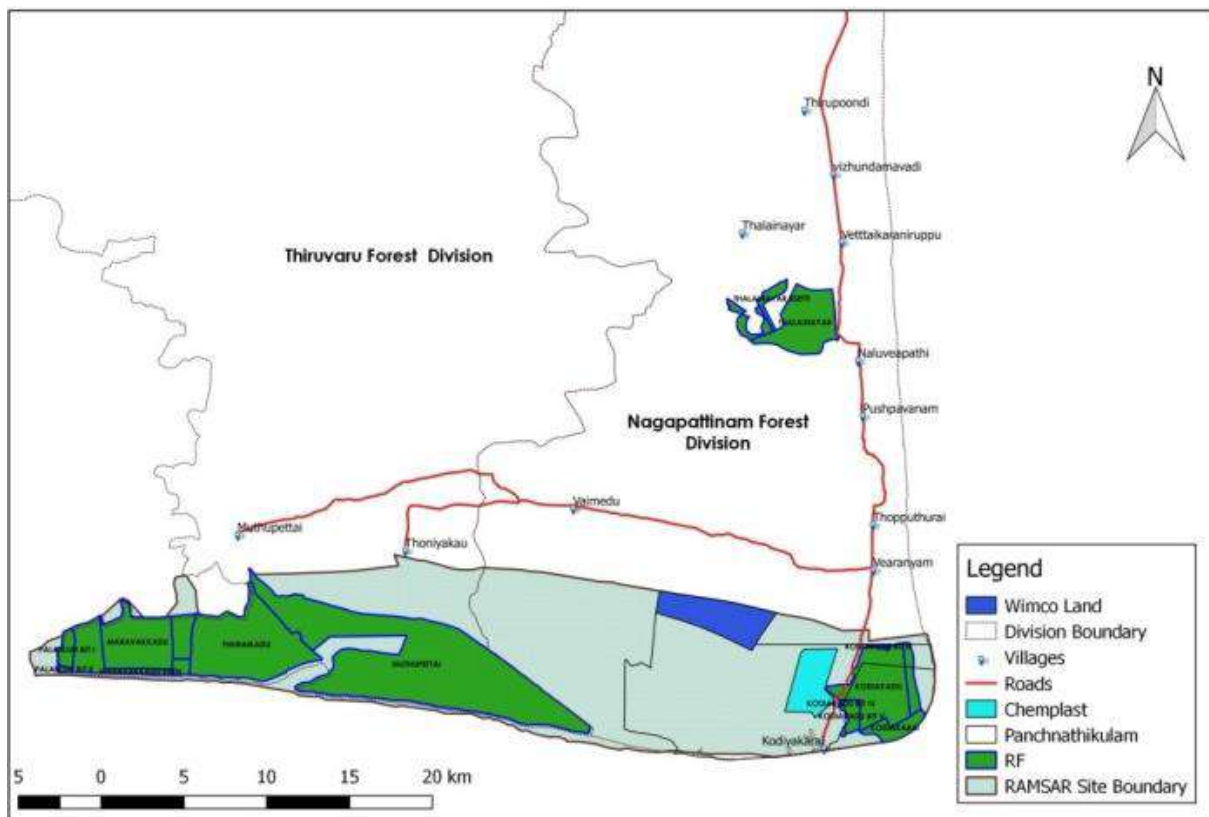
The Point Calimere Wetland Complex has been divided into Block- A & Block- B. **Block- A** covers Thanjavur and Thiruvarur district and **Block- B** covers Nagapattinam district. **Block- A**, in Thanjavur district covers parts of Pattukottai Taluk as well as Pattukottai Development Block by covering the Palanjur, Maravakadu, Thambikottai Vadakadu, and Thamarankottai Reserve forest areas. Adjacent to it, in Thirvarur district parts of Thiruthuraipoondi Taluk and Muthupettai Development Block are covered by Muthupet, Duraikadu and Thondiyakadu Reserve forest areas. **Block -B** mostly covers Vedharanyam Taluk of Nagapattinam district, including both Vedhranyam and Thalainayar Development Blocks.

### 2.2. Brief on Block-A - Muthupet Mangroves

The sanctuary was created as per G.O.No.59, Environment & Forest (FR5) Department, and dt.26.04.2013. The total area of the sanctuary is 11885.91 ha. Point Calimere Wildlife Sanctuary (Block-A), is located in Thanjavur and Thiruvarur districts. An area of 9304.73 ha in Thiruthuraipoondi taluk of Thiruvarur District and an area of 2581.18 ha in Pattukkottai taluk of Thanjavur district forms the Point Calimere Wildlife Sanctuary. The salient feature of this sanctuary is Mullipallam lagoon which receives fresh water from the distributaries of Cauvery



River, Nasuviniyar, Pattuvanathiyar, Paminiyar, Korayar, Kilaithangi, Marakakorayar, Kanthapirichan channel and Valavanar and creates an interface of salt and fresh water in a manner that it maintains the ecological balance of the sanctuary. According to Champion and Seth classification of forests, Point Calimere Wildlife Sanctuary Block A falls into two categories, viz, 4B/TS1 Mangrove scrub and 4B/TS2 Mangrove forest under 4B Tidal swamp forest. 4B/TS1 is dominated by halophytes and others by mangrove species. The sanctuary is an important feeding ground for migratory water birds that come from different parts of the world. Every year it attracts more than 70 species of water birds from September to February. In the first half of the migratory period, i.e. from October to December, population of smaller birds like teals and ducks is high as depth of water is more. As water starts receding from December onwards, larger birds like Painted Storks, Open Bill Storks, etc., start congregating in the sanctuary. Rare migratory water birds visit and roost in this Sanctuary while certain species also breed.



**Map 2-2: Forest Division & Ramsar Boundary Map. Source- Forest Department**

### 2.3. Block-B Point Calimere Wildlife Sanctuary

The sanctuary was created in 1967 as per G.O.Ms.No.1821, Agriculture, and 13 thJune1967. With the enactment of Wildlife Protection Act 1972 as per, sec. 66(4) of the said Act, the area stands declared as a sanctuary. Point Calimere Wildlife Sanctuary (Block - "B"), is located in Nagapattinam district of Vedharanyam Taluk, and covers Panchanathikulam Wetlands, Un-Surveyed Salt Swamps, Point Calimere Wildlife Sanctuary and Thalainayar Reserve forest. Except the Thalainayar Reserved Forest, the remaining constituents are parts of the Great Vedaranyam Swamp. There are two major forest types in the sanctuary viz., the Tropical dry-



evergreen forest and the grass lands. A third forest type but occurring in lesser extent is the mangrove forests fringing the Muniappan Lake inside the sanctuary and parts of the sanctuary coast. Nearly half the sanctuary is under the evergreen forests and thickets. Two species of insectivorous plants viz, *Droceraindica* and *Droceraburmani* are also found in the sanctuary. They flourish after the northeast monsoons. Block - B covers, Tropical and dry evergreen Forest and Grass land Eco system. Important animals like Blackbuck, Spotted Deer, Wild ponies, jackal, and wild pig are found in the Sanctuary. Point Calimere Wildlife Sanctuary (2147 hectares) forms the eastern limit of the Ramsar Site. It is famous for the large congregations of water birds, particularly the Greater Flamingo. The tropical dry every green forests of the sanctuary are considered as the best in the country, both in terms of species richness and conservation status (TNSWA, 2020). The sanctuary is home to the largest population of the endemic Blackbuck (*Antilope cervicapra*) in South India. 364 species of flowering plants including 198 species of medicinal plants have been recorded in the sanctuary (TNSWA, 2020).

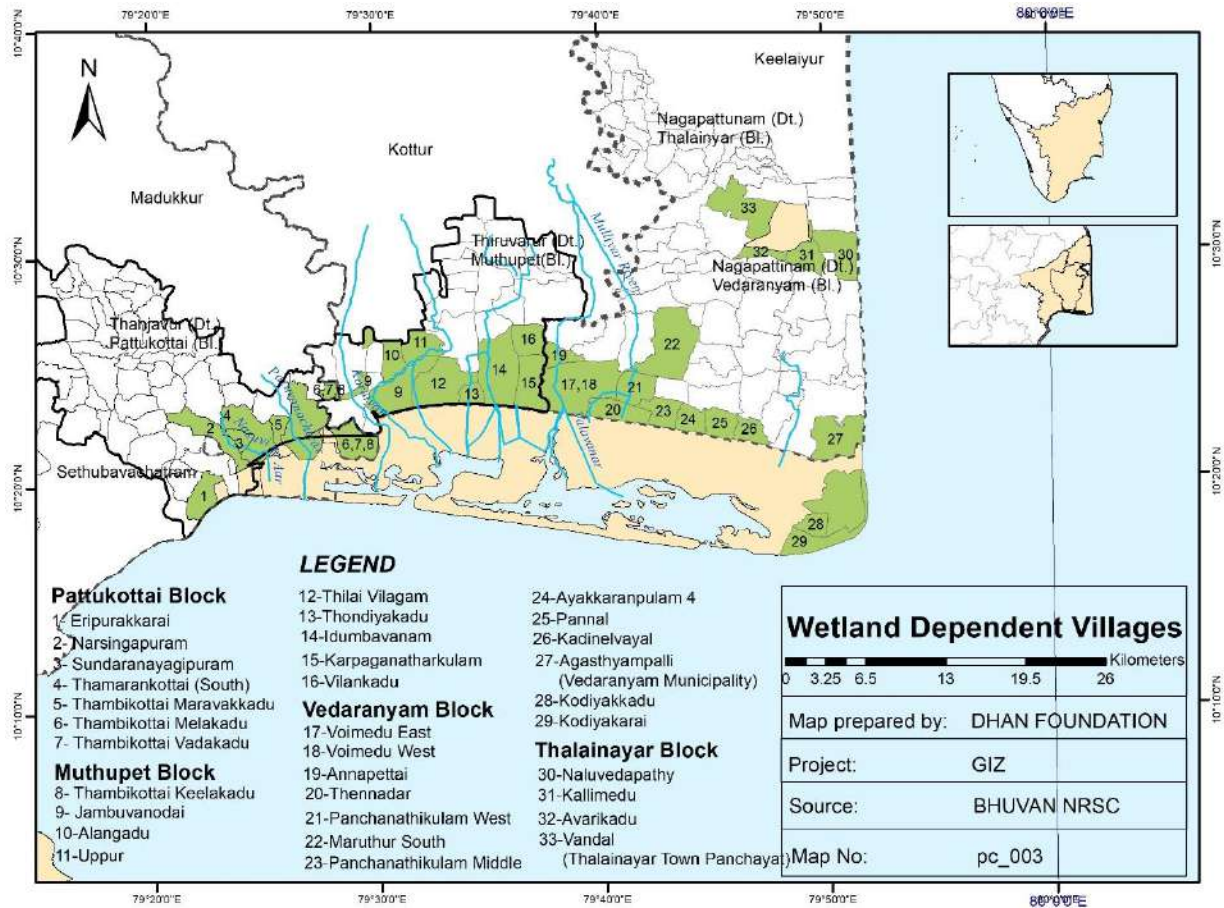
## 2.4. Study Villages

In the Selected blocks the study was conducted in 15 sample villages but in the entire dependent villages the eco system based services are explored along with livelihood dependences and its impact on the wetland. The selection criteria for the sample villages included dependency of the villages on the wetlands, with maximum livelihood dependency being prioritized. These villages are also diverse in that they are adjacent to different ecosystems exhibited in the wetland, and thus the livelihood practices also differ.

**Table 2-1: Sample Study Villages**

Forest Division	District	Block	S. No.	Villages	Existing Eco System	Major Livelihoods
A	Thanjavur	Pattukottai	1	Manganankadu	Mangroves, Creeks & Agriculture	Fishing
		2	T.Maravakadu	Mangroves, Creeks , Aquaculture & Agriculture	Fishing & Agriculture	
	Thiruvarur	Muthupettai	3	Akkaraikadu (Jambuvanodai)	Lagoon, Thottam, Mangroves & Aquaculture & Agriculture	Fishing & Agriculture
		4	Sengangadu (Thillaivilagam)	Lagoon, Thottam, Mangroves & Aquaculture	Fishing	
		5	Thondiyakadu	Thottam, Mangroves & Agriculture	Fishing& Agriculture	
		6	Karpaganatharkulam	Thottam and Agriculture	Fishing& Agriculture	

Forest Division	District	Block	S. No.	Villages	Existing Eco System	Major Livelihoods
		7	Keela& Mela Vadiyakadu (Idumbavanam)	Thottam& Agriculture	Fishing& Agriculture	
B	Nagapattinam	Vedharanyam	8	Annapettai	Thottam, Valavanar & Agriculture	Fishing
		9	Chinthamani Kadu (Voimedu)	Thottam, Valavanar& Agriculture	Fishing & Agriculture	
		10	SakkaranPettai (Pannal)	Thottam, Salt Pan & Agriculture	Fishing & Agriculture	
		11	Seruthalaikadu (Panchanathikulam Middle)	Thottam, Chellakanni Creek& Salt Pan	Fishing	
		12	Agasthiyampalli (Vendranyam)	Salt Pan	Salt Production	
		13	Kodiyakadu	Forest, Thottam, Salt Pan, Bird Sanctuary & Agriculture	Fishing & Agriculture	
	Vedharanyam	14	Kodiyakarai	Forest and Wild Life Sanctuary, Thottam& Sea	Fishing	
	Thalainayiru	15	Vandal (Thalainayar)	Mangroves, River and Back Water	Fishing & Agriculture	



**Map 2-3: Sample Study Villages**

Annexure II List of Coastal Villages under the selected blocks (sample villages are highlighted)

The selected sample villages are marked in the LULC Map for better understanding along with existing eco system.

## 2.5. Study Design

PCWC supports and serves as an important habitat for the existing flora and fauna along with poor communities living in the bordering villages. Moreover, the site confers many ecosystem-based services to the people in and around the area. Over the decades it has been affected by various natural and anthropogenic factors hence; it is important to protect the biodiversity rich site with the involvement of all the stakeholders. The '**Assessment of Livelihood-Ecosystem Interdependencies for Integrated Management of "Point Calimere Ramsar Site"**', Tamil Nadu, India, is a detailed study which includes different components like, ecosystems, livelihood, stakeholders, drivers of change, trends, socio-economic status of the dependent community. A clear study design has been prepared to collect various primary and secondary data along with review of literature to bring out comprehensive study report on integrated management and sustainable development of the site and the dependent community.

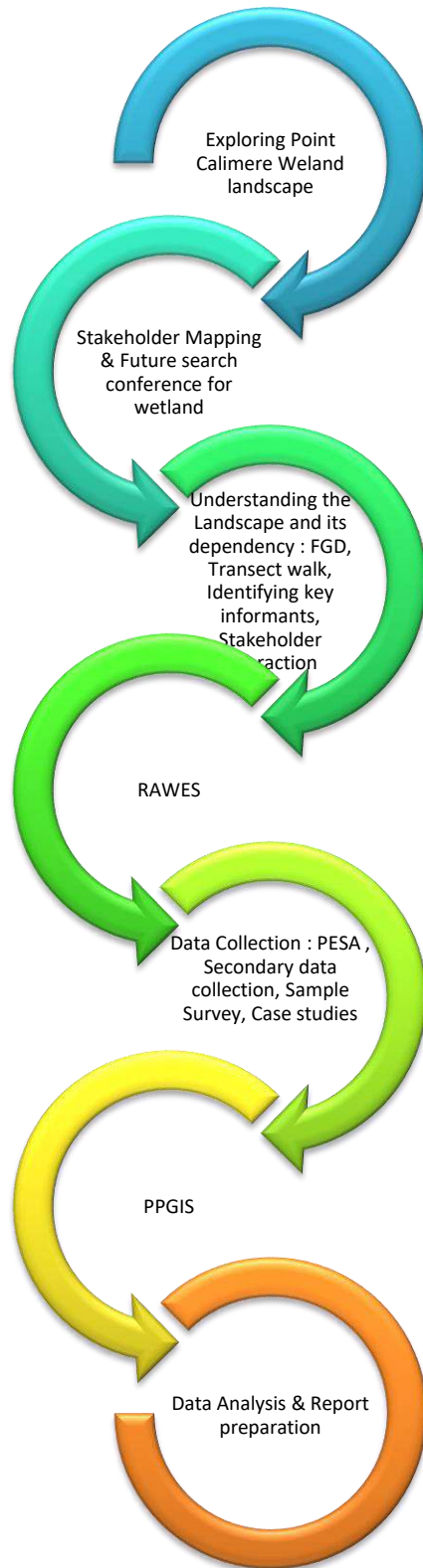
## **2.6. The objectives of the Study**

The study aims to have exhaustive understanding of the following areas in different perspectives

- Assessment of ecosystem services provided by Point Calimere wetland site
- Documenting the Socio-economic profile of communities' dependent on Point Calimere wetland site
- Assessment of governance and institutional arrangements in the selected villages
- To assess the interlinkages between ecosystem services and livelihoods, trends in livelihood and ecosystem interlinkages (last 20 Years) and impact on the livelihoods due to changes in the wetland and ecological character on the Point Calimere site
- Drivers of change impacting wetland-dependent livelihoods
- Recommendations for integrated management and institutional arrangements for effective management of Point Calimere Ramsar site

## **2.7. Study Methodology**

The project period of the study is 6 months since 2019 December – June 2020, but due to Covid-19 Pandemic it's been extended till December 31st. During the study period the following tools and techniques are applied as part of the Study Methodology.



**Image- Study Design**

### *(a) Exploring Point Calimere Wetland Landscape*

In the beginning, the study team had very minimum understanding on the PCWC and its boundary, while going through the review of literature, maps, consultations with forest department and GIZ it got tuned over the period. One of the assignments of this study is to finalize the wetland boundary based on the criteria existing in Muthupettai and Great Vedharanyam Swamps. Based on this, initially the Ramsar boundary was defined up to Adhirampattinam. The inception document was submitted. Following that GIZ organized consultation meeting which enabled the team to have clear understanding on the boundary and selection of sample villages. Finally, the sample villages were selected by spreading in to Thanjavur, Thiruvarur and Nagapattinam districts.

### *(b) Stakeholders Workshop*



**Photo 2.1: Muthupettai Stakeholders Workshop**

As per the commitment of the study two stakeholders' workshop was organized based at Vedharanyam and Muthupet. There was rich participation from all the stakeholders in the workshops and gave space to design our study aligning with the objectives.

#### **2.7.1. Vedharanyam and Muthupet Stakeholders Workshop**

The stakeholders' workshop was organized in Vedharanyam of Nagapattinam District on 13th February 2020 by involving 33 stakeholders at Vedharanyam Block Development office. For Vedharanyam stakeholders' workshop the participants came from Vedharanyam and Thalainaiyiru block of Nagapattinam district. The stakeholders' workshop was organized in



Muthupettai of Thiruvarur District on 18<sup>th</sup> February' 2020 by involving 93 stakeholders. In the Muthupettai stakeholders' workshop the participants came from Pattukottai block of Thanjavur district and Muthupettai block of Thiubarur district.

The key stakeholders in the workshop were members, leaders of fisherfolk community, farmers, elected people representatives of Gram Panchayat, Block Panchayat, and District Panchayat, members of village forest committee, representatives of UzhavarMamanram and women SHG federations, officials from line departments such as forest, fisheries, agriculture, coast guard and public works. The professionals and staff from the DHAN Foundation also participated in these workshops.

#### *Annexure-II &III-List of Participant*

### **2.7.2. Future Search Conference for Wetland**

DHAN Foundation organized three days *Future Search Conference* for Point Calimere wetland site by involving various stakeholders directly interacting with the site.



**Photo 2.2: Futue Search Conference**

### **2.8. Brief of Future Search Conference**

Search Conference is a participative, collaborative, strategic planning method that enables people to create a plan for the most desirable future of their community, a plan they carry out themselves. The process takes 24 hours spread in three days establishing learning through a participatory democracy, where planning is done by the planning community for the people, by the people themselves. The Search Conference is a practical way to build communities of people who step up to the challenges during turbulent times and take responsibility for directing the changes in a responsible manner. As the world becomes more and more

unstable, there is an increased need for people to form communities to search for desirable futures together.

## 2.9. Purpose of Search Conference

The purpose of the search conference was to Establish Common Ground for the development of new strategies

- Pro-active, creative and effective collaboration.
- Vigilance-responding flexibly and adequately to changes in the environment

The three days' **future search conference** commenced in Muthupettai of Thiruvavarur district from **14-16<sup>th</sup> March 2020** by involving the community members of the Point Calimere wetland site. This FSC was organized by DHAN Foundation and it was facilitated by Mr. Frank Heckman and Mr. Peter from Embassy of Earth, Netherlands. In addition to this Tamil Nadu forest department and **GIZ, New Delhi also extended their support** for the successful completion of the process with community members.

The participants of the three-day conference were fringe fishermen, marginal farmers, Panchayat President, leaders of fishermen association, women SHG members, marine police officers, staffs, officers from Tamil Nadu Forest Department and DHAN staff. Besides, students from NIRD, Hyderabad and The DHAN Academy, Madurai also participated in the conference, along with Ms. Avanthika and Mr. Xavier Francis from GIZ, New Delhi.

### *Annexure -IV Proceedings of FSC*

#### **2.9.1. Understanding the Landscape and its dependency: FGD, Transect Walk, Identifying Key Informants, Stakeholder Interaction**



**Photo 2.3: FGD in Vandal Village**

Based on the leads from Stakeholders' workshops and Future Search Conference (FSC) the team conducted transect walks along with Focus Group Discussions (FGD) to understand the



villages, communities, livelihoods, resources, ecosystems etc. Further key informants from each village were consulted to further the stakeholders' interaction with Panchayat presidents, Forest department staffs, Fisheries Department staffs, Fishermen Association Leaders, Salt Producers Association etc.

### ***2.9.2. RAWES (Rapid Assessment of Wetland Ecosystem Services)***

Ecosystem services in the selected study areas were then assessed using the Rapid Assessment of Wetland Ecosystem Services (RAWES) approach, adopted under Ramsar Resolution XII.17 (Ramsar Convention 2018) as a rapid and cost-effective method for the systematic assessment of ecosystem services provided by wetlands. As per the recommendation of the GIZ technical team and consultant meeting, the RAWES tools was applied and the data collected for the sample villages. This process broadened the idea to design the PESA (Participatory Ecosystem Services Appraisal) tool to gather rich knowledge from the community.

#### ***Annexure- V The consolidated RAWES sheet-4***

### ***2.9.3. PPGIS (Participatory People Geographic Information System) & Data Collection***

The platforms were created to link the technical team of DHAN Foundation with community and forest department to prepare GIS Map for the wetland site. Relevant maps, research study and data were referred for better understanding by the technical team. The reference points cover the entire landscape and ecosystems thus, LULC, NDVI, fishing route, Saltpan and Boundary Map etc. were prepared for the site.

### ***2.9.4. Collection of Secondary data, Sample Survey and Secondary Data***

To strengthen the study, primary and secondary data were collected from VAO, Village Panchayat, Forest department, Fisheries Department, Census of India website, District Human Development Index etc., by our field staff and study team. This provided additional information for understanding the socio-economic status of people around the site.

### **2.9.5. Participatory Ecosystem Services Appraisal (PESA)**



**Photo 2.4: PESA Process in Managanangadu Village**

Having three decades of experience of working with community DHAN evolved the concept of PESA to collect the primary information from the community. By applying the PESA techniques, information was collected in an interactive manner. The collected information was very helpful for the team to prepare the study report in detail. The Participatory Ecosystem Services Appraisal was developed with the reference of RAWES sheet provided by GIZ, for referring international resource material on assessment of wetland ecosystems. This helped in developing an understanding of Point Calimere Wetland ecosystems from international resources along with our experience in Participatory Learning Method by involving the Community for understating the village eco systems.

### **2.9.6. Case studies**

For the different ecosystem-based livelihoods, case studies are prepared by covering the entire landscape and community representation. Further these case studies are provided for a finer understanding of the wetland dependent livelihoods.

### **2.9.7. Data Analysis and Reporting**

By applying the aforesaid tools, the primary and secondary data along with maps, were consolidated and the data interpreted. The study report was then discussed and consulted with the DHAN Advisory Committee. Based on the reflections from the seniors and GIZ

consultants in the meeting the report was prepared with the objective of providing sustainable livelihoods and integrated management of Point Calimere site by integrating the recommendations from various key stakeholders and study output.

### ***2.9.8. The Consultation and Deliberation Workshop***

Based on the suggestion, feedback and support from the GIZ technical team and DHAN Foundation advisory committee meeting the Consultation Workshop will be organized to get expert recommendations and opinion to finalise the study and submit the final report.



### 3. Socio-Economic Status of Wetland Dependent Communities in Point Calimere

#### 3.1. Introduction

The entire Point Calimere spreads in Pattukkottai, Muthupettai, Vedaranyam and Thalainayar coastal blocks at the tail end of Cauvery distributaries which falls into to Palk Bay. The primary occupation in the selected villages is farming, fishing, salt production, salt work, aquaculture, and labor in addition to which considerable number of people are working in gulf countries as laborers. Being coastal districts, these areas are prone to various natural disasters posing high risks to the lives and livelihoods of the dependent community. In the selected blocks, around 33 villages are dependent on PCWC for various services, out of these, 15 highly dependent villages were taken as sample villages for the study. From the available and collected data, inferences are made to understand the socio-economic status of the community in the site.

**Table 3-1: Selected Villages and Major Livelihoods**

Forest Division	District	Taluk	Block	Gram Panchayat & Hamlet	Primary Livelihoods	Secondary Livelihoods
A	Thanjavur	Pattukottai	Pattukottai	Sundaranayagi-puram - Manganankadu	Fishing	Agriculture
				T. Maravakadu	Fishing	Agriculture
	Thiruvarur	Thiruthurai-poondi	Muthupettai	Jambuvanodai - Akkaraikadu	Fishing	Agriculture, Aquaculture & Thatches Making
				Thillaivilagam-Sengangadu	Fishing	Agriculture
				Thondiyakadu	Fishing	Agriculture & Livestock
				Karpaganatharkulam	Fishing	Agriculture & Thatches Making
			Idumbavanam - Vadiyakadu	Fishing	Agriculture & Livestock	
B	Nagapattinam	Vedharanyam	Vedharanyam	Annapettai	Fishing	Agriculture
				Voimedu - Chinthamani Kadu	Fishing	Agriculture
				Pannal - SakkaranPettai	Fishing	Agriculture & Salt Work
			Vedharanyam	Panchanathikulam Middle - Seruthalaikadu	Fishing	Salt Work

Forest Division	District	Taluk	Block	Gram Panchayat & Hamlet	Primary Livelihoods	Secondary Livelihoods
				Vedharanyam Municipality-Agasthiyampalli	Salt Production	Agriculture & Fishing
				Kodiyakadu	Fishing and Agriculture	Salt Work
				Kodiyakarai	Fishing	Salt Work
			Thalainayiru	Thalainayar Town Panchayat - Vandal	Fishing	Agriculture & Aquaculture

### 3.2. Demographic details of the wetland dependent Gram Panchayats

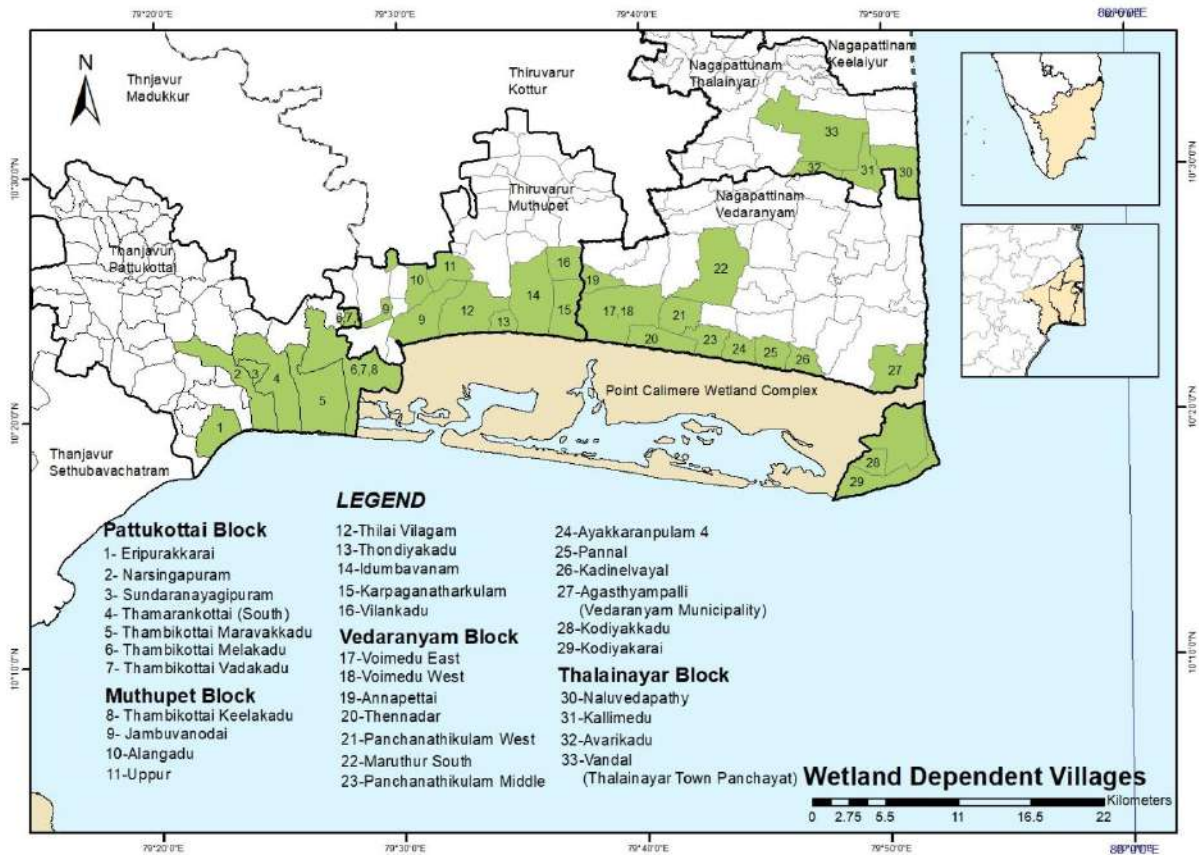
In the buffer zone of Point Calimere Wetland Complex, 33 Gram Panchayats are dependent for their livelihoods on the wetland. The basic demographic details these villages are given below.

**Table 3-2: Demographic details of dependent Gram Panchayats and Town Panchayats of Point Calimere Wetland**

S. No.	District Name	Block Name	Gram Panchayat Name	Total House-holds	Total Population of Village	Total Male Population of Village	Total Female Population of Village	Total Scheduled Castes Population of Village	Total Scheduled Tribes Population of Village
1	Thanjavur	Pattukkottai	Eripurakarai	995	4285	2047	2238	1093	0
2			Narasingapuram	479	1848	867	981	337	0
3			Soundaranayakupuram- Managanankadu	379	1371	586	785	4	0
4			Thamarankottai South	922	3120	1373	1747	319	8
5			Thambikottai Maravakad	728	2721	1312	1409	308	0
6			Thambikottai Melakkadu	722	2613	1227	1386	68	4
7			Thambikottai Keelakadu	728	2721	1312	1409	308	0
8			Thambikottai Vadakadu	941	3338	1623	1715	283	29
9	Thiruvarur	Muthupettai	Alangadu	923	3364	1603	1761	427	0
10			Uppur	807	2793	1330	1463	184	0
11			Jambuvanodai	1104	3839	1812	2027	1016	0
12			Thillaivilagam	1928	6803	3275	3528	1057	0
13			Thondiyakkadu	487	1607	769	838	164	0
14			Karpaganatharkulam	657	2112	952	1160	0	0
15			Idumbavanam	2127	7345	3615	3730	1397	0
16			Vilangadu	559	1946	914	1032	7	0
17	Nagapattinam	Vedaranyam	Annapettai	2040	7384	3609	3775	966	4

S. No.	District Name	Block Name	Gram Panchayat Name	Total House-holds	Total Population of Village	Total Male Population of Village	Total Female Population of Village	Total Scheduled Castes Population of Village	Total Scheduled Tribes Population of Village	
18			Voimedu East	994	3751	1898	1853	889	6	
19			Voimedu West	566	2006	983	1023	252	0	
20			Panchanathikulam Middle	911	3115	1522	1593	457	0	
21			Pachanathikulam West	770	2833	1390	1443	1151	0	
22			Pannal	741	2523	1261	1262	541	0	
23			Kadinelvayal	448	1594	816	778	479	0	
24			Marudur Therku Sethi	1240	4350	2180	2170	1103	0	
25			Thennadar	498	1774	875	899	645	0	
26			Ayakkaranbulam IV th Sethi	581	2016	1043	973	387	0	
27			Kodiyakkadu	869	3085	1489	1596	194	0	
28			Kodiakarai	513	2128	1152	976	615	0	
30			Thalainayar	Kallimedu	215	801	402	399	227	0
31				Avarikadu	181	676	339	337	191	0
32				Naluvadapathi	1418	4819	2447	2372	208	0
S. No.	District Name	Block Name	Town Panchayat	Total House-holds	Total Population of Village	Total Male Population of Village	Total Female Population of Village	Total Scheduled Castes Population of Village	Total Scheduled Tribes Population of Village	
	Nagapattinam	Vedaranyam	Vedaranyam Municipality	1110	4386	2122	2264	653	8	
		Thalainayar	Thalainayiru Town Panchayat	337	1251	613	638	425	2	
			<b>Total</b>	<b>27918</b>	<b>1,00,318</b>	<b>48,758</b>	<b>51,560</b>	<b>16,355</b>	<b>61</b>	

As per 2011 census the 33 Gram Panchayats have around 28000 households with one lakh population which includes 48758 males and 51560 females. Female to male ratio is more than the state average of 996 females per thousand males. Of the 1 lakh population 16355 people belong to scheduled castes while less than hundred belong to scheduled tribes. The average household size is 3.5 which is lesser than national average of 4.5 as per 2011 census. Map 2.3 shows 33 Gram Panchayats and Town Panchayats along the periphery of the Point Calimere Wetland.



**Map 2.3 The 33 Gram Panchayats and Town Panchayats along the periphery of the Point Calimere Wetland.**

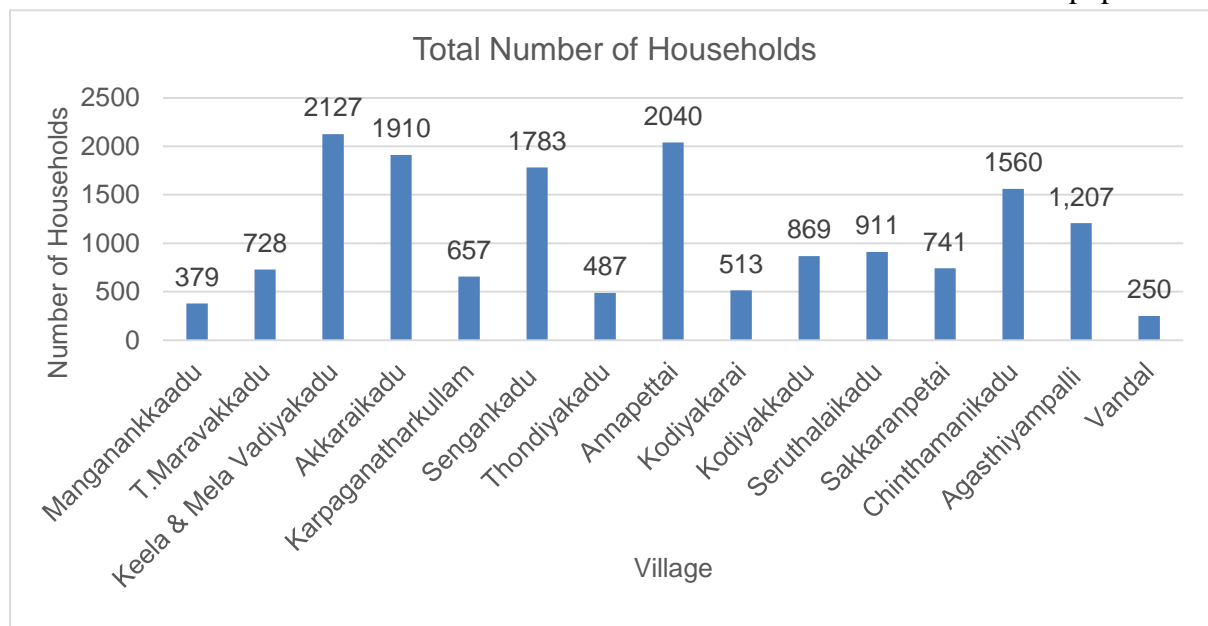
### *Demographic details of sample villages*

Out of the selected sample villages Vandal and Agasthiyampalli fall under Thalainayar Town Panchayat and Vedaranyam Municipality respectively, rest of the villages are part of respective Gram Panchayats. The 2011 Census is used as reference for interpretation of data which covers and gives information for the entire Gram Panchayat including sample villages. Through PESA, Gram Panchayat, Key informants, and Primary Data are collected for the sample hamlets of the Gram Panchayats. The 2011 census was taken as base for consolidating the demographic details, which was rechecked with the collected primary data in PESA process. Due to a slight variation among the sources, 2011 census data was considered for the interpretation of data. The sample panchayats alone cover 16162 households in 13 village panchayats while Agasthiyampalli which covers ward number 9, 10 and 11 of Vedaranyam Municipality and Vandal covers ward number 5 of Thalainayar Town Panchayat. In the sample villages Idumbavanam has the highest number of 2127 households and a population of 7345 followed by Annapettai with 2040 households and a population of 7384. Jambuvanodai and Thillavilagam have 1104 and 1928 households respectively. In the entire Point Calimere wetland complex these four villages need the most attention covering large geographic area

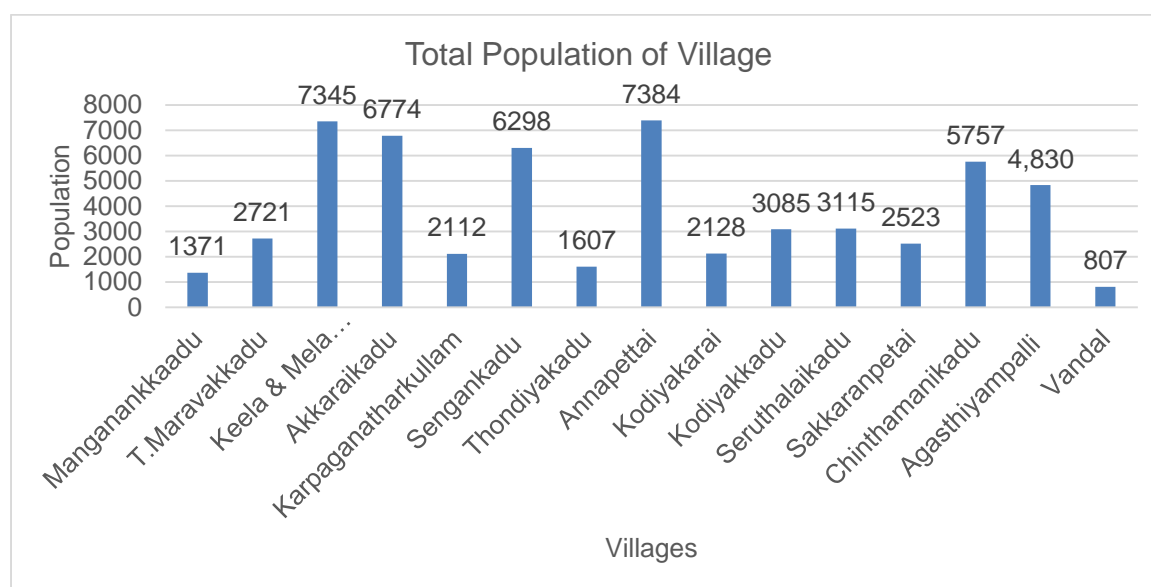


and

population.



**Chart 3.1: Number of Households in the sample villages**



**Chart 3.2: Total Population in Sample Villages**

**Table 3-3: Male and Female population in sample villages**

Villages	Total Population of Village	Total Male Population of Village	Total Female Population of Village	Total SC Population
Manganankkaadu	1371	586	785	4
T. Maravakkadu	2721	1312	1409	308
Keela & Mela Vadiyakadu	7345	3615	3730	1397
Akkaraikadu	6774	3236	3538	1285
Karpaganatharkullam	2112	954	1160	0

Villages	Total Population of Village	Total Male Population of Village	Total Female Population of Village	Total SC Population
Sengankadu	6298	3045	3253	1057
Thondiyakadu	1607	769	838	164
Annapettai	7384	3609	3775	966
Kodiyakarai	2128	1152	976	615
Kodiyakkadu	3085	1489	1596	194
Seruthalaikadu	3115	1522	1593	457
Sakkarapetai	2523	1261	1262	541
Chinthamanikadu	5757	2881	2876	1141
Agasthiyampalli	4,830	2,318	2,512	170
Vandal	807	398	407	280
<b>Total</b>	<b>57857</b>	<b>28147</b>	<b>29710</b>	<b>8579</b>

Sex ratio in all the sample villages is more than the state average, except in Kodiakarai and Chinthamani Kadu, where sex ratio is below 1000. PESA and FGD indicate that in the sample villages more girls are going to school than boys. It is one of the key development indicators of the villages reflecting the perspectives of community on the importance of girl child and their education.

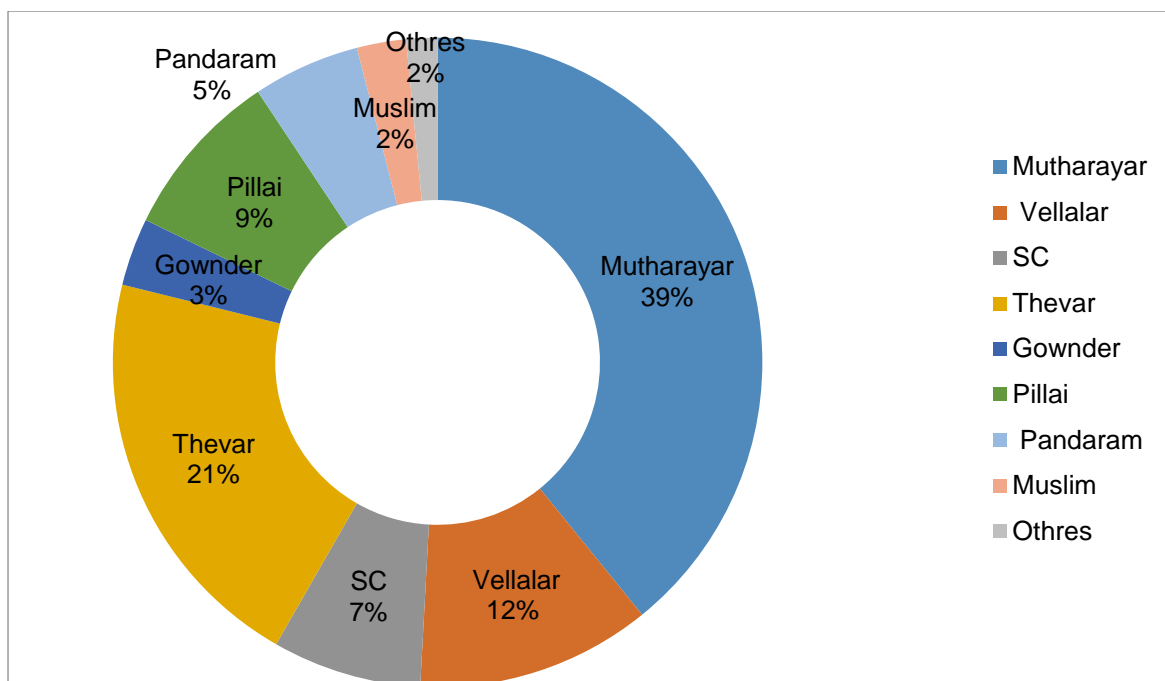
#### *Scheduled Caste and Scheduled Tribes Population*

Considerable SC population is there in sample villages mostly working as agriculture laborers, construction labourers and MGNREGA laborers. Exceptionally, Manganankadu and Karpaganatharkulam villages have no SC population. Out of the total population of 57857, 8579 people belong to scheduled caste, i.e. almost 15% of the total population.

The SC population is higher in Idumbavanam, Jambuvanodai and Thillaivilagam than other villages. However, the population of Scheduled tribes is negligible.

#### *The caste wise populations in the Sample Villages*

As per the primary data sources, around 17 communities such as, Ambalakarar/Mutharayar, Thuluva Vellalar/Kara Kara Pillai, Konar, Pallar, Nadar, Parayar, Thevar, Chettiyar, Koliyar, Gowndar, Aasari, Thattar, Ambattar, Agamudayar, Pillai, Veera Kodi Vellalar, Vera Saiva Pandaram and Muslim. Overall, the Amabalakar, Parayar, Pallar, Koliyar, Gowndar, Thevar and Pillai are more in the PCWC region. Out of these the Mutharayar community is mostly dependent on fishing. In very few villages, the Thevar and Agaumadayar communities are considered as wealthy families. The Thevar and Gowndar communities are politically active especially in Jambuvanaodai and Thambikottai etc.



**Chart 3.3: Caste wise presence in the Sample Villages**

Of the major communities, Mutharayar population is the highest with 4084 families out of 10430 households. Agamudaayar and Thevar community consists of 1412 and 733 households respectively. Further, 920 Thuluva Vellalar and 881 Pillai households are spread across the entire wetland stretch. These details are generated from the primary data and PESA and FGD. Other than this Nadar, Koliyar, Chettiyar, Ambattar, Pattar and Konar together have a total of 162 households living in the sample villages, which are very less compared to the total population in the area.

### 3.3. Education

Importance of education in different communities in sample villages is highly recognized. All the communities give importance to education, the Mutharayars especially emphasize on providing education to girls. In the sample villages girls' enrollment is better than boys since the latter are pushed in to traditional occupation or are forced to move to foreign countries. The availability, accessibility and affordability of schools and colleges are excellent, influencing the parents to provide better education for their children. Even among the Scheduled Castes the importance of education is recognized. There are good number of government schools and colleges in and around Muthupettai, Athirampattinam, Voimedu, Vedharanyam, Thiruthuraipoondi, Kodiakarai and Ayakaranpulam Villages with good road and transport connectivity.

**Table 3-4 Literacy Rate in the 33 Gram Panchayats and Town Panchayats**

S.No	District Name	CD Block Name	Gram Panchayat Name/Town Panchayat	Total population	Total Literacy	Male Literacy	Female Literacy	Litracy Rate
1	Thanjavur	Pattukkottai	Eripurakarai	4285	2780	1466	1314	64.88%
2			Narasingapuram	1848	1245	648	597	67.38%

3			Soundaranayakipuram	1371	925	435	490	67.47%
4			Thamarankottai South	3120	1373	508	416	44.01%
5			Thambikottai Maravakad	2721	1980	1035	945	72.77%
6			Thambikottai Melakkadu	2613	2007	1028	979	76.81%
7			Thambikottai Vadakadu	3338	2490	1333	1157	74.6%
8			Thambikottai Keelakadu	2721	1980	1035	945	72.77%
9			Alangadu	3364	2556	1406	1150	75.99%
10			Uppur	2793	2014	1082	932	72.11%
11			Jambuvanodai	3839	2857	1478	1379	74.43%
12			Thillaivilagam	6298	4598	2410	2188	73.01%
13			Thondiyakkadu	1607	1118	610	508	69.58%
14			Karpaganatharkulam	2112	1469	779	690	69.56%
15			Idumbavanam	7345	4937	2648	2289	67.22%
16	Thiruvarur	Muthupettai	Vilangadu	1946	1483	748	735	76.21%
17			Annapettai	7384	5313	2839	2474	71.96%
18			Voimedu East	3751	2729	1494	1235	72.76%
19			Voimedu West	2006	1524	838	686	75.98%
20			Panchanathikulam Middle	3115	2473	1288	1185	79.4%
21			Pachanathikulam West	2833	2158	1187	971	76.18%
22			Pannal	2523	1917	1059	858	75.99%
23			Kadinelvayal	1594	1235	682	553	77.48%
24			Marudur Therku Sethi	4350	3308	1826	1482	76.05%
25			Thennadar	1774	1415	739	676	79.77%
26			Ayakkaranbulam IV th Sethi	2016	1689	927	762	83.78%
27			Kodiyakkadu	3085	1955	1027	928	63.38%
28			Kodiakarai	2128	1714	978	736	80.55%
29		Vedaranyam	Vedaranyam Municipality	4386	3157	2254	903	71.98%
30			Kallimedu	801	452	276	176	56.43%
31			Avarikadu	676	340	156	184	50.3%
32			Naluvvedapathi	4819	3672	2019	1653	76.2%
33	Nagapattinam	Thalainayar	Thalainayiru Town Panchayat	1251	901	477	424	72.03%

### 3.4. Agriculture and Land holding

In the selected villages, castes other than Scheduled Castes have minimum land holdings, especially the Mutharayar community. On an average the holding size is 1-2 acres in most of the villages. In some villages Thevars hold an average of 3 acres of land, majorly cultivating coconut with few cultivating paddy.

Interestingly, most of the land is a part of Vedaranyam temple in Agasthiyampalli, and Idumbavanam temple in Idumbavanam and Annapettai. The entire Karpaganatharkulam and parts of Thondiyakadu land belongs to Karpaganatharkulam sivan temple. In Thillaivilagam, as a government policy decision, two acres of land was given to landless families, in 1976. In Maravakadu and Manganankadu the villagers were once a part of the Indian National Army under Netaji Subash Chandra Bose and therefore as a symbol of respect, government had given 2 acres of agriculture land each to the people who served in the INA. In Annapettai, people do not have ownership over the land on which they have built their homes, since it belongs to the Idumbavanam temple; due to political influence, people face difficulties in obtaining patta for their lands.

In Idumbavanam, Jambuvanodai, Thillavilagam and Puhukottagam most of the agriculture lands were sold for the outsider of the villages for shrimp farming and they are from Thoothukudi, Chennai and Dindigul at very minimum price in 1980s. There was clear shift in land use pattern over the period of time, like Alam (mudflats) to agriculture land, agriculture to aquaculture, aquaculture to decommissioned land. On the other hand, the salt pan and forest land was occupied by aquaculture pond; later it was decommissioned due to heavy loss and legal enforcement by the salt departments in Managanakadu, Maravakadu, Thambikottai, Jambuvanodai and Thillaivilagam.

**Table 3-5: Agriculture land holding. (Gol, 2011)**

<b>S. No.</b>	<b>Block name</b>	<b>Village Name</b>	<b>Agricultural Land Holding (in Hectare)</b>
1	Pattukkottai	Eripurakarai	198.38
2	Pattukkottai	Narasingapuram	26.15
3	Pattukkottai	Soundaranayakipuram	180.48
4	Pattukkottai	Thamarankottai South	309.53
5	Pattukkottai	Thambikottai Maravakad	416.72
6	Pattukkottai	Thambikottai Melakkadu	422.43
7	Pattukkottai	Thampikotai Kelakadu	425.56
8	Pattukkottai	Thambikottai Vadakadu	416.72
9	Muthupettai	Alangadu	321.44
10	Muthupettai	Uppur	396.53
11	Muthupettai	Jambuvanodai	820.44
12	Muthupettai	Thillaivilagam	982.01
13	Muthupettai	Thondiyakkadu	417.31
14	Muthupettai	Karppaganatherkulam	454
15	Muthupettai	Idumbavanam	1458.6
16	Muthupettai	Vilangadu	451.31

S. No.	Block name	Village Name	Agricultural Land Holding (in Hectare)
17	Vedaranyam	Annapettai	955.94
18	Vedaranyam	Voimedu East	570.54
19	Vedaranyam	Voimedu West	661.58
20	Vedaranyam	Pachanathikulam Middle	491.28
21	Vedaranyam	Pachanathikulam West	573.62
22	Vedaranyam	Pannal	456.38
23	Vedaranyam	Kadinevayal	283.56
24	Vedaranyam	Marudur Therku Sethi	629.11
25	Vedaranyam	Thennadar	525.26
26	Vedaranyam	Ayakkarambulam IV Sethi	357.03
27	Vedaranyam	Kodiakkadu	72.29
28	Vedaranyam	Kodiakarai	3.78
29	Vedaranyam	Agasthiyanpalli	141
30	Thalainayar	Kallimedu	685.3
31	Thalainayar	Avarikadu	685.3
32	Thalainayar	Naluvadapathi	616.86
33	Thalainayar	Vandal	81
		<b>Total</b>	<b>15487.44</b>

In the 33 dependent villages a total of 15487.44 agriculture land is owned by different communities. Among these villages Idumbavanam and Thillaivilagam has the highest agriculture land of 1458 and 988 Hectares respectively. The least agriculture land of 26 hectares was owned in Narasingapuram, where there is little land available due to its proximity to reserve forest area. On an average every village holds 450 hectares of land.

**Table 3-6: Community wise land holding in sample villages**

S. No.	Village	Agriculture Landholding (in Acre)												
		Ambalakarar / Mutharayar	Thuluva Vellalar/ Kara Kara Pillai	Konar	Nadar	Thevar	Parayar	Chettiyar	Gownder	Ambattar	Agamudayar	Pillai	Andi Pandaram	Muslim
1	Manganankadu	1-4	0	0-1	0	0	0	0	0	0	0	0	0	0
2	T. Maravakadu	1-2	0	0	0-1	1-5	0	0	0	0	0	0	0	0

S. No.	Village	Agriculture Landholding (in Acre)												
		Ambalakarar / Mutharayar	Thuluva Vellalar/ Kara Kara Pillai	Konar	Nadar	Thevar	Parayar	Chettiyar	Gownder	Ambattar	Agamudayar	Pillai	Andi Pandaram	Muslim
3	Jambuvanodai - Akkaraikadu	0-1	0	0	0	1-6	0	0	0	0	0	0	0	0
4	Thillaivilagam - Sengankadu	1-2	0	0	0	1-6	0	0	0	0	0	0	0	0
5	Thondiyakadu	1-3	0	0	0	0	0	0	0	0	0	0	0	0
6	Karpaganatharkulam	1-2	0	0	0	0	0	0	0	0	0	0	0	0
7	Idumbavanam-Kel & Mela Vadiyakadu	1-2	0	0	0	1-5	0	0	0	0	0	0	0	0
8	Annapettai	0-1	0	0	0	0	0	1-2	1-2	0	0	0	0	0
9	Voimedu-Chinthamanikadu	1-2	0	0	0	0	0	0	0	0-0.5	0	0	0	0
10	Pannal - Sakkarapettai	0	0-1	0	0	0	0	0	0	0	0	0	0	0
11	Seruthalaikadu (Panchanathikulam Middle)	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Agasthiyampalli (Vendranyam)	0-1	0	0	0	0	0-1	0	0	0	1-2	1-2	0	0
13	Kodiyakadu	0	0-0.5	0	0	0	0	0	0	0	1-2	0	0-1	1-3
14	Kodiyakarai	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Thalainayar - Vandal	0	0	0	0	0	0	0	0	0	0	0	0	0

### 3.5. Irrigation Source and Primary Produce

In Point Calimere wetland region, villages are dependent on Cauvery water as a main source of irrigation as the ground water is saline. Being in the delta region of Cauvery the major crop cultivated is paddy, followed by coconut and some horticulture crops. Of the total agricultural land of 15487.44 hectares only 4725.27 hectares of land is irrigated from the distributaries of Cauvery. This is very critical as almost 10762.17 hectares of land is rainfed. Even though ground water table is good, it is not useful for agriculture due to salinity. Only 285.31 hectares of land is irrigated by wells.

Apart from this, lift irrigation method is being adopted in these areas especially in Thennadar, Annapettai, Karpaganatharkulam, Voimedu and Idumbavanam etc. by pumping the Valavanar river water using pumping stations at different locations.

**Table 3-7: Total agriculture area and irrigated area for the dependent villages. (GoI, 2011)**

S. No.	Village Name	Major crop cultivates (in Hectare)	Total Land in Cultivation (in Hectare)	Area Irrigated by Source (in Hectare)	Area irrigated by Canals Area (in Hectare)	Area irrigated by Wells/Tube Wells Area (in Hectare)	Area under rainfed (in Hectare)
1	Eripurakarai	Paddy	198.38	167.48	155.37	12.11	30.9
2	Narasingapuram	Coconut	26.15	11.47	0	11.47	14.68
3	Soundaranayakipuram	Paddy	180.48	113.41	59.89	53.52	67.07
4	Thamarankottai South	Paddy	309.53	228.77	138.57	90.2	80.76
5	Thambikottai Maravakad	Paddy	416.72	188.3	67.42	0	228.42
6	Thambikottai Melakkadu	Paddy	422.43	244.3	105.87	0	178.13
7	Thampikotai Kelakadu	Coconut	425.56	257.18	139.17	118.01	168.38
8	Thambikottai Vadakadu	Paddy	416.72	188.3	67.42	0	228.42
9	Alangadu	Paddy	321.44	252.94	252.94	0	68.5
10	Uppur	Paddy	396.53	229.47	229.47	0	167.06
11	Jambuvanodai	Paddy	820.44	296.56	296.56	0	523.88
12	Thillaivilagam	Paddy	982.01	270.17	270.17	0	711.84
13	Thondiyakkadu	Paddy	417.31	386.62	386.62	0	30.69
14	Karppaganatherkulam	Paddy	454	454	454	0	0
15	Idumbavanam	Paddy	1458.6	795.57	795.57	0	663.03
16	Vilangadu	Paddy	451.31	451.31	451.31	0	0
17	Annapettai	Coconut	955.94	81.56	81.56	0	874.38
18	Voimedu East	Paddy	570.54	2.07	0	0	568.47
19	Voimedu West	Paddy	661.58	7.78	0	0	653.8
20	Pachanathikulam Middle	Paddy	491.28	0	0	0	491.28
21	Pachanathikulam West	Paddy	573.62	28.52	0	0	545.1
22	Pannal	Paddy	456.38	26.36	0	0	430.02
23	Kadinevayal	Paddy	283.56	0	0	0	283.56
24	Marudur Therku Sethi	Casurina	629.11	28.27	0	0	600.84
25	Thennadar	Paddy	525.26	5.47	5.47	0	519.79
26	Ayakkarambulam IV Sethi	Paddy	357.03	0	0	0	357.03
27	Kodiakkadu	Groundnut	72.29	0	0	0	72.29
28	Kodiakarai	Not Available	3.78	0	0	0	3.78



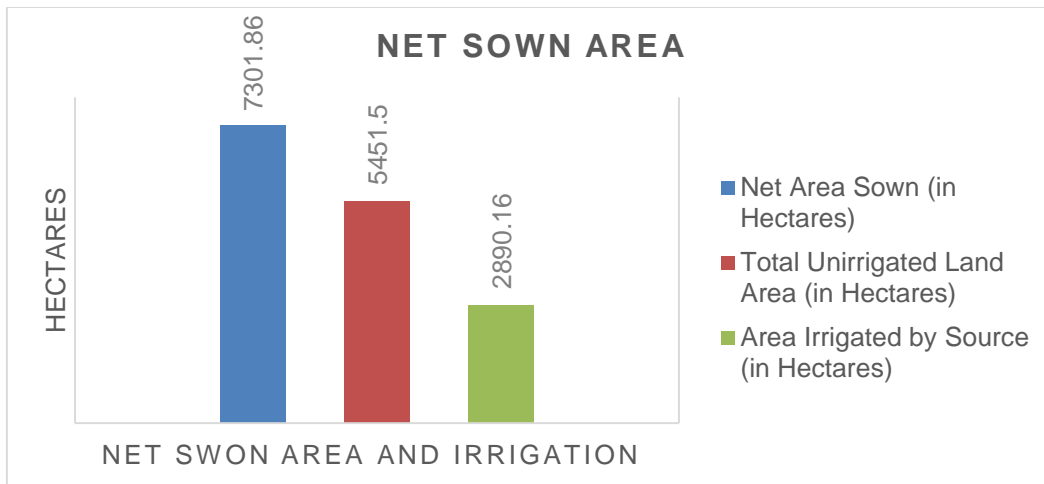
S. No.	Village Name	Major crop cultivates (in Hectare)	Total Land in Cultivation (in Hectare)	Area Irrigated by Source (in Hectare)	Area irrigated by Canals Area (in Hectare)	Area irrigated by Wells/Tube Wells Area (in Hectare)	Area under rainfed (in Hectare)
29	Agasthiyanpalli	Paddy	141	0	0	0	141
30	Kallimedu	Paddy	685.3	2.84	2.84	0	682.46
31	Avarikadu	Paddy	685.3	2.84	2.84	0	682.46
32	Naluvadapathi	Coconut	616.86	3.71	3.71	0	613.15
33	Vandal	Paddy	81	0	0	0	81
<b>Total area</b>			<b>15487.44</b>	<b>4725.27</b>	<b>3966.77</b>	<b>285.31</b>	<b>10762.17</b>

Based on the water availability and soil condition various crops are cultivated in the entire Point Calimere dependent villages.

The main sources of irrigation are canals and rain fed. The area sown in the entire sample villages is around 7301.86 hectare. Out of which only 2890 hectares come under irrigated land and the remaining 5450 hectares are rain-fed lands. On further analysis, canals were found to be the major source of irrigation.



Photo 3.1: Irrigation Pumping Station in Annapettai

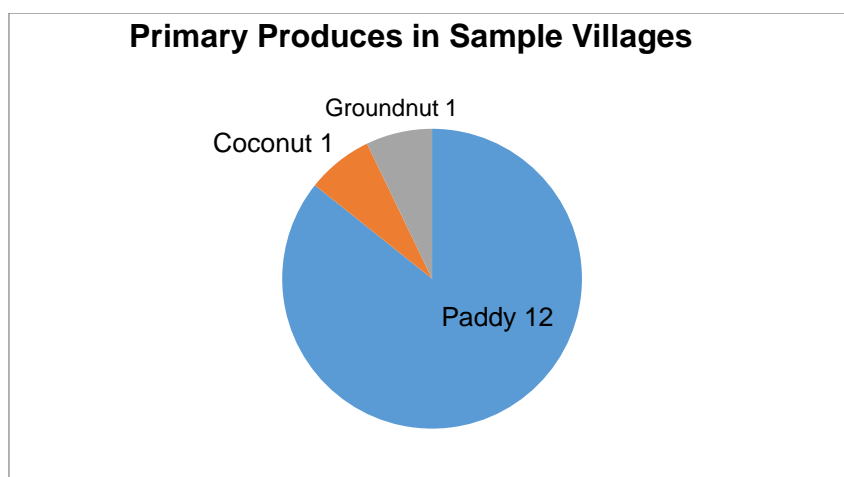


**Chart 3.4: Total Net Sworn Area in Sample Villages**

The net sown area is higher in Thillaiwilagam, Idumvavanam, Jambuvanodai and Annapettai; it is almost close to 1000 hectares in these villages. Further except Kodiakarai, Kodiakadu, Agasthiyampali and Vandal, the average net sown area in the rest of the villages is closer to 500 hectares. When it comes to irrigation very minimum number of lands have source of irrigation. The details of irrigation are given in the below table. The total number of rain-fed lands is higher than the number of irrigated lands. Out of the 2890 hectares of the irrigated area almost 2679 hectares are covered through canals, other sources are minimum especially wells which cover 53 hectares that is not even 5% of the total irrigation source. This may be due to the salinity of the ground water. Although, these areas have numerous tanks and ponds but the surface water irrigation is negligible. These surface water bodies are mainly used to recharge the ground water and reduce water salinity.

**Chart 3.5: Irrigation Source in sample villages**

The fringe villages in Point Calimere cultivate Paddy, Coconut, Groundnut, Black gram, Tobacco, and Sesame. Pulses are the main crops, with jasmine cultivation in few pockets. In the analysis of Primary and Secondary agricultural commodities, Paddy is primary, while coconut and pulses fall under secondary produces. Out of 15 sample villages agriculture is not practiced in Kodiakarai and Seruthalaikadu. The Panchanathikulam Middle Village has agriculture as primary livelihood. Therefore, the sample is applicable for 14 villages and out of those, 12 villages cultivate paddy as a primary crop. The remaining two cultivate coconut and groundnuts respectively.



**Chart 3.6: Primary Agricultural Produces in the Sample Villages**

### 3.6. Source of Domestic Water

Due to the increasing salinity in ground water, the dependent villages have age old practice of constructing ponds at village level for domestic usage. Thus, people use traditional water bodies like ponds to meet their domestic water needs. For drinking water people depend on the **Kaveri- Kollidam ootu Kudineer Thittam** administered by TWAD board and supplied through Gram Panchayat. Occasionally fresh water is supplied or purchased from Chemplast, GHCL and other private players during festivals and functions. The ground water at depths more than 15-20 feet (differ for each village) is saline and non-potable. Most of the dependent villages have hand pumps, mainly for domestic use and livestock. The depth of these hand pump bore wells was within 10 feet up to 2015. Villages

**Table 3-8 The Water Bodies in the Dependent Villages (Kodiyakadu, Kodiyakarai and Siruthalaikadu lie within the Ramsar boundary)**

S. No.	Gram Panchayat	Tank	Village pond	Common well	Bore well for drinking
1	Panchanathikulam Middle	0	8	3	0
2	Kadinelvayal	1	15	0	2
3	Seruthalaikadu		6	0	2
4	Pannaal	1	20	0	0
5	Thamarankottai South				
6	T. Vadakadu				
7	T. Melakadu				
8	Ayakaranpualm 4			2	3
9	Maruthur	1	58	1	0
10	Panchaanthikulam West	0	20	0	0
11	Thennadaar	2	26	12	2

S. No.	Gram Panchayat	Tank	Village pond	Common well	Bore well for drinking
12	Voimedu	0	8	2	4
13	Annapettai	0	25		7
14	Kodiyakarai	0	7	18	2
15	Kodiyakadu	0	16	10	1
16	Agasthiyampalli			0	0
17	Maravakadu	1	6		2
18	Vandal				
19	Thamarankottai		5		2
20	Eripurakarai	1	10		2
21	Vilankadu		3		1
22	Idumbavanam		12		3
23	Uppur		7		5
24	Jambavanodai		5		4
25	Thondiyakadu		10		3
26	Karpanatharkulam		10		3
27	Thillaivilagam		6		3
28	Alangadu				
29	T. Keelakadu				
30	Kallimedu				
31	Naluvdapathy				
32	Narasingapuram				
33	Soundarnayakipuram				

### 3.7. The Occupation and Income of the Villagers

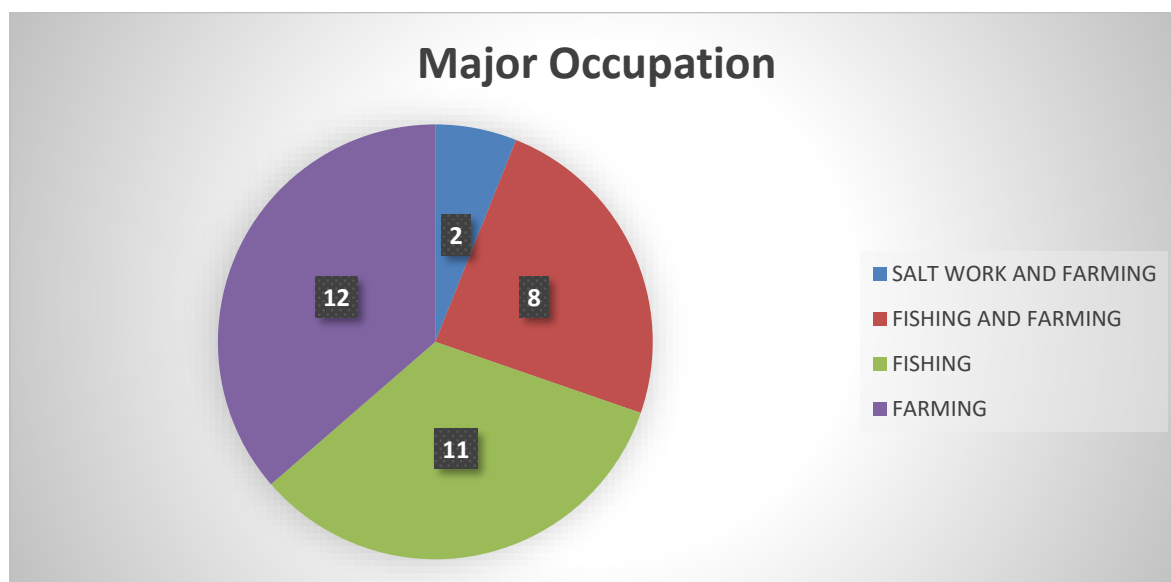
Most of the villagers are involved in both fishing and farming. In few villages fishing is predominant like in, Kodiakarai, Kodiyakkadu and Seruthalaikadu. Around Vedaranyam many villages especially Agasthiyampalli and Kadinelvayal are involved in salt production. The average monthly income varies from Rs.8000 to Rs. 18000 based on their occupation and seasonality. The given income source and income was collected and worked from the primary sources.

**Table 3-9: Income profile and major occupation of dependent villages**

S. No.	Villages	Annual Income INR	Monthly income INR	Major Occupation
1	Eripurakarai	2,05,000	17,083	Fishing
2	Narasingapuram	1,16,000	9,667	Fishing
3	Soundaranayakipuram	1,28,000	10,667	Fishing
4	Thamarankottai South	1,44,000	12,000	Fishing & Farming
5	Thambikottai Maravakad	1,38,000	11,500	Fishing
6	Thambikottai Melakkadu	2,76,000	23,000	Fishing
7	Thampikotai Kelakadu	1,57,000	13,083	Fishing
8	Thambikottai Vadakadu	2,19,000	18,250	Fishing & Farming
9	Alangadu	1,63,000	13,583	Fishing & Farming
10	Uppur	1,65,000	13,750	Farming
11	Jambuvanodai	1,51,000	12,583	Fishing & Farming
12	Thillaivilagam	1,20,000	10,000	Farming
13	Thondiyakkadu	1,77,000	14,750	Fishing
14	Karppaganatherkulam	1,76,000	14,667	Fishing
15	Idumbavanam	1,80,000	15,000	Fishing & Farming
16	Vilangadu	1,18,000	9,833	Farming
17	Annapettai	1,22,000	10,167	Farming
18	Voimedu East	1,15,000	9,583	Farming
19	Voimedu West	1,43,000	11,917	Fishing
20	Pachanathikulam Middle	1,34,000	11,167	Farming
21	Pachanathikulam West	1,45,500	12,125	Fishing
22	Pannal	1,61,000	13,417	Farming
23	Kadinevayal	1,30,000	10,833	Salt Work & Farming
24	Marudur Therku Sethi	1,45,000	12,083	Farming
25	Thennadar	1,55,000	12,917	Farming
26	Ayakkarambulam IV Sethi	1,54,000	12,833	Farming
27	Kodiakkadu	1,61,000	13,417	Fishing
28	Kodiakarai	2,24,500	18,708	Fishing
29	Agasthiyanpalli	1,45,000	12,083	Salt Work & Farming
30	Kallimedu	1,03,000	8,583	Fishing & Farming
31	Avarikadu	1,15,000	9,583	Fishing & Farming
32	Naluvdapathi	2,15,000	17,917	Farming

S. No.	Villages	Annual Income INR	Monthly income INR	Major Occupation
33	Vandal	1,04,500	8,708	Fishing & Farming

Other than agriculture and fishing, dairy produce, thatching, salt production, prawn rearing, tobacco cultivation and pottery come under the primary manufacturers' commodities. Out of the 15 sample villages, salt manufacturing done in 3 villages, thatching and milk production in 2 villages respectively, pottery and tobacco in each villages respectively.



**Chart 3.7: Major Occupation of the Gram Panchayats**

### 3.8. Livestock

In addition to agriculture and fishing lot of people are dependent on livestock-based livelihoods. Considerable income is generated by livestock rearing in the area. The livestock population details collected from the ground indicate that dependent villages have a total of 12696 cattle and 32171 goats this number may vary from the government livestock census.

**Table 3-10: Livestock population in dependent villages. (Source: Primary Survey)**

S. No.	Villages	Cattle	Goat
1	Eripurakarai	149	299
2	Narasingapuram	144	287
3	Soundaranayakipuram	114	227
4	Thamarankottai South	369	738
5	Thambikottai Maravakad	291	582
6	Thambikottai Melakkadu	253	758
7	Thampikotai Kelakadu	218	437
8	Thambikottai Vadakadu	282	565

S. No.	Villages	Cattle	Goat
9	Alangadu	554	1108
10	Uppur	484	1453
11	Jambuvanodai	552	1656
12	Thillaivilagam	925	2776
13	Thondiyakkadu	292	877
14	Karppaganatherkulam	394	1183
15	Idumbavanam	1170	2925
16	Vilangadu	319	797
17	Annapettai	959	2876
18	Voimedu East	596	1789
19	Voimedu West	340	1019
20	Pachanathikulam Middle	364	729
21	Pachanathikulam West	462	1386
22	Pannal	445	889
23	Kadinevayal	269	806
24	Marudur Therku Sethi	744	1488
25	Thennadar	299	896
26	Ayakkarambulam IV Sethi	349	1394
27	Kodiakkadu	217	435
28	Kodiakarai	103	205
29	Agasthiyanpalli	222	444
30	Kallimedu	129	258
31	Avarikadu	54	109
32	Naluvadapathi	567	681
33	Vandal	67	101
	<b>Total</b>	<b>12696</b>	<b>32171</b>

The area falls in Cauvery delta region, thus a few decades ago the livestock population was high but in recent years the livestock population has decreased due to change in land use patterns, reduced grazing lands and strict forest regulations. The shift in occupation at micro and macro level made people neglect livestock due to work drudgery and social status. In Thondiyakadu and Karpaganatharkulam collective livestock rearing is practiced by the villagers in post-harvest period. The details of livestock-based livelihoods and impacts are given in the livelihood chapter.

### 3.9. Fishing

In all the selected sample villages fishing is the primary occupation for the community. Various types of fishing is practiced in different landscapes and eco systems through different techniques and methods. The fisher's population varies based on their fishing places and methods as given below. A population of 9453 fishermen is recorded in the dependent villages. Most of the fishermen have fishermen identity card as sea fishermen except the Vandal and Avarikadu where they hold Inland fishermen identity card. Most of the them are part of government supported fishermen associations, where they get many entitlements like fishing ban period allowances, insurance, purchase of boats, insurance etc.

**Table 3-11: Fishermen population and Fishing Type. (Source: Primary Survey)**

S. No.	Village	Total fishing population	Canal Fishermen	Thottam Fishermen	Lagoon	Backwater / River	Sea (Near shore)
1	Eripurakarai	1159		120			1039
2	Narasingapuram	241	15	15		30	181
3	Soundaranayakipuram	115	50	30			35
4	Thamarankottai South	405	40	32		12	321
5	Thambikottai Maravakad	192	70	60		10	52
6	Thambikottai Melakkadu	191		50		15	126
7	Thampikottai Kelakadu	192		50		11	131
8	Thambikottai Vadakadu	368		45		15	308
9	Alangadu	405			335	3	67
10	Uppur	158			130	2	26
11	Jambuvanodai	405			376		29
12	Thillaivilagam	517		34	406		77
13	Thondiyakkadu	194		128			66
14	Karppaganatherkulam	304		223			81
15	Idumbavanam	251		212			39
16	Vilangadu	37		25			12
17	Annapettai	521		345		2	174
18	Voimedu East	302		254			48
19	Voimedu West	450		376			74
20	Pachanathikulam Middle	310		276			34
21	Pachanathikulam West	192		154			38
22	Pannal	177		132			45
23	Kadinevayal	0					0
24	Marudur Therku Sethi	287		188			99
25	Thennadar	90		90			0
26	Ayakkarambulam IV Sethi	76		54			22
27	Kodiakkadu	937		105		130	702



S. No.	Village	Total fishing population	Canal Fishermen	Thottam Fishermen	Lagoon	Backwater / River	Sea (Near shore)
28	Kodiakarai	450		100			350
29	Agasthiyanpalli	0					
30	Kallimedu	97				90	7
31	Avarikadu	70				70	0
32	Naluvdapathi	287					287
33	Vandal	73				73	0
	<b>Total</b>	<b>9453</b>	<b>175</b>	<b>3098</b>	<b>1247</b>	<b>463</b>	<b>4470</b>

Except for sea fishing, all the other fishing types have the same season from September to January. The ban period is observed from April to May for sea fishing, while other types of fishing within the wetland continue but with very less catch. Fisheries Department is responsible for enforcing the ban. The given fish catch represents an average which may get varied from day-to-day for each fisherman and the income thus gets varied based on the season. This fishermen population is collected from the primary sources



**Photo 3.2: Fishing Family in Kodiayakadu**

There are 128 Canals individually owned by Fishermen who have traditionally fished in the Muthupettai Mangrove forest from Maravakadu, Manjavayal, Manganankadu and Karisaikadu Villages of Thanjavur District (TNFD, 2018). They fish in the mangroves in the fishing canals of Palanjur and Thamarankottai mangrove forest based on the high and low

tide flow by using the indigenous fishing method of pari-sar. Many of the canals became defunct due to Gaja cyclone and other factors.

**Table 3-12: Status Muthupet Indigenous Fishing Canal**

**Status of Fishing Canal in Muthupet Mangroves. (Source: Primary Survey)**

S. No.	Village	Name	Father's Name	Length	Status
1	Maravakadu	M.K. Mahalingam	Kamatchi	1.5 km	Not Maintained
2		M. Selvaraj	Maruthaiyan	1.4 km	Not Maintained
3		P. Suntharaj	Piramaiyan	2 km	1 km Maintained
4		M. Ballusamy	Maruthaiyan	1 km	Not Maintained
5		K. Maarriyappan	Kathaiyan	2 km	Not Maintained
6		P. Chinnappa	Balaiyan	1.4 km	Not Maintained
7		V.Pitchaimuthu	Vadiveal	1.6 km	Not Maintained
8		N. Paneerselvam	Nagalingam	1.7 km	Not Maintained
9		P. Suresh	Ballusamy	1.3 km	Not Maintained
10		P. Ramaiyan	Podhiyappan	1.5 km	Not Maintained
11		S. Nagarajen	Sankeran	1.1 km	Not Maintained
12		M. Balasubramaniyan	Maruthaiyan	1 km	100m Maintained
13		M. Vadivealan	Maruthaiyan	1 km	Not Maintained
14		M. Muruganantham	Murthy	1.5 km	Not Maintained
15		M. Jaganathan	Murugaiyan	1.7 km	Not Maintained
16		S. Jeevanantham	Subramaniyan	1.5 km	Not Maintained
17		K. Sivakumar	Kanthasamy	1.5 km	Not Maintained
18		R. Suntharaman	Ramaiyan	1.6 km	Not Maintained
19		B. Paneerselvam	Ballusamy	2 km	Not Maintained
20		B. Basker	Ballusamy	1.5 km	Not Maintained
21		V. Paneerselvam	Veerariyan	1.5 km	Not Maintained
22		P. Murugeasan	Podhiyappan	1.5 km	Not Maintained
23		P. Sudhager	Palaneveal	1.5 km	Not Maintained
24		K. Veerasegeran	Ganesan	1.1 km	Not Maintained
25		M. Thiruganam	Marriyappan	1.5 km	Not Maintained
26		P. Veadhareathinam	Planeveal	1.5 km	Not Maintained
27		S. Balakrishnan	Sellaiyan	1.5 km	Not Maintained
28		S. Murugeasan	Subramaniyan	1.3 km	Not Maintained

S. No.	Village	Name	Father's Name	Length	Status
29		V. Sivakasi	Veeraiyan	1.5 km	Not Maintained
30		S. Subramaniyan	Singaram	1.4 km	Not Maintained
31		K. Kalliyamurthy	Ganapathy	1.5 km	Not Maintained
32		V.R. Murugaiyan	Rengasamy	1.7 km	Not Maintained
33		P. Paneer	Pallaiyan	1.2 km	Not Maintained
34		C. Ballaiyan	Chelladurai	1.3 km	Not Maintained
35		K. Balasubramaniyan	Ganesan	1.5 km	Not Maintained
36		S. Subramaniyan	Chelladurai	1.5 km	Not Maintained
37		L. Suntharaj	Ladamuthu	1.7 km	Not Maintained
38		S. Sivakumar	Subramaniyan	600 m	Not Maintained
39		A. Arunacheallam	Ayyakannu	1.5 km	Not Maintained
40		R. Murugaiyan	Rengaiyan	1.9 km	Not Maintained
41		K. Ballusamy	Kathaiyan	2 km	1 km Maintained
42		P. Govindaraj	Piramaiyan	1.5 km	Not Maintained
43		N. Jaganathan	Nateasan	1 km	Not Maintained
44		P. Ladamuthu	Podhiyappan	1.6 km	Not Maintained
45		M. Shanker	Mariyappan	1.5 km	Not Maintained
46		M. Basker	Murugaiyan	1.7 km	Not Maintained
47		K. Ramalingam	Kunchu	1.7km	Not Maintained
48		A. Kittu	Aadhiyappan	1.6 km	Not Maintained
49		A. Maruthamuthu	Aadhiyappan	1.8 km	Not Maintained
50		P. Rajendiran	Podhiyappan	1.5 km	Not Maintained
51		A. Balasubramaniyan	Arunachallam	2 km	Not Maintained
52		S. Archunan	Subramaniyan	1.5 km	500m Maintained
53		M. Kallimuthu	Mariyappan	1.5 km	Not Maintained
54		R. Ramalingam	Ramasamy	1.5 km	Not Maintained
55		S. Veeramani	Subramaniyan	1.1 km	Not Maintained
56		M. Ballu	Marimuthu	2 km	Not Maintained
57		K. Veeramuthu	Kallimuthu	1.3 km	Not Maintained
58		V. Subramaniyan	Veerappan	1.5 km	Not Maintained
59		C. Balasubramaniyan	Chinnadurai	1,7 km	Not Maintained
60		L. Nagaraj	Ladamuthu	1.5 km	100m Maintained

S. No.	Village	Name	Father's Name	Length	Status
61		Annadurai	Subramaniyan	1.2 km	Not Maintained
62		Veeramani	Sanmugam	1.5km	Not Maintained
63	Manjavayal	T. Govindaraj	Durairaj	1.8 Km	Not Maintained
64		M. Subramaniyan	Mannikam	1.4 Km	Not Maintained
65		B. Thiravidasalliyar	Ballaiyan	1.5 Km	Not Maintained
66		J. Ballasubramaniyan	Jaganathan	1.6 Km	Not Maintained
67		P. Saragunam		1.6 Km	Not Maintained
68		L. Keasavan		1.5 Km	Not Maintained
69		R. V. S. Ramasamy		1.7 Km	Not Maintained
70		S. Ravichandran		1.4 Km	Not Maintained
71		Karisalkadu	M. Mahendiran	Marriyapan	1.7 km
72	K. Balasubramaniyan		Kathamuthu	2 km	Not Maintained
73	R. K. Ramachanran		Kallimuthu	2 km	Not Maintained
74	G. Mahendran		Ganesan	2 km	Not Maintained
75	M. Shakthiveal		Marriyappan	2 km	Not Maintained
76	M. Palaneveal		Mannikam	2 km	Not Maintained
77	N. Marrimuthu		Natesan	2 km	Not Maintained
78	K. Ganesan		Kathamuthu	2 km	Not Maintained
79	S. Balusamy		Shanmugam	2 km	Not Maintained
80	M. Karthekayan		Maruthakannu	2 km	Not Maintained
81	R. Shanker		Ramasamy	1.7 km	0.7km Maintained
82	V. Sager		Vearaiyan	1.9 km	Not Maintained
83	M. Chandrasager		Maniyan	2 km	Not Maintained
84	K. Ravichandran		Katherasan	2 km	Not Maintained
85	K. Pallaneveal		Kunchu	2 km	Not Maintained
86	D. Vetriveal		Durairaj	2 km	Not Maintained
87	S. Muthumanikkam		Shanmugam	2 km	Not Maintained
88	Manganankadu	N. Marrimuthu	Nagalingam	1.5 km	Maintained
89		G. Mohan	Ganesan	No Canal	Not Maintained
90		S. Subramaniyan	Singaram	1.5 km	0.5 km Maintained
91		M. Rajendiran	Muthusamy	2 km	Maintained

S. No.	Village	Name	Father's Name	Length	Status
92		A. Subramaniyan	Ayyavu	1.5 km	0.7km Maintained
93		B. Murugeasan	Balasubramaniyan	1.5 km	Not Maintained
94		K. Mani	Kanni	1.5 km	Not Maintained
95		A. Murugaiyan	Ayyavu	No canal	Not Maintained
96		K. Marimuthu	Kunchu	1.5 km	Not Maintained
97		P. Balasubramaniyan	Peramaiyan	1.6 Km	Not Maintained
98		S. Rajalingam	Subramanyan	1.7 km	Not Maintained
99		S. Ragupathy	Chinnaiyan	1.5 km	0.7km Maintained
100		S. Dharmraj	Subramaniyan	No canal	Not Maintained
101		S. Laxumanan	Singaram	No canal	Not Maintained
102		K. Sager	Karuppaiyan	1.5 km	Not Maintained
103		M. Nagarajan	Marimuthu	No canal	Not Maintained
104		K. Balasubramaniyan	Kunchu	1.5 km	Not Maintained
105		G. Chandrasekaran	Ganesan	1.5 km	0.7km Maintained

In order to ensure better livelihood opportunities these fishing canals needs to be renovated by the forest department for mangroves regeneration.

**Table 3-13: Fishing type, season and income**

Fishing type	Favorable season	Fish catch during season (kg/day)	Income during favorable season (INR/Day)
Canal Fishermen	September to January	5 to 10	300-1500
Thottam Fishermen	October to February	5 to 20	500-1500
Lagoon	October to February	5 to 20	500-1500
Backwater /River	July to January	1 to 3	100-200
Sea	whole year	15 to 30	2000-2500

The main fishes available in Point Calimere area are listed in Table 3.14. The fish catch depends on the type of fishing and season. The fishermen catch fish, crabs and prawns. For each of these they have different kinds of nets with varying sizes. The average life of a net is six months to one year based on the usage. The fish and its catch are detailed in the livelihood chapter. The common catch includes Keluthi, Koduva, Vellampodi, Madava Kenntai, Panna and white prawn.



**Photo 3.3: Mudskippers near Muthupettai**

**Table 3-14: Major Fish Species available in Point Calimere Wetland**

Local name	Common name	Scientific name
<b><i>Common Fish Species</i></b>		
Madava	Mullet	Mugil cephalus
Kendai	Mullet	Liza dussumeri
Koduva	Sea Bass	Liza Macrolepis
Motta kendai	Mullet	Liza Tade
Visha kedutha	Catfish	Tachvsurus thassinus
Panni (kalava)	Reef cod	Epinephelus malabaricus
Pengyalai	Mackerel	S. Cavalla
Keluthi, Mandai	Catfish	Mystus gulio
Kural/kodava	Seabass	Lates calcarifer
Vilangu	Eel	Err oplus surarensis
Seleppi	Mangrove red snapper	Ambassis sp
Vallai	Mula	
Tokapodi	Anchovy	
Tolipodi		
Seraiyakendai		
Palakendai,		
Kadavakendai		
Pullavalai	Threadfin bream,	Nemiptreus sp
Kattla	Mula(emperor)	Sillago sihama

Local name	Common name	Scientific name
<b>Common Fish Species</b>		
<b>Common Prawn Species</b>		
Vella ral	White prawn	Peneaus indices
Karunvandu ral	Tiger prawn	Peneaus monodon
Sivappu ral and	Brown shrimp	Aletapeneaus monoceras,
Manguni eral	Pink shrimp	Metapeneaus spp
Thazhai ral		
<b>Common Species of Crab</b>		
Seethunandu or Sambha nandu	Mud crab	Scylla serrate
Thillai Nandu	Mangrove crab	Scylla oceanic
Nedunkal nandu	Sea crab	Portunus pelagicus
Kadukka nandu	Sea crab	Protunus sangulionatus
Neela Kaal Nandu		
Mukkan Nandu		
Neruppu Nandu		
Kolukkattai Nandu		
Aakaalai Nandu		
Thoppi Nandu		
Kaatu Nandu		
Kadi Nandu		

### 3.10. Floriculture

In addition to fishing, floriculture as part of agriculture is also practiced as key livelihood. This helps the families involved ensure income during the functions and festival season. Due to poor market facility the floriculture farmers find it difficult to get fair price. Often the merchants and middlemen take away their profits.

**Table 3-15: The Areas and Villages involved in Floriculture**

S. No.	Gram Panchayat	Hectare-Acre-Cent	No. of Households Involved
1	Kadinelvayal	4.84	65
2	Pannaal	12	210
3	Panchanathikulam Nadusethi	8.23	70
4	Panchanathikulam East	8.25	80
5	Panchanathikulam West	9.47	120
6	Ayakaranpulam 1	9.64	110
7	Ayakaranpulam 2	11.27	160
8	Ayakaranpulam 3	92.54	370

S. No.	Gram Panchayat	Hectare-Acre-Cent	No. of Households Involved
9	Ayakaranpulam 4	5.80	60
10	Thennadaar	5.07	50
11	Maruthur South	10.26.5	160
12	Maruthur North	2.49.5	30
13	Voimedu East	1.76.5	20
14	Voimedu West	2.58	30
	<b>Total</b>	<b>184.2</b>	<b>1535</b>

In all, 171.99 hectares is cultivated for floriculture by the farmers. This activity is more common and rigorously practiced in the villages around Vedharanyam. There is high scope to expand this activity among the dependent villages of PCWC.

### 3.11. The Working Population

There are around 45000 workers in total in the 33 villages, out of which 31328 are classified as main workers working for the whole year. Main workers are further divided into 8221 cultivators, 12883 agricultural laborers, 337 household industry workers and 9888 other workers (GoI, 2011). The other workers include salt works, aquaculture and fishing industry laborers.

**Table 3-16: The Working Population in the Dependent Villages**

S. No.	Village Name	Total worker	MAIN WORK Population	MAIN Cultivators Population	MAIN Agri. labours	MAIN Household industry workers Population	MAIN Other Population
1	Eripurakarai	1548	1479	12	300	8	1159
2	Narasingapuram	918	754	13	496	4	241
3	Soundaranayakipuram	677	671	50	505	1	115
4	Thamarankottai South	1986	1649	414	826	4	405
5	Thambikottai Maravakad	1291	503	100	211	0	192
6	Thambikottai Melakkadu	1024	993	347	399	56	191
7	Thampikotai Kelakadu	1291	503	100	211	0	192
8	Thambikottai Vadakadu	1239	1142	329	405	40	368
9	Alangadu	2027	1649	414	826	4	405
10	Uppur	1388	537	235	128	16	158
11	Jambuvanodai	1807	1649	414	826	4	405
12	Thillaivilagam	2563	2382	923	924	18	517
13	Thondiyakkadu	998	439	134	110	1	194
14	Karppaganatherkulam	1057	522	145	70	3	304



S. No.	Village Name	Total worker	MAIN WORK Population	MAIN Cultivators Population	MAIN Agri. labours	MAIN Household industry workers Population	MAIN Other Population
15	Idumbavanam	4038	1493	285	877	80	251
16	Vilangadu	1112	1103	489	577	0	37
17	Annapettai	3385	2044	727	787	9	521
18	Voimedu East	1552	1519	518	653	46	302
19	Voimedu West	817	478	4	22	2	450
20	Pachanathikulam Middle	1428	1291	440	540	1	310
21	Pachanathikulam West	1329	503	100	211	0	192
22	Pannal	1119	1059	417	462	3	177
23	Kadinevayal	631	164	1	77	0	86
24	Marudur Therku Sethi	1658	955	373	291	4	287
25	Thennadar	808	145	54	0	1	90
26	Ayakkarambulam IV Sethi	1006	423	75	267	5	76
27	Kodiakkadu	1294	1142	56	140	9	937
28	Kodiakarai	806	478	4	22	2	450
29	Agasthiyanpalli	1817	1649	414	826	4	405
30	Kallimedu	498	219	67	55	1	97
31	Avarikadu	456	429	120	293	2	14
32	Naluvethapathi	1492	955	373	291	4	287
33	Vandal	409	407	74	255	5	73
	<b>Total</b>	<b>45469</b>	<b>31328</b>	<b>8221</b>	<b>12883</b>	<b>337</b>	<b>9888</b>

### 3.12. The Basic Infrastructure

All the Point Calimere wetland dependent villages are equipped with basic infrastructure facilities like, health, sanitation, education, disaster relief buildings, veterinary services etc. As per 2011 census Idumbavanam, Kodiakarai, Voimedu and Naluvethapathi have Primary Health Centers (PHC). Primary Health Sub Health Centers exist in 22 villages, but in 11 villages there is no health service provision made by the government. The details are mentioned in Annexure VI

#### The Drainage and Waste Management Status in the Dependent Villages

In most of the villages, drainage and waste management facilities are available and working which are maintained by the Gram Panchayat and Municipality. In almost all the villages the waste is being collected by the Gram Panchayat and Municipality workers. There is minimum threat for the wetland on disposal of solid waste and sewage. Gram Panchayats in the periphery of the Ramsar Site have pit system for toilets. The sewage waste from Muthupet drains into Koraiyar and from Adhirampattinam is directly drained into the sea.

**Table 3-17: Drainage Status ins in the dependent villages**

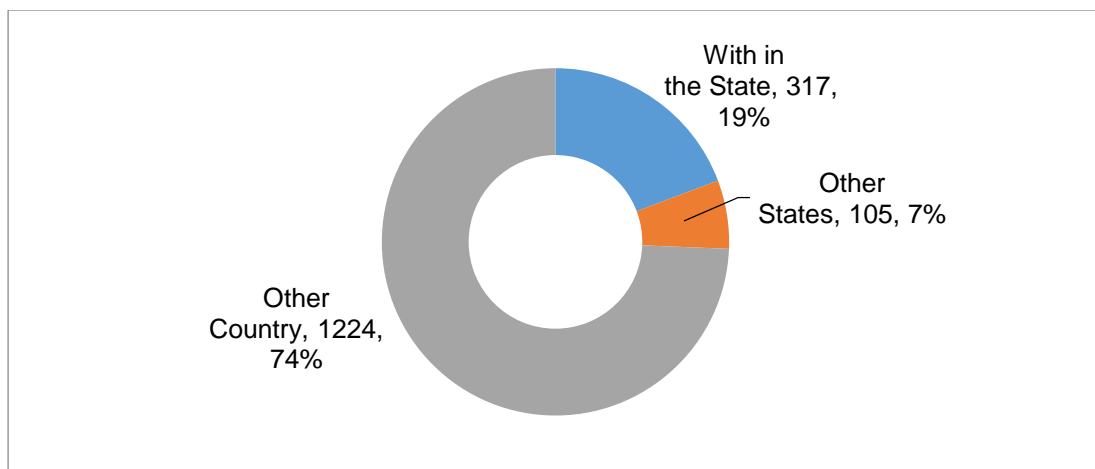
<b>S. No.</b>	<b>Village Name</b>	<b>Block Name</b>	<b>Closed Drainage (Status A(1)/NA(2))</b>	<b>Open Drainage (Status A(1)/NA(2))</b>	<b>No Drainage (Status A(1)/NA(2))</b>
1	Eripurakarai	Pattukkottai	1	1	1
2	Narasingapuram	Pattukkottai	1	1	1
3	Soundaranayakipuram	Pattukkottai	1	1	1
4	Thamarankottai South	Pattukkottai	1	1	1
5	Thambikottai Maravakad	Pattukkottai	1	1	1
6	Thambikottai Melakkadu	Pattukkottai	1	1	1
7	Thampikotai Kelakadu	Pattukkottai	1	1	1
8	Thambikottai Vadakadu	Pattukkottai	1	1	1
9	Alangadu	Muthupettai	1	1	1
10	Uppur	Muthupettai	1	1	1
11	Jambuvanodai	Muthupettai	1	1	1
12	Thillaivilagam	Muthupettai	1	1	1
13	Thondiyakkadu	Muthupettai	1	1	1
14	Karppaganatherkulam	Muthupettai	1	2	1
15	Idumbavanam	Muthupettai	1	1	1
16	Vilangadu	Muthupettai	1	1	1
17	Annapettai	Vedaranyam	1	1	2
18	Voimedu East	Vedaranyam	2	1	2
19	Voimedu West	Vedaranyam	1	1	2
20	Pachanathikulam Middle	Vedaranyam	1	1	2
21	Pachanathikulam West	Vedaranyam	1	1	2
22	Pannal	Vedaranyam	1	1	2
23	Kadinevayal	Vedaranyam	1	1	2
24	Marudur Therku Sethi	Vedaranyam	1	1	2
25	Thennadar	Vedaranyam	2	2	1
26	Ayakkarambulam IV Sethi	Vedaranyam	1	1	2
27	Kodiakkadu	Vedaranyam	1	1	2
28	Kodiakarai	Vedaranyam	2	1	2
29	Agasthiyanpalli	Vedaranyam	1	1	2
30	Kallimedu	Thalainayar	1	1	2
31	Avarikadu	Thalainayar	1	1	2
32	Naluvvedapathi	Thalainayar	1	1	2
33	Vandal	Thalainayar	1	1	2

Common Property Resources

Little area of natural common property resources is available in the fringe villages due to the unique landscape. The area borders reserved forest adjacent to sea. The existing revenue land is either used for infrastructure development or taken by forest department as part of management as most land has prosopis growths. Other than that numerous surface water bodies like tanks, ponds, rivers, canals and common infrastructures are effectively used in these villages.

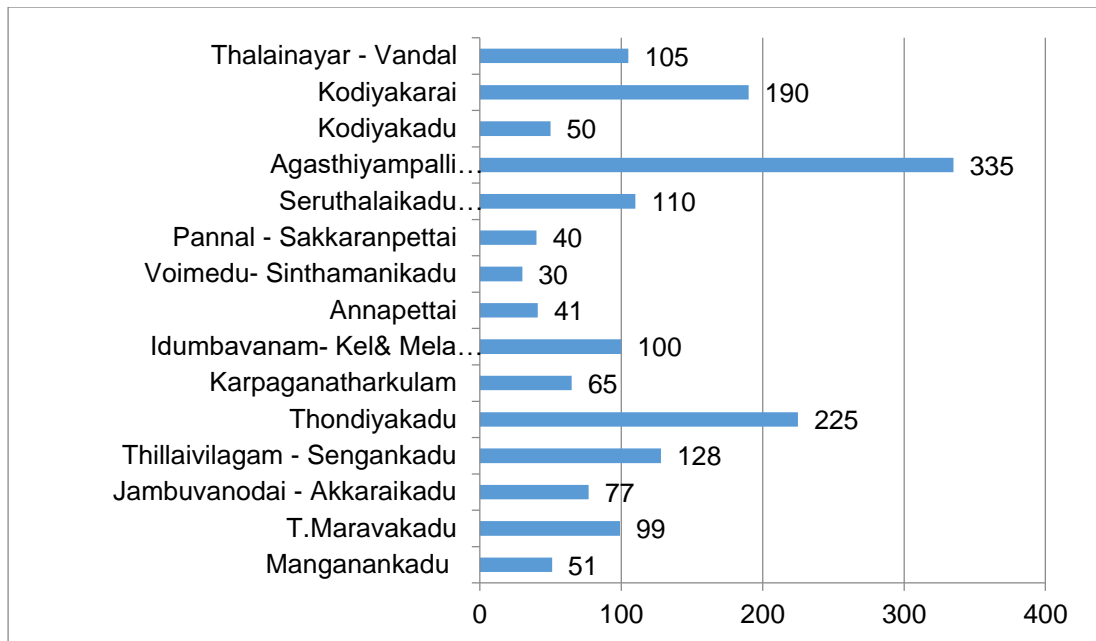
### 3.13. Migration

Migration is a common in the wetland-dependent villages. Most of the villagers, especially the men migrate to gulf countries as laborers. They are dependent on external agents from Muthupettai, Athirampattinam and Vedharanyam for immigration. The expenses are met by the money obtained from money lenders and other informal resources. An internal study found that 1646 villagers from these villages have either migrated to other regions within the state or other states or left for other countries in search of better livelihood opportunities. They often migrate as semi-skilled or unskilled labors. Migration to Arabian countries is common in the area.



**Chart 3.8: Details of migration**

It has been observed that most men in their twenties and forties leave for gulf countries from these villages. They work there for 3-6 years before returning to settle their debts, construct a house or purchase a boat to secure their and families' futures.



**Chart 3.9: Village wise migrants' status**

From the sample villages, 1224 people have immigrated to gulf countries as laborers with a monthly income of around Rs.20, 000- Rs.50, 000. Approximately 420 have migrated to other districts and states as unskilled laborers in construction or service industries. A detailed study on migration needs to be done to understand the dynamics of the migrants and its impacts. In Agasthiyampalli, ThonDIyakadu, Kodiakarai, Seruthalaikadu, Idumbavanam, Vandal, and Sengankadu more than 100 people have migrated to different places. The reason for migration is majorly better employment opportunities and better labour rate. However, recent findings have shown that the rate of migration is gradually reducing.

## 4. Analysis and Report

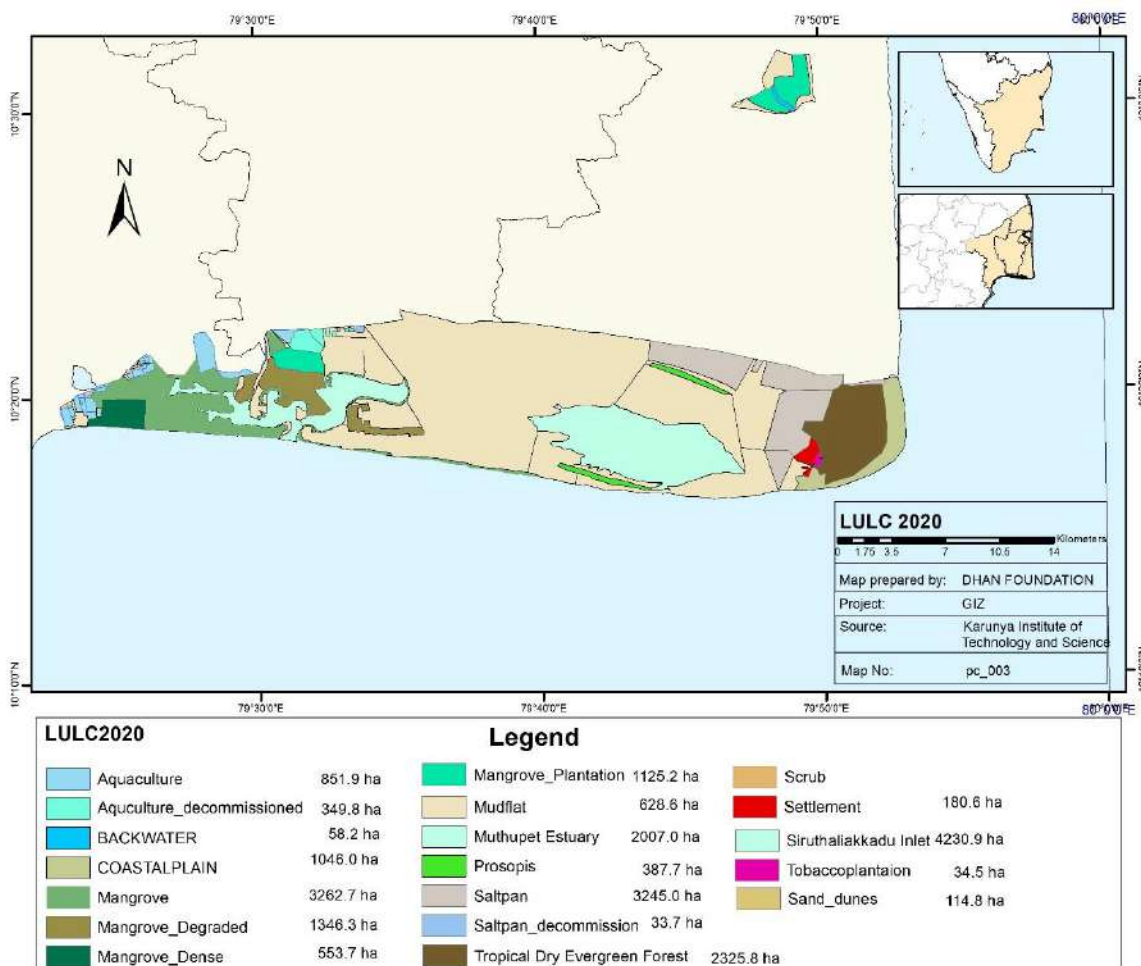
### 4.1. Mapping and Description of ecosystem of Point Calimere site

#### *Wetland Ecosystem in Point Calimere wetland complex*

The Point Calimere wetland complex is the geographical region between the estuaries of the distributaries of River Cauvery and the sea. This geographical region has a wide range of ecosystem such as Mudflats, swamps, mangroves, tidal creeks, lagoons, dry evergreen forests and sand dunes. The land cover of the wetland landscape has been changed into man-made fishing canals, salt pans, shrimp farms, brine reservoirs and saltwater channels over several centuries. These ecosystems provide various services to not just the wetland dependent local communities but also the regional and global communities.

Before exploring the services provided by the ecosystems in the wetlands, their influence and the spatial extent, it is important to understand the 'zonation of the wetland complex' as per the wetland dependent communities.

The wetland dependent communities zonate this wetland complex into four major zones:



**Map 4-1: Land use land cover Point Calimere Wetland Complex 2020**

### **Zone 1- Alam (Mudflats):**

Alam is an extensive mudflat in the northern Point Calimere wetland complex, just after the agricultural lands where many of the drainage arteries of the Cauvery delta empty their water. These drainage arteries are part of the Vennar Sub-basin that flows seasonally. These mudflats remain dry except when the sea water rises during high tides and when the river flows during the monsoon. The depth of water in the alam during the wet period varies from 0.1 m to 1 m. During the summer, when the high tides wet the mudflats, salt gets deposited. These deposited salts are handpicked by the communities for their consumption. The soil salinity increased during this season is diluted by the fresh water draining during the monsoon.

The mudflat spreads over Muthupet reserve forest, Vedharanyam and in Thalainyayiru reserve forest. The Alam from Athirampattinam to Vedharanyam receives saltwater during 'Thennangkaathu' (southern winds) and the Alam in Thalainyayiru receives saltwater from the backwaters 'Keezhakaathu' (eastern winds).

Over three centuries, mudflats have undergone several land use land cover changes such as Salt pans, Aquaculture – Shrimp farms and agriculture lands.

This is the zone where the freshwater from drainage arteries of River Cauvery interacts with high tidal sea water. This interaction creates a brackish zone that favours proliferation of Mangroves. Higher the freshwater-seawater interaction, higher the mangrove establishment. This is reflected in the presence of mangroves in Muthupet and Thalainyayiru region than the Vedharanyam swamps.

### **Zone 2 - Thottam/ Kottagam (Mangrove Degraded Mudflats at High Tidal Zone):**

The trough-shaped portion of the mudflats, next to Alam in a falling gradient towards the shoreline is called Thottam or Kottagam. Depending upon the semi-diurnal tides, the depth of water in this Thottam varies from 0.3 m to 1 m. The water level in the Thottam is high during the monsoon and southern winds. In the past this zone was densely populated with mangroves. But due to coup felling, damming of rivers, the mangrove regeneration in this zone was severely affected, turning the soil and water highly brackish. This retarded the regeneration of mangroves further in the degraded zone.

Apart from Mangroves and degraded Thottam, lagoons, sand dunes, manmade fishing canals, saltwater channels, manmade boat canals and Brine reservoir are the other land cover components of the Thottam.

### **Zone 3 - Shoreline:**

Next to the Thottam, there is a long shore line from Athirampattinam to Kodyakarai, which has linear vegetation. This shore line has natural creeks in which Mullipallam creek, Chellakannacreek are the major creeks that resulted in formation of lagoons. Kaluvapaththai, Manavaikkal, Siththankoyil and Pudhu creeks are minor creeks in this shore line. The community locally calls it as *Udavu*.

## Zone 4 - Coastal Plains:

The Coastal plain are located between the Vedharanyam Swamps and the Point Calimere, falling towards south east. This coastal plain is demarcated by the shore line that turns approximately 90° connecting the Bay of Bengal and the Palk Strait. The coastal plain has a mixture of Tropical dry evergreen forest, mudflats, grasslands, storm water drains that act as backwater channels and sand dunes. This coastal plain serves as the habitat for some of the endangered bird species, black bucks and Olive Ridley turtles.

**Table 4-1: Distribution of land use land cover in the Point Calimere Wetland Complex**

Zone	Land use Landcover of wetlands	Muthupet Mangrove Reserve Forest	Vedharanyam Reserve Forest	Thalainyayiru Reserve Forest
Alam	Mudflats – Alam	67.5%	51.3%	83%
	Salt Pan– Operational and Decommissioned	1.9%	15.8%	
	Aquaculture Shrimp farm – Operational and Decommissioned	11%		
Thottam	Manmade fishing canals with natural dense mangroves	4%		
	Lagoon	9.3%	15%	
	Brine reservoir		3.8%	
	Boat canals	1.9%	0.2%	
	Thottam - Degraded trough portion	3.9%		
	Plantation Mangroves in Mudflats		0.1%	17%
Shoreline	Back water channels	0.4%	0.1%	
	Creeks		8.2%	
Coastal Plains	Tropical evergreen forest		5.6%	
Total		100%	100%	100%

## 4.2. Description of the Land-use and Land-cover

### Mudflats-Alam

Mudflats formed in intertidal areas are the exposed layers of bay mud, resulting from deposition of estuarine silts, clays and aquatic animal detritus. Mudflat has both barren and marshy zones. Among the barren and the marshy zones of the Mudflats, Alam is the barren zone that extends from the lowest portion of the intertidal zone to the marsh areas.

The mudflats of the Muthupet are formed by the estuaries' silts of Nasuviniyar, Pattuvanachi, Paminiyar, Korayar, Kilathangiyar and Marakkakoryar and the tidal deposits via Mullipallam Creek. As the Muthupet mudflats receive higher quantity of freshwater flow from 6 arteries, the mangrove proliferation in these mudflats is comparatively higher than that of other reserve forests.

The mudflats of the Vedharanyam swamp are formed by the estuaries' silts of Valavanar, Mulliyar and Manakondanar and the tidal deposits via Chellakannai Creek. Since the flow in three of the arteries is very poor, the soil salinity of the mudflats in this swamp is very high. This got reflected in the degradation of mangroves. Vedharanyam swamp has poor mangrove cover compared to that of other reserve forests. The Mudflats are predominately invaded by *Prosopis* (Chinthamanikadu, Vandal, Serthalaikadu).

The mudflats of the Thalainyayiru reserve forest are formed by the estuaries' silts of Adappar and Nallar. As the Vedharanyam Canal is the only source of tidal action, the mudflat is less influenced by coastal detritus. Therefore, the behavior of this mudflat varies from that of other two mudflats in terms of presence of fresh water ecosystem.

As these tidal mudflats are saline in nature, very less salt-resistant flora could survive. The names of the mudflats, coined by the local community tells the flora of these mudflats,

- The mudflats in the Muthupet region are called 'Putharkaadu/Umurikaadu' named after the scrubs of *Suaeda* (Umuri),
- The mudflats of Pannal are called 'Karuvakkaadu' named after invasive *Prosopis*, which was introduced in 1960s for meeting household firewood demand,
- The mudflats of Panchanathikulam are called 'Serthalaikaadu' named after 'swamp forest'
- The mudflats of Vedharanyam are called 'Kallikaadu' named after *cactus*
- The mudflats of Thalainyayiru are called 'Sambalam' and 'Allialam' named after *Sambu* (reed) and *Alli* (water lily) respectively.

Only very few ultra-poor communities are involved in hand fishing in the Alam zone of Great Vedharanyam swamps, that too in the wet season. But this is not the case in Avarikadu-Vandal and Kallimedu. Almost 8 communities are directly involved in fishing in the Alam zone. People around the Vedharanyam canal backwaters are involved in hand fishing in low flow season and net fishing during high flood season. Prawn catch is predominant in this zone.

Reclamation of mudflats into agriculture land and conversion of mudflats into saltpans and shrimp farms is a common practice in Asian countries; Point Calimere is no exception to it. About 10,000 acres of the Point Calimere Wetland Complex has been converted into Saltpans, which is a significant percentage of the total area.

#### **Agricultural land:**

As the mudflats remained barren 'Poromboke', in 1960s a portion of mudflats adjacent to agricultural land was distributed by Tamil Nadu state government.

Landless fishing communities were distributed with 2 acres of land each in the periphery of the wetlands along with the families of INA soldiers as a freedom fighter's rehabilitation. The land was distributed with some regulations such as the land should be brought into cultivation within three years and dug to more than a pot's depth and so on.



Communities of Maravakadu, Thillaivilagam, Karpaganatharkulam were majorly benefitted by these land distribution schemes.

These agricultural lands were rainfed in nature. Fishermen communities and agricultural laborers strived hard to flush away the soil salinity and created bunds to protect from the surge of high tides.

### **Salt pans:**

The deposition of salt during the high tidal season, opened up opportunities to convert the mudflats into salt pans. Salt Pans are predominantly found in Athirampattinam, Maravakadu and Thambikottaivadakadu of the Muthupet reserve forest covering 912 hectares; Pannal, Panchanathikulam Middle, Kadinelvayala and Agasthiyampalli of Vedharanyam swamp covering 3850 hectares.

Till 19<sup>th</sup> century the salt production was done only when the sea water rises during the '*Thennangkaathu*' (southern winds) from March to June. The salt production was only for two or three months, i.e. during the late summer.

In 19<sup>th</sup> century, the saltwater canals were created for connecting the mudflats to the sea. In Agasthiyampalli and Maravakkadu, parallel saltwater canals were created to convey saltwater to the pans. In Agasthiyampalli, Visagam Canal was created in a way, that it conveys high tide saltwater both in *Thennangkaathu* and *Keezhakathu*. The salt pans received saltwater in March – June from Palk Strait due to southern winds and in July to September from Bay of Bengal due to eastern winds. The lateral channels from the Vishagam channel filled up the salt pans of Agasthiyampalli. '*Eravaipotti*' (traditional V shaped box attached to a swing) was used to fetch saltwater from the low-lying channel to the high lying salt pans.

In 20<sup>th</sup> century, British invested in salt production by creating pumping stations in the saltwater channel to pump the sea water to a maximum potential. This extended the salt production period for more than six months.

In 1980s, bore wells powered by diesel motors were used to fill the salt pans with saltwater. This was the period when the saltwater was abstracted from the aquifers. But the practice was predominantly adopted by a private company called SKSP Pvt Ltd.

In the first decade of 21<sup>st</sup> century, the salt pan producers shifted towards bore wells powered by electric motors. Even small-scale salt producers have electric motor driven bore wells as individual or collective. The supplementary saltwater from aquifers extended the salt production throughout the season except the rainy season (October-December).

Presently a total of 10,054 ha of land is under salt pans in the Point Calimere Wetland Complex. The total production, employment and lease periods for each type of ownership are mentioned below.

1. GHCL- The total area covered 3200 acres, total production 80000 - 1.5 lakh metric ton per year based on the seasonality and the total staffs are 710
2. Chemplast- The total area covered 3350 acres, total production 80000 - 1.5 lakh metric ton per year based on the seasonality and the total staffs are 760

3. Small scale Salt producers – 3504 acres, total production average 1 lakh – 1.5 metric ton per year based on the seasonality and the depended families and labours are 7000-9000

The lease period is 20 years, the last leased out year is 2000, now the lease renewal process about to start (post May, 2021).

### **Aquaculture-Shrimp Farm:**

It was only after 1990s, the Aquaculture shrimp farms entered into the wetlands. Insurgence of saltwater and availability of less saline ground water favoured the aquaculture producers to convert the agricultural lands, salt pans, poromboke lands into Shrimp farms. The agricultural lands of Thambikottai, Jambavanodai and Thillaivilagam, Salt pans and poromboke lands of Athirampattinam and Maravakadu were converted into shrimp farms. Similarly, agricultural lands of Avurikkadu and Vandal were also converted into shrimp farms.



**Photo 4.1: Aquaculture Farm close to Mangrove Forest in Adirampattinam**

The canals that carried saltwater for salt pans were also used by the shrimp farmers. Saltwater reservoirs were created in the upstream of the farms to store the pumped sea water. As the sill level of saltwater canals were below the shrimp farms, diesel or electric motors were used to pump the saltwater from the canal to fill the farm. Separate drainage canals were provided to dispose the highly polluted nutrient and pesticide rich farm water into the lagoon or sea.

The total area of aquaculture-shrimp farms in the Point Calimere Wetland Complex is about 3130 hectares, in which 7.5% is located in the Avarikkadu -Vandal, rest are located in Muthupet Mangroves from Athirampattinam to Sengangadu. Among these shrimp farms, about 25% remains non-operational and few acres of encroached farms near the Manganakaadu remains defunct.

### **Dense Mangroves:**

The marsh zone of the mudflats in the intertidal area of the wetland is called the Alam. This marsh zone, where the freshwater from river arteries interacts with the high tides, in the tropical region is a favourable zone for the mangroves. The brackish water condition creates the best suitable environment for the mangrove habitat proliferation.

Mangroves locally called *Alaiyathi*, meaning subsides the sea waves, is dominated by *Venkandal* (*Avicennia marina*), *Nari kandal* (*Aegiceras corniculatum*) and *Thillai* (*Excoecaria agallocha*). *Pei kandal* (*Rhizophora mucronata*) and *Thee parathai* (*Lumnitzera racemosa*) are considered to be introduced to this ecosystem from Pitchavaram mangroves. *Umuri* (*Suaeda*) is the common associate species found along with the mangroves. *Neer umuri* (*Suaeda maritima*), *Kalu muri* (*Suaeda monica*) and *Poo umuri* (*Salicornia brachiata*) are commonly found associate species.



**Photo 4.2: Associate Species of Mangroves**

The mangroves host lakhs of migratory birds both terrestrial and aquatic, mangrove dependent aquatic habitats, wild fox, wild boar, wild cat and insects. The sensitive mangroves serve as breeding grounds for the marine habitat.



The mangroves, especially *Avicennia marina* is densely populated in the marshy mudflats between lagoons, drainage channels, fishing canals, boating canals where the fresh and seawater interface is better.

### **Thottam:**

In the past the marsh mudflats were wetted by the arteries of the Cauvery River. Therefore, the mangrove proliferation was wide along this marshy zone of Point Calimere wetland complex. The revenue generated by clear felling of the mangrove forest was utilized by the Chatram Department, which built a number of rest houses (Chatrams) for north Indian pilgrims who visited Rameswaram in the south. This practice of clear felling was locally called as '*Kooppu*'.

In 1900s the British authorised the Chatram Department to clear fell the mangrove forest for revenue generation. This practice continued till 1912 when the first working plan for Muthupet was prepared. The working plan prescribed clear felling with 12 years rotation and this continued till 1936. Later the Muthupet mangrove forest was handed over to the Forest Department which also clear felled the mangrove trees but with 20 years rotation. This practice continued till 1971.

Damming of rivers to fulfil the growing water demand of the urban settlements and intensive irrigation-based agriculture practiced in the Cauvery Delta adversely affected the regeneration of the mangroves in clear felled areas. As the flow of arteries into the marshy zone reduced, the salinity of the zone increased to a greater extent (45 - 125ppt), which resulted in shoot die-back syndrome. Subsequently clear felling of mangrove forests was stopped due to large-scale degradation and poor regeneration.

This degraded marsh zone that remains as Thottam, is the ground for the marginal fishermen from Thondiyakadu, Idumbavanam, Karpaganatharkulam, Voimedu, Annapettai, Maruthur south, Thennadar, Pannal, Kodiyakadu, Kodiyakarai, Panchanathikulam, Maniyantheevu of Agasthiyampalli. These fishermen either travel a distance of 10-30 kilometres a day by walk, cycle, motorcycle or boat, based on their economic stability.

### **Lagoon:**

There are two lagoon formations in the Point Calimere Wetland Complex. The Muthupet lagoon formed by the Mullipallam creek is present in the Thottam of Muthupet reserve forest and the lagoon (which is also locally called as Chellakannaicreek) formed by the Chellakannaicreek falls under the Thottam of Vedharanyam swamps.

Muthupet lagoon with an area of around 1700 hectare supports fishing communities from Thillaivilagam, Muthupettai, Jambavanodai, Thuraikadu, Pudhukottagam, Uppur, Aalangkaadu, Veeranvayal, Maravakadu, ThambikottaiVadakadu and TambikkottaiMelakadu. The depth of the lagoon ranges from 0.2 to 2.0 m. The eastern portion of the lagoon is very shallow and the average depth is about 0.3 m. The western portion of the lagoon and a newly formed portion located to the west of the lagoon are 0.5 to 1.0 m deep. In the creek region of the lagoon, the depth ranges from 1.0 to 2.0 m.

Chellakkani lagoon with an area of around 3800 hectares supports fishing communities from Thondiyakaadu to Kodyakarai. Due to poor or zero flow from the three arteries of Cauvery (Valavanar, Mulliyar and Manakondanar), the thottam around the lagoon has lost its green cover completely. The only green cover left in this lagoon is the trees thriving in the sand dunes. These sand dunes are called as '*theevu*', meaning islands, as it is surrounded by the lagoon water. The depth of lagoon ranges from 0.2 to 1.5 m. The depth of lagoon increases falling towards the Chellakannai Creek. As there is zero fresh water flow into the lagoon, the salinity of the lagoon water is higher than 45 ppt. This favours the salt producers to pump the saline water from the lagoon for their salt production.

### **Manmade fishing canals**

Manmade Fishing canals (*Pari Madai Vaikkal*) are unique traditional practices that exhibit the ingenuity of the indigenous communities on the symbiotic relationship between mangroves and their fishing livelihood. Reliable flow of fresh water from rivers Nasuvini and Pattuvanachi, presence of sea in the vicinity, are the key factors to create these fishing canals in the mudflats. It is a sustainable landscape architecture in the mangrove mudflats designed well, utilising the fresh water and sea water interface. There are about 128 fishing canals, created and maintained by communities of Maravakkadu and Manganakadu.

Traditional fishermen created '*Veraguvetti Vaikal*' (channels) across the estuary of river arteries, to carry freshwater to the lateral channels that connect with the sea. The freshwater-saltwater interface takes place in these lateral (Parimadai) channels.

Fishers from Manganakkadu, Karisaikkadu, Manjavayal and Maravakkadu (Veerankoil) villages are active in these canals fishing intensively from November to March (late monsoon to post-monsoon season). The canals are about 1 to 3.5 km long, 2 to 3 m broad and 1 to 1.5 m deep. Sea water along with fish, prawns and their juveniles enter these canals during the high tide. During low tide, the mouth of the canal is fitted with a locally developed fish pen called '*saar*'. Fish and prawn that try to move out into the sea during the low tide are caught in a trap called '*pari*' or harvested by a scoop net locally known as '*kachchavalai*'.

Saltwater rises through the channel during diurnal high tides, wets the mudflats and increases the salinity of the soil around the channel. During the monsoon, the canal acts as a drainage that drains away the salt along with the freshwater flow and reduces the salinity of soil. This natural system helps the mangroves to thrive.

### **Plantation Mangroves**

Though tree felling was stopped in 1971 to address extensive degradation, it took 15 years to invest on regeneration of the mangroves. Canal Bank Planting Technique had been adopted in the earlier days for artificial regeneration of the mangroves. In this technique, canals were first laid in selected areas to allow tidal water to leach excess soil salinity and create conditions conducive for establishment of mangrove propagules. Until 1997, regeneration was carried out only in smaller extents, say 50 to 100 hectares. Only after 2000, large scale mangrove afforestation was undertaken under Centrally Sponsored Schemes.

Canal bank plantation technique is but an adaptation of the traditional fishing canal technique that utilizes the fresh and sea water interface. The box-design of canal formation has undergone several modifications to attain the current practice of Modified fish bone technique. Higher survival of mangroves in the fish bone canals in Muthupet region motivated the Forest Department to scale it up in Vedharanyam swamps. But low fresh water flow and higher degree of salinity in Chellakkani lagoon resulted in failure of the mangroves planted in this region.

### **Fishing boat canal**

Traditionally the river arteries and backwater (salt) canals have been used by the fishermen for accessing the lagoon, creek or the sea. A group of fishermen travel together in a boat through this canal, and get down wherever they wish to fish, after the fish catch they board back and return in the same boat. A share of 1% of the fish catch is given to the owner of the boat as a travel charge.

A 3-km long fishing boat canal that connects the Seruthalaikaadu with the Chellakannai Lagoon is one of the traditional fishing boat canals created by the local communities to access the lagoon.

When the flow in Valavanara and Manankondan river reduced from low to nil, the fishermen from Thodiyakadu to Kadinavayal lost their accessibility to the Chellakannai lagoon, creek or the sea completely. This led to a loss in livelihood. To revive their access, the fishermen communities, especially the boat owners contributed Rs.5000 per boat and created an 8 km long new fishing boat canal from Thonduyakadu to Chellakkani Lagoon. The canal created by the fishermen was 15 meters long and 1 m deep. Other than this, Pattuvanachi, Kathaparichan and oraiyar also used as fishing route reach out Thottam, Lagoon and Sea.

### **Brine reservoir**

Brine reservoirs are the seawater reservoirs which were constructed in the Kottagam or Alam of the Mudflats. The salt water pumped from the sea or the lagoon (Chellakkani) is stored in the brine reservoirs to increase the salinity of the water from 3<sup>o</sup> Be to 10<sup>o</sup> Be. Once the water reaches 10<sup>o</sup> Be, it is pumped to the condensers and then to the Salt pans.



**Photo 4.3: Chemplast brine reservoir in Kodiyakarai**

When the saltwater is pumped from the sea or the lagoon, it is pumped along with the juvenile prawns and fishes. Prawn locally called as '*Vellaraal*' and '*Manguni*' are abundantly available in this brine reservoir. Economically downtrodden communities from Manniantheevu, Kodyakaadua and Kodiyakarai involve in hand fishing in these Brine reservoirs.

Currently, Chemplast pumps the saltwater directly from the sea and stores in the brine reservoirs of Kodiyakarai and GHCL pumps from Chellakannailagoon and stores in the brine reservoirs above Serthalaikaadu.

#### **Sethuguda:**

'Sethuguda' is a small bay of about 30 to 40 ha, where Koraiyar meets the lagoon. It is bordered by thick mangroves. Traditional practice of fishing in Sethuguda, a prawn rich pocket, is an integrated version of Canal fishing with the aquaculture, utilising the tidal movement and mangrove habitat. This traditional community practice of fishing in Sethuguda later fell into the hands of rich politically influential people. These families restricted the entry of any fishermen into the areas. Later, during the 1950s, a fisherman co-operative society was formed to break this tradition. The society took these areas on lease from the government and opened it to all fishermen. Currently, fishermen are paying Rs.2 per member to the association as lease amount.

#### **Shoreline**

Point Calimere wetland complex has a 65 kilometers long shore line. The shoreline had dense mangroves from Athirampattinam to Mullipallam creek. These mangroves have been severely affected by Gaja cyclone. The shoreline from Mullipallam Creek to Chellakannacreek has sparse mangroves with high *Prosopis* invasion. A thick *prosopis* patch is found for a stretch of 5 kms. The shoreline from Chellakannacreek to Point Calimere has sparse *Prosopis* and the coast line from Point Calimere to Vedharanyam has sand dunes lining coastal plains. Black buck and Spotted deer travel from tropical dry ever green forest to the Chellakannacreek along the shoreline.

All the fishermen except Avarikadu-Vandal are sea fishermen. Till 2000, fishermen from Karaiyur, Manganankadu and Maravakadu accessed the shoreline through the fishing canals or the saltwater canals. Fishermen from Maniyanteevu, Kodiyakkadu and Kodiyakarai accessed the shores adjoining their villages. As the distance to access the sea is less than 3 kilometers fishermen from both these regions are involved in individual shoreline fishing.

This is not possible for the fishermen from other villages. Therefore, fishermen from rest of the villages practice 'Group Fishing'. Crabs, fishes and prawns are the major harvest in the shoreline.

### **Creek**

There are about six creeks in the shore line from Vedharanyam to Kodiyakarai. Mullipallam creek breeches the shoreline at Muthupet, Chellakannacreek breeches the shore line between muthupet and Kodiyakarai. Kaluvapaththai, Manavaikkal, Siththankoyil and Pudhuvaikal are the minor creeks near to Kodiyakarai.

Seawater enters into the lagoon through the creeks during high tide (*Vellam*) and flows back to the sea during low tide (*Vadu*). Fishermen caution that *Vellam* is the right time to enter into the creek; the opposite might even topple the boat and kill people. Prawns are the major target for the creek fishermen.

Though fishing in the creek is riskier than fishing in Thottam or lagoon, some fishermen prefer creek fishing due to its huge harvest. While fishing in the Mullipallam creek is open for all, the Chellakannacreek is open only for Seruthalaikaadu fishermen. They had legal battle to restore the traditional right over the creek. Similarly, communities of kodiyakarai are the only people who involved in fishing at Kaluvapaththai, Manavaikkal, Siththankoyil and Pudhuvaikal creeks.

### **Sand dunes/Islands**

There are more than 10 sand dunes (locally called *theevu* or islands) in the creeks and shoreline. The fishermen involved in 'group' fishing or 'collective' fishing, reside in the temporary sheds established on these sand dunes. Every fisherman village has their own sheds in these sand dunes. They have traditionally allocated the sand dunes among themselves. *Ayyanar theevu*, *Salli theevu*, *Muniyan theevu*, *Naran theevu*, *Nedun theevu*, *Onaan theevu*, *Kuttiniyakkaadu*, *Melakadaisi theevu* are some of the sand dunes, where fishermen stay, cook using the dry twigs or dead branches of the trees in the sand dunes. The sand dunes have drinking water lenses,



recharges during the rainy season. These lenses are accessed through dug outs (*Thondu Pallam*) to meet drinking and cooking water demand.

Goats and cows are also carried to the shoreline, *Mannavaram theevu*, for grazing. More than 200 cows and 500 goats graze in this *theevu* and drink the water in the *Pallam*.

During the British period, one of the sand dunes was used for exchanging the smuggled goods. Therefore, the sand dune is named as '*Moottai Avilthaan theevu*', (unboxing island)

### **Tropical Dry Evergreen Forest**

The tropical dry evergreen forest is home to the largest population of the Blackbuck in Southern India. The forest, declared as wildlife sanctuary hosts more than 1000 blackbucks, 154 species of medicinal plants, 2 species of insectivorous plants and 260 species of migratory land birds including the rare Spoonbilled Sandpiper (*Eurynorhynchus pygmaeus*).



**Photo 4.4: Mirratory Birds in Thondiyakadu aquatic**

The sanctuary and its surrounding wetlands are important wintering grounds for waterbirds from the North. Nearly 100 species of migratory waterbirds including the Greater Flamingo start arriving in the sanctuary and its surroundings from September onwards and stay on till January before their return to the North. The sanctuary coast has been a regular nesting site of the endangered Olive Ridley turtle. Dolphins are frequently sighted along the sanctuary coast and stranding of whales has also been reported.

Several sites of historical importance like the Ramarpadam, Modimandapam and the old Chola lighthouse are located inside the sanctuary. Communities, especially in the Athivasi colony of Kodiyakadu are highly dependent on this forest for their food and nutritional security.

### 4.3. Ecosystem Services provided by the Point Calimere wetland complex:

The study of the the wetlands and their dependent livelihoods reveal that Point Calimere wetland complex provides multiple ecosystem services. At the same time, the land use land cover changes happened in the wetland also have positive and negative implications on several components of the wetlands and its services. Following are the details of the services provided by the ecosystems, their significance, prioritisation and the spatial distribution of the ecosystem services.

#### 4.3.1. Provisional Services

Freshwater, food, fuel, genetic resources and the natural medicine are the current provisional services of these intertidal wetland ecosystems. Though oyster reefs and shells were collected in the past to manufacture lime, the later forest regulations banned this activity in Karaiyur. Similarly, harvesting timber woods from mangroves by tree felling was also banned post 1971. Few families from Nagapattinam collected ornamental shells in the past, from the shores of Kodyakarai, but do not practice any more.

**Table 4-2 Scale and contribution of ecosystems towards provisioning services.**

Ecosystem	Provisional service				
	Fresh water	Food	Fuel	Genetic resources	Natural medicine
Saltpan	--	++			
Aquaculture -shrimp farm	-	++			
Mudflats	+	+	++		
Thottam		++			
Mangrove forest			+		+
Plantation mangroves					
Fishing canal		++			
Fishing boat canals					
Lagoon		++			
Brine reservoir		++			
Sand dunes/islands	++	++	++		+
Shoreline	+	++			
Creeks		++			
Dry evergreen forest	++	+	+	++	++

Local	
Regional	
Global	

#### Legend

--	-		+	++
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Highly negative contribution	Moderately negative contribution	No contribution	Moderately positive contribution	Highly positive contribution
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### Freshwater

The limited freshwater sources in this intertidal wetland complex are surface ponds in the mudflats, freshwater lenses in the sand dunes/islands and the shallow freshwater aquifers. Traditionally hamlets of Pannal, Seruthalaikadu, Kodiyakadu and Kodiyakarai were dependent on the ponds and open wells that fall under the wetland complex. Seruthalaikadu communities have created 7 ponds in the mudflats, to meet their drinking and domestic water demand. The community wells of Sakkaranpettai, Kodiyakadu and Kodiyakarai were operational up till the late 1990s. The shallow freshwater aquifers lay between 10-15 ft. from the ground level. Now the communities are highly dependent on the Kollidam Integrated Drinking water scheme that supplies water once in 15 days in the summer.



**Photo 4.5: Drinking Water Source in Kadinelvayal**

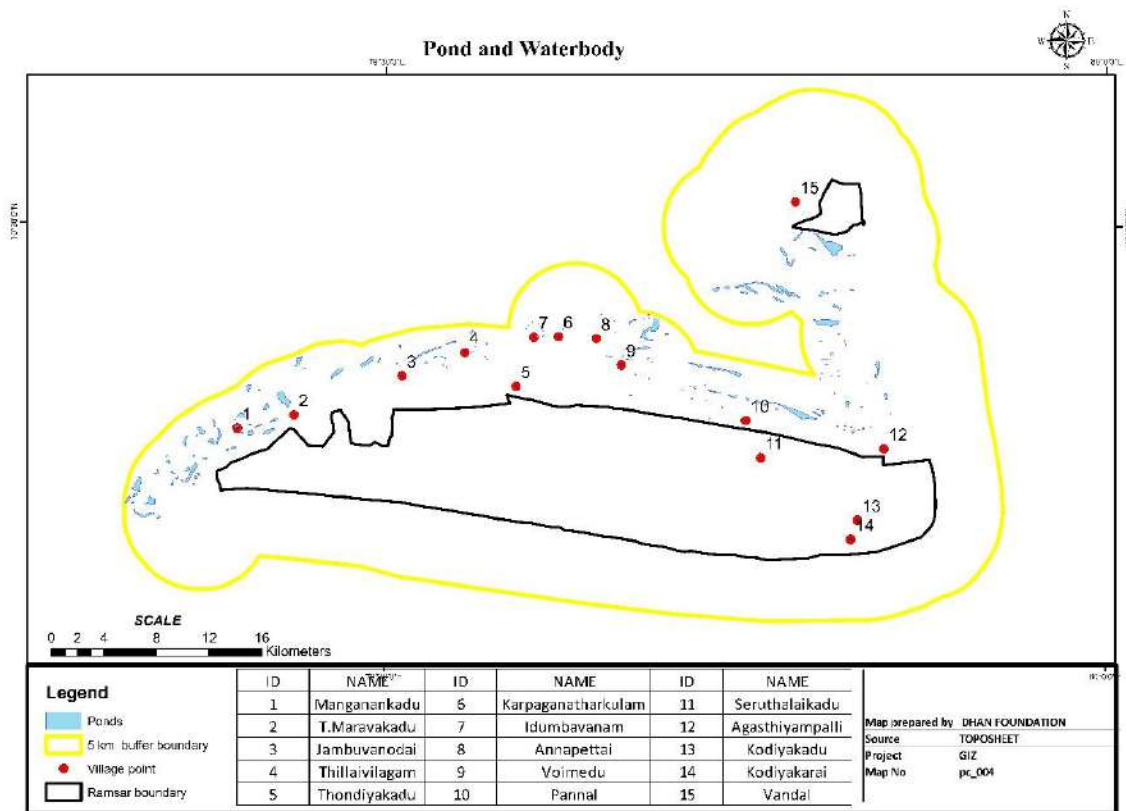
Presence of saltpan and its brine reservoir adjacent to the hamlets and pumping of saltwater from aquifers for filling salt pans are the major reasons highlighted by the communities on depletion of the shallow fresh water aquifers. Communities correlate the invasion of saline and drought resistant prosopis in the mudflats with the depletion of fresh groundwater aquifers.

The freshwater lenses in the sand dunes not only met the drinking water demand of the communities but also the livestock. *Thaalai-adi-kulam*, of Sallitheevu, is a dugout pond in one of the sand dunes accessed by Annapettai fishermen. As the sea winds silt the dugout every



year, fishermen desilt it. They prefer instant dugouts than permanent ones, since wild fox might urinate in the water. Flora such as *Thaalai*, *Othiyam tress*, *Neem tree*, *Tamarind tree* which are not native to inter tidal zone are found in the sand dunes, indicating the freshwater lenses. Fishermen who involve in collective or group fishing highly rely on these lenses for drinking water. These fresh water lenses are present in sand dunes in the creeks as well as the coastal plains. The sand dunes and depressions in the coastal plain serves as the fresh water source of wild life in the sanctuary.

Konnar community of Pannal and Kadinavayal, majorly involved in livestock rearing, has a practice of shifting their animals through boat or thottam to the *Mannavaram theevu (Island)*, in the shoreline. Just after the monsoon showers, grass cover of the island increases and depressions and dugouts are filled with freshwater. Cows and goats graze in these lands for more than three months and are brought back. Communities believes that this practice makes the animals healthier. All these services benefit the the local communities living in the wetland buffer.



**Map 4-2: Pond and Water body**

Every village in the buffer of the wetland has at least one '*Vettukulam*' (dugout pond) and an '*Uppukulam*' (Saline pond). The *Vettukulam* is used for meeting the domestic water demand of the communities and the *Uppukulamis* used to drain out the soil and groundwater salinity. This traditional practice of water harvesting is a key character in the wetland conservation.

Fresh water from shallow groundwater aquifers is pumped to dilute the salinity of brackishwater filled in the aquaculture farms. Shallow bore wells are used by the farmers to pump the water which leads to sea water intrusion in the ground water aquifers.

About 4725 ha of cultivable lands are irrigated land in the villages adjacent to the wetland. Among which 3966 ha of cultivable land are irrigated by canal, 285 ha are irrigated by tube well and 473 ha are irrigated by farm ponds and tanks. But none of the irrigated land falls inside the wetland complex. The farm lands in Vandal and Kodyyakadu are rainfed. Farmers cultivating Tobacco in Kodyyakadu are the ground water dependent population for irrigation. Though 30 ha in Vandal is cultivated for Paddy, it remains rainfed, as the arteries turn saline due to back water flow.

**Food:** Common salt, fishes, prawns, crabs, shrimps, fruits and vegetables are the major food produces of the wetland.

**Paddy:** Though paddy was cultivated inside the wetland in the past in Seruthalaikadu, Agasthiyampalli and Kodyyakarai, after storm surge in 1952, it remains fallow, invaded by Prosopis. Currently paddy is cultivated only in Vandal, that too rainfed. These paddy fields do not fall under the Ramsar boundary.

**Fish:** Since Point Calimere is an intertidal wetland complex, fishermen heavily rely on the ecosystems of the wetlands for food and livelihood. Except communities of Agasthiyampalli, all the other communities are involved in fishing either completely or partly. Entry of fishes, prawn and their juveniles into wetland complex through creeks, salt channels and fishing canals makes the food resource available in abundance.

While prawn is the major catch in Alam, brine reservoirs and creeks; fishes of table size less than 500 grams are caught in Thottam, backwater and fishing canals; fishes of table size upto 10 kg are caught in lagoon and sea and crabs are the major catch in shoreline fishing. Catch from shoreline, creek and lagoon reaches the regional market of Tamil Nadu and neighbouring states, rest of the catch satisfying the local demand.

**Shrimp:** Vannamei white legged shrimps are the major shrimp variety produced in the aquaculture farms of this wetland. While the shrimps from 30 to 45 counts are exported to the global market, shrimps of 60 to 100 counts are sold to the regional market.

**Fruits and vegetables:** The tropical dry ever green forest provides fruits (Kovai, Vaasam, Korattai, Kizha, Varpula, Paala, Noval, Ilanthai, Soorampalam, Kaaramplam, Thuvaraipalam, Konji/unji, Kodukapuli), greens and vegetables (Paasuthi, musutai, umuri, Thuthi leaves, Palupavakkai). Communities from Aadhivasi colony of Kodyyakaadu and Kodyyakarai were highly dependent on these resources in the past. They even collected the fruits, leaves, vegetables and sold them in the Vedharanyam market. In the recent years, due to ban for collecting forest produces, the communities are less dependent on the forest for food.

Edible Suaeda, locally called as '*pooumuri*', was widely consumed by all the fishermen communities, especially during famine, when no other food source was available. This cuisine of eating *pooumuri* is almost extinct among the people, except in Kodyyakarai.

**Salt:** Common Salt is largely produced in the wetland complex. The intertidal zone favors the salt production process. The ages old Vedharanyam salt pans have political importance since freedom struggle. About 9 lakh tones of common salt is produced every year from the saltpans of Athirampattinam and Vedharanyam, reaching across the states of India. Karnataka is the major market for salt produced in this region. Though the saltiness of this salt is higher, market price is low due to its pale color.

### **Fuel**

Communities are allowed to collect only the fallen dry woods and twigs for their firewood. In earlier days, dry woods were collected and sold in the local market and also for restaurants. But due to stringent action of the forest department, very few communities of Kodiyakadu and Kodiyakarai involve in the collection of firewood.



**Photo 4.6: Charcoal Making in Seruthalaikadu**

While *Prosopis* in Seruthalaikadu is used for making 'Charcoal', *Prosopis* in the Mudflats of Thondiyakadu, Pannal and Kadinelvayal are either used as fire woods or charcoal. *Prosopis* in the poromboke lands of Seruthalaikadu are leased by the village administration and the income generated by this charcoal is used as village common fund. *Prosopis* in the individual 'patta' lands are leased by the individuals. Through Charcoal making, once in 5 years in an income of Rs.45,000 is generated per acre.

### **Natural Medicines:**

Herbs such as Milagusaranai (*Polygala arvensis* wild.), Thuthuvaalai (*Solanum tribolatum* L.), Pirandai (*Cissus quadrangularis* L.), Sangumulilai (*Clitoria ternatea* L.), Vaagai (*Albizia lebbek* (L.) Willd.), Kaatunaathi, Aavarampoo (*Senna Auriculata*), Poonaikaachikottai (*Mucuna pruriens* (L.) DC.), Nannari (*Hemidesmus indicus* (L.) R.Br. var. *indicus*), Avuri, Aathandai (*Capparis sepiaria*), Oomathai (*Datura metel*), KachaKomatti (*Citrullus colocynthis*), NeerMulli (*Hygrophila schulli*), Thillai, Karthigaikilangu (*Gloriosa superba*), Thannivittankilangu (*Asparagus racemosus*) are some of the herbs used locally as medicines.

Among these herbs Milagusaranai, Thuthuvalai, Avuri are widely used for fever, Thillai and Vaagai are used for healing wounds, KachaKomatti is used for hair fall, oomathai is used for indigestion of livestock and Karthigaikilangu is used in pesticides. Very few families (less than 20) are involved in herbs collection. The herbs are collected and sold through agents to the regional market. Fishermen have a practice of drinking hot 'mangrove leaves tea' to arrest diarrhoea when affected during 'Group fishing'.

**Clay, Silt and Sand Extraction:**

In the wetland complex, the silt in the Mudflats is used only for laying kacha roads. Recently, in Seruthalaikadu silt dredged from the mudflats was used for extending road from landing center to the verge of boat canal. Since the silt is highly saline it is not used for any other purpose.

**Table 4-3 Scale and contribution of point Calimere ecosystems towards regulatory services.**

Landuse landcover	Regulatory service									
	Air quality regulation	Local climate regulation	Global climate regulation	Water regulation	Flood hazard regulation	Disaster regulation	Erosion regulation	Water purification	Salinity regulation	Noise and visual buffering
Saltpan		+							--	
Aquaculture - shrimp farm	-	+			--			--	--	--
Mudflats	-	+		+	++					
Thottam		++			++					
Mangrove forest	++	++	++			++	++	++		
Fishing canal				++	+				++	
Fishing boat canals					+				+	
Lagoon		++			++					
Brine reservoir		++			--					
Sand dunes/ islands				++						
Shoreline										
Creeks							--			
Dry evergreen forest	++	++		+		++				

Local	
Regional	
Global	

**Legend**

--	-		+	++
Highly negative contribution	Moderately negative contribution	No contribution	Moderately positive contribution	Highly positive contribution

### **4.3.2. Regulatory Services**

Since, Point Calimere Wetland Complex has estuaries of Cauvery arteries and intertidal zones of creeks, it plays crucial role in protecting the communities during disasters. Following are the regulatory services of the wetlands,

#### **Air Quality Regulation**

The wetland complex has both the landscapes that cause air pollution and absorbs air pollution. Dry mudflats in the Alam of intertidal zone, become the source of silica (Soil) particulate matters which is carried away by the sea winds, especially *Thennagkaathu*. During southern winds, silty winds affect the air quality and cause respiratory issues to the communities in the buffer zone. Seruthalaikadu is highly affected by these silty winds.

Though a similar condition is found in Sakkaran Pettai of Pannal, the *Prosopis*' growth in the mudflats acts as a buffer against the silt winds and protects the communities from its effects.

Generators and back-up generators used to run the oxidation pedals in Aquaculture- Shrimp farms is another major source of pollution. Though electric connections are provided to the farms, the power is available only for 10-12 hrs per day. Therefore, generators are used to run the oxidation unit to fulfil the power supply gap. As these generators are powered by diesel, the smoke pollutes the environment. There are more than 1500 generators running inside this wetland releasing smoke for almost 12 hrs every day.

On a positive note, the wetland complex Mangroves and tropical dry evergreen forest supports and contributes to carbon sequestration. The mangroves act as carbon-sequestration units in the Muthupet and Thalainayiru wetlands, the tropical dry evergreen forest in the Vedharanyam swamps.

#### **Local climate regulation**

Flow of water and stagnation of water plays important role in regulating the local climates by increasing the air humidity through higher evapo-transpiration. Saltpan, aquaculture farms, Thottam, lagoon and Brine reservoirs are the important sources of evaporation; Mangrove forest, dense *Prosopis* and Tropical dry evergreen forest are the sources of evapo-transpiration. Almost the wetlands contribute to the evapo-transpiration in the non-monsoon season, and the complete wetland regulates the local climate during the monsoon. Increase in humidity and cool sea breeze is the climatic regulatory parameters realised by the communities

#### **Global Climate Regulation**

Research studies reveal the presence of mangroves in these wetlands not only contribute to the regional but also to the global climate regulation (Sakthivel, Vijayakumar, & Priyadharshini, An Analysis of Coastal Wetland Ecosystem and Climate Change: With Special Reference to Point Calimere Wildlife Bird Sanctuary in Nagapattinam District, 2019). The local communities believe that the mangroves present in this wetland plays important role in



regulating climate of Canada and Sweden, citing the global investments on conserving the mangrove forest and enhance the mangrove cover.

### **Water regulation**

Ponds in Mudflats and sand dunes are the potential landscapes of water regulations in this intertidal wetlands, where majority of the landscape is saline. Ponds and dunes regulate the water by harvesting the rainwater and storing it in the sub surface. Both these structures are used for drinking in summer via dugouts. Sand dunes in the coastal plain store the rainwater in the monsoon. The stored water in the dunes is released to the depressions as it dries up. The *Muniyappan* Lake in Kodyyakadu is an important flood regulating '*Thangal*' that stores fresh water during the high floods and recharges the freshwater lenses.

Wetting the mangrove root zone in summer and flushing away the salinity of soil in the mangrove root zone during monsoons by facilitating river flow is mandatory for the survival of the mangroves. Fishing canal is the only wetland component that facilitates this process. It regulates the water (both brackish and fresh) by the connecting the estuaries with the sea. Therefore, mangroves proliferate exponentially in this zone than in any other region.

River flow in the arteries plays critical role in resisting the saline intrusion into the river plains. **As the flow in the arteries is reduced due to damming, salinity intrusion into the agricultural plains is increasing over the period. This is further aggravated by the erratic rainfall, resulting in conversion of the cultivable land to fallow.**

### **Flood Hazard Regulation**

Mudflats in the intertidal zone has the nature of regulating floods, as there is a huge corridor that would absorb the shockwaves of the peak flood flow. Both Alam and Thottam act as flood regulators. The waterbodies created in the mudflats such as *Muniappan lake*, *Thondiyakadu* (half made) *lake* also act as flood regulators. The lake in Thondiyakadu which was initiated by the then district collector, to convert it into a tourism centre, was not completed. It was stopped half way.

Creation of bunds and brine reservoirs in these mudflats reduces the natural drainage capacity of the wetlands. **While the short rise bunds of saltpans have minimum effect over the drainage capacity of the mudflats, the high-rise bunds in aquaculture farms have adverse effects during flood, by inundating the upstream. The brine reservoirs and brackish reservoir channels used by saltpans and aquaculture farms further reduce the natural drainage, as they always remain full.**

### **Disasters Regulation**

The point Calimere wetland is a disaster-prone zone that has faced several cyclones and a Tsunami. Some of the cyclones that changed the landscape of the wetlands are the *Dhanushkodi cyclone* in 1952 and the 2018 *Gaja cyclone*. The wetlands faced a Tsunami in 2004.

It is the Mangroves that protected the communities in the buffer zone of the Muthupet Reserve forest and the Thalainyayiru reserve forest from all these disasters (Chaitanya, 2021). The mangrove forests in the shore line act as the front-line buffer and the mangroves in the lagoon

area act as the second line buffer. It is common to hear from community that mangroves sacrificed themselves to protect them. Similar is the statement of the communities in Kodiyakadu. The tropical dry evergreen forest acts as a cyclone buffer when it hits in the eastward direction.

### **Erosion regulation**

Erosion, siltation and deposition are very common in the intertidal wetland complex. River flow into the estuaries deposits the alluvium into the mudflat, high tides through the creeks deposits and erodes sea silts in the mudflats.

Mangroves and their associates through its unique root system, arrests the erosion in the intertidal zone both due to tides and also the river flow. Mangroves and *Prosopis* in the shoreline arrest the shoreline erosion. Trees in the sand dunes arrest the sand erosion to a certain extent. Mangroves in Avarikadu-Vandal are another evidence for the erosion control of the mangroves.

Tropical dry evergreen forest acts as an erosion regulator in the coastal plains. As the coastal plains receive an average of 1100 mm of annual rainfall, there is higher possibility of erosion due to storm water runoff. The dense evergreen forest and the grassland play an important role in controlling erosion of the plains. Communities of Kodiyakarai have also cited that '*Vishwamithirai* creeper (*Ipomoea caprae*)' and '*Ravanan meesai*' (*Spinifex littoreus*) in the sand dunes also protects the soil erosion caused by winds in the dry season.

### **Water Purification**

As there is no any source of freshwater in this wetland, except the aquifers, the ecosystem doesn't play a great role in regulating the quality of water; except in case of Shrimp farm. Intensive use of fertilisers, pesticides in the shrimp farm and disposal of the effluent into the drainage canals without any treatment is an important concern in terms of water pollution. The water is released from the shrimp farm once in 40 days, decided based on the colour and turbidity of the water in the farm. Intensive feeding, application of probiotics, pesticides, fertilizers and adapting unethical practices worsen the water and soil quality. **Fishermen are sensing that the movement of aquatic life towards upstream has been affected due to this effluent discharge. They have also noticed incidences of floating of dead fishes whenever the effluent is discharged.**

### **Salinity regulation**

In this intertidal wetland soil salinity and groundwater salinity is improved only by the freshwater flow of rivers and rainfall. It is this natural cycle of seawater surge and freshwater flush creates this unique ecosystem of mangroves. As the freshwater flow is reduced due to upstream activities, the soil and water salinity shoots up over the period. The fishing canals and river arteries are the salinity regulators.

In saltpans, the residue after extraction of various salts, called Bittern, has a very high level of salinity of more than 30<sup>0</sup>be. This residue is allowed to stand in a sink and seep into the soil. Sometimes the bittern would overflow into the neighbouring area. It is the seepage of the

high saline bittern that has increased the salinity of freshwater aquifers in Kodyyakarai and Kodyyakadu.

The partially completed lake in Thondiyakadu, bunds constructed across the mudflats to arrest the entry of high tides, MuniappanLake, ponds (Uppukulam and Vettukulam) in the villages are the artificial structure created by the local community to protect the water and soil quality against the salinity.

#### Noise buffer

Diesel powered generators running 10-12 hours a day is important source of noise pollution, not only affects the communities around but also the fauna of the wetland habitat. Though there are indications that the noise created by the fibre boats also affects the birds, communities object this statement saying that birds have already accustomed to the situation.

#### 4.3.3. Cultural Services

Point Calimere Wetland Complex is an emerging tourism centre. Local, regional and international tourists visit the wetland to enjoy the mangroves, lagoon, wild life sanctuary and various religious centres in the wetland. Following are the details on these services,

**Table 4-4 Scale and contribution of ecosystems towards cultural services.**

Landuse landcover	Cultural service					
	Cultural heritage	Recreation and tourism	Spiritual and religious value	Inspirational value	Social relation	Education and research
Saltpan			+	++	++	
Mudflats		+				
Mangrove forest		++				++
Lagoon		++			++	++
Sand dunes/islands		+	+			
Shoreline	+		++		++	
Creeks					++	
Dry evergreen forest		++	++		++	++

Local	
Regional	
Global	

#### Cultural Heritage:

The ruins of an old Chola lighthouse stand at the point known as Point Calimere where the Bay of Bengal meets the Palk Strait. Here the coast turns west and runs along the Palk Strait towards the Muthupet mangroves. This 1000 years old Chola lighthouse at Point Calimere that once stood very much away from the coast today stands submerged. During the tsunami of 2004 the top part of this structure was broken off and thrown to a distance of about 100m Southwest where it can be seen today partly submerged in the beach sand. This is the only archaeological site in the Point Calimere.

'KanakkarMaadam', a mandabam in the then Kodiyakarai, 10 kms away from present coast is only in the memories of old people of Kodiyakarai and Seruthalaikaadu. These old fishermen have noticed ruins of this Maadam when they were youngsters.

### **Recreation and Tourism:**

Tourists especially the nature lovers visit the mangrove forest and lagoon in the Muthupet region. Though the visitors are less in number, it is increasing day by day. The shed facilities and the wooden plank walking pavements were the special arrangements made specially by the forest department to attract the tourists. Though fishermen were allowed to take tourists in the past, after Korankani fire accident, only forest department hosts the tourists for the boat ride.

Similarly, wildlife and bird sanctuary in Point Calimere is one of the hotspots of wildlife lovers and bird watchers. The peak season for the tourists is from October to February.

Performing rituals for the ancestors and dead ones of the family at Kodiyakarai during Aadi Amavasai and Thai Amavasai (New moon day of July and January) is a religious tradition among Hindu communities. In these days more than 15,000 devotees come to the sea shore of Kodiyakarai and perform the rituals. More than 5000 tourists are visiting Muthupet Mangroves, lagoon and Tropical dry evergreen forest every month. As Muthupet Mangroves is a favourite wintering ground for more than a hundred species of migratory water and land birds, the number of tourists shoots up to 15000/month.

### **Spiritual and Religious value:**

*Ramarpadham*, Rama's feet, is an important religious point that associates Point Calimere with the Hindu epic, The Ramayana. It is located in the highest point of the cape. A stone slab bears the impressions of two feet and is believed to be the place where Rama stood and reconnoitred Ravana's kingdom in Sri Lanka. Large number of Rama devotees, during the 2nd week of April, gathers to celebrate the Ram Navami Festival.

*Modi Mandapam* is another important shrine located near Ramarpadam. According to the mythology of Lord Vedaraneswarer, he spends a night here with his consort *Modi amman* during January - February. It is believed that the consort got the name *Modi amman* since the Lord Vedaraneswarer visits her after getting angry with his wife. 'Being angry' is also locally called *Modi*. In the first week of March, *ManjalNeeraattuvizha*, a major festival is celebrated in this temple. More than 10,000 people participate in this event, Lord Vedaraneswarer in *pallakku* that weighs 5 tonnes is carried by twenty villagers of Agasthiyampalli. The villagers

who carry this *pallakku* fast for 10 days as a ritual. Apart from this, *Paalkaavadi*, *Paneerkaavadi*, *Sevalkaavadi*, *Paraakavadi*, *Pushpakaavadi*, *velkaavadi* are taken as an expression of devotion towards the God. *Kavadi* or *Kavad* is a folklore ritual practiced in many parts of India.

*Sanyasi MunieeswararKovil* is a shrine between the eastern bank of Muniappan Lake and Kodikkarai road visited by devotees on all auspicious occasions. On March 20 a special Puja is celebrated here. *Munineeswarar* temple near to the lake/tank bund is common in Tamil Nadu.

*MattumunianKovil* (*Mattu* - Cow) is a small temple in the south of the sanctuary where people worship and offer prayers throughout the year. A major festival is celebrated here on the 3rd Friday of September every year. It is belief of the communities in Kodiyakadum, Kodiyakarai and Agasthiyampalli that the cattle left inside the forest are protected by the *Mattumunian* and will return back whenever they pray him.

*Avulaiganni Dargah* is the grave of a Muslim saint located near the road by *Ramarpadam*. His death anniversary is observed by the Islamic communities here at the end of November.

*ShevrayanKovil* is a local temple to the deities *Shevrayan* and *Soni* located deep in the forests of the northern part of the sanctuary. A small village near this shrine was then relocated at *Aathivasi colony* outside the sanctuary after its establishment. The people of Kodiyakadu believe that *Servarayan* guards the forest, moving around in horse. There is a myth that one can see him in the forest if went alone but no one has seen him till date. Lord *Soni* is widely worshipped by salt workers and producers. Before start of the salt production season in mid of January, they offer liquor to *Soni*, from the pan itself sighting the direction of his temple. Large congregations of devotees from Aarkaduthurai celebrate a special festival here in June-July every year.

*KuzhagarKovil* is a shiva temple in Kodiyakarai. The temple was constructed by various Chola kings who ruled from 7<sup>th</sup> to 10<sup>th</sup> century. The deity is *Kuzhagar*. Live goats were offered to the temple, as the temple administration was run through the income generated from goat rearing during the Chola period.

Bathing in the sea at Point Calimere is considered sacred by Hindus. People from Tanjore, Thiruvarur and Nagapatinam districts visit this area on Adi amavasai (off moon day in the month of Tamil Adi) and Thai amavasai (off moon day in the month of Tamil Thai) to pay rituals in remembrance of their departed souls. *NavagodiSithar* in the shore of Kodiyakarai is worshipped by these people. It is believed that couples without babies will have a baby if they pray to this sithar.

*Karuppanasamy*, *Kaathavarayan* and *Gomathiamman* are the prominent deities locally worshipped. As these deities have a small temple for them, *Vanadhurgai* has only a small idol and a single tree for worship. This is the traditional form of sacred groves practiced by the tribal communities' dependent on the forest.

*Kaattumuni*, *Vaalmuni* and *Perumuni* are the three male deities who are believed to be the protectors of Alam in Avurikadu-Vandal.

*Bali*, animal sacrifices (Goat and hen) widely practiced for the local deities are offered along with alcohol. The festivals were celebrated with fireworks and folk music. Though forest department imposes restrictions, the rituals are practiced as usual.

*Muniyantheevu* in Sellakanni lagoon is an important deity worshiped by fishermen communities of this Ramsar site. A small idol below century's old '*Othiyam*' tree, is worshipped as *Muni*. '*Samivalai*', a traditional custom of offering a day's complete catch to the Deity, is practiced by every boat fisherman. In one of prawn seasonal days (Oct-Dec), nets were placed in name of '*Muni*' and the fish/prawn catch will be sold completely in the market without any shares. With the income of this catch, flower garlands and Pongal (Sweet porridge) are offered to the *Muni*. This *Muni* accepts only vegetarian offerings. As *Muni* is believed to be the saviour of the wetlands, Islamic people who involve in fishing too gives offerings to *Muni*.

*Mann Thaalii* is a unique custom practiced by the Kodiyakarai fishermen communities. *Thaali*, is a highly holy chain, that identifies a woman as married. The poor fishermen who don't have money to purchase it, ties this '*Mann Thali*' in his wife's neck as a marriage ritual. *Mann Thaalii* are collected from the seashore. There is another belief that every soil of Vedharanyam is one of the forms of '*lingam*'.

#### **Inspirational Value:**

The Salt Satyagraha of Vedharanyam is an important historic event in Indian Freedom struggle. Sir Vedharathinam Pillai was the key Gandhian Congress Leader who organised '*Salt Satyagraha*' in Vedharanyam parallel to Dandi March led by Mahatma Gandhi. This '*Salt Satyagraha*' movement was led by then Congress leader Rajagopalachari (Rajaji). He was arrested on March 30<sup>th</sup> 1930 and jailed. The salt corporation office of Vedharanyam still preserves the Jail room where Rajaji was imprisoned. A Stubi was also established for Rajaji, in remembrance of this movement. For every anniversary, Gandhians and Congress members march towards this Stubi and pay respect to it.

Old salt workers shared the memories of their father that all the saltpan workers, including women were '*security checked*' in an abusive manner by the British soldiers to ensure that no salt has been stolen from the saltpans.

#### **Social Relation:**

The fishing communities in the buffer of the wetlands, salt producers and saltpan workers in Agasthiyampalli, Forest dependent communities in Kodiyakadu have established themselves by well utilising the services provided by the wetland. It is remembered that communities of Seruthalaikadu, being native of Pannal have established themselves in this swampy mudflats before three centuries. The communities who migrated from Pannal for some social dispute, have reclaimed the mudflats into agriculture land and also involved in fishing. It is obvious that all the hamlets around the wetland would not have been created without this wetland and its services.

#### **Education and Research:**

The intertidal zone of the wetland complex, Mangrove forest and its habitat, marine resources in this wetland, wildlife- bird sanctuary and the tropical dry evergreen forest are the hotpots for the research community. A wide range of research focuses on wild life, mangrove flora and fauna, migratory birds, impact of saltpans, trend in aquatic resources, coastal erosion and shore line changes, socio-developmental studies are common to this wetland. Hundreds of research papers have been published by researchers from regional, national and international institutions. Being a Ramsar site it has pulled the attention of international research communities as well as the development institutions in later 1990s.

#### 4.3.4. Supporting services:

**Table 4-5 Scale and contribution of ecosystems towards supporting services.**

Landuse landcover	Supporting service		
	Soil formation	Nutrient cycling	Provision of habitat
Mangrove forest	+	+	++
Lagoon		+	
Dry evergreen forest			++
Shrubs in mudflats			++
Sand dunes/islands			++
Shoreline	+		++
Creeks		+	++

Local	
Regional	
Global	

#### **Soil Formation:**

Deposition of alluvium from river arteries, sedimentation of sea silt by tidal action, decomposition of organic component from fallen woods of mangroves and tropical dry ever green forest might result in soil formation. But the community reveals that oyster reef in the inter tidal zone is growing at a considerable rate.

#### **Nutrient Cycling:**

Sewage disposal from Muthupet, effluent discharge from Shrimp farm are two point source pollutants entering into the wetlands. The agricultural pollution entering into the wetlands via river flow is non-point source of pollution. Study on the bioremediation or regenerative capacity will reveal the nutrient cycling capacity of the wetlands.

#### **Provision of Habitat**

The wetland complex serves as a habitat for 260 birds species, 70 fish species and 300 floral species in the PCWC, wild life such as blackbuck, wild boar, wild cat, deer, fox, water dog and olive ridly turtle. Degradation of the wetland directly affects the migratory pattern of the birds. The water birds in the Vedharanyam swamps takes the shrubs in the Mudflats as their habitat, the waterbirds and Bats in the Muthupet region are dependent on the Mangroves for their habitat. The land birds in the wetland complex takes the tropical dry evergreen forest as their habitat.



## 5. Socio-Economic Dependency of Communities on Point Calimere Ramsar site

### 5.1. Farmers

Seruthalaikaadu, Kodiyakaadu, Kodiyakarai and Vandal are the villages that had agricultural land in the wetland complex. Rest of the villages that predominantly cultivate paddy and coconut are adjacent to the wetlands and not inside the wetlands. Among the four villages cited earlier Kodiyakaadu and Vandal are the two villages where agriculture is in practice.



**Photo 5.1: Tobacco Cultivation in Ayakaranpulam**

Tobacco is the major crop cultivated in the rain-fed lands of Kodiyakaadu. Though the land ownership predominantly is with the Islamic communities, the lands are leased to Pandaram and few families of Aathivasi colony of Kodiyakaadu for a price of Rs. 35,000 per cultivation.

Vandal being an alluvium plain is often affected by floods and backwaters. The flow of *Nallaru* and *Adapparu* are the major sources of fresh water for the farmers. Paddy is the major crop grown this region. Most of the farmers cultivate in their own land and a very few lease their lands to others.

### ***5.1.1. Seasonal dependency of farming***

Tobacco is a six-month crop and so cultivated twice in a year. The families of Pandaram and Aathivasi colony, lessee of these lands invest their family labour in it throughout the year. Since, people of Aathivasi colony traditionally dependent on the forest and backwater fishing, the emerging farmers (3 families) from these communities partly involves in fishing in the monsoon season.

In Vandal, among 450 family's 350 families own agriculture land. In which about 300 families own less than 1 ma (0.33 acres), 40 families own 1-2 ma and 10 families own more than 2 ma of cultivable land. Paddy is the major crop cultivated in the rain-fed land. As the sea water rises into the flood plain zone through Veharanyam backwater channel during the flooding season of the river arteries (*Nallaru and Adappar*), the water becomes brackish. The water remains fresh just for a month and becomes saline later. Therefore, the paddy is rainfall dependent. Since only one crop of Paddy is possible in Vandal, the farmers engage themselves as saltpan workers or Aquaculture labourers for the non-cultivable period. The favourable period of cultivation is (Sep- January). Saline resistant crop is preferred in this region.

### ***5.1.2. Temporal dependency of farming***

Currently, the agricultural lands of Seruthalaikaadu and Kodyakarai, are not under cultivation and are invaded by *Prosopis*. 'Pillai', locally called as 'karakarapillai', is basically a farming community. Before 5 centuries, farming communities from the flood plains of adjacent villages, cleared the forest in mudflats and coastal plains to establish the agriculture lands.

Seruthalaikadu was created by reclaiming the swampy mudflats into agricultural land and Kodyakarai was created by clearing the 'Kaachankaadu', a forest of Kaachan tree which is widely used as prop for Kalasams of temple.

Communities of Seruthalaikadu and Kodyakarai cultivated Paddy, Chilli, Vegetables, small millets, pulses and oil crops in these rain-fed lands. Establishment of Saltpans and brine reservoirs in the upstream of the cultivable area catalysed by erratic rainfall and surge of salty slurry during disasters pushed communities away from cultivation. Now there is no single piece of land under cultivation. Farmers turned into full fishermen, some even own boats. The lands invaded by *Prosopis* has been leased to communities who convert it into Charcoal. The lease price ranges from 10,000 - 30,000 per acre varies with the age of *Prosopis*. Older the *prosopis* better the price.

In Vandal, higher return from Aquaculture - shrimp farm, fresh water from *Adappar* river and backwaters from Vedharanyam channel motivated the farmers to convert their agricultural land into Aquaculture farm. As the saline leach from aquaculture farms affected the adjacent farmlands, they too converted their land into shrimp farms. In 20 years more than 50 acres of agriculture land has been converted into aquaculture-shrimp farms. Majority of the farms are run by the villagers themselves and a very few farms are run by private parties from Nagapatnam for lease.

### ***5.1.3. Resource utilization of farming activities***

Soil and fresh water are the primary resources utilized by the farmers, who are predominantly paddy cultivators. The Mudflats adjacent to the coastal plains were distributed to the landless and were reclaimed into cultivable land. Freshwater from surface and groundwater sources makes farming viable in this coastal plain.

Since farming in Kodiyakadu and Vandal primarily dependent on rainfall, groundwater abstraction for farming is minimum or negligible.

In rest of the villages, the cultivable area is adjacent to the wetland complex and not within the complex. This cultivable area utilises the freshwater from the river arteries and the irrigation water supplied under *Vennar Irrigation System*.

### ***5.1.4. Resources Extraction Techniques***

Electrified motors pump the groundwater reserve that is just 15-20 feet below the ground level. Apart, barrages and earthen bund are constructed to protect the freshwater from increased salinity caused by seawater surge. This also helps in improvising the groundwater aquifers by building freshwater head and arresting freshwater flow into the wetlands.

### ***5.1.5. Access for livelihood***

All the cultivable land holds a 'patta' either owned by individual or by any temple (HR&CE). The farmlands are either directly cultivated by the owners or leased to other villagers.

### ***5.1.6. Seasonal and Temporal trend in Ecosystem services***

The livelihood is dependent on the freshwater sources such as rainfall, river/irrigation flow and groundwater. Farmers rely on 'North-East Monsoon' showers during its base period. The command area of *Vennar Irrigation System* relies heavily on the flow of River Cauvery which directly depends on 'South-west monsoon'. The Groundwater reserve supplements the farming activity whenever there is shortage in rainfall.

Since the retreating monsoon is highly erratic in nature, the farmers either depend on groundwater or leave the farms fallow. Damming of rivers in the upstream of river Cauvery has reduced the flow in arteries. This added pressure on the irrigation dependent farmers. Therefore, the cultivable area being fallow is increasing day by day. In the past there were more than 5000 active open wells in Kodiyakarai and surrounding villages which helped in irrigating the tobacco fields.

### ***5.1.7. Competing Use of Farming Resources***

Aquaculture-shrimp farms are the only competing users of the groundwater reserve. The salinity of seawater stored in the channels or ponds in the wetland complex is higher than that of sea (>35 ppt). Such high degree of salinity is not suitable for shrimp farming. Therefore, freshwater from groundwater reserve is pumped into the farms to dilute the saline water.

Reduced groundwater recharge attributed by poor rainfall and increased groundwater abstraction by shrimp farmers deplete the groundwater reserve and allows seawater intrusion into the shallow aquifers. Though the competing use is not direct, it has direct implications on the agriculture livelihood as well as the ecosystem.

### ***5.1.8. Impact of Disaster on Eco System and Wetland Dependent Livelihood***

While the coastal plains of Palk Strait are highly prone to cyclones, the coastal plains of Coramandal coast are prone to both cyclone and Tsunami. The sea waves and winds carry away the sea slurry and deposit in the cultivable land and farm ponds. This in fact increases the soil salinity and makes the soil less fit for agriculture.

It is important that disastrous cyclone in 1952 turned the agriculture lands in Kodiyakarai and Seruthalaikadu into fallow by huge deposition of sea slurry. This pushed the agrarian community (*Karakaraipillai*) towards fishing. Minimum of Rs. 20,000 has been spent per acre of cultivable land to remove the sea slurry deposited post Tsunami and Gaja cyclones.

### ***5.1.9. Existing Market for resources***

Apart from the agriculture land in the vicinity of Aquaculture shrimp farms are not having any demand in the market. Most of the land near the shrimp farms has been converted into aquaculture ponds.

## **5.2. Livestock rearing**

Livestock rearing is an important livelihood activity of *Konar* communities in the villages adjacent to the wetlands. These communities rear both cows and goats in a large number. Other than this community, families from other communities also involves in livestock rearing but in a small number. These communities are dependent on the wetland (grassland) for meeting their livestock fodder demand. Mangroves near Athirampattinam, Forest in Kodiyakadu and Mannavaramtheevu are the hotspot grazing lands in this region.

### ***5.2.1. Seasonal Dependency of livestock rearing***

Just after the monsoon showers, the grazing land turns into paddy fields. To meet the livestock fodder demand, they were taken to the *MannavaramTheevu*, either by boats or by swim. They are allowed to graze the fodder available in the island and drink fresh water available in the *Kuttai/Pallam* dug for this functionality. Once the harvest is done, cattle will be shifted back to the villages. Cattles left in the forest has a marking made by its owner for better identification.

### ***5.2.2. Temporal Dependency of livestock rearing***

In earlier days, livestock was left into the mangrove forest, tropical dry evergreen forest and the island with a mark in it. The animals fed on the leaves of the trees in the forest. After a span of six months, they were brought back. Over grazing of the Mangroves and forest cover,

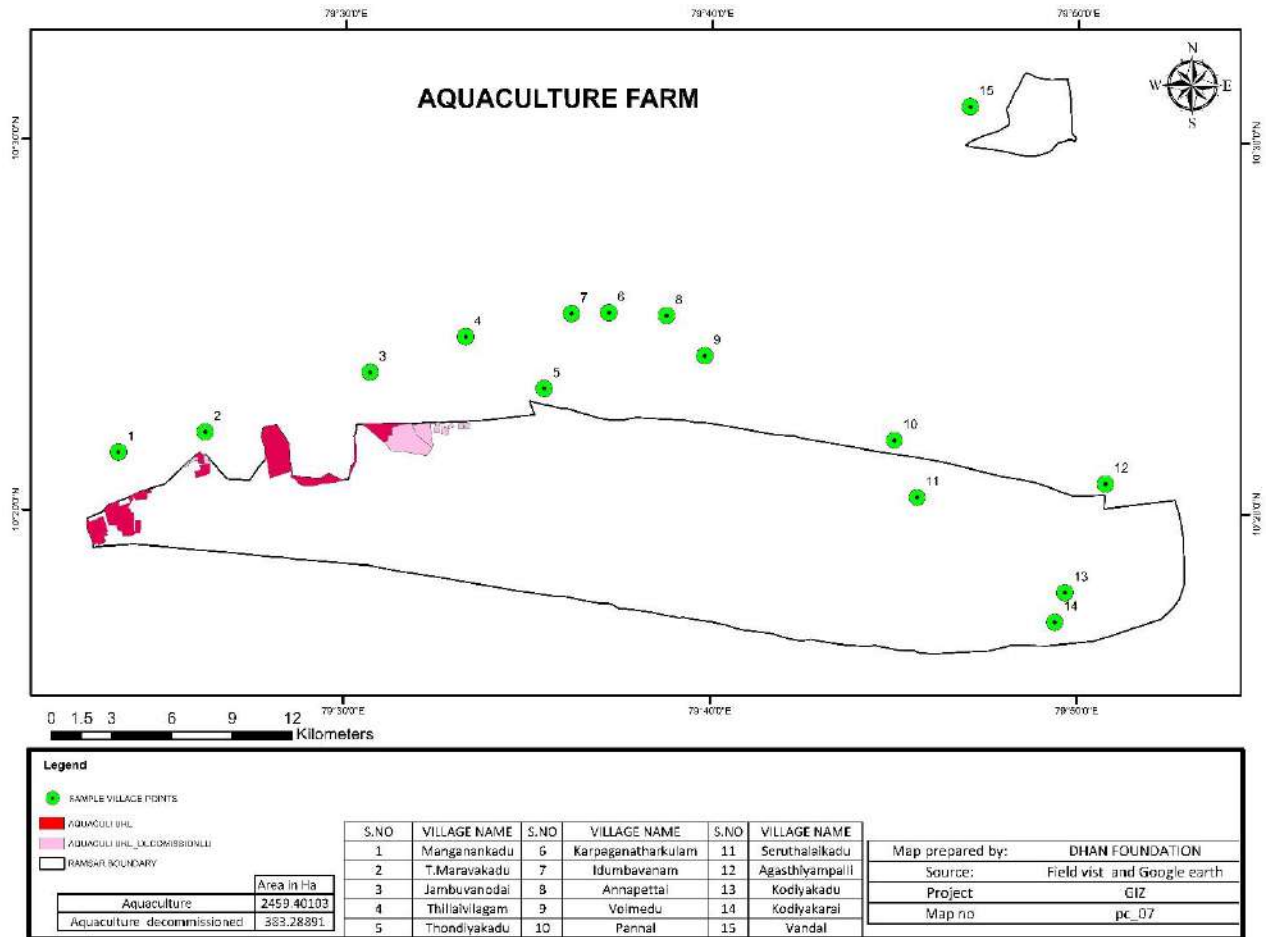
led to degradation of forest and invasion of *Prosopis*. Therefore, forest department has restricted 'grazing' inside the forest area.

People dependent on *MannavaramTheevu* are also reducing because of the animal death during cyclones and non-availability of freshwater and fodder grass due to *Prosopis* invasion.

### **5.3. Aquaculture- Shrimp**

In 1990s aquaculture-shrimp farms entered the wetland ecosystem. The higher rate of return from shrimp farm resulted in conversion of Agricultural lands, saltpans, Mudflats into Aquaculture farms. Communities, who were economically sound in Athirampattinam, Muthupet, Thambikottai, Jambuvanodai, Thillaivilagam and Vandal entered shrimp farming. The huge profits from shrimp farms motivated relatively poor communities to take up farms on lease. These lease farmers were supported by debt-based input suppliers (backward linkages) with an agreement that the harvested shrimps should be sold only to these suppliers. The backward linking suppliers pay the shrimp farmers as per the market price.

In this wetland complex, about 4,000 shrimp farmers are involved in the aquaculture who employs more than 8,500 aquaculture labourers. Majority of these labours are from the adjacent villages. It is mandatory for the aquaculture labourers to stay in the farm throughout the season. They are paid Rs.15,000 per month, with only six days leave during the crop period of 120 days. One labourer is employed per farm, who looks after feeding, liming, application of medicines, pesticides, probiotics and fertilisers. Most of these labourers are either landless or marginal farmers.



**Map 5-1: Aquaculture Farm**

### 5.3.1. Seasonal Dependency in aquaculture

In a year, shrimps are cultured twice for four months in each cropping season. Fog in the winter creates unfavorable conditions for the shrimps. Thus, winter season i.e. October to January remains the off season. Since winter in this region, coincides with the north east monsoon, shrimp farm laborers and shrimp farmers engage themselves in agriculture.

### 5.3.2. Temporal Dependency in aquaculture

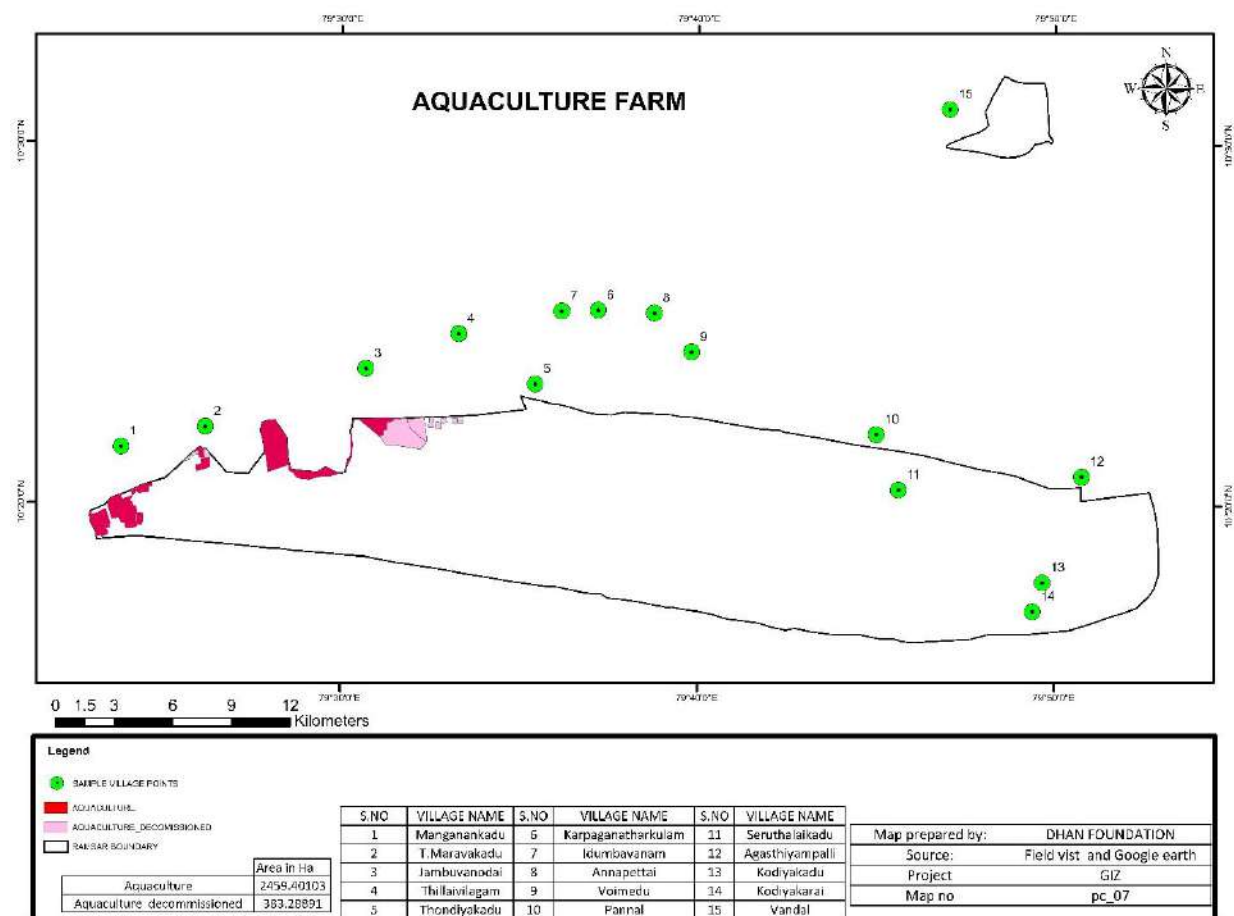
As stated earlier, post 90s, even salt pans leased by private players were converted into aquaculture farms. Later, this practice was banned by the salt Corporation of India. Similarly, aquaculture farms were created in the area that belongs to Muthupet reserve forest. These aquaculture farms were banned by the forest department through legal battle.

Till 2013, Tiger prawn was the major shrimp cultured in this area. Due to its poor survival rate and longer growth period, shrimp farmers started preferring white legged *Vannamei* shrimps. As shrimps are highly vulnerable to diseases shrimp farming remains as a gamble. It might either generate huge profits or a great loss. Disasters such as cyclones in this intertidal zone, add more uncertainty to the farmers' income. Shrimp farming saw an increasing trend till 2010 after which it declined till the introduction of *Vannamei*, i.e. 2013. This was then followed by

an increasing trend till 2018, until Gaja cyclone, after which there was a fall and now the trend is stagnating. Fall in the market price of shrimps in global market, and cost of reclamation post Gaja were the reasons behind the non-operational aquaculture farms. The uprising market price for shrimps might motivate shrimp farmers to get back to the occupation.

### 5.3.3. Resource utilization in aquaculture

Saltwater and Freshwater are the two important resources that are extracted by the shrimp farms, from the wetland complex. The natural drainages, traditional saltwater canals, newly created canals were used as conveyance structures that deliver saltwater during high tides. Electric motors are now used to pump saltwater from the canals/channels and freshwater from groundwater aquifers. To maintain the water quality of pond, water is changed every 40 days. i.e. 3 times in a cropping period. Separate drainages were created to dispose this aquaculture effluent back to the lagoon.



Map 5-2: Aquaculture Farm

### 5.3.4. Resource Extraction Techniques in aquaculture

In these farms the modified extensive system is followed. All these farms draw water either from the sea through canals or from the mangrove wetland. In the modified extensive farms water exchange is done once in 40 days. The water level maintained in the farms is about 110 to 115 cm.



During the post-monsoon season, salinity in the lagoon is in relatively lower in the upstream end and high in the mouth region of the lagoon. This is the reason behind pumping saline water for Shrimp farming. Since the salinity of the lagoon is higher than 40 ppt during the summer months, groundwater from aquifers are pumped into the farm to dilute the salinity of the water stored in the farm.



**Photo 5.2: Water Extraction for Aquaculture and Salt Farms in Adirampattinam**

In Muthupet region (Block A), arteries of Cauvery river, their natural drainages, saltwater canals were used to transfer the surging saltwater from sea or lagoon to the aquaculture pond. In Avarikadu-Vandal, backwaters in Vedharanyam Channel is used for filling up the ponds. The effluents are released in the drainage channels, canals, backwater canals or arteries without any treatment.

### ***5.3.5. Access for livelihood***

Shrimp farming is practiced in the individual agriculture lands which wereconverted into aquaculture farms. These lands are either owned by the shrimp farmer or leased from others. Very few farms were established in the '*poramboke*' or the forest land. These farms were considered as encroachments and remain defunct due to regulatory measures. The shrimp farmers have to obtain approvals from '*Coastal Aquaculture Authority*' for establishing shrimp farms in the coastal zone.



### ***5.3.6. Seasonal and Temporal trend in Ecosystem services***

During the shrimp farming season, farmers capitalize on the high tides to pump saltwater to the ponds.

The saltwater resource is abundant in sea, lagoon and saline aquifers. But high groundwater abstraction and poor freshwater recharge reduces the freshwater column in the aquifers.

### ***5.3.7. Competing Use of Resources***

Shrimp farmers dominate over the salt producers for saltwater flowing through the canals, the farmers in fresh groundwater abstraction and over the canal fishermen by diverting the flow of freshwater away from the fishing canal to fill their ponds. Among these recessive groups, canal fishermen are the most affected and salt producers are least affected wetland dependent communities.

As shrimp farm deteriorates the adjacent land by increasing the soil salinity, there is a strong conflict between farmers and shrimp farmers. In Sengankadu of Thillaivilagam, communities protested against the establishment of shrimp farms to protect their agriculture land. Even some of the agrarian families' regret for selling their agriculture land to shrimp farmers.

### ***5.3.8. Impact of Disaster on Eco System and Wetland Dependent Livelihood***

Most of the shrimp farms that remain defunct currently are the ones affected by the Gaja Cyclone. During the cyclone, the bunds were breached, sea slurries and forest twigs and branches were deposited into the farms. It cost more than Rs.50,000 to restore the pond for aquaculture. Only very few farmers got involved in restoration process.

It was a huge loss for the shrimp farmers who stocked during this period. Many farmers who leased the farms for culturing, left the farms unaddressed. Few shrimp farmers who were unable to meet the debts or make further investments moved away from shrimp farming towards agriculture, fishing or foreign migration.

### ***5.3.9. Existing Market for shrimps produced***

Fluctuation of market price makes this investment intensive farming as a gamble. The average price for shrimps as per count/kg is 30 counts - Rs. 600, 45 counts - Rs. 400, 60 counts - Rs. 300, 80 counts - Rs. 200, 100 counts - Rs.150. Most of the shrimp farmers sell their shrimps to the merchants who provide credit based backward support. The trade is done as per the market price. In the last five years, the market price for shrimps has not been rising as expected by the farmers. Post release of COVID lockdown, shrimp farmers are slowly investing more on culture as the price in market is increasing due to increased global demand.

## 5.4. Saltpan

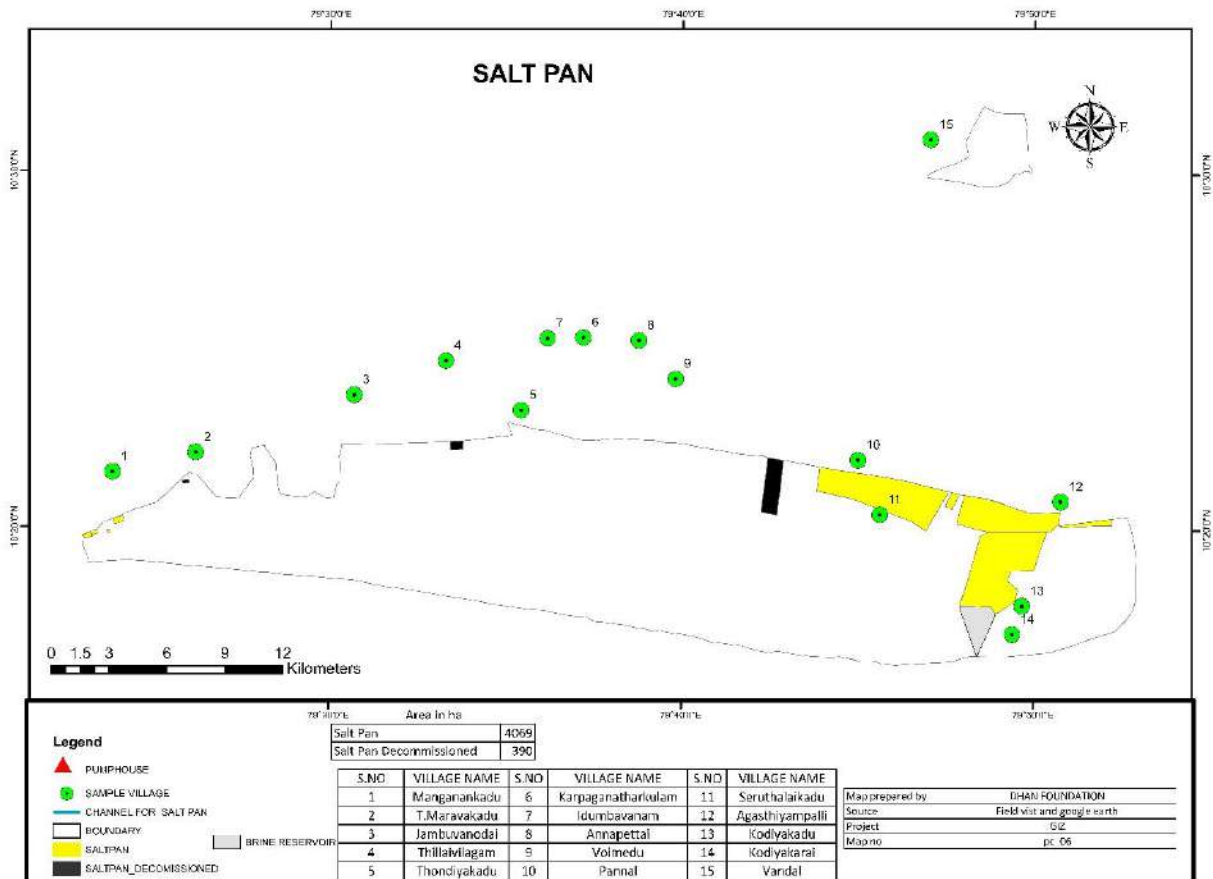
Salt pans in Athirampattinam, were leased by KTK Pvt. Ltd., a Tuticorin based salt producing company from Salt Corporation of India. Villagers of Maravakadu, Karisaikadu and Manganankadu are employed as workers in this saltpan. The wages for these saltpan workers vary from Rs.300 to Rs.500 per day. The work timings are usually from 4 am in the morning till 10 am.

The salt pans in Vedharanyam swamp, owned by both Tamil Nadu salt corporation and Salt Corporation of India. 2550 hectares of saltpan under Central government is leased to 10,000 small scale salt producers and remaining 450 hectares was leased to a Gurukulam. The salt pans owned by State government in Kadinavayal and Agasthiyampalli have been leased to two corporately, Gujarat Heavy Chemical Limited (GHCL) and Chemplast Pvt. Ltd. respectively. These salt pans employ their workers from neighbouring villages of Kadinavayal, Pannal, Seruthalaikadu, Agasthiyampalli and Kodiyakadu.

Most of the small-scale salt producers are from Agasthiyampalli itself. The Salt Corporation provides licence to these producers. The lease price per acre per year varies from Rs.400 - Rs.760 depending on the block (Block A, B, C, Y) where the salt pan is located. As the lease period is for 20 years, it has to be renewed. The price paid to transfer the lease contract for an acre of saltpan varies from 2-4 lakhs depending upon its location.

Unlike wage salt workers who are working in the small-scale salt pans, there are 2-3 permanent saltpan workers in the Corporate companies from each of the adjacent villages, who gets monthly salary of Rs.12,000 - 15,000. The only service provided by these corporates to these villages are supplying drinking water for village functions/festivals.

There are about 100 '*Palm leaf collectors*' from Karayankadu, Karpanatharkulam, Naluvelapathi, Vellappallam. They are the offsite benefitting marginal communities who provide palm leaves for making sheds for the harvested salt heaps. The cost per Palm leaf is Rs.6. These communities earlier involved in toddy making from palm trees.



**Map 5-3: Saltpan**

#### 5.4.1. Seasonal Dependency of salt works

Salt production in this wetlands starts from Mid of January and ends with the onset of North East Monsoon, i.e. Mid of October. As the water level in the mudflats rises more than a foot, it becomes impossible for the salt producers to produce salt. During this off season, the saltpan workers involve in fishing both in saltpans as well as in the brine reservoir and go as agricultural labours.

#### 5.4.2. Temporal dependency of salt works

While the saltpans are reducing in Athirampattinam, it is increasing over the period in Vedharanyam Swamps. Therefore, the number of people dependent on the salt production is also increasing day by day in Vedharanyam. Introduction of electricity driven bore wells was the key behind expansion of saltpans.

A saltpan was established in Thillavilagam by Crystal Salt Company, but it was closed due to poor production.

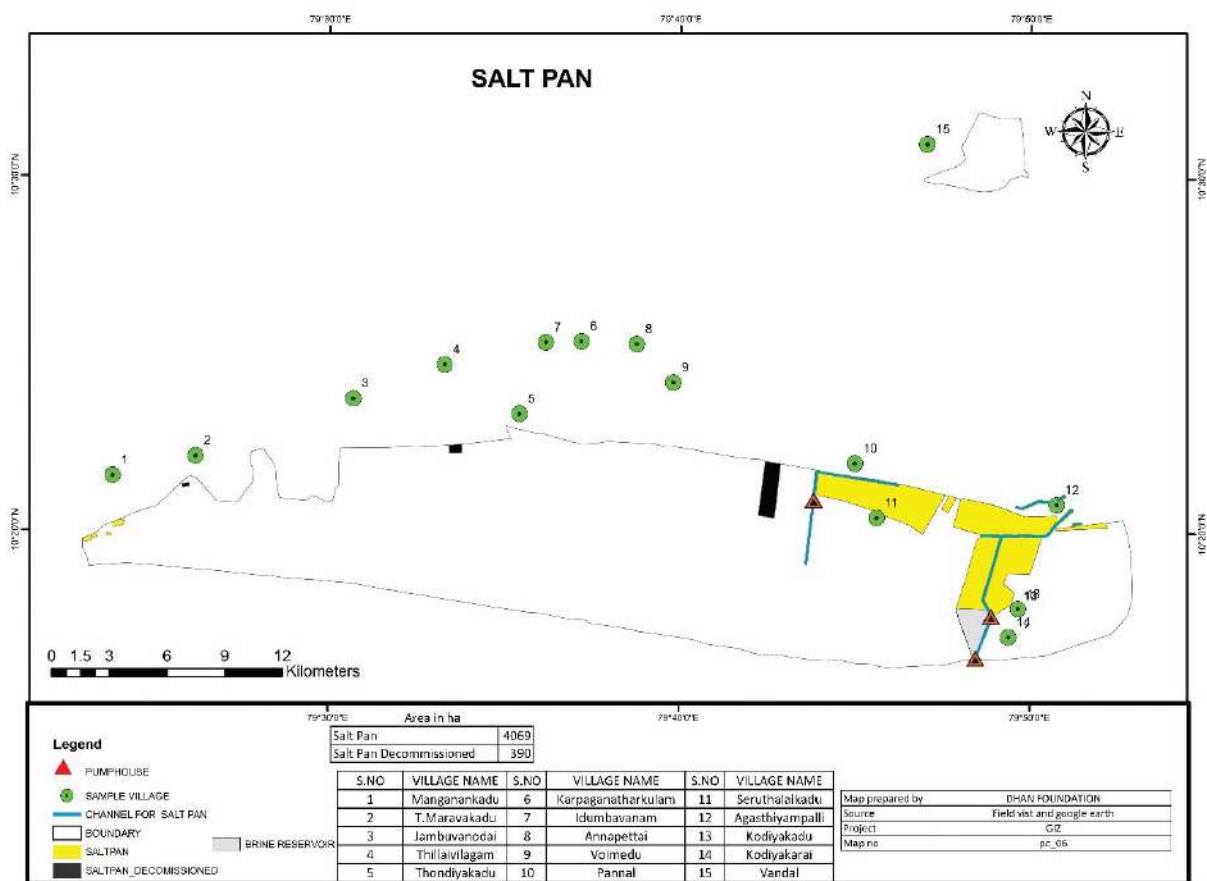
#### 5.4.3. Resource utilization in salt works

Saltwater canals that carries sea water into the intertidal zone during high tides are the major conveyance structures for the saltpans. In Athirampattinam, Saltwater canals running parallel

to the 'fishing canals' starting from sea, supply sea water to the Saltpans. Salt producers either pump this canal water directly into the pan or transfer first to saltwater reservoir and then to the pans.

In Kadinevayal, Saltwater is pumped from the canal created by the Saltpan industry (GHCL). The pumped water is stored in the brine reservoir created between Kadinelvayal and Seruthalaikadu. This canal carries saltwater from the Chellakannai Lagoon/Creek to the pumping station. Since the salinity of water in the lagoon portion is higher than the sea (>40 ppt), salt shall be harvested in a quick span.

In Agasthiyampalli, Saltwater is pumped from the Vishagam canal that links the Coromandal coast with Pay Strait. This canal connects east coast with north coast running north-east to south-west and vice versa. The water level in the canal naturally rises due to the eastern sea winds in May and southern sea winds in August. Water is supplied to the saltpans using the distributary channels that connects with the Vishagam canal.



**Map 5-4: Saltpan**

Chemplast, one of the biggest producers of Salt in Vedharanyam pumps saltwater directly from the sea, stores in the brine reservoirs (*Kottagam*) before pumping into their pans.

As the seawater flow in the canal is low during low tidal season, saltwater from aquifers were pumped using electric motors. The saltwater is pumped from aquifers that is 30 to 50 feet deep just below the pans.

#### ***5.4.4. Resources Extraction Techniques in salt works***

Salt is produced by gradually increasing the salinity level of seawater in a series of reservoirs until salt is extracted. Sea water is first stored in reservoirs called *Brine reservoirs* and is allowed to stand till salinity level reaches around 10° Be i.e., specific gravity of 1.04 to 1.05. Salinity of normal seawater is upto 3° Be (35ppt). Once the water attains the desired level of salinity it is then pumped to smaller reservoirs called *Condensers*. There are three type of condensers where the salinity level is maintained between 10-15° Be, 15-23° Be and 23-24° Be for elimination of unwanted chemicals, impurities and precipitation of Calcium sulphide. In the third stage, the concentrated brine is drawn into *Crystallizers* where edible salt starts crystallizing between 24°-29° Be (specific gravity 1.25-1.27). The prescribed salinity level for extraction of edible salt is 24° Be. The extracted salt is removed, allowed to dry, stored and later transported.

Though common salt (Sodium Chloride) is the major product produced by the small scale and large-scale salt producers, other salts like sodium sulphate and soda ash (carbonates) that are important industrial raw materials are also extracted from the Brine.

#### ***5.4.5. Access for livelihood***

The salt pans were leased out by the National and State Salt Corporations to small scale salt producers and the corporate giants respectively. Since the lease period is for 20 years, small scale salt producers (lessee) of Agasthiyampalli renew their licence through their small-scale salt producers association. This association facilitates the process of lease transfer within the same family generation after generations.

Since the small-scale producers showed less interest over the salt pans of Athirampattinam, it was leased to a Tuticorin based private company (KTK Pvt. Ltd.).

On the other hand, the salt pans regulated by TamilNadu Salt Corporation auctions the lease contract every 20 years. Since both Chemplast and GHCL in machinery-based companies, they employ less labourers than KTK.

Though fish culture in the salt pans during rainy season has been restricted, fishing in brine reservoirs and canals is allowed. People from Maniyantheevu, Kodiyakadu and Kodiyakarai catch fish in this brine reservoir throughout the year without any restrictions.

But the access to the boat deck located near the pumping station at the saltwater canal in the Seruthalaikadu has been treated as trespassing by the GHCL. The fishermen from Pannal have been requesting for an access road on the bund created for the saltwater channel, which would ease their movement during the rainy season. During showers the current mud road becomes swampy and creates more trouble to the fishing community. The demand for road has been put down by the GHCL and the line departments, since the road comes inside the Salt Corporation leased to GHCL.

#### ***5.4.6. Seasonal and Temporal trend in Ecosystem services***

Salt production starts from January, and ends up with the onset of North-East Monsoon. Salt production is relatively better in summer than any other seasons.

Since saltwater is abundantly available in sea as well as in the saline aquifers, the production of salt has been increasing over the decades.

#### ***5.4.7. Competing Use of Resources***

In the past there were several conflicts regarding the rights over the Vishagam Saltwater canal between small saltwater producers and the SKSP Salt Company. Later the saltwater canal became common to all. There is a strong legal battle between small scale salt producers and Salt Corporation of India regarding the renewal of the licence for next lease period. Salt Corporation prefers having a single private party (like Chemplast) to multiple small parties.

There is also another competition between the fishing communities and the avian species over the fishes and prawns in brine reservoir.

#### ***5.4.8. Impact of Disaster on Eco System and Wetland Dependent Livelihood***

The ecosystem services were stalled during the disasters such as Tsunami and Cyclones. Cyclones have breached pan bunds, deposited sea slurry and thrown away broken branches of Prosopis into the pans. Removal of Prosopis and Sea slurry was expensive. Every salt producer had invested more than Rs.20,000 per acre to restore the pans and restart the salt harvest post disaster.

#### ***5.4.9. Existing Market for salt produced***

Though the salt market is steady throughout the nation, salt produced in this wetland is exported majorly to Karnataka. Salt producers highlight that despite higher saltiness of Vedharanyam Salt than that the Thuthukudi salt, it has lesser market price compared to the Thuthukudi salt. The major reason is its pale colour; as the Tuticorin salt is whiter than the Vedharanyam Salt.

### **5.5. Fishing**

Based on the fishing ground, fishermen can be categorised into the following,

- Canal fishermen, who fish traditionally in the man-made fishing canals
- Thottam fishermen, who travels by walk or bicycle, to fish in Thottam and Alam
- Lagoon and Creek fishermen, who fish in Muthupet Lagoon and Chellakannacreek/Lagoon.
- Backwater fishermen, who fish in the backwater channels, saltwater canals and brine reservoirs





**Photo 5.3: Fishing in Seruthalaikadu**

### ***5.5.1. Canal fishing***

There are about 128 fishing canals in the estuaries of Nasuvini and Paatuvanachi arteries. These fishing canal created by the communities residing across these arteries (Sundaranayagipuram and Maravakadu), are traditionally maintained and used by their families, generation after generation. These manmade fishing canals fall under reserve forest of Muthupet. The fishing rights transfers to the family who practiced fishing in those respective channels. These got heavily damaged during Tsunami. Though most of these canals were retrieved with the support of NGOs, it was again damaged by the Gaja cyclone.

#### ***Seasonal Dependency of canal fishing***

The favourable month for canal fishing is the river flow season, i.e. September to January. This is the season; marine fishes move upstream in the arteries via. these fishing canals for breeding. During their return, fishes were caught using 'Pari- Sar'. Fish catch in this season varies from 5-15 kg per day which has a market value of Rs.500-Rs.3000. But this is not the case in non-flow season. The average fish catch will be less than 2 kg, which can meet only their food-nutritional demand. Therefore, they involve in seashore fishing or sea fishing during this season. They go along with the other boat fishermen for fishing.

#### ***Temporal Dependency of canal fishing***

Drudgery in reaching fishing canals, constraints in crossing the aquaculture farms, inaccessible canals due to fallen trees (during cyclone), siltation of canals during disasters, lesser market price for the canal fish catches, reducing flow of freshwater in the river arteries

and siltation of 'Veraguveetti' canal pushed canal fishermen to take up alternative livelihoods or alternative fishing grounds. These canals used to provide livelihood to approximately 200 fishermen but today less than 20 fishermen are involved in canal fishing. They have moved towards sea fishing, labourers in abroad and other non-fishing occupations.

### **5.5.2. Alam/Thottam Fishing**

Individual marginal fishermen from almost every village adjacent to the wetland involve in this Thottam fishing throughout the year. As the water level rises in Alam during the monsoon period, they prefer fishing directly in Alam instead of going to Thottam. Meanwhile, boat fishermen use Thottam for fishing during this seasons. Boat fishermen who access Valavanar uses the Thottam portion ahead of the Sellakkanni creek for fishing.

As Thottam holds water throughout the year, it becomes ground for fishing. Fishes and prawns enter into the Thottam during high tides via. creek, are fished by the marginal fishermen throughout the year in Thottam and seasonally in Alam.



**Photo 5.4: Thottam Fishing in Maruthur South**

Fishermen who neither own boats nor engage in group fishing moves to Thottam early in the morning (around 2 or 3 a.m.) or in the evening (around 5-6 p.m.). Individual fishermen reach the Thottam by walk from their hamlet or uses bicycle till the most accessible point and then by walk to the Thottam. They carry an Aluminum pot ('Kundan') of 20-30 litres capacity, a 'Chippivalai', scoop net and an inflated car/bike tube.

### **Seasonal Dependency**

As the Alam fishing is seasonal unlike the Thottam fishing, fishing in the Alam of Avarikadu-Vandal starts when the backwater rises in the Vedharanyam Backwater channel due to the eastern winds (July). Prawn fishing is major in this portion of Alam. Though freshwater fishes



are caught during river flow (monsoon), their market value is poor as they are not preferred by the coastal communities. These Alam fishermen involve as Aquaculture labourers and salt labourers when the Alam is dry. Women of Avarikadu- vandal are involved in hand fishing of prawn especially when the water level in the Alam is less than 2 feet.

Though almost all the fishes caught in the sea/lagoon is also caught in Thottam, their table size is smaller and so the market value is also less compared to that of fishes caught in Sea/Lagoon. Generally, Thottam fishermen sell their fish catch in the local market. Very few, who own a motorcycle, sell their fishes directly to the households going door to door. Since, monsoon and winter are the favourable period for Thottam fishing, the daily income generated during this period ranges from Rs.700- Rs.1500. In rest of the season the average daily income ranges from Rs.200- Rs.350. The Thottamfishermen prefer 'time spent in the Thottam' to catch a considerable quantity, say 3-5 kg, as the parameter of their favourable season.

### ***Temporal Dependency***

Till the start of 21<sup>st</sup> Century, almost 6 of the fishermen in this Wetland Complex were involved in the Thottam fishing. Post introduction of motorisedfibre boats, fishermen involved in Thottam fishing is reducing day by day. Fishermen prefer boat fishing over Thottam fishing due to its drudgery. The Thottam fishing potential in Thalainyayiru reserve forest is reducing day by day due to poor backwater flow into the Alam. This is basically due to construction of barrages across the Adappar River by Public Works Department.

### ***5.5.3. Lagoon and Creek fishing***



**Photo 5.5: Lagoon Fishing in Muthupet**

Fishermen from Maravakkadu to Thillaivilagam, enters the Muthupet lagoon through different arteries whichever is nearer to them. While fibre boat fishermen from Maravakkadu, Pudhukottagam, Thuraikaadu and Thambikkottai access the lagoon via. Paatuvanachi and Paamani river; fishermen from Muthupet, Alangkadu, Uppur, Pettai, Jambavanodai access via. Koraiyaru; fishermen from Thillaivilagam and Veeranvayal access via. Kanthaparichan river; fishermen from Idumbaavanam access via. Kilaithangiyaru and Maraikakoraiyaru arteries.

Fishermen from Thondiyakadu to Chinthamanikadu, enters the Chellakannailagoon through Valavanaru, the only artery that connected the lagoon in the past. Fishermen of Pannal access through the Saltwater channel created by GHCL and fishermen of Seruthalaikadu access through the fishing canal created by them.



**Photo 5.6: Valavanar Fish Route and Landing Centre**

Fishing in the mangrove lagoon and tidal creeks is open to all fishers (except Chellakkani Creek); no curbs on fishing areas or fishing days. A group of fishermen with its boat owner, sails towards the lagoon, involve in 'group fishing', sells the fish catch in the local market and divides the shares among them.

The share is divided in two patterns, one is 1 of the fish catch of non-boat owner is given to the boat owner as rent and the other is when 'n' number of fishermen takes a boat, the catch is divided into 'n+1' share, in which 2 shares will be given to the boat owner. The income of a lagoon fishermen varies from Rs.500- 1,500.

### *Seasonal Dependency*

As the lagoon provide fish throughout the year, the practice of fishing changes only during the 'prawn season'. During the peak season for prawn (November to December), rotational policy is followed. During this season, some 150 to 200 fishers go for prawn during the day - from 6 a.m. to 6 p.m. At night, fishing is reserved for another group of fishermen - who in turn vacate the place the next morning in favour of a third batch of fishermen. This practice of rotation goes on till the end of the prawn fishing season; after that, no restrictions in fishing time, day or area are imposed. The fishermen interviewed said the rotation system ensures that all fishers share available prawn resources equally during the peak season.



### *Temporal Dependency*

The number of fishermen, fishing in lagoon are increasing day by day. Though *Mutharaiyar* are the traditional fishermen in this region, people from other communities, other religion and far away hamlets have entered into the lagoon fishing. There is no resistance by the community towards the entry of non-fishermen community into lagoon fishing.

#### **5.5.4. Backwater fishing**

Fishing in backwater channel is predominant in the Coramandal coast especially in the Nagapatinam district. The Vedharanyam Channel is the predominant back water channel in which both men and women engage in fishing prawn and fishes. Villages in Thalainyayirublock has large number of back water fishermen. The daily average income of these backwater fishermen is Rs.200 in non-season and Rs.500 in season. More than 100 families in Kodyyakadu, Maniyantheevu and Kodyyarakarai involve in hand fishing in the brine reservoirs of Chemplast and backwaters in the tropical dry evergreen forest. Average daily income varies from Rs.150-250. Less than 20 old marginalised fishing men and women involve in fishing in the saltwater channels and storage pits. They fish mostly for subsistence.



**Photo 5.7: Hand Fishing in Backwater near Kodyyakadu**

Hand fishing in the backwaters and depressions in the coastal plains of Kodyyakadu is a traditional fishing practice of Aathivasi colony families. *Paravaikocham, Olakocham, munaivaikal, kodimarathuvaikal, palayanthunduvaikal, kaathanodai, keechanodai, Narikaathanodai, koyanadappu, muniyankoyilvaikal, kumaladivaikal* are some of the fishing backwater channels in the forest. *Peralam, NanduPallam, Kaathuwaripallam, Onanthikulam, ChinnaPeralam, IrattaiPallam,*

*NallathaneerPallam, SilamburaniKulam, PuliyanKannuKulam, ManoraPallam and AanaiVilunthaPallam* are some of the depressions where hand fishing happens in the monsoon.

Scoop fishing is a traditional practice followed by very few poor fishermen. Small twigs of '*Avicennia marina*' are bundled, tied in the live branches of Mangrove trees adjacent to the waterways. These bundles are tied in a fashion that they are dropped into the water. This attracts the fish and prawns and acts as a trap. The fishes and prawns assemble around these twigs are scooped by the net. One could notice such traps when sailing towards the lagoon. But this practice is slowly reducing over the period.

### ***Seasonal Dependency***

In Vedharanyam swamps, as the industry fills the brine reservoir throughout the year, both men and women involve in hand fishing except in the rainy season. As the water level in the reservoir is more than 3 feet during the rainy season, only men are involved in fishing that too with the '*Veechuvolai*' (cast net).

Almost every family in the Adhivasi colony of Kodiyakadu, involve in backwater fishing in the monsoon season, when the water level will rise.

In Thalainyayiru, prawn season is the most favourable season which gives income more than Rs.300 per day. These fishermen or women work as labourers in saltpan, shrimp farms and other non-farm sectors

### **Temporal Dependency**

The number of fishermen or women involved in backwater fishing is slightly in a declining trend. This is basically due to other better employment opportunities such as ice factory, sea food export factory, saltpans and Shrimp farms. The increase in number of boats has pulled many fishermen towards sea fishing.

As the four backwater channels or creeks (Kaluvapaththai, Manavaikkal, Siththankoyil and Pudhu) has been blocked due to shoreline siltation, fishermen on Kodiyakarai who were dependent on it became fishing labourer. The creeks were silted only post establishment of the brine reservoirs. The wage for the fishing labourers is Rs.700 per day with some bonus during best catches.

#### ***5.5.5. Resource utilization for fishing***

'Wherever there is sea water, there are fishermen'. It is a statement told by the fishermen during Participatory Ecosystem Appraisal. This statement reveals that the fishing activities take place in every region where the brackish water enters. i.e. Fishing canals, backwater channels, Thottam, Lagoon, Creeks, Seashore and sea.

The freshwater entering into the intertidal zone via river arteries are well utilised by the *Veraguvetti* channels created across the flow. The freshwater carried by this channel is distributed through the lateral canals running along the flow direction connecting sea. Thus the flowing freshwater is well utilised by the lateral canals that are used as fishing canals. The







**Photo 5.8: Fishing in Parisar Fishing in Canal**

The *saar* is nothing but a pen made of cane. It is about 1.5 m high and 2.5 to 3.0 m long. The size of the pen depends on the size of the canal. The *saar* is fixed across the canal, from a point 100 m from the shore.

*Mooku Saar* is another pen that is used during river flow. This pen allows the fishes and prawns to move from sea to river during high tide but not the reverse movement during low tide.

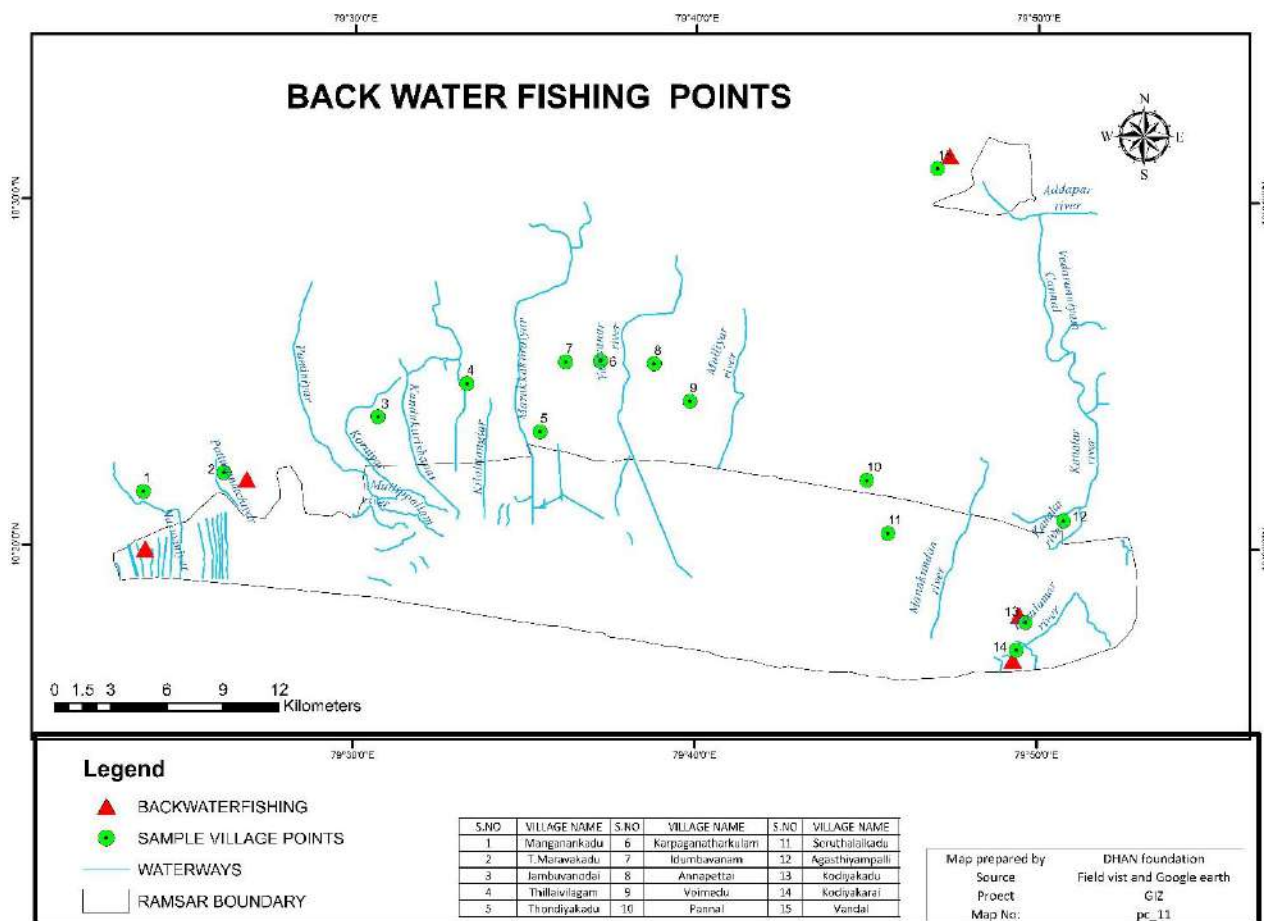
*Kannis* a curved canal that starts from fishing canal just ahead of the *Saar* and ends up again in the same fishing canal little upstream (5-8 meters). This is where the *Pari* is fixed for fish catch.

During low tide, water from the wetland starts draining into the sea, along with the fish and prawns. These fish and prawns are trapped in the *pari*. The *pari* is removed during high tide or early morning; all the fish and prawn trapped in the *pari* segregated. The fingerlings are thrown back into the canal, that meets the sea. Carry able quantity of marketable catches are transferred to the aluminium pot and taken to the market.

Small scoop net is also used to collect the trapped fish and prawn circling in the *Kann*.

### ***Hand Fishing***

Groping, a method of fishing that aims at capture of prawns in shallow water (Alam, Brine reservoir, backwaters) during low tide. Sitting on their knees, they keep their head above the water level, holding a pouch made of cloth or plastic bag, women move their hands on the surface to catch the prawn. The pouch has to be kept submerged in the water so that the catch is not spoiled. They repeat this drudgery process until they get a desirable prawn catch, say a catch worth of Rs.200.



Map 5-6: Backwater Fishing Points

### Net fishing

The following are the common gears used by fishers for fishing in the mangrove waters

*Adappuvalai*: The net is operated in lagoon, tidal creeks and mouth of canals. This is a type of gill net used in the mangrove water, mainly to fish *Seraiyakendai* and *Keduthai*. It is about 18m long and 2 to 2.5 m broad. The mesh size is about 2 cm. Since, *Seraiyakendai* have a habit of moving towards the shore for feeding, they can be easily caught using these nets during low tide. The net is put up in the water around 8 pm, 10 m away from shore and left undisturbed, and catches are collected in the next morning.

*Koduvalalai*: It is another kind of gill net used exclusively for fishing seabass (*Koduva*). It is operated in Lagoon and creek. It is about 30 m long and 4.5 m broad, with a mesh size of 8 to 10cm. The net is erected in the muddy bottom with the help of wooden poles, normally put up around 6 pm and left undisturbed. The seabass moving along with the incoming tides are caught in the net, and are collected the next morning. The *koduvalalai* operation requires 4 to 10 persons.

*Izhuppuvalai*: This is a small-sized drag net used mainly for prawns. It is 30 to 40 m long with the mesh size of 2 to 3 cm. During fishing operations, two persons who hold opposite ends of



the net move slowly towards each other, marking a rough circle as the net moves towards the shore. The fish and prawn entangled in the net are collected.

*Chippivalai*: This is the most common gill net, used to catch varieties of small fish like *Tholli*, *Vallaipodi*, *Vellampodi*, *Thogaipodi*, *Soodapodi* and *prawns*. It is about 20 m long, with a mesh size varying from 2 to 4 cm. while *oonuchippivalai* is a stake net used across the lagoon with the help of wooden poles, *vazhichippivalai* is allowed to float along the water current. Chippivalai operations start around 4 or 5 a.m. and end around 10 or 11 a.m.

*Nandukachchavalai*: This is specially designed to catch crabs, particularly samba crab. It is about 8 to 10m in length; mesh size varies from 7 to 9 cm. It is used across the water current. Its operation starts by 5 p.m., it is left undisturbed in the water overnight and catches are collected the next morning. It is used mostly in the creek where the sea water enters lagoon.

*Yendhuvalai*: Yendhuvalai is a scoop net used in the mangrove water by poor fishers. The scoop net contains a round wooden frame with handle and a net with mesh size varying from 1 to 2 cm. It is used near the stagnant portion near mangrove trees. In these areas, a small branch of *Avicennia marina* is dropped into the water; fish and prawns. Fish and prawn attracted by these branches are trapped and Scooped using *Yendhuvalai*.

#### **5.5.7. Access for livelihood**

Almost every portion of intertidal zone that includes Alam, Thottam, Lagoon, Creek, Kottagam, backwaters are open to all. Even the non-fishermen can catch fish in these region.

Fishing canals are accessed only by the families who have the traditional right over the particular canal. Other families are allowed to catch in the canals only when it is leased. A record has been maintained by the forest department on the families having traditional right over these fishing canals.

As stated earlier, Sethuguda is leased out by the fisheries department and the lease amount has been paid by the fishermen cooperative society. Every fishermen pays an amount of Rs.2 for taking up this lease for a year.

Though fishing in Sellakkanni Lagoon portion is open for all, fishing in the creek (mouth) portion is a traditional right of Seruthalaikadu fishermen. Therefore, other fishermen are restricted from fishing in the mouth, but they are allowed to pass through the creek.

#### **5.5.8. Seasonal and Temporal trend in Ecosystem services**

The favourable fishing period for the entire wetland complex is between September to January. This is the season when the river flows into the inter tidal zone and the southern winds blow. October to December is the best season for prawn and crabs. This intertidal zone permits the fishermen to fish in this zone even during the fish-ban period.

The intertidal fishermen senses that none of the fish variety has extinct but their number has drastically come down. This might be due to unsustainable fishing practiced adopted by the bottom trawlers. The fishermen also highlight that number of fishermen fishing in the

intertidal zone has increased over the two decades, especially after introducing motorised fibre boats.

### ***5.5.9. Competing Use of Resources***

Since the inter tidal zone is open for all fishermen, there is no big competition among the fishermen in fish catch. There is a common system exists among the fishermen that everyone should be benefitted from the fishing.

### ***5.5.10. Impact of Disaster on Eco System and Wetland Dependent Livelihood***

Cyclones in the Palk Strait have created change in the shoreline by breaching it. It has created new creeks; it has widened the mouth of the lagoon; a new submerged portion, called 'Sethuguda' has been formed, some of the creeks have been blocked or silted, the flow of water inside the seawater (*Neerottam*) has changed.

Fall of mangroves due to cyclone has completely made fishing canals inaccessible. This has resulted in siltation of the fishing canal. This reduced the freshwater-saltwater interface resulting in further dying of surrounding mangroves. After Gaja cyclone, less than 20 fishermen involve in canal fishing which was once used by more than 80 fishermen.

In Avarikadu-Vandal, post Gaja cyclone, dying mangroves **resulted in erosion of the soil** held up by the mangroves. This has resulted in increased alam portion and reduced circumference of mangrove portion.

Increased growth of Oyster bed in the lagoon and Creeks of the wetlands is another significant impact of Tsunami highlighted by the fishermen.

### ***5.5.11. Existing Market for fish***

As the demand for sea foods are growing day by day locally and regionally, the resources have very good market value. The market value of the fish, crab or prawn depends on the factors such as table size, taste of the fish, nature of bone, freshness of the catch and season.

## **5.6. Forest Collection**

Herbs, fruits and honey are the important produces collected by the local communities. Since the wetland serves as an important source of herbs, few families collect these herbs and sell to a local trader. Fruits, honey and herbs were collected from the tropical dry evergreen forest, by the communities of Kodiyakadu and sold in the local market. Among all the herbs, '*Thannivittankilangu*' is widely collected by one or two families in each village. '*Paala and Thaalai*' trees are the major host for the honey bees to build their combs. Families from Aathivasi Colony of Kodiyakadu collect this honey and sell in the local market.

### **5.6.1. Seasonal dependency of forest collection**

Since the availability of these herbs is seasonal, the dependent families are also involved seasonally. Post monsoon season is the most favorable period for herb collection. On an average Rs.250-400 is earned from this activity every day. Herb collectors are involved in this activity for less than 120 days. For rest of the year, these families involve in fishing or agriculture.

Similarly, there are fruit collectors who collect '*Naavalpazham, Kaarmbazham, Soorapazham, Paalapazham*' fruits from the forest. Average daily income during the fruiting season varies from Rs.200-Rs.300.

### **5.6.2. Temporal Dependency of forest collection**

The number of people involved in forest produce collection is reducing day by day to almost nil. Restrictions imposed by the forest department for collection of fruits, as they attract the avian population, reduced number of fruits bearing or host trees due to disasters and invasion of *Prosopis* are the reasons behind this falling trend.

### **5.6.3. Resources utilization for livelihood**

Families of Aathivasi colony are the major forest product collectors. They collect fruits, vegetables, pulses, herbs and honey majorly for their food security and surplus for the market.

Fruits collected from the forest are Paala (*Manilkara hexandra*), Naaval (*Syzygium cumini*), Korattai (*Passiflora edulis*), Kadukka (*Terminalia chebula*), Thovaran (*Cajanus cajan*), Kizhaa (*Carissa carandas*), Varppula (*Securinega leucopyrus*), Konji, Naaga (*Rubus argutus*), Veeram (*Drypetes sepiaria*), Magilampazham (*Mimusops elengi*), Soorampazham (*Ziziphus oenoplia*), Elanthai (*Ziziphus jujube*), Eecchai (*Phoenix sylvestris*), Kovai (*Coccinia grandis*), Vaagai (*Albizia lebeck*) and Kaarampalam (*Peristrophe paniculata*).

*Paasuthi, Musutai, Umuri, Thuthi, Athandangai, Perandai, Thuthuvalai* are some of the leaves collected and consumed by the local communities.

*Palupavai* is a type of bitter guard, is an important cuisine of this community which is cooked along with prawns.

*Poonakachikottai, Kaatumochai, kozhiavarangkottai* are the pulses collected from the forest. These nuts are first boiled, crushed and washed till the colour changes to white. It takes more than 16 washes to remove the bitterness. Then it is mixed with *Moringa* leaves, cooked and consumed. These nuts were considered as the life saviour for the community during famine.

*Sangu ilia, Milagusaranai, Paanaiadaippan, Kaatunaathi, Aavarampoo, Nannari, Avuri* and *Komatti, Thannivittankilangu*, barks of *Vathaam, Kaipaala* and *Perumbala* are used as herbal medicines to traditionally to cure some of the diseases and heal wounds.

These forest products are collected for their self-consumption as well as for selling in the market.

#### ***5.6.4. Resources Extraction Techniques***

The forest products are collected directly by the communities living around it.

#### ***5.6.5. Access for livelihood***

Since the Aathivasi colony people are the traditional users of the forest, they are permitted to access the forest, abiding the rules and regulations of the department. Whenever they breach the law, they are warned and fined.

#### ***5.6.6. Seasonal and Temporal trend in Ecosystem services***

While most of the resources are perennial, fruits are seasonal. Monsoon season is the fruit bearing season for majority of the trees in this forest.

Since the native trees are replaced by invasive *Prosopis*, the produces from the forest are also reducing. The forest cover well protects the community from the cyclones and Tsunamis.

#### ***5.6.7. Competing Use of Resources***

Similar to other forests, this forest also faces the competing use of resources between wild and domestic life. Cattle grazing is one of the most serious problem of the forest. **Around 400-500 cattle graze everyday inside the sanctuary. As the surrounding areas are mostly under swamps and salt pans, very little grazing land is available for the local cattle. It leads to competition over water and food between the blackbucks and the cattle.**

Similar with the fruits. The birds and bats feed on the fruits that are harvested by these local communities. Though forest department restricts picking up fruits, in order to host the bird population, they still harvest.

#### ***5.6.8. Impact of Disaster on Eco System and Wetland Dependent Livelihood***

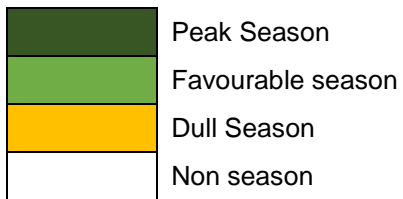
Since forest in the shoreline and coastal plains act as the frontline barrier against the cyclones and tsunamis, forests are the most affected one. Since mangroves are highly sensitive towards cyclonic winds, they die in a large number. Almost 5 of the native trees were replaced by the invasive *Prosopis*. This reduced the services provided by the forest which directly affected the forest dependent communities.

#### ***5.6.9. Existing Market for resources***

Post ban for marketing forest collects, the market exists only for few herbs. Especially, *Thannivittankilangu*, is having good market, as it is used in medicines for impotency.

**Table 5-1 Seasonality in wetland dependent livelihoods.**

Wetland dependent Livelihood	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Agriculture - Tobacco	Crop 2						Crop 1					
Agriculture - Paddy								Crop 1				
Salt Production												
Aquaculture - Shrimp farming	Crop 1				Crop 2							
Canal fishing												
Thottam Fishing												
Lagoon and creek fishing												
Backwater fishing												
Forest Collection												





## 6. Impact of Major Livelihood on wetlands

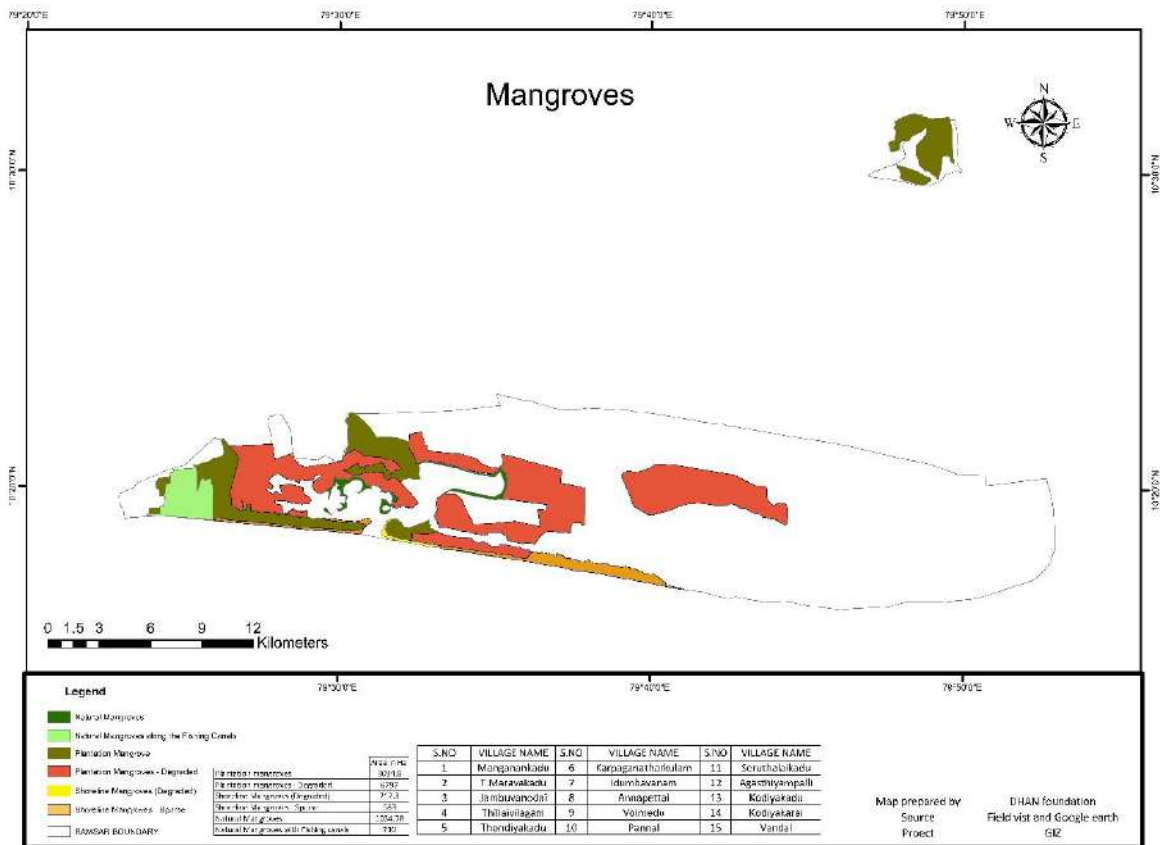
### 6.1. Impacts of Agriculture on the wetlands

**Increased Thottam:** Irrigation intensified agriculture practice adapted in the Cauvery Delta was possible only by damming of rivers. Although, damming improved the water availability in the Cauvery basin, the wetland got negatively affected. This resulted in reduced flow of freshwater into the intertidal zone and created a less favourable situation directly affecting the 'regenerative capacity of the mangroves'. Poor freshwater-saltwater interactions in the intertidal wetland complex did not support the dying of mangroves. Though 'coop felling' was totally banned, regeneration post the 'natural disasters' did not happen as natural it was. Therefore, the Thottam area is increasing over decades.

Shutters or Barrages were constructed in every artery of the river Cauvery to build the head of freshwater and recharge the groundwater aquifers. These barrages also arrest the entry of seawater during high tides.



**Photo 6.1: Shutter Construction in Valavanar River at Munnangadu**



**Map 6-1: Mangroves**

This again affects the freshwater-saltwater interaction, resulting in degradation of mangroves and its habitat. This is well cited in the Avarikadu-Vandal region of Thalainyayiru reserve forest.

## 6.2. Impacts of Salt pans on the wetlands

### 6.2.1. Increased salinity

The change in livelihood practices such as establishment of brine reservoir, pumping of saltwater from aquifers are some of the reasons cited by the communities for increased salinity in soil as well as the aquifers.

Till 1990s, dug out community wells in the *Sakkaranpettai* were the primary drinking water source for the communities. Till 1950s, Farming was the major occupation of *Seruthalaikadu*, which was established deforesting the swampy forest before five centuries. Currently the dug wells are ignored because of its higher salinity level and the agriculture lands remain fallow due to increased salinity. The saline farmlands were invaded by the *Prosopis*.





**Photo 6.2: Chemplast pumping station in Kodiayakadu**

Communities highlights the expansion of GHCL and establishment of brine reservoir between *Sakaranpattai and Seruthalaikadu* as the reason behind this impact.

On the other hand, farmers of *Agasthiyampalli, Kodiayakadu and Kodyakarai* blames the practice of pumping saltwater from aquifers to produce salt as the major reason for intrusion of seawater and depletion of freshwater. There were more than 5000 active dug wells irrigating the rain-fed fields in which paddy, pulses and millets were cultivated. Currently none of the wells are active due to increased salinity.

The *Muniyappan lake* and its dependent habitat have been completely lost due to increased soil and water salinity. The mudflats of *Agasthiyampalli*, called as 'Kallikadu', which was rich in cactus turned in to land of *Prosopis*.

### **6.2.2. Siltation of creeks**

*Kaluvapaththai, Manavaikkal, Siththankoyil and Pudhuaaru* were the four creeks found in between *Chellakannaicreek* and the Point Calimere. These creeks were accessed by the fishermen of *Kodyakarai and Kodyakadu* for fishing. But the *Pudhuaaru* creek was later converted into pumping station for Chemplast and the water is stored in the brine reservoir. This has direct impact on the tidal motion in the intertidal zone. As a result, the other three creeks were silted and blocked. Currently fishermen are not accessing this portion for wetlands. Impact of this shoreline changes has to be researched deeper.

Some studies also highlight the positive impact of the brine reservoir. Since water is stagnant in the brine reservoir through the year, it hosts migratory wetland dependent birds for a longer span.



**Photo 6.3: Chemplast brine reservoir in Kodiyakarai**

### ***6.2.3. Poor Drainage***

Altering the landscape of mudflats by creation of bunds for saltpans and brine reservoir has a minor implication in the drainage capacity of the wetlands. Post damming of rivers, flood is not a major concern in this region. Due to erratic rainfall, it might become an important concern in the future.

#### 6.2.4. Replacement of Flora and Fauna



**Photo 6.4: Prosopis Invasion in the dense Mangrove forest in Maravakadu**

The residue after extraction of various salts, called Bittern, has a very high level of salinity of more than 30° Be, in excess of 300ppt. This residue is allowed to stand in a sink and seep into the soil. Sometimes the bittern would overflow into the tropical dry evergreen forest. It is the seepage of the high saline bittern that is primarily responsible for increasing salinization of the soil and the ground water table. This alters the flora and fauna of the forest itself. People of Aathivasi colony, indicates this salinity increase as one of the reasons for native trees and increasing Prosopis.

### 6.3. Impacts of Aquaculture- shrimp farms on the wetlands

#### 6.3.1. Degradation of soil and water

Mudflats turned agricultural lands were later converted into shrimp farms. When the land is under agricultural use, it is exposed to freshwater and less chemical inputs. On the other hand, when it is used as shrimp farms it is filled with brackish water. Normally 25 kg of prawn feed is used per 0.5 ha of pond. About 250 to 350 kg of lime is used per 0.5 ha of pond to increase the soil pH. A variety of antibiotics such as oxytetracycline, wolmid, muzophore and germicides are used to control diseases. All these intensive chemical applications not only degrade the soil but also the water.





**Photo 6.5: Aquaculture effluents are connected in the Mangroves in Thillaivilagam**

As the effluents are released into the wetlands without any treatment, it might adversely affect the wetland dependent habitat. Fishermen have cited incidences of dead fishes floating near to the effluent channels. Reclamation of the defunct shrimp farms back to agriculture is another big challenge. The average lifetime of a shrimp pond ranges between 7-15 years. However, abandonment of ponds is common in this localities. The restoration of abandoned shrimp ponds is difficult because many of the environmental conditions that originally fostered the growth of mangroves or agriculture have been altered. The ability of the substratum to support vegetation has been destroyed due to increased soil salinity and deposition of chemical inputs applied in the farm over the period. This complicates rehabilitation of abandoned ponds.

### ***6.3.2. Impact on drainage system***

Saltwater channels created by the aquaculture farms to pump for their pond, also conveys seawater to the mangroves even in the low tide. This improves the growth of mangroves and its associate species in the channel bunds. This is in fact a positive impact on the mangrove ecosystem.

When it comes to drainage of freshwater during flood, aquaculture farms create adverse impact. The huge bunds constructed across the natural drainage obstructs the flow of flood water. This might lead to inundations in the buffer villages.

Alteration of '*Veraguvoetti canals*' in favour of aquaculture shrimp farms, to tap the flowing river water, leads to reduced freshwater flow into the fishing canals. This adversely affects the mangrove growth in between the fishing canals which were degraded after Gaja Cyclone.

### **6.3.3. Mangrove deforestation**

Shrimp farms were established deep into the reserve forest zone deforesting the mangroves. These shrimp farms in the mangrove region are encroachments. While some have obtained 'patta' for these lands in the later period, some remained as encroachments. These farms remain defunct after legal battle taken up by the forest department. But the mangrove and its habitat loss have not been retrieved in this defunct portion.

### **6.3.4. Light and Noise pollution**

Shrimp farms are aerated and illuminated by the electric lines. Since most of these lines faces a power shut down for 10-12 hours a day, diesel powered generators along with backup generators are used to run the aerators. **More than 1500 generators are running in this wetland complex. This not only releases diesel emissions but also creates noise pollution. This noise pollution impacts birds and bats hosted by the mangrove wetlands.**

The illumination system in the tank bunds around the shrimp farms might lead to light pollution which might lead to metabolic changes in some of the aquatic life. Deeper research in this aspect has to be undergone.

## **6.4. Impacts of fishing on the wetlands:**

### **6.4.1. Increase in Mangroves**

Canal Fishing livelihood keeps the fresh-saltwater interactions alive in the inter tidal wetland zone. The canal fishermen desilt the canals at regular intervals, which facilitates better flow of fresh and seawater. It leads to better mangrove growth. The dense mangrove growth in this locality is the evidence for the symbiotic relationship between the canal fishermen and the mangroves.

### **6.4.2. Reduction in fish resource**

Unethical practices such as bottom trawler and gill nets (*Surukkuvalai and Rettaimadi*) followed by deep sea fishermen affects the aquatic life entering into the inter tidal zone. Unanimously, all fishermen accept that quantum of fish in the wetland complex is reducing over years, e.g. *Kaala, Kathalai, Serayakendai, Thirukkai and Koduva* are the major fishes facing a declining trend. Apart *Kadinandu and Tiger prawn* are also facing declining trend.

### **6.4.3. Changes in oyster bed**

Growth and degradation of oyster bed in the inter tidal zone is one of the major concern of lagoon and creek fishing communities. The oyster bed hurts their foot when they try to get down into the Thottam to push the struck boat. The oyster bed growth also changes the flow of tidal water and also the fishing route. Study on the significance of oyster bed will add more value to the understanding on wetland complex.

## 6.5. Impacts of livestock rearing on the wetlands:

### *Degradation of mangroves, forest and shoreline vegetation*

Mangroves in the western side of the Muthupet reserve forest, *Mannavaramtheevu* in the shoreline of Chellakannacreek and Wild life sanctuary at Vedharanyam Swamps are the major grazing pockets of the Point Calimere wetland complex.

The two major reasons of 'livestock rearing communities' to rely on this wetland for their animal grazing are,

- 1 Scarcity of grazing lands during cropping season (September-January)
- 2 Reduced availability of *poramboke* land in and around the villages

While the first reason applies for grazing in Muthupet and Mannavaramtheevu, the second reason applies for grazing in Wild life sanctuary.

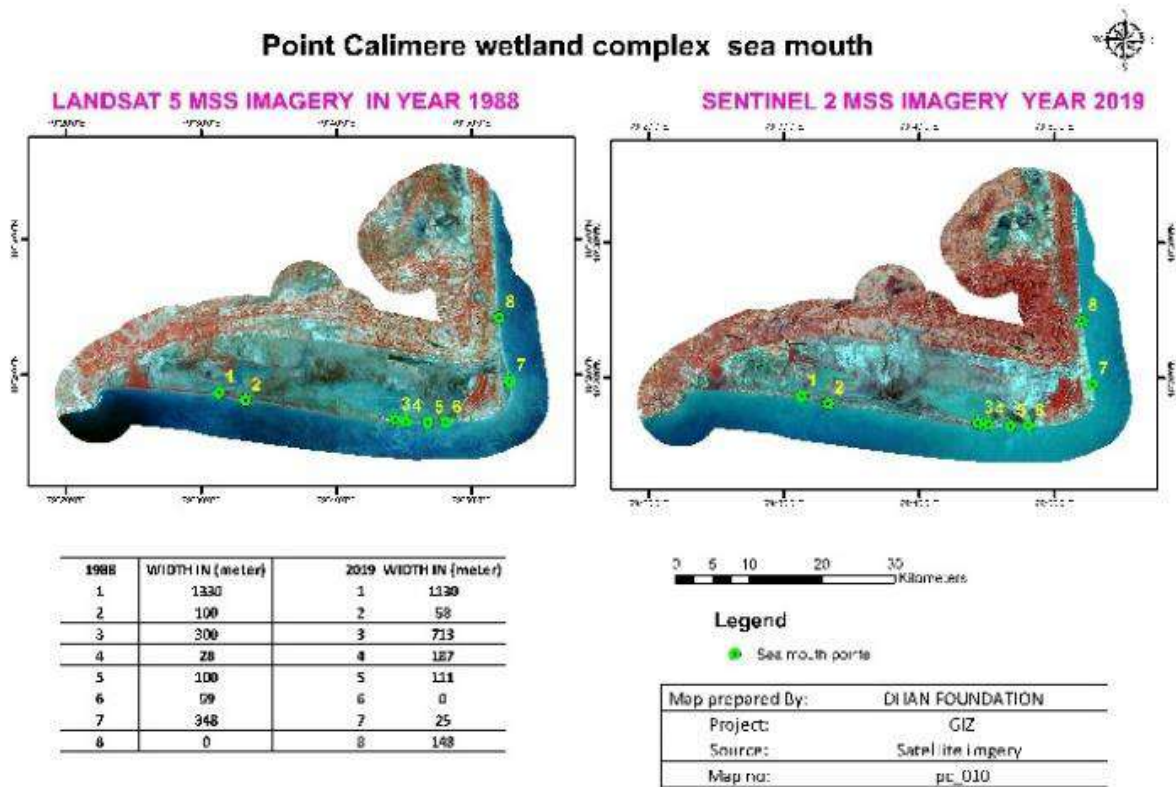
In Muthupet mangroves, livestock from Adirampattinam and Karisaikkadu graze in the peripheral regions of the mangrove wetlands. Cattle consume leaves, propagules and seedlings of *Avicennia marina*, causing stunted growth of mangroves and poor establishment of seedlings in the peripheral regions. This is the region where the freshwater flow is more during the monsoon and post-monsoon seasons which is most suitable for mangrove regeneration. Grazing might be a factor in dispersal of *Prosopis* inside the mangrove region.

Livestock shifted to the *Mannavaramtheevu* during the cropping season, feeds on the fresh grass green cover developed after the showers. Livestock feed on forages of other trees in the shoreline region. The shoreline rich in '*Thaalai*' (*Pandanus fascicularis*) is almost extinct due to the livestock grazing. The faeces of livestock that carries the seeds of *Prosopis* are the major source of *Prosopis* invasion in the shoreline. *Prosopis* not only invaded other native habitat but also depleted the freshwater lenses in the sand dunes of shoreline.

As the surrounding areas are mostly under swamps and salt pans, very little grazing land is available for the local cattle. Therefore, local villagers have left more than 600 cattle in the Point Calimere wild life sanctuary. The ownership markings on cattle indicates that these are not feral in nature. Cattle competes with the blackbuck over fodder and water, especially acute during the dry summer. Each cow consumes twice that of an average blackbuck. The pressure over grassland is further aggravated by the feral horses. There is also the incidental risk of transmission of diseases from domestic livestock to the wild populations.

## 6.6. Impact of 'Change in wetland' over wetland dependent Communities

### 6.6.1. Change in shoreline and creeks



**Map 6-2: Point Calimere Wetland Complex Sea mouth**

Over past 5 decades the shoreline of Palk strait has undergone lot of changes. While of the creeks were silted the other were breached or widened. In Point Calimere wetland complex following changes took place,

A new submerged portion was formed in the left side of the Muthupet lagoon. It is called as Sethuguda.

A new creek breaching the shoreline, just near the Mullipallam creek, was formed connecting the Muthupet Lagoon with the sea. It is locally called as Thovaikal.

Chellakannai Creek has been widened than before

Minor creeks (Kaluvapaththai/Maanpanjavaikal, Manavaikkal, Siththankoyil) has been blocked due to siltation/accretion.

The first three changes have increased the fishing zone in the intertidal wetlands. *Sethuguda* became as the fishing ground for prawns and fishes. *Thovaikal* made access for boat fishermen to the shore line as well as the Thottam much easier. Widened Chellakannai creek brought higher quantum of fishes and prawns into the lagoon/creek portion during its high tides. The number of fishermen are increasing both in Muthupet Lagoon and Chellakannai Creek.

On the other hand, accretion of minor creeks in the Kodiyakarai has reduced the fishing zone of boat-less Kodiyakarai fishermen. The fishermen who fishes in the shorelines, minor creeks and the inundated Kottagam/Thottam has become wage fishermen. In the past, this fisherman starts their day at 3.00 am, travels two hours by walk along the shore line or the Thottam to reach sea shore by 5 am. If there is a good catch (September to January is the favourable fishing period), he returns by 4.00 pm or stays whole night and returns by next day morning 4 am. The average fish catch expected by these fishermen is 4-5 kg. They process the spoiled fishes into dry fish. Now, these fishermen are employed by the local and migratory fishermen for a wage of Rs.600 per day fishing and Rs.700 per night fishing.



**Photo 6.6: Fishing kit of Mannavarum Fishermen**

### ***6.6.2. Disconnected Arteries***

Freshwater inflow via arteries of Cauvery is the life line of the wetland complex. It regulates the soil and water salinity in the intertidal zone. Freshwater inflow into the Alam zone is obstructed due to two following reasons,

Construction of barrages/ Shuttters across the arteries before entering into the wetland complex

Heavy siltation of the arteries due to desiltation for a longer period.

While first is a manmade process with the objective of groundwater improvement and the latter is a natural process attributed by poor allocation of fund for restoration.



Though barrage/Shutters were constructed in every river artery, **it has serious implication only on the livelihoods of inland fishermen in Avarikadu-Vandal.** The major reason for this impact is, in all other arteries shutter was constructed above (upstream) the intertidal wetland zone but in Adappar it is constructed just after (downstream) the mangrove/ intertidal zone. This shutter has obstructed the inflow of high tidal backwaters and also the incoming prawns and fishes. The fishermen who fished prawns in the Alam were generating an average income of Rs.300 per day in non-season and Rs.1,100 in season (Aug-Feb). Losing their livelihoods, these fishermen started to move as wage labourers in Shrimp farms and saltpans. Though the people of Avurikadu-Vandal protested against the Public Works Department with a demand to construct the shutter in the upstream, it was declined and completed. The communities also warn that it might degrade the mangroves in the upstream of shutter.

Natural siltation of *Valavanar*, *Manangkondan* and *Pattuvanachi* arteries, attributed by low flow for a prolonged period disconnected the freshwater flow into the mudflats.



**Photo 6.7: Narrow Mouth and Siltation of Pattuvanachi River**

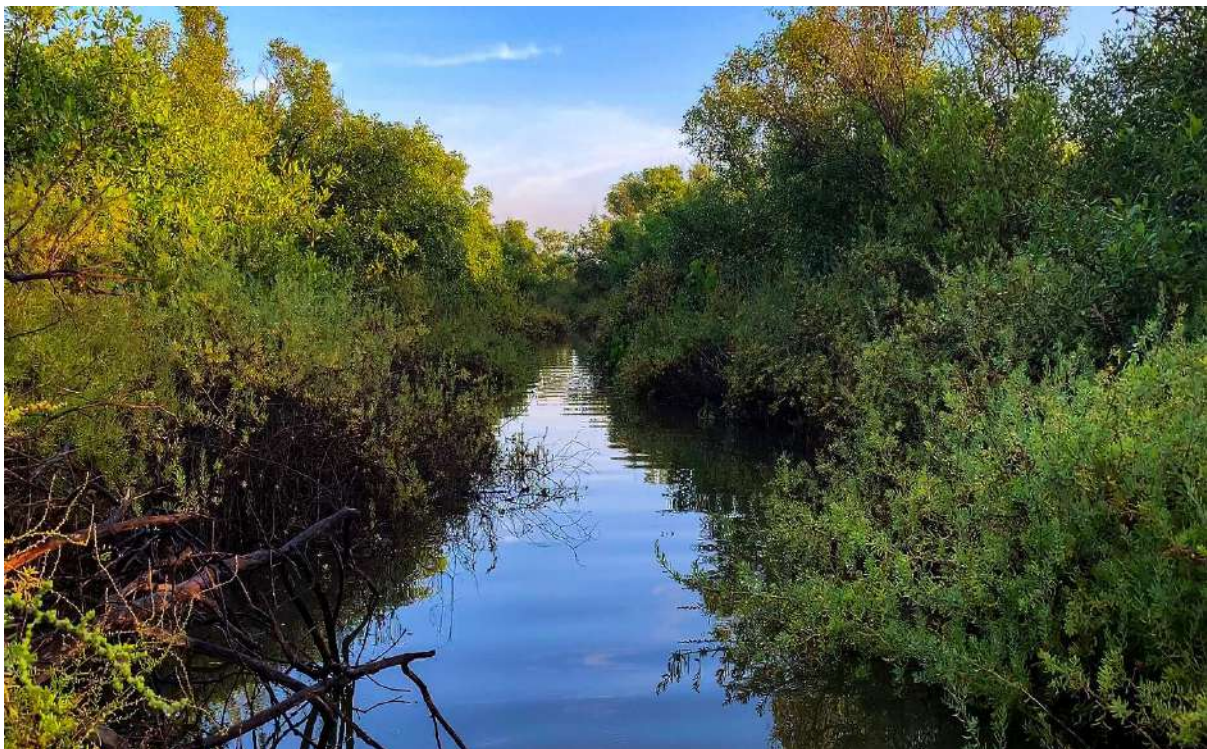
*Valavanar* is the major artery and *Manangkondan* is the minor artery draining into the *ChellakannaiCreek*. Fishermen from Thodiyakadu to Pannal used *Valavanar* as the entry point into the *ChellakannaiCreek*. As the natural connect has been lost due to low flow, an 8 km long new channel (*VettuVaikal*) was dredged by the fishermen. Every boat fisherman contributed Rs. 5,000 in creating this channel with a width of two boats. Though the channel connected *Valavanar* with the creek, it needs regular investments from fishermen.

*VeraguvettiVaikal* and *ParimadaiVaikal* (Fishing Canals) of Maravakkadu are dependent on the freshwater flow from *Pattuvanachi*artery. Siltation of this artery affected the flow of freshwater

through fishing canals. This was further aggravated by the Gaja cyclone. The fishermen dependent on these fishing canals have either shifted to sea-lagoon fishing or non-fishing activities.

### **6.6.3. Defunct fishing canals**

Gaja Cyclone-fell mangrove trees made the fishing canals inaccessible. Sea slurry carried by waves and silt carried by river flow silted these unused fishing canals. The situation favoured *Suaeda*, an associate of Mangroves to dominate the ecosystem. Ultimately, the fishing canals became defunct. More than 100 fishing families depend on these canals for their livelihood. They were self-sustaining with an average income of Rs.300 in off season and Rs.1500 in on season. Losing their traditional fishing, these fishermen are moving towards sea and lagoon fishing.



**Photo 6.8: Defunct Fishing Canal in Managankadu**

### **6.6.4. Imposed land use changes**

Very few farmers, attracted by the higher returns, converted their agriculture land into shrimp farms. The leach from the farms gradually affected adjacent farmlands by increasing its soil and water salinity. Aquaculture farm bunds affected the natural drainage capacity of the agriculture lands. This situation pushed other farmers to sell their land to existing shrimp farm owners or lease to shrimp farm practitioners. Especially in Jambavanodai and Thillaiwilagam almost every traditional farmer turned into shrimp farming activity. Even few traditional agrarian families who faced severe loss in shrimp farming, even turned down into fishermen in this decade.

## 7. Trend Analysis

### 7.1. Spatio-Temporal Trend in Resources Availability for livelihood

Natural conversion and the anthropogenic activities are keep redesigning the ecosystem and its services. Some of the trends needs to be noted and documented to minimise the forthcoming pressure on the ecosystem and the dependent livelihood of the local community. A community centric spatio temporal analysis are done with the information collected from the sample villages. This trend analysis is done for the different livelihoods which is directly depends on the wetland such as Fishing, Salt extraction, Aquaculture farming and Agriculture.

**Table 7-1 Spatio-temporal trends in resource availability for wetland dependent livelihoods**

Livelihood	Past	Present	Future
<b>Agricultural</b>	<ul style="list-style-type: none"> <li>▪ Completely Canal based irrigation</li> <li>▪ Usage of Ground Water and Surface Water</li> <li>▪ Multiple Crops and Multiple Seasons</li> <li>▪ Agriculture as livelihoods</li> <li>▪ Only food crops like paddy ad vegetables</li> <li>▪ Usage of Manual Lift Irrigation</li> <li>▪ Native Paddy variety</li> <li>▪ Agriculture done only in the agriculture land</li> <li>▪ No usage of much chemicals, pesticides and fertilizers</li> <li>▪ Very minimum of external market by the middle man</li> <li>▪ No insurance coverage</li> <li>▪ Enough water released from Cauvery distributaries and minimum shutters and barrages</li> <li>▪ No intrusion of saline water in to agricultural land</li> <li>▪ No deposit of sea sludge in to agriculture land by cyclone and tsunami</li> <li>▪ Minimum level of soil salinity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Shift to commercial crops such as Tobacco, Tabiaco, Floriculture, Coconut, Casurina and other horticulture crops</li> <li>▪ Usage of Motorised lift irrigation based on the economic status</li> <li>▪ Usage of Farm Ponds</li> <li>▪ Usage of Bore well</li> <li>▪ Lift Irrigation with the Support of PWD</li> <li>▪ Hybrid paddy seed variety</li> <li>▪ Thottam is been used for Agriculture purpose</li> <li>▪ Usage of high chemicals, pesticides and fertilizers</li> <li>▪ Market support by the government</li> <li>▪ Insurance coverage by the government programmes</li> <li>▪ Less water released from Cauvery more number of shutters and barrages</li> <li>▪ High intrusion of saline water</li> </ul>	<ul style="list-style-type: none"> <li>▪ High possibility to have more barren land</li> <li>▪ Agriculture will be done as commercial livelihood</li> <li>▪ Only the economically well of people can practice agriculture</li> <li>▪ Possibility of revival of aquaculture pond in to agriculture purpose</li> <li>▪ Soil resistant crop can be intervened</li> <li>▪ New agricultural technology can be introduced</li> </ul>

Livelihood	Past	Present	Future
		<ul style="list-style-type: none"> <li>▪ High deposit of sea sludge in to agriculture land by cyclone and tsunami</li> <li>▪ Increasing trend of soil salinity</li> <li>▪ Changes in the agricultural land use pattern</li> <li>▪ Agricultural land was sold out for aquaculture</li> <li>▪ Due to aquaculture nearby agricultural land gets impacts</li> <li>▪ Establishment of more surface water for water percolation</li> </ul>	
<b>Fishing</b>			
<b>Canal Fishing</b>	<ul style="list-style-type: none"> <li>▪ More than 180 fishing canals are in usage by Manganakadu, Maravakadu, Karisalkulam and Majnavayal villagers</li> <li>▪ Very effective fresh as well as brackish water flow in to the canal</li> <li>▪ Very normal tidal movement in Palk Strait</li> <li>▪ Very larger mangrove was there</li> <li>▪ Many number of fishing species were available</li> <li>▪ Less Drudgery</li> <li>▪ All the family members are involved in this fishing type</li> <li>▪ Nasuvini river which flows in to the entire fishing canal</li> </ul>	<ul style="list-style-type: none"> <li>▪ The Fish Bone method seriously affected the fresh water flow in to the fishing canals</li> <li>▪ Palk strait was silted</li> <li>▪ The entire mangrove vegetation was impacted by Gaja cyclone</li> <li>▪ Fish varieties are getting reduced due to bottom trawlers and gill nets by the larger fishermen in the Sea</li> <li>▪ Very few of the family members are involving and the youth category is completely moving away from this livelihood</li> <li>▪ More drudgery</li> <li>▪ Only 20 canals are in functional status</li> <li>▪ The entire canals are silted and the water ways was obstructed by the fallen mangroves</li> <li>▪ The Nasuvini river was completely blocked</li> </ul>	<ul style="list-style-type: none"> <li>▪ There is high possibility to revive all the fishing canals by involving the fishermen and forest department</li> <li>▪ The present status is continuous the entire livelihood will be destroyed</li> <li>▪ These fishermen became fishing labour as the fishermen in Kodiayakarai</li> </ul>



Livelihood	Past	Present	Future
		<ul style="list-style-type: none"> <li>▪ The path way of reaching the fishing canal is encroached by the aquaculture owners and they disturb this poor fisherman</li> <li>▪ In and around Adirampattinam and Maravakadu many of the Aquaculture wastes are spoiling the fishing canals</li> </ul>	
<b>Lagoon Fishing</b>	<ul style="list-style-type: none"> <li>▪ Very minimum number of dependent villagers are involved in this fishing</li> <li>▪ Mostly the lagoon fishing was done by only country boats</li> <li>▪ Many variety of fish species are made available</li> <li>▪ The Depth of the lagoon in high and it gets enough fresh water from the distributaries</li> <li>▪ Non fishermen population not in to this fishing</li> <li>▪ They get good catch and price</li> <li>▪ Mostly they went by walk in to the lagoon without depending on the boats</li> <li>▪ Minimum and simple type of nets were used</li> </ul>	<ul style="list-style-type: none"> <li>▪ After Tsunami more number of motorized boats are introduced by the NGOs and Government</li> <li>▪ The Lagoon fish population has increased significantly by the entry of non-traditional fishermen</li> <li>▪ More number of aquaculture effluents are directly connected in to lagoon which affects the entire habitat</li> <li>▪ The Prospis invasion on to the lagoon area increased drastically</li> <li>▪ Highly commercialised</li> <li>▪ The Sewage effluents from Muthupettai is directly connected in to Koraiyar which affects the Lagoon habitat and allows to reduce the fish species and catch</li> <li>▪ The lagoon became shallow, where the fishermen doesn't get enough catch</li> <li>▪ The fishermen are using different kind of fishing nets and they start exploiting the resources</li> </ul>	<ul style="list-style-type: none"> <li>▪ Strict regulation of can only regulate lagoon fishing</li> <li>▪ High threat due to poor fresh water flow and lagoon depth</li> <li>▪ High pressure on lagoon fishing by variety of fishing type and fishermen</li> </ul>

Livelihood	Past	Present	Future
<b>Thottam/ Alam Fishing</b>	<ul style="list-style-type: none"> <li>▪ The work drudgery is very minimum due to better connectivity of roads and water ways</li> <li>▪ They get better catch and varieties</li> <li>▪ They used to stay and do fishing in Maanavaram Theevu</li> <li>▪ The Thottam depth is better</li> <li>▪ Accessibility is good</li> </ul>	<ul style="list-style-type: none"> <li>▪ Many changes in the sea shore affects their livelihoods</li> <li>▪ The ground water lenses in the sand dunes are reduced</li> <li>▪ The Thottam fishing is more expensive and less profitable and high drudgery of walking and reaching the fishing areas</li> <li>▪ The Thootam area is getting reduced</li> <li>▪ The Gaja cyclone takes filled the Thottam with silt and dried prosopis and mangrove which impact life and livelihoods of fishermen</li> <li>▪ Development of oyster bed in the Thottam area disturbs fishing and creates health issues</li> <li>▪ <b>The changes in the 6 creek mouth directly impacts their livelihood by reduction in the inflow and fish movements</b></li> <li>▪ The Thottam area and Alam are converted in to Agriculture, Aquaculture and brine reservoir etc.</li> <li>▪ <b>The fishing ways and routes to reach the boat yard is completely blocked by the Salt Pan industry</b></li> <li>▪ High disturbance in the name of regulation and enforcement by forest department</li> </ul>	<ul style="list-style-type: none"> <li>▪ There is high possibility and need to regulate this kind of fishing</li> <li>▪ High threat and possibility for fishermen to shift out of fishing</li> <li>▪ It is slowly under the control of few larger players due to marketing power</li> <li>▪ The fishermen they themselves can renovate the fishing routes and water ways and laid down road collectively on mutual contribution</li> <li>▪ High possibility to became complete commercial activity since the dependent village and population is high in number</li> </ul>
<b>Sea Fishing</b>	<ul style="list-style-type: none"> <li>▪ Only by the native fishermen</li> </ul>	<ul style="list-style-type: none"> <li>▪ Fishing by the migratory fishermen</li> </ul>	<ul style="list-style-type: none"> <li>▪ Sea fishing is going to became highly</li> </ul>

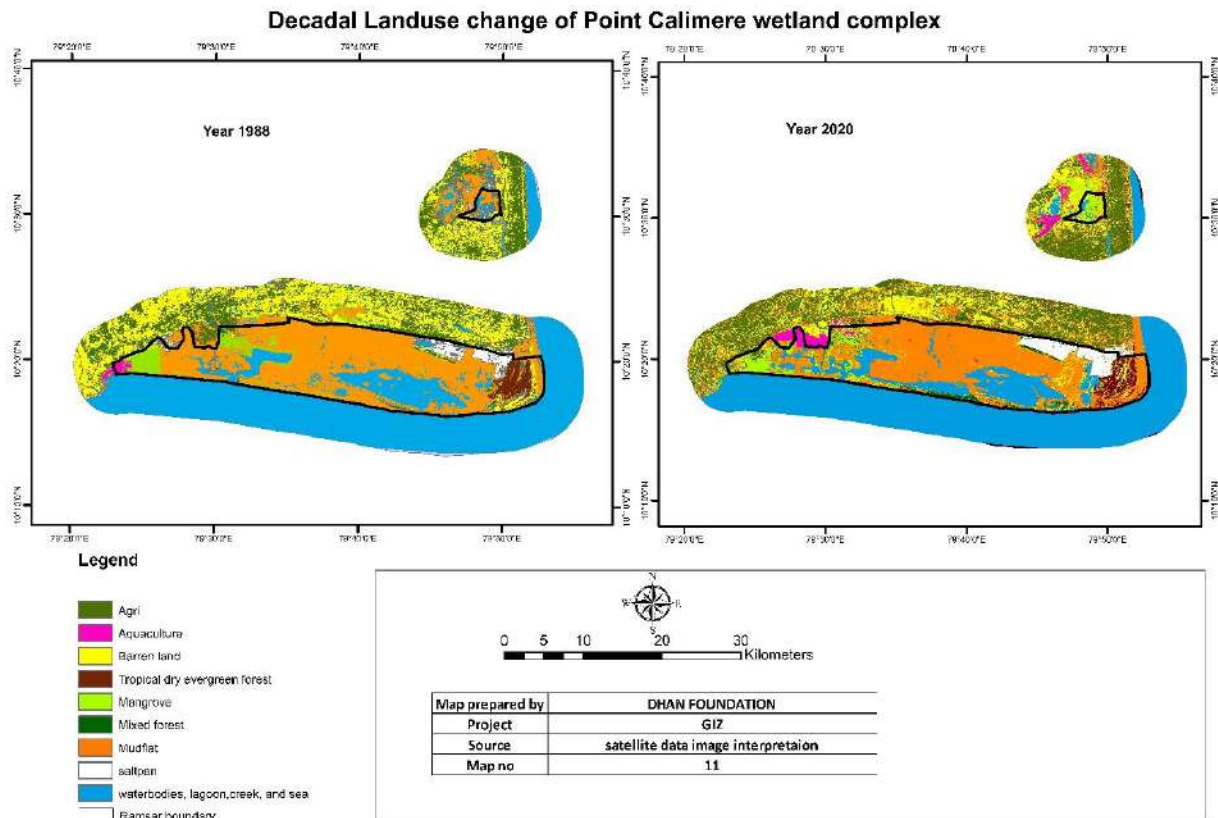
Livelihood	Past	Present	Future
	<ul style="list-style-type: none"> <li>▪ Within 5 Nautical mile</li> <li>▪ Simple and minimum type of nets</li> <li>▪ Only in Kodyakari and Kodyakadu in larger level</li> <li>▪ Highly regulated fishing</li> <li>▪ Fishing by few communities</li> <li>▪ There was no much support from fisheries department</li> </ul>	<ul style="list-style-type: none"> <li>▪ Local fishermen became labours for the migratory fishermen</li> <li>▪ Fishing by even non fishing community</li> <li>▪ Considerable support is being ensured by the fisheries department through entitlements and other services</li> <li>▪ Usage of banned nets and banned fishing methods</li> <li>▪ No concern on the marine species like Olive Ridley, Dolphin and Sea cow dugong etc.</li> <li>▪ More number of boats and high power engines and launch etc</li> </ul>	<p>political and possibility of taken over by the corporate</p> <ul style="list-style-type: none"> <li>▪ The Vellapallam port is going to be established which significantly impact the sea fishing</li> <li>▪ The deep sea fishing concept is getting improved and different kind of sea fishing method will be introduced</li> </ul>
<b>Saltpan</b>	<ul style="list-style-type: none"> <li>▪ Very regulated salt production by natural way</li> <li>▪ Shifting in the land lease ownership to different corporate</li> <li>▪ Naturally the salt water was extracted</li> <li>▪ Intervention of diesel engine motors for extraction of salt water</li> <li>▪ Usage of Vishahan Cannal</li> <li>▪ Only edible salt production</li> <li>▪ Introduction of electricity connection for bore well</li> </ul>	<ul style="list-style-type: none"> <li>▪ In Adirampattinam and Thambikottai area most of the Salt land was decommissioned</li> <li>▪ The Thottam area is converted a brine reservoir to storage of sea water</li> <li>▪ More number of bore wells</li> <li>▪ Production of by products</li> <li>▪ Usage of machineries</li> <li>▪ Establishment of strong small scale producers' association and entitlement support</li> <li>▪ The lease is going to end by this march</li> <li>▪ Acquisition of more land than the leased land by the corporate companies</li> <li>▪ More number of labours are depended on this</li> </ul>	<ul style="list-style-type: none"> <li>▪ Possibility of shifting the small scale salt pan land to corporate and others</li> <li>▪ Possibility of introducing more technologies and by products</li> <li>▪ Possibility of expanding the unused salt land</li> <li>▪ Impact in the loves of Salt worker by losing their wage</li> </ul>



Livelihood	Past	Present	Future
		livelihood on seasonally <ul style="list-style-type: none"> <li>Most illegal way of salt water extraction</li> </ul>	
<b>Aquaculture</b>	<ul style="list-style-type: none"> <li>Aquaculture was done by only the economically well of people</li> <li>The Tiger variety is cultured</li> <li>Heavy profit or Loss</li> <li>High usage of pesticides and chemicals</li> <li>Marketing facility is poor</li> <li>No Generator facility</li> <li>Usage of Ground water as salt water</li> <li>Conversion of Agriculture land, Salt Pan Land and Forest Land</li> <li>Water was extracted by establishing exclusive canals and pass the effluents</li> <li>The dependency of consultancy especially the doctors are more</li> </ul>	<ul style="list-style-type: none"> <li>Vennamei is cultured</li> <li>Less use of chemicals when compare with previous years</li> <li>More number of Aquaculture ponds are defunct</li> <li>Agitation by the community in several villages</li> <li>Strict regulation of forest and salt department to bring back the land in to hold by legal battle</li> <li>Judgement of ban and regulation of Aquaculture farm by Supreme court</li> <li>Less profit</li> <li>Even the marginal farmers are in to this livelihood</li> <li>The aquaculture farmers are becoming expert on this livelihood by not depending on the consultant</li> <li>Better marketing expert</li> <li>Increasing trend of using leased pond rather own pond</li> <li>More number of bore wells are introduced</li> </ul>	<ul style="list-style-type: none"> <li>There is good scope for expansion of aquaculture due to balance profit and loss</li> <li>High technology and less expensive when compare</li> <li>Strict Regulation by CRZ and ESZ</li> <li>Strict Regulation by CAA by licensing and renewing and providing new one</li> <li>Regulation by Pollution control board</li> <li>More opportunities for aquaculture labours force with standard wage</li> </ul>
<b>Livestock</b>	<ul style="list-style-type: none"> <li>More in number it was around 30000 cattle and 65000 sheep approximately</li> <li>Grazing in forest, mangroves and purampokku land</li> <li>Less regulation by the forest department</li> </ul>	<ul style="list-style-type: none"> <li>The cattle population is getting reduced</li> <li>The collective grazing is practised in few of the villages</li> <li>Good infrastructure for Animal husbandry</li> </ul>	<ul style="list-style-type: none"> <li>Possibility to intervene on stall feeding by forest department as experimentation</li> <li>Scope to grow green fodder in the agriculture land</li> </ul>

Livelihood	Past	Present	Future
	<ul style="list-style-type: none"> <li>Grazing in Mannavaram theevu by taking in to boat</li> </ul>	<ul style="list-style-type: none"> <li>Hybrid varieties</li> </ul>	
<b>Tourism</b>	<ul style="list-style-type: none"> <li>Less scope and implantation</li> <li>Only pilgrims are visited</li> </ul>	<ul style="list-style-type: none"> <li>The Scope is high and the potential of forest and Tourism department is good</li> <li>More number local and international tourists are coming and it is increasing trend</li> <li>Improvement in the infrastructure</li> <li>The interest and involvement of people is towards positive trend</li> </ul>	<ul style="list-style-type: none"> <li>High scope and possibility to promote tourism based livelihoods</li> <li>High scope to attract more number tourists by forest and tourism devilment</li> <li>Possibility to strengthen the infrastructure facilities</li> <li>Possibility to groom the community based community based responsible tourism</li> </ul>

There is significant changes happended in the land use pattern over the period of 20 years.



**Map 7-1 Decadal Land Use change in Point Calimere Wetland Complex**

**Findings from LULC and changes in the land use:**

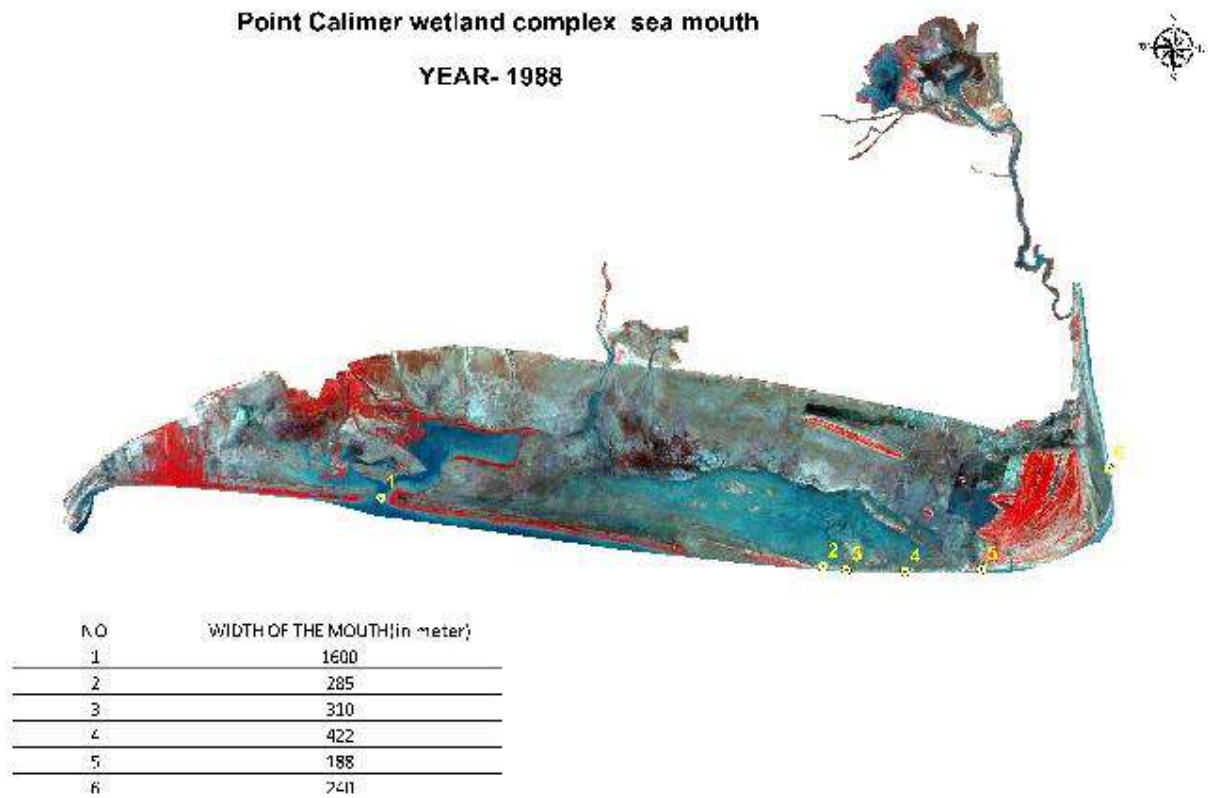
<b>S. No.</b>	<b>Land Use Land Cover-Wetland Fragmentation-for year 2020</b>	<b>In Ha</b>
1	Agriculture - Tobacco Cultivation	42.47
2	Agriculture-Paddy Field	58.8
3	Aquaculture	1494.25
4	Aquaculture Decommissioned	361.8
5	Coastal Plains	1430
6	Creek	3933
7	Hamlet	459.72
8	High Tide Mudflats-Thottam	4891
9	Intertidal Mudflats	8784.36
10	Lagoon	1164
11	Lake	18.6
12	Mangroves - Degraded	6797
13	Mangroves - Sparse	868
14	Mangroves (Degraded)	212.3
15	Mangroves with Prosopis invasion	98.4
16	Natural Mangroves	1034.78
17	Plantation mangroves - Partially Degraded	3094.8
18	Prosopis Invaded Mudflats	380.8
19	Prosopis Invaded Shoreline	392
20	Salt Pan	4069
21	Salt Pan Decommissioned	389.69
22	Sand Dunes	274.8
23	Tropical Dry Evergreen Forest	2147

<b>S. No.</b>	<b>Land Use Change from 1988</b>	<b>In Ha</b>
1	Thottam Portion Formed due to 'Tho Vaikal'	713
2	Sethuguda Thottam Portion Formed to the west of Mullipallam lagoon after 1952 Storm Surge	769
3	Mudflats turned Aquaculture	134.55
4	Mudflats turned into Plantation mangroves	3094.8
5	Mudflats turned into Plantation mangroves which has been Degraded	6797
6	Degraded Natural Mangroves along the fishing canal	734
7	Paddy Field to Aquaculture	1360
8	Paddy Field to Aquaculture to Decommissioned	108.1
9	Forest to Aquaculture to Decommissioned	65.7
10	Salt Pan to Aquaculture to Decommissioned	188
11	Salt Pan to Decommissioned	389.69
12	Mangroves with Prosopis invasion	98.4

### **Changes in the Creek and Lagoon Mouth**

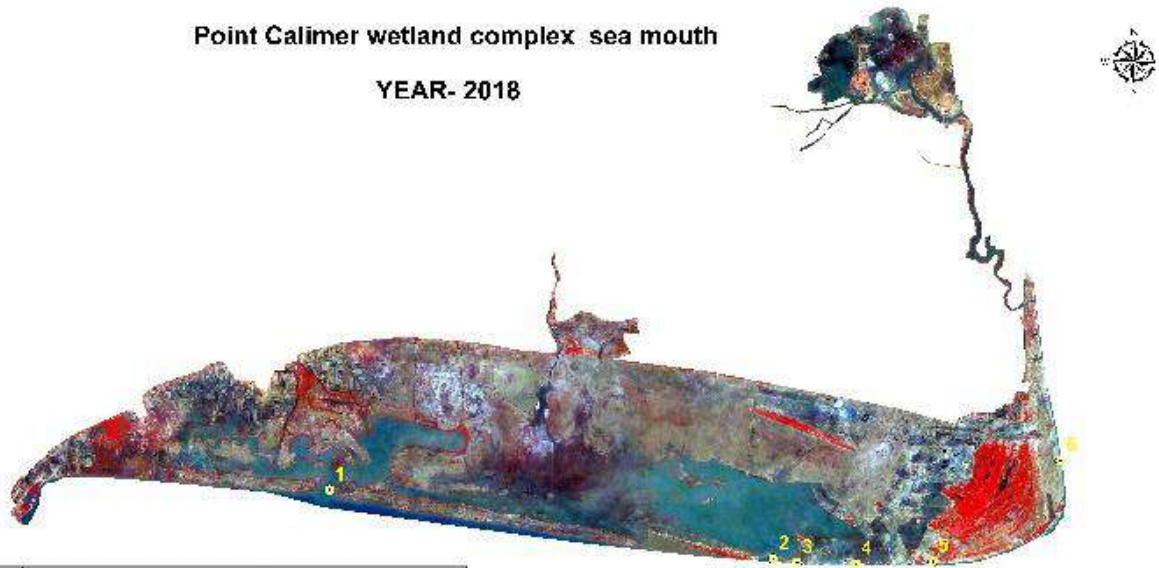
There are significant changes in the Creeks Mouth over the period which is the major factors to decide life of entire mudflts ecosystems and fishermen livelihoods. The forest department

can have detailed management plan to manage the creek and lagoon mouth by consideration of aquatic species flow in to Thottam and fishermen livelihoods. This is one of the key and dynamic issues which make changes in the fishing types and methods etc.



**Map 7-2 Sea mouth measurements in Point Calimere Wetland Complex, 1988. Source: LANDSAT 5 MSS Imagery**

Point Calimer wetland complex sea mouth  
YEAR- 2018



NO	2018_ WIDTH OF THE MOUTH(in meter)
1	1121
2	589
3	107
4	460
5	0
6	0

Map 7-3 Sea mouth measurements in Point Calimere Wetland Complex, 2019. Source: SENTINEL 2 MSS Imagery

## **8. Drivers of Change**

### **8.1. Social Justice: Distribution of land for landless**

1960s was an important decade for the landless tenants of the Cauvery delta districts. Socio-Political agitations of Communist and Dravidian movement resulted in various reforms favoring the strangled tenants from the control of the landlords. The Tamil Nadu Cultivating Tenants (Special Provisions) Act, 1968, Tamil Nadu Agricultural Lands (Record of Tenancy Rights) Act, 1969 and Conferment of Ownership of Homestead Act, 1971 were passed resulting in land distribution among landless. During this period, 'patta' lands were issued to the landless fishermen communities and families of soldiers participated in the Indian National Army (INA). About 2-3 acres of Alam (paleo-mudflats) were provided to the families residing along the intertidal zone. Bunds were created along the wetlands to prevent the entry of saline water via high tides. The lands were reclaimed to cultivate rainfed crops. Paddy is the predominant crop cultivated in this delta region. To stabilize their cultivation, the arteries of Cauvery were well utilized only by the agrarian community and not by the fishing communities. Agriculture remained as supporting livelihood for these fishing communities rather than turning into primary livelihood. Alam between Nasuvini and Valavanar rivers were the lands that are distributed to the landless fishermen communities. Fishermen of Maravakadu, Mankanangkadu, Sengkankadu still remember this land distribution and expressed their gratitude towards the political leaders who were involved in the process.

### **8.2. Intensive agriculture - Damming of rivers**

Until late 1960s the government largely concentrated on expanding the farming areas (Conversion of Alam into agricultural land). But the population explosion and prevailed food insecurity called for an immediate and drastic action to increase yield. The action came in the form of the Green Revolution. In 1970s Green Revolution initiatives were taken up with the agenda of changing India's status from a food-deficient country to one of the world's leading agricultural nations. Rivers were dammed by major irrigation projects, single cropping were converted into double cropping, rainfed lands were converted into irrigation command area, high yield varieties were introduced, agriculture was intensified by introducing inorganic chemical fertilizers and pesticides, technology and machineries were introduced for improving efficiency. This intensive agriculture resulted in reduced river flow in the tail reach of the Cauvery delta. This low flow in the tail reach reduced the flow of freshwater into the intertidal zone both in terms of duration as well as the quantum. This affected the degree of salinity in the intertidal mudflats reflected in the mangrove proliferation and regeneration. Reduced flow also pushed cultivable lands to remain fallow or to be converted into aquaculture farms.

### **8.3. Centralisation and Urbanisation**

Centralisation of service and production sector both public and private, induced infrastructure establishments along the Cauvery Delta. Urbanisation of the state and district capitals due to centralisation of administrative, governance and judiciary system created greater opportunities for the emerging rural communities. The urban agglomeration was not

only the result of urban pull but also due to rural push. While Bangalore, the Silicon Valley of Karnataka attracted the educated youth; Tiruppur, the textile city of Tamil Nadu attracted the unskilled or semiskilled rural communities from drought prone districts of Tamil Nadu. Urban agglomeration necessitated the establishment of centralised water distribution system and sewer system which required large quantum of water. Reservoir dammed across the river Cauvery turned into drinking water sources for these urban fabrics. Increased urban water demand further reduced the flow in arteries of River Cauvery flowing into the wetlands.

Urbanisation due to economic activities, religious and market establishment at local levels has also created pressures on the wetland ecosystem. Athirampattinam of Thanjavur district is the socio-economic centre for the coastal communities, which also has public and private infrastructures that provide multiple services such as education, entitlements, health care and other necessities. It acts as market centre for marine catch. Similar is the case with the Muthupet of Thiruvarur district which also has eco-tourism infrastructures added to other services. Vedharanyam acts as the socio-economic centre for fishing and salt producing communities. 'Thirumaraikaadaar - Vedhanayagi' temple, one of the important Shiva temple of religious importance lead to related infrastructures. These smaller towns have become the potential source of solid and sewage disposals into the arteries which in fact pollute the intertidal wetland complex.

#### **8.4. Mechanisation**

The surface-water based civilization that accessed shallow aquifers only during dry seasons via dug wells, started to abstract deep aquifers post the invention of motor pumps. The abstraction turned into over exploitation affecting the groundwater cycle. This effect was seen not only in urban and agrarian rural but also in the coastal aquifers. Both the salt producers and shrimp farmers used pumps to either pump salt water from sea or from deep saline aquifers.

Diesel motors were used to pump salt water directly from sea or from creeks and backwater channels during high tides. Later, electric motors were used by small scale salt producers to pump saltwater from deep aquifers. This resulted in sea water intrusion as well as pollution of freshwater in shallow aquifers.

'Out board motors' fixed in the fiber boats eased fishing both in the intertidal zone as well as sea shore. Before motorization of fishing boats, fishermen used yatch (Paai maram) to drive their boats. Since 'Paai maram' capitalises 'the nature of wind', sailing was labor intensive. If the sea winds were rough fishermen used to wait till it turned smooth. In most of the cases, the fish catch got spoiled before it reached the market. This spoiled fish catch was preserved as dry fish and later sold in the market for lower price.

#### **8.5. Foreign migration**

Migrating abroad, to the countries such as UAE, Singapore and Malaysia is a common socio-economic practice adopted by the fishing and agrarian communities in the region. The communities, especially youth of age 20-28 years work as unskilled, semi-skilled or skilled labourers in these countries. As most of them work till the age of 45-50 years, some even work



beyond 60 years. A strong network has been established especially by the Islamic community for effective migration.

These migratory labourers when they return from abroad invest on fishing boat for higher returns in the later stages. This has been one of the important reasons behind increased number of fishing motorised fibre boats, fishing in the intertidal and seashore zone.

## **8.6. Demand for fire wood - Introduction of invasive species**

*Prosopis Juliflora*, a non-native species was introduced in the adjacent villages of the wetland complex in order to meet the fire wood demand of the communities. In 1960s, in the grazing land (Meichal puramboke), *prosopis* seeds were sown by the initiatives of the government. Initially, as expected, this exotic species served the purpose of providing abundant fire wood for cooking to the local communities. But later, it turned invasive. It invaded all the fallow cultivable lands, intruded into the mangrove ecosystem, proliferating itself, replacing almost 90% of Thillai Tree, a native mangrove species, in the Alam of intertidal zone. It has even invaded the deep mangrove ecosystem, in the brackish water region.

Cattle entering into the mangroves for grazing and the freshwater flowing through the coastal plains and Alam are the major carriers of the *Prosopis* seeds. The seeds floating in the flowing fresh water get deposited in the bunds of the fishing canals and Alam portion between the fishing canal and remains dormant. The seeds germinate in the favorable situation and establish themselves.

A 250-m wide buffer of *Prosopis* for a length of about 20 kilometers has been formed in the periphery of the Alam, starting from estuaries of Valavanar river artery till salt pans of Agasthiyampalli. The *Prosopis* has completely invaded the Seruthalaikadu village, which became one of the major sources of income through 'charcoal making'. The *prosopis* has invaded the Muniyappan lake, and has intruded into sand dunes in the lagoon/creeks, shoreline 'Mannavaram theevu' and the tropical dry evergreen forest.

Cattle grazing and feral horses are the major carrier of the *Prosopis* seeds in these sand-rich regions. The freshwater lenses in these sand-rich regions are favorable for the proliferation of *Prosopis*. This invasion of *Prosopis* has adversely affected the fresh water sources in the shallow aquifers of the coastal region. It has reduced the quantity of freshwater available as well as increased salinity of the shallow aquifers. As the invasive *Prosopis* of a hectare area has the potential of abstracting 70 m<sup>3</sup> of groundwater per month (Selvan, 2018), the fall of water table in the freshwater lenses has seriously affected the native flora, dependent fauna that uses the dug outs to meet their drinking water demands and the fishermen community that well utilized the freshwater sources by creation of 'pallam/kuttai'.

Invasion of *prosopis* has completely altered the native ecosystem not only in the tropical dry evergreen forest but also the mangrove ecosystem. This has seriously affected the water and terrestrial avian population that were dependent on the native trees for nesting as well as feed. The number of fruit bearing trees were reducing day by day due to the domination of *Prosopis*. The decline rate has been further accelerated by the cyclones, which altered the ecosystem that favours *Prosopis* invasion.

## 8.7. Tourism

Muthupet mangroves and lagoon, Wildlife Sanctuary in Kodiyakadu, Bird Sanctuary in Kodiyakarai, religious temples throughout the stretch from Athirampattinam to Vedharanyam attracts the local and regional tourists during the respective season.

The Wildlife Sanctuary in Kodiyakkadu has been regularly attracting fairly large number of domestic tourists from the neighboring areas, especially during weekends and holidays. Indian Black buck, spotted deer, Common dolphin, Olive Ridley turtle and Indian star tortoise attract the tourists to visit the Sanctuary. The mudflats of Vedharanyam swamp which attracts the water birds from different parts of the world such as Eastern Siberia, Northern Russia, Central Asia and parts of Europe, also attracts bird watchers, researchers, photographers and domestic tourists. Since the wildlife and bird sanctuary are well protected and visited by the eco-sensitized communities, it has been well maintained. The container based sophisticated parlors are being erected in the Point Calimere to host the tourists, visitors and guests. The environmental implications of this structure will come to light only when it is operational.

The local community celebrates 'Thiruvizha' (folklore temple festival) for the local deities inside the site like Muniappan, Mattumunian, Servarayan, Soni and Kaathavarayan. These festivals are either celebrated by the villagers in a grand manner or celebrated by individual families based on the offering prayed for. During these celebrations animals are sacrificed, cooked, folklore musical instruments are played, crackers are fired, alcohols were offered and consumed as part of the ritual. The local rituals lead to noise and air pollution, improper plastic and glass bottles disposals. Though the rituals are traditional, the containers that hold the ritual materials and the materials used have been undergone changes from degradable to non-degradable. This would have serious implications on the tropical dry evergreen forest and its dependent habitat.

Performing rituals for the ancestors and dead ones of the family at Kodiyakarai during Aadi Ammavasai and Thai Ammavasai (New moon day of July and January) is a religious tradition among Hindu communities. In these days more than 15,000 devotees come to the sea shore of Kodiyakarai and perform the rituals. Since, clothes, banana, coconut, ceramic pots, plastic carry bags and other ritual materials are being disposed in the sea shore. The disposals not only affect the marine life in the shoreline but also enters into the intertidal zone through backwaters occasionally. This in fact affects the nature of the intertidal zone to a minimal extent.

Ramarpadam, one of the importance religious site of Hindus in the Vedharanyam reserve forest, is visited by thousands of tourists every day. A new culture of feeding the monkeys with banana is growing among the devotees. This newly introduced feeding habit would definitely affect the dietary nature of the monkeys and influence the food chain of the forest.

More than 5000 tourists are visiting Muthupet Mangroves and lagoon every month. As Muthupet Mangroves is a favourite wintering ground for more than a hundred species of migratory water and land birds, the number of tourists shoots up to 15000/month. Though

the fishermen were involved in hosting tourists, taking them for a boat sail, it was later restricted to the forest department after the Kurangani forest fire.

The wooden boat jetties, tourists shed complex, wooden walking pavements and other structures are emerging in order to attract the tourists in a large number and to boost the eco-tourism economy. If the eco-tourism in this region gets appropriate mileage, it could attract more infrastructure in Muthupet. It would also prompt the fishermen to negotiate with the forest department to open up hosting tourists with appropriate regulation, licences and monitoring. Maintaining balance between tourism and ecosystem conservation in the sensitive mangrove zone is highly critical.

### **8.8. Livestock rearing**

Livestock rearing, is one of the supportive livelihoods of the wetland communities. Though the percentage of this livelihood dependency is higher among the Konar community, who are traditionally known for livestock rearing, other communities also rear lesser number of livestock. Grazing wastelands (Meichal puramboke), mangroves adjacent to the hamlets, grasslands of tropical dry evergreen forest and sand dunes are the primary grazing grounds for cows and goats reared.

Though grazing has been restricted post declaration of reserve forest, it was imbibed by community only through continuous sensitization programs and regulatory measures taken up by forest department and non-government organizations. Grazing in the forest zone not only destroys the germinating mangroves and native flora but also spreads the invasive species into the native ecosystem. This has done serious damage to the native ecosystem as well as freshwater reserves in the shallow aquifers. Grazing has drastically reduced the mangrove zone except in the tropical dry evergreen forest zone. The cattle with marks for identification, compete for grazing with the wildlife such as blackbuck and spotted deer in the tropical dry evergreen forest zone. This adds pressure to the wildlife's health and its survival. The same stands true for meeting drinking water demand of the wildlife. The arrangements made by the forest department to ensure water for the wildlife are also overconsumed by the cattle population.

The practice of taking cow in boats to the 'Mannavaram theevu', shoreline sand dunes, has reduced due to low availability of grass in the monsoon season which are dominated by *Prosopis*. Demise of cattle left in the sand dunes due to cyclone is also another reason for the reduction in this practice. The damage is already done by *Prosopis* invasion; which has covered almost 1700 hectares of the ecosystem.

### **8.9. Market forces**

Market forces in shrimp farming, salt production, paddy cultivation, sand mining and migratory fishing practice has played a vital role in impacting the wetland and its dependent livelihoods.

### **8.9.1. Boom in shrimp market**

India is endowed with a long coastline and hence offers scope for large exploitation of marine wealth. Till a few years back, fishermen in India were involving themselves in traditional marine fishing. In the seventies fishermen started concentrating on catching prawns more commonly known as 'shrimps' due to high profitable return on the same on account of their export value. Its formal introduction in government policy can be traced to the 1970s. In the Fifth Five-Year Plan, the Central government sponsored organisations such as the Fish Farmers Development Agency, followed by the Brackish Water Fish Farmers Development Agency, to develop aquaculture techniques and practices, fish breeding and exports. Brackish water prawn farming started in a big way during 91-94 especially in the coastal districts of Andhra Pradesh and Tamil Nadu.

The 1990s were boom time for shrimp farming in this wetland complex. Shrimp farms were established on a war footing in coastal region by converting agriculture lands, salt pans, 'puramboke' wasteland and forest lands. Big and small companies partnered with major international importers to make crores in profits. But as more investment flowed into the shrimp farming business, along with government incentives promoting this export-led model, resistance to shrimp farming rose too. But the business suffered in the wake of the 2004 tsunami. Major importers, such as the United States and the European Union, cut down on import volumes citing high toxicity in shrimp in India. The business resurged with the introduction in 2009 of Vannamei or the white-leg shrimp in the country. The Vannamei shrimp accounts for 80% of all shrimp exports and close to half the shipment value of all outbound marine products. Since practicing Vannamei, the export value of the variety has multiplied almost six times, according to data from the Marine Products Exports Development Authority. The increased demand for shrimp in global market and higher value for the shrimp have motivated economically sound farmers, investors and politically sound members to enter into the sector.

The expansion of aquaculture- shrimp farm led to reduction in forest cover and grazing waste land due to illegal shrimp farm establishments. Some of these illegal establishment has been legalised and some are retrieved back by the forest department. These retrieved forest lands remain degraded and has to be treated for regeneration of Mangroves. The conversion of grazing waste land into shrimp farms has added pressure on mangroves to meet the grazing demand. The conversion of agriculture land into shrimp farms was either 'pulled' by the higher returns of aquaculture farm or 'pushed' by the reduction of yield in paddy field adjacent to shrimp farms. The incremental increase of ground water salinity and soil salinity over the period of 15 years has reduced the paddy yield.

For aquaculture, artificial ponds are made on plots of land surrounded by raised mud bunds. Smalls channels lead the fresh and brackish water to these ponds, through an inlet valve, where the shrimp are bred. Blatant violations of canals being dug out through the mangrove forests. This affects the natural flow of fresh-brackish water flow in the intertidal zone. The salt water that flows into the farm is mixed with medicines to keep the shrimp disease-free, and this seeps into the groundwater and often contaminates drinking water sources.

Additionally, the salinity of the top soil is irreversible and the land cannot be used for agriculture once the shrimp culture season is over.

As the return over investment in shrimp farming in a successful season ranges from 60-105%, people who have the financial capacity to invest 25,00,000 per hectare convert the agriculture land into shrimp farm. On the other side, in case of outbreak of any disease, it leads to complete loss. Therefore, shrimp farming becomes a gamble. A shrimp farmer who met huge loss over it, invests back to get back the investment made earlier, exactly like a gambler, who keeps on gambling.

### ***8.9.2. Increasing demand for salt***

Salt manufacturing is carried out along the intertidal zone of the wetland complex well utilizing the Mudflats (Alam). Though salt deposits are collected by the villagers adjacent to the Alam, salt production for commerce was done in Athirampattinam and Vedharanyam swamps. The shortest distance between sea/creek and the mudflats (Alam), existence of barren mudflats, higher salinity of brackish water less diluted by the freshwater sources are the factors behind existence of saltpans in these pockets. Salt producing area in Athirampattinam is meagre compared to that of Vedharanyam. Construction of backwater channels which draw water from sea or creek, establishment of brine reservoirs, pumping of saline water directly from sea and aquifers alter the land use land cover and the functions of the intertidal complex. Increase in market demand for commercial and domestic salt triggered mechanization in salt production in the corporate leased saltpans. Other saltpan establishment was explored at sites of Thondiyakadu but it failed due to poor outturn. Salt production in this region contributes to 18% of the total salt production of Tamil Nadu, next to Thuthukudi (htt). Increase in demand as well as availability of potential areas lead to the expansion of the salt pans in the Vedharanyam over the cost of forest cover and intertidal swamps which were habitat for water and terrestrial avian species.

### ***8.9.3. Sand mining***

Sand mining in the river bed of Cauvery and its arteries is common all over the basin. The practice of sand mining with bullock carts for construction and use in agriculture lands are age old traditional practice. The huge infrastructure development led to the rise in demand for river sand. Employing excavators in sand mining to meet the rising demand, exploitative mining of sand exceeded much higher than the replenishing capacity of the river. In June 2015, the Kerala government imposed a total ban on sand mining from six rivers. The opportunity to sell sand to Kerala for very high prices was grabbed by mining mafia. As the sand mined from Cauvery is transported to Kerala, it leads to a drop in water levels in the river basin. Unregulated mining of the riverbed to meet the rising demand for sand is often overlooked as a major reason for reduced flow of water. This has led to severe damages to the river basin environment. The river sand recharges the ground water table, slows down the flow of water and increases the base flow period.



**Photo 8.1: Sandmining in Eripurakarai**

The removal of sand from the river bed increases the velocity of the flowing water and reduces the flow period. This quick discharge affects the wetland complex directly. The health of the mangroves in the inter tidal complex nourishes with increased freshwater discharge period and disposition of sand in the mudflats. As the freshwater flow favours the germination of the mangrove seeds, it supports its proliferation in the silted sand deposits in the mudflats. Increased velocity of flow flushes the floating mangrove seeds into the sea at higher rate compared to that of freshwater flowing through low velocity.

As the river sand in the bed acts like a sponge allowing water percolation across large areas on either side of the river, its depletion in the river results in declining water tables in the villages adjacent to the wetland complex. This attributes to the increased salinity in the agricultural land.

#### ***8.9.4. Low profit paddy cultivation***

As most of the cultivable lands are rain-fed in nature, the returns over paddy cultivation is poor. The paddy cultivation in the coastal plains has been tested by the climatic factors such as erratic rainfall, cyclones and sea winds. Increased water and soil salinity reduced the paddy yield. Poor profit from paddy cultivation triggered farmers either to sell/lease their land to shrimp farmers or directly involve into shrimp farming. The farm turned into shrimp pond can never be reversed to cultivable land. Therefore, it is left fallow for a longer period.

## **8.10. Hosting migratory sea fishermen**

Kodiyakarai turned into a market place when the communities collectively decided to host the migratory fishermen coming from rest of the coastal districts of Tamil Nadu. As their sea is rough, these coastal fishermen migrates seasonally towards the Palk strait where the sea is calm. The communities of Kodiyakarai meets all the requirements of these fishermen starting from temporary shelter houses, groceries, fuel, drinking water, electricity, cooking items, fish market, netting centre, etc. More than 200 families are dependent on these migratory fishermen directly and indirectly. They not only provide supplies but also perform as wage fishermen in their deep sea fishing boats. The dynamics of village economy has improved after hosting these fishermen but it has highly affected the local boat fishermen involved in sea fishing. Kodiyakarai village committee collects 1% of the total fish catch as a common fund from these migratory fishermen. Though the income generated from these migratory fishermen is seasonal, it is considerably high and reliable.

## **8.11. Coupe felling**

In this mangrove wetland, a system of management called “coupe-system” was followed from early 1900s to 1970. Under this system of management, healthy mangrove forest was clear-felled in coupes by rotation of every 20 to 25 years for revenue generation. This clear-felling of mangrove trees exposed mangrove soil. Since nearly 80% of the volume of the mangrove soil is water, exposure to the sun caused evaporation of soil water. This in turn led to subsidence of sediment in the clear felled area, on account of which the topography of the coupe-felled area became trough shaped. As a result, tidal water entering into these “troughs” during high tide became stagnant; evaporation of stagnant tidal water led to increase in salinity to a level which is not tolerated by any mangrove plant. An estimate indicates that coupe felling is responsible for nearly 80% in Muthupet mangroves.

## **8.12. Social Dimensions**

### ***8.12.1. Fishing is open for all***

Unlike Tuticorin fishermen, fishing is open for all. In coastal belt of Tuticorin and Kanyakumari, only the traditional fishing community, called ‘Paravar’ are allowed to fish in the sea. There is only the concept of ‘collective fishing’ and no concept of wage fishing among those fishing community. Women operates vibrantly in preparing nets, drying fishes and marketing the fish catch.

On the other hand, the intertidal complex and the sea of this region is open for all. Any community member shall involve in fishing and own a fishing boat. Except the Chellakkani Creek mouth, which is a right of seruthalaikaadu fishermen, rest of the area of brackish water is open for all. The entry of non-fishermen into the fishing activity has increased the number of boats accessing the wetland zone but the effects are less sensed by the local communities.

Sethukuda, one of the prawn rich wetland areas was once restricted to the families who lease the area. Later, the fishermen society leased it and opened for all fishermen. It was an achievement for the collective protest of ‘fishermen community’.



During the prawn season, there is a social regulation among the fishing community by practicing a rotational fishing method. It is adopted so that every fishermen gets equal opportunity to catch prawn during the season. This equitable fishing practice makes the fishing in the intertidal zone more viable and sustainable. 'Wage fishing' is practiced only by the migratory fishermen with whom the local fishermen accompany. Other fishermen practice collective fishing.

### ***8.12.2. Traditional fishing rights***

Though brackish water zone is open for all, it is restricted in few zones. One is traditional user rights over the fishing canal and the other is fishing rights of Seruthalaikadu fishermen over Sellakkanni creek mouth.

Traditional fishing canals, the lifelines of mangrove forest are well maintained by the fisherman families who has the right over it. The right over these canals are well recorded by the department for better regulation. The fishermen who own the right not the land, transfer the right to other fisherman as leasing.

Next generation fishermen are moving away from traditional fishing canal for the following reasons,

- Restoring the cyclone affected canal needs huge investment
- Fishing in these traditional canals is tiresome than sea fishing
- Highly fluctuating income generation, as the fish catch varies with the season
- Growing up other opportunities such as abroad migration

This traditional fishing practice was key behind effective interface of brackish and freshwater in the intertidal zone. If the fishermen stop using the canals, it will be silted and the fresh-brackish interface will be cut off. Therefore, bringing canal fishing into operation is non-negotiable to enrich the mangrove growth in the intertidal zone.

### ***8.12.3. Unscientific myths***

Bird poaching is a serious issue in the wetland dependent villages. Migratory birds are highly poached by the villagers both for own consumption and also for selling in the local market. The birds are sold in the local market for Rs. 1,000 - Rs. 3,000 based on its weight. Forest department is taking serious action against the poachers by increasing guards, watchers and anti-poaching committees. Despite their attempt poaching is predominant during the winter season. The basic reason for the poaching are lack of awareness on the importance of conserving endangered migratory species and believes on unscientific myths about birds. It is widely and strongly believed by the local communities that these birds are best medicines for increasing 'potency' and longer intercourse. This believe drives the demand in the market, in spite of serious punishments imposed by forest department on the poachers.

Fishermen know the importance of Dolphins, Finless porpoises and whales and do not hunt them. Stranded mammals were even rescued by both, the department and local fiber boat

fishermen. Necropsy reports of carcass reveal that the mammals were injured by the propellers of the boats and not hunted.

This was not the case with turtles. There is a myth among the fishermen that taking turtles in boat might lead to reduced fish catch in the future. Therefore, they never involve in rescuing stranded turtles or injured turtles. Only the Forest rescues turtles and drops them back into the sea.

#### **8.12.4. Zero flow into sea: an effective water harvest**

Intensive agriculture in the monsoon dependent Tamil Nadu also created a psychological social narrative among the agrarian communities that ‘the river water draining into the sea is a water, wasted’. This narrative has gained momentum among the public, in concern with the farmers over the ignorance on importance of intertidal ecosystem and its sensitivity towards river flow. It triggered the investments of the public system towards damming of rivers and construction of barrages even at the arteries.

### **8.13. Extreme events:**

The landscape of the Point Calimere wetland complex has undergone lot of changes, as it is prone to extreme events. There were 11 extreme events recorded in past 7 decades in which 6 are cyclones, 2 are floods, a storm surge, a heavy rainfall and a Tsunami.

Time of incidence	Nov-52	Dec-67	Nov-77	Dec-84	Nov-91	Dec-93	Dec-04	Nov-08	Nov-10	Dec-11	Nov-18
Extreme Event	Storm Surge	Cyclone	Cyclone	Floods	Floods	Cyclone	Tsunami	Nisha Cyclone	Heavy rainfall	Thane Cyclone	Gaja Cyclone

Among the extreme event storm surge in 1952 and Gaja in 2018 are the most disastrous events that altered the landscape of the ecosystem to a great extent. The storm surge was the driving factor behind conversion of agricultural lands in Seruthalaikadu and Kodiyakarai into uncultivable land. The sea slurry deposits increased the soil salinity and made it unfit for agriculture. This storm surge resulted in widening of the creek mouth which allowed higher inter tidal flow. It is also believed by the fishermen that the oyster reefs formation was more only after this storm surge.

The later cyclones and floods resulted in formation of new prawn rich area called ‘Sethuguda’ and minor shore line changes. Sludge deposits in the brackish water channel/canals is the only recorded aftermath of the Tsunami in this region. But it is also expressed by the fishermen that, the seasonal pattern of direction of sea winds has been altered after Tsunami.

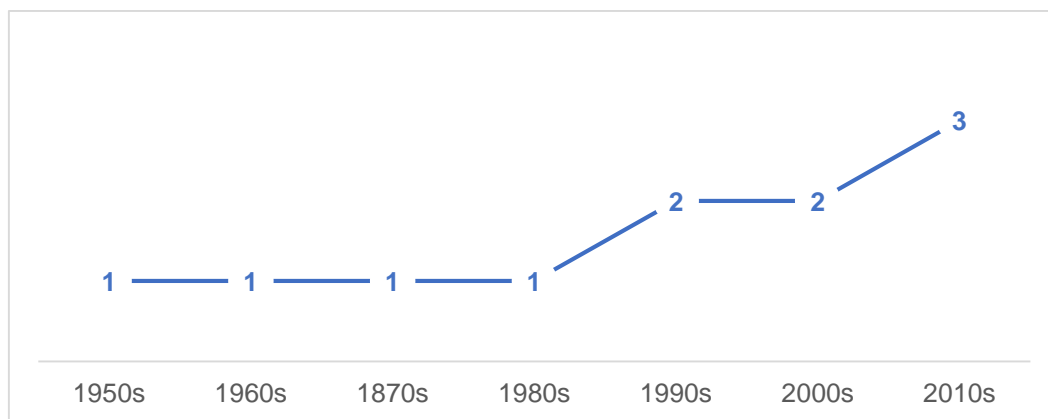
Gaja cyclone, the most disastrous cyclone with a wind speed of 130 kmph has destroyed the mangroves and killed the dependent wild life and birds in a large number. Almost a lakh carcasses of migratory birds were found as huge heaps in the roost of mudflats and mangrove forest. Even the wildlife such as deer and blackbuck are reported dead in the wildlife sanctuary. The native trees and mangroves were shoot twisted, uprooted and thrown away by the cyclone winds. Shoot dead mangroves stands still in the intertidal zone as a symbol of Gaja’s destruction. The fishing canals were less accessible due to blockage by fallen dry woods, which further lead to siltation of the canals. Clearing of thrown away trees in the

mudflats was a tedious process for the fishermen fishing in the Thottam. The tropical dry evergreen forest, once protected by the native dominant flora was then well dominated by the Prosopis. The Gaja cyclone also created shoreline changes and widening of the creek mouth. This cyclone severely affected the wetland dependent hamlets by throwing away their habitats as well as the coconut and palm trees.



**Photo 8.2: Destroyed Mangroves in Muthupettai by Gaja Cyclone**

It can be observed that the number of extreme events has increased over the decades. Increased incidences of extreme events are one of the impacts of climate changes. Therefore, it is important to cope and adapt the livelihood practices against the climate change impacts.



**Chart 8.1: No. of Extreme Events in a Decade**

### ***8.13.1. Shoreline erosion and deposition***

Accretion and deposition are common phenomenon in the shore line. The change in the creek mouth at Mulippalam and Chellakkani impacts the high tide submergence area of the lagoon portion. The widening of these creeks has resulted in increased entry of marine life into the lagoon as well as increased area of Thottam. On the other side, the minor creeks in between Chellakkani creek and Point Calimere have been subjected to accretion of silt deposits. It

stopped the entry of fish into the Kottagam of Kodiyakarai and the creek dependent fishermen have moved away from fishing at mouth of these creeks. The backwater channels entering into the tropical dry evergreen forest have also been affected due to siltation of the channel as well as shoreline deposition.

### ***8.13.2. Erratic rainfall***

Increased in erratic rainfall in the Cauvery basin has pushed the crops in the coastal plains highly vulnerable due to crop failure. Farmers were highly reliant on the shallow aquifers for meeting the irrigation demand. The freshwater water table in the shallow aquifers has drastically reduced due to high abstraction using pumping wells. This in fact led to salt water intrusion in the shallow aquifers and increasing the salinity of the water. These saline aquifers have no potential benefits for the wetlands as well as wetland dependent communities.

## **8.14. Environmental Regulations: Reserve forest, CRZ and ESZ**

Until 1892, The Point Calimere wetland complex was under administration of revenue department as well as temple authorities. They allowed local people to collect firewood, fish and Minor Forest Produces, thus it was continuously exploited. Though the formal protection of this forest has begun during 1892 by creation of Kodiakkadu Reserve Forest, the British Government later cleared some area of this forest for hunting ground and later established Eucalyptus and Casuarina plantations for firewood purpose. Since independence, the reserve forest has been under the control of Tamil Nadu Forest Department. The coupe system of tree felling was stopped in 1970s as the mangrove regeneration was poor.

In 1967, Point Calimere Wild Life Sanctuary was formed covering the areas of Kodiakadu Reserved Forest and its extension. The area of the sanctuary was 4,27,181 acres. The native forest dependent communities residing inside this wildlife sanctuary was relocated as Adivasi colony away from the sanctuary boundary.

In 1970, amendments to the rules have been made prohibiting shooting, prevailing among the landlords, hunting of birds and animals, collection of MFPs such as fruits, herbal produces, fishing in the backwater channels and depressions, restricted grazing of livestock.





**Photo 8.3: Medicinal Specises in Muthupettai Mangroves**

The recently notified Block (A)- Muthupet mangrove wetland and Thainyayiru reserve forest also adds restriction to the fishermen communities from collecting mangrove woods, leaves for cattle, grazing of animals, camp firing and cooking in the notified area.

Poaching of birds was very common among the villagers in the wetland complex. The imposition of reserve forest regulations has restricted the poaching activities. Stringent action and punishments serves as an important factor against poachers.

The anti-poaching committees, village forest development committees, ecotourism development committee are some of the village committees promoted by the forest department in order to reduce violation of forest regulation and enhance the alternative livelihoods. The lack of continuous funding and less sustainable approach leads the groups defunct.

In 2018, Eco Sensitive Zone around Point Calimere Sanctuary (including block B) was declared in order to help scientific conservation of ecosystems. ESZs act as “shock absorbers” to the protected areas. The basic aim is to regulate certain activities around wildlife sanctuaries, so as to minimise the negative impacts of such activities on the fragile ecosystem. With ESZ going up to 6 km from the boundary of protected areas, Point Calimere Sanctuary, which is home to the largest population of the black buck in southern India and has the single largest stretch of the unique dry evergreen forest in the country are adequately protected. As per ESZ notification, Point Calimere has protected area of 22.51 sq. km and ESZ area of 88.93 sq.km. The notification would help in protecting the sanctuary from future exploitations as it has categorized the activities as permitted, regulated and prohibited.

Point Calimere wetland complex has almost all the zones of Coastal Regulation Zone (CRZ). It has CRZ 1-A, CRZ 1-B, 50 m Mangrove buffer from CRZ 1-A, CRZ 2 and CRZ 3. Most of the villages adjacent to the wetland complex falls under CRZ 3. In this CRZ 3, area up to 200mts from High Tide Line (HTL) on the landward side in case of seafront and 100mts along tidal influenced water bodies or width of the creek whichever is less is be earmarked as 'No Development Zone (NDZ)'. Many industrial activities have been restricted in this zone. The foundation stone laid for textile park in 'Ayyakkaranpulam Naalu' village panchayat of Vedharanyam block has been planned to be established in this NDZ. The effects of this textile park on the wetland complex has to be forecasted and appropriate policy decisions has to be taken to avoid the negative impacts over the wetlands.

On the other hand, in 2019, a fisheries harbor was announced at Vellappallam, Nagapattinam in order to enhance the marine export. Thalainayayiru reserved forest, Kodyakarai sanctuary are some of the prominent features both on the coast and land within 10 km radius of the proposed site of development. The planning process should take into account the proximity of these locations to ensure that the proposed development is in accordance with the stipulations and guidelines available for such development projects.

The harbor is a threat to some of the endangered marine species such as whales, dolphins and turtles frequenting the sanctuary coastline. The coastline of Point Calimere running north-south, acts as the nesting grounds of Olive Ridley Turtles, one of the five endangered sea turtles of Indian ocean. Three hatcheries were set up in Kodyakarai, Arukattuthurai and Vanavanmahadevi, to compensate the hatchling failure that was primarily due to predation by jackals, wild boars, mongooses and Brahminy kites. Establishment of harbor would affect the route of these turtles that moves in a bale, which would directly affect their nesting and so the population.

#### ***8.14.1. Fisheries regulation and Entitlements***

The marine fishermen who also fish in the intertidal zone are supported by the fisheries department through various entitlements of central and state government. The National Fishermen Saving cum Relief scheme, Tamil Nadu Fisher women Savings cum Relief scheme, Fishing Ban Period Relief, Lean Period Relief Assistance, high-speed diesel scheme, subsidized motorization of boats, insurances and other assistances helps the fishermen during economic odds. These entitlements on one side reduces pressure over the wetlands on lean season and ban season and on the other hand attracts non-fishermen to enter into fishing activity.

Marine police and coast guard play important role in regulating the operations in the sea and intertidal zone. This zone is known for 'smuggling' goods even during the British period. One of the sand dunes in the Seruthalaikadu creek is called as 'Mootai Avilthaan theevu', which means 'disperse of packages'. As, Sri Lanka is nearby, even now few incidences of smuggling happen then and there, recorded by the coast guard. The smuggling goods includes illegal drugs too. Close watch by the coast guards help to maintain the regulations in the sea.

### **8.14.2. Aquaculture regulations**

The brackish water aquaculture activities are governed by the Coastal Aquaculture Authority (CAA) Act, 2005, its Rules and Guidelines for sustainable, eco-friendly shrimp farming. One of the major tasks accomplished by the CAA was the registration of shrimp farms on the recommendations of the State and District Level Committees constituted for this purpose. It is mandatory that all persons carrying on coastal aquaculture shall register their farm with the Coastal Aquaculture Authority. Registration is made for a period of five (5) years, which can be renewed further. The registration process would be continued in respect of new farms as well as farms that may be renovated for taking up coastal aquaculture activities in future. The Act mandates the Central Government to take all such measures as it deems necessary or expedient for regulation of coastal aquaculture by prescribing guidelines, to ensure that coastal aquaculture does not cause any detriment to the coastal environment and the concept of responsible coastal aquaculture contained in the guidelines shall be followed in regulating coastal aquaculture activities to protect the livelihood of various sections of people living in the coastal areas.

Introduction of Vannamei, was another initiative of CAA, which accelerated the shrimp farm. Shrimp farms were decelerating after severe loss in tiger shrimp culture due to its vulnerability towards disease. It was booming again with the introduction of white legged white legged prawn.

On the other hand, there are out of 3130 hectares of Aquaculture farm in the wetland complex only 1222 hectares owned by 103 members has been registered under CAA. Remaining 454 members holding aquaculture farm of area 1065 hectares has not been renewed (CAA, 2020). This serve as an evidence that the aquaculture farms are least regulated. The farm applies abundant pesticides and chemicals in order to protect their shrimps from disease and infections. The effluents are discharged into the wetlands and backwaters without any treatment which is adversely affect the biota and marine life in the intertidal zone.

In this backdrop, in 2020, the aquaculture division has taken up the objective of increasing the brackish water aquaculture production by 4% on year-to-year basis. This would worsen the impact of shrimp farm over the wetlands further.

The Supreme court judgement on the public interest petition filed by S. Jagannathan, Chairman, Gram Swaraj Movement on the enforcement of Coastal Zone Regulation Notification dated 19-2-1991 issued by the Government of India, stoppage of intensive and semi-intensive type of prawn farming in the ecologically fragile coastal areas, prohibition from using the wastelands/wetlands for prawn farming and the constitution of a National Coastal Management Authority to safeguard the marine life and coastal areas has following highlights,

- The shrimp culture industry/the shrimp ponds are covered by the prohibition contained in para 2(i) of the CRZ Notification. No shrimp culture pond can be constructed or set up within the coastal regulation zone as defined in the CRZ notification. This shall be applicable to all seas, bays, estuaries, creeks, rivers and



backwaters. This direction shall not apply to traditional and improved traditional types of technologies (as defined in Alagaraswami Report) which are practised in the coastal low-lying areas.

- All aquaculture industries/shrimp culture industries/shrimp culture ponds operating/set up in the coastal regulation zone as defined under the CRZ Notification shall be demolished and removed from the said area before 31-3-1997. We direct the Superintendent of Police/Deputy Commissioner of Police and the District Magistrate/Collector of the area to enforce this direction and close/demolish all aquaculture industries/shrimp culture industries, shrimp culture ponds on or before 31-3-1997. A compliance report in this respect shall be filed in this Court by these authorities before 15-4-1997.
- The farmers who are operating traditional and improved traditional systems of aquaculture may adopt improved technology for increased production, productivity and return with prior approval of the "authority" constituted by this order.
- The agricultural lands, salt pan lands, mangroves, wetlands, forest lands, land for village common purpose and the land meant for public purposes shall not be used/converted for construction of shrimp culture ponds.

But the judgment remains unimplemented.

### **8.14.3. Salt regulations**

Salt extraction is one of the primary economic activities of Vedaranyam region of Nagapattinam district. In Vedaranyam region salt is produced from about 10,400 acres of which 7,000 acres are operated by two big companies by taking land on lease from the Salt commission of India while the remaining 3400 acres is accessed by about 700 small-scale producers (holding 5 to 10 acres) by again leasing it from the salt commission. The operations of salt commission are to ensure leasing license, renewal of lease after every 20 years, ensuring appropriate usage of salt pans exclusively for salt production, and restricting illegal expansion of saltpans encroaching wetlands. The regulations on using borewells to extract subsoil brines from shallow aquifers would be critical in maintaining the sea water intrusion in the aquifers. Though most of the salt producers use the saltwater canals to fill their pans, during the low flow season, they use bore wells to fill the pans. The salt commission should adopt scientific methods to regulate the usage of these bore wells for production of salt.

During the boom of aquaculture farms, some of the salt pans leased from the salt corporation in Athirampatinam were converted into aquaculture farms and used for shrimp farming. After the judgement on the petition of S. Jagannathan, shrimp cultivation in those aquaculture ponds were banned. The converted farms still remain non-operational for the salt production. The salt corporation restricts the salt producers from shrimp or any other aquaculture production even during rainy season.

### **8.15. Change in land and administration ownership**

Handing over of revenue lands to the forest department has been taking place in bits and parcels from Vedharanyam swamps. The portion of 'unsurveyed swamp' which belongs to

the revenue department has been monitored and regulated by the Nagapatinam forest department. The change in land ownership has restricted the free access of the local communities and on the other side it ensures better protection of the wetlands. Mangrove plantation also been attempted in this unsurveyed swamp.

Similarly, the panchayat lands of Sakkaranpettai and Chinthamanikadu has also been transferred to the forest department. But this was not the case with other adjacent villages.

Vandal, one of the isolated villages in Thalainyayiru reserve forest, surrounded by water in all the direction has been included as part of Thalainyayiru town panchayat. This has affected the remote village from getting benefits of rural schemes such as Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA), National Rural Livelihood Mission. The villagers have also not benefitted from the amenities such as road and infrastructures as a Town panchayat. Inclusive of such villages into Town Panchayat shatters the development of the poor rural communities.

## **9. Role and Interest of Governance and Institutional framework impacting wetland dependent Livelihoods**

### **9.1. Forest Department**

Forest department is the key stakeholder which is legally empowered to conserve and develop the PCWC. The Nagapattinam and Thiruvarur district forest department play very crucial role in managing and protecting the Point Calimere Wetland Complex, through its 3 administrative divisions namely, Muthupettai, Vedharanyam and Thalainayar range. The management and protection of Muthupet Mangroves, Bird Sanctuary and Wildlife Sanctuary along with protecting the existing ecosystems and biodiversity are key functions of forest department since. In the context of PCWC the forest department does the following activities.

#### ***9.1.1. Protection and Conservation***

As per the legal bindings, the forest department involves in protection and conservation of forest areas, wild life and bird sanctuary by adopting the existing laws and acts like, The Indian Forest Act 1927, The Tamil Nadu Forest Act of 1882, Wildlife Protection Act 1972 (Central Act), Wetlands (Conservation and Management) Rules, 2017 etc. Along with conservation of natural resources, there are lots of tangible and intangible culturally rich heritage sites also protected by the forest department in the PCWC like Muniyappan Temple, Mattumai temple, Modi Mandapam, RamarPadam, and Servarayan Temple, Avuliakani (Grave of Muslim Saint) etc.

#### ***9.1.2. Regulation & Enforcement***

The forest department enforces in regulating the general public from cutting mangroves, cattle grazing, bird and animal poaching, wild fires, lagoon/ thottam fishing and mangroves etc.,

#### ***9.1.3. Awareness building***

In addition, the forest department also plays crucial role in building awareness among the community on the importance of wildlife & bird sanctuary, protection of olive ridley tortoise and mangroves etc. Yearly considerable number of schools, college students and visitors are coming to the sanctuary and point Calimere. They were given enough orientation on the importance of forest, sanctuary, olive ridley tortoise, wild animals and birds etc. Likewise, such orientation and awareness is also given by the forest department in the fringe villages of PCWC.

#### ***9.1.4. Development and Management***

Above all forest department does lots of development interventions for the dependent community like, providing alternative livelihoods, skill building, credit support for the needy people, promotion of Village forest committee and Eco Tourism Development Committee etc. (ST & other Traditional forest dwellers (Recognition of Forest Right Act, 2006)

## 9.2. Fisheries Department

Similar to the forest department, the fisheries department is also powered with regulation and enforcement activities. The fisheries department regulates both inland and marine fishing by adhering to the stipulated rules, regulations and laws on the fishing activities both in inland and marine land. In addition, they are empowered to enforce punishments for illegal fishing and violation of rules and regulations etc. Overall, it ensures sustainable fishing by allowing approved fishing vessels, gears and ensure fishing border limit. The Government has newly created an exclusive marine enforcement wing for conservation of fishery resources and effective implementation of Tamil Nadu Marine Fishing Regulation Act (TNMFR), 1983.

The major functions of the fishing department are,

- Implementing various social security welfare schemes
- Regulation and enforcement of fisheries Acts and Rules
- Conservation and management of fishery resources
- Rescue and rehabilitation measures during natural calamities and disasters and ensuring fishermen safety at sea
- Development of infrastructure facility along with livelihood focus

In Point Calimere wetland complex different kinds and types of fishing and fishermen exist. They are supported by fisheries department through their fishermen cooperatives.

### 9.2.1. Key Interventions

**1. Fishing Ban period relief assistance to fishermen:** In order to conserve the marine fishery resources, seasonal fishing ban is imposed every year since 2001. The fishing ban period is from April 15th to June 14th in the East Coast region. The fishermen who are all members' fishermen cooperatives own license they get relief assistance of Rs. 5,000/- to mitigate their sufferings during fishing ban period

**2. Registration of Fishing Boats:** Registration and licensing of fishing boats is done by the department after proper inspection as per the Tamil Nadu Marine Fisheries Regulation Act, 1983

**3. Issue of Identity Card to fishermen:** Monitoring work for proper fishing is done by fisheries, coast guard and police official by issuing individual ID Cards to fishermen. Recently, for the issuance of Bio-metric Identity Card to all fishermen their photographs and data entries were gathered and recorded.

**4. National Fishermen cum Relief Scheme:** This scheme envisages and supports the Fishermen financially during fishing off season Members of fishermen / Fisherwomen Co-operative Society those who are below poverty line, engaged in full time fishing and age between 18 and 60 are eligible for this Scheme. Each fisherman has to pay Rs. 70 per month for 8 months from January onwards and Rs. 40 for the 9th month. The total amount collected from fishermen is Rs. 600 and the contribution by Central/ State Government is Rs. 1200/-.

Thus the contribution of Rs. 1800/- will be distributed to fishermen in 3 equal monthly installments of Rs. 600/- each.

**5. Supply of outboard engine to traditional fishing boats in subsidized rate [Motorization of Traditional Craft]:** Traditional fishing boats which are registered and licensed through the department are eligible to avail the subsidy for outboard engine purchase at 50 % level.

Other than this many other services are given by the fisheries department but in the PCWC the fishermen majorly receive these services from fisheries department.

Regarding fishing lease rights in different parts like Lagoom, Thottam and adjacent areas are laid down with forest, fisheries and revenue department.

Fishing in Thalainayar reserved forest and adjoining unreserved is leased out by the Revenue department annually. The right of fishing in the pits and puddles of Chatram forests (Thottam area and Muthupet reserved forest is given after negotiation with the Fishermen's Co-operative Society at a rental based on the average of the auction amounts of 1961 and 1962 as per G.O.Ms.No.304, Food and Agriculture, dated 31st January 1961. As the societies did not agree to the lease amount, fixed units were sold in auction during the year 1963-64 and 1964-65. During 1965-66 the units were leased out to the societies at negotiated rates in consultation with the Assistant Director of Fisheries. From 1966-67 onwards the units were allotted to the societies based on G.O.Ms.No.365, Food and Agriculture, dated 6th March 1965. Fishing is free in the lagoons of Muthupet reserved forests and in Kodyakkadu reserved forest the right of fishing is sold by the District Forest Officer along with other minor forest produce.

Other than this the Aquaculture farms are registered with coastal aquaculture authority for which the fisheries department will support and facilitate the farmers to register with Coastal Aquaculture Authority.

### **9.3. Coastal Aquaculture Authority**

The Coastal Aquaculture authority (CAA) was established under the Coastal Aquaculture Authority Act, 2005 and notified vide Gazette Notification dated 22nd December, 2005. The main objective of the Authority is to regulate coastal aquaculture activities in coastal areas in order to endure sustainable development without causing damage to the coastal environment. The Authority is empowered to make regulations for the construction and operation of aquaculture farms in coastal areas, inspection of farms to ascertain their environmental impact, registration of aquaculture farms, fixing standards for inputs and effluents, removal or demolition of coastal aquaculture farms, which cause pollution etc. One of the major tasks accomplished by the CAA was the registration of shrimp farms on the recommendations of the State and District Level Committees constituted for this purpose. It is mandatory that all persons carrying out coastal aquaculture shall register their farm with the Coastal Aquaculture Authority. Registration is made for a period of five (5) years, which can be renewed further. The registration process would be continued in respect of new farms as well as farms that may be renovated for taking up coastal aquaculture activities in future. Regarding the study area many of the farms are not registered. Moreover, they have not properly renewed the registration as per the stipulated time. In Nagapattinam, Thanjavur and Thiruvarur district Vannami

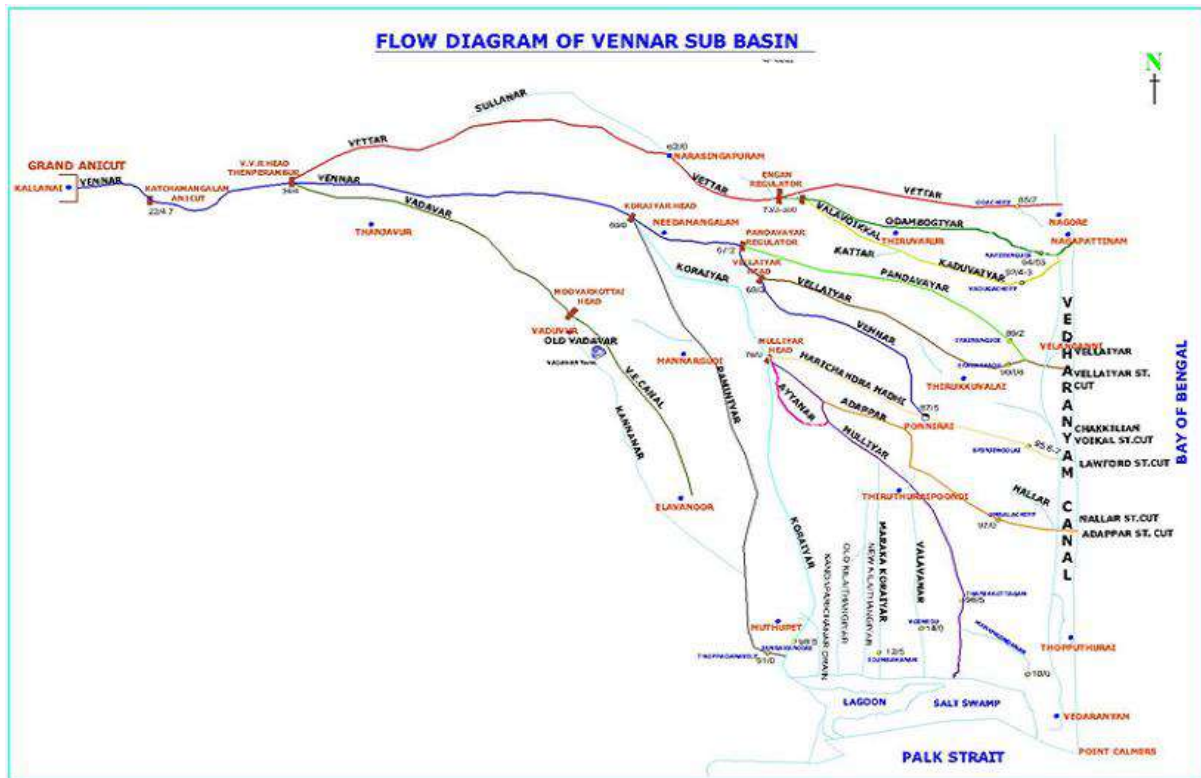
aquaculture farming is done by the farmers. The farmers intend to culture /SPF L. Vannamei have to obtain permission from CAA as per the Guidelines issued by DAHD&F, Ministry of Agriculture and Farmers Welfare for this purpose. The Farmers, who have registered their farms with CAA, can only apply in the prescribed format along with the prescribed processing fee to get formal approval from CAA. This CAA also provides technical inputs especially on antibiotic free shrimp cultivation.

*Annexure- VII The list of registered aquaculture farms*

#### **9.4. Public Works Department - Water Resources Department**

The Tamilnadu PWD plays very crucial role in development of PCWC since it is tail end of Cauvery distributaries. PWD has been serving for the past 159 years in the construction and maintenance of irrigation structures. The Project area includes many rivers / drains namely, Nasuvini, Pattuvanachi, Pamini, Koraiyar, Kanthaparichan, Maraikoraiyar, Kilathangi, Harichandranathi, Adappar, Pandavayar, Vellaiyar, Valavanar drain and Vedaranyam Canal, in the Agni and Vennar irrigation system. The WRD undertaken many reconstruction, repair, desilting, standardization of river banks, construction of new tail end regulators and dredging etc., in the Project area.

However, these sub-basins lie in a marginally semi-arid region where the availability of water resources is limited and variable. Therefore, maximum efficiency of water supply and use is a clear imperative across all water using sectors. The agricultural sector accounts for almost all water use in the sub-basin, but the irrigation and drainage systems are very old adaptations of natural drainage systems, particularly in the delta. According to government tests bed losses in the rivers and main canals are typically 55%. The consequences of these environmental and infrastructure factors include low agricultural productivity due to water shortages, insecure rural livelihoods, high vulnerability to natural disasters such as floods, droughts and tidal surges due to limited and only partially maintained defenses, inefficient water use, over-abstraction of groundwater and disturbed ecosystems.



**Map 9-1: Vennar Sub Basin- Source -PWD**

Therefore, many water storage, conservation and regulation structures are built across these rivers and drains by giving priority for drinking, domestic and agriculture purpose. It leads and reduce the water flow in to lagoon, thottam, mangroves and sea. Due to lack of fresh water flow in to the wetland, canals, and Muthupet mangroves the habitat and its dependant flora, fauna directly gets affected.

The wetland-dependent community especially the farmers and fishermen get affected by the works carried out by the PWD, since the need is not felt by the community. Although management and regulation of water resources in larger perspectives is needed.

The long term aims of efficient water resources management is necessary in the Cauvery sub-basin should include agriculture development, bio diversity development and conservation of coastal wetland eco systems.

The Government of India’s National Water Policy 2012 recognizes numerous water resource issues in India and proposes the introduction of modern water resources management principles and best practices to address these issues. These include integrating the planning, development and management of water resources by river basin units, and treating water as a shared resource on a socially equitable and environmentally sustainable basis through transparent, informed and participatory decision making. The policy prioritizes safe drinking water, then food security followed by the maintenance of minimum ecologically acceptable river flows and water levels

By considering the above all the PWD plays very crucial role in conservation and development of wetland eco systems and for the welfare of dependant communities etc.



The Harichandra, Adappar, Pandavayar and Vellaiyar rivers serve the dual purpose of conveying irrigation supplies and removing drainage and floodwaters. Flood flows in these rivers can be more than three times water flows for irrigation. But the Valavanar drain and the Vedharanyam canal are single purpose drains and therefore do not have to cope with such a wide range of flows. The rivers follow natural courses with appurtenant structures such as embankments, regulators including tail end regulators, irrigation sluices, drainage inlets, drainage sluices and bed dams/low weirs added to them.

These six rivers channels are unable to cope with the larger floods resulting from present climatic conditions and delivery of irrigation flows is compromised by old structures many of which are in chronic need for repair or replacement.

The main and major functions of the PWD in this particular region is, the water for delta irrigation released from Mettur dam reaches the Grand Anicut situated at Thogur village in Thiruvaiyaru Taluk of Thanjavur District. At Grand Anicut the water has been regulated and distributed to Cauvery, Vennar, Grand Anicut Canal and Coleroon rivers by the divisions of Lower Cauvery Basin circle Thanjavur to irrigate the command area of 4,53,046 acres. During floods the storm water is being diverted to the Coleroon river, the flood carrier, in the Grand Anicut and their by the irrigation systems of Cauvery, Vennar, Grand Anicut Canal are kept intact without any damages.

The main work of PWD in the selected districts are, to improvements and maintenance of irrigation structures and other irrigation components, augmentation of water resources and formulation of new additional schemes and structure and improvement and maintenance of water courses and drainages systems. The PWD has very close interaction with farmers especially with the Farmers committee of Vennar Sub Basin.

In addition, the PWD has plan like, 95% of surface water have been utilized the remaining portion of this resource has to be distributed utilized with efficient water management, available water should be rationally utilized by considering the necessity of space and time, participatory irrigation management should be improved with the help of farmers and Non-Government organization (NGOs).

## **9.5. TWAD Board**

The Tamil Nadu Water Supply and Drainage Board (TWAD Board) is a statutory body corporate constituted under TWAD Board Act, 1970 on 14.04.1971. TWAD Board is entrusted with the development of Water Supply facilities in the State of Tamil Nadu.

Thanjavur, Thiruvarur and Nagappatinam district due to ground water salinity and poor surface water system the people of these districts are dependent on Kollidam Kootu Kudineer Thittam as a major source for their drinking water. Hence, the TWAD board plays very crucial role in meeting the basic needs of the wetland dependent communities.

## **9.6. Railway Department**

In the PCWC from Muthupettai to Adirampattinam the Railway line exists, and this track connects Mayilduthurai to Karaikudi, recently this track was shifted into Broad guage line.

The railway track comes near RF boundary and pass the Pattuvanachi and Nasuvini river viz Muthupet Mangroves. Recently there was plan to construct the bridge from Maravakadu to Adhirampattinam. This proposal was stopped by the legal proceeding by the forest department since it affects the entire stretch as part of Muthupet Mangroves.

In 1936, the British had laid a railway line for transportation of salt from Vedaranyam and for fostering trade with Sri Lanka. The train services were terminated in 1988 and the railway line was subsequently dismantled in 1995. There is plan to extend the Railway track to Kodyakarai which is right now available up to Agasthiyampallai. Therefore, if any development comes in the RF and Wetland it has to be consulted with the forest department and fringe villagers since they are the primary beneficiaries of the wetland.

### **9.7. Village/Town/ Municipality**

Rural Local Bodies, owing to the enormous power vested in them, can be successful in conservation efforts. Rural Local Bodies came into existence in 1992, consequent to the 73rd Constitution Amendment Act 1992. Though they were in existence since 1950, it is the 73rd Amendment, which gave enormous powers and responsibilities to these bodies. This process of decentralization has strengthened the "Village Republics".

The environmental dictum, "Think globally and act locally" can be well applied to Village Panchayats. Reserved forests are protected by Forest Departments of every state. But unclassified wastelands and unreserved forests belong to the Panchayat.

The Panchayats have the authority to evolve a code of conduct and regulations for rearing livestock, anti-poaching, effective usage of wetland, common properties, protecting sacred groves and disposal of solid waste etc.

The local bodies can also play a part in the prevention and control of environmental degradation in their respective areas. They are responsible for approval of layouts and building plans, and can enforce moves for prevention of pollution. Establishment of factories, industries and workshops can be done only with the approval of local bodies. When applicants approach the local bodies for approval, the local bodies should process applications in compliance and enforce strict measures in order to prevent impacts on the wetland.

In addition to these functionalities of Panchayats, there is another effective organ in the form of the village administration namely "the Grama Sabha". All voters in the village panchayat are members of the Grama Sabha of the village. It meets once in a quarter and on other occasions as per the need of the time. The Panchayat President is the Chairman of the Grama Sabha. All the members participate in the meetings and issues common to the village as a whole are discussed and concluded. It is also a forum where specific issues detrimental to the village are discussed openly. Such meetings can always be used as a platform for infusing wetland conservation practices.

These grass-root institutions can become the pillars of sustainable development by assisting in reviving wetland ecosystems and its conservation.

There are many development works taking place in the boundary of village panchayats, Town Panchayats and Municipality area where the PCWC spreads. Though there are ESZ, CRZ, still in many villages the local panchayat is implementing infrastructure developments, sewage connections and pollutions on the wetlands by deviating from the CRZ acts. For example, in Ayakkaranbulam very recently the foundation for Textile Park was laid by the local minister since the area falls in CRZ-1. The park will be established in coming years to ensure alternative livelihoods for the nearby villagers. In Muthupettai many of the households, hotels, hospitals wastes and effluents are connected in to Koraiyar river, even the connections are regulated by the Muthupettai Municipality.

In many of the villages all the development works are carried out by the Village Panchayat therefore being the frontline institutions it must play very active role in protecting and developing the wetland eco systems. Especially the MGNREGA works can be properly tapped for the effective wetland management and development like plantation of tree saplings, renovation of water bodies etc.

As per the Tamilnadu Panchayat Raj Act 1994, the gram panchayat and town panchayat must perform the basic services to the citizen, but such interventions should not affect the wetlands resources.

## **9.8. Marine Police/ Coast Guard / Indian Navy**

Kodiyakarai is a politically sensitive area. During 1980s there was strong connectivity between Kodiakarai and Sri Lankan Tamil especially for LTTE (Liberation Tigers of Tamil Elam) which was headed by Mr. Velupillai Prabhakaran. Since Sri Lanka is very close in terms of nautical miles from Kodiakarai; there is high possibility of migration of people and exchange of goods. There were lots of cases registered over the period of time for smuggling prohibited products and highly valuable products to Sri Lanka. The nearest point in Sri Lanka i.e., Point Pedro is situated merely 28 nautical miles (51 km) from Point Calimere.

Being part of large mangrove dependent wetland, the environment is very conducive to such activities therefore the role of these uniformed service departments is very relevant and much needed for protecting this wetland. Lot of illegal activities take place in the coastal areas like drinking, dumping plastics and wastes etc. This can be stopped by the regulation of marine police in the sea shore.

On the other hand, by regular and keen patrolling of Coast Guard and Navy, illegal and exploitative fishing can be blocked in the sea and seashore, which in turn would help the local country fishermen. Through these departments, strict enforcement on Maritime zone of India (regulation & fishing by foreign vessels) Act 1980 and Territorial water, continental shelf, Exclusive Economic zone and other Marine Zone Act, 1976 can be ensured.

## **9.9. Animal Husbandry**

Next to fishing and farming livestock is the key livelihoods in the fringe villages of Point Calimere wetland complex, therefore the relevance and need of animal husbandry

department and its services are highly significant to ensure better livelihood opportunities for the dependent community.

### **9.10. Agriculture Department**

Agriculture is the main livelihood for the people of Point Calimere wetlands as is the fisheries. There is close connectivity between Alam/Salt Pan/Aquaculture and Agriculture, because there is a clear shift from one to the other. Moreover, there is very strong connectivity between irrigation source, changes of crops and cultivating practices and shifting to other livelihoods and people moving to Gulf countries etc.

The changes taking place in the agriculture livelihoods in turn, will support or affect the wetland and other dependent livelihoods. For example, in Jambuvanodai, Muthupettai and Seruthalaikadu those who were involved in agriculture, left the occupation and have switched to fishing. Due to lack of fresh water, surface water and rainwater, the agriculture-livelihoods are being left and the dependent people are shifting to other livelihoods. This is bringing lots of changes in the life style of wetland dependent communities. The major schemes and support by the Agriculture Department to disseminate improved production technologies for increasing the productivity of agricultural crops, as

- Pradhan Manthri Fasal Bhima Yojana (PMFBY) as new crop insurance scheme
- Collective Farming to increase the income of small and marginal farmers
- National Mission on Sustainable Agriculture (NMSA) for Soil health improvement through Bio-fertiliser including Green Manuring, adoption of Integrated Nutrient Management (INM)
- National Agricultural Development Programme (NADP) for Paddy, Millets, Pulses, Oilseeds, Sugarcane, Coconut and Green Manures
- National Food Security Mission (NFSM) for Paddy, Pulses and Commercial crops
- Coconut Development Board (CDB) Schemes
- Sub Mission on Seeds and Planting Materials (SMSP) for Paddy, Pulses and Oilseeds
- Special schemes on Kuruvai and Samba packages
- Support to State Extension Programmes for Extension Reforms Scheme (SSEPERs)
- Agricultural Technology Management Agency-(ATMA), technology support, farmers linkage and demonstration etc,
- Tamil Nadu Irrigated Agriculture Modernization and Water-Bodies Restoration and Management (TN-IAMWARM) is a multidisciplinary project funded by the World
- National Mission on Sustainable Agriculture (NMSA) – Integrated Farming System.
- Sub- Mission on Seeds and Planting Materials (SMSP) – Paddy, Millets, Pulses and Oilseeds – Certified Seed Distribution.
- Pradhan Manthri Krishi Sinchayee Yojana (PMKSY) – Micro Irrigation in Agricultural Crops.
- Collective Farming – Establishing FPO's.

### **9.11. Horticulture Department**

In and around Vedharanyam block, considerable number of families are involved in floriculture and orchards. The production and the producers are increasing day after day. Moreover, the agro-climatic conditions are supportive for horticulture crops and floriculture. Therefore, in future, by designing the livelihoods program for the needy people the relevance of horticulture department could increase.

Especially in the wetland dependent coastal blocks the following schemes are supported by the horticulture department like,

- Through National Agriculture Development Programme (NADP), cultivation of organic vegetables and greens supported by financial support.
- Through Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), financial assistance was supported for micro irrigation facilities.
- By Integrated Horticulture Development Scheme (IHDS), the flower crops cultivation was supported.
- Pradhan Mantri Fasal Bima Yojana (PMFBY) as part of this scheme in Nagapattinam and Thiruvarur district tapioca crop was covered under loss crop damage natural calamities.
- State Horticulture Farms (SHFs) helps the farmers on supply of Tricoderma Virde and pseudomonas fluorescens, supply of farm tools, distribution of seed balls, supporting coconut seedlings etc.

### **9.12. Revenue Department**

Almost in all the villages near to the wetland, considerable area of land falls under the revenue department, if part of land is given for any development intervention the revenue department must be cautious of the wetland and its dependent people. The land shouldn't be given for any prohibited and regulated activities under CRZ. The development should not take place by exploiting the natural resources and dependent flora and fauna.

### **9.13. Tourism Department**

At present, the scope for Tourism Department is less, but there is more scope for developing tourism activities in the Point Calimere wetland complex. There are significant tangible and intangible cultural, heritage and religious sites available that could be promoted. Further the mangroves, beach and bird watching related activities have high potential of attracting visitors. The community can be trained and promoted for Eco Tourism with convergence of forest and tourism department. Environment friendly and eco-sensitive tourism can be promoted in and around point Calimere.

### **9.14. Hindu Religious and Charitable Endowment Department (HR& CE)**

Around the wetland like revenue, HR& CE department also owns a large portion of land such as the Vedhranyam temple and Idumbavanam temple lands. The Annapettai and Idumbavanam village completely belongs to the Idumbavanam temple, Karaganatharkulam is benogs to Karpaganathar temple, likewise in and around Vendranyam the entire lands are

belongs to Vendranyam temple. In future in any development is planned around the wetland the role of HR& CE department is very high and relevant. Even the house lands are belonging to temple in addition to agriculture land; some policy decisions can directly reduce impacts on the wetland, like giving temple agriculture land to the tenant etc.

### **9.15. Agriculture Engineering**

Through agri-engineering department many related interventions are made in the fringe villages like, land development schemes by agricultural implements and machinery, minor irrigation schemes, rainwater harvesting and runoff management under soil conservation scheme, construction of farm ponds, percolation ponds, check dams etc. There is high need of Agri engineering department for the fringe villages of Point Calimere to strengthen the agriculture interventions in order to reduce the pressure on the wetlands.

The major interventions ensued through the district agri engineering departments are

- Construction of Percolation ponds for Ground Water Recharge and prevention of flash floods
- On Farm Development works in River commands, Tank ayacuts construction of Threshing Floors and Introduction of Rotational Water Supply Systems.
- Training of farm youths, to upgrade their knowledge, skills and develop their attitude in handling Agricultural Machineries, their maintenance and Management
- Disaster Management by carrying out relief works during natural calamities like flood and cyclone.
- Farmers are benefited to hire Bull Dozers, Tractors, Transplanter and Combined Harvesters, Tractors, Power Tillers, Transplanters, Power Threshers, Power Weeder, Rotavators, Laser Land Levellers and Sprayers to carry out farm operations.
- Formation of farm ponds, harvest rain water for ground water recharge to prevent soil erosion and to provide supplementary irrigation etc.

The aforesaid interventions are implemented by the given schemes of the State Agricultural Engineering departments,

- Land Development Schemes
- Minor Irrigation Schemes
- Rainwater Harvesting and Runoff Management Under Soil Conservation Scheme
- Demonstration of Agricultural Implements
- Micro Irrigation Scheme (Drip and Sprinkler Irrigation Systems)
- Training on Agricultural Implements
- Sub Mission of Agricultural Mechanization (SMAM) and National Agricultural Development Programme (NADP)

### **9.16. Pollution Control Board**

The Tamil Nadu Pollution Control Board enforces the provisions of the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the rules made under other relevant acts. In the

entire Point Calimere especially in Muthupet town since lots of effluents and drains connect in to the Koriyar. No proper disposal system of solid waste management is there, many brick industries are functioning around the wetlands, the farm and aquaculture effluents are connecting in to rivers and wetlands. This in turn affects the habitat and its rich bio diversity. The Pollution control board being the statutory body it could play a major role in controlling the air and water pollution in the areas. Although presently there is no strict regulation by the pollution control board on the parts of shrimp farming effluents, shops and discharge of municipal waste in to rivers.

### 9.17. Archeology Department

Through the PESA and Focus Group Discussion, in many villages like Kodiakarai, Kodyakkadu, Seruthalaikadu and Pannal the community members have requested to have Archaeology excavation from Kodiakarai to Muthupettai. Every so often, people find age old artefacts in their villages. Moreover, they believe more than 100 years ago there was a big civilized city in this wetland boundary. Therefore, when the management plan is prepared this could be considered as part of the plan.

### 9.18. Disaster Management Authority

Nagapattinam district has been exposed to natural calamities since a long time, particularly due to storms, cyclones, storm surge and tsunami. Major damage has been caused by cyclones than any other natural calamity.

**Table 9-1: Past history of natural calamities**

S. No.	Date of occurrence	Calamity	Damages caused
1	30.11.1952	Storm wage in land Up to 5 miles	Damages caused to country crafts, FRP Vessels and shore side structures.
2	08.12.1967	Cyclone	7 lives and 15000 rendered homeless.
3	12.11.1977	Cyclone	560 lives and 196 missing and damages to Port, Irrigation systems, Road, Power supply and communication including large No. ofhouses.
4	01.12.1984	Floods due to heavy rain.	Crops damaged in large scale and affected normal life due to heavy floods.
5	15.11.1991	Heavy rainfall	Crops damaged.
6	04.12.1993	Cyclone speed 188 kmph	1100 people lost their live hood Heavy damage to crop.
7	26.12.2004	Tsunami waves	6065 life loss. 12821 cattle loss. 791 missing, 1922 injured. Houses loss and damages to shops and building, business people.
8	27.11.2008	Nisha Cyclone speed 80 kmph	20 Life Loss, 1174 cattle, 3 injured and 4,58,949 houses were damaged.



S. No.	Date of occurrence	Calamity	Damages caused
9	11/2010 and 12/2010	Heavy rain fall	10Lifeloss, 1492Cattleloss, 56025Huts, Pucca and Katcha houses were damaged. Paddy 76419Hects, 461 Hects Horticulture and 28 Hects Groundnut crops were also damaged.
10	31.12.2011	Thane Cyclone	Hut damages partly 1468, Fully 24. Cattle loss 49. Crop loss 50,931.58 Hectares in all of Paddy, Sugar cane, Banana and Ground nut.
11	15.11.2018	Gaja Cyclone	56,942 houses completely damaged, 60732 houses partly damaged, 735 livestock animals loss, 170454 trees are uprooted, 250,000 vulnerable people were evacuated to relief camps, heavy damage to public infrastructure, standing crops, fishing craft and gear, forest and wildlife associated with the Point Claimere Wildlife Sanctuary and Muthupet mangrove wetland.

Being one of the disaster-prone districts and coastal blocks, there is high relevance, need and integration of District Disaster Management unit along with forest and other line departments to protect the social and natural resources. Moreover, the disaster Prevention, Mitigation and Relief activities are usually taken by the district disaster management unit with the integration of other line departments.

Whatever is built for the benefit of the wetland dependent community and the conservation of natural resources, could be destroyed overnight. Therefore, there is strong need for integration of district, state and national disaster management authority to avoid and mitigate the risk.

### 9.19. Coastal Zone Management Authority (CRZ)

The entire Point Calimere site being a coastal wetland it falls under the CRZ boundary, where there are many restrictions, regulations and prohibition activities are listed out by CRZ authority. The Government of India issued the Coastal Regulation Zone Notification in 2011 under Environment (Protection) Act, 1986 to protect the coastal environment and to regulate development activities along the coastal areas, thereby aiming to ensure livelihood security to the fishing communities, other local communities living in the coastal areas, to conserve and protect the coastal stretches, to promote sustainable development in the coastal areas. As per this notification, the coastal areas have been classified into four zones.

CRZ-I (ecologically sensitive),

CRZ-II (built-up area),

CRZ-III (Rural area) and

CRZ-IV (water area which includes the water areas up to 12 Nautical miles (Nm) of the territorial waters and the tidal influenced water bodies.)

Critical Vulnerable Coastal Area (CVCA) (Ecologically Sensitive areas like Gulf of Mannar)

CRZ area includes the land area from High Tide Line (HTL) to 500 mts on the landward side along the sea front, the land area between HTL to 100 mts or width of the creek, water bodies etc. whichever is less.

The Environment (Protection) Act, 1986 has had a crucial role in the conservation and management of mangrove ecosystems. It declares industrial and other activities such as discharge of untreated water and effluents, dumping of waste, land reclamation and bunding are restricted in order to protect the coastal environment. The Coastal Regulation Zone Notification 2011 ensures (i) protection of livelihoods of traditional fisher folk communities, (ii) preservation of coastal ecology and; (iii) promotion of economic activities that have to be necessarily located in coastal regions. As per CRZ 2011, mangroves are declared as an Ecologically Sensitive Area and protected under Coastal Regulation Zone I, where no construction activities are allowed.

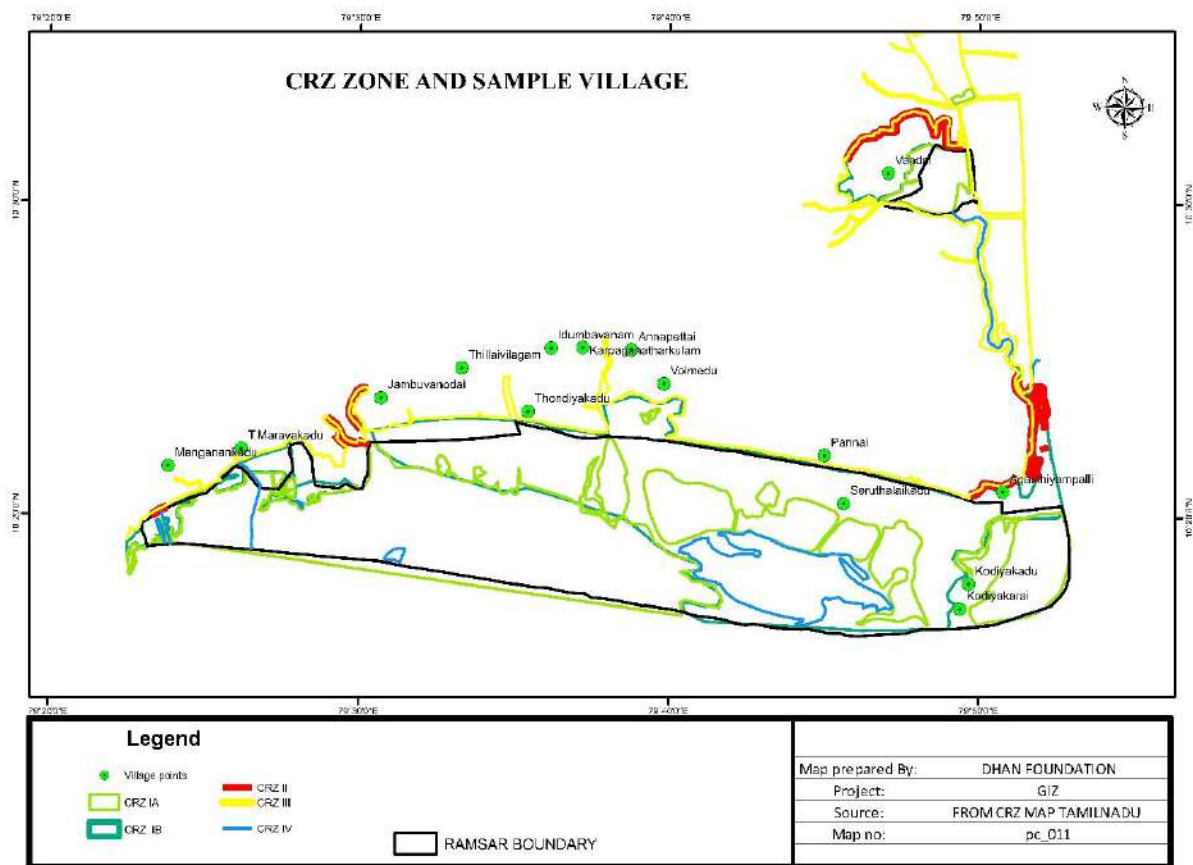
At present Public Works Department (PWD), Fisheries and Forest Departments are proposing several coastal protection works for clearance under CRZ notification 2011. The State Coastal Zone Management Authority ensures that the said works are not taken in adhoc manner. The Authority take decisions based on the high, medium and low eroding areas, and also based on sediment cells and shoreline maps prepared as a part of Coastal Zone Management Plan. Further the erection of hard structures perpendicular to the coast saves the shoreline on one side and causes erosion on the other side. Hence, the Authority considers the erection of hard structures are not possible as a part of Comprehensive Coastal Zone Management plan.

Even then in many areas the PWD & fisheries department are trying to construct structures in the Point Calimere Wetland areas. Like Vellapallam fishing harbour is being planned by fisheries department and many other constructions are taking place on the Vennar sub basin too.

Within the 10 km radius of the proposed Vellapallam port, significant ecosystems are existing like, Nallar river, Thalainayar reservoir, Thalainayar reserved forest and Kodiyakarai sanctuary. The possibility of affecting these ecosystems is high. Moreover, the aquatic species of the particular area will be affected. In addition, this area acts as the natural hatcheries for Olive Ridley turtle, when the port is established, it will directly impact the turtles.

Due to the usage of motorized boats there is a high possibility of ambient impact on the air, noise levels, surface, ground water, soil, seawater, seabed sediment, ecology and biodiversity and socio economics status of the people in around 10 km radius.

Therefore, the CZMA is considered as the key stakeholder for protecting the wetland, dependent resources and community from any development interventions which is planned by relevant departments for the coastal areas of Nagapattinam, Thanjavur and Thiruvavarur.



**Map 9-2: CRZ Zone and Sample Village**

As part of this study addition of Point Calimere Wetland site under the CRZ category V like Gulf of Mannar could be proposed. These areas require special consideration for the purpose of protecting the critical coastal environment and difficulties faced by local communities and other Ecologically Sensitive areas identified and managed with the involvement of Coastal communities including fisher folk.

#### Eco Sensitive Zone

There are many activities are restricted in the ESZ as the wildlife protection act 1972, the details of the activities are given in the ESZ Notification for block -A & B is given in the *Annexure-VIII*

List of whole and part villages falling under Eco-Sensitive Zone of Point Calimere Wildlife Sanctuary Block A.

**Table 9-2: Villages under ESZ in Block-A**

S. No.	Village Name	Direction from Protected Area	Whole	Part
1	Earikulakarai	N		✓
2	Athirampattinam	N		✓

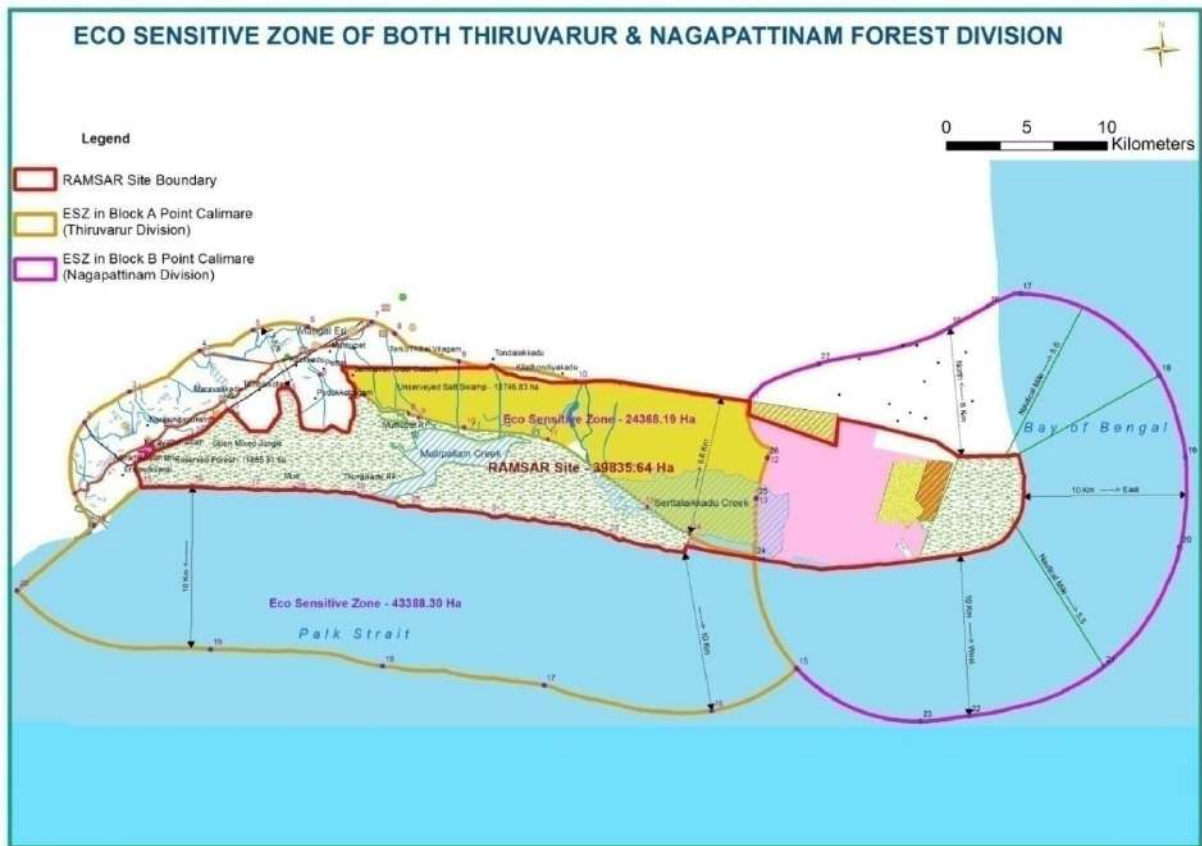
S. No.	Village Name	Direction from Protected Area	Whole	Part
3	Karisakadu	N	✓	
4	Maravakkadu	N	✓	
5	Thuraikadu	N	✓	
6	Muthupet	N		✓
7	Veeranvayal	N	✓	
8	Jambuvanodai	N	✓	
9	Thillaivilagam	N	✓	
10	Mangal	N		✓
11	Edumbavanam	N	✓	
12	Kaluvankadu	N		✓
13	Kelanammankurichi	N		✓
14	Thondiyakadu	N	✓	
15	Karppaganatharkulam	N		✓
16	Vilangady	N		✓
17	Melakkadu	N	✓	
18	Kelathodiyakadu	N	✓	

All villages (other than those specified) are in Pattukkottai taluk, Thanjavur District (1 to 4) and Muthupet Block, Thiruthuraiipoondi taluk, in Thiruvarur District (5 to 18).

List of whole and part villages falling under Eco-Sensitive Zone of Point Calimere Wildlife Sanctuary Block B.

**Table 9-3: Eco Sensitive Village in Block-B**

S. No	Village Name	Direction from Protected Area	Whole	Part
1	Agasthiyampalli	N		✓
2	Kodiyakarai	W	✓	
3	Kodiyakadu	W	✓	
4	Vedhranyam	N		✓



**Map 9-3: Source Forest Department – Eco Sensitive Zone in PCWC**

## 9.20. Central Salt Corporation

The Great Vedaranyam Swamp (GVS) has a long history of salt works. A number of domestic and industrial salt works operate in the Swamp. There have been demands from different quarters for setting-up of more salt works, including a huge (24,000 ha) salt complex. Though the impacts of salt work on water birds can be beneficial for some species, the overall impact of a salt complex of such a magnitude will definitely alter the ecosystem, affecting the flora and fauna of the GVS, besides having possible impact on the fisheries of the coast.

Salt Corporation is one of the key stakeholders in Point Calimere since they own large part of land in and around the wetland, they support the national salt production and 20000 families. There is a close connectivity between the forest, fisheries, agriculture, aquaculture farms, revenue panchayat and salt department in PCWC. The Salt corporation workers are spread in and around Kodyakkadu- Thennadar and Athirampattinam- Thambikottai Maravakadu.

The salt corporation land was given for lease to Chemplast, GHCL, Gurukulam and Small-scale salt producers, overall, nearly 10000 acres of land was given for lease including in Athirampattinam.

Salt is a central subject in the Constitution of India and appears as item No:58 in the union list of the 7<sup>th</sup> Schedule. The Central Government is responsible for controlling and regulating all aspects of Salt Industry. The salt commissioner organization comes under Ministry of

Commerce & Industry (Department of Industrial Policy & Promotion), Government of India, has been entrusted with the task of Manufacture, Supply and Distribution of Salt by Union Agencies and by other Agencies

Central Government lands under the administrative control of Salt Commissioner' organization is leased out for salt manufacture for a period of 20 years through open tenders giving vast circulation in the salt manufacturing area concerned. As per the interactions with the Small-Scale Salt Producer Association members in Vedharanyam and Agasthiyampalli, they clearly spelled out that there is a high possibility of taking small scale salt production land by government and transfer the same to corporate companies. But they are ready to face legal consequences by approaching even supreme court if necessary, to continue with their rights of salt production in the generations old allocated land.

#### *Annexure-IX The Salt Lease Agreement*

### **9.21. Academic & Research Institutions**

There are many academic and research institutions who are doing lots of study and research in the Point Calimere site especially AVC College, Anna University, Sathyabama University, IRMA, Baharathidasan University, Annamalai University, BHNS, MSSRF, State and Central Research Institutions, the colleges exist within the district etc. Very critical studies are carried out by these institutions those can be incorporated for the development and integrated management of Point Calimere Site.

### **9.22. Chemplast & GHCL**

The Chemplast and GHCL are the private corporates who produce the salt in Vedaranyam area, these companies own 3000 acres respectively. They occupy a large portion of wetland for salt production and support by providing drinking water for schools, households when they are in need especially for functions like marriage etc. Further they support nearby schools through their CSR activities. Chemplast partnered the Bombay Natural History Society (BNHS) in setting up a study center at Kodiakarai. The BNHS-Sanmar center is a boon for bird watchers who gather to watch migratory birds from across the globe swarming the swamps of Vedaranyam, during the northeast monsoon season. The center spread across two-and-a-half acres of land purchased by BNHS is the first of its kind in the country.

On the other hand, lots of ecological changes have occurred due to the salt corporation especially the increasing soil and water salinity hence, the fringe villagers lose their drinking water source and agriculture, Seruthalaikadu village is one such example. The Natural water flow areas like Thottam and Alam have been encroached by these companies which affects the natural water flows and its dynamics. Further the villagers in Pannal and Thennadar get affected by these companies by disturbing their fishing route etc.

Therefore, these corporate companies are very crucial as both positive and negative stakeholders who impacts the wetland.

### **9.23. Elected representatives Presidents, Union and District Councilors, MLAs, MPS**

Across the PCWC there are many elected representatives are there like ward, union and district councilors, Panchayat Presidents, Union Chairman, District Chairman and MLAs, MPs are plays very crucial role in policy decision and bringing the development works.

Each and every representatives plays crucial role at their level hence all the elected representatives are key stakeholders. In the entire PCWC, Vedharanyam, Thiruthuraiipoondi and Pattukottai MLA and Nagapattinam and Thanjavur MP are representing. As of now they are not much aware on the site, ecology, bio diversity and eco systems etc., even then they must be part preparing the integrated management plan with their consultation and suggestions.

### **9.24. NGOs**

There are good number of NGOs are working in the PCWC like LAFTI, MSSRF, SIFFS, BEDROC, DHAN, OMCAR and others these NGOs are working very long period in the landscape on environment, water, coaster conservation and livelihoods etc. Their experience and knowledge could be tapped and they do lots of development interventions. Especially LAFTI lead by Krishannamal Jeganathan fight and got judgment against the Aquaculture farming. DHAN did lots of water conservation works like farm pond and tank renovation etc. SIFFS working closely with the fisher folk by ensuring backward and forward support for fishermen.

### **9.25. Schools and Collages**

In the PCWC there are many government schools and government supported collages they are functioning well in these areas. Though schools and colleges are not directly dependent or impacting wetland in future these younger generations must know the importance of mangroves, wetlands, swamps and lagoons etc. Further they may bring awareness among the community and family on the importance of site at least they may not negatively impact the s site. In future among these students they can take up study and action research for this wetland. Hence, they could be integrated as part of preparation of Wetland Management Plan towards integrated management of the site.

Apart from the above stakeholders the following Community Based Formal Institutions are functioning in this wetland like, Fishermen Welfare Society, Eco Development Committee, Village Forest Committee, Vennar Sub Basin Farmers Committee, Small scale Salt Producers Association, Salt Workers Association etc.,

In addition, there are few Informal Institutions are also existing like, Traditional village panchayats, Traditional Community association, Aquaculture owners network, Fish Vendors associations, Women SHGs and their federations, Farmers Federations and Fishermen Federations etc.

The other key individual stakeholders are, Hunter and bird poacher, Bird Watcher, Tourists, Pilgrims also plays considerable role in impacting the wetland in different ways.



Legal legislations which bind the Wetland are

- Coastal Regulation Zone Notification in 2011 under Environment (Protection) Act, 1986
- ESZ Notification 2020 under Environment (Protection) Act, 1986
- Environmental (Protection) Rules 1986 (EPR)
- Coastal Zone Management Plan
- National Wetland Conservation Programme (NWCP),1985
- Wetlands (Conservation and Management) Rules, 2010
- Wetlands (Conservation and Management) Rules, 2017
- The Tamil Nadu Forest Act of 1882
- Regulations of Tamil Nadu State Wetland Authority - 2016
- The Indian Forest Act 1927
- Forest Conservation Act 1980
- Wildlife Protection Act 1972
- Water (Prevention and Control of Pollution) Act 1974,1980
- Maritime zone of India (regulation & fishing by foreign vessels) Act 1980
- Territorial water, continental shelf, Exclusive Economic zone and other Marine Zone Act, 1976
- ST & other Traditional forest dwellers (Recognition of Forest Right Act, 2006)
- Wildlife & Forest Protection Laws
- Environmental Protection Act 1986
- Bio Diversity and Natural Eco system Law
- Wetland Conservation Rules
- The Indian Fisheries Act 1857
- Tamil Nadu Marine Fishing Regulation Act (TNMFR), 1983.
- Coastal Aquaculture Authority Act, 2005
- TWAD Board Act, 1970
- Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981,

The Power and Influence Matrix of the Stakeholders on the Wetland

Formal Institutions

**Table 9-4: Power & Influence Matrix of Formal Institutions in PCWC**

S. No.	Village	Formal						
		Fisheries Association	Salt Producers Association	Salt Workers Association	Eco Development Committee	Eco Tourism Management Committee	Village Forest Committees	Gram Panchayat
1	Manganankadu	Low Power- High Impact- Low Influence - High interest	NA	NA	NA	NA	NA	High Power- Low Impact - Low interest - Low influence
2	T. Maravakadu	Low Power- High Impact- Low Influence - High interest	NA	NA	NA	NA	Low Power- Low Impact- High interest - Low influence	High Power- Low Impact - Low interest - Low influence
3	Jambuvanodai Akkaraikadu	Low Power- High Impact- Low Influence - High interest	NA	NA	NA	NA	NA	High Power- Low Impact - Low interest - Low influence
4	Thillaivilagam Sengankadu	Low Power- High Impact- Moderate Influence - High interest	NA	NA	NA	NA	NA	High Power- Low Impact - Low interest - Low influence
5	Thondiyakadu	Low Power- High Impact- Moderate Influence - High interest	NA	NA	NA	NA	Low Power- Low Impact- High interest - Low influence	High Power- Low Impact - Low interest - Low influence
6	Karpaganatharkulam	Low Power- High Impact- Low Influence - High interest	NA	NA	NA	NA	NA	High Power- Low Impact - Low interest - Low influence
7	Idumbavanam	Low Power- High Impact- Low Influence - High interest	NA	NA	NA	NA	NA	High Power- Low Impact - Low interest - Low influence
8	Annapettai	Low Power- High Impact- Moderate Influence - High interest	NA	NA	NA	NA	NA	High Power- Low Impact - Low interest - Low influence

S. No.	Village	Formal						
		Fisheries Association	Salt Producers Association	Salt Workers Association	Eco Development Committee	Eco Tourism Management Committee	Village Forest Committees	Gram Panchayat
9	Voimedu-Chinthamanikadu	Low Power- High Impact- Low Influence - High interest	NA	NA	NA	NA	NA	High Power- Low Impact - Low interest - Low influence
10	Pannal Sakkaranpettai	Low Power- High Impact- Low Influence - High interest	NA	NA	Low Power- Low Impact- Low influence - High interest	NA	NA	High Power- Low Impact - Low interest - Low influence
11	Seruthalaikadu (Panchanathikulam Middle)	Low Power- High Impact- High Influence - High interest	NA	NA	NA	NA	NA	High Power- Low Impact - Low interest - Low influence
12	Agasthiyampalli (Vendranyam)	NA	Low Power- High Impact- High influence - Low interest	Low Power- Low Impact- Low interest - Low influence	Low Power- Low Impact- Low influence - High interest	NA	NA	High Power- Low Impact - Low interest - Low influence
13	Kodiyakadu	NA	Low Power- High Impact- High influence - Low interest	Low Power- Low Impact- Low interest - Low influence	Low Power- Low Impact	NA	NA	High Power- Low Impact - Low interest - Low influence
14	Kodiyakarai	Low Power- High Impact	NA	NA	Low Power- Low Impact	NA	NA	High Power- Low Impact - Low interest - Low influence
15	Thalainayar - Vandal	NA	NA	NA	Low Power- Low Impact	NA	NA	High Power- Low Impact - Low interest - Low influence

Low Power- High interest- High Impact - High influence

**Table 9-5: Power & Influence of Informal, Government and Private Institutions in PCWC**

S. No.	Village	Informal			Government Institutions							Private		
		Traditional Village system	SHGs	VaSociety	Forest Dept.	Fisheries Dept.	TWAD	PWD	Coast Guard	Revenue Dept.	Salt Corporation	Chemplast/ GHCL	Individual Owners/ Trust	Aquaculture Owners
1	Manganankadu	Low Power - High Impact - High interest - Low influence	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	NA	NA	NA	Low Power - High Impact - Low interest - High influence
2	T. Maravakadu	NA	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	NA	NA	NA	Low Power - High Impact - Low interest - High influence
3	Jambuvanodai Akkarakadu	Low Power - High Impact - High interest - Low influence	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	NA	NA	NA	Low Power - High Impact - Low interest - High influence
4	Thillaivilagam Sengankadu	Low Power - High Impact - High interest - Moderate influence	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	NA	NA	NA	Low Power - High Impact - Low interest - High influence
5	Thondiyakadu	Low Power - High Impact - High interest - Moderate influence	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	NA	NA	NA	NA

S. No.	Village	Informal			Government Institutions							Private		
		Traditional Village system	SHGs	VaSociety	Forest Dept.	Fisheries Dept.	TWAD	PWD	Coast Guard	Revenue Dept.	Salt Corporation	Chemplast/ GHCL	Individual Owners/ Trust	Aquaculture Owners
6	Karpaganatharkulam	Low Power-High Impact-High interest - Low influence	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	NA	NA	NA	NA
7	Idumbavanam	Low Power-High Impact-High interest - Low influence	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	NA	NA	NA	NA
8	Annapettai	Low Power-High Impact-High interest - Low influence	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	NA	NA	NA	NA
9	Voimedu-Chinthamanikadu	Low Power-High Impact-High interest - Low influence	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	NA	NA	NA	NA
10	Pannal Sakkaranpettai	Low Power-High Impact-High interest - Low influence	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power-High Impact - Low Influence - Low interest	Low Power-High influence - High impact - Low interest	NA	NA

S. No.	Village	Informal			Government Institutions							Private		
		Traditional Village system	SHGs	VaSociety	Forest Dept.	Fisheries Dept.	TWAD	PWD	Coast Guard	Revenue Dept.	Salt Corporation	Chemplast/ GHCL	Individual Owners/ Trust	Aquaculture Owners
11	Seruthalaikadu (Panchanathikulam Middle)	Low Power-High Impact-High interest - Moderate influence	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power-High Impact - Low Influence - Low interest	Low Power-High influence - High impact - Low interest	NA	NA
12	Agasthiyampalli (Vendranayam)	Low Power-High Impact - Low influence	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power-High Impact - Low Influence - Low interest	Low Power-High influence - High impact - Low interest	NA	NA
13	Kodiyakadu	NA	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power-High Impact - Low Influence - Low interest	Low Power-High influence - High impact - Low interest	NA	NA
14	Kodiyakarai	Low Power-High Impact	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power-High Impact - Low Influence - Low interest	Low Power-High influence - High impact - Low interest	NA	NA
15	Thalainayar - Vandal	NA	Low Power - Low impact - Low interest - Low influence	NA	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	High Power - Low Impact - Low influence - Low Interest	High Power - High Impact - High influence - Low Interest	High Power - High Impact - High influence - High Interest	High Power - Low Impact - High influence - Low Interest	NA	NA	NA	Low Power-High Impact - Low interest - High influence





## 10. Recommendations for sustaining wetland dependent livelihoods and maintaining wetland ecological character

### 10.1. Recommendations for Strengthening Eco System Based Livelihoods

**Agriculture:** Irrigation intensified agriculture practice adapted in the Cauvery Delta was possible only by damming of rivers. This resulted in reduced flow of freshwater into the tail end, which highly impacts the agricultural. *The Recommendations are*

In this area already there are many surface water conservation structures like ponds and tanks are existing, which needs to be properly managed and maintained to catch the rainwater.

In addition, there are successful impact by the farm ponds in this area therefore, with the support of agriculture department and available schemes this can be replicated and more number of farm ponds can be created to support agriculture.

Being Cauvery delta region, paddy is cultivated as the primary crop. Being highly water intensive, it consumes a lot of water. Alternative crops can be experimented like floriculture, which is doing well in few pockets in the same area and can be extended in addition to vegetable cultivation with proper soil test support by agriculture department. Further Horticulture crops in Nagapattinam district are doing well by the farmers, which could be expanded to the dependent villages.

If any other water storage construction such as shutters and check dams are constructed in the Vennar and Agni river sub basin, it could be consulted with the respective tail end farmers through their farmers' association.

#### **Salt Pan**

Saltwater from aquifers is one of the reasons cited by the communities for increased salinity in soil as well as the aquifers. **Recommendations are**

Strict monitoring, regulations and enforcement should be ensured by the Salt Corporation on source of salt production especially on the dug wells.

The wetland in Kodyakrai, Kodyakadu, Serthuthalaikadu, Pannal and Sakkarapettai is used to store the salt water which is pumped by the GHCL and Chemplast from Sea which needs to strictly regulated by the Salt Corporation and district administration.

Regulation of creation of bunds for salt pans and brine reservoir has a minor implication in the drainage capacity of the wetlands especially in mudflats. This has to be regulated for better drainage of intertidal zones and rainwater.

The restoration of Muniyappan lake supports larger number birds and other species which is completed degraded by high effect of salinity which could be renovated and maintained by the forest department by removing the prosopis, desilting the lake and planting native trees.

## **Renovation of Silted creeks**

*Kaluvapaththai, Manavaikkal, Siththankoyil and Pudhuaaru* were the four creeks found in between *Chellakannaicreek* and the Point Calimere. These creeks were accessed by the fishermen of *Kodiyakarai and Kodiyakkadu* for fishing. The Pudhuaaru creek was later converted into pumping station for Chemplast and the water is stored in the brine reservoir. This has direct impact on the tidal motion in the intertidal zone. As a result, the other three creeks got silted and blocked. Currently, fishermen are not accessing this portion for wetlands. Impact of this shoreline changes has to be researched deeper.

The Pudhuaaru Creek can be renovated and maintained by the respective community and government.

## **Aquaculture**

Due to shift of land use pattern from mudflats, agricultural to aquaculture farm around Muthupettai there are many ecological issues are witnessed around Muthupettai Mangroves.

Recommendations are

The license and its renewal of all Aquaculture Farms are strictly monitored by the Coastal Aqua Culture Authority along with fisheries department.

Further the district administration and pollution control board must strictly Supreme court judgement on regulation the aquaculture farms in delta districts.

Where the forest department and salt department land is illegally used for aquaculture can be immediately taken over by the respective departments.

The local self-government can be empowered to monitor and control the aquaculture farms because in many of the villages the community highly resisting the aquaculture farms since it is directly affecting the entire eco systems and their livelihoods.

## **Fishing**

Due to many reasons the availability of fish varieties and fish catch is reduced over the period of time, which impacts the wetland eco system by unethical fishing practices.

Recommendations

Strict regulation by the forest, fisheries and coast police needs to be ensured on the fishermen.

Renovation of 120 fishing creeks in Manganakadu, Karisalkadu, Majavayal and Maravakadu villages by the community with the support of forest department.

The Oyster bed growth is increasing trend in the entire wetland, this could be removed with the support of forest department.

Accretion of minor creeks in the Kodiyakarai has reduced the fishing zone of boat-less Kodiyakarai fishermen. The fishermen who fishes in the shorelines, minor creeks and the

inundated Kottagam/Thottam has become wage fishermen. This impacts the livelihood of fishermen, which needs to be considered.

### **Livestock**

Degradation of grazing land, shoreline, prosopis invasion, reduction of Purampokku land leads and affects the livestock based livelihoods. In the other hand due to the livestock population affects the mangroves and TDEF by propagules the prosopis seedlings.

#### Recommendations

The Animal husbandry department, Local Gram Panchayat and Revenue department can facilitate for better grazing of available Purampokku land for cattle grazing.

The forest department spends lots of money and resources for plantation but the success of survival is poor in Thondiyakadu area due to cattle, sheep and goat grazing by the nearby villagers.

An experimentation basis with the collaboration of animal husbandry subsidy scheme somewhere in the site stall feed and another kind livestock management technique can be experimented by selecting positive village and beneficiary.

### **Change in the Shoreline, Lagoon and Creeks**

Over past 5 decades the shoreline of Palk strait has undergone lot of changes. While of the creeks were silted the other were breached or widened in many places.

#### Recommendations

Renovation of Muthupet, Sethukua, Mulipallam, Chellakannai and Thovaikal creeks which is been completely silted by over the period of time especially the mouth can be renovated. The other minor creeks (Kaluvapaththai/Maanpanjavaikal, Manavaikkal, Siththankoyil) has been blocked due to siltation/accretion it needs to be renovated.

### **Regulation of disconnected Arteries:**

Freshwater inflow via arteries of Cauvery is the life line of the wetland complex. It regulates the soil and water salinity in the intertidal zone. Freshwater inflow into the Alam zone is obstructed due by construction of barrages/ Shutters across the arteries before entering into the wetland complex and siltation of the arteries due to desiltation for a longer period.

## Recommendations

This has to be addressed jointly by the PWD, Agriculture, Forest and Fisheries department by the negotiation of state authority to renovate the water ways.

While first is a manmade process with the objective of groundwater improvement and the latter is a natural process attributed by poor allocation of fund for restoration.

Natural siltation of *Valavanar*, *Manangkondan* and *Pattuvanachi* arteries, attributed by low flow for a prolonged period disconnected the freshwater flow into the mudflats which needs immediate restorations.

*Valavanar* is the major artery and *Manangkondan* is the minor artery draining into the *ChellakannaiCreek*. Fishermen from Thodiyakadu to Pannal used *Valavanar* as the entry point into the *ChellakannaiCreek*. As the natural connect has been lost due to low flow, an 8 km long new channel (*VettuVaikal*) was dredged by the local fishermen by their contribution. Though the channel connected *Valavanar* with the creek, it needs regular investments from fishermen.

Further the same needs to be dredged for another 5 km which connects directly to the Palk Strait and allows the better growth of mangroves and species.

*VeraguvettiVaikal* and *Parimadai Vaikal* (Fishing Canals) of Maravakkadu are dependent on the freshwater flow from *Pattuvanachi* artery. Siltation of this artery affected the flow of freshwater through fishing canals. This was further aggravated by the Gaja cyclone. The fishermen dependent on these fishing canals have either shifted to sea-lagoon fishing or non-fishing activities. Therefore, it has to be renovated along with *Nasuvini* river because it carries water to the Mangroves forest and fishing canals.

## Alternative Livelihoods

Poaching and hunting happening in many of the pockets of Point Calimere wetland especially *Managanakadu*, *Thondiyakadu*, *Idumbavanam*, *Vandal Panchanathukulam* etc.

## Recommendations

The eco sensitive bird watching committee can be promoted by involving the people who are all part of poaching and hunting as an alternative livelihood strategy.

The maintenance of *Point Calimere* and *Muthupettai Lagoon* can be given to the local villagers by promoting eco-tourism committee by enabling necessary skills, knowledge and financial supports.

Right now there is no entrance fee for entering into *Kodiyakadu* check post, where there are lots of tourists entering *Kodiyakadu* and *Kodiyakarai* to visit *RamarPadham*, *Sidhar Kovil* and others for which minimum fees can be collected and it could have been done by *Village Tourism Committee*.

*Thondiyakadu* can be developed as one of the tourism points which attracts more number of birds and there is a canal which can be developed as a boating point, and the same can be given to

the local villagers as part of eco-tourism committee, and they can be allowed to collect minimum entrance fees.

Likewise, there is high potential to restore the Muniyappan lake and further it can be developed as tourist attracts point where more numbers of tourist already coming to Kodyakadu and Kodyakari.

Collective community patrolling can be done for the entire site since there are few numbers of forest officials are not enough to manage the site. The community can be paid with minimum honorarium.

**Table 10-1: Eco System and Livelihood based Recommendations**

S. No.	Areas	Recommendations
<b>Livelihoods</b>		
1	Fishing	<ul style="list-style-type: none"> <li>▪ Renovation of 128 fishing canals in Maravakadu, Karisalkadu, Manjavayal and Manganakadu traditional fishermen</li> <li>▪ To allow the fishermen to grow fish in <i>MaAlam</i> – Vandal to ensure year-round fishing in the Maalam (Thalainayar) by establishing proper regulation systems from forest department</li> <li>▪ Renovation of Viraku Vaikal and Nasuvini river which allows the fresh water flow to the mangroves and fishing canals</li> <li>▪ Many of the fishing routes connects in to Lagoon and Chellakanai river are silted it has been silted to reduce their drudgery, expenses and life risk. The water ways are Valavanar (VettuVaikala) Maraikoraiyar, Chinthamanikadu (KenndiVaikal)</li> <li>▪ The fishing rights in to the lagoon and Thottam can be given only for the fringe villages, traditional fishermen to avoid and regulate increasing trend of the nontraditional fishermen over the period time</li> <li>▪ The shutters height can be increased in Valavanar river for easy mobility of fishermen from Annapettai, Voimedu and Karpaganatharkulam</li> <li>▪ Further in Chinthamanikadu, Sakaranpettai they are in high need of road facility to connect the lagoon moreover they spend lots of money and drudgery to reach out the fishing point</li> <li>▪ The deposited prosopis from the Thottam can be removed along with Oyster reef since it damages the boat and nets fishermen</li> <li>▪ Regulation of Salt pan &amp; Aqua farming since the effluents are discharged in to Lagoon, Thottam , Alam and Mangroves</li> <li>▪ Proper policy guideline can be established for fringe communities especially who are all fishing in Thottam, Alam, Creeks and Mangroves of Point Calimere wetland site with the consultation of forest and fisheries department</li> <li>▪ Marketing, storage and fishing yard (Cement Floor) support can be established in Thondiyakadu, Sengangakadu, Seruthalaikadu, Jambuvanodai, Maravakadu, Thambikottai and Avarikadu</li> <li>▪ Regulation can be stringent on illegal fishing like bottom trawling and usage of gill net etc in the sea shore</li> </ul>

S. No.	Areas	Recommendations
		<ul style="list-style-type: none"> <li>▪ Fishing and dry fish yard can be established in the main fish route points</li> <li>▪ Fishermen Producers Institution (FPI) can be promoted to support the entire fishing value chain</li> <li>▪ Through timely credit for purchase of fishing gears and net can be supported</li> <li>▪ Insurance coverage for fisherman's life and assets to mitigate the disasters can be initiated</li> <li>▪ The disaster risk reduction and management centers can be established selective villages to avoid the risks from major disasters</li> <li>▪ Providing alternative source of livelihoods in addition to fishing can be supported like, processing unit of fishing, marketing through fishermen association, skill building for youth, Charcoal making etc.</li> <li>▪ Ensuring all the relevant entitlements to the fishermen from line departments and enable them in to regulatory fishing from harmful fishing</li> <li>▪ Awareness and BCC building for fishermen on biodiversity and eco systems and its services</li> <li>▪ Bringing self-regulation among the communities on habitat protection and conservation through traditional fishermen institutions &amp; Panchayat Institutions</li> </ul>
2	Agriculture	<ul style="list-style-type: none"> <li>▪ There is high potential for scale up the floriculture activities in Kadinelvayal, Pannal, Ayakaranpulam, Voimedu, Karupanpulam, Karpaganathrgulam and Panchanathikulametc with the support of horticulture department</li> <li>▪ During flood to avoid sea water intrusion in to the agriculture land proper drainage system can be developed with the support of PWD especially in Vandal, Thondiyakadu, Thillaivilagam, Voimedu, Maruthur, Panchanathikulam and Pannaletc</li> <li>▪ The 300 acres prosopis can be cleared in Seruthalaikadu can be utilized for agriculture, this land belongs to partly by individual and partly by the Panchayat.</li> <li>▪ Revolving fund can be given due to heavy loss on Gaja on their livelihoods</li> <li>▪ Bring back the agriculture land which is been used as aquaculture farms</li> <li>▪ The lift irrigation method and its indigenous knowledge can be documented</li> <li>▪ Introducing soil resistant crops</li> <li>▪ Reducing salt content from soil with the support of agricultural research station</li> <li>▪ Renovation on water bodies and agriculture lands</li> <li>▪ Establish and strengthen rain water harvesting structures for irrigation and renovation of village ponds and tanks to conserve the surface water</li> <li>▪ Promoting shallow farm ponds in agriculture fields</li> <li>▪ Promoting integrated/ multi crops especially millets and pulses</li> </ul>

S. No.	Areas	Recommendations
		<ul style="list-style-type: none"> <li>▪ Fruits orchards can be developed exclusive focus can be driven by government for horticulture development</li> <li>▪ Promoting farmer producers' organizations to ensure backward and forward support</li> <li>▪ Replacing casuarina plantation with other crops</li> <li>▪ Training farmers on good and sustainable coastal agriculture practices;</li> </ul>
3	Salt Production	<ul style="list-style-type: none"> <li>▪ Strict regulation can be enforced on lifting bore water for Salt production</li> <li>▪ The encroached salt pan area can be taken back in to the previous stage for the benefit of birds and villagers in Pannal, Pnchanathikulam, Kodayakadu and Kodayakaraietc</li> <li>▪ Alternative livelihoods can be provided for the salt workers during the rainy season especially on skill development</li> <li>▪ Periodical health checkup can be ensured for the salt workers on their health hazard</li> <li>▪ Strict regulation and enforcement by the salt corporation on land encroachment and usage to be ensured like usage of salt pan as aquaculture farms in Adirampattinam area</li> <li>▪ Avoiding creation of new and manual water ways for the salt pan from sea and ensuring usage of existing and older water routes especially in Kodayakarai, Sakkaranpettai and Adirampattinam.</li> <li>▪ Creating awareness on usage of Personal Protective Equipment through producers and labors association and supporting the kits</li> <li>▪ Permission to grow fish in salt pan during the raining season</li> </ul>
4	Aquaculture	<ul style="list-style-type: none"> <li>▪ Proper renewal of Aquaculture license to be ensured by fisheries department</li> <li>▪ While providing the license the CRZ notification, ESZ notification and supreme court judgment of regulation of aqua farms needs to give consideration</li> <li>▪ Conversion of agriculture land and salt pan for aqua farm is strictly prohibited</li> <li>▪ The effluents discharge needs to be monitored and regulated</li> </ul>
<b>Eco Systems</b>		
1	Mangroves	<ul style="list-style-type: none"> <li>▪ Mangroves Plantation can be done in the bunds of 120 traditional fishing creeks and the responsibility of its maintenance can be given to the respective fishermen in Managanakadu, Manjavayal, Karisalkadu and Maravakadu</li> <li>▪ Mangrove seed collectors available in and around Muthupettai they can properly utilized to collect and plant the seed with the support of forest department</li> <li>▪ The Valvanar connects in to Thottam at Munnankadu from where in the bunds mangroves can be planted</li> <li>▪ Restoration of Cauvery distributaries for better flow of fresh water in to Mangrove forest</li> <li>▪ To renovate the VeraguVaikal for allowing the water flow in to the manmade canals for better growth of mangroves in Maravakadu, Managanankadu, Karisalkadu</li> </ul>



S. No.	Areas	Recommendations
		<ul style="list-style-type: none"> <li>▪ Removing the Aquaculture ponds encroachment inside and near the RF in Maravakadu, Managanankadu, Thambikottai, Jambuvanodai and Thillaivilagam area</li> <li>▪ Ensure the water flow in to the mangrove forest by renovation of Nasuvini river which flows in Maravakadu</li> <li>▪ Plantation of Surappunnai and Thillai plants by removing the prosopis</li> <li>▪ The prosopis removal and plantation can give to the villagers along with forest department</li> <li>▪ During the Gaja mangroves are completely damaged the branches can be removed for better growth of mangroves</li> <li>▪ Strict enforcement of cutting the mangroves and cattle grazing by forest department</li> <li>▪ In many island like Mannarpuran, Miniyan, Ayyanaretc by removing the prosopis mangroves can be planted the responsibility given to the respective fishing villages to access the islands</li> <li>▪ No more manmade canal because it affects the productivity and natural water flow</li> <li>▪ Formation and strengthening Mangroves Protection and Management Councils by involving the local community.</li> <li>▪ Community led and collective restoration campaign can be launched and it could involve various stakeholders for fund mobilizing, protection and restoration etc.</li> <li>▪ Awareness building among villagers and stakeholders has been done in larger way to sensitize the importance; this responsibility can be given to women SHGs along with stakeholders.</li> <li>▪ Awareness building among the school and college students.</li> <li>▪ Regulation of salt and aqua industries near and around mangrove forest.</li> <li>▪ Strict prohibition and enforcement by nearby Grama Panchayat on pollution, sewage, disposal of waste and plastic usage.</li> <li>▪ Exclusive movement and action plan for prosopis clearance and further to use the barren land by planting appropriate plants.</li> <li>▪ There is a need for maintenance of buffer zone between the aqua farms/ Saltpan and the forest area.</li> <li>▪ Detailed study on the impact of aquaculture/ salt farms on mangrove wetlands.</li> <li>▪ Habitat improvement measures through the removal of invasive plant species.</li> <li>▪ Regulating developmental activities in the CRZ area to maintain the eco systems.</li> <li>▪ Plantation of mangroves by community involvement through improved technology along with its maintenance.</li> <li>▪ Collective monitoring by involvement of community and other stakeholders as well.</li> <li>▪ High potential to develop Thondiyakadu as tourist place by promoting trees and mangroves even during raining season boating can be arranged</li> </ul>

S. No.	Areas	Recommendations
2	Lagoon/Thottam	<ul style="list-style-type: none"> <li>▪ Renovation of rivers like Pattuvanachi, Pamini, Kanthaparichan, Maraikoriyar, Kilathangi, Koraiyar and Valavanar for ensuring fresh water flow in to the Lagoon/ Thottam.</li> <li>▪ Regulate the waste, domestic, shops and other establishments' wastes in lagoon especially in Muthupet town.</li> <li>▪ Strict enforcement of lagoon and canal fishing along with awareness building of the fishermen.</li> <li>▪ Rigorous legal enforcement on illegal fishing practices in Lagoon.</li> <li>▪ Fishing in and around lagoon is permissible only for the local fishermen who holds fisheries license for the longer period.</li> <li>▪ Rigorous monitoring and legal enforcement of aquaculture farms which connects the effluents in to lagoon in Jambuvanaodai, Thillaivilagam, Duraikadu, Thambikottai, Maravakadu and Manganankadu.</li> <li>▪ No further permission on initiate salt and aqua industry near lagoons and CRZ boundary.</li> <li>▪ Eco –tourism is good for the village economy but it must be properly managed by not harming the lagoon especially strict prohibition of taking plastic, easily flammable goods and liquor in to lagoon.</li> <li>▪ Consultations and awareness raising programs for stake holders and other government agencies may be organized periodically on the importance of protecting the lagoon.</li> </ul>
3	Rivers/ Estuary	<ul style="list-style-type: none"> <li>▪ Agni River estuary in Keelathottam due to sea water intrusion is shrinking and gets siltation, hence 300 fishermen find difficulties too reach the sea, the community themselves are spend more than Rs.5 lakhs, but this issue must be arrested.</li> <li>▪ Construction of shutters and check dams in the entire river connected in to the Thottam/Lagoon needs to be regulated and it must be executed with the referendum of both fishermen and farmers.</li> <li>▪ Regulate and monitor dumping domestic, industrial waste and sewage discharges in to the rivers.</li> <li>▪ Renovation of major rivers and sub canals by clearing the scrub, prosopis and planting native trees.</li> <li>▪ Removing encroachments and strengthening the bunds by planting trees.</li> <li>▪ Desiltation of Cauvery Distributary Rivers especially in the mouth section where it connects with Lagoon / Thottametc, to stop stagnation and sea water intrusion.</li> <li>▪ The renovation such rivers must be a community practice than one-time event, at least two years once before monsoon it must be ensured by the involvement of relevant stakeholders.</li> <li>▪ The respective GramaPanchyat must be empowered on maintenance of renovated river with necessary policy decision.</li> <li>▪ Not only the rivers but also the adjacent tanks and ponds must be renovated and maintained properly for the benefit of agriculture.</li> <li>▪ The Muthupettai and Adhirampattinam get good rainfall but water storage structures must be strengthened and proper drainage must be ensured.</li> </ul>

S. No.	Areas	Recommendations
		<ul style="list-style-type: none"> <li>▪ Framework developed for water management keeping in view both human and ecological demands.</li> <li>▪ In Vennar sub basin, for the selected river by involving the farmers, fishermen and PWD representatives the River Rejuvenation Committee can be promoted with adequate capacity building and enabled responsibilities with long term vision.</li> </ul>
4	Forest	<ul style="list-style-type: none"> <li>▪ Removal Invasive species</li> <li>▪ The removal of invasive species can be given to the nearby villagers like Kodiyakadu, Pannal and Sakkarapettai and this could be considered as alternative livelihoods for the dependent villagers</li> <li>▪ Further the prosophis could be used as an alternative fuel for cooking</li> <li>▪ The contract of removing the prosophis could be given to the Village Forest Committee/ ETC to make charcoal as alternative energy</li> <li>▪ Near Maravakadu RF the Railway department planned to construct a big bridge, which is not at all relevant and need for the people hence</li> <li>▪ Cattle grazing, fishing, collection of non-timber forest produces by the dependent community can be regulated with stringent enforcement</li> <li>▪ Planting trees in Panchayat-owned lands, school campus and other common places like Seruthalaikadu, Pannal, Ayakaranpulam, Maruthur etc.</li> <li>▪ Establishing a permanent nursery for tropical dry ever-green forest trees through eco-tourism management committees at Kodiyakadu</li> <li>▪ Restoring sacred groves that are affected by the cyclone around Point Calimere wetland fringe villages</li> </ul>

## 10.2. The other general recommendations

- The community members in few villages strongly insisted for excavation works to be carried out in the entire Point Calimere wetland from Kodiyakarai to Muthupettai the since, there have found artefacts and evidences of different settlement in parts of the site.
- There are many islands which existed in the wetland but due to many factors it got eroded and some of them have disappeared. These islands are very closely connected with the life of dependent villagers in terms of fishing, livestock rearing, collection of medicines & plants etc. It should be given priority for protection by the forest department.
- The importance on the wetland, eco systems and services must be rooted among the schools and college students through many competitions and events etc.
- There are many NGOs are working in the field on environment, conservation, water resources and livelihoods etc, those NGOs can be involved as part of preparation of management plan and implementation in terms of bringing awareness among the communities and integrated management of site.

- Many surface waterbodies exist in and around the PCWC which can be revived with the involvement of Panchayat, PWD and NGOs to harvest the rainwater and runoff water etc.
- Exclusive study on invasive species can be taken especially on the Prosopis and its positive and negative impact on the site. It could be interlinked as part of promoting alternative livelihoods.
- The scared groves can be revived since they are getting damaged due to Cyclones
- There are many community-based institutions existing in this wetland like Village Forest Committee, Eco-Development Committee etc, those institutions can be effectively used for integrated management of sites.
- Any such development through, Railway, PWD, Fisheries, DRDA and other line department, it could be ensured with the consultation of forest department and dependent community by obeying the ESZ, CRZ boundary and Integrated Coastal Zone Management plan etc.
- Interpretation center on Point Calimere wetland can be promoted by forest department in a few places where the floating population is significant.
- Eco-tourism can be developed by involving the potential community members and the well-designed accommodation facility, hospitality and hygienic food can be ensured for the tourist which is presently very poor.
- Detailed community lead disaster management and disaster risk mitigation plan must be prepared by involving the fringe villages of PCWC
- There are a multitude of problems that confront the Sanctuary and the Forest Department. Solutions to some of these problems are complex and cannot be tackled by the Forest Department alone. It will require the cooperation of different government departments, social workers, research institutions, elected people representatives, and environmentalists to set things right.
- The natural water bodies which work based on the tides like Keechanaru and Kachanaru can be renovated by the forest department to ensure the water flow in TDEF.

### **10.3. Conclusion**

The area is biodiversity rich and with multiple ecosystems existing in Point Calimere wetland Complex. The wetland is getting impacted by many factors over the years by natural and anthropogenic activities. The entire ecosystem directly supports more than 50000 people directly including fishermen, farmers, salt workers and aquafarmers etc. On the other hand, the site supports large number of water birds, migratory birds, land birds, native birds and wild animals along with many other aquatic species.

A lot of development is taking place in this wetland, which on one hand helps the people and the on the other disturbs the ecosystem. By considering this, an integrated management plan needs to be prepared by the forest department, being the management authority of this site not only to protect and conserve the site but rather to improve the biodiversity along with ecosystem enrichments. The integrated management plan can be prepared by involving multiple stakeholders who play a key role in protecting and disturbing the eco systems such as, the primary stakeholders (people of the dependent villages), PWD, Agriculture, Fisheries, Coastal Aquaculture Authority, Pollution Control Board, Horticulture, Revenue, Rural

Development, Local Grama Panchayat, Cost Guard, Railway departments, Elected People representatives, Community Organizations working in the ground, academic institutions, School, Collages, NGOs and Community representatives etc.

Altogether, the eco sensitive **Point Calimere Wetland Rejuvenation Plan document** can be made available by projecting the 20 years' trend both backward and forward for the development of the site.

The institutions like **GIZ, Wetland Internationals** have to work in the site in the long run with clear vision and outcome to bring back and protect the ecosystems along with multiple stakeholders by developing *Eco Sensitive Rejuvenation Plan for Point Calimere Wetland Complex*.

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**Annexure I List of Coastal Villages under the selected blocks (sample villages are highlighted)**

S. No.	District	Block	Panchayat	S.No	Villages
1	Thanjavur	Pattukottai	Eripurakkarai	1	Eripurakkarai
2			Narasingapuram	1	Melamanganankadu
3			Narasingapuram	2	Mudukkukkaadu
4			Narasingapuram	3	Peikkaalikkaadu
5			Narasingapuram	4	Vallikollaikkaadu
6			Narasingapuram	5	Narasingapuram
7			Sundaranayagipuram	1	Kovilthooppu
8			<b>Sundaranayagipuram</b>	<b>2</b>	<b>Manganankkaadu</b>
9			Sundaranayagipuram	3	Sundaranayagipuram
10			Thamarankottai (south)	1	Karisakkaadu
11			Thamarankottai (south)	2	Karunkulam
12			Thamarankottai (south)	3	Manakkollai
13			Thamarankottai (south)	4	Manjavayal
14			Thamarankottai (south)	5	Manjavayalvadakku
15			Thamarankottai (south)	6	Sengapaduthankkaadu
16			Thamarankottai (south)	7	Thamarankottai (south)
17			T. Maravakkadu	1	Burma tamilar colony
18			<b>T. Maravakkadu</b>	<b>2</b>	<b>T.maravakkadu</b>
19			T. Melakkadu	1	T.Melakkadu
20			T. Vadakadu	1	Chetikuttaikalany
21			T. Vadakadu	2	Pudukottagam
22			T. Vadakadu	3	Rayiladi colony
23			T. Vadakadu	4	Sundaramcolony
24			T. Vadakadu	5	T.vadakadu
25			T. Vadakadu	6	Mariyammankovil colony
26	<b>Thiruvarur</b>	<b>Muthupet</b>	T.KEELAKADU	1	T.keelakadu
27			ALANGADU	1	Alangadu
28			ALANGADU	2	Airakkani
29			ALANGADU	3	Sirupatakkarai
30			IDUMBAVANAM	1	Adanjvilagam
31			IDUMBAVANAM	2	Idumbavanam
32			IDUMBAVANAM	3	Karpaganatharkulam kaduvetti
33			IDUMBAVANAM	4	Idumbavanam Kalani
34			IDUMBAVANAM	5	Karpaganatharkulam kalani
35			<b>IDUMBAVANAM</b>	<b>6</b>	<b>Kelavadiyakkadu</b>
36			IDUMBAVANAM	7	Mangalanayagipuram
37			<b>IDUMBAVANAM</b>	<b>8</b>	<b>Melavadiyakkadu</b>
38			IDUMBAVANAM	9	Sarvamanyam

39			JAMBUVANODAI	1	Ambattankollai
40			JAMBUVANODAI	2	Chinnankollai
41			JAMBUVANODAI	3	Dargha serif
42			JAMBUVANODAI	4	Kalladikkollai
43			JAMBUVANODAI	5	Jambuvanodai
44			JAMBUVANODAI	6	Kollaikadu
45			JAMBUVANODAI	7	Melakkadu
46			JAMBUVANODAI	8	Thandankollai
47			JAMBUVANODAI	9	Therkukadu
48			JAMBUVANODAI	10	Vadakadu
49			JAMBUVANODAI	11	Veeranvayal
50			JAMBUVANODAI	12	Vellathikadu North
51			JAMBUVANODAI	13	Munnal ranuva coloy
52			KARPAGANATHAR KULLAM	1	Karpaganathar kullam
53			THILAI VILAGAM	1	Aramankadu
54			THILAI VILAGAM	2	Kaluvankadu
55			THILAI VILAGAM	3	Namachikadu
56			THILAI VILAGAM	4	Sengankadu
57			THILAI VILAGAM	5	Therkukadu
58			THILAI VILAGAM	6	Thuraitoppu
59			THILAI VILAGAM	7	Thilai vilagam
60			THILAI VILAGAM	8	Kelakkarai
61			THONDIAKKADU	1	Melathondiyakadu
62			THONDIAKKADU	2	Munankadu
63			THONDIAKKADU	3	Pudukkudi
64			THONDIAKKADU	4	Thondiakkadu
65			UPPUR	1	Gopalamuthram
66			UPPUR	2	Kasadikkollai
67			UPPUR	3	Vadaku uppur
68			UPPUR	4	Uppur
69			VILANKADU	1	Karayankadu
70			VILANKADU	2	Karpaganatharkulam koviladi
71			VILANKADU	3	Vilankadu
72	Nagapattinam	Vedhranyam	Annapettai	1	Annapettai
73			Annapettai	2	Rajankattalai
74			Annapettai	3	Thirukuvalai kattalai
75			Ayakkaranpulam 4	1	Kovilkulam therkku
76			Ayakkaranpulam 4	2	Kovilkulam vadakku
77			Ayakkaranpulam 4	3	Thimmappanayakkam kuthakai
78			Kadinelvayal	1	Naduk kadu
79			Kadinelvayal	2	Keelak kadu
80			Kadinelvayal	3	Melak kadu
81			Kodiyakkarai	4	Kodiyakkarai
82			Kodiyakkadu	5	Kodiyakkadu

83			Maruthur south	1	Andiyappankadu
84			Maruthur south	2	Chidhambampillai kadu
85			Maruthur south	3	Keelakkadu
86			Maruthur south	4	Namasivayapuram
87			Maruthur south	5	Poovanthevankadu
88			Maruthur south	6	Kunju kakka sevanthankadu
89			Maruthur south	7	Thiruvēn kadu
90			Maruthur south	8	Kottavelli kadu
91			Maruthur south	9	Andan kadu
92			Panchanathikulam middle	1	Avudaikon kadu
93			Panchanathikulam middle	2	Ganapathidevan kadu
94			Panchanathikulam middle	3	Koolaiyathevan kadu
95			Panchanathikulam middle	4	Seruthalai kadu
96			Panchanathikulam middle	5	Perumaikon kadu
97			Panchanathikulam west	1	Chellaiyan kadu
98			Panchanathikulam west	2	Chinnari kadu
99			Panchanathikulam west	3	Chinnang kadu
100			Panchanathikulam west	4	Kondang kadu
101			Panchanathikulam west	5	Sabbani kadu
102			Panchanathikulam west	6	Sandanag kadu
103			Panchanathikulam west	7	Sandannathevan kadu
104			Panchanathikulam west	8	Vembathevan kadu
105			Pannal	1	Keela kadu
106			Pannal	2	Melakkadu
107			Pannal	3	Naduk kadu
108			Pannal	4	Sakkaram pettai
109			Thennadar	1	Melakkadu
110			Thennadar	2	Vazhian kadu
111			Thennadar	3	Nadukkadu
112			Thennadar	4	Keelakkadu
113			Voimedu	1	Ammakattalai
114			Voimedu	2	Chenathikadu
115			Voimedu	3	Chinthamani kadu
116			Voimedu	4	Melak kadu
117			Voimedu	5	Nadukkadu
118			Voimedu	6	Udaiyadevan kadu
119			Voimedu	7	Udayarajapuram
120			Voimedu	8	Sayakkaranthoppu
121			Voimedu	9	Vellakutti kadu
122			Voimedu	10	Javulikkadu
123			Voimedu	11	Onthankadu and kuunjdhavankadu
124			Vedhranyam ( Municipality)	1	Agasthiyampalli
125	Nagapattinam	Thalainayar	Avarikadu	1	Avarikadu
126			Avarikadu	2	Vairavan pettai

127		Avarikadu	3	Avarikadu west
128		Avarikadu	4	Avarikadu east
129		Kallimedu	1	Kallimedu
130		Kallimedu	2	Palan kallimedu
131		Naluedapathy	1	Goundar theru
132		Naluedapathy	2	Mookkachi theru
133		Naluedapathy	3	Nadutheru
134		Naluedapathy	4	Sanjadi theru
135		Naluedapathy	5	Ulakanathan theru
136		Naluedapathy	6	Naluedapathy
137		Naluedapathy	7	Naidu Theru
138		Naluedapathy	8	Sinnankudikadu Arakkarai
139		Thalainayar Town Panchayat	1	Vandal Ward

## Annexure II The participants List of Vedhranyam Stakeholders Workshop

S.No	Name	Designation	Place	Phone number
1	R.Natesaraja	Inspector of Fisheries	Vedharanyam	9843492889
2	K. Arivanantham	Panchayat Secretary	Kodiyakarai	9786107514
3	K.Muthuraja	Forester	Kodiyakarai	6383943095
4	T.Sathishkumar	Forester	Kodiyakarai	9518241286
5	N.Jothibasu	Assistant Director of Agriculture	Vedharanyam	9655983523
6	R.Vignesh	Supervisor, Marine Fisheries	Vedharanyam	8122694151
7	V.Jeyachithra	Village Administrative Officer	Kodiyakarai	8778123191
8	R.Rajasekaran	Union Councillor	Kadinelvayal	9943432222
9	S.Tamilarasi	Panchayat President	Ayyakaranpulam Sathi-4 Panchayat	9585119747
10	K.Shanthi	Panchayat President	Pannaal Panchayat	9092246428
11	A.Neelavarnam	Panchayat Vice President	Panchanathikulam	9442476307
12	N.Ponnuthurai	Leader, Fishermen Association	Seruthalaikadu	6384354478
13	P. Chinnapillai	Fishermen	Seruthalaikadu	9751742339
14	T.Saravanan	Fishermen	Panchanathikulam	9751742339
15	L.Naguran	Village President	Seruthalaikadu	9095720592
16	R.Janaki	SHG Member	Thethakudi	8270383842
17	Malarkodi	SHG Member	Periyakuthagai	8940694035
18	S.R.Annadurai	President, Vedhanyam Uzhavar Mamandrum	Vedharanyam	9524006643
19	Balasubiramanian	Treasurer, Vedhanyam Uzhavar Mamandrum	Vedharanyam	8838120751
20	Selvaraju	Secretary, Vedhanyam Uzhavar Mamandrum	Vedharanyam	8608469807

21	M.Vasanthi	Farmer	Pushpavanam	9786385619
22	K.Surya	Farmer	Thennampulam	6383521702
23	T.Kalaiselvi	Farmer	Thennampulam	9655431965
24	V.Menaga	Farmer	Thennampulam	8098235174
25	V.Aananthi	Farmer	Thalainayiru	7845405371
26	S.Subhashini	Farmer	Thalainayiru	9787461675
27	P.Rangeela	Farmer	Thalainayiru	9344621336
28	R.Rajmohan	Farmer	Yathavapuram	9965207298
29	M.Kandasamy	Farmer	Ayyakaranpulam Sethi-1	8760446266
30	S.Padmavathy	Farmer	Pushpavanam	9751899981
31	T.Anusiya	Farmer	Pushpavanam	9843773043
32	A.Rajalingam	Farmer	Thalainayiru	9751141817
33	P.Gunasekaran	Farmer	Vellapallam	9843336127
34	Malarkodi	Cluster Associate	Periyakuthakai	8940694035
35	Latha	Cluster Associate	Thethakudi	9159721532
36	P.Sudha	Cluster Associate	Vedharanyam	9655142046
37	A.Kanagavalli	Cluster Associate	Vedharanyam	9786581308
38	R.Parvathi	Cluster Associate	Vedharanyam	9943406427
39	S.Indirani	Cluster Associate	Vedharanyam	9843199420
40	B.Hemalatha	Cluster Associate	Vedharanyam	7094211675
41	N.Shanthi	Cluster Associate	Thalainayiru	9629177925
42	S.Nithya	Cluster Associate	Thalainayiru	6385612885
43	S.Singarayar	Programme Leader, DHAN Foundation	Madurai	9443832322
44	T.Asaithambi	Team Leader, DHAN Foundation	Madurai	9488464575
45	Sivasubiramanian	Regional coordinator, DHAN Foundation	Cuddalore	9943441918
46	N.Saravanan	Regional coordinator, DHAN Foundation	Nagapattinam	7871653988

47	Abraham Stanley	Federation Coordinator	Keelaiyur Uzhavar Mamanram	8830211950
48	Balasubiramanian	Federation Coordinator	Thirunallar Mahalir Vattara Kalanjiam	8940241754
49	Kalpana	Federation In-charge	Sethubavachtram Vattara Meenavar Kalanjiam	9488069261
50	S.Senthilkumar	Federation In-charge	Vedharanyam Uzhavar Mamanram	8778263547
51	Mohan	Documenter	Centre for Development Communication, Madurai	9894090767

### Annexure III The Participants List of Muthupet Stakeholders Workshop

S.No	Name	Designation/ Occupation	Village	Phone Number
1	R.Rajesh	AD Fisheries, Thiruvarur	Muthupettai	8825760988
2	S.Rahupathi	Coastal Sub Inspector	Muthupettal	9080980180
3	Kalaivannan	Coastal Sub Inspector	Muthupettai	9944569977
4	B.Sivaneshan	Forester Guard	Muthupettai Range	6379200890
5	L.Chandirasekaran	Supervisor, PWD, Vennaru river sub basin	Muthupettai	8526240432
6	S.Ganeshan	Forester Guard	Muthupettai	9095593838
7	U.Balu	District councillor	Maravakadu	8489991010
8	Karunanidhi	President, Jambavan Odai Meenavar sangam	Jambavanodai	8524095167
9	Selvaraj	President, Karpaganatharkulam Meenavar sangam	Karpaganatharkulam	9715351306
10	Muniyandi	President, Thambikottai Meenavar sangam	Thambikottai	9751716345



11	Thangaraj	President, Thondiyakadu Meenavar sangam	Thondiyakadu	9788049742
12	Sakthi	Panchayat President	Eripurakarai	9715425530
13	Selvakumar	Panchayat President	Mankanakadu	9385769734
14	Pothiyappan	Panchayat President	Karpaganatharkulam	9976094034
15	Poomala Poovanam	Panchayat President	Thondiyakadu	9842193058
16	Sankar	Joint Mangorve Management Committee	Maravakadu	9791545687
17	Ravichandran	Marine Fishermen	Eripurakarai	9080045974
18	G.Chandirasekaran	Fishermen	Sirupattakarai	7094806297
19	R.Devi	Farmer	Uppur	9626799968
20	Sumathi	Farmer	Uppur	7639175875
21	S.Jeya	Fishermen	Uppur	9159367186
22	N.Usharani	Fishermen	Uppur	8682817242
23	N.Jeyalakshmi	Farmer	Uppur	9626799968
24	M.Mala	Farmer	Uppur	9940734091
25	M.Rani	Farmer	Athirampattinam	7708803461
26	Sabir	Fishermen	Athirampattinam	9363149599
27	B.Usha	Farmer	Thillaiwillakam	7639413750
28	K.Vasantha	Farmer	Uppur	8682817223
29	P.M.Murugapandian	Fishermen	Melakaddu	9786847993
30	R.Senthamilselvi	Fishermen	Athirampattinam	6955622869
31	G.Gyanambaal	Farmer	Alankadu	
32	S.Banumathi	Farmer	Thillaiwillakam	7639413750
33	R.Siyamala	Farmer	Uppur	9159367186
34	S.Santhi	Farmer	Uppur	8682817223
35	M.Valli	Farmer	Uppur	9159367186
36	R.Chithra	Farmer	Uppur	8940756679
37	Alagumenaka	Farmer	Uppur	8682817223
38	V.Yegambaal	Farmer	Uppur	9159367186

39	A.Malathi	Farmer	Uppur	9047189224
40	J.Kalpana	Farmer	Uppur	9843563976
41	V.Punitha	Farmer	Uppur	8489552693
42	Janaki	Farmer	Uppur	6384113941
43	K.M.Vadivelu	Farmer	Melakaddu	9159367305
44	T.Kavitha	Farmer	Thambikottai	7094562490
45	Suganthi	Farmer	Uppur	8220899109
46	R.Vasuki	Farmer	Thambikottai	8056449114
47	T.Selvi	Farmer	Uppur	8220899109
48	V.Balu	Fishermen	Thambikottai	8489991010
49	G.Kannan	Fishermen	Thambikottai	9791595689
50	V.Sudha	Fishermen	Athirampattinam	6955622869
51	S.Vasantha	Fishermen	Sembarakadu	8940452415
52	S.Nagarathinam	Fishermen	Sembarakadu	9626780625
53	R.Jeyalakshmi	Fishermen	Sembarakadu	7868030335
54	V.Sumithra	Farmer	Thillaiyillakam	7639413750
55	P.Davamani	Farmer	Melakaddu	8940223653
56	T.Vasantha	SHG Member	Uppur	8220899109
57	M.Vasantha	Farmer	Maravakadu	9498209245
58	S.Banumathi	Farmer	Karayankadu	9715351306
59	S.Vasuki	Farmer	Karpaganatharkulam	9940916420
60	B.Chithra	Farmer	Thondiyakadu	9842193058
61	M.Kamatchiu	Farmer	Thondiyakadu	8883602258
62	S.Vijayarani	Farmer	Karayankadu	8428184940
63	S.Vimala	Farmer	Karayankadu	9578493855
64	R.Chithra	SHG Member	Athirampattinam	6955622869
65	Kadharmani	Fishermen	Melakaddu	8524095167
66	Illaiyaraja	Fishermen	Melakaddu	9655462681
67	M.Ulaganathan	Fishermen	Thondiyakadu	9942211632

68	M.sudha	Fishermen	Melakaddu	8940223653
69	M.Vasiyammal	Fishermen	Melakaddu	8524095167
70	A.Kalaiselvi	Fishermen	Melakaddu	9344166300
71	R.Shanmugam	Fishermen	Sembarakadu	7868030335
72	T.Rajikayal	Fishermen	Melakaddu	8524095167
73	P.Murugesan	Fishermen	Sembarakadu	
74	P.Kamala	Fishermen	Sembarakadu	7868030335
75	A.K.Shanmugam	Fishermen	Melakaddu	8940223653
76	T.Karunanidhi	Fishermen	Melakaddu	8524095167
77	V.shanmugam	Fishermen	Melakaddu	9159367305
78	V.Thetchinamoorthy	Fishermen	Vadakkuvetriyur	7373239524
79	Rajeshwari	SHG Member	Uppur	8940409587
80	Manimegalai	Farmer	Uppur	9159367186
81	Sekathambaal	Farmer	Uppur	8682817223
82	L.Selvarani	SHG Member	Uppur	7639510909
83	A.Rajakumari	SHG Member	Uppur	9159367186
84	D.Pushpanathan	Fishermen	Uppur	8682817223
85	T.Veeraselvi	Farmer	Karayankadu	Not Available
86	B.Sumathi	Farmer	Uppur	8110844822
87	Ravi	Fishermen	Maravakadu	9942634945
88	Sakthivel	Fishermen	Maravakadu	9715425530
89	N.Suresh	Fishermen	Maravakadu	9787512692
90	Ravi	Fishermen	Thambikottai	9715351306
91	S.Ravichandiran	Fishermen	Thiallaivilakam	9080045974
92	V. Bala	Fishermen	Keelathottam	8489991010
93	G. Kannan	Fishermen	Thillai villakam	9791545687
94	Anusiya	Cluster Development Associate	Thondiyakadu	6379567602
95	Shakila	Cluster Development Associate	Eripurakarai	9786358703

96	Punitha	Cluster Development Associate	Maravakadu	9751632844
97	Solaiyammal	Cluster Development Associate	Muthupettai	7825940176
98	S.Singarayar	Programme Leader DHAN Foundation	Madurai	9443832322
99	T.Asaithambi	Team Leader DHAN Foundation	Madurai	9488464575
100	S.P.Madanmohan	Team Leader DHAN Foundation	Madurai	9842179883
101	Sivasubiramanian	Regional coordinator DHAN Foundation	Cuddalore	9943441918
102	N.Saravanan	Regional coordinator DHAN Foundation	Nagapattinam	7871653988
103	Kalpana	Community Accountant	Sethubavachathiram Vattara Kalanjiam	9488049261

## ***Annexure IV Proceedings of FSC***

### **Introduction**

**Ramsar Convention** signed in 1971 and it is a global treaty focusing on management and protection of important wetlands. India is among 170 signatory countries that agreed to pay notice and commence needful measures towards conservation of wetlands. Globally, so far over 2300 wetlands have been identified as Ramsar sites. In 2020, total number of Ramsar wetlands in the country is 37 covering about 10,679.39 sq km area across 15 different Indian States and two Union Territories (UTs). The main purpose is, to achieve and maintain the ecological character of the wetlands and facilitate sustainable use for the benefit of people and the environment.

Point Calimere is the only one site in Tamil Nadu declared as a Ramsar Site on 19th August 2002 located along the Palk Strait covering Nagapattinam, Tiruvarur and Thanjavur districts with an area of 38,500 Ha. It is situated at the southern end of Nagapattinam district, Tamil Nadu. Point Calimere is actually a complex wetland composed of creek, forest, swamps, and intertidal mudflats. This site includes, Point Calimere Wildlife Sanctuary, Muthupet Mangroves, Panchanadikulam Wetland, Unsurveyed Salt swamp and Thalainayar Reserved Forest. This site is known for water birds, black buck, olive

turtle, and breeding ground for many fish species, crabs and prawns. More than 35000 families are directly depended on this wetland site for their livelihoods like farmers and fishermen etc.

### **Need of Search Conference for Point Calimere**

Being the international importance bio diversity rich site it is significantly affected by various factors like, salt industry, aquaculture, urbanization climate change, pollution, and other human activities. Directly and indirectly more than 90 villages are depended on this site for their livelihood hence, it is time for protect the site by its primary stakeholders with the support of relevant stakeholders. In this Juncture, DHAN Foundation organized 3 days *future search conference* for point Calimere wetland site by involving various stakeholders who are connected with the site.

### **Brief of Future Search Conference**

Search Conference is a participative, collaborative, strategic planning method that enables people to create a plan for the most desirable future of their community, a plan they carry out themselves. The process takes 24 hours spread in to three days that establishes learning – planning community which will be planning for the people, by the people and experience in participative democracy. The Search Conference is a practical way to build communities of people who step up to the challenges of our turbulent times and take responsibility for making change happen in a purposeful way. As the world becomes more and more turbulent, the need is great for people to form communities to search for their desirable futures together.

**Search Conference means a collaborative method, enabling people to create a plan for their most desirable future of their area and community and the plan carried out**

*by the participants / participants themselves*

### **Purpose of Search Conference**

- Establishing Common Ground for the development of new strategies
- Pro-active, creative and effective collaboration.
- Vigilance-responding flexibly and adequately to changes in the environment

### **The Search Conference Process**



With this backdrop the three days future search conference was started in Muthupettai of Thiruvarur district from 14-16<sup>th</sup> March, 2020 by involving the community members of the point calimere wetland site.

This 3 days process was organized by DHAN Foundation and it was facilitated by Mr. Frank Heckman and Mr. Peter from Embassy of Earth, Netherlands, in addition to this Tamilnadu forest department and GIZ, New Delhi were also extends their support for its successful completion of the process along with community members.

### **The Participants**

The participants of 3 days process are fringe fishermen, marginal farmers, Panchayat President, leaders of fishermen association, women SHG members, marine police officers, staffs, officers from Tamil Nadu forest department and DHAN staffs. In addition, students from NIRD, Hyderabad and The Dhan Academy, Madurai were also part of the conference and along with them Mrs. Avnthika and Mr. Xavier Francis from GIZ, New Delhi were actively takes part of this 3 days process.

### **PROCEEDINGS OF DAY-1 (14th OF MARCH)**

First day of the future search conference started with grand inauguration ceremony with cultural folk music with *parai*, traditional prayer with fire and pooja for Mother Earth and Sun by involving all the stakeholders. In the ceremony, community representatives



from different livelihoods of the wetland area offered, Muthupettai lagoon water into the holy fire. It was enhanced with the cooperation of people and facilitation of Mr. Frank Heckman.

The inauguration ceremony further moved forward with lighting the lamp by distinguished guests Dr.

Arivoli District Forest Officer, Mr. Raghupathi – Coastal police, Mr. Frank Heckman and the community representatives. Mr. T.Asai Thambi started the event by addressing the gathering and welcoming the guest subsequently he briefed about the Future Search Conference.

#### **Dr. Arivoli - District Forest Officer**

He shared about the contemporary problems, threats that are prevailing in the wetlands. According to him, issues will be sorted out only if it is voiced. He appreciated the efforts of state government in conserving the wetland ecosystem and encouraged the NGO participation for the same. He took an example of how the wetland is being conserved in Netherland and other countries.

#### **Mr. Raghupathy – Inspector of Police( Coastal )**

He stated about the ill-effects of the natural disasters like heavy rains and unpredictable seasons. He also stated that these disasters cannot be prevented but its impacts can be reduced by certain sustainable measures. He suggested the community to create awareness about reducing solid waste and aquaculture.

#### **Mr. Frank Heckman**

He told about the importance of conserving mangrove forest in Muthupettai Lagoon. According to him, Netherlands is a delta region and it doesn't have the diversity of the wetland as in India. So, the wetland conservation should be the foremost duty of people in this region. He quoted that the coming three days of the Future Search Conference needs every body's involvement and participation towards conserving ecosystem.

#### **Agenda**

Mr. Lokesh an environmental engineer, working for DHN Foundation, does the facilitation and translation for the whole event along with Mr. Frank. He explained the agenda for three days and he insisted the conference would become successful only if the people participate and share their voice and knowledge. He stated that cleanliness of the sea helps for the growth of healthy fishes which would benefit the fishermen. Rejuvenation of lagoon and estuaries are felt need as most of the people are reliant on fishing. He quoted; the people of the area are experts because they have live experience form their lives.

After all, Search programme was initiated with the quote ***“Hearing many voices of knowledge, experience and wisdom from the experts”***.

### **ACTIVITY - 1: EXPECTATIONS**

After the inauguration ceremony, Mr. Frank and Mr. Lokesh started explaining the whole process and its functioning. They explained the metaphors in the chart covering the social ecosystem; learning, planning and acting in the community, search conference method and the first day agenda to the audience. Mr. Frank shared ground rules,

#### **Ground Rules for a Search Conference**

- All perceptions are valid
- Participation is equal and open, regardless of status or position
- People’s perceptions are spoken and written on flip-chart paper
- No presenters, no speeches, keynote addresses, games, ice breakers or training sessions
- People are self-managing and responsible for tasks and outcomes
- Rationalization of conflict (seeking Common Ground in disagreement)

After the explanation of the ground rules, the people were divided into six subgroups. They were asked to write their expectations which they hope to meet from the three days’ workshop. They noted down the points on chart after discussions and shared these in the forum.

#### **The main expectations suggested by six groups are mentioned as follows**

1. To take necessary measures to reduce soil salinity mainly on agricultural land
2. Reduce the salinity of ground water along with improving the water table.
3. Tackling the ill-practices of aquaculture farming (Shrimp Cultivation).
4. Taking community led afforestation and conservation measures.
5. Find out the possible means to reduce the solid and plastic waste which is affecting marine biodiversity and livelihoods.
6. Evolving new policies and ensuring present guidelines for protection of the freshwater sources like ponds, lakes, estuaries, lagoon etc by community themselves.



7. Conserving the agricultural land and enhance its productivity along with sustainable farming.
8. Improve and protect the existing forest area, planting more tree saplings to increase the rainfall.
9. Desiltation of existing creeks and estuaries by involving the beneficiaries and villagers.
10. Promoting awareness about wetlands ecosystem and its importance through different kind of participatory trainings and events.
11. Taking necessary steps to manage the encroachment of existing industries which is worsening the agricultural land and ground water table.
12. There are many Cauvery tributaries channel needs renovation.
13. Exclusive interventions on promotion of mangroves and its conservations and insist rigorous national level and state level policies for conservation of mangroves.
14. Finding out the possible ways and taking steps to remove the silt accumulation by the functioning of big industries.
15. Try to improve the diversity of fish and its catches by suggestive fishing methods and practices.



## **ACTIVITY - 2: CHANGES IN THE WORLD IN LAST 10 YEARS**

The second activity was to know about the changes that have happened around the world in past ten years. The participants were divided into two groups and each group is discussed about the positive and negative changes that have happened in past ten years. They noted down the following points and did their presentation in the plenary.

### **Positive changes in last ten years include:**

1. The vacant land areas are covered by forest, green trees and mangroves moreover people got sensitization to protect the forest and its eco system.
2. Self employment opportunities are increased with more new avenues and further its gives platforms for generation of new jobs.
3. The need and consumption of freshwater became adequate.
4. Information and Communication technology got improved and its gives space to even laymen to have access on the technology.
5. Availability and accessibility of health services are significantly improved.
6. The status of primary to higher education got improved and it gives better space for girl children.

7. The transportation and road facilities are significantly improved.
8. There is significant improves in the women empowerment in the society.
9. The housing and sanitization facilities are improved hugely at village level.

**Negative changes in last ten years include:**

1. Frequencies of disaster are larger than earlier and it affects not only the livelihoods but also the natural resources very drastically.
2. Degradation of natural resources is increased and deforestation is experienced for the survival community.
3. Ground water got depleted than earlier and fresh water source got reduced.
4. There is significant increment in the usage of plastics and it adversely affects the environment especially marine resources
5. Increase in the radio waves and its adverse effects
6. Individual income got decreased and demonetization directly impacted the lives of poor
7. The air, water, soil and nuclear pollution is keeps on in increasing trend
8. There is reduction in the rain fall ration due to climate change
9. There is serious health impacts due to changes in the life style and nature etc
10. There is considerable changes in the marine resources and its diversity especially on the fish catch

A fisherman, Mr. Palinaivelu from Chenganankadu, stated that reduction in average rainfall, variations of temperature are the major changes and human actions are the main factor for the change. Rise in sea water level in Antarctica, climate change and global warming are related to each other and further he insisted in preserving mangrove forest to avoid such kind of problems. Participants shared, the communities are optimistic towards development of younger generation mainly on education.

**ACTIVITY - 3: FACTORS AFFECTING THEIR LIVELIHOOD**



Mr. Frank stated FSC focus is directly on the wetland. Regarding the changes in climate, decrease in rainfall, increase in invasive species are some of the factors which are affecting the wetlands. The participants were asked to sit in their respective groups formed initially and they were given 30 minutes

to discuss and pool out key factors affecting their livelihoods.

### **The sub groups are come out with following points**

1. Sea water intrusion - Salinity in the soil is increased, adequacy of arable and freshwater is getting reduced.
2. Reduction in the mangroves which is affecting fish catch and fish breeding.
3. Natural disasters which affects both livelihoods and natural resources.
4. Aquaculture and chemical based residues affects the soil, ground water, lagoon and other flora and fauna.
5. Improper maintenance of estuaries, creeks and canals.
6. The availability of fresh water got depleted due to many factors like rain, sedimentation and encroachment etc.
7. Aftermath consequences of cyclone are affecting coconut plantation and other crops.
8. Fish species are getting affected because of the shrimp cultivation which is negatively affecting their livelihoods.
9. Increase in the invasive species (prosopis juliflora) are depleting the ground water table, not allowing the other native species to grow, it holds more water vapor and air and make the area so hot where only the prosopis juliflora can grow.
10. Predominance in plastic usage and its adverse effect on aquatic ecosystem.
11. Trawling, gillnet and other unethical fishing practices affect fish resources.
12. Soil fertility is decreasing because of more chemical used in agriculture, aquaculture and cattle grazing.

### **Activity -4: ENVIRONMENTAL IMPACT SCAN**

The selected members from each group came together to map the main issues listed in the third activity according to its intensity. The following are the final impacts mentioned where the first three impacts got the highest grading in terms of intensity.

1. Aquaculture and released chemicals are affecting farm and aquatic livelihoods.
2. Desiltation practices are not properly managed. Estuaries and creeks are accumulated with depositions with solid waste and it becomes polluted.
3. Natural Disasters are affecting more because of the reduction in the mangrove forest. Also, there is more water intrusion into the land area.
4. Changes in land use pattern (Agricultural land to housing / industries) and reduction of forest areas.
5. Adverse usage Plastics
6. Illegal fishing practices like trawling and gillnet method of fishing is affecting on small species such as fishes and planktons, there is changes in fish catch and variety, it directly affecting livelihoods of the seashore fishermen
7. Decrease in annual rainfall and groundwater.
8. Livestock activities are affecting the wetland such as open grazing.
9. Inorganic agriculture is reducing the soil fertility.

These points were presented in the end of the session and overall first day event was successful with active cooperation of community and proper management of DHAN Associates and professionals.

### **PROCEEDINGS OF DAY-2 (15th OF MARCH)**

Second day of the future search conference started with the prayer and Mr. Asai Thambi introduced the today's guest to the community they are M.P. Vasimalai, Executive Director of DHAN Foundation, Mr. Praveen Kumar Water Engineer from DHAN Foundation, Mr. Xavier Francis and Mrs. Avanthika from GIZ and other forest department officials. Mr. T. Saravana Kumar ( TDA) has shared the recap of the findings which evolved from the Day 1 of the Future Search Conference. Further he emphasized the second day agenda as well.

#### **Second day's agenda, as follows**

1. Environment impact scans need to be discussed and explored in deep.
2. Inter discussion for bringing more understanding.
3. Story narration – Previous happenings in the point calimere area.
4. Factors in livelihood that has to be kept, created and dropped.
5. Sub-group discussions on vision 2030 and further finalization.

Mr. Frank Heckman and Mr. Lokesh took over the forum with the scheduled agenda.

#### **ACTIVITY – 1: ENVIRONMENT IMPACT SCAN DISCUSSIONS**

Important points which are generated in Day 1 of Future Search conference were taken as the lead point for the today's start. Main points of the discussions included

1. Aquaculture and released chemicals are affecting farm and aquatic livelihoods.
2. Desiltation practices are not properly managed. Estuaries and creeks are accumulated with depositions with solid waste and it becomes polluted.
3. Natural Disasters are affecting more because of the reduction in the mangrove forest. Also, there is more water intrusion into the land area.
4. Adverse usage of plastic and pollution

The participants were asked to explain and substantiate about their stated problems and what actions could be taken to tackle these problems. Everybody pooled in their knowledge and mention the following points.

- 1. Most of shrimp cultivation is done by local people and they are polluting the fresh water bodies**
  - a. The issue has already been taken to the gram panchayat and the community claims that actions taken were not enough to stop this.
  - b. The shrimp cultivation is done in private lands, but sewage from that is drained into the fresh water affecting all livelihoods depending upon it.



- c. Since, the negative impact of the shrimp cultivation is high, people started to protest against it to remove them. Because of that more than 70 people were arrested by Police.
- d. Natural breeding of prawns is very less and these people are doing artificial breeding to get high profit which is again causing health hazards.
- e. Fishermen who engage in backwater fishing are affected and they couldn't able to get better catch.

**2. Siltation**

- a. Gaja cyclone impacts very seriously in the natural resources especially the excessive sediments and depositions in the agriculture land, common land, canal, estuaries, creeks no steps are been taken by government

**3. Natural disaster affecting mangroves**

- a. Aquaculture sewage should be treated before discharge.
- b. Renovation of the water bodies.

**4. Increase in the usage of the plastic**

- a. This plastic and dumping waste is disturbing the ecosystem and fishermen face difficulties to have good catch due to the increase in the plastic lagoon and marine

**ACTIVITY - 2: SUB GROUP DISCUSSION ON KEEP, CREATE AND DROP**



People were divided into three groups and they were assigned with the theme of "**keep, create and drop**". Under the **theme of keep**, people are supposed to keep/maintain something as it is. **Under create**, what other new things to be done. **Under drop**, what are all the things that have to be stopped. Based on the assignment different groups came up with

interesting points such as,

**Under the theme of keep the following aspects were discussed**

1. Agriculture
2. Livestock
3. Forests
4. Conservation of water and renovation of tanks and ponds
5. Provision of favorable conditions for growth of diversified fish species
6. Collaboration with SHG activities and NGOs for development of sustainable water conservation structures

**Under the theme of Create the following aspects were discussed:**

1. Enforcing proper fishing methods to protect marine resources (like some people are using banned nets instead they should use the traditional nets which are useful for fishes and the community)
2. Initiate some schemes and credit facilities for carrying the fishing activities
3. Restoration of backwater channels – helpful for the fisherman
4. Construction of check dams which can upstream water to the agricultural fields
5. Creating primary producer groups for marginal farmers and fishermen
6. Creating alternative livelihood activities for self-employment (during non-seasons) like preparation of healthy nutrition powder, pickle making, dairy production and cooperative, poultry
7. Development of organic fish farming like spirulina and algae production and confining the shrimp catch only in seas.
8. Create mangrove nurseries and promote mangrove forests
9. Plant more casuarina trees and other soil binding trees and mangroves for prevention of sea water intrusion and shore erosion.

**Under the theme of Drop people discussed the following aspects:**

1. Alcoholism
2. Ban on cutting trees and grazing particularly forests
3. Avoiding banned nets
4. Ban on usage of plastic
5. Aqua cultural discharge should not be released in residential, agricultural and water bodies
6. Improper uprooting of invasive species such as prosopis

**ACTIVITY – 3: STORY TELLING BY PARTICIPANTS**

The story telling activity started with an ancestral and nature prayer by lighting the lamp. All their memories about the point calimere area, both positives and negatives, were discussed by the participants. They exchanged stories about how the tsunami and cyclone affected them, their losses and how they overcame the problems.

They talked about how their houses got ruined, livestock and livelihood loss. The fishermen talked about the problems they faced because of boat damage. The participants also mentioned about how the DHAN members and other people helped them in their crisis situation. They also wish to get disaster resilient building interventions in all the villages.

**ACTIVITY – 3: VISION 2030**

Community enlisted out that what kind of changes that they want to see in the world during the year 2030.

1. Transformation of Coastal village shoreline in to mangrove forest.

2. Improved fish resources and eradicate illegal aquaculture farms.
3. Reduction of salinity in ground water through desiltation of existing and creation of new surface water bodies.
4. Plastic and pollution free villages.
5. Natural farming and sustainable fish practices towards a self-reliant village.
6. Eradicate prosopis Juliflora and planting native trees for ecological enhancement.

### **PROCEEDINGS OF DAY-2 (16th OF MARCH)**

Third day of the future search conference started with the prayer Ms. Amrutha Krishnan has shared the recap of the findings which evolved from the Day 2 of the Future Search Conference along with agenda for third day.

1. Orienting the yesterday's findings and substantiating with valid reasons.
2. Grouping the members according to their perception on the yesterday's findings.
3. The strategy and methods adopted to achieve the goals and
4. Group discussion sharing on issues wise

Mr. Frank Heckman and Mr. Lokesh took over the forum with the scheduled agenda.



### **ACTIVITY - 1: ACTION PLAN**

Sub- groups were divided depending on the yesterday's findings. The yesterday's findings are as follows.

1. Transformation of Coastal village shoreline in to mangrove forest.
2. Improved fish resources and eradicate illegal aquaculture farms.
3. Reduction of salinity in ground water through desiltation of existing and creation of new surface water bodies.

4. Plastic and pollution free villages.
5. Natural farming and sustainable fish practices towards a self-reliant village.
6. Eradicate prosopis Juliflora and planting native trees for ecological enhancement.

The people gathered in to their respective groups, and they started to prepare the action plans, process with involvement of resultant six points acquired from yesterday's event. Each group got a theme to decide the steps and process of action plan; it included fullest participation and involvement of people. Accordingly, after the completion of processes and planning the villagers will go for passing a resolution in their gram sabha.

## **The detailed Action Plan are**

### **I. Transformation of Coastal village shoreline in to mangrove forest.**

1. Protection of Mangrove forests.
2. Create and manage proper channels for backwaters, canal and river.
3. Collaboration of forest department and community.

#### Protecting the mangrove forest

- a. High inflammable materials should not be taken into the forests.
- b. Protecting from cattle grazing – going for stall feeding.
- c. Prohibition of plastic inside the forests.

#### Create channels, ponds and renovate estuaries

- a. Create huge number of new backwater channels and avoiding sedimentation.
- b. Planting new mangrove saplings in new and existing areas.
- c. Saplings ought to be done near brackish water areas.

#### Collaboration with forest department and community

- a. Mobilizing fund from outsiders.
- b. Protection and management of forests.
- c. Promote and extend the forest area.

### **II.Improved fish resources and eradicate illegal aquaculture farms**

1. The waste discharged from aqua cultural ponds should not mix directly to lagoon and sea without proper treatment
2. Renovation of ponds, channels and water sourced areas.
3. Initiate alternative livelihoods in off season of farming and fishing period.

#### The waste discharged from aqua cultural ponds should not go directly to sea without treating

- a. Each shrimp cultivator should have waste water purifiers; Government should enforce it by strict monitoring and enforcing the law and rules.
- b. The aqua cultural farms should be controlled and monitored under pollution control board.

#### Renovation of ponds, channels and water sourced areas

- a. Renovation catchment area and water harvesting resources like ponds and channels in periodical interventions.



- b. Create concrete check dams near shoreline and adjacent to river channels to avoid inundation and sea water intrusion.

#### Initiate alternative livelihoods during fish breeding period

- a. Every fisherman should get alternative employment opportunities.
- b. Create trainings and job opportunities mainly on off season
- c. Collaboration of panchayat and community for regulating the laws

### **III.Desalination**

1. Increase the forest area and plant mangroves and other native trees.
2. Construction of water harvesting structures and renovation of existing ponds and channels.
3. Filtration of water from effluents and chemical wastes.

#### Increase the forest areas and tress

- a. Each house should plant and grow at least 5 plants
- b. Tree saplings should be planted near river and pond channels
- c. Regular and proper maintenance of plants with adequate water

#### Construction of water harvesting structures and renovation of existing ponds and channels

- a. Every house should have roof water harvesting structures and others
- b. Collective rain water harvesting by the village by using the common property management.
- c. The farm pond/ other water harvesting structure must be technically managed and measured

### **IV.Plastic and pollution free villages**

1. Avoid usage of plastic in packaged edible foods, containers and water bottles.
2. Awareness and regulation to avoid plastic at gram panchayat level.
3. Avoid burning of plastic materials. (if necessary recycle)
4. Establishing proper plastic and solid waste management practices, to support improvement in water table, agriculture and fish.

#### The Action plan is directed at: Individuals, family, street and village

- a. People awareness ( September 2020)
- b. Reduction in the usage of plastics with collaboration local government (March 2021 – 2023)
- c. Increase in usage of cloth bag ( September 2020 – March 2022)
- d. Alternative usage for plastic (leaf plate, cloth bag, paper bag) (September 2020 – March 2022)
- e. Replacement water bottle (sliver bottle, copper vessels) ( September 2020)

- f. Collaboration with government (January 2020 – February 2022)
- g. Reduction of plastic residues (June 2020 – august 2021)

#### **V.Natural farming and sustainable fish practices towards a self-reliant village**

1. Village as a whole should go for integrated farming
2. Replacement of chemical fertilizers with green manure like cow dung and vermi compost.
3. Fish ban period should be extended for better breeding of fish.
4. Cultivation of sea grass and spirulina in brackish water regions.
5. Avoid usage of banned nets.
6. Avoiding intrusion of waste water and conservation of marine fish resources.

#### **Village as a whole should go for integrated farming**

- a. Giving awareness, training, input materials and credit facilities through societies.
- b. Each family should engage in agriculture practices by creating some Primary Producer Groups for their backward and forward linkages.
- c. Farmers should engage in integrated farming and relevant training and exposure can be given and should given profit farming.
- d. Conduct peoples' conferences for profitable organic farming with regular discussions. (5 years)

#### **Avoid usage of banned nets**

- a. Create awareness about ill-effects to all fishing communities about its usage.
- b. Formation of village marine resource councils.
- c. Create stringent laws and policies at village level.
- d. Each panchayat and district government department should enforce the law against the usage of banned nets. ( 2 years)

#### **Avoiding of waste water intrusion and conservation of marine fish resources**

- a. Creating awareness at village level about impact of chemical based water and sewage wastes
- b. Treatment of waste water before flowing into seas and create separate waste water channels.
- c. Renovation of backwaters, channels and allowing fresh water passage for proper growth of mangroves.(2 years)

#### **VI.Eradicate prosopis Juliflora and planting native trees for ecological enhancement**

1. Uprooting of prosopis which got spread in vast area.
2. Planting native species in all villages.
3. Community participation for uprooting prosopis and planting of native trees.

### Uprooting of prosopis from the vast area

- a. Creating awareness about the negative effects of prosopis to the community through gram sabha. ( April 2020)
- b. Awareness through schools and colleges.

### Planting native species in all villages

- a. Planting native species like Vengai (ornamental plant), teak, tamarind, neem, saffron. (January 2021 – February 2022)

### Community participation for uprooting and planting of trees

- a. Use of technologies at government level for the protection of unused land. (December 2020- 2022)

### **Concluding address of Forest Range Officer**

The Muthupet Forest Range Officer delivered his concluding address like, we forest department is only working for the management of the site, but for people it is life and livelihood. Therefore you must take more responsibility than forest to protect the site, and forest department will extend best services by joining hands with people of the site.

Finally deliberation of the 3 days process needs to be reached out in all the villages of point calimere wetland site, hence for each major task the councils are been formed.

### **Way forward**

The entire proceeding of FSC will be taken in to all the relevant villages with specifics. Around the six major issues the councils are formed, the council includes representatives of community, officials and DHAN members. In near future through this council all the action plan will be ensured in the villages of point calimere wetland site with the support of community and other stakeholders.

### **The members of each council are**

### 1.Mangrove Restoration Council

Vedhayan, Palanivel, Jeyanthi,Ganesan (FG)and Lokesh

### 2.Improving Fishing Reserves Council

Selvaraj, Rangaraj,Ramajeyam ( FG) and Madhan Mohan

### 3.Plastic & Pollution Free Village Council

Viji, Kalaiarasi,Shanthi, Regupathy (SI) and Asaithambi

### 4.Prosopis Free Villge Council

Pushpalatha, Vijayarani, Shivanesan ( FG) and Stanly

### 5.Organic Farming Council

Backiyaraj, Ravichandran, Nagarajan ( FG) and Balasubramani

### 6.Salinity Reduction Council

Shylamala, Jamuna, Alagumohana and Peter ( Netherlands)

The overall guidance and support will be facilitated by DHAN Foundation, Mr. Frank Heckmen and his team to reach out the action plan in to villages with the support of the councils. With this the future search conference for Point calimere was successfully concluded with vote of thanks but the work gets starts now onwards

### Annexure V The consolidated RAWES sheet

NAME OF THE VILLAGE	SIRUTHALAIKAADU	DESCRIPTION OF BENEFIT	HOW IMPORTANT?	SCALE OF BENEFIT			REMARKS
				LOCAL	REGIONAL	GLOBAL	
PROVISIONAL SERVICE	FRESH WATER	Due to presence of Salt Pan, Salinity has increased	--	y	y		Fresh water Lences were the source in the past, which was totally affected by the salt pan
	FOOD	Fish, Prawn, Livestock fodder	++	y	y		Livestocks are brought from various neighbouring villages to graze in the mannavaram island
	FUEL	Prosopis Charcoal and fire wood	+	y	y		
	FIBRE		0				
	GENETIC RESOURCES	Sea fly (name should be identified)	??				
	NATURAL MEDICINE	Medicinal Plants are collected and used	+	y			
	ORNAMENTAL RESOURCES	Presence of sea shells	0				
	CLAY, MINERAL, AGGRAGATE HARVESTING		0				

	ENERGY HARVESTING FROM AIR AND WATER	Yatch boats (Pai Mara Kapal), uses sea winds and reduces fuel consumption of fishing boats	++	y			
REGULATORY SERVICE	AIR QUALITY REGULATION	Floating sea silt particulates, especially in dry season	--				
	LOCAL CLIMATE REGULATION	Evapotranspiration in Thottam and Prosopis	+	y			
	GLOBAL CLIMATE REGULATION		0				
	WATER REGULATION	Pillaiyar Koyil and Amman Koyil Ponds reduces salinity	+	y			
	FLOOD HAZARD REGULATION	Presence of Thottam reduces effect of high tides	+	y			
	STORM HAZARD REGULATION	Presence of Thottam reduces effect of Storms	+	y			
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	Prosopis reduces erosion in the island	+	y			
	WATER PURIFICATION	Salt pan has affected the fresh water source	--	y			
	POLLINATION	No agriculture at present	0				There was agriculture before 30 years
	SALINITY REGULATION	River drains regulates the salinity close to Alam	+	y			
	FIRE REGULATION		0				
	NOISE AND VISUAL BUFFERING	Motor boats creates noise pollution affects incoming birds	--				
CULTURAL SERVICE	CULTURAL HERITAGE	Mannavaram Island - Folklore rituals	++	y	y		
	RECREATION AND TOURISM	Mannavaram Island - Recreation for regional communities	+	y	y		
	AESTHETIC VALUE		0				
	SPIRITUAL AND RELIGIOUS VALUE		0				
	INSPIRATIONAL VALUE	Folk stories on Sellakanni aaru	+	y			

	SOCIAL RELATION	hamlet was established in the island based on the wetland services	++	y			
	EDUCATION AND RESEARCH		0				
SUPPORTING SERVICE	SOIL FORMATION	Gaja Cyclone and Tsunami led to sludge deposit in Thottam	--	y	y		Affects other fishermen too
	PRIMARY PRODUCTION	Alagal wetland and Prosopis	+	y			
	NUTRIENT CYCLING	Due to salt silt deposit by wind reduces the soil fertility by increasing salinity	-	y			
	WATER RECYCLING	Due to Salt pan, there is no fresh water source	--	y			
	PROVISION OF HABITAT	Presence of reefs attracts fishes in the thottam, which attracts birds too. Due to Sludge deposit aquatic life in thottam is reducing. Prosopis is invading over the period.	+/--	y	y		Affects other fishermen too
<b>NAME OF THE VILLAGE</b>	<b>VANDAL</b>						
PROVISIONAL SERVICE	FRESH WATER	After shutter construction in Kallimedu Bridge, back water flow has been stopped. Therefore, the wetland is filled with fresh water for 3-4 months. This water is used for agriculture and Ground water recharge	++	Y	Y	N	It is like an island in low line area filled with fresh water flow from Nallaru, Adapparurivers
	FOOD	Fish, Prawn, Livestock fodder	++	Y	N	N	After shutter construction, back water flow has been cut off. Therefore there is declining trend in fish production in the wetland
	FUEL	People are not collecting fire wood	0				
	FIBRE	NA	0				
	GENETIC RESOURCES	No rare species	0				
	NATURAL MEDICINE	Some plant species were used as medicine in the past but it is not used at present	0				

	ORNAMENTAL RESOURCES	NA	0				
	CLAY, MINERAL, AGGRAGATE HARVESTING	NA	0				
	ENERGY HARVESTING FROM AIR AND WATER	NA	0				
REGULATORY SERVICE	AIR QUALITY REGULATION	NA	0				
	LOCAL CLIMATE REGULATION	There is presence of standing water in the wetland along with mangrove forest	++	y	y		The mangrove forest has been affected after Gaja cyclone and the arresting of backwater has led to poor growth of mangroves
	GLOBAL CLIMATE REGULATION	Presence of Mangroves in the wetland is very minimum and in decreasing trend	0				
	WATER REGULATION	There is presence of standing water in the wetland and to improve Groundwater quality shutters where constructed	++	y	y		
	FLOOD HAZARD REGULATION	The wetland acts as flood moderator	++	y	y		
	STORM HAZARD REGULATION	The wetland with mangroves act as storm regulator e.g. Gaja cyclone	++				But since Mangroves are reducing, the wetland might loose this character
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	Presence of Mangroves in the wetland is very minimum	+	y			
	WATER PURIFICATION	Inflow of sea water has been reduced andso water quality is slowly improving but there is considerable inflow of aquaculture effluent	+	y	y		
		POLLINATION		??			



	SALINITY REGULATION	Inflow of sea water has been reduced and so water quality is slowly improving	++	y	y		Manmade barrier in form of shutters are present
	FIRE REGULATION	No any fire related activity around the wetland	0				
	NOISE AND VISUAL BUFFERING	No any potential source of noise or light pollution	0				
CULTURAL SERVICE	CULTURAL HERITAGE		0				
	RECREATION AND TOURISM		0				
	AESTHETIC VALUE		0				
	SPIRITUAL AND RELIGIOUS VALUE		0				
	INSPIRATIONAL VALUE		0				
	SOCIAL RELATION	Vandal island communities have established settlements based on the wetland resources in the past	++	y			
	EDUCATION AND RESEARCH		0				
SUPPORTING SERVICE	SOIL FORMATION	The wetland is in tail end of river and close to the sea. Therefore it helps in sedimentation and the existing mangroves add organic carbon to it and helps in soil formation	+	y			
	PRIMARY PRODUCTION	Sparse presence of Vegetation	+	y			
	NUTRIENT CYCLING	Aquaculture effluents are discharged in the wetland which result in change in nutrient value of water	-	y			
	WATER RECYCLING	Improvement in Ground water recharge	+	y			
	PROVISION OF HABITAT	Decrease in incoming migratory birds due to reduction in aquatic life and increase in Prosopis (invasive species)	-	y			
<b>NAME OF THE VILLAGE</b>	<b>KODIYAKAADU</b>						

PROVISIONAL SERVICE	FRESH WATER	Due to Salt pan, there is no reliable source of freshwater. People are dependent on Kolidam Source	--	y	y		Fresh water Lences were the source in the past, which was totally affected by the salt pan
	FOOD	Fish, Prawn, fruits, Livestock fodder	++	y	y		People collect forest produces
	FUEL	Collects dry fallen fire woods	+	y			
	FIBRE		0				
	GENETIC RESOURCES		??				
	NATURAL MEDICINE	Though medicinal plants were used in the past, due to regulatory measures of forest, people are not using at present. Eg. Pungai ver, Sangu Ilai, Milagukaaram	0				
	ORNAMENTAL RESOURCES		0				
	CLAY, MINERAL, AGGRAGATE HARVESTING		0				
	ENERGY HARVESTING FROM AIR AND WATER		0				
REGULATORY SERVICE	AIR QUALITY REGULATION	Obstructs inflow of salt air waves	++	y			
	LOCAL CLIMATE REGULATION	Presence of Tropical dry evergreen forest	++	y	y		
	GLOBAL CLIMATE REGULATION	Presence of Tropical dry evergreen forest	++	y	y	y	
	WATER REGULATION	Only source of fresh water is rainfall	0				
	FLOOD HAZARD REGULATION	Reduced flow of surface sea intrusion into land	+	y			
	STORM HAZARD REGULATION	Presence of Tropical dry evergreen forest act as storm regulator e.g. Gaja cyclone, Tsunami	++	y			
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	Presence of Tropical dry evergreen forest reduces erosion	++	y			
	WATER PURIFICATION		0				

	POLLINATION		??				
	SALINITY REGULATION	Salt Pan in the vicinity	--	y	y		
	FIRE REGULATION	No potential source of fire and no historical record	0				
	NOISE AND VISUAL BUFFERING	Sea waves sound has been reduced by forest	+	y			
CULTURAL SERVICE	CULTURAL HERITAGE	Strong relationship with forest and folklore god inside forest	++	y			
	RECREATION AND TOURISM	Wild life sanctuary, Bird Sanctuary	++	y	y		
	AESTHETIC VALUE	Forest, Wild Animals and Bird Watching	++	y	y		
	SPIRITUAL AND RELIGIOUS VALUE	Ramarpaadham	++	y	y		
	INSPIRATIONAL VALUE	Kodiyakaadu has lot of stories and myths	++	y	y		
	SOCIAL RELATION	The settlement is only due to presence of forest	++	y			
	EDUCATION AND RESEARCH	It is a hotspot research area	++			y	
SUPPORTING SERVICE	SOIL FORMATION	Formation of organic carbon	+	y			
	PRIMARY PRODUCTION	Presence of Tropical dry evergreen forest, bird sanctuary	++	y			
	NUTRIENT CYCLING	Presence of Tropical dry evergreen forest, bird sanctuary	++	y			
	WATER RECYCLING		0				
	PROVISION OF HABITAT	Presence of Tropical dry evergreen forest, bird sanctuary. At the same time prosopis is increasing day by day	++/-	y	y	y	
<b>NAME OF THE VILLAGE</b>	<b>PANNAL - SAKKARANPETTAI</b>						
PROVISIONAL SERVICE	FRESH WATER	Degraded Ground water due to salt pan	--	y	y		
	FOOD	Fish, Prawn	++	y			
	FUEL	Prosopis - Fire wood	+	y			
	FIBRE		0				
	GENETIC RESOURCES		0				

	NATURAL MEDICINE		0				
	ORNAMENTAL RESOURCES		0				
	CLAY, MINERAL, AGGRAGATE HARVESTING		0				
	ENERGY HARVESTING FROM AIR AND WATER	Yatch boats (Pai Mara Kapal), uses sea winds and reduces fuel consumption of fishing boats	++	y			
REGULATORY SERVICE	AIR QUALITY REGULATION	Prosopis acts as barrier against silt waves from sea	++	y			
	LOCAL CLIMATE REGULATION	Salt Pan, Thottam	??				
	GLOBAL CLIMATE REGULATION		0				
	WATER REGULATION		??				
	FLOOD HAZARD REGULATION		0				
	STORM HAZARD REGULATION	Prosopis and Thottam acts as barrier against storm	+				
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	Prosopis regulates erosion	+				
	WATER PURIFICATION	Sea water intrusion	--				
	POLLINATION	Jasmine cultivation	+				
	SALINITY REGULATION	Fresh water intrusion has been affected	--				
	FIRE REGULATION	No potential for fire	0				
NOISE AND VISUAL BUFFERING	No potential noise or light pollution	0					
CULTURAL SERVICE	CULTURAL HERITAGE	Ayyanarkoyil-Sakkaranpettai	++				
	RECREATION AND TOURISM		0				
	AESTHETIC VALUE		0				
	SPIRITUAL AND RELIGIOUS VALUE		0				
	INSPIRATIONAL VALUE		0				

	SOCIAL RELATION		0				
	EDUCATION AND RESEARCH		0				
SUPPORTING SERVICE	SOIL FORMATION	Gaja Cyclone and Tsunami led to sludge deposit in Thottam	--	y	y		Affects other fishermen too
	PRIMARY PRODUCTION	Prosopis	+	y			
	NUTRIENT CYCLING		0				
	WATER RECYCLING	Due to Salt pan, there is no fresh water source	--	y			
	PROVISION OF HABITAT	Prosopis invasion	--	y	y		
<b>NAME OF THE VILLAGE</b>	<b>VOYMEDU- SINTHAMANIKAADU</b>						
PROVISIONAL SERVICE	FRESH WATER	Feasibility exploration of Mathane leads to destruction of fresh water (before 15 years)	--	Y	Y		
	FOOD	Fish, Prawn	++	Y	Y		
	FUEL	Prosopis - Fire wood	+	Y			
	FIBRE	NA	0				
	GENETIC RESOURCES	NA	0				
	NATURAL MEDICINE	NA	0				
	ORNAMENTAL RESOURCES	NA	0				
	CLAY, MINERAL, AGGRAGATE HARVESTING	NA	0				
	ENERGY HARVESTING FROM AIR AND WATER	Yatch boats (Pai Mara Kapal), uses sea winds and reduces fuel consumption of fishing boats	++	y			
REGULATORY SERVICE	AIR QUALITY REGULATION	Scope to regulate silt waves from sea	+	y			
	LOCAL CLIMATE REGULATION	Thottam regulates air temperature	+	y			
	GLOBAL CLIMATE REGULATION		0				
	WATER REGULATION	When fresh water from Valanaaru drains into the alam, it leads in betterment in agriculture	+	y			
	FLOOD HAZARD REGULATION	Presence of Alam and Thottam regulates flood	+	y	y		

	STORM HAZARD REGULATION	Presence of Alam and Thottam regulates storm	+	y	y		
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	Since the agriculture land is close to Alam, there is erosion in the interface	-	y			
	WATER PURIFICATION	Almost 150 wells were used in the past but it became saline. Now farmers are using Lift irrigation, which is improving ground water	+	y			
	POLLINATION	Floriculture at their backyard, Paddy in the farm	+	y			
	SALINITY REGULATION	When fresh water from Valanaaru drains into the alam, it leads in betterment in salinity	+	y	y		
	FIRE REGULATION	No potential source of fire	0				
	NOISE AND VISUAL BUFFERING	No potential source of pollution	0				
CULTURAL SERVICE	CULTURAL HERITAGE	Poojai in the islands in Wetland (Kallitheevu)	+	y			
	RECREATION AND TOURISM		0				
	AESTHETIC VALUE		0				
	SPIRITUAL AND RELIGIOUS VALUE		0				
	INSPIRATIONAL VALUE		0				
	SOCIAL RELATION	The village is predominantly based on fisheries	+	y			
	EDUCATION AND RESEARCH		0				
SUPPORTING SERVICE	SOIL FORMATION	Silt deposits from Vallanar aaru in alam	+	y			
	PRIMARY PRODUCTION	Prosopis presence in RF	+	y			
	NUTRIENT CYCLING	Agriculture runoff into Alam leads to lesser influence in nutrient cycling	-	y			

	WATER RECYCLING	When fresh water from Valanaaru drains into the alam, it leads in recycling of water when it is stored in surface	+	y			
	PROVISION OF HABITAT	Valavanaaru helps in breeding of fishes and prawns	+	y			
<b>NAME OF THE VILLAGE</b>	<b>Annapettai</b>						
	FRESH WATER	Ground water salinity has increased in past 10 years but after construction of shutters in Valavanaaru, Ground water is improving	+	Y	Y		
	FOOD	Fish, Prawn, Livestock	++/-	Y	Y		The Valavanaru helps in fishing, but the islands which supported for cattle feeding are no more used, due to Prosopis invasion
	FUEL	Prosopis - Fire wood	+	Y			
	FIBRE	NA	0				
	GENETIC RESOURCES	NA	0				
	NATURAL MEDICINE	NA	0				
	ORNAMENTAL RESOURCES	Thalampoo, Thaalai kaai was integral part of culturebut it got extinct due to invasion of Prosopis	-				
	CLAY, MINERAL, AGGRAGATE HARVESTING	NA	0				
PROVISIONAL SERVICE	ENERGY HARVESTING FROM AIR AND WATER	Yatch boats (Pai Mara Kapal), uses sea winds and reduces fuel consumption of fishing boats	++	y			
	AIR QUALITY REGULATION	Scope to regulate silt waves from sea	+	y			
	LOCAL CLIMATE REGULATION	Thottam regulates air temperature	+	y			
	GLOBAL CLIMATE REGULATION		0				
REGULATORY SERVICE	WATER REGULATION	When fresh water from Valanaaru drains into the alam, it leads in betterment in agriculture	+	y			

	FLOOD HAZARD REGULATION	Presence of Alam and Thottam regulates flood	+	y	y		
	STORM HAZARD REGULATION	Presence of Alam and Thottam regulates storm	+	y	y		
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	Sedimentation of Slurry from Thottam, reduces depth in channel and thottam. Islands has been eroded and sunk due to various disasters	--	y	y		Fishermen communities more than 1000 people resided in the island and involved in sea fishing for more than a month, marketed directly via sea, but now the isalnds are not suitable
	WATER PURIFICATION	Valavanaaru improves the salinity-degraded ground water	+	y			
	POLLINATION	Orchads predominant	0				
	SALINITY REGULATION	When fresh water from Valanaaru drains , it leads in betterment in salinity	+	y	y		
	FIRE REGULATION	No potential source of fire	0				
	NOISE AND VISUAL BUFFERING	No potential source of pollution	0				
CULTURAL SERVICE	CULTURAL HERITAGE	Poojai in the islands in Wetland (Erukan theevu, Ayyanarkoyil Theevu, PodiKaivutheevu, Kutiyakaadu theevu)	+	y			
	RECREATION AND TOURISM		0				
	AESTHETIC VALUE		0				
	SPIRITUAL AND RELIGIOUS VALUE		0				
	INSPIRATIONAL VALUE		0				
	SOCIAL RELATION	The village is predominantly based on fisheries	+	y			



	EDUCATION AND RESEARCH		0				
SUPPORTING SERVICE	SOIL FORMATION	Erosion of island and siltation in thottam and channel	--	y			
	PRIMARY PRODUCTION	Prosopis presence in island replaced Thalam poo	-	y			
	NUTRIENT CYCLING	Only orchad so no potential application of fertilizer	0				
	WATER RECYCLING	Prosopis invasion has affcted water recycling in the silands	--	y			
	PROVISION OF HABITAT	There is considerable change in habitat of island and also in the fish breeding due to shutter construction.	-	y			
		Vallanaru once reached the thottam has been silted and so the connect has been disrupted. This leads to no fresh water flow into thottam. Resulting in low fish breeding.					
<b>NAME OF THE VILLAGE</b>	<b>Agasthiyampalli</b>						
PROVISIONAL SERVICE	FRESH WATER	Village surrounded by salt pan. Maanankondan Aaru is not connected to the alam, flow in the river is also getting deteriorated.	--	y	y		
	FOOD	Salt production	++	y	y	y	The existing ecosystem helps in production od salt by increasing saline density of the brine.
	FUEL	Prosopis	+	y			
	FIBRE		0				
	GENETIC RESOURCES		0				
	NATURAL MEDICINE		0				
	ORNAMENTAL RESOURCES		0				
	CLAY, MINERAL, AGGRAGATE HARVESTING	Salt production used in chemical industries	++	y	y	y	
	ENERGY HARVESTING FROM AIR AND WATER		0				

REGULATORY SERVICE	AIR QUALITY REGULATION	Presence of forest and Salt pan helps in regulating salt-silt waves	+	y			
	LOCAL CLIMATE REGULATION	Increase in temperature due to salt pan	-	y			
	GLOBAL CLIMATE REGULATION		0				
	WATER REGULATION	Salt Pan increases salinity	--	y	y		
	FLOOD HAZARD REGULATION	Since natural alam is converted into salt pans, drainage has reduced.	-	y			
	STORM HAZARD REGULATION	Salt pan reduces storm impact	+	y			
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	Salt pan bunds leads to poor drainage, no ffresh water flow are back water flow	0				
	WATER PURIFICATION	Salt Pans reduces fresh water quality	--	y	y		
	POLLINATION		0				
	SALINITY REGULATION	Salt pan	--	y	y		
	FIRE REGULATION	No potential source of fire	0				
NOISE AND VISUAL BUFFERING	No potential source of pollution	0					
CULTURAL SERVICE	CULTURAL HERITAGE	Connect with Kodyakarai and Kodyakadu	+	y			
	RECREATION AND TOURISM	Connect with Kodyakarai and Kodyakadu	+	y			
	AESTHETIC VALUE	Salt Pan attracts tourists and Photographers	+	y			
	SPIRITUAL AND RELIGIOUS VALUE		0				
	INSPIRATIONAL VALUE	Historically connected with Danthi March	++	y			
	SOCIAL RELATION	Salt Pan dependent communities	+	y			
	EDUCATION AND RESEARCH	Researches on the salt pan and salt pan workers	+	y	y	y	
SUPPORTING SERVICE	SOIL FORMATION		0				

	PRIMARY PRODUCTION	Prosopis and scrubs, Tobacco cultivation	+	y			
	NUTRIENT CYCLING	Soil nutrient is reduced due to salt pan	-	y			
	WATER RECYCLING	Salt pan reduces recharge of fresh water into shallow aquifers	--	y			
	PROVISION OF HABITAT	Birds are attracted towards salt pan in the rainy season	+	y	y	y	
<b>NAME OF THE VILLAGE</b>	<b>THONDIYAKAADU</b>						
	FRESH WATER	improved water resources due to construction of shutters and decommission of salt pan but still water is notted with salinity	+	y	y		there is marakakoraiyaru, vettaru, vallavanaru these supports the freshwater inflow.
	FOOD	Fish, Prawn	++	y	y	y	
	FUEL	NA	0	y			
	FIBRE		0				
	GENETIC RESOURCES		0				
	NATURAL MEDICINE		0				
	ORNAMENTAL RESOURCES		0				
	CLAY, MINERAL, AGGRAGATE HARVESTING	Salt production used in chemical industries	++	y	y	y	
PROVISIONAL SERVICE	ENERGY HARVESTING FROM AIR AND WATER	Yatch boats (Pai Mara Kapal), uses sea winds and reduces fuel consumption of fishing boats	+				
	AIR QUALITY REGULATION	Presence of large thottam helps in regulating salt-silt waves	+	y			
	LOCAL CLIMATE REGULATION	large thottam (08kms) reduces the air temperature	+	y			
	GLOBAL CLIMATE REGULATION	Presence of large thottam	+	y			
	WATER REGULATION	Presence of large thottam helps in regulating water flows and valavanar check dams regulates the sea water inflow.	+	y	y		
	FLOOD HAZARD REGULATION	larger thottam acts as a barrier	+	y			
REGULATORY SERVICE	STORM HAZARD REGULATION	larger thottam acts as a barrier	+	y			

	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	Gaja cyclone leads to increase of mud in the thottam, this directly affects the livelihood	--				
	WATER PURIFICATION	Salt Pans reduces fresh water quality	--	y	y		
	POLLINATION		0				
	SALINITY REGULATION	people succeeded in closure of salt pan. That is the major contributor for salinity	+	y	y		
	FIRE REGULATION	No potential source of fire	0				
	NOISE AND VISUAL BUFFERING	No potential source of pollution	0				
CULTURAL SERVICE	CULTURAL HERITAGE	Connect with island for their local festival	+	y			they contribute only fishing income for this festival as a practise.
	RECREATION AND TOURISM	Government is trying to promote tourism due to the presence of larger thottam.	+	y			
	AESTHETIC VALUE	Larger thottam and its geographical feature creates potential to invite tourists and Photographers	+	y			
	SPIRITUAL AND RELIGIOUS VALUE		0				
	INSPIRATIONAL VALUE	NA	0	y			
	SOCIAL RELATION	sveral local associations for farmers and fishermen.	+	y			
	EDUCATION AND RESEARCH	NA	0	y	y	y	
SUPPORTING SERVICE	SOIL FORMATION	transfer of mud from thottam to agriculture land leads to the increase of soil salinity	-				
	PRIMARY PRODUCTION	paddy and vegetable cultivation	+	y			
	NUTRIENT CYCLING	agriculture land leads to the runoff with presences of fertilizers	-	y			

	WATER RECYCLING	presence of large amount of the mud leads difficulty in water stagnation	-	y			water storage is upto 1 or 2 feet.
	PROVISION OF HABITAT	Birds are attracted towards thottam in the rainy season	+	y	y	y	
<b>NAME OF THE VILLAGE</b>	<b>KARPAGANAATHARKULAM</b>						
PROVISIONAL SERVICE	FRESH WATER	improved water resources due to construction of shutters and marakakoraiyaru, vettaru, vallavanaru these rivers supports in freshwater inflow. Still peoples are using open well	+	y	y		Pudhu aaru helps drastically on fresh water inflow
	FOOD	Fish, Prawn	++	y	y	y	
	FUEL	NA	0	y			
	FIBRE		0	y			
	GENETIC RESOURCES		0	y			
	NATURAL MEDICINE		0	y			
	ORNAMENTAL RESOURCES		0	y			
	CLAY, MINERAL, AGGRAGATE HARVESTING		0	y			
	ENERGY HARVESTING FROM AIR AND WATER	Yatch boats (Pai Mara Kapal), uses sea winds and reduces fuel consumption of fishing boats	+	y			
REGULATORY SERVICE	AIR QUALITY REGULATION	Presence of thottam and magrooves helps in regulating silt waves	+	y			
	LOCAL CLIMATE REGULATION	Presence of thottam and magrooves helps in regulating the air temperature	+	y			
	GLOBAL CLIMATE REGULATION	Presence of thottam and magroves	+	y			
	WATER REGULATION	Presence of marakakoraiyaru, vettaru, vallavanaru helps for water regulation.	+	y	y		
	FLOOD HAZARD REGULATION	thottam and mangroves acts as a barrier	+	y			
	STORM HAZARD REGULATION	thottam and mangroves acts as a barrier	+	y			
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
DISEASE REGULATION- LIVESTOCK		??					

	EROSION REGULATION	cyclones are favorable for the sediment deposits in the thottam and waterways.	-				
	WATER PURIFICATION	rain is helpful to stagnent the freshwater	--	y	y		
	POLLINATION		0				
	SALINITY REGULATION	rain is helpful to stagnent the freshwater	+	y	y		
	FIRE REGULATION	No potential source of fire	0				
	NOISE AND VISUAL BUFFERING	No potential source of pollution	0				
	CULTURAL HERITAGE	Connect with island for their local festival	+	y			they contribute only fishing income for this festival as a practise.
	RECREATION AND TOURISM	NA	0	y			
	AESTHETIC VALUE	NA	0	y			
	SPIRITUAL AND RELIGIOUS VALUE	NA	0				
	INSPIRATIONAL VALUE	NA	0	y			
	SOCIAL RELATION	Several local associations for farmers and fishermen.	+	y			
CULTURAL SERVICE	EDUCATION AND RESEARCH	NA	0	y	y	y	
	SOIL FORMATION	transfer of mud from thottam to agriculture land leads to the increase of soil salinity	-				
	PRIMARY PRODUCTION	paddy, vegetabl, sesame, millets and pulses cultivation	+	y			
	NUTRIENT CYCLING	agriculture land leads to the runoff with presences of fertilizers	-	y			
	WATER RECYCLING	NA	0	y			
SUPPORTING SERVICE	PROVISION OF HABITAT	freshwater inflows increses the potential of species breeding.	+	y	y	y	
<b>NAME OF THE VILLAGE</b>	<b>IDUMBAVANAM</b>						

PROVISIONAL SERVICE	FRESH WATER	improved water resources due to construction of shutters and marakakoraiyaru, vettaru, vallavanaru these rivers supports in freshwater inflow. Still peoples are using kennis openwell.	+	y	y		Pudhu aaru helps drastically on fresh water inflow
	FOOD	Fish, Prawn	++	y	y	y	
	FUEL	Extraction of crude oil in the area leads to the distruction of environmnet	-	y			kariyankaddu area are hihly exposed for the extraction.
	FIBRE		0	y			
	GENETIC RESOURCES		0	y			
	NATURAL MEDICINE		0	y			
	ORNAMENTAL RESOURCES		0	y			
	CLAY, MINERAL, AGGRAGATE HARVESTING		0	y			
ENERGY HARVESTING FROM AIR AND WATER	Yatch boats (Pai Mara Kapal), uses sea winds and reduces fuel consumption of fishing boats	+	y				
REGULATORY SERVICE	AIR QUALITY REGULATION	Presence of thottam and magrooves helps in regulating silt waves	+	y			
	LOCAL CLIMATE REGULATION	Presence of thottam and magrooves helps in regulating the air temperature	+	y			
	GLOBAL CLIMATE REGULATION	Presence of thottam and magroves	+	y			
	WATER REGULATION	Presence of marakakoraiyaru, vettaru, vallavanaru helps for water regulation.	+	y	y		
	FLOOD HAZARD REGULATION	thottam and mangroves acts as a barrier	+	y			
	STORM HAZARD REGULATION	thottam and mangroves acts as a barrier	+	y			
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	cyclones are favorable for the sediment deposits in the thottam and waterways.	-				
WATER PURIFICATION	rain is helpful to stagnent the freshwater	--	y	y			

	POLLINATION		0				
	SALINITY REGULATION	rain is helpful to stagnent the freshwater	+	y	y		
	FIRE REGULATION	No potential source of fire	0				
	NOISE AND VISUAL BUFFERING	No potential source of pollution	0				
	CULTURAL HERITAGE	Connect with island for their local festival	+	y			they contribute only fishing income for this festival as a practise.
	RECREATION AND TOURISM	NA	0	y			
	AESTHETIC VALUE	NA	0	y			
	SPIRITUAL AND RELIGIOUS VALUE	NA	0				
	INSPIRATIONAL VALUE	NA	0	y			
	SOCIAL RELATION	Several local associations for farmers and fishermen.	+	y			
CULTURAL SERVICE	EDUCATION AND RESEARCH	NA	0	y	y	y	
	SOIL FORMATION	transfer of mud from thottam to agriculture land leads to the increase of soil salinity	-				
	PRIMARY PRODUCTION	paddy, vegetabl, sesame, millets and pulses cultivation	+	y			
	NUTRIENT CYCLING	agriculture land leads to the runoff with presences of fertilizers	-	y			
	WATER RECYCLING	NA	0	y			
SUPPORTING SERVICE	PROVISION OF HABITAT	freshwater inflows increases the potantial of species breeding.	+	y	y	y	
<b>NAME OF THE VILLAGE</b>	<b>THILLAIVILAAGAM</b>						



PROVISIONAL SERVICE	FRESH WATER	Increased salinity due to aqua culture	--	y	y		but still aquaculture is in increasing trend and people agitated against the salt pan which they still under the legal process
	FOOD	Fish, Prawn, food for livestock (minor grasses)	++	y	y	y	
	FUEL	Prosopis as fuel	+	y			
	FIBRE		0	y			
	GENETIC RESOURCES		0	y			
	NATURAL MEDICINE	umiri and other plants	+	y			
	ORNAMENTAL RESOURCES		0	y			
	CLAY, MINERAL, AGGRAGATE HARVESTING		0	y			
	ENERGY HARVESTING FROM AIR AND WATER	Yatch boats (Pai Mara Kapal), uses sea winds and reduces fuel consumption of fishing boats	+	y			
REGULATORY SERVICE	AIR QUALITY REGULATION	Presence of lagoons and magrooves helps in regulating silt waves	+	y			
	LOCAL CLIMATE REGULATION	Presence of lagoons and magrooves helps in regulating the air temperature	+	y			
	GLOBAL CLIMATE REGULATION	Presence of lagoons and magrooves	+	y			
	WATER REGULATION	Presence of kanthaparichayan aaru helps for water regulation.	+	y	y		below 70feet only saline water
	FLOOD HAZARD REGULATION	lagoon and mangroves acts as the barriers.	+	y			
	STORM HAZARD REGULATION	lagoon and mangroves acts as the barriers.	+	y			
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	magrooves and scrubs helps for soil stabilization.	+				

	WATER PURIFICATION	whenever the fresh water inflow in the Kanthaparichyan river and the shutter construction increases the water purification	+	y	y		
	POLLINATION	presences of numerous scrubs	+				
	SALINITY REGULATION	rain is helpful, whenever the fresh water inflow in the Kanthaparichyan river and the shutter construction decreases the salinity	+	y	y		
	FIRE REGULATION	No potential source of fire	0				
	NOISE AND VISUAL BUFFERING	usage of motorised boat leads to decreased incoming of migrant birds	-				
CULTURAL SERVICE	CULTURAL HERITAGE	Celebration of local god _Munikoyil in the wetland located in the juncture of the river and the lagoons.	+	y			yearly once celebration
	RECREATION AND TOURISM	Presences of holistic of overall ecosystem.	+	y			
	AESTHETIC VALUE	Presences of holistic of overall ecosystem.	+	y			
	SPIRITUAL AND RELIGIOUS VALUE	NA	0				
	INSPIRATIONAL VALUE	Presences of holistic of overall ecosystem.	+	y			
	SOCIAL RELATION	Several local associations for farmers and fishermen.	+	y			
	EDUCATION AND RESEARCH	this wetland falls under muthupet lagoon	++	y	y	y	
SUPPORTING SERVICE	SOIL FORMATION	NA	0				
	PRIMARY PRODUCTION	Mangroves, umiri, prosopis	+	y			
	NUTRIENT CYCLING	agriculture land leads to the runoff with presences of fertilizers	-	y			
	WATER RECYCLING	NA	0	y			
	PROVISION OF HABITAT	Degradation due to aquaculture, agriculture runoff on aquatic species	--	y	y	y	
<b>NAME OF THE VILLAGE</b>	<b>JAMBAVANODAI - AKKARAKAADU</b>						
PROVISIONAL SERVICE	FRESH WATER	Koriyaru discharges with several towns waste water	--	y	y		Aquaculture impacts lot

	FOOD	Fish, Prawn, food for livestock(minor grasses)	++	y	y	y	
	FUEL	Prosopis as fuel	+	y			
	FIBRE		0	y			
	GENETIC RESOURCES		0	y			
	NATURAL MEDICINE	umiri and other plants	+	y			
	ORNAMENTAL RESOURCES		0	y			
	CLAY, MINERAL, AGGRAGATE HARVESTING		0	y			
	ENERGY HARVESTING FROM AIR AND WATER	Yatch boats (Pai Mara Kapal), uses sea winds and reduces fuel consumption of fishing boats	+	y			
REGULATORY SERVICE	AIR QUALITY REGULATION	Presence of lagoons and magrooves helps in regulating silt waves	+	y			
	LOCAL CLIMATE REGULATION	Presence of lagoons and magrooves helps in regulating the air temperature	+	y			
	GLOBAL CLIMATE REGULATION	Presence of lagoons and magroves	+	y			
	WATER REGULATION	Presence of Koraiyaru helps for water regulation.	+	y	y		koriyaru is highly vulnerable for the urban effluents which connects to the lagoons
	FLOOD HAZARD REGULATION	lagoon and mangroves acts as the barriers.	+	y			
	STORM HAZARD REGULATION	lagoon and mangroves acts as the barriers.	+	y			
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	magrooves and scrubs helps for soil stabilization.	+				
	WATER PURIFICATION	aqua culture increase the salinity and polluts the lagoon water	--	y	y		
	POLLINATION	presences of nourmous scrubs	+				

	SALINITY REGULATION	aqua culture increase the salinity and pollutes the lagoon water	--	y	y		Day by day increase in the salinity of Lagoon and groundwater.
	FIRE REGULATION	No potential source of fire	0				
	NOISE AND VISUAL BUFFERING	usage of motorised boat leads to decreased incoming of migrant birds	-				
CULTURAL SERVICE	CULTURAL HERITAGE	NA	+	y			yearly onces celebration
	RECREATION AND TOURISM	Presences of holistic of overall ecosystem.	++	y			
	AESTHETIC VALUE	Presences of holistic of overall ecosystem.	++	y			
	SPIRITUAL AND RELIGIOUS VALUE	NA	0				
	INSPIRATIONAL VALUE	Presences of holistic of overall ecosystem.	+	y			
	SOCIAL RELATION	Several local associations for farmers and fishermen.	+	y			
	EDUCATION AND RESEARCH	this wetland falls under muthupet lagoon	++	y	y	y	
SUPPORTING SERVICE	SOIL FORMATION	NA	0				
	PRIMARY PRODUCTION	Mangroves, umiri, prosopis	+	y			
	NUTRIENT CYCLING	agriculture land leads to the runoff with presences of fertilizers	-	y			
	WATER RECYCLING	NA	0	y			
	PROVISION OF HABITAT	Degradation due to aquaculture, agriculture runoff on aqautic species	--	y	y	y	
<b>NAME OF THE VILLAGE</b>	<b>MARAVAKAADU</b>						
PROVISIONAL SERVICE	FRESH WATER	Paatuvanachi river is recharging the water resources. Ponds and lakes adds more fresh water benefits	++	Y	Y		

	FOOD	Fish, Prawn harvested from Artificial Creeks and backwater channels. Livestock fodder from Mangroves	++	Y			
	FUEL	Prosopis	+	Y			
	FIBRE		0				
	GENETIC RESOURCES	Mangroves, Scrubs, some specific species like snake and insects	++	Y			
	NATURAL MEDICINE		0				
	ORNAMENTAL RESOURCES		0				
	CLAY, MINERAL, AGGRAGATE HARVESTING	Small Scale salt production	+	Y	Y		
	ENERGY HARVESTING FROM AIR AND WATER	Yatch boats (Pai Mara Kapal), uses sea winds and reduces fuel consumption of fishing boats	++	Y			
REGULATORY SERVICE	AIR QUALITY REGULATION	Mangroves help in air regulation	++	Y	Y		
	LOCAL CLIMATE REGULATION	Mangroves help in climate regulation	++	Y	Y		
	GLOBAL CLIMATE REGULATION						
	WATER REGULATION	Connect between fresh water rivers and the sea via creeks and the mangroves helps in water regulation	++	Y			
	FLOOD HAZARD REGULATION	Mangroves and creeks	++	Y			
	STORM HAZARD REGULATION	Mangroves and creeks	++	Y			
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	Mangroves and creeks	++	Y			
	WATER PURIFICATION	Creeks and River helps in purifying water	++	Y			

	POLLINATION	Mangroves helps in pollination	++	Y			
	SALINITY REGULATION	Creeks regulate salinity in wetland	++	Y			
	FIRE REGULATION	No potential source of fire	0				
	NOISE AND VISUAL BUFFERING	No potential source of pollution	0				
CULTURAL SERVICE	CULTURAL HERITAGE		0				
	RECREATION AND TOURISM	Mangrove attract tourists	++	Y	Y		
	AESTHETIC VALUE	Mangrove and lagoons attracts people	++	Y	Y		
	SPIRITUAL AND RELIGIOUS VALUE		0				
	INSPIRATIONAL VALUE		??				
	SOCIAL RELATION	Maravakadu people are dependent on wetland and agriculture	+	y			
	EDUCATION AND RESEARCH	Being part of many researches	+	y			
SUPPORTING SERVICE	SOIL FORMATION	Silt from river and Mangroves help in soil formation	++	y			
	PRIMARY PRODUCTION	Mangrove and scrubs	++	y			
	NUTRIENT CYCLING	Agricultural runoff, aquafarm runoff disturbs the nutrient cycle	--	y			
	WATER RECYCLING	River, creeks, mangroves helps in water recycling	++	y			
	PROVISION OF HABITAT	Mangrove, scrubs and creeks supports aquatic life and birds	++	y			
<b>NAME OF THE VILLAGE</b>	<b>MANGANAKAADU</b>						
PROVISIONAL SERVICE	FRESH WATER	Paatuvanachi and naswini river is recharging the water resources. Ponds and lakes adds more fresh water benefits	++	Y	Y		

	FOOD	Fish, Prawn harvested from Artificial Creeks and backwater channels. Livestock fodder from Mangroves	++	Y			
	FUEL	Prosopis	+	Y			
	FIBRE		0				
	GENETIC RESOURCES	Mangroves, Scrubs, some specific species like snake and insects	++	Y			
	NATURAL MEDICINE		0				
	ORNAMENTAL RESOURCES		0				
	CLAY, MINERAL, AGGRAGATE HARVESTING	Small Scale salt production	+	Y	Y		
	ENERGY HARVESTING FROM AIR AND WATER	Yatch boats (Pai Mara Kapal), uses sea winds and reduces fuel consumption of fishing boats	++	Y			
REGULATORY SERVICE	AIR QUALITY REGULATION	Mangroves help in air regulation	++	Y	Y		
	LOCAL CLIMATE REGULATION	Mangroves help in climate regulation	++	Y	Y		
	GLOBAL CLIMATE REGULATION						
	WATER REGULATION	Connect between fresh water rivers and the sea via creeks and the mangroves helps in water regulation	++	Y			
	FLOOD HAZARD REGULATION	Mangroves and creeks	++	Y			
	STORM HAZARD REGULATION	Mangroves and creeks	++	Y			
	PEST REGULATION		??				
	DISEASE REGULATION- HUMAN		??				
	DISEASE REGULATION- LIVESTOCK		??				
	EROSION REGULATION	Mangroves and creeks	++	Y			
	WATER PURIFICATION	Creeks and River helps in purifying water	++	Y			

	POLLINATION	Mangroves helps in pollination	++	Y			
	SALINITY REGULATION	Creeks regulate salinity in wetland	++	Y			
	FIRE REGULATION	No potential source of fire	0				
	NOISE AND VISUAL BUFFERING	No potential source of pollution	0				
CULTURAL SERVICE	CULTURAL HERITAGE		0				
	RECREATION AND TOURISM	Mangrove attract tourists	++	Y	Y		
	AESTHETIC VALUE	Mangrove and lagoons attracts people	++	Y	Y		
	SPIRITUAL AND RELIGIOUS VALUE		0				
	INSPIRATIONAL VALUE		??				
	SOCIAL RELATION	Maravakadu people are dependent on wetland and agriculture	+	y			
	EDUCATION AND RESEARCH	Being part of many researches	+	y			
SUPPORTING SERVICE	SOIL FORMATION	Silt from river and Mangroves help in soil formation	++	y			
	PRIMARY PRODUCTION	Mangrove and scrubs	++	y			
	NUTRIENT CYCLING	Agricultural runoff, aquafarm runoff disturbs the nutrient cycle	--	y			
	WATER RECYCLING	River, creeks, mangroves helps in water recycling	++	y			
	PROVISION OF HABITAT	Mangrove, scrubs and creeks supports aquatic life and birds	++	y			



## Annexure VI Details of PHSCs & PHCs in dependent villages

S. No.	Village Name	CD Block Name	Primary Health Centre (Numbers)	Primary Health Sub Centre (Numbers)
1	Eripurakarai	Pattukkottai	0	1
2	Narasingapuram	Pattukkottai	0	0
3	Soundaranayakipuram	Pattukkottai	0	0
4	Thamarankottai South	Pattukkottai	0	1
5	Thambikottai Maravakad	Pattukkottai	0	0
6	Thambikottai Melakkadu	Pattukkottai	0	1
7	Thampikotai Kelakadu	Pattukkottai	0	1
8	Thambikottai Vadakadu	Pattukkottai	0	0
9	Alangadu	Muthupettai	0	1
10	Uppur	Muthupettai	0	0
11	Jambuvanodai	Muthupettai	0	1
12	Thillaiwilagam	Muthupettai	0	3
13	Thondiyakkadu	Muthupettai	0	0
14	Karppaganatherkulam	Muthupettai	0	1
15	Idumbavanam	Muthupettai	1	1
16	Vilangadu	Muthupettai	0	0
17	Annapettai	Vedaranyam	0	3
18	Voimedu East	Vedaranyam	1	1
19	Voimedu West	Vedaranyam	0	0
20	Pachanathikulam Middle	Vedaranyam	0	1
21	Pachanathikulam West	Vedaranyam	0	1
22	Pannal	Vedaranyam	0	0
23	Kadinevayal	Vedaranyam	0	1
24	Marudur Therku Sethi	Vedaranyam	0	1
25	Thennadar	Vedaranyam	0	0
26	Ayakkarambulam IV Sethi	Vedaranyam	0	0
27	Kodiakkadu	Vedaranyam	0	1
28	Kodiakarai	Vedaranyam	1	1
29	Agasthiyanpalli	Vedaranyam		
30	Kallimedu	Thalainayar	0	1
31	Avarikadu	Thalainayar	0	1
32	Nalurvedapathi	Thalainayar	1	1
33	Vandal	Thalainayar		

## Annexure VII The list of registered aquaculture farms

### List of registered aquaculture farms

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband and Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
1	TN-II-2013 (1670)	A.KAVITHA	ARIKRISHNAN	T.KEELAKADU P.O, THIRUTHU RAIPOONDI TK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	3.25	269/1, 4A, 4C, 3, 2A, 2B, 270/1A, 1B	23-09-2013
2	TN-II-2013 (1669)	S.M.S.MOHAMADUAPDUL KATHAR	SHEAK PAREEDU MARAKAYAR	3/4 ARABI STREET, MUTHUPEET, THIRUTHU RAIPOONDI TK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	3.55	52/3, 4, 56/4B, 53/1, 56/2A, 2B, 55/4, 56/3B, 3A	23-09-2013
3	TN-II-2013 (1668)	CHITHAMBARAM.S	SUBRAMANIAN	T.VADAKADU, PATTUKOTTAI TK, THANJAVUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	2.40	208/3, 212/2, 212/3	23-09-2013
4	TN-II-2013 (1667)	M.MOHAMADU SHEAK	MATHER SHAMARAİKAYAR	PETTAI ROAD, MUTHUPEET VIA, THIRUTHU RAIPOONDI TK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	4.00	56/4A, 49/4, 55/2A, 52/5, 55/2C, 2B, 50/3, 51/2	23-09-2013
5	TN-II-2013 (1666)	S.MOHAMED ABUPAKKAR	SEYNULAPDEN	AMMAPATTINAMP.O, MANAMELKUDI - TK, PUDUKOTTAI DISTRICT.	PERAVURANI	THIRUVATHEVAN	3.00	286/4	23-09-2013
6	TN-II-2013 (1665)	S.M.SHALIG	SHAHAL HAMED	AMMAPATTINAMP.O, MANAMELKUDI TK, PUDUKOTTAI DISTRICT.	PERAVURANI	THIRUVATHEVAN	3.00	286/4, 5, 6	23-09-2013

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
7	TN-II-2013 (1664)	P.R.PERIYASAMY	RAMA SAMY	28/1 P.K.R.NAGAR, SATTI ROAD, COIMBATORE - 12.	PERAVURANI	PILLAIYAR THITAL	3.20	236/3, 4B, 4A, 5, 6B, 7, 8, 6A, 273/3, 4, 5, 6, 7, 8, 91, 274/5, 234/8, 7B, 7C, 9, 7A, 233/4, 274/1	23-09-2013
8	TN-II-2013 (1663)	N.MANOHRAN, M/S. AMBAL AQUA FARM	NATESAN	T.MELAKKADU POST, PATTUKKOTTAI TK, THANJAVUR DISTRICT.	PERAVURANI	VALLAVANPATTINAM	4.80	727, 339	23-09-2013
9	TN-II-2013 (1655)	R.BHANURAMAN, M/S S.M.MARINE PRODUCTS		SOMANATHANPATTINAM, THIRUVATHEVAN (PO), PERAVURANI (TK), THANJAVUR DISTRICT - 614 802.	PERAVURANI	THIRUVATHEVAN	6.80	332 - 2, 332 - 1, 330 - 1, 335 - 3, 331 - 1, 331 - 8, 331 - 5, 331 - 6, 331 - 7	23-09-2013
10	TN-II-2013 (1653)	V.RAMARAJ, M/S OPAL AQUA FARMS		ADAIKKADDEVAN, PERAVURANI TALUK, THANJAVUR DISTRICT - 614 802.	PERAVURANI	ADAIKKADDEVAN	9.55	104, 105, 105/2, 105/3, 116/14, 114/2, 114/3, 114/4, 114/5, 115/1, 115/2, 115/4, 115/5, 115/6, 115/7, 115/8, 115/9, 116/1, 116/2, 116/4, 116/5, 116/7, 116/15, 116/14, 116/16, 116/17, 116/18, 116/19, 116/20, 116/21, 117/11C, 117/13B, 117/14, 117/18	23-09-2013
11	TN-II-2012 (1632)	R. BALASUBRAMANIAN, M/S. RBT AQUA FARM	RAJAPAKKYAM	PARAKKALAKOTTAI PO, PATTUKOTTAI TALUK, THANJAVUR DISTRICT.	PERAVURANI	THIRUVATHEVAN	2.00	270/13, 269/4, 276/1, 2, 279/1, 268/6, 5, 280/1, 2, 4, 5	21-12-2017
12	TN-II-2012 (1631)	R. GOVINDASAMY	RENGASAMY	THAMARANKOTTAI POST, PATTUKOTTAI	PATTUKOTTAI	ERIPURAKARI	1.60	235/9	21-12-2012

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				TALUK, THANJAVUR DISTRICT.					
13	TN-II-2012 (1630)	V. JAYAPIRAKASH	VAITHILINGAM	19/B, VALLUVAR NAGAR, PERUMAG ALOOR PO, PERAVOORANI TALUK, THANJAVUR DISTRICT,	PERAVURANI	KUPPATHAVAN	0.42	271/2B,1C	21-12-2012
14	TN-II-2012 (1629)	A. KIYASDEEN	ABULHASAN	JAGATHAPATTINAM, MANAMEL KUDI TALUK, PUDUKKOTTAI DISTRICT.	PERAVURANI	ARIYAKU TTITHEVAN	1.80	83, 84/3	21-12-2012
15	TN-II-2012 (1628)	A. MOHAMED IQBAL	ABUL HASAN	JAGATHAPATTINAM, MANAMEL KUDI TALUK, PUDUKKOTTAI DISTRICT,	PERAVURANI	ARIYAKU TTITHEVAN	1.60	83	21-12-2012
16	TN-II-2012 (1627)	T. VENKATRAMAN	THIYAGARAJAN	113, CHINNAKUTTY STREET, T. VADAKADU PO, PATTUKOTTAI TALUK, THANJAVUR DISTRICT.	PERAVURANI	ARIYAKU TTITHEVAN - SENTHAL AIPATTINAM	2.00	20/8, 24/6,4,7,8,9,5,20/1,6,5A,20/3A,3C,20/7,10, 19/9,10,11,21/4 A1,3B1	21-12-2017
17	TN-II-2012 (1626)	R. BALAKRISHNAN	RAJU	9, THANGAVEL NAGAR, 2ND STREET, PATTUKOTTAI - 614601, THANJAVUR DISTRICT.	PERAVURANI	ARIYAKU TTITHEVAN - SENTHAL AIVAYAL	2.00	20/3B.5B, 9.2, 21/2.3A1.4B, 23/1A	21-12-2017
18	TN-II-2012 (1625)	T. VENKATRAMAN	THIYAGARAJAN	CHINNAKUTTI STREET, T. VADAKADU PO, PATTUKO	PERAVURANI	ARIYAKU TTITHEVAN	1.60	44/2	21-12-2012

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				TTAI TALUK, THANJAVUR DISTRICT.					
19	TN-II-2012 (1624)	V. LATHA	VENKATRAMAN	113, CHINNAK UTTI STREET, T. VADAKADU PO, PATTUKO TTAI TALUK, THANJAVUR DISTRICT.	PERAVURANI	ARIYAKUTTITHEVAN	1.60	44/2, 44/1B	21-12-2012
20	TN-II-2012 (1623)	R. MATHAVI	K. RAJENDRAN	PARAVAK KOTTAI PO, MANNARGUDI TALUK, THIRUVARUR DISTRICT.	PERAVURANI	VILLUNIVAYAL	1.20	63/2	21-12-2012
21	TN-II-2012 (1622)	V. LATHA	T. VENKATARAMAN	CHINNAK UTTI STREET, T. VADAKADU PO, PATTUKO TTAI TALUK, THANJAVUR DISTRICT.	PERAVURANI	61, MARAKK AVALASAI	1.90	75/3I, 3J, 74.1C1, 1C3, 1C4, 3A, 3B, 75/1A. 1B.1C, 1D.1E, 2A.2B, 76/1B	21-12-2012
22	TN-II-2012 (1621)	V. LATHA	T. VENKATRAMAN	CHINNAK UTTI STREET, T. VADAKADU PO, PATTUKO TTAI TALUK, THANJAVUR DISTRICT.	PERAVURANI	61, MARAKK AVALASAI	0.95	150/1,2,3,4,5,6	21-12-2012
23	TN-II-2012 (1620)	T. VENKATRAMAN	THIYAGARAJAN	CHINNAK UTTI STREET, T. VADAKADU PO, PATTUKO TTAI TALUK, THANJAVUR DISTRICT.	PERAVURANI	MARAKK AVALASAI	0.55	150/7, 8, 9	21-12-2012

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband and Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
24	TN-II-2011 (1572)	M.THANGAVEL	MURUGAIYAN	1, SOUTH STREET, KEEZHAVANJORE, NAGOOR (PO).	NAGAPATTINAM	MELANAGORE	3.60	264/2,265/2,267/1,268/2	23-08-2016
25	TN-II-2011 (1565)	R.K.P.ARUNACHALAM	PALANI DURAI THEVAR	NO.14, PALANIAPPAN STREET, PATTUKOTTAI - PO, THANJAVUR DISTRICT.	PERAVURANI	MARAKKAVALASI	2.52	140/7,8,9,11,142/2A1,2A2,2A3,2B1,2B2,2B3,2B4,143/3,5,6,7	05-07-2011
26	TN-II-2011 (1564)	T.VENKATRAMAN	M.THIYAGARAJAN	M/S RAGAVENDRA AQUA FARM, THIRUVATHEVAN - MANTHIRI PATTINAM - PO, EAST COAST ROAD, PERAVURANI TALUK, THANJAVUR DISTRICT.	PERAVURANI	THIRUVATHEVAN & ARIYAKUTTHEVAN	7.00	32/2,3,4,33/1B,2A,3,4,5,34/1,2,4,6,35/1,2,3,4A,4B,36/1,2,3,4,37/2,3,4,38/2,3,4	05-07-2011
27	TN-II-2011 (1557)	R.LAKSHMANAN	TRS. RAMALINGA THEVAR	173, MANJAVAYAL ROAD, T.MARAVAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT.	PATTUKOTTAI	THAMARANKOTTAI SOUTH	1.60	893, 888/5	05-07-2011
28	TN-II-2011 (1556)	R.VENKATACHALAM	TRS. RAMALINGA THEVAR	173/1, MANJAVAYAL ROAD, T.MARAVAKKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT - 614 704.	PATTUKOTTAI	THAMARANKOTTAI SOUTH	1.60	885/3A,889/2,892/1,888/5	23-08-2016
29	TN-II-2011	V.ALAMELUMANGAI	R.VENKADACHALAM	173/1, MANJAVAYAL ROAD, T.MARAVA	PATTUKOTTAI	THAMARANKOTTAI SOUTH	1.60	819/1B,1D,2,3B,4,1C,3C, 892/1, 892/2	23-08-2016

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
	(1555)			KKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT - 614 704.					
30	TN-II-2011 (1554)	S.VIJAYA	SARABOJI	T.KEELAKADU, MUTHUPETT (VIA), THIRUTHIRAIPOONDI TALUK, THIRUVARUR DISTRICT - 614 704.	PATTUKOTTAI	T.VADAKADU	1.68	355/2,356/2	05-07-2011
31	TN-II-2011 (1553)	K.THIRUCHIRTRAMPALAM	KANDHASAMY THEVAR	T.VADAKADU.P.O, PATTUKOTTAI TALUK, THANJAVUR DISTRICT - 614 704.	PATTUKOTTAI	T.VADAKADU	0.78	348/1,2, 349/1, 304/2	05-07-2011
32	TN-II-2011 (1552)	R.AYYAMPERUMAL	RAJAMANICKA THEVAR	MAIN ROAD, T.KEELAKADU PO, THIRUTHIRAIPOONDI TALUK, THIRUVARUR DISTRICT - 614 704.	PATTUKOTTAI	T.VADAKADU	0.33	441/9	05-07-2011
33	TN-II-2011 (1551)	G.AYYADURAI	GANAPATHI THEVAR	MAIN ROAD, T.KEELAKADU, MUTHUPETT (VIA), THIRUTHIRAIPOONDI TALUK, THIRUVARUR DISTRICT - 614 704.	PATTUKOTTAI	T.VADAKADU	0.33	441/9	05-07-2011
34	TN-II-2011 (1550)	S.VIJAYALAKSHMI	K.R.SIVAPIRAKASAM	T.VADAKADU.P.O, PATTUKOTTAI TALUK, THANJAVUR	PATTUKOTTAI	T.VADAKADU	0.64	415/6,451/7	05-07-2011

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				DISTRICT - 614 704.					
35	TN-II-2011 (1549)	N.VASUKI	NARAYANA SAMY	T.VADAKA DU.P.O, PATTUKO TTAI TALUK, THANJAVUR DISTRICT.	PATTU KOTTAI	T.VADAK ADU	2.000	214/2A,2B,213/2,380/8,391/5,6,7,8	23-08-2016
36	TN-II-2011 (1548)	R.THIRU MURUGAN	RAJA SEKARAN	T.VADAKA DU.P.O, PATTUKO TTAI TALUK, THANJAVUR DISTRICT - 614 704.	PATTU KOTTAI	T.VADAK ADU	2.000	304/2,348/2,349/2	23-08-2016
37	TN-II-2011 (1547)	N.R.BALASUBRAMANIAN	RAVUTHA THEVAR	T.MELAKA DU.P.O, PATTUKO TTAI TALUK, THANJAVUR DISTRICT.	PATTU KOTTAI	T.VADAK ADU	1.600	401-1,389-1,394/7,389/6,7	05-07-2011
38	TN-II-2011 (1546)	R.RAJAVARSHINI	RAMAMOORTHY	T.KEELAK ADU.P.O, THIRUTHU RAIPOondi TALUK, THIRUVARUR DISTRICT.	PATTU KOTTAI	T.VADAK ADU	1.200	367/4,424/5,6,8	23-08-2016
39	TN-II-2011 (1545)	G.GRAMAMORTHY	GANAPATHI THEVAR	T.KEELAK ADU.P.O, THIRUTHU RAIPOondi TALUK, THIRUVARUR DISTRICT.	PATTU KOTTAI	T.VADAK ADU	2.000	350,367/2,3,4	23-08-2016
40	TN-II-2011 (1544)	RUMA	G.GRAMAMORTHY	T.KEELAK ADU.P.O, THIRUTHU RAIPOondi TALUK, THIRUVARUR DISTRICT.	PATTU KOTTAI	T.VADAK ADU	2.000	367/5, 423/4,5,6,7,8	23-08-2016
41	TN-II-2011 (1543)	R.YOGAVARSHAN	G.GRAMAMORTHY	T.KEELAK ADU.P.O, THIRUTHU RAIPOondi TALUK, THIRUVARUR DISTRICT.	PATTU KOTTAI	T.VADAK ADU	1.600	423/9,424/1,2,3,4	23-08-2016



List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
42	TN-II-2011 (1542)	V.VETHESVARI	VEERA PANDIA THEVAR	OTHIYADIKKADU.P.O, PATTUKOTTAI TALUK, THANJAVUR DISTRICT.	PATTUKOTTAI	THAMBIKOTTAI (VADAKADU)	1.75	354,357,353/2	05-07-2011
43	TN-II-2011 (1540)	A.JOTHIRAMALINGAM	ANNAMALAI THEVAR	T.VADAKADU.P.O, PATTUKOTTAI TALUK, THANJAVUR DISTRICT.	PATTUKOTTAI	T.VADAKADU	1.58	392/1,2,3,405/12,13	23-08-2016
44	TN-II-2011 (1539)	A.BALASUBRAMANIAN	ARUNACHALAI THEVAR	T.MELAKADU.P.O, PATTUKOTTAI TALUK, THANJAVUR DISTRICT.	PATTUKOTTAI	T.VADAKADU	1.60	402/7,8,9,393/9,10	23-08-2016
45	TN-II-2011 (1538)	R.P.MURUGANANTHAM	PANNEER THEVAR	MAIN ROAD, T.VADAKADU.P.O, PATTUKOTTAI TALUK, THANJAVUR DISTRICT.	PATTUKOTTAI	T.VADAKADU	1.30	436/2,4,5,437/1,2,3	23-08-2016
46	TN-II-2011 (1537)	CHITHAMBARAM.S	SUBRAMANIAN	T.VADAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT.	PATTUKOTTAI	T.VADAKADU	0.30	452/5	05-07-2011
47	TN-II-2011 (1536)	J.SWAMINATHAN	JAGADEESAN	MAIN ROAD, T.VADAKADU.P.O, PATTUKOTTAI TALUK, THANJAVUR DISTRICT - 614 704.	PATTUKOTTAI	PUDUKOTTAGAM	1.33	210/2,211/3A,211/3B	05-07-2011
48	TN-II-2011 (1535)	R.VAIRAGANAPATHI	RAMA SAMY	T.KEELAKADU.P.O, THIRUTHURAIPOondi TALUK, THIRUVAR	PATTUKOTTAI	PUDUKOTTAGAM	1.40	176/2,3,4,5,6,	05-07-2011

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband and Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				UR DISTRICT - 614 704.					
49	TN-II-2011 (1534)	R.VAITHIYA NATHAN	RAMA LINGAM	NO.27 MANNARG UDI ROAD, MUTHUPE T, THIRUTHU RAIPOOND I TALUK, THIRUVAR UR DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	0.75	42/1	23-08-2016
50	TN-II-2011 (1533)	V.TAMILAR ASHI	R.VAITHIYAN ATHAN	NO.27 MANNARG UDI ROAD, MUTHUPE T, THIRUTHU RAIPOOND I TALUK, THIRUVAR UR DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	1.12	87/4, 87/2	05-07-2011
51	TN-II-2011 (1532)	K.R.SIVA PIRAKASAM	RAMA LINGAM	T.VADAKA DU.P.O, PATTUKO TTAI TALUK, THANJAVU R DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	1.36	313/1,2,3,4A,4B, 5,6,7,8, 314/1, 316/1,8	05-07-2011
52	TN-II-2011 (1531)	T.SATHYA RAJ	THIRU CHIRTRAMPALAM	T.VADAKA DU.P.O, PATTUKO TTAI TALUK, THANJAVU R DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	0.75	134/1, 134/3	05-07-2011
53	TN-II-2011 (1530)	S.BALAMURUGAN	SELVA RAJ	T.VADAKA DU.P.O, PATTUKO TTAI TALUK, THANJAVU R DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	0.80	212/2	23-08-2016
54	TN-II-2011 (1529)	S.AYYADURAI	SELVA RAJ	T.VADAKA DU.P.O, PATTUKO TTAI TALUK, THANJAVU R DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	0.80	212/3	23-08-2016

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				R DISTRICT - 614 704.					
55	TN- II- 2011 (152 8)	R.BALASUB RAMANIAN	RAJASEKARA N	T.VADAKA DU.P.O, PATTUKO TTAI TALUK, THANJAVU R DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	0. 7 5	134/4, 135/2A	05- 07- 201 1
56	TN- II- 2011 (152 7)	N.MULLAIY AMMAL	NARAYANA SAMY	NO.11, OLD POST OFFICE STREET, MUTHUPE T, THIRUTHU RAIPOOND I TALUK, THIRUVAR UR DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	0. 9 0	181/1A, 181/1B	23- 08- 201 6
57	TN- II- 2011 (152 6)	S.VIJAYA KUMAR	SIVA PIRAKASAM	T.VADAKA DU.P.O, PATTUKO TTAI TALUK, THANJAVU R DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	1. 4 0	311/6,7,312/1,2, 3,4,5,6,7A,312/7 B,8	05- 07- 201 1
58	TN- II- 2011 (152 5)	C.VANITHA	V.B.CHANDRA SEKARAN	T.VADAKA DU, T.KEELAK ADU.P.O, MUTHUPE T (VIA), PATTUKO TTAI TALUK, THANJAVU R DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	1. 2 6	198/3, 198/2	23- 08- 201 6
59	TN- II- 2011 (152 4)	J.SASIKALA	V.B.JAYAKUM AR	T.VADAKA DU, T.KEELAK ADU.P.O, MUTHUPE T (VIA), PATTUKO TTAI TALUK, THANJAVU R DISTRICT.	PATTU KOTT AI	PUDUKOT TAGAM	2. 0 0	199/2, 199/3, 199/4	23- 08- 201 6

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SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
60	TN-II-2011 (1523)	P.VAITHIYA NATHAN	PONNU SAMY	T.KEELAK ADU.P.O, MUTHUPE T (VIA), THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT - 614 704.	PATTU KOTTAI	PUDUKOT TAGAM	1.43	136/1,136/3,136/4	23-08-2016
61	TN-II-2011 (1522)	C.MARI MUTHU	CHITHAMBARAM	T.KEELAK ADU.P.O, MUTHUPE T (VIA), THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT - 614 704.	PATTU KOTTAI	PUDUKOT TAGAM	1.60	135/2A, 137/1, 137/2	23-08-2016
62	TN-II-2011 (1521)	R.ANANTHA KUMAR	RAJA MOHAN	T.KEELAK ADU.P.O, MUTHUPE T (VIA), THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT - 614 704.	PATTU KOTTAI	PUDUKOT TAGAM	1.10	180/3, 177/2A	23-08-2016
63	TN-II-2011 (1520)	G.RAJA MOHAN	GANAPATHI THEVAR	T.KEELAK ADU.P.O, MUTHUPE T (VIA), THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT - 614 704.	PATTU KOTTAI	PUDUKOT TAGAM	0.80	177/5, 177/4B, 180/4	23-08-2016
64	TN-II-2011 (1519)	R.BAIRAVA MOORTHI	RAJAMOCHAN	T.KEELAK ADU.P.O, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT - 614 704.	PATTU KOTTAI	PUDUKOT TAGAM	1.10	176/6, 176/7	23-08-2016
65	TN-II-2011 (1518)	R.GANAPATHI	RAJAMOCHAN	T.KEELAK ADU.P.O, MUTHUPE T (VIA), THIRUTHU RAIPOONDI TALUK,	PATTU KOTTAI	PUDUKOT TAGAM	1.00	177/2B, 177/3, 177/4A, 177/4B	23-08-2016

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				THIRUVARUR DISTRICT - 614 704.					
66	TN-II-2011 (1517)	V.VEDHARE THINAM	R.VEERAMANI	5.DHARMAR KOIL STREET, MUTHUPE T, THRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	1.56	249/1,2A	05-07-2011
67	TN-II-2011 (1516)	V.RETHINA SAMY	VEERAPPAN	5.DHARMAR KOIL STREET, MUTHIPET , THRUVARUR DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	1.56	312/6,7A,7B, 311/3,4,5,6	05-07-2011
68	TN-II-2011 (1515)	M/S RAM C. AQUA FARM, SHRI. C.THILLAI NATHAN	CHOKKALINGAM	T.KEELAK ADU.P.O, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	2.00	314/1,2, 315/5,6, 322/1,2,3,4,5, 322/6,7,8,9	23-08-2016
69	TN-II-2011 (1514)	M.PAKALAVAN	MURUGAIYAN	KALLADIK KOLLAI, JAMBUVA NODAI. PO, MUTHUPE T (VIA), THIRUTHRUAIPOONDI TALUK, THRUVARUR DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	1.10	90/2	23-08-2016
70	TN-II-2011 (1513)	M.MURUGAIYAN	MUTHU THEVAR	KALLADI KOLLAI, JAMBUVA NODAI - PO, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT - 614 704.	PATTU KOTT AI	PUDUKOT TAGAM	1.10	87-1	23-08-2016

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SI No	Reg. No	Name	Father/Husband and Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
71	TN-II-2011 (1512)	KANNADURAI	KANDA SAMY THEVAR	T.VADAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT - 614 704.	PATTUKOTTAI	PUDUKOTTAGAM	1.60	168/3,4, 166/8, 148/2B, 156/6A	05-07-2011
72	TN-II-2011 (1511)	S.V.GANAPATHI THEVAR	VAIRAPPA THEVAR	PATTAI, MUTHUPET VIA, THIRUTHRAIPOONDITALUK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	1.60	295/2,3,5	05-07-2011
73	TN-II-2011 (1510)	R.PANNEERSELVAM	RAMALINGAM	T.KEELAKADU.P.O, THIRUTHU RAIPOONDITALUK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	1.45	197-2, 197-3, 197-4	23-08-2016
74	TN-II-2011 (1509)	P.LATHA	PANNEERSELVAM	T.KEELAKADU.P.O, THIRUTHU RAIPOONDITALUK, THANJAVUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	1.60	198-4, 198-5, 197-5	23-08-2016
75	TN-II-2011 (1508)	P.SEVANTHAIYAN	POTHYAPPA THEVAR	T.KEELAKADU.P.O, THIRUTHU RAIPOONDITALUK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	0.80	88/1, 85/6	05-07-2011
76	TN-II-2011 (1507)	G.RAMA BALASUBRAMANIAN	GANAPATHI THEVAR	T.MELAKADU, MALAKADU P.O, MAIN ROAD, PATTUKOTTAI TALUK, THANJAVUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	1.52	190/1,190/2,190/6,191/1	23-08-2016
77	TN-II-2011 (1506)	R.BALA SUNDHARI	RAMABALA SUBRAMANIAN	T.MELAKADU, MELAKADU P.O, MAIN ROAD,	PATTUKOTTAI	PUDUKOTTAGAM	1.44	190-4,191-2B,190-3,190-5,191-2A	23-08-2016

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				PATTUKOTTAI TALUK, THANJAVUR DISTRICT.					
78	TN-II-2011 (1505)	R.PANNEER SELVAM	RAMALINGAM	T.KEELAKADU P.O, THIRUTHU RAIPOondi TALUK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	1.74	305/2,3,4,5,6,7,8	05-07-2011
79	TN-II-2011 (1504)	P.THANGARASU	PALANIAPPAN	DURAIKKA DU.P.O, THIRUTHU RAIPOondi TALUK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	2.00	260/1, 261/3	23-08-2016
80	TN-II-2011 (1503)	R.THANGAMUTHU	RAMANATHAN	T.VDAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	1.68	40/2,3, 41/1A,1B,2	23-08-2016
81	TN-II-2011 (1502)	P.NARAYANASAMI	PONNU SAMY	SIVANKOVIL NORTH STREET, PETTAI, MUTHUPETT P.O, THIRUTHU RAIPOondi TALUK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	2.00	72-1A,1B,3, 305/8.9.10.11, 304/2	23-08-2011
82	TN-II-2011 (1501)	N.SELVARAJ	NARAYANASAMY THEVAR	T.KEELAKADU, MUTHUPETT (VIA), THIRUTHU RAIPOondi TALUK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	1.31	274/2B,4B,5B,6B,7B,8B, 274/2A,4A,5A,6A,7A,8A	23-08-2016
83	TN-II-2011 (1500)	S.DHARMALINGAM	SUBRAMANIAN	T.KEELAKADU, THIRUTHU RAIPOondi TALUK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	1.50	248/1,2	05-07-2011

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84	TN-II-2011 (1499)	S.AYYAPPAN	SUBRAMANIAN	T.KEELAK ADU, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	2.00	245/1,2,3	05-07-2011
85	TN-II-2011 (1498)	R.VEERAPANDIYAN	RENGA SAMY THEVAR	T.KEELAK ADU P.O, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	1.55	305/9,10,12,11, 304/2,3, 306/1	05-07-2011
86	TN-II-2010 (1419)	SHRI.S.PANNEER SELVAM	S/O SHRI.SAKKARATHA THEVAR	T.KEELAK ADU, THIRUTHU RAIPOONDI TK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	2.70	128/2,131/3,139/2,128/3,138/13A,13D,126/1, 127/2,128/1	28-06-2010
87	TN-II-2010 (1418)	SHRI.S.NATARAJAN	S/O SHRI.SOUNDERRAJAN	SEMPADA VANKADU, MUTHUPETT (VIA), THIRUTHU RAIPOONDI TK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	2.80	85/5,3, 86/2B,1,2A.	28-06-2010
88	TN-II-2010 (1417)	SHRI.R.CHANDRA BOSS	S/O SHRI.RAMA SWAMY	SEMBADA VANKADU, MUTHUPETT (VIA), THIRUTHU RAIPOONDI TK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	3.00	290/1, 2	28-06-2010
89	TN-II-2010 (1416)	SMT.K.VASUKI	W/O SHRI.C.KARTHIKEYAN	THAMBIK KOTTAI VADAKADU, PATTUKKOTTAI TK, THANJAVUR DISTRICT.	PATTUKOTTAI	PUDUKOTTAGAM	3.00	188/2,3, 189/2A, 189/2B, 189/1, 190/1	28-06-2010
90	TN-II-2010 (1415)	M. KUMAR	MARIAPPA THEVAR	T.VADAKADU (PO), PATTUKKOTTAI (TK), THANJAVUR	PATTUKOTTAI	T.VADAKADU	2.50	381/1,2,3,4,6,7,8, 9, 378/4	28-06-2015



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				DISTRICT - 614 704					
91	TN-II-2010 (1414)	B.JAYARAMAN	M.R.BALASUBRAMANIAM	93-D. THAMBIK OTTAI VADAKADU (PO), PATTUKK OTTAI (TK), THANJAVUR DISTRICT.	PATTUKOTTAI	T.VADAKADU	4.75	255/1, 276, 277/1,3, 275/4, 9-1	28-06-2015
92	TN-II-2010 (1413)	NISHA ALEX	ALEX K. NINAN	646, NAINANKULAM, PATTUKK OTTAI TK, THANJAVUR DISTRICT.	PERAVURANI	VILLUNIVAYAL & ROWTHANVAYAL	3.62	26/4,8,5,6A,7,1,2,3,6B, 25/1,8A,8B,5,6,2,7,9, 24/1,8,9,5,6,7,3, 9,27/3,2, 23/10, 17/9,10, 18/9, 38/113, 17/5, 18/1,2,3,4, 19/1,2,3, 20/1,2,4,5,8.	28-06-2010
93	TN-II-2010 (1412)	GEORGE K. NINAN	K.C.NINAN	646, NAINANKULAM, PATTUKK OTTAI TK, THANJAVUR DISTRICT.	PERAVURANI	VILLUNIVAYAL	4.38	17/4,6,7, 15/1 TO 13,15, 13/2,6,8,13, 12/1,3,5,6, 16/2,6,8 TO 17, 10/1,4	28-06-2010
94	TN-II-2010 (1411)	ALEX K NINAN	K.C.NINAN	646, NAINANKULAM, PATTUKK OTTAI TK, THANJAVUR DISTRICT.	PERAVURANI	VILLUNIVAYAL	4.79	4/6A, 11/1,3A,5, 32/1A, 7/15, 8/4,5, 10/3,2, 5/7,8,9, 13/1 - 16, 15/8,14,19, 9/3A,1E, 16/7,18, 10/5	28-06-2010
95	TN-II-2010 (1410)	SHRI.Y.MOHAMADHUMARAICKAYAR	S/O SHRI.YOOSUBMARAICKAYAR	JAGATHAI PATTINAM PO, MANAMEALGUDI TK, PUDHUKK OTTAI DISTRICT.	PERAVURANI	ADAIKKADEVAN	3.00	80/1,3,84/1A	28-06-2010
96	TN-II-2010 (1409)	ROOPA GEORGE	GEORGE K NINAN	646, NAINANKULAM, PATTUKK OTTAI, THANJAVUR DISTRICT.	PERAVURANI	VILLUNIVAYAL & ROWTHANVAYAL	3.16	24/10,4,2, 23/3,6,7,1,4,5,8,9, 27/1,4,43/2,6, 41/4, 17/8,7,18/2,5,6,8, 38/2,20/3,6,7B,7A, 18/6B,5, 17/4,2,3, 19/6,4,5,7, 18/6C	28-06-2010

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97	TN-II-2010 (1408)	K.C.NAINAN	K.G.CHANDY	646, NAINANKULAM, PATTUKKOTTAI, THANJAVUR DISTRICT.	PERAVURANI	VILLUNIVAYAL	3.20	5/2, 6/1,2,3, 8/1,2,3, 9/1A,1B,1C,1D,1E,2,3B, 10/5,6,7,8,9,3B,3C.	28-06-2010
98	TN-II-2010 (1407)	SHRI.S.KAN NAPIRAN	S/O SHRI.SRINIVASAN	84A SOUTH KALIAMMAN KOVIL STREET, PATTUKKOTTAI TK, THANJAVUR DISTRICT.	PERAVURANI	KARANGUDA	5.75	72/3B,77/1A,79/1A,1B,4,5,80/4A,4B,81/12B,14,15,16,17,2C,3B,5,9,82/2B,86/10A,77/1C,1D,79/3A,3B,6,80/8A,,9A,81/10,13,1A,1B,2B,3A,4A,8,82/2A,3,84/7,8,86/1,2,3,77/1B,79/2A,2B,7,80/1,2,5,6,7,8B,9B,81/11,12A,2A,7,86/4A,4B,5,6A,6B,7A.	28-06-2010
99	TN-II-2010 (1406)	J.SAKTHI KUMARI	JAYA RAMAN	93-D T.VADAKADU, PATTUKKOTTAI (TK), THANJAVUR DISTRICT.	PERAVURANI	NADIYAM	4.80	279-11,12,277-1 TO 14, 284-3,4,5,6, 278-9 TO 12, 279-5 TO 9, 229-3,8, 283-3B,3C,284-6	28-06-2010
100	TN-II-2010 (1405)	B.JAYARAMAN	M.B.BALASUBRAMANIYA THEVAR	93-D-T.VADAKADU, PATTUKOTTAI (TK), THANJAVUR DISTRICT.	PERAVURANI	NADIYAM	5.00	230-2A,2B,2C,2D,2E,3,4A,4B,282/1 TO 9,283/1B1,1B2,1B3,1B4,2A,2B,2C,2D,3/1,6,10,2A,229/5,283/1B5,284/8,229/7,11,4B,284/2,1,229/2B,229/4A,229/9	A,229-2010 28-06
101	TN-II-2010 (1404)	S.KANNAPIRAN M/S ANDAL AQUA FARM	SRINIVASAN	KARANGUDA - 614802, PONNERI (TK), THANJAVUR DISTRICT.	PERAVURANI	KARANGUDA	3.00	75/2G, 2F,2E, 77/3,4A, 4B, 78/1,2,5,6,7	28-06-2015
102	TN-II-2010 (1403)	SHRI.M.PALANI NATHAN	S/O SHRI.MURUGAIYA THEVAR	T.MELAKADU, PATTUKOTTAI TK, THANJAVUR DISTRICT.	PERAVURANI	MARAKKAVALASI	3.00	157/2,3,4,5, 158/2,6, 150/1,2, 148/4,6,5,10,2,8, 11,7,9.	28-06-2010

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				R DISTRICT.					
103	TN-II-2010 (1402)	R.VEERAPATHIRAN	A.T.RAMU THEAVAR	A-6, NEW HOUSING UNIT, UKKADAI, PONNAVA RYANKOTTAI, PATTUKOTTAI (TK) THANJAVUR DISTRICT.	PATTUKOTTAI	T.VADAKADU	4.80	275-2A,2B,4, 274-1A,1B, 8-1C,1B,1A	28-06-2010
104	TN-II-2010 (1401)	K.PORKODI	B.KAMARAJ	93-E, T.VADAKADU, PATTUKOTTAI (TK), THANJAVUR DISTRICT.	PATTUKOTTAI	T.VADAKADU	4.90	261-2A,2B,3A,3B,260-2A,2B, 262-1A,1B,2,275-A	28-06-2010
105	TN-II-2010 (1400)	B.KAMARAJ	M.R.BALASUBRAMANIAN DHEAVAR	93-E, THAMBIKOTTAI VADAKADU (PO), PATTUKOTTAI (TK), THANJAVUR DISTRICT.	PATTUKOTTAI	T.VADAKADU	5.00	259-1, 260-2B, 256-1, 255-1, 254-3	28-06-2010
106	TN-II-2010 (1399)	SMT.P.KANNAKI	W/O SHRI.N.PANDIYAN	NO-68/B, VALLVANPURAM, PATTUKOTTAI, THANJAVUR DISTRICT.	PATTUKOTTAI	ERIPURAKARI	2.64	235/8,9	28-06-2010
107	TN-II-2010 (1398)	SHRI.T.N.PANDIYAN	S/O SHRI.T.NADARAJAN	NO.68/B, VALLVANPURAM, PATTUKOTTAI, THANJAVUR DISTRICT.	PATTUKOTTAI	ERIPURAKARI	3.58	235/9,8	28-06-2010
108	TN-II-2010 (1397)	P.VEERASEKRAN	V.PALANI DURAI	VATTAKKUDI SOUTH, THAMARANKOTTAI (VIA), PATTUKOTTAI TK, THANJAVUR	PATTUKOTTAI	S.R.PATTINAM	7.50	39/6,1, 40/1-7,41/1,3,4,5,7,8A,8B,9, 42/2,1A,1B, 40/5, 33/6,7,5, 34/7B,4A,39/1,5B,2, 262/2	28-06-2010

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				R DISTRICT.					
109	TN-II-2010 (1396)	R.THIRUNA VUKKARASU	RAJA PAKKIYA THEVER	T.MELAKKADU, ECR MAIN ROAD, MELAKKADU PO, PATTUKOTTAI TK, THANJAVUR DISTRICT.	PATTUKOTTAI	PILLAIYAR THIDAL	3.00	274/2,275/3-8, 282/2,5, 279/1,2,3,4, 273/10,11,12,13, 278/1-8, 275/11	28-06-2015
110	TN-II-2010 (1395)	SHRI.S.SARABOJI	S/O SHRI.SUBRAMANIYA THEVAR	T.KEELAKADU, MUTHUPE T (VIA), THIRTHURAIPOONDI T.K, THIRUVARUR DISTRICT.	PATTUKOTTAI	T.VADAKADU	2.89	437/11,12, 438/6,7,2,8	28-06-2010
111	TN-II-2010 (1355)	SHRI.T.PAULRAJ, M/S. MARINA SHRIMPS	S/O SHRI.THANISLAS	PILLAIYAR THIDAL, S.R.PATTINAM, THANJAVUR DISTRICTY-614 723	PERAVURANI	NADIYAM	1.50	298/8A, 298/8B	05-04-2010
112	TN-II-2010 (1354)	SHRI.T.MUTHUKRISHNAN	S/O SHRI.THANGAVEL	SEMPADAVANKADU PO, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	2.00	232/1B,233/1,2, 3,4,5,234/1	05-04-2015
113	TN-II-2010 (1353)	SMT.V.LATHA	W/O SHRI.VENKATARAMAN	T.VADAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	T.VADAKADU	1.60	426/1,3,5,6,7	05-04-2010
114	TN-II-2010 (1352)	SMT.R.MAHESWARI	W/O SHRI.N.RAMALINGAM	T.KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.85	223/3,4,2,5	05-04-2015

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SI No	Reg. No	Name	Father/Husband and Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
115	TN-II-2010 (1351)	SHRI.N.RAM ALINGAM	S/O SHRI.NARAYANA SAMY THEVAR	T.KEELAK ADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KOTTAI	PUDUKOT TAGAM	2.00	222/4,5,2	05-04-2015
116	TN-II-2010 (1350)	SMT.T.SANTHA LAKSHMI	W/O SHRI.TAMIL SELVAN	T.KEELAK ADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KOTTAI	T.VADAK ADU	1.60	377/8,9,389/5,2,8	05-04-2015
117	TN-II-2010 (1349)	SHRI.M.SIN GARAVEL	S/O SHRI.MARIAPPA THEVAR	T.KEELAK ADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KOTTAI	PUDUKOT TAGAM	1.70	221/2B, 220/1, 221/3	05-04-2015
118	TN-II-2010 (1348)	SMT.S.LALITHA	W/O SHRI.SIVAPIR AKASAM	MAIN ROAD, T.KEELAK ADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KOTTAI	T.VADAK ADU	1.60	377/5, 6, 382/9,3,4	05-04-2015
119	TN-II-2010 (1347)	SMT.J.SUMATHI	W/O SHRI.JAYA CHANDRAN	T.KEELAK ADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KOTTAI	T.VADAK ADU	1.70	394/3, 370/2,3,377/1,389/9	05-04-2015
120	TN-II-2010 (1346)	SMT.R.MANJULA	W/O SHRI.RANGA SAMY	MAIN ROAD, T.KEELAK ADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KOTTAI	T.VADAK ADU	2.00	423/3,416/9, 418/3,4,406/8,9	05-04-2010

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				ITALUK, THIRUVARUR DISTRICT					
121	TN-II-2010 (1345)	SHRI.J.RAM A KRISHNAN	S/O SHRI.JAGANA THA THEVAR	T. VADAKADU, NEAR MARIAMMAN KOIL STREET,P ATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTU KOTTAI	T.VADAK ADU	0. 3 2	439/2	05-04-2010
122	TN-II-2010 (1344)	SHRI.G. CHANDRA SEKARAN	S/O SHRI.GANAPA THI THEVAR	146/1, T.VADAKADU, THAMBIK KOTTAI PO, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTU KOTTAI	T.VADAK ADU	1. 8 0	403/2, 3,4,5,451/5,7	05-04-2010
123	TN-II-2010 (1343)	SHRI.R.THIRUNAVUKK ARASU	S/O SHRI.RAJA PACKIYA THEVAR	MURUGAN KOIL STREET, T.VADAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTU KOTTAI	T.VADAK ADU	1. 6 0	393/1,2,5,402/3, 4	05-04-2010
124	TN-II-2010 (1342)	SHRI.R.BAL A KRISHNAN	S/O SHRI.R.RAJU	9, THANGAVEL NAGAR, HIND STREET, PATTUKOTTAI - 614 601, THANJAVUR DISTRICT	PATTU KOTTAI	T.VADAK ADU	1. 3 0	418/1,2,3,4	05-04-2010
125	TN-II-2010 (1341)	SHRI.D.RAJE NDRAN	S/O SHRI.DURAI RAJ	MAIN ROAD, RAJAMADAM, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTU KOTTAI	RAJA MADAM	1. 5 4	240/2,241/2B(P), 242P	05-04-2010

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SI No	Reg. No	Name	Father/Husband and Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
126	TN-II-2010 (1340)	SHRI.M.BAIRAVANATHAN	S/O SHRI.MANICKA THEVAR	T.KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	164, PUDHUK OTTAGAM	2.00	228/1,2,3	05-04-2015
127	TN-II-2010 (1339)	SMT.B.KALAISELVI	W/O SHRI.M.BAIRAVANATHAN	T.KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	164, PUDHUK OTTAGAM	1.45	229/4,5	05-04-2015
128	TN-II-2010 (1338)	SHRI.N.MANOKARAN	S/O SHRI.NITHAIYA THEVAR	T.KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.82	39/1, 39/3	05-04-2015
129	TN-II-2010 (1337)	SHRI.T.SUBRAMANIYAN	S/O SHRI.THANGAVEL	SEMPADAVANKADU PO, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	2.00	232/1A,2,3,4,6,234/3,4,5,6,7,8	05-04-2015
130	TN-II-2010 (1336)	SHRI.N.R.BALASUBRAMANIAN	S/O SHRI.RAVATHA THEVAR	T.MELAKADU PO, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	T.VADAKADU	2.00	406/1, 428/1, 406/2, 416/1, 406/3, 4, 26/8	05-04-2010
131	TN-II-2010 (1335)	SHRI.K.R.SIVAPIRAKASAM	S/O SHRI.K.RAMALINGAM	T.VADAKADU, MUTHUPE T VIA, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	T.VADAKADU	1.26	415/1,2,4	05-04-2010

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SI No	Reg. No	Name	Father/Husband and Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
132	TN-II-2010 (1334)	SMT.S.KASDURI	W/O SHRI.SENTHILNATHAR	T.KEELAKADU, MUTHUPETTIVIA, THIRUTHURAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	2.00	230/1,232/5,230/2A,2B,232/7B	05-04-2010
133	TN-II-2010 (1333)	K.RAJENDRAN	KASINATHA THEVAR	NORTH STREET, PARAVAKKOTTAI PO, MANNARGUDI TALUK, THIRUVARUR DISTRICT	PERAVURANI	VILLUNIVAYAL	1.60	63/2	05-04-2015
134	TN-II-2010 (1332)	R.BHUVANEASWARI	RAJENDRAN	309, VOC NAGAR, PONNAVARAYAN KOTTAI, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PERAVURANI	VILLUNIVAYAL	1.60	63/2	05-04-2015
135	TN-II-2010 (1331)	S.RAJENDRAN	SELLAPPA THEVAR	309, VOC NAGAR, PONNAVARAYAN KOTTAI, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PERAVURANI	VILLUNIVAYAL	1.60	63/2	05-04-2015
136	TN-II-2010 (1330)	SHRI.K.NAGAPPAN	S/O SHRI.SOMAKANNAPPAN	8A/81, ANGALAMMAN KOVIL SANDHU, SUNNAMBUKARA STREET, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	S.R.PATTINAM	1.89	31/5A,5B,5C,5D,5E	05-04-2010



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SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
137	TN-II-2010 (1329)	SHRI.R. CHITHAMBARANATHAN	S/O SHRI.RAMA CHANDRAN	T.MELAKKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	T.MARAVAKKADU	1.35	103/5A, 103/5C	05-04-2015
138	TN-II-2010 (1328)	SMT.G.YOGA LAKSHMI	W/O SHRI.GOVINDARASU	T. MARAVAKKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	T.MARAVAKKADU	1.10	103/7	05-04-2010
139	TN-II-2010 (1327)	SHRI.R.AYYAKKANNU	S/O SHRI.RAMU THEVAR	T.MELAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	T.MARAVAKKADU	1.10	103/7	05-04-2010
140	TN-II-2010 (1326)	SHRI.S.JAYARAMAN	S/O SHRI.K.M.SHANMUGA THEVAR	T.VADAKADU, MUTHUPET	PATTUKOTTAI	T.VADAKADU	2.00	360/3,4,361/3A, 361/1,361/2	05-04-2015
141	TN-II-2010 (1325)	SHRI.P.VEERA SAMY	S/O SHRI.PALANI SAMY	29 D, THIRUVENKADATHAPILLAI STREET, NAGAPATTINAM	PATTUKOTTAI	T.VADAKADU	1.80	355/1,2,356/1,2, 357	05-04-2010
142	TN-II-2010 (1324)	SHRI.C. PALANI DURAI	S/O SHRI.CHOCKKALINGA THEVAR	T.VADAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	T.VADAKADU	1.70	369/2, 1,3,378/1,2,3	05-04-2010
143	TN-II-2010 (1323)	SHRI.S.RAJENDRAN	S/O SHRI.K.M.SHANMUGA THEVAR	T.VADAKADU, T.MELAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	T.VADAKADU	1.70	360/2,316/2,360/1	05-04-2015
144	TN-II-2010 (1322)	SHRI.A.GANESAN	S/O SHRI.ARUMUGA THEVAR	RAILWAY STATION ROAD, T.VADAKADU,	PATTUKOTTAI	T.VADAKADU	1.60	378/5,6,8,9,10	05-04-2015

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SI No	Reg. No	Name	Father/Husband and Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				PATTUKO TTAI TALUK, THANJAVUR DISTRICT					
145	TN-II-2010 (1321)	SHRI.M. NARAYANA SAMY	S/O SHRI.MARIYAPATHEVAR	T.VADAKADU, PATTUKO TTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	T.VADAKADU	1.60	367/7, 391/1,2,3,4	05-04-2015
146	TN-II-2010 (1320)	SHRI.S. CAHNDRA SEKARAN, M/S. ARUL AQUA FARM	S/O SHRI.K.M.SHANMUGADEVAR	T.MELAKADU PO, MUTHUPE T VIA, PATTUKO TTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	2.00	212/5,4,211/2B	05-04-2010
147	TN-II-2010 (1319)	SHRI.NADARAJAN	S/O SHRI.JAGANTHA THEVAR	T.KEELAKADU PO, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	2.00	291	05-04-2010
148	TN-II-2010 (1318)	SHRI.N.KANNAN	S/O SHRI.NARAYANASAMY	NO.11, OLD POST OFFICE ROAD, MUTHUPE TTAI VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	2.00	179/2,179/3, 179/4	05-04-2015
149	TN-II-2010 (1317)	SHRI.R.BALASUBRAMANIAN	S/O SHRI.RAJENDARN	T.KEELAKADU PO, MUTHUPE TTAI VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.98	291/1,292	05-04-2015
150	TN-II-2010	SHRI.M. AYYAPAN, M/S. MAHAVISH	S/O SHRI.MARIYAPAN	KUTHANTHERU, T.KEELAKADU PO,	PATTUKOTTAI	PUDUKOTTAGAM	1.92	275/4, 276/1, 289/3B,4A,275/3,289/2,3A,3C,3D,276	05-04-2010

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	(1316)	NU AQUA FARM		MUTHUPE TTAI VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT				/3,282/1A,1B,289 /4B,5A,275/2	
151	TN-II-2010 (1315)	SHRI.R.HAR IKRISHNAN	S/O SHRI.RAJENDRAN	T.KEELAKADU PO, MUTHUPE TTAI VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOT TAGAM	1.90	147/4, 156/5, 147/3,5,6,145/1	05-04-2010
152	TN-II-2010 (1314)	SMT.M.MAHESWARI	W/O SHRI.MAYELVAGANAN	T.VADAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	PUDUKOT TAGAM	1.89	303	05-04-2015
153	TN-II-2010 (1313)	SHRI.S.V.GA NAPATHI THEVAR	S/O SHRI.VAIRAPPA THEVAR	S.V.STREET, MUTHUPE T, PETTAI, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOT TAGAM	1.81	295/6A,6B,3,5	05-04-2010
154	TN-II-2010 (1312)	SMT.G.MEE NATCHI SUNDARAM MAL, M/S. VAIRAVAN AQUA FARM	W/O SHRI.S.V.GANAPATHI THEVAR	S.V.STREET, MUTHUPE TTAI VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT.	PATTUKOTTAI	PUDUKOT TAGAM	1.69	295/6D, 6C	05-04-2010
155	TN-II-2010 (1311)	SHRI.G.ARU NACHALAM	S/O SHRI.GOVINDASAMY	PERUMAL KOVIL STREET, SAMBADA YANKADU PO, MUTHUPE TTAI VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOT TAGAM	1.65	60/2B,3,4A,4B,4C,302/1A,2A,309/1B	05-04-2010

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156	TN-II-2010 (1310)	SMT.R.PRIYA	W/O SHRI.RAVICHANDRAN	T.KEELAKADU PO, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.60	274/5B,6B,7B,8B,5A,6A,7A,8A,2B, 273/1,2	05-04-2015
157	TN-II-2010 (1309)	SHRI.B.KAMALAKANNAN	S/O SHRI.BALASUBRAMANIAN	502, VAIRAVAN STREET, T.VADAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.60	292	05-04-2015
158	TN-II-2010 (1308)	SHRI.A.MANIKANDAN	S/O SHRI.ARUNACHALAM	PERUMAL KOVIL STREET, SAMBADA YANKADU PO, MUTHUPETTAI VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.60	302/2B,3A,3B,3C,58/3	05-04-2010
159	TN-II-2010 (1307)	SHRI.G.RAVICHANDRAN	S/O SHRI.GANAPATHY THEVAR	ERIKARI STREET, T.KEELAKADU PO, MUTHUPETTAI VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.56	268/I	05-04-2015
160	TN-II-2010 (1306)	SMT.M.RAMA, M/S. RAMA AQUA FARM	W/O SHRI.M.MANIKANDAN	3/14,A, KEELAKADU, THENPURAM, THEMBIKOTTAI, KEELAKADU, THANJAVUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.40	307/1,2,3,304/1	05-04-2010
161	TN-II-2010	SMT.B.INDIRA	W/O SHRI.M.N.BAL	4/B1, MAIN ROAD,	PATTUKOTTAI	PUDUKOTTAGAM	1.30	46/2,3,47/3	05-04-

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	(1305)		ASUBRAMANIAN	T.VADAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT					2010
162	TN-II-2010 (1304)	SMT.ADHANALAKSHMI	W/O SHRIARUNACHALAM	PERUMALKOVIL STREET, SAMBADAYANKADU PO, MUTHUPETTAI VIA, THIRUTHURAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.30	59/3,59/4	05-04-2010
163	TN-II-2010 (1303)	SMT.A.KAMALAVATHI	W/O SHRI.AYYARU	T.VADAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.20	181/1B,180/3,180/3	05-04-2015
164	TN-II-2010 (1302)	SHRI.M.VEGNESH	S/O SHRI.MAILVAGANAN	T.VADAKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.15	301/2	05-04-2015
165	TN-II-2010 (1301)	SMT.J.NAGALAKSHMI, M/S. NAGALAKSHMI AQUA FARM	W/O SHRI.JAYAPAL	THEMBIKOTTAI, KEELAKADU, THANJAVUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	1.08	61/4,5,6	05-04-2010
166	TN-II-2010 (1300)	SHRI.S.THANGAMANI	S/O SHRI.G.SARKUNADHEVAR	7/27,PILLIYAR KOVIL STREET, PETTAI, MUTHUPETTAI	PATTUKOTTAI	PUDUKOTTAGAM	0.36	295/4	05-04-2015
167	TN-II-2009 (1158)	SHRI.N.SHANMUGAM	S/O SHRI.NARAYANA THEVAR	OTHİYATIKADU, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	3.80	254/3, 253/1,2, 254/1A, 1B, 2	19-10-2009

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168	TN-II-2009 (1157)	SHRI.S. NARAYANA SWAMY	S/O SHRI.SIVAMANI THEVAR	MAIN RAOD, T. KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOOND I, THIRUVARUR DISTRICT	PATTU KOTT AI	PUDUKOT TAGAM	2.92	169/2, 170/2C, 2B, 2A, 171/6, 2, 5B, 171/3, 4, 5A	19-10-2009
169	TN-II-2009 (1156)	SHRI.T. MAHALINGAM, M/S. BHARATHA M AQUA FARM	S/O SHRI.THIRUGNANA THEVAR	T. KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOOND I, THIRUVARUR DISTRICT	PATTU KOTT AI	T.VADAKADU	2.93	305/2,3,4, 359/2, 3, 4	19-10-2009
170	TN-II-2009 (1141)	.S.SELVI SETHURAMAN	SETHURAMAN	PATTUKOTTAI MAIN ROAD, THAMBIK KOTTAI KEELAKADU, THIRUVARUR DIATRICK-614704	PATTU KOTT AI	PUDUKOT TAGAM	4.00	296/2,3,4,5, 299, 326/2,1	03-04-2014
171	TN-II-2009 (1140)	.M.K.SETHURAMAN	M.KALAYANA SUNDARA THEVAR	T.KEELAKADU POST, PATTUKOTTAI MAIN ROAD, MUTHUPE T VILLAGE, THIRUVARUR DIATRICK	PATTU KOTT AI	PUDUKOT TAGAM	4.00	327/4,6,62,65,3 05,287,64,65,64	03-04-2014
172	TN-II-2009 (1139)	G.GUNASEKARAN	GANAPATHI THEVAR	39/69, SRINIVASA PURAM, PATTUKOTTAI MANDAL, THANJAVUR DISTRICT	PATTU KOTT AI	PUDUKOT TAGAM	3.67	277/11-15,17,18,20,21,22, 278/1,2, 280/1,2, 317/1,2, 318/2,3,4, 319/2, 283/1,2,5, 282/5,9,10, 281/5	03-04-2014
173	TN-II-2009 (1138)	MS.S.RENGANAYAKI	D/O SHRI.M.K.SETHURAMAN	T.KEELAKADU POST, PATTUKOTTAI MAINROA	PATTU KOTT AI	PUDUKOT TAGAM	3.59	322/2,5,4,6,10,11,12,13,14, 320/2A,2B, 321/2,6,8,5,9,4,3	03-04-2014

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				D, THIRUVARUR DIATRICK- 614704				,7A,7B, 311/7 351/4	
174	TN-II-2009 (1137)	MS.S.MEEN ATCHI SUNDARI	D/O SHRI.M.K.SET HU RAMAN	T.KEELAK ADU POST, PATTUKO TTAI MAIN ROAD, THIRUVARUR DIATRICK- 614704	PATTU KOTT AI	PUDUKOT TAGAM	3. 4 0	323/1,2, 324/5,2B,2A,3,4, 1, 328/1,6,4	03- 04- 201 4
175	TN-II-2009 (1136)	.S.MARIMUT HU, M/S MUTHUBAL A AQUA FARM	SUBRAMANIY A THEVAR	RAILADY STREET, T.KEELAK ADU POST, MUTHUPE T VILLAGE, THIRUTHU RAIPOOND I MANDAL,T HIRUVARU R DIATRICK	PATTU KOTT AI	PUDUKOT TAGAM	3. 3 5	272/1,2,3, 273/1, 271/2, 277/3, 275/2-4, 276/1,2A,2B,3, 282/1A,1B, 318/1A,1B, 319/1,2	03- 04- 200 9
176	TN-II-2009 (1135)	.K.MURUGE SAN, M/S MURUGESA N AQUA FARM	T.V.KASINATH A THEVAR	T.MELAKK ADU POST, THAMBIK KOTTAI, PATTUKO TTAI MANDAL, THANJAVU R DISTRICT	PATTU KOTT AI	PUDUKOT TAGAM	3. 2 0	283/2-6, 317/2,3, 278/2- 5, 280/2-5, 310/1,2, 317/5A,5B,4, 320/1A	03- 04- 201 4
177	TN-II-2009 (1134)	.S.SANKARA THEVAR	SUBBAIYA THEVAR	T.KEELAK ADU MUTHUPE T VILLAGE, THIRUTHU RAIPOOND I MANDAL,T HIRUVARU R DIATRICK	PATTU KOTT AI	PUDUKOT TAGAM	3. 2 0	280/5,6,7, 310/1-4, 315/1,2, 316/1,2A,2B, 317/4,5B, 320/2A,1A,1B,2 C	03- 04- 200 9
178	TN-II-2009 (1133)	.M.KALAYA NA SUNDARAM	MANIKKATHE VAR	T.KEELAK ADU MUTHUPE T VILLAGE, THIRUTHU RAIPOOND I MANDAL,T HIRUVARU	PATTU KOTT AI	PUDUKOT TAGAM	3. 1 3	258/1A, B, 2, 259/1,2B, 259/2-A	03- 04- 201 4

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				R DIATRICK					
179	TN-II-2009 (1132)	G.LATHA	G.GUNASEKARAN	39/69, SRINIVASA PURAM PATTUKO TTAI MANDAL, THANJAVUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	2.72	277/10,16A,16B, 16C,19,23, 281/2,3,4,6, 282/3,4,6,7,8, 318/1B, 319/2	03-04-2014
180	TN-II-2009 (1131)	.S.MAYLVAGANAN, M/S THIRUMANGAL AQUA FARM	SARKUNATHAR	2.61A- MARUTHAN STREET, T.VADAKA DU PATTUKO TTAI MANDAL, THANJAVUR DISTRICT	PATTUKOTTAI	PUDUKOTTAGAM	2.60	262/2,4 264/3A,3B, 263/1	03-04-2014
181	TN-II-2009 (1130)	.S.RAVUTHA THEVAR, M/S SEA GOLD AQUA FARM	SANKARATHAVAR	T.MELAKK ADU POST, PATTUKO TTAI MANDAL, THANJAVUR DISTRICT	PERAVURANI	VALLAVANPATTINAM	4.20	727, 339	03-04-2009
182	TN-II-2009 (1129)	.M.AGAMADUTHAMBI	MOHAMED MEERARAVUTHAR	AMMAPAT TINAM POST, MANAMEL KUDI MANDAL, PUDUKOT TAI DISTRICT	PERAVURANI	THIRUVATHEVAN	3.50	286/1-4	03-04-2009
183	TN-II-2009 (1128)	.V.GUNASEKARAN, M/S EAST COST AQUACULTURE	VENUGOPAL	NO.20 VOC ROAD, MANNARG UDI MANDAL, THIRUVARUR DISTRICT	PERAVURANI	SOMANATHAPATTINAM	4.45	306/3,4,7-11, 14-17, 321/6,8	03-04-2009
184	TN-II-2009 (1127)	.S.HAPIP MOHAMED	SEHU ABDUL RAHUMAN	AMMAPAT TINAM POST, MANAMEL KUDI MANDAL, PUDUKOT TAI DISTRICT	PERAVURANI	ARIYAKUTTITHEVAN	3.00	45/1A, 45/2A	03-04-2009
185	TN-II-2009	.R.VETHANAYAGI, M/S JAYA	P.V.RAJENDRAN	NO.1 GUEST HOUSE ROAD,	PERAVURANI	SETHUBAVASATHIRAM	2.62	21/1,2, 22/1,18/5-10, 19/2,3,4,5,	03-04-2014



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SI No	Reg. No	Name	Father/Husband and Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
	(1126)	MARUTHI AQUA FARM		VEDARANI YAM MANDAL, NAGAPAT TINAM DISTRICT				283/1B,5,3C, 284/8, 229/8	
186	TN-II-2009 (1124)	.N.SETHUPATHI RAJA M/S MADONNA MARINES	NATARAJA KANDIYAR	VADIYAKK ADU, KEELAVIK IRAMAM, PATTUKO TTAI MANDAL, THANJAVU R DISTRICT	PATTU KOT TAI	ANDIKKA DU	2. 9 4	164/2, 165/1,2, 160/1A,1B, 163/2	03- 04- 200 9
187	TN-II-2009 (1123)	.S.SOMASUN DARAM, M/S. AYYA AQUA FARM	SIVANDAIYA THEVAR	T.KEELAK ADU, THIRUTHU RAIPOON AI TALUK, THIRUVAR UR DISTRICT	PATTU KOTT AI	T.VADAK ADU	3. 8 8	436/1, 435/1,5,7,8,9,10, 11,12	03- 04- 200 9
188	TN-II-2009 (1122)	.S.SANTHIM ERI	N.SETHUPATH IRAJA	VADIYAKK ADU, KEELAVIK IRAMAM, PATTUKO TTAI MANDAL, THANJAVU R DISTRICT	PATTU KOT TAI	ANDIKKA DU	2. 8 8	158/1,2, 160/2A,2B	03- 04- 201 4
189	TN-II-2009 (1121)	.D. AYYARU	DURAI RAJ THEVAR	T.KEELAK ADU, THIRUTHU RAIPOON AI TALUK, THIRUVAR UR DISTRICT	PATTU KOTT AI	PUDUKOT TAGAM	4. 3 2	256/2A,2B,251/ 1, 257/1,2,255/1	03- 04- 200 9
190	TN-II-2009 (1120)	.P.A.JOSE KUTTY, M/S. CALYPSO AQUA FARM	ANTONY	NO 59-H, KUMARAR AN NAGAR, MUTHUPE T POST, THIRUTHU RAIPOON AI TALUK, THIRUVAR UR DISTRICT	PATTU KOTT AI	PUDUKOT TAGAM	4. 2 8	283/1 TO 4,6,286/2,3,1,28 8/7,289 /5A,2,320/1A,1B , 325/3,4,1	03- 04- 200 9
191	TN-II-2009 (1117)	.T.MAYIL NATHAN,M /S. BIRAVAR AQUA FARM	V.THIRUGNAN A THEVAR	T.KEELAK ADU PO, MUTHUPE T VIA, THIRUTHU RAIPOON	PATTU KOTT AI	PUDUKOT TAGAM	4. 2 5	145/2,4B,5,6A,6 B,7,146/2B,156 /7,3,8,157/2,3,4, 5,6B,7,8,9,10	03- 04- 201 4

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SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				ITALUK, THIRUVARUR DISTRICT					
192	TN-II-2009 (1116)	R.CHOKALINGAM	RAMALINGA THEVAR	T.KEELAK ADU, MUTHUPET (VIA), THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTUKOTTAI	PUDUKOT TAGAM	4.25	271/1A,1B,2A,270/2B,2C,275/2,3A,2A,269/14C,276/2A,277/3,281/2,3,276/1,2B,281/1,318/1A,1B,277/1,11	03-04-2014
193	TN-II-2009 (1115)	.K.SHAJI	K.KUNJU SANKARAN	NO 30: WEST MAIN ROAD, VIVEKANANDA NAGAR, PONDICHERY	PATTUKOTTAI	PUDUKOT TAGAM	4.01	282/3 TO 10,288/4,5,6,2B,289/5B,6,7,286/4,325/2	03-04-2009
194	TN-II-2008 (0999)	RATHMAN ATHAN	RAJA GOPAL	MAIN ROAD, RAJAMADAM, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	RAJAMADAM	1.40	186/2,240/2,240/P,243/P	25-11-2008
195	TN-II-2008 (0998)	K. AMUTHA	. V. KULANDAI	KATTATHY, NAMBIVAYAL PO, ALANKUDI TALUK, PUDUKKOTTAI	PATTUKOTTAI	RAJAMADAM	1.59	259/2, 259/1,260/1,4	25-11-2013
196	TN-II-2008 (0997)	M. ARUNACHALA SERVAI	. MUTHU RAMALINGAM	KALYANODAI, PATTUKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	RAJAMADAM	2.00	185/3,5, 250/5,251/1	25-11-2008
197	TN-II-2008 (0996)	N.S. DURAI RAJ	. SHANMUGAM	SILLATHUR PO, ORATHAN DU TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	RAJAMADAM	1.40	186/4,7, 187/2,243	25-11-2008
198	TN-II-2008	K. SHANMUGAM	. KARUPPAN CHETTIAR	NO 28, VELLALAR STREET,	PATTUKOTTAI	RAJAMADAM	1.46	240/2, 241/2A,2B	25-11-2008

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SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
	(0995)			ARIYALUR - 621 704,					
199	TN-II-2008 (0994)	V. KULANTHAI	.VEERAPAN	KATTATHI PO, PUDUKKOTTAI	PATTUKKOTTAI	RAJAMADAM	1.40	186/1,187/1,3,4,253/1	25-11-2008
200	TN-II-2008 (0905)	P. GOVINDASAMY,	. PERUMALSAMY	P.G AQUA FARM, NO:30, K.O.N PALAYAM STREET, PATTUKKOTTAI TALUK, THANJAVUR DISTRCT	PERAVURANI	THIRUVATHEVAN	2.00	268/2, 276/2, 279/1,2, 280/2, 5,3, 280/6, 281/1, 2, 278/2A, 277/1, 3A, 277/3B	04-08-2013
201	TN-II-2008 (0904)	N. THIYAGARAJAN,	. NARAYANASAMY	WINNER AQUA FARM, 64/D.K.O.N PALAYAM STREET, PATTUKKOTTAI TALUK, THANJAVUR DISTRCT	PERAVURANI	THIRUVATHEVAN	2.00	277/6, 5, 7, 4, 278/2A, 278/2B, 3,4, 5, 281/1, 2, 3, 5, 6	04-08-2013
202	TN-II-2008 (0903)	S. VENKATESAN,	. SRINIVASAN	SV AQUA FARM, 17/133, N.M. NAGAR, HIGH SCHOOL ROAD, PATTUKKOTTAI TALUK, THANJAVUR DISTRCT	PERAVURANI	THIRUVATHEVAN	2.00	271/6, 7, 8, 9, 270/12, 14, 272/1, 2, 275/1,2, 275/5, 276/1,2	04-08-2013
203	TN-II-2008 (0902)	G. SUMATHI,	GOVINTHASAMY	PGS AQUA FARM, NO:30, K.O.N PALAYAM STREET, PATTUKKOTTAI TALUK, THANJAVUR DISTRCT	PERAVURANI	THIRUVATHEVAN	2.00	272/1,2,3,4; 273/1A,2,3; 274/1,2; 275/5,6,7,8,9	04-08-2013
204	TN-II-2008 (0901)	T. VANATHI,	. N. THIYAGARAJAN	NTV AQUA FARM, 64/D, K.O.N PALAYAM STREET,	PERAVURANI	THIRUVATHEVAN	2.00	273/1B, 273/3, 273/4A, 273/4B, 274/4, 274/3, 274/5, 274/6, 274/7,	04-08-2013

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SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				PATTUKK OTTAI TALUK, THANJAVUR DISTRICT				274/8, 277/6, 277/7, 277/5	
205	TN-II-2008 (0900)	V. K. MUTHAIYAN	. KARUPPAIYA THEVAR	VILANKULAM PO, PERAVURANI TALUK, THANJAVUR DISTRICT	PERAVURANI	ADAIKKA THEVAN	1.78	75, 77	04-08-2013
206	TN-II-2008 (0899)	P. GOVINDASAMY	. PERUMALSAMY KONAR	KALLIKKADU, THUVARANKURICHI PO, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PERAVURANI	ADAIKKA THEVAN	2.00	75, 78, 74, 77, 79	04-08-2013
207	TN-II-2008 (0898)	D. RAJA	DURAIRAJ PILLAI	MANNANKADU PO, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PERAVURANI	ADAIKKA THEVAN	1.80	74	04-08-2013
208	TN-II-2008 (0897)	G. MAHENTHIRAN	. GURUSAMY CHETTIAR	VATACHERI ROAD, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PERAVURANI	ADAIKKA THEVAN	1.90	75	04-08-2013
209	TN-II-2008 (0896)	T. VENKATRAMAN	M. THIYAGARAJAN	M/S RAM GARDENS, KARANGUDA-MARAKKA VALASAI, ECR, PERAVURANI TALUK, THANJAVUR DISTRICT	PERAVURANI	MARAKK AVALASAI	1.50	144/2B, 4, 5, 6, 7, 8, 9, 10, 11	04-08-2013
210	TN-II-2008 (0895)	S. VENKATRAMAN	. SOMUTHEVAR	4/74B, KURUVIKARAMBAI PO, PERAVURANI TALUK, THANJAVUR DISTRICT - 614 802	PERAVURANI	ADAIKAT HEVAN	1.60	84/1-B1	04-08-2008

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211	TN-II-2008 (0894)	V. ELAKKUMANAN	.VAIRAPPATHEVAR	T. KEELAKADU, MUTHUPE T (VIA), THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PERAVURANI	ARIYAKU TTITHEVAN	2.00	25/1, 3, 5, 28/7, 29/4	04-08-2018
212	TN-II-2008 (0893)	V. SEETHARAMAN	.VAIRAPPATHEVAR	T. KEELAKADU, MUTHUPE T (VIA), THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PERAVURANI	ARIYAKU TTITHEVAN	2.00	26/4, 26/5A, 7, 8A, 8B, 28/1, 29/1, 3, 32/1A, 1B	04-08-2018
213	TN-II-2008 (0892)	R. ANANTHAKUMAR	.RAJA MOHAN	T. KEELAKADU, MUTHUPE T, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PERAVURANI	ARIYAKU TTITHEVAN	2.00	24/3, 25/4, 29/6, 28/5, 29/5, 32/4, 23/1, 32/5, 33/2B	04-08-2018
214	TN-II-2008 (0891)	K. VAIRAPPAN	.GANAPATHITHEVAR	T. KEELAKADU, MUTHUPE T (VIA), THIRUTHU RAIPOONDI TALUK, THIRUTHU RAIPOONDI	PERAVURANI	ARIYAKU TTITHEVAN	2.00	13/11, 23/2, 3, 25/2, 28/6B, 33/1B, 13/12, 40	04-08-2018
				TALUK, THIRUVARUR DISTRICT					
215	TN-II-2008 (0890)	G. BUSHBANKATHAN	.GANAPATHITHEVAR	T. KEELAKADU, MUTHUPE T (VIA), THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PERAVURANI	ARIYAKU TTITHEVAN	2.00	33/1A, 26/1, 2, 3, 5B, 6, 28/2, 3, 4, 6A, 29/2	04-08-2018

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216	TN-II-2008 (0889)	T. VENKATRAMAN,	M. THIYAGARAJAN	M/S MEERA AQUA FARM, KARANGUDA-MARAKKA VALASAI, ECR, PERAVURANI TALUK, THANJAVUR DISTRICT	PERAVURANI	MARAKK AVALASAI	1.50	155/ 1, 2, 5, 6, 7	04-08-2013
217	TN-II-2008 (0888)	S. ARUMUGASAMY	. SIVA SHANMUGA NATARAJA THEVAR	T.MELKADU, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PATTUKOTTAI	NADIYAM	2.00	43/16, 24, 26, 17, 25, 42/2, 263/6, 8, 7, 9, 263/2,3	04-08-2013
218	TN-II-2008 (0887)	A. SHAHUL HAMEED	. ANNAMALAI MARAIYAR	M/S. MUTHUPE T AQUA FARM, 21, S.K.M. STREET, MUTHUPE T - 614 704, THIRUVARUR DISTRICT	PERAVURANI	NADIYAM	1.50	298/8B	04-08-2008
219	TN-II-2008 (0886)	C. RAJKUMAR	. CHITHAMBARAM	SUNNAMB UKKARA STREET, ANGALAMAN KOVIL SANTHU, PATTUKK OTTAI TALUK & PO, THANJAVUR DISTRICT	PATTUKKOTTAI	S.R. PATTINAM	1.29	31/18, 31/19	04-08-2008
220	TN-II-2008 (0885)	V. THANGAVEL	. VARUTHAPPA KAVUNDER	PANNAVAL ROAD, R.K. NAGAR, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PATTUKKOTTAI	S.R. PATTINAM	2.00	31/15, 31/16, 31/17	04-08-2008
221	TN-II-2008 (0884)	V. SELVARANI	VENKADACHALAM	VANDIYAR STREET, ATHIVETTI PO, PATTUKK	PATTUKKOTTAI	ERIPPURAKKARAI	2.00	235/5	04-08-2008

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				OTTAI TALUK, THANJAVUR DISTRICT					
222	TN-II-2008 (0883)	E. MOHAMED ABUBACKAR	. ESHACK	2, HOSPITAL ROAD, RAMMAM BALPURAM, MADUKKUR PO - 614903, THANJAVUR DISTRICT	PATTU KKOT TAI	ERIPPUR AKKARAI	2.00	235/3	04-08-2008
223	TN-II-2008 (0882)	E. ABDUL RAHIM	. ESHACK	85, PALLIVASAL STREET, MADUKKUR PO - 614903, THANJAVUR DISTRICT	PATTU KKOT TAI	ERIPPUR AKKARAI	2.00	235/3	04-08-2008
224	TN-II-2008 (0881)	DR. K. KALIDHASAN	. KALYANASUNDARA THEVAR	402, BARATHI SALAI, KARIKKADU, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	ANDIKKADU	1.60	159/3, 148/1, 148/2A	04-08-2008
225	TN-II-2008 (0880)	N. SEKAR	. NARAYANAN	KALLAMPATTI, SERUPALAKKADU PO, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	ANDIKKADU	1.70	131/2, 128/1A2, 128/1B2	04-08-2008
226	TN-II-2008 (0879)	M. VELUCSAMY	MUNIYAPPA KAVUNDAR	41/2, SUNNAMP UKARA STREET, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	ANDIKKADU	1.60	113/1, 114/1A2, 1B3, 1A3, 130/2, 148/3, 131/3, 4	04-08-2013
227	TN-II-2008 (0878)	K. CHITHAMBARAM	KUMARASAMY KAVUNDAR	8A/12, ANGALAM MAN KOVIL SANTHU, SUNNAMP UKARA	PATTU KKOT TAI	ANDIKKADU	2.00	162/2C, 125/3A, 126/5	04-08-2013

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				STREET, PATTUKK OTTAI TALUK, THANJAVU R DISTRCT					
228	TN-II-2008 (0877)	B. AMARTHAN GAVEL	BALAKRISHNAN	235, NATIMUTHU NAGAR, PATTUKK OTTAI TALUK,	PATTU KKOT TAI	ANDIKKA DU	1. 8 0	126/5, 125/3A, 108/4	04-08-2018
229	TN-II-2008 (0876)	A. SARAVANA N	ARUNACHALAM	T. MELAKADU PO, PATTUKK OTTAI TALUK, THANJAVU R DISTRCT	PATTU KKOT TAI	ANDIKKA DU	1. 7 4	114/1A, 123/1B, 1C, 1D, 2, 127/4	04-08-2013
230	TN-II-2008 (0875)	K. KANDASAMY	. KANDASAMY	101/26, R.K. NAGAR COLONY, PANNAVA YAL ROAD, PATTUKK OTTAI TALUK, THANJAVU R DISTRCT	PATTU KKOT TAI	ANDIKKA DU	1. 7 5	92/2A, 2B, 93/4, 114/1B1, 1B2, 114/3A, 3B, 3C, 113/5B	04-08-2013
231	TN-II-2008 (0874)	P.MEGANATHAN	. PANNEERSELVAM	PARAKKA LAKOTTAI, PATTUKK OTTAI TALUK, THANJAVU R DISTRCT	PATTU KKOT TAI	ANDIKKA DU	1. 6 0	120/2B3, 2B4, 115/1A1, 1B1,1B2, 1B3, 1B4, 124/2A, 2B, 2C, 2D, 2E, 2G, 120/1B3, 1B4	04-08-2013
232	TN-II-2008 (0873)	V. DURAISAMY	. VEERAPPAKAVUNDAR	51/8, SUNNAMP AKARA STREET, PATTUKK OTTAI TALUK, THANJAVU R DISTRCT	PATTU KKOT TAI	ANDIKKA DU	1. 6 5	162/1, 2B, 2A, 160/1C, 161/2B, 163/1	04-08-2013
233	TN-II-2008 (0872)	A. KAMAL BATCHA	K.M.M. ABDULKAREEM	1/65, KARIM HAJIYAR STREET, MALLIPAT TINAM POST, PATTUKK OTTAI TALUK, THANJAVU R DISTRCT	PATTU KKOT TAI	ANDIKKA DU	2. 0 0	147/1A, 1B, 1C, 149/1A, 129/1A1, 2B4, 150/1C, 134/2B	04-08-2018



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234	TN-II-2008 (0871)	K.M.M. ABDUL MAJITH	. MOHAIDEEN PITCHAI	SETHU ROAD, MALLIPAT TINAM, PATTUKK OTTAI TALUK, THANJAVUR DISTRCT	PATTU KKOT TAI	ANDIKKA DU	2.00	99/2, 3, 4B, 100/1A, 1D, 2A, 101/5A, 5B	04-08-2018
235	TN-II-2008 (0870)	S. BALASUBRAMANIAN	. SOMASUNDARA THAVAR	T. MARAVAK KADU, PATTUKK OTTAI PO, THANJAVUR DISTRCT	PATTU KKOT TAI	ANDIKKA DU	2.00	132/1, 2, 3, 147/2	04-08-2018
236	TN-II-2008 (0869)	B. KANAGESH	BALAKRISHNAN.K	NADIMUTH NAGAR, PATTUKK OTTAI TALUK, THANJAVUR DISTRCT	PATTU KKOT TAI	ANDIKKA DU	2.00	148/3, 159/2,3, 127/2, 128/2C	04-08-2018
237	TN-II-2008 (0868)	A. KAMAL BATCHA	. ABDUL KARIM	1/65, KARIM HAJIYAR STREET, MALLIPAT TINAM, THANJAVUR DISTRCT	PATTU KKOT TAI	ANDIKKA DU	1.74	30/2, 176/6, 176/23	04-08-2018
238	TN-II-2008 (0867)	A. ABDUL MALIK	. ABDUL AZIZ	M/S.AZIZ SHRIMPS, 62/B, NORTH STRET, MALLIPAT TINAM - 614723,	PATTU KKOT TAI	ANDIKKA DU	1.68	133/2, 134/2A, 145/1A, 1B1, 2A, 2C, 3A, 3C4A, 146/2, 3, 4A1, 4A2, 4A4, 4B, 146/4B2, 4B3, 5B, 6B, 150/1B	04-08-2018
239	TN-II-2008 (0866)	A. SHAHABUDEEN	ABDUL AZIZ	M/S. AZIZ MARINE, 62/B, NORTH STRET, MALLIPAT TINAM - 614723,	PATTU KKOT TAI	ANDIKKA DU	2.00	134/2B, 145/1B2, 1B5, 2D, 3D, 4B, 145/1B4, 2B, 146/4A3, 5A, 6A, 144/3A, 149/1A, 150/1C, 151/1A	04-08-2018
240	TN-II-2008 (01061)	M. RAJASEKARAN	. MUTHAIAH	SILLATHUR PO, ORATHAN ADU TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	RAJAMADAM	1.45	240/2, 242/P, 243/P	25-11-2008
241	TN-II-2008 (01060)	ASSISTANT DIRECTOR OF FISHERIES,	GOVERNMENT OF TAMIL NADU	NAGAPAT TINAM,	PATTU KKOT TAI	ERIPPURAKKARAI	2.00	235/15	25-11-2018

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		AQUACULTURE							
242	TN-II-2008 (01059)	R. PALANITHURAI	RAMACHANDRAN	PARAKKALAKOTTAI PO, PATTUKKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKKOTTAI	ANDIKKADU	200	144/2B,2C,3C,3D,151 /1C,2A,2B,1E,1F,2C,2D,2F,152 /1A1,1A2	25-11-2018
243	TN-II-2008 (01058)	K. BALAN	KARUPPAIYAI PILLAI	KALAIYAR KOVIL PO & TALUK, SIVAGANGAI DISTRICT	PATTUKKOTTAI	ANDIKKADU	171	134/2D,135 /2A2,2A3,2A4,2B2,2B3,2B4,136 /2A,2A2,2A3,2B1,2B2, 144/1A2,1A3,1A4	25-11-2018
244	TN-II-2008 (01057)	A. THAJUDEEN	.K.M. M.ABDULKARIM	1/65, KARIM HAJIYAR STREET, MALLIPATTINAM,	PATTUKKOTTAI	ANDIKKADU	160	99/4A,100/1B,1E,2B,2D,129 /1A3,1A4,1B	25-11-2018
245	TN-II-2008 (01056)	K. GOVINDRAJ	. KRISHNASAMY	PARAKKALAKOTTAI PO, PATTUKKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKKOTTAI	PUDUKOTTAGAM	200	142/4A,143 /1A,1B,1C,1E,1F, 1G,3A,3A2,143 /3B1,4A,4B,4C,144/1B2,1B3,1B4, 1B7, 1B8	25-11-2018
246	TN-II-2008 (01055)	D. SWAMINATHAN	.DURAI RAJ	CHETTIYAR STREET, PATTUKKOTTAI, THANJAVUR DISTRICT	PATTUKKOTTAI	ANDIKKADU	200	130/1,128/1A2	25-11-2018
247	TN-II-2008 (01054)	R. D. RENGASAMY, M/S. T.R AQUA FARM	. DHASNAMOORTHITHEVAR	MAIN ROAD, T. KEELAKADU PO, MUTHUPEET VIA, THIRUTHU RAIPOondi TALUK, THIRUVARUR DISTRICT	PATTUKKOTTAI	T. VADAKADU	200	406/10,11, 401/9,401/5,423/2,406/7,5	25-11-2008
248	TN-II-2008 (01053)	R. AYYAPPAN	RAJAPPA THEVAR	T. KEELAKADU, MUTHUPEET VIA, THIRUTHU RAIPOondi TALUK,	PATTUKKOTTAI	T. VADAKADU	176	358/1,2,353/1	25-11-2008

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				THIRUVARUR DISTRICT					
249	TN-II-2008 (01052)	M. NATARAJAN	. MURUGAIA THEVAR	T. MELAKADU, PATTUKKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKKOTTAI	T. VADAKADU	1.66	390/6-10	25-11-2008
250	TN-II-2008 (01051)	V. NATESAN	. VEERAIYA THEVAR	T. VADAKADU, PATTUKKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKKOTTAI	T. VADAKADU	1.64	390/1-5	25-11-2018
251	TN-II-2008 (01050)	T. RAJAMANICKAM	. M. THIAGARAJAN	THAMBIK KOTTAI, VADAKADU, PATTUKKOTTAI TALUK, THANJAVUR DISTRICT-614 704	PATTUKKOTTAI	THAMBIK KOTTAI, VADAKADU	1.60	421/1,2,3,4,5	25-11-2008
252	TN-II-2008 (01049)	S. NARAYANASAMY	. R. SARANGABANAN	THAMBIK KOTTAI, MARAVAKADU, PATTUKKOTTAI TALUK, THANJAVUR DISTRICT-614 704	PATTUKKOTTAI	THAMBIK KOTTAI, VADAKADU	1.30	418/5,8,9,10	25-11-2008
253	TN-II-2008 (01048)	T. VENKATRAMAN	. M. THIAGARAJAN	THAMBIK KOTTAI, VADAKADU, PATTUKKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKKOTTAI	THAMBIK KOTTAI, VADAKADU	1.30	421/6,7,8,9	25-11-2008
254	TN-II-2008 (01047)	V. KARTHIKEYAN	. VEDANAYAGAM	T. VADAKADU, PATTUKKOTTAI TALUK, THANJAVUR DISTRICT	PATTUKKOTTAI	T. VADAKADU	1.30	393/4,6,7,8	25-11-2018

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband and Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				R DISTRICT					
255	TN-II-2008 (01046)	V. SATTANATHAN	.VAIRAPPA THEVAR	T. KEELAKADU, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	T. VADAKADU	1.27	382/7, 394/1,4, 401/7	25-11-2018
256	TN-II-2008 (01045)	S. JAGADEESAN	.SUBRAMANIAN THEVAR	T. VADAKADU, PATTUKKOTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	T. VADAKADU	1.24	380/1,2,381/5, 10	25-11-2013
257	TN-II-2008 (01044)	R. SEETHARAMAN	.RENGU THEVAR	T. KEELAKADU, MUTHUPET VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	T. VADAKADU	1.20	402/1,2,5,6	25-11-2008
258	TN-II-2008 (01043)	S. VITHYALAKSHMI	.V. SATTANATHAN	T. KEELAKADU, MUTHUPET VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	T. VADAKADU	0.95	382/8,1,6	25-11-2018
259	TN-II-2008 (01042)	K. PAIRAVANTHAN	.KUPPUSAMY THEVAR	T. KEELAKADU, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	0.60	156/4, 6A	25-11-2008
260	TN-II-2008 (01041)	M.A. MAVULABUPAKKAR	JANAPAVIKKINALAI	NO.1: ATHANKARAI SANDU, MUTHUPET TAI PO, THIRUTHU RAIPOONDI TALUK,	PATTU KKOT TAI	T. VADAKADU	2.00	46/1,47/1,49/2, 63/3	25-11-2008

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				THIRUVARUR DISTRICT					
261	TN-II-2008 (01040)	E. SEHIK MOHAMED	IBRAMASH	S.K.M. STREET, MUTHUPE TTAI PO, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	2.00	46/6,7,9,11,52/2b,63/5b,4,62/1,83/5,6	25-11-2008
262	TN-II-2008 (01039)	G. RAMACHAN DRAN	.GANAPATHI THEVAR	T. KEELAKADU, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	2.00	53/2, 81/1C,82/2,83/2B	25-11-2018
263	TN-II-2008 (01038)	J. MANEKSHA	JAYAPAL	T. VADAKADU, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	2.00	229/3, 227/1, 226/1,2	25-11-2013
264	TN-II-2008 (01037)	A. ADAIKKALAMERI	ADIKKALASAMY	NO. 252, AMANAGAR, NIJAM COLONY, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	2.00	65/5,6, 68/1,2,3,4	25-11-2018
265	TN-II-2008 (01036)	D. PANNEER SELVAM	.DHARMALIN GAM	72, NADIAMMAN KOIL ROAD, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	2.00	57/2B,3,58/2,57/2A	25-11-2008
266	TN-II-2008 (01035)	M. BALASUBRAMANIAN	.MANIKKA THEVAR	T. KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK,	PATTU KKOT TAI	164, PUDUKOT TAGAM	2.00	275/2,3,4,276/1, 2A,2B,6,277/2A,2B,4,5,277/7,11,1	25-11-2013

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				THIRUVARUR DISTRICT					
267	TN-II-2008 (01034)	G.GUNA RATHINAM	.GANAPATHI THEVAR	T. KEELAKADU PO, THIRUTHU RAIPOondi TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	2.00	288/2A,289/3A, 3D,3B,3C,289/4A	25-11-2018
268	TN-II-2008 (01033)	E.J.MOHAID EEN ADUMAI	. JEYNALUPDEEN	86, A PETTAI ROAD, MUTHUPE T PO, THIRUTHU RAIPOondi I TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	2.00	262/3,1,2, 264/2,3A	25-11-2013
269	TN-II-2008 (01032)	S. SENTHIL KUMAR	. D. SETHURAMAN	41, KALYANI ILLAM, MANNAI SALAI, MUTHUPE T - 614 602, THIRUTHU RAIPOondi I TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.98	183/1A,1B,1C,184/1B,2B,3,186/1B,2,187/7, 207/2	25-11-2008
270	TN-II-2008 (01031)	S. SELVARANI	S. SENTHIL KUMAR	41, MANNAI SALAI, MUTHUPE T - 614 704, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.97	186/1A,187/8A, 8B,207/1	25-11-2008
271	TN-II-2008 (01030)	V. B. CHANDRAS EKARAN	BALASUBRAMANIAN	T. VADAKADU, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.84	192/1, 193/2,3,5,6,10, 4A,9B	25-11-2018
272	TN-II-2008 (01029)	C. VIJAYA RATHINAM	. CHITHAMBARA THEVAR	T. KEELAKADU, MUTHUPE T VIA,	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.73	146/2A,2B,146/1, 147/2B,135/4,5	25-11-2018

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				THIRUTHU RAIPOONDI TALUK, THIRUVAR UR DISTRICT					
273	TN-II-2008 (01028)	G. RAVUTHASAMY	.GANAPATHI THEVAR	T. KEELAKA DU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVAR UR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1. 7 1	268/1,2, 267/1,3	25-11-2018
274	TN-II-2008 (01027)	DR. S. SIVAKUMAR	.D. SETHURAMAN	41, KALYANI ILLAM, MANNAI SALAI, MUTHUPE T - 614 704, THIRUVAR UR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1. 7 0	183/3A,3B, 184/1A,2A	25-11-2008
275	TN-II-2008 (01026)	V. B. JAYAKUMAR	. BALASUBRAMANIAN	T. VADAKAD U, PATTUKK OTTAI TALUK, THANJAVU R DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1. 6 8	193/4B,9C,192/ 3,4, 193/1,6,7,8	25-11-2013
276	TN-II-2008 (01025)	B. VETHAVALLI	BALAKRISHNAN	235, NADIMUT HU NAGAR, PATTUKK OTTAI TALUK, THANJAVU R DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1. 6 7	251/2,252/2A,2B	25-11-2013
277	TN-II-2008 (01024)	S. SARAVANALINGAM	.D. SETHURAMAN	41, KALYANI ILLAM, MANNAI SALAI, MUTHUPE T - 614 704, THIRUTHU RAIPOONDI TALUK, THIRUVAR	PATTU KKOT TAI	164, PUDUKOT TAGAM	1. 6 2	182/2,187/2,3,4, 5	25-11-2008

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband and Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				UR DISTRICT					
278	TN-II-2008 (01023)	G. AYYAM PERUMAL	.GANAPATHI THEVAR	T. KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.60	220/2,196/3B,196/2	25-11-2013
279	TN-II-2008 (01022)	P. BALAIYAN	.POTHIYAPPA THEVAR	JAMBUVA NODAI, VADAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.60	311/2,3,4,5,6,1,315/4,5,316/2B,321/4,316/2A,7,3	25-11-2013
280	TN-II-2008 (01021)	K. BALAKRISHNAN	.KANAKESHA THEVAR	235, NADIMUTHU NAGAR, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.58	250/1, 252/1, 251/1	25-11-2013
281	TN-II-2008 (01020)	V. POONKOTHA I	.VAIRAPPA THEVAR	T. KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.55	199/2, 200/2A,2B,3	25-11-2018
282	TN-II-2008 (01019)	K. AYYARU	.R. KANTHASAMY	T. VADAKADU, PATTUKK OTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.50	209/2, 210/2,3	25-11-2018
283	TN-II-2008 (01018)	A. SARAVANA MOORTH I	.G. AYYAMP ERU MAL	T. KEELAKADU, MUTHUPE T,	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.50	196/3A1,4	25-11-2013



List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT					
284	TN-II-2008 (01017)	D. SETHURAMAN	.S. DHARMALINGAM	41, KALYANI ILLAM, MANNAI SALAI, MUTHUPE T, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1. 5 0	184/5,6, 185/1,2,3,4	25-11-2008
285	TN-II-2008 (01016)	T. R. CHANDRA SEKARAN	. RAVUTHA THEVAR	JAMBUVA NODAI, MELAKADU, JAMBUVA NODAI PO, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1. 5 0	316/4,5,6,7,315/ 3,2, 321/5,2,6,3,7A	25-11-2013
286	TN-II-2008 (01015)	N. DHARMALINGAM	. NARAYANA SAMY	PETTAI, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1. 4 6	264/1A,1B,265	25-11-2008
287	TN-II-2008 (01014)	KOBI KALYANI	. D. SETHURAMAN	41, KALYANI ILLAM, MANNAI SALAI, MUTHUPE T - 614 704, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1. 4 0	186,3,4,5,6,184/ 4,7,187/6	25-11-2008
288	TN-II-2008 (01013)	A. SELVANAYAGAM	. ANNAMALAI THEVAR	OTHIYATI KADU, KALYANA ODAI PO, MADUKKOR VIA, PATTUKK	PATTU KKOT TAI	164, PUDUKOT TAGAM	1. 3 9	169/4,5,6,7,9,10 A,11	25-11-2008

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
				OTTAI TALUK, THANJAVUR DISTRICT					
289	TN-II-2008 (01012)	G. VEERIYAN	. GHANA SUNDARA THEVAR	T. KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.30	58/3,4, 59/2	25-11-2008
290	TN-II-2008 (01011)	K. ANJUKAM	.M. KALYANA SUNDARA THEVAR	T. KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.25	69/1A, 2C	25-11-2013
291	TN-II-2008 (01010)	S. BARAMESWARI	.SEETHARAMAN	T. KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.20	200/4,5	25-11-2018
292	TN-II-2008 (01009)	A. VEERAMANI	.G. AYYAMPERMAL	T. KEELAKADU, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.20	221/2A, 222/2	25-11-2013
293	TN-II-2008 (01008)	RMS. YOGESWARI	. RMS. GOWDHAMAN THEVAR	PETTAI, MUTHUPE T VIA, THIRUTHU RAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.04	61/1,2,3	25-11-2013

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husband Name	Address	Mandal	Revenue Village	W S A	Survey No	Issue Date
294	TN-II-2008 (01007)	M. SARATHA	. N. MANOKARAN	T. KEELAKADU, MUTHUPETTIVIA, THIRUTHURAIPOONDI TALUK, THIRUVARUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	1.000	38/9, 40/1, 2	25-11-2013
295	TN-II-2008 (01006)	G. SWAMINATHAN	. GANAPATHI THEVAR	T. MARAVAKKADU PO, PATTUKKOTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	0.800	87/2, 4	25-11-2008
296	TN-II-2008 (01005)	S. YOGAVALLI	SIVASUBRAMANIAN	T. VADAKADU, MARUTHAN STREET, PATTUKKOTTAI TALUK, THANJAVUR DISTRICT	PATTU KKOT TAI	164, PUDUKOT TAGAM	0.661	64/1, 11, 2, 4, 65/1, 2	25-11-2013
297	TN-II-2008 (01004)	PMS. MOHAMED LEBBAIGANI	. SHICKTHAVUTHU	KATHUMAVADI PO, MANAMELKUDI TALUK, PATTUKKOTTAI DISTRICT	PERAVURANI	SENTHAL AIVAYAL	2.000	61/5B, 4G, 6A,6G,6E,6D,6F,5A,4F,6C,62/1	25-11-2008
298	TN-II-2008 (01003)	C. SUTHAKAR	. CHANDRASEKARAN	36-A, 4TH CROSS, BALAJI NAGAR, THANJAVUR DISTRICT	PATTU KKOT TAI	RAJAMADAM	1.600	18,52,50,252	25-11-2008
299	TN-II-2008 (01002)	MEERA SULOCHAN A	. K. KALIDASS	A7/G, IST FLOOR, RAGAVENDRAPURAM IIND STREET, SRIRANGAM, TRICHY DISTRICT	PATTU KKOT TAI	RAJAMADAM	1.600	18,52,50,251	25-11-2008
300	TN-II-2008 (01001)	M. J. VICTOR	MARIADASS	50, ANNA NAGAR, ARYALUR - 621713, PERAMBALUR DISTRICT	PATTU KKOT TAI	RAJAMADAM	1.566	1,86,24,32,52,253	25-11-2008

List of Farmers Registered in District						Valid for 5 years from date of Issue			
SI No	Reg. No	Name	Father/Husb and Name	Address	Mand al	Revenue Village	W S A	Survey No	Issu e Dat e
				LUR DISTRICT					
30 1	TN- II- 2008 (010 00)	S. LATHA SELVAM	SELVAM	UNJYAVID UTHI, ORATHAN DU TALUK, THANJAVU R DISTRICT	PATTU KKOT TAI	RAJAMAD AM	1. 4 0	2,50,25,21,57,25 1	25- 11- 200 8

## Annexure VIII List of activities prohibited or to be regulated within Eco-Sensitive Zone

S. No.	Activity	Description
<b>A. Prohibited Activities</b>		
1	Commercial mining, stone quarrying and crushing units	<p>(a) All new and existing mining (minor and major minerals), stone quarrying and crushing units are prohibited with immediate effect except for meeting the domestic needs of bona fide local residents including digging of earth for construction or repair of houses and for manufacture of country tiles or bricks for housing and for personal consumption;</p> <p>(b) The mining operations shall be carried out in accordance with the order of the Hon'ble Supreme Court dated the 4 th August, 2006 in the matter of T.N. Godavarman Thirumulpad Vs. UOI in W.P.(C) No.202 of 1995 and dated the 21st April, 2014 in the matter of Goa Foundation Vs. UOI in W.P.(C) No.435 of 2012.</p>
2	Setting of industries causing pollution (Water, Air, Soil, Noise, etc.)	<p>New industries and expansion of existing polluting industries in the Eco-sensitive Zone shall not be permitted:</p> <p>Provided that non-polluting industries shall be allowed within Eco-sensitive Zone as per classification of Industries in the guidelines issued by the Central Pollution Control Board in February, 2016, unless otherwise specified in this notification and in addition the non-polluting cottage industries shall be promoted.</p>
3	Establishment of major hydro-electric project	Prohibited (except as otherwise provided) as per the applicable laws.
4	Use or production or processing of any hazardous substances	Prohibited (except as otherwise provided) as per the applicable laws
5	Discharge of untreated effluents in natural water bodies or land area	Prohibited (except as otherwise provided) as per the applicable laws.

6	Setting up of new saw mills	New or expansion of existing saw mills shall not be permitted within the Eco-sensitive Zone.
7	Setting up of brick kilns	Prohibited (except as otherwise provided) as per the applicable laws
<b>B. Regulated Activities</b>		
8	Commercial establishment of hotels and resorts	<p>No new commercial hotels and resorts shall be permitted within one kilometer of the boundary of the protected area or upto the extent of Eco-sensitive Zone, whichever is nearer, except for small temporary structures for eco-tourism activities:</p> <p>Provided that, beyond one kilometer from the boundary of the protected area or upto the extent of Eco-sensitive Zone whichever is nearer, all new tourist activities or expansion of existing activities shall be in conformity with the Tourism Master Plan and guidelines as applicable.</p>
9	Construction activities	<p>(a) New commercial construction of any kind shall not be permitted within one kilometer from the boundary of the protected area or up to extent of the Eco-sensitive Zone, whichever is nearer:</p> <p>Provided that, local people shall be permitted to undertake construction in their land for their use including the activities mentioned in sub-paragraph (1) of paragraph 3 as per building bye-laws to meet the residential needs of the local residents:</p> <p>Provided further that the construction activity related to small scale industries not causing pollution shall be regulated and kept at the minimum, with the prior permission from the competent authority as per applicable rules and regulations, if any.</p> <p>(b) Beyond one kilometer it shall be regulated as per the Zonal Master Plan.</p>

10	Small-scale non-polluting industries.	Non-polluting industries as per classification of industries issued by the Central Pollution Control Board in February, 2016 and non-hazardous, small-scale and service industry, agriculture, floriculture, horticulture or agro-based industry producing products from indigenous materials from the Ecosensitive Zone shall be permitted by the competent Authority.
11	Felling of trees	(a) There shall be no felling of trees in the forest or Government or revenue or private lands without prior permission of the Competent Authority in the State Government.  (b) The felling of trees shall be regulated in accordance with the provisions of the concerned Central or State Act and the rules made thereunder.
12	Collection of Forest produce or Non-Timber Forest produce	Regulated as per the applicable laws
13	Erection of electrical and communication towers and laying of cables and other infrastructures	Regulated under applicable laws (underground cabling may be promoted).
14	Infrastructure including civic amenities	Taking measures of mitigation as per the applicable laws, rules and regulation and available guidelines.
15	Widening and strengthening of existing roads and construction of new roads	Taking measures of mitigation as per the applicable laws, rules and regulation and available guidelines.
16	Undertaking other activities related to tourism like flying over the Eco-sensitive Zone area by hot air balloon, helicopter, drones, Microlites, etc	Regulated as per the applicable laws
17	Protection of hill slopes and river banks	Regulated as per the applicable laws
18	Movement of vehicular traffic at night	Regulated for commercial purpose under applicable laws.

19	Ongoing agriculture and horticulture practices by local communities along with dairies, dairy farming, aquaculture and fisheries	Permitted as per the applicable laws for use of locals.
20	Establishment of large-scale commercial livestock and poultry farms by firms, corporate and companies	Regulated (except otherwise provided) as per the applicable laws except for meeting local needs.
21	Discharge of treated waste water or effluents in natural water bodies or land area	The discharge of treated waste water or effluents shall be avoided to enter into the water bodies and efforts shall be made for recycle and reuse of treated waste water. Otherwise the discharge of treated waste water or effluent shall be regulated as per the applicable laws
22	Commercial extraction of surface and ground water	Regulated as per the applicable laws.
23	Open Well, Bore Well etc. for agriculture or other usage	other usage. Regulated and the activity should be strictly monitored by the appropriate authority.
24	Solid waste management	Regulated as per the applicable laws.
25	Introduction of exotic species	Regulated as per the applicable laws.
26	Eco-tourism	Regulated as per the applicable laws.
27	Use of polythene bags	Regulated as per the applicable laws.
28	Commercial sign boards and hoardings	Regulated as per the applicable laws.
<b>C. Promoted Activities</b>		
29	Rain water harvesting	Shall be actively promoted
30	Organic farming	Shall be actively promoted
31	Adoption of green technology for all activities.	Shall be actively promoted
32	Cottage industries including village artisans, etc	Shall be actively promoted



33	Use of renewable energy and fuels	Bio-gas, solar light etc. shall be actively promoted.
34	Agro-Forestry	Shall be actively promoted
35	Use of eco-friendly transport	Shall be actively promoted
36	Skill Development	Shall be actively promoted
37	Restoration of degraded land/ forests/ habitat	Shall be actively promoted
38	Environmental awareness	Shall be actively promoted
39	Plantation of Horticulture and Herbals	Shall be actively promoted

## **Annexure IX The Salt Lease Agreement**

### **LEASING OUT CENTRAL GOVERNMENT' SALTPAN LANDS FOR SALT MANUFACTURE**

1. Central Government lands under the administrative control of Salt Commissioner' organization is leased out for salt manufacture for a period of 20 years through open tenders giving vast circulation in the salt manufacturing area concerned.
2. There is no renewal clause in the lease agreement.
3. The minimum lease money (Assignment fee @ Rs. 10/- per MT / per annum and Ground rent @ Rs. 5/- per acre/per annum) is charged as per Government policy subject to manufacture of salt at minimum yield per acre / per annum fixed by the Government of India from time to time. These rates are effective from 01.01.2004 and under revision. For the details with regards to levy of assignment fee and ground rent, minimum production of salt in respect of salt land owned by the Salt Department, Govt of India in various States and concessions given to various categories may be seen in the Government orders dated 27-1-2004 as at Annexure - A.

4. In respect of fresh and virgin lands, lease money/ assignment fee at half of this scale is recovered for the first three years. However, such conditions are always incorporated in the NIT and subsequent in lease agreement.
  
5. In respect of the duly registered Co-operative Societies of weaker section, the rate of assignment fee obtained in the NIT is charged at half of the normal rate of assignment fee proposed for the first five years.
  
6. Before the lands are formally assigned, the assignees is required to deposit a fixed amount equal to the estimated amount of assignment fee for one year as security deposit. This is refundable after successful expiry of the terms of the lease.
  
7. Notice inviting tenders for leasing of Salt Dept lands for salt manufacture are always uploaded on website. For detailed conditions of the Notice inviting tenders, please see website.

Annexure - A

Sankhya/ No. 02011/2/2003-salt

Bharat Sarkar/ Government of India

Vanijya Avam Udyog Mantralaya/

Ministry of Commerce & Industry

(Audyogik Neeti Aur Samvardhan Vibhag/

Department of Industrial Policy & Promotion )

Udyog Bhavan, New Delhi 110 011

Dated the 27th January,2004

To

The Salt Commissioner  
2A, Lavan Bhavan, Lavan Marg,  
Jaipur.- 302001

Sub:- Revision of assignment fee, ground rent and rate of minimum Production of slat per acre for charging assignment fee and Ground rent, etc of the Salt Commissionerate land- reg.

Sir,

I am directed to refer to the correspondence resting with your D.O. No 10(2) P/91.1546 dated the 20th Feb. 2002 and the recommendations of CAB for Salt made in its meeting held in New Delhi on 28.8.2003 on the subject mentioned above. The proposal of the Salt Commissionerate for revision of assignment fee /lease money and ground rent has been under consideration of the Government and the president is pleased to revise the assignment fee/lease money and ground rent as under: -

a) Assignment  
fee/ lease money has been revised to Rs. 10/- per tonne per annum of salt produced and issued subject to minimum production of salt in respect of each state as mentioned in para (2) below;

b) Ground  
rent has been revised to Rs. 5/- per acre per annum.

2. For the purpose of levy of assignment fee minimum production of salt in terms of tonnes per acre per annum has been fixed at the following rates in respect of salt land owned by the Salt Commissionerate in the following States:-

State Minimum production of slat in MT/Acre/Annum

Gujarat	30
Andhra Pradesh	20
Maharashtra	20
Karnataka	20
Orissa	10
Tamilnadu (other than Tuticorin area)	20
TamilNadu (Tuticorin area)	75

3. This order supersedes the following orders issued by the Ministry of Industry, Department of Industrial Development :-

- i. 18(4)/59-salt(pt.VIII) dated the 7th Dec. 1961
- ii. 16/23/63-Salt dated 20th June, 1964
- iii. 16/23/63-Salt dated 22nd July, 1964
- iv. 16(23)63-Salt dated 19th Dec. 1969
- v. 04014/1/89/Salt dated 24th July 1989.

4. The following procedure shall be adopted for levy of assignment fee/ lease money in the said States:-

(i) Ground rent should be recovered in lump sum annually in advance.

(ii) The assignment fee in respect of area covering more than 10 acres should be collected in installment, not exceeding four in a year. In respect of the holdings of 10 acres and less, the assignment fee for the entire lease period to be collected in installment not more than 10.

(iii) Before the lands are formally assigned the assignees should be required to deposit a fixed amount equal to the estimated amount of assignment fee for one year as security deposit. This would be refundable after the expiry of the terms of the lease. The assignment

fee paid as advance shall be adjusted against outstanding dues in case the lease of land given for manufacture of salt is revoked owing to violation of lease conditions.

(iv) In respect of fresh and undeveloped lands, lease money/ assignment fee at half of this scale should be recovered for the first three years. However, such conditions should be incorporated in the NIT and subsequent in lease agreement.

(v) In respect of the State of Orissa, the rate of assignment fee should be 40% of that applicable to other States. However, the annual ground rent shall remain the same.

(vi) In respect of the duly registered Co-operative Societies, the rate of assignment fee obtained in the NIT should be half of the normal rate of assignment fee proposed for the first five years.

(vii) In case of prevailing assignment fee obtained by NIT ranging from Rs. 1 to 10 , the minimum assignment fee shall be charged Rs. 10. However, this shall be made applicable after current lease tenure expires and competent authority renews the lease of land for another term.

(viii) In case the higher tender rate of assignment fee being more than Rs. 10, the lessee shall pay the tendered rate.

(ix) In case of holdings less than 10 acres where a fixed amount of assignment fee/ lease money is charged shall be calculated in such a way that minimum assignment fee does not come to less than Rs. 10 per tonne per annum.

(x) The revised rates of assignment fee and ground rent will be effective from 1st January,2004 onwards.

5. The working of the above formula should be reviewed at the end of three years and result of the review furnished to this Department.

6. This issues with the concurrence of IF Wing vide their Dy. No. 1728/AS&FA dated 23rd Oct. 2003.

Yours faithfully

(S. C. Sivaji Rao)

Under Secretary to the Govt. of India

Tele No. 23793510

Copy to

1. Pay and accounts Officer, Salt Commissioner, Jaipur
2. IF Wing, Deptt. of IPP
3. Sanction folder/Guard file
4. Deputy Salt Commissioner, Mumbai, Chennai and Ahmedabad
5. Assistant Salt Commissioner, Kolkata and Jodhpur.

(S. C. Sivaji Rao)

Under Secretary to the Govt. of India.

PROPOSED FORM OF INDENTURE OF LEASE OF GOVERNMENT LANDS FOR  
MANUFACTURE OF SALT

\*\*\*\*\*

This Indenture made on the .....day of..... two thousand..... between the President of India (hereinafter called the "lessor" which expression where the context so admits shall include his successors and assigns) of the one part and Shri/ Smt. / Kumari .....son / wife / daughter of....., residing at..... (hereinafter called the lessee which expression where the context so admits shall include his respective heirs, executors, administrators, legal representatives and assignees) of the other part.

OR

\_\_\_\_\_ (Name of person of \_\_\_\_\_ (Address and occupation) hereinafter referred to as the lessees which expression shall where the context so admits be deemed to include their respective heirs, executors, administrators, representatives and their permitted assignee of the other part.

OR

\_\_\_\_\_ (Name of person of \_\_\_\_\_ Address) and \_\_\_\_\_ (Name person) of \_\_\_\_\_ (Address of the firm or syndicate) under the name & the style of \_\_\_\_\_ (Name of the firm or a syndicate) registered under \_\_\_\_\_ (Act under which registered) hereinafter referred to as the lessees which expression shall where the context so admits be deemed to include all the partners of the said firm, their representatives, heirs, executors administrators of the other part.

OR

\_\_\_\_\_ (Name of company) a company registered under (Act under which incorporated and having its registered office \_\_\_\_\_ (Address) hereinafter referred to as the lease which expression shall where the context so admits be deemed its successors and permitted assignees of the other part.

OR

\_\_\_\_\_ of \_\_\_\_\_ Society of \_\_\_\_\_ (Address of society) a cooperative society registered under \_\_\_\_\_ (Act under regd.) herein which expression where the context so admits be deemed to include its administrative and legal representatives and permitted assignees) of the other part.

Whereas the lessee has applied to the lessor to grant to the lessee a lease of all that piece or parcel of land.....acres or .....Hectares in the .....salt factory or in the village of.....in the district of.....in the State of.....particularly described in the Schedule hereunder written, which the lessor has agreed to do upon the terms and conditions hereinafter appearing and contained.

Now this Indenture witnesseth that in consideration of the sum of Rs.....(Rupees.....only) paid as the ground rent for the year.....and the sum of Rs.....(Rupees.....) equivalent to the estimated amount of assignment fee for one year deposited as and by way of security before the execution of these presents (the receipt whereof the lessor hereby acknowledges) and of the balance of the assignment fee payable in installments as hereafter provided and of the ground rent

hereinafter reserve of the covenants and conditions on the part of the lessee hereinafter contained, the lessor doth hereby demise unto the lessee all the piece or parcel of land in the schedule hereunder written, particularly mentioned and described and all salt pans and brine pits upon in and under the said piece or parcel of land expressed to be hereby demised together with all easements and appurtenances to the said piece or parcel of land and pans belonging or reported to belong or with the same respectively usually held or enjoyed (hereinafter referred to as 'the demised premises").

The Lessor and the Lessee hereby covenant with each other in the manner following, that is to say;

1. (i) The Lessee shall pay Assignment Fee (AF) (in the beginning of each year in advance) i.e. total sum of Rs.....only at the rate of Rs. \_\_\_\_ per tonne, or as amended by the Government of India from time to time, of salt produced and issued subject to a minimum of.....tonnes per acre / per annum payable by the lessee on or before the date fixed from time to time.

(ii) Also pay Ground Rent (GR) of Rs.\_\_\_\_ in lump-sum only at the rate of Rs.\_\_\_\_\_ per acre per annum or as amended by the Government of India from time to time payable in advance at the beginning of every year on or before the date fixed by the Lessor.

(iii) The Lessor may permit payment of assignment fee in instalments not exceeding four in a year, along with simple interest as notified by the Ministry of Finance, Govt. of India, from time to time, on the balance of the assignment fee due on account of deferred payment. The amount paid by the Lessee as stated above shall be adjusted at the end of the said year on the basis of the quantity salt issued from the salt works.

(iv) The Lessee shall be liable to pay Cess on salt on removal as per the provision under Salt Cess Act, 1953 and rules made there under from time to time. Excess payment of Cess on Salt removal, if any paid, will be adjusted against Cess on salt payable on future removal of salt.

(v) In the event of failure to pay the Assignment Fee and Ground Rent as per agreement by the fixed date, a grace period of two months will be allowed and to pay the dues within the said grace period of two months, the Lessee (s) will be liable to pay interest thereon at a



rate not exceeding .....% per annum as fixed by the Ministry of Finance, Department of Expenditure, Government of India from time to time.

(vi) In default of payment of AF & GR during extended period of two months as aforesaid, the lease shall be liable to be terminated by service of a week's notice on the Lessee by the Salt Commissioner/ Dy Salt Commissioner on behalf of the lessor.

(2) The lease shall be subject as herein provided for a period of.....year commencing from..... provided always that either the Salt Commissioner / Deputy Salt Commissioner on behalf of the Lessor or the Lessee shall be at liberty to give notice of termination of lease in writing at the close of the salt manufacturing season. Such notice will have immediate effect.

(3) On expiry of the lease or its sooner determination thereof as provided herein clause Nos. 1, 2, & 20, the Lessee shall leave the demised premises in such a good order and condition as is consistent with the due performance of this lease and shall remove himself entire quantity of salt and also all civil structures and dwelling units etc. erected or made thereon along with machinery/ Washery / Refinery / Iodization Plant or any other machinery related to improvement of quality of salt etc., erected by him on the said land at his own costs, within four weeks' from the date of notice or the order terminating lease, whichever is earlier, failing which, the civil structures and dwelling units etc., machinery etc., stated above shall stand forfeited to the Government; and the Lessee shall not be entitled to any compensation for any expenditure that may have been incurred in respect of the works or machinery. The actual expenditure incurred for removal of the civil structures and dwelling units etc. would be recovered from lessee.

(4). (i) The Lessee shall use or utilize the demised premises exclusively for the manufacture, storage and sale of salt including salt iodization and refining and for the works connected therewith and shall not do any construction work relating to dwelling houses on the demised premises and shall not utilize it for any other purpose. The lessee may, however, use a part of premises for constructing office premises / Laboratory on specific approval of the Competent authority. No additions / alteration to the existing civil structures etc. should be made without prior approval of the lessor.

(ii) The Lessee shall furnish the plan of his salt works or the realignment of existing salt works for prior approval to the Salt Commissioner / Deputy Salt Commissioner before the construction is started and no alteration thereafter should be made without sanction of the lessor. The Lessee(s) shall complete all preliminary arrangements in time to commence the manufacture of salt within a reasonable time of two years from the date of issue of the lease

orders / tender acceptance orders. The Lessee(s) shall pay expenses of any survey that may be ordered of the land within the aforesaid limits and of preparing maps thereof.

(5). (i) The Lessee shall allow the officers of the Govt. of India duly authorized in this behalf by the Salt Commissioner or Deputy Salt Commissioner or any other equivalent competent officer (hereinafter referred to as "The Authorized Officer) to inspect his salt works and civil structures and shall reserve for the Lessor such portion of the demised premises as the authorized officers may from time to time require for the purpose of providing experimental pans worked by or under Government of India control for means of communication and for erecting guard houses, store houses and offices.

(ii) The Lessee(s) shall be bound to allow all neighboring Lessee(s) / salt manufacturers and their labourers such reasonable right of way over the ridges of their pans as may be necessary for them to carry the salt from their pans to the drying grounds, storage platforms or otherwise.

(6). The Lessor reserves to himself the right to any quarries, mines, veins and beds of coal, lead stone, or other minerals in or under the demised premises with liberty to himself and his employees to enter and search for such minerals and to dig and carry them away doing as little damage to the Lessee's works and interfering as little with his liberty as possible.

(7) The Lessee shall pay Non-Agricultural Land Assessment Tax or any other tax as prevailing from time to time in respect of all such portions of the demised premises under salt manufacture or in respect of use of the said land or portion thereof for any purpose incidental to the same viz. like salt iodization, refining, brine storage tanks, office, engine rooms, fuel yard, settlers etc., reservoirs, condensers, crystallizers and their ridges, brine pits and bitterns channels, brine supply and transport channels as also platforms, drying grounds and roads and pathways within factory limits and also all existing and shall also pay Cess, taxes, duties, rents and outgoing of every description for the time being payable or which may hereafter become payable either by the land lord in respect of the demised premises and any buildings, machinery etc., and in such cases, it will be lessees who shall be responsible for payment thereof.

(8). The Lessee shall not manufacture salt, not conforming to the quality standard as prescribed under Clause 14 below, in the demised premises, and shall forthwith destroy / upgrade such salt, if any, at its own costs and shall not make any commercial or other use of such salt.

(9). The Lessee shall bear the costs of all works incidental to laying out of the reservoirs, condensers, crystallizers and pans and the lifting of brine, boiling refining, iodization etc.

(10). Except with the written consent of the Lessor, first obtained, the Lessee(s) shall not assign, underlet or part with possession of the demised premises or any portion thereof and shall not transfer by way of sale, gift, mortgage or otherwise the demised premises provided that nothing herein contained shall prevent the lessee at any time from taking any partner or partners into the business carried on by them under the present lease, after obtaining the previous approval in writing of the Salt Commissioner / Deputy Salt Commissioner, on the terms and condition prescribed by him..

(11). The Lessee shall work the salt works directly under him / their authorized person and shall employ supervisors capable of understanding and carrying on such improved methods of manufacture as may be prescribed by the Authorized Officer for the production of salt of good quality. In the event of the Lessee proposing appointment of any Power of Attorney to direct and supervise the work of Salt manufacture, the previous permission in writing of the Salt Commissioner / Deputy Salt Commissioner of the Region shall be obtained.

(12). The Lessee (s) shall not sell salt manufactured by it at an ex-factory price higher than that fixed by the Govt. of India or the State Govt. if any, from time to time.

(13). (i) The Lessee shall comply with such rules in respect of manufacture, storage and sale of salt as may be in force from time to time and shall maintain general discipline of the factory.

(ii) The Lessee (s) shall exercise due diligence in manufacturing of salt and shall work the leased area to its' full capacity every year. It shall produce the minimum quantity of salt fixed for the State in which land is located. Failure to produce such quantities of salt for two consecutive years may entail cancellation of lease.

(14). The Lessee(s) shall manufacture salt of a quality not inferior to the standard laid-down under the P.F.A. Act, 1954 and declared by the Government by a notification in the Gazette of India from time to time or any other similar law enacted by the Government.

(15). The Lessee(s) shall be bound, at his own expenses, to construct and maintain within the salt works set up in the demised premises in good repair all roads and all channels, reservoirs, embankments, drying grounds, platforms and other works used or intended to be used for

the manufacture and storage of salt, and would also construct and maintain any works required for protection of the salt works from inundation or for the supply of brine to the satisfaction of the authorized officer.

(16). The Lessee (s) shall make adequate arrangements to prevent demised premises from misuse / encroachments by fencing and employing security guards wherever needed, at its own cost and will also not be entitled for any compensation whatsoever from the Government of India, on account of such construction and for expenditure incurred on employment of security guards.

(17). The Lessee shall pay wages as per Minimum Wages Act as notified by the Government to the labour employed by them and shall also provide welfare amenities in accordance with the Labour Laws / Rules / Orders, applicable in the respective State.

(18). In the event of issuance of notice of termination either by the lessor or by the lessee, the lessee shall pay all sums due or falling due to the lessor up to the close of the manufacturing season in which such notice is given, otherwise all the sums due under this lease shall be recoverable as arrears of land revenue as per provisions of the Revenue Recovery Act, 1890 and rules made there under from time to time.

(19). The lessor shall be entitled to a lien every year up to 25% of the salt produced by the lessee in the factory and the lessee shall keep in reserve the 25% of the salt manufactured in the leased salt works in that season. Such salt shall be termed "Government Reserve". The lessor will have the option to purchase the said Government Reserve salt at such rate as may be decided by the Govt. of India from time to time. The Government Reserve Stock of the season shall be released by the lessee for disposal as it is replaced by equal quantity of the new salt of the succeeding season.

(20). Subject to the foregoing conditions, the Lessee shall continue to enjoy the demised premises undisturbed for a term of twenty years commencing from.....provided that (i) the Salt Commissioner / Deputy Salt Commissioner, on behalf of the Lessor, shall be at liberty to determine forthwith the lease on account of the lessor / Govt. requiring the leased land for public purposes giving to the lessee notice in writing during currency of lease stated above, (ii) in case of breach of any of the above mentioned conditions, or in the event of lessee delaying payment of any sum or sums due under this Agreement for over two months (excepting payment in installments of the agreed sums, in respect of the ground rent or assignment fee) for which a specific provision has been made in Clause I hereof from the date

when it falls due, then in such event, the lessor may determine the lease forth with and the security deposit paid shall stand forfeited to the Govt.

(21). In the event of any question, dispute or difference arising in respect of or in connection with these presents (excepts as to any matters, the decision of which is specially provided for by these presents), the same shall be referred to the sole arbitration of the Salt Commissioner or some other person appointed by him. It will be no objection that the Arbitrator is a Government Servant that he has to deal with matters to which these presents relate or that in the course of his duties as Government servant, he had expressed views in all matters or any of the matters in dispute or difference. The Award of the Arbitrator shall be final and binding on the parties to this Indenture. The provisions of Arbitration and Conciliation Act, 1996 and the rules made hereunder and in statutory modification therein for the time being in force shall apply to the Arbitration proceedings under this clause.

In witness whereof Shri.....  
.....for and on behalf of the President and .....have hereunto  
and subscribed their respective hands and seals the day and year first above written.

Signed by (name)..... (designation) for and on behalf of the President  
of India In the presence of :

1. Witnesses:

Occupation

Address.

2. Witnesses:

Occupation

Address

(Signature)

FOR AND ON BEHALF OF

THE PRESIDENT OF INDIA

Signed by the above named lessee (s) in the presence of

1. Witnesses:

Occupation

Address.

2. Witnesses:

Occupation

Address

Signature of lessee (S).

SCHEDULE