

# **RESTORATION OF CHELLANAM PANCHAYATH**

**Interim Report submitted to the  
Hon'ble Minister for Fisheries, Culture and  
Youth Affairs  
Government of Kerala**

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## PREFACE

Chellanam is a calm coastal village of serene beauty with about 16000 families of inhabitants. Main vocation of the families in the village is intricately intertwined with various facets of fisheries. Being a narrow coastal strip of land between the sea and the Vembanad backwaters, the village had multiple waterways and channels for stabilising the seawater influx from the seaside and freshwater influx from the backwater side. Owing to various factors, which need extensive scientific study, the coastal belt of Chellanam is under the dreadful phenomena of coastal erosion. However, timely intervention by providing a strong seawall has protected the coastline without much damage for several years. Due to the climatic variations and increasing monsoon waves, there has been chinks in the protection capacity of the seawall not only due to the increasing fury of the monsoon waves but also due to the lack of water receding channels on the shoreside of the guarding seawall. This has led to an ominous situation in this comparatively peaceful village with severe wave over topping and flooding becoming a norm of the monsoon days with the families residing near to the seawall spending sleepless nights for fear of the fury of waves, which hurls large seawall stones and tons of water directly hitting the houses, damaging them irreparably.

While the Government and administration has been doing many corrective measures in solving the situation, it has become apparent that the steps in this direction is not adequate enough to protect the vulnerable section of this land area and its residents. It is in this juncture, our Hon. Minister for Fisheries, Shri. Saji Cheriyan when visiting our university and while interacting with the staff requested the Kerala University of Fisheries and Ocean Studies to take up this problem as a challenge and do all what possibly can and adopt this placid village and submit a detailed proposal for the wholesome protection and total development of all spheres of activities of the people of this village.

We at KUFOS are always ready to stand by the side to the people in this State and do whatever we can for alleviating the sufferings of the communities. In this regard, we have made a Committee to take up the various activities directed at all spheres that need improvement and gathered information by expert consultations, stake holder meetings, invited expert lectures, individual house hold electronic surveys, department level meeting with various authorities for making up the report. This report forms the preliminary draft aimed at touching all the different aspects ranging from engineering solutions to the crucial issue of coastal protection and prevention of flooding to various other issues like rehabilitation, livelihood enhancement,

health protection, education improvement, infrastructure development, social and psychological upliftment, sports and cultural support etc. In as much as the University would be undertaking the activities connected with the expertise at its disposal to the benefit of Chellanam community, KUFOS would also connect and negotiate with all other concerned departments and offices that would be required to participate in the wholesome development of the Chellanam coastal village.

Prof. K. Riji John  
Vice Chancellor, KUFOS

## **EXECUTIVE SUMMARY**

At the behest of Shri. Saji Cheriyan, Hon'ble Minister for Fisheries, different sub committees were formed under the chairpersonship of KUFOS officers incorporating members and experts from outside for formulating a detailed proposal for the comprehensive development of Chellanam Panchayath. The committees on coastal protection and drainage have made an overview of all the possible measures with regard to shore protection and rectification of drainage issues, and proposed suggestions incorporating the scientific inputs and indigenous technical knowhow of the local community. The Government of Kerala is to assign the implementation of the coastal protection and other engineering aspects to the different nodal departments as may be necessary. At the same time, a detailed study has been planned by KUFOS all along the coastal stretch of Kerala to investigate similar issues and to propose the mitigatory measures. Also, the aspects of bio-shielding integrating mangroves and other plant communities will be taken care of KUFOS.

Agriculture and aquaculture development are the other two aspects covered extensively under the study. People of Chellanam had been recognized as very good farmers both in land and water in the past but unfortunately they lost the glory in recent times which needs to be revamped to protect the livelihood of thousands of families. Since the socio-economics is an integral part of development index, a comprehensive socio-economic study has been proposed by the KUFOS team.

Health aspects of Chellanam people was considered with due importance by the concerned committee and proposed a comprehensive plan to establish a hospital with all facilities. The committee wishes to undertake a study on local and State level basis encompassing the fish consumption linking with the health aspects of the population.

Fishing has been a major occupation of Chellanam people since many centuries. The newly established harbour in Chellanam is a boon to the local fisher folk as it supports easy and faster marketing. Since there is immense scope for enhancing the sector, improving the cold chains for attaining better price levels, value addition of fishery products and utilization of waste materials are included in the report.

Addressing the issues of child and women development including the recreational and cultural aspects coupled with mental health was considered with due importance during the preliminary investigation. A comprehensive plan has been proposed by the concerned committee comprehending all the related aspects including the sports and cultural development.

Lastly, the suggestions given by two external parties; one suggesting the generation of electrical energy using the groynes and another on the construction and laying of Chelploid as a means of shore protection and road transportation have also been incorporated in this report.

A set of recommendations is included at the end for the easy reference.

**KUFOS TEAM**

# **CHAPTER 1**

## **INTRODUCTION**

Chellanam is a coastal Panchayath of Ernakulam located in the Southwest border of the District, connecting Ernakulam and Alappuzha Districts with a total coastline of 17.5 km. The Panchayath has a total population of almost 16000 mostly belonging to the working class and farming community mainly into daily labour work, fishing, agriculture, aquaculture etc. with relatively modest or poor living conditions. The major issue faced by the Panchayath is the erosion of the seashore, which has been creating serious havocs among the people due to destruction and loss of houses constructed near the shore. Unfortunately, large stretches of revenue land and property owned by the local community have been eroded over a period a 40-50 years in this area. Hundreds of families lose their houses and other valuables on a regular basis due to the sea rise and saline water intrusion. The phenomenon of coastal damage is supposed to be resulted due to the peculiar nature of seawater movements existing in the Cochin area of the Arabian Sea. A few studies have reported that the erosion of Chellanam coast started with the dredging by the Cochin Port Trust including the outer channel deepening. Offshore dumping of the dredged material doesn't help the replenishment of sand on Chellanam coast. The dumping of the dredged material from the ship channel in open sea by Cochin Port Trust is believed to aggravate the coastal erosion in Chellanam.

A science and technology based solution is required for managing coastal erosion and disposal of materials dredged by the Cochin Port trust. Raising and strengthening the sea wall, construction of groynes at least at the rate of 2 nos. per kilometer, use of geo tubes appropriately, dumping the dredged soil (by Cochin Port Trust) in Chellanam areas instead of open sea, giving alternative avocations to the suffering families (fish culture, animal keeping, bird rearing, aquaponics, biofloc farming, installation of small fish drying units etc.), giving compensation to the affected incumbents, rehabilitating the people to distant places by providing proper housing and shelter, revamping the canal and drainage system, cleaning of inland areas for rejuvenating the shrimp culture operations, up grading and maintaining proper drinking water distribution system, proper maintenance of existing coastal protection structures, bio-protection of the area through afforestation with appropriate plant community (mangroves), putting FADs to promote sustainable fishing, reclaiming the lost land along the



coast as per the revenue records, improved coordination among the various Departments and Organizations, Formation of an Authority to Save Chellanam with proper funding support, attracting international attention etc. are the various suggestions put forth by the local population.

So, it is the need of the hour to understand the reality of the situation, to synthesize the demands and to address the issues in a sustainable perspective. There is an immediate requirement to plan short, mid and long term programmes for permanently saving the eco-geographic integrity of the region and improving the livelihood of the people by adopting a scientific approach and taking care of their daily bread and most importantly boosting their morale up by psychologically supporting them in every sense by protecting them from fear to live in their own land.

Under these circumstances, as directed by the Government, Kerala University of Fisheries and Ocean Studies (KUFOS) has organized a Half Day Consultation Meeting on 29th May 2021 Saturday for supporting Chellanam by bringing all the associated organizations and people to a single platform. The programme was organized in a HYBRID mode with both online and offline participation and discussion. Hon'ble Minister for Fisheries, Harbour Engineering and Culture, Sri. Saji Cheriyan inaugurated the programme in which the Hon'ble Minister for Industries, Sri. P. Rajiv presided over and the Vice Chancellor, Prof. (Dr.) K. Riji John proposed the welcome address. Dr. K.V. Thomas, former Dean of KUFOS has presented the keynote address.

The major objective of the programme was to build up confidence among the coastal population residing in Chellanam and adjoining coastal zones by preparing an Integrated Management Plan and implementing in a time bound manner. The Chellanam model, if found successful will be extended to the different coastal areas of the State modifying it to the specific, regional, eco-morphological and socio economic conditions. Ocean Scientists, technologists, social scientists, academicians, NGOs, people's representatives and local community leaders participated in the meeting. For preparing an action plan, a Chellanam Restoration Committee was constituted by KUFOS under the Chairmanship of the Vice Chancellor. The areas of the intervention of members are noted against their name.

1. Prof. (Dr.) Riji John, Hon'ble Vice Chancellor, Chairman
2. Dr. B. Manojkumar, Registrar, KUFOS
3. Shri. Joby George, Finance Officer
4. Prof. (Dr.) Daisy C Kappen, Director of Extension & Convenor, CRC

5. Prof. (Dr.) Devika Pillai, Director of Research
6. Prof. (Dr.) Suryakala, Dean, Ocean Engineering and Technology
7. Prof. (Dr.) Radhika Rajasree, Prof. & Head, Dept. of Fish Processing Technology (Fish processing and value addition)
8. Dr. Basil Mathew, Adjunct Faculty
9. Dr. Girish Gopinath, Assoc. Professor (Drainage systems)
10. Dr. Binu Varghese, Asst. Professor (Aquaculture)
11. Dr. Anu Gopinath, Asst. Professor (Education and empowerment aspects)
12. Dr. Safeena M.P., Asst. Professor (Health)
13. Dr. Phiros Shaw, Asst. Professor (Coastal protection)
14. Dr. Abhilash Sasidharan, Asst. Professor (Fish processing and value addition)
15. Sr. T. Manjusha, Asst. Professor (Education and empowerment aspects)
16. Dr. Rajesh K., Asst. Professor (Economics)
17. Er. Mohammed Koya, University Engineer (Infra structure development)
18. Shri. K.K. Reghuraj, Farm Superintendent (Agriculture and bio-shielding)
19. Shri. Raju Raphael, Director, Public Relations
20. Dr. K. Dinesh, Associate Professor & KUFOS Nodal Officer, CRC (Overall coordination)

The concerned officers were entrusted to make separate sub committees to prepare reports encompassing various sectors like coastal protection, inundation, drainage systems, aquaculture development, agriculture development, welfare of women and children, health, tourism, sports and cultural activities, infrastructure development, bio-shielding, alternate energy sources etc.

To make the committee members aware of the global efforts on costal protection and beach nourishment, a renowned expert in the area Mr. Mathew Joseph was invited for a general discussion on 3rd June, 2021. He has explained the various projects operated around the world including certain Indian States to protect the shores aiming the overall welfare and safety of the coastal communities.

Further, a Stakeholders' Meet was organized on 7th July 2021 in which 120 delegates from various realms of life participated and took part in the discussions. Their suggestions and thoughts were recorded by the committee for enriching the report with respect to various points of discussion. Wide publicity was given in the media inviting response from all corners interested in Chellanam issue.

A questionnaire was formulated for Chellanam people on Google Doc (in both Malayalam and English) to gather the first hand information from them on various aspects. It was widely circulated among the community since June 17th. The response from the public has been rather poor, may be because of the COVID-19 issues.

In response to all our efforts, ten groups from Chellanam have come to the University and handed over their plans and thoughts on Chellanam restoration. The groups who submitted their opinions included Matsyathozhilali Union (CITU), Fisheries organization of AITUC, Fisheries organization of INTUC, Care Chellanam, CADAL, Ernakulam District Residence Apex Council, a bonafide group containing 191 members, another group of residents from the premises of Manassery gap and a few other NGOs. Another consortium under the leadership of Shri. Santhosh Thanikkat came forward a discussion to discuss the alternative energy sources for Chellanam by using the groynes constructed.

Shri. Sheikh Pareeth, State level Nodal Officer has convened a meeting with the NCCR and other related departments in which the Vice Chancellor, Registrar and a few committee members participated. Dr. Ramana Moorthy, Director, NCCR presented a draft report in the meeting. The plans for protecting the shore of Chellanam were discussed in detail and the draft report was submitted to the Government by them.

The Interim Report contains 13 chapters encompassing various segments like coastal protection, inundation, alternative shore protecting methodologies including bio-shielding, source of alternative energy, drainage issues, agriculture, aquaculture, livelihood security, fish processing, education and child development and health sector. All the different aspects are given as included as separate chapters for easy understanding and paving way towards further discussions and fine tuning.

During the interactive sessions, the residents of Chellanam, Local Self Government officials, NGOs, Church authorities and public have raised the following issues.

1. Need of coastal protection
2. Need of beach nourishment
3. Rectify the drainage issues
4. Improve the livelihood of the residents promoting different programmes
5. Revamp the agriculture and aquaculture
6. Improve the health of children, women and youth
7. Build self-confidence among the population
8. Revisit the “Punargeham” programme proposed by the Government

The various sub committees looked into these issues separately taking suggestions from stakeholders, public and all other relevant sources. The ideas are shared in the upcoming chapters with suiting titles and appropriate photographs.

# CHAPTER 2

## COASTAL PROTECTION

### 2.0 INTRODUCTION

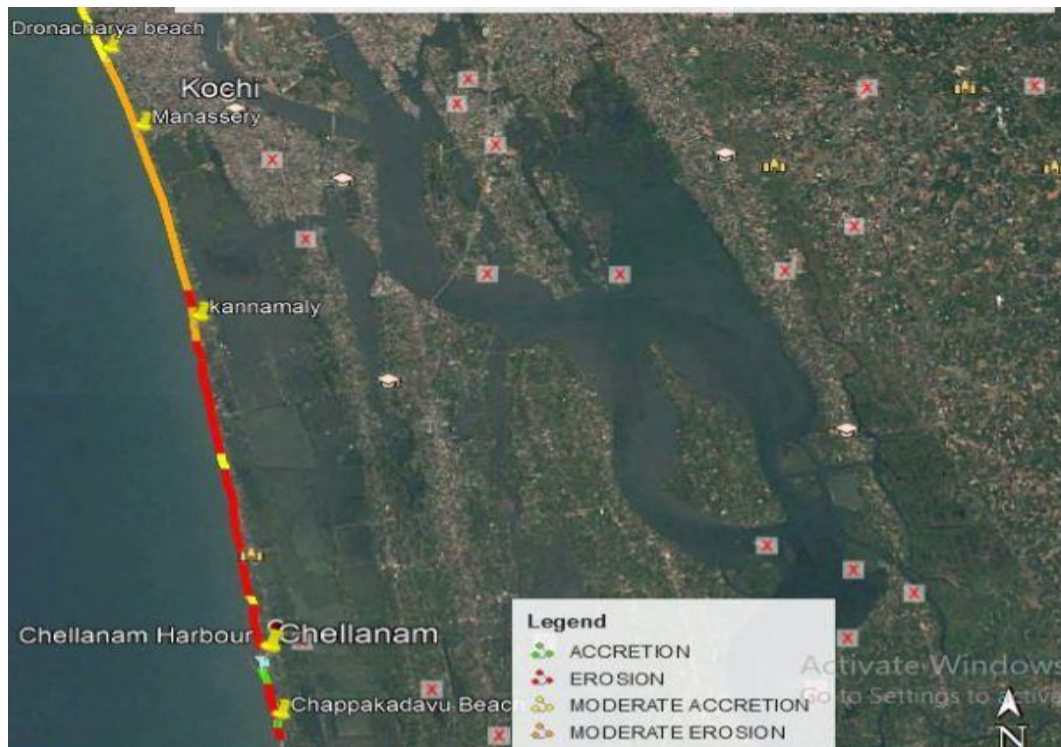
The coastal stretch of Chellanam panchayat (henceforth Chellanam coast) extends to about 15 km, from Manassery at the north to St. George Church, south Chellanam at the south. The Chellanam coast is constantly under the siege of flooding and inundation during high waves and tides. Furthermore, most part of coastal Chellanam is under erosion and need to be properly monitored with detailed site-specific study for implementation of coastal protection measures. Recently the passage of tropical cyclone ‘Tauktae’ badly affected the entire coastal belt of Chellanam. Huge waves overtopped the sea wall resulting flood to the low lying areas. Severe damages occurred to the houses, household items, vehicles and other infrastructure facilities. Most critical stretches of coastal erosion and inundation is located between Companypady to Chellanam Harbour.

The adopted protection measures are inadequate to manage the erosion and inundation along the Chellanam coastal stretch. Along several places of the Chellanam coast, these protection structures were critically damaged causing overtopping during high waves. Toe scouring and undermining is considered to be the main causative factor for the damage of the sea wall. The wave action along the sea wall is also increased due to the bathymetry changes near toe of the sea wall.

**Critical Stretches:** - Cheriyakadavu, Companypady, Kannamaly, Puthenthodu, Velankanni, Bazar, Chalakkadavu, Malaghapady.

### 2.1 PROBABLE CAUSES OF COASTAL EROSION ALONG CHELLANAM

From the available secondary data and remote sensing data sets it was inferred that net longshore sediment transport along the Chellanam coastal stretch is towards north. The cumulative shoreline change of Chellanam from the year 2015 – 2021 is given in Figure 1 with demarcation of erosion/accretion areas. From Figure 1, it is evident that erosion is predominant in the Chellanam Coast with moderate accretion towards North of the coastal belt. The trapping of the sediments by the groynes placed at INS Dronacharya suggests that the longshore sediment transport pattern is towards north. The South side of Chellanam Harbour tacit the accretion process, which again suggests the littoral drift pattern towards North.



**Figure 1:** Shoreline mapping of Chellanam for the years 2015 to 2021. Eroded and Accreted areas are clearly demarcated with different colours. [Red: Erosion, Green: Accretion, Yellow: Moderate Accretion, Magenta: Moderate Erosion]. [Data Source: The LANDSAT 8 (OLI/TIRS)]

The construction of Harbour at south Chellanam obstructed the northward sediment transport at the south of the coastal belt and making Chellanam coast a sediment deprived area. It has been observed that lot of sediments are deposited near Andhakaranazhi south of Chellanam. The northward transport of sediments is blocked by the fishing harbour disturbing the natural sediment balance. Furthermore, sediment transported to the Cochin Sea mouth (port inlet channel) is continuously dredged away affecting the natural course of beach development along this coastal stretch. Inorder to understand the reason for the coastal erosion conclusively, proper site specific scientific study is needed.

## 2.2 THE ADOPTED COASTAL PROTECTION STRATEGIES

The adopted coastal protection strategies for the Ernakulum districts were groynes, sea wall, and geotubes or combination of the above mentioned measures constructed over years back. Along the entire Chellanam section, the coastal erosion and inundation over the area from Cochin port trust to INS Dronacharya is better managed up to some extent with the above mentioned coastal protection measures. But the coastal villages of the Chellanam Panchayat between Manassery to Chellanam harbour were badly affected with catastrophic effects of coastal erosion and inundation due to wave overtopping.

## **2.3 RECOMMENDED PROTECTION STRATEGIES IN GENERAL**

One of the major lacuna in finding and implementing coastal protection strategies along this coast is the lack of site-specific scientific studies on coastal oceanographic processes. In order to understand the vulnerability of the study area, it is required to encompass the adjoining areas for better understanding of the nearshore dynamics and subsequent coastal process resulting in erosion/accretion. Hence an integrated approach has to be taken to understand the coastal oceanographic process and near shore dynamics of entire Chellanam and Vypin stretch.

Considering the available information on wave pattern, slope and bathymetry details from the fisher folks of the shore area of Chellanam, certain temporary/permanent remedial measures are recommended for the ensuing monsoon and future expected calamities. It would be better to adopt hybrid measures such as the combination of beach nourishment and wave dampening structures. It is also recommended to make use of the dredged sediments from the port inlet channel for the beach nourishment in the Chellanam area. In order to properly manage the coastal disasters along the Chellanam coast, some immediate solutions and long term solutions are suggested herewith. Before implementing any long term protection measures, proper environmental impact assessment study is required.

## **2.4 IMMEDIATE SOLUTION ON WAVE OVERTOPPING AND INUNDATION**

### **2.4.1 Sea wall**

Sea wall is a flexible structure. Once it is constructed, routine maintenance is necessary for an interval of minimum 5 years. It is noticed that for the entire vulnerable area of Chellanam, there is no proper maintenance or re-construction done for the past 15 years. For an immediate remedy, replenishment of sea wall at various reaches is to be done which can prevent wave overtopping and flooding.

The existing damaged or dilapidated sea wall can act as a strong base by increasing the height with tetra pod for a better stability and energy dissipation of waves. The existing top level of sea wall fixed for Chellanam is +3.50 to +4.00 m with respect to Mean Sea Level or chart datum. Due to the overtopping phenomenon this can be changed to +4.50 to +5.00 m. The fishing gaps existing can also be closed while constructing the sea wall. It is learnt that there are 8 Nos. of vulnerable reaches urgently needs restoration.

## **2.5 LONG TERM PROTECTION STRATEGIES**

### **2.5.1 Groynes**

Construction of groyne is almost a permanent solution of beach nourishment. At Chellanam 8 km of coastal line is more vulnerable and needs beach stabilization. For that area 40 nos. of groynes of length varying 35 m to 100 m perpendicular sea are necessary. Since the water depth is more at this area, groyne head may be protected with tetra pods weighing 3 to 5 tons for making it more durable. The size and length of groyne can be finalized only after the study of wave parameters, bathymetry study etc.

### **2.5.2 Off-shore breakwater**

This is also a semi-permanent solution and economical method. More vulnerable area may be identified and breakwater can be constructed parallel to sea shore beyond 50 to 100 m. This is not a continuous type structure and gaps are given intermittently. This facilitates beach landing and another advantage is that the sufficient water-logged shallow beach space can be developed for vegetation. The disadvantage of this construction is floating pontoon/barge and a wharf is necessary for loading and unloading stones.

### **2.5.3 Sheet piling**

This type of construction is relatively expensive and the difficulty during construction is driving down of sheet pile. The area where sea wall is to be constructed can be changed by sheet pile instead of stones. If driving of sheet pile is failed due to underlying stones the alignment can be changed to sea side or land side. Due to that change in the alignment additional area for vegetation can be developed. The cost will be twice the construction of sea wall. But we cannot specifically mention the extent as it depends on the end bearing depth of sheet pile.

### **2.5.4 Bio-shielding**

This is a soft method of beach nourishment and is advisable for the site conditions demands. Mangrove afforestation, geo tube construction etc. are suitable for the site where there is beach facility continuously attacked by severe waves. But the reforestation of mangroves is not an easy task and we have to attend the measures with scientific sanctity for any reforestation efforts here.

### **2.5.5 Beach Nourishment**

Beach nourishment is adding of sediments onto or adjacent to an eroding beach. A wide, nourished beach system absorbs wave energy, protects upland areas from flooding and

mitigates erosion. However, availability of huge amount of sediments to nourish large stretch of coast is often difficult.

#### **2.5.6 Managed Retreat**

Managed retreat can be adopted if the expenses for coastal protection exceed the cost of the assets to be protected or if the adverse environmental impact outweighs the potential benefits.

### **2.6 STUDY PROPOSAL BY KUFOS FOR ENTIRE KERALA COAST WITH SPECIAL EMPHASIS TO CHELLANAM.**

The frequent occurrence of cyclones, rising sea level associated with climate change and enhanced wave energy in the Arabian Sea makes the Kerala coast more vulnerable. Furthermore, it has been estimated that more than sixty five per cent of the Kerala coast is eroding. One of the major lacuna in finding and implementing coastal protection strategies along this coast is the lack of site-specific scientific studies in sub-regional scale. Every coastal stretch is unique in regional to sub-regional scale and any attempt for the mitigation strategies require a thorough understanding of the factors and near shore dynamics involved in the local geomorphology. Hence a holistic approach has to be taken to study the nearshore dynamics and wave activities of the Kerala coast in the present climate change scenario. The Intergovernmental Panel on Climate Change (IPCC) projected a sea level rise of about 1 meter by 2100. The rising sea level also has to be accounted in long term coastal protection plan.

#### **2.6.1 Objectives of the study**

- To achieve sustainable management and use of coastal systems through observational as well as modelling studies of various processes along the Kerala Coast at sub-regional level.
- Detailed understanding of wave hydrodynamics, nearshore dynamics and sediment budget along the Kerala coast with special emphasis to Chellanam.
- The effect of Chellanam fishing harbour on littoral transport of sediments and the effect of dredging in the shipping channel needs thorough investigation.
- Demand driven research to support coastal policy development in Kerala, taking into account present and future requirements and likely climate change.



### 2.6.2 Expected Outcome

The outcome of the study will constitute a data base at regional and sub-regional level that could be used by the state to develop suitable coastal protection strategies. The improved understanding on near shore dynamics and expected sea level rise in the climate change scenario will provide a base line information for modelling coastal processes and effective policy making.

#### Budgetary outlay (5 years)

Sl. No	Particulars	Amount (Rs. lakhs)
	<b>Non-recurring</b>	
1.	15 M- Hydrographic Survey Launch (Boat)	200
2.	Equipment	
a	Wave and Tide Recorder ( 4 Nos)	90
b	Current meter ( 4 Nos)	80
c	Server	20
d	Wave rider buoy	75
e	ADCP (2 Nos)	50
f	CTD	50
g	Dumpy level/Sieve analyzer	5
	<b>Recurring</b>	
3.	Manpower	153
4.	Contingency	15
5.	Consumables	15
6.	Travel	15
7.	Others	15
	<b>Total</b>	<b>783 lakhs</b>

# CHAPTER 3

## SOCIO-ECONOMIC PROFILE

### 3.1. Introduction

The total area of Chellanam grama panchayat is 812 hectares and it accommodates 14928 persons as per the 2011 census. The population density of Chellanam is, thus, calculated as 1838, which is more than double the size of the population density of Kerala (860/sq.km) and almost five times higher than the national average (382). Male female ratio is 1008, which is far below than the state average (1080), though higher than the national average (940). It was reported that, there were 3446 households at Chellanam in 2011, majority of them are Christians. Out of the total population, seven percentage of the people are belonging to SC/ST category. The Scheduled Tribes are less in number, just three percentage of the total scheduled population of the panchayat. Hindus belonging to communities such as Gowda Saraswatha Brahmins, Eazhava, Pulaya, Velan, Kudumbi, and Ulladan also live in Chellanam. Total literacy rate of Chellanam is 94.02%, for male literacy is 94.92% and for female literacy rate is 93.14% which is higher than the state's average (93%) and the national average (84%).

### 3.2. Economic and employment profile of the population

Being a coastal village, partially surrounded with sea and backwaters and blessed with pokkali fields, most of the people make their living from fishing and agriculture. Fishermen work at deep-sea and fresh-water fishing, using the latest technologies. Majority of the people does white collar jobs in Cochin city. There are two banks, Corporation bank and South Indian bank has their branches at Chellanam. Chellanam service Cooperative bank having head office at South Chellanam and a branch at Maruvakadu. North Chellanam panchayath service Cooperative bank is another service Cooperative bank having its branch at Cheriyakadavu. Details of the working population of the panchayat is given in table 2.

Table 2: Working population

	<b>Male</b>	<b>Female</b>	<b>Total</b>
Total Workers	4477	1327	5804
Main Workers	4329	819	5148
Main Workers Cultivators	55	7	62
Agriculture Labourer	13	4	17
Household Industries	15	7	22
Other Workers	4246	801	5047
Marginal Workers	148	508	656
Non-Working Persons	2957	6167	9124

Source: Census Report, 2011

A cross retrospection of Table 2 made it clear that, many people are engaged in more than one jobs. However, majority of the times, many people are not able to find out employments, therefore around 61% of the people are remained as non-working class. Many fishermen reported that they were not able to find out employment throughout the year due to the unavailability of fish and natural calamities.

### **3.3. Health sector**

Economic wellbeing is meaningful, only when we are able to ensure the improvement in the health sector. Almost all are consuming fish, which is the secret of their health, however, at present, there were many cases of health issues reported, such as skin diseases, mental trauma, ancestral diseases etc. At present there are only two Primary Health Centre's are there in the panchayat. Though there are sufficient land at Malikaparambu PHC, the government yet to take initiatives to upgrade it as a hospital. Therefore, at present the people of the panchayat is heavily depending on the neighbouring panchayats and Kochi corporation for health treatment.

### **3.4. Housing sector**

It was already mentioned that there are 3446 households at Chellanam. Many of the houses are small in size and situated within three cents. Majority of them do not have access to drinking water or sanitary facilities. More than that, the eastern side of the panchayat, often faced the problem of flood and many of the houses were already destroyed due to the flood. The western side, is often faced the problem of sea erosion and rough seas. Altogether, there are around 1000 houses are partially destroyed due to the annually occurring natural calamities.

### **3.5. Educational sector**

Educational institutions are less in numbers. It includes Puthenthode Government High School, St Mary's High school at Chellanam North, St George LP School, Leo Public School, St Xavier's school at Kandakadavu, Exodus school at Maruvakad. However, the village lack, a higher secondary or higher education institutions.

In order to prepare a coastal zone development plan for Chellanam, it is important to understand the demographic features and socio-economic indicators. Moreover, economic development of a region is directly related to the employment avenues and active employment of its population. So, we are proposing an extensive study to understand the socio-economic profile of the region.

### **3.6. Project proposal by KUFOS for socio-economic study**

In order to improve the socio-economic life of the people at Chellanam, it is important to protect them from the recurring natural calamities. Proper management of men and resource are the need of the hour, including proper rehabilitation. The present housing project, “punargeham” is not attractive (as it provides six lakh rupees to purchase land and four lakh rupees to construct the house), due to the high cost of the land. Government should construct flat complex to accommodate the people of Chellanam at the same panchayat. Chellanam is the worst sufferer of Cochin Port, it should be taken in to consideration while formulating development plan. One option could be beach nourishment of the coastal areas of Chellanam, by depositing the same sand of dredging. Waste disposal is another important issue, which should be addressed immediately. Chellanam is blessed with the sea and the backwaters on its both sides, which offer ample potential for the development of fishery and tourism. At present, Chellanam harbour is also not functioning well, it should be supported with an adjacent ice factory. Altogether, in and around 845 hectors of Pokkali cultivation are there at Chellanam region. The pokkali rice can be marketed with a separate brand name. Pokkali lands, can be further used as a source of farm tourism, however, nothing was done in this regard. To sum up, in order to ensure the proper utilization of the resources, it is important to conduct a in-depth study of socio-economic mapping of Chellanam. This present study proposed at this juncture.

#### **3.6.1. Objectives of the study**

Overall objective of this study is to prepare a sustainable development plan for Chellanam in the long run. Specifically, the study aims to:

- To study the socio-economic profile of the people at Chellanam
- To make a comparative study between the modern and traditional practices used by the people to conserve the coastal resources
- To summarise the pros and cons of all developmental activities of Chellanam

#### **3.6.2. Methodology**

Both primary and secondary data will be collected for the study. Primary data will be collected through structured questionnaires. Participatory planning methods also proposed.

### 3.6.3. Expected outcome

The outcome of the study will constitute a data base at the village level that could be used by the state to develop suitable coastal protection strategies. The improved understanding on socio-economic profile will help us to provide a long-term development model that ensure the sustainability of this region.

### 3.6.4. Budgetary outlay (3 years)

Sl. No	Particulars	Amount (Rs. lakhs)
2.	Equipment	10
3.	Manpower	35
4.	Contingency	15
5.	Consumables	15
6.	Travel	15
7.	Others	15
	<b>Total</b>	<b>105 lakhs</b>

## CHAPTER 4

# INFRASTRUCTURE DEVELOPMENT

Considering the infrastructure development of Chellanam, the main factors included for the development of inhabitants, socially and economically are given below.

### 4.1. Accessibility to their livelihood

Accessibility includes roads, pathways, foot over bridge or any other developmental activities that are essentially needed for their socio cultural activities including their livelihood. At present a main road is passing the entire area of Chellanam around 15 km up to Andhakaranazhi estuary. The people need by-roads, pocket roads to access beach area or sea wall area and to the eastern part which is considerably low lying. This road also facilitates the restoration works wherever necessary. The western parts beyond road near sea wall are thickly populated and of 3 or 4 series line of houses are closely packed. Approximately 15,000 m<sup>2</sup> bituminous roads and around 7500 m<sup>2</sup> concrete pavements are necessary for the infrastructure development according to site conditions. Concrete pavements come to 100 lakh and bituminous pavements also come to 100 lakh and overall cost comes to **Rs. 200 lakhs**.

### 4.2. Facilitation Centre

This centre is essentially needed to rehabilitate the people temporarily when a calamity occurs. The calamity maybe wave attacks, flood or cyclone. Since the area is very close to the sea it can happen any time. The facilitation centre maybe a framed structure and is elevated 3 meter from ground level, so that people can stay safe from flood. It also includes primary health care, community halls, individual rooms for women, toilet facilities and recreational rooms. The extent of the floor area is 3000 m<sup>2</sup> in each floor in a three storeyed structure (total 9000 m<sup>2</sup>). The approximate cost comes to **Rs. 360 lakhs**.

### 4.3. Elevated ground

The Chellanam area is a 17.5 km length, narrow strip land and most of the area is low lying. People suffered a lot to protect their household items and vehicles from the recent tute and its flood after. It is learnt that about one metre height seawater is over topped from sea wall and then circulated the whole area. Lack of drainage facility created the situation severe and people living nearby suffered great loss to their house hold items as well as vehicle. So an elevated

land of approximate 2500 m<sup>2</sup> is needed to protect their vehicles and it should make available in the adjacent of an existing road. If vacant government land is available this can be converted to this facility by raising the area above to the high flood level. Provision is made to elevate the ground for a height of one metre, so that the vehicles can be parked there during the calamity. The approximate cost comes to **Rs. 150 lakhs**.

#### **4.4. Dredging the Kayal**

Kallanchery kayal is passing through the east side of the road and it can be discharged to Andhakaranazhi estuary. It is learnt that at present the kayal is blocked in between various reaches and causing flood during monsoon and similar flood happens. Proper deepening of the kayal is very essential and this has to be effectively utilized. The dredged material can be used for filling the low lying areas and strengthening of bund formation of the existing ponds and it helps the fish farming and other water logged areas and the total estimate amount comes to **Rs. 500 lakhs**.

*The additional points noted for infrastructure development from the NGO representation of Chellanam and LSGD authorities:*

#### **4.5. Bus Terminal at south side**

Facility for providing the conveyance of people is the main criteria for the development of the socio-cultural activities of the society. People living near the area need more conveyance facilities for their day to day activities and for this more transport facility is to be arranged. A bus terminal is very necessary for the halt and parking of the buses and while improving these facilities more bus owners can be attracted to this area and it is benefitted to the society and construction of bus terminal amounts to **Rs. 200 lakhs**.

#### **4.6. Additional road parallel to Chellanam-Pandikkudi road at East side**

This road is proposed along the east phase of Chellanam area. Around 10 km length is proposed to cover for this facility. This road will help to develop the accessibility of the inhabitants for their living in and everywhere of the area when a calamity happens. This road will remain as a main road of the area in addition to the Chellanam- Pandikkudi road. After construction of this road, by roads developed in the infrastructure facilities may inter linked to this road. The by roads may be either bituminous or concrete. This 10 km road is bituminous with sufficient

raising of the general ground level with quarry muck or GSB. (Amount to be arrived at by the concerned Department).

#### **4.7. Additional road along the beach side with tourism angle**

The Chellanam area is a 17.5 km length, narrow strip land and most of the area facing to sea side can be attracted to tourists. For this proposal beach nourishment is very necessary and a portion of the area can be proposed as a road parallel to Chellanam- Pandikkudi road along the western part of the road. This road will be act as sea shore area road and facilities regarding tourism angle can be further developed after the construction of road. The road construction will be done only after the shore protection and beach nourishment.

#### **4.8. Sports complex**

For improving the mental and physical health of the youth and students sports facility of the area has to be developed. A sports complex has to be constructed near the available ground and it costs around **Rs. 500 lakhs.**



## **CHAPTER 5**

# **DRAINAGE SYSTEM & SUGGESTED INTERVENTIONS**

### **5.1. Introduction**

In recent times, issues related to sea erosion and flooding of homes in the coastal village of Chellanam are widespread and gained immense publicity. Currently Chellanam is experiencing severe tidal flood as turbulent sea waves crash on the shore. Due to continuous flooding and sea erosion lives of the coastal residents are under threat. In the wake of the alarming situation, Kerala University of Fisheries and Ocean Studies (KUFOS) intend to study the characteristics of drainage networks, which plays significant role in maintaining hydrological regime of Chellanam.

### **5.2. Drainage analysis**

A preliminary analysis on drainage networks lines indicates that the structure and shape of many streams/canals in the panchayat is changes or altered due to urbanization/encroachment. As shown in Fig 1 there was a lot of interconnections between the Sea and Vembanad lake through canals known as “pozhi”, especially in the north of Chellanam panchayat. Even though these interconnections are not always connected to sea, they play a vital role in maintaining free flow of water especially monsoon season. However, in the present scenario these interconnecting channels are altered and subsequently many of them are not connected with Sea (Fig. 1a & 1b). This is primarily due to the establishment of sea wall in 1977-82 period. This might have impact on free flow of water especially during high tide and low tide. Further, it can be observed that, between Kannamali bus stop and Kandakadavu junction, there was a well-connected drainage system (Fig.1a) which is altered and subsequently the number of canals is reduced (number 7 in Fig.1b). In addition, some parts of lower Muthalathod are fully lost its connection with Vijayam Canal which might affect the free flow of water (number 6 in Fig.1). This is primarily due to urbanization/encroachments, which is well evident in Fig 2a. Another major segment we identified is the disconnection between Paruthi thodu and Vijayam canal (number 4 in Fig 1). In the SOI toposheets this segment is well connected where as in 2021 due to land use change and urbanization the canal lost its connection with Vijayam canal

(Fig.2b). Further, several encroachments in drainage networks are also visible in satellite images. In addition to this tidal fluctuation is also noticed different parts of Chellanam panchayat from stakeholders. Chellanam area is underlain by quaternary deposits of unconsolidated sand and silt. Due to continuous interaction between surface waterbodies/groundwater with sea water there may be chances of saline water intrusion. Other major issues pointed out by stakeholders is the silting in canals is very necessary and also recommended the maintaining proper width and increasing the depth of canals.

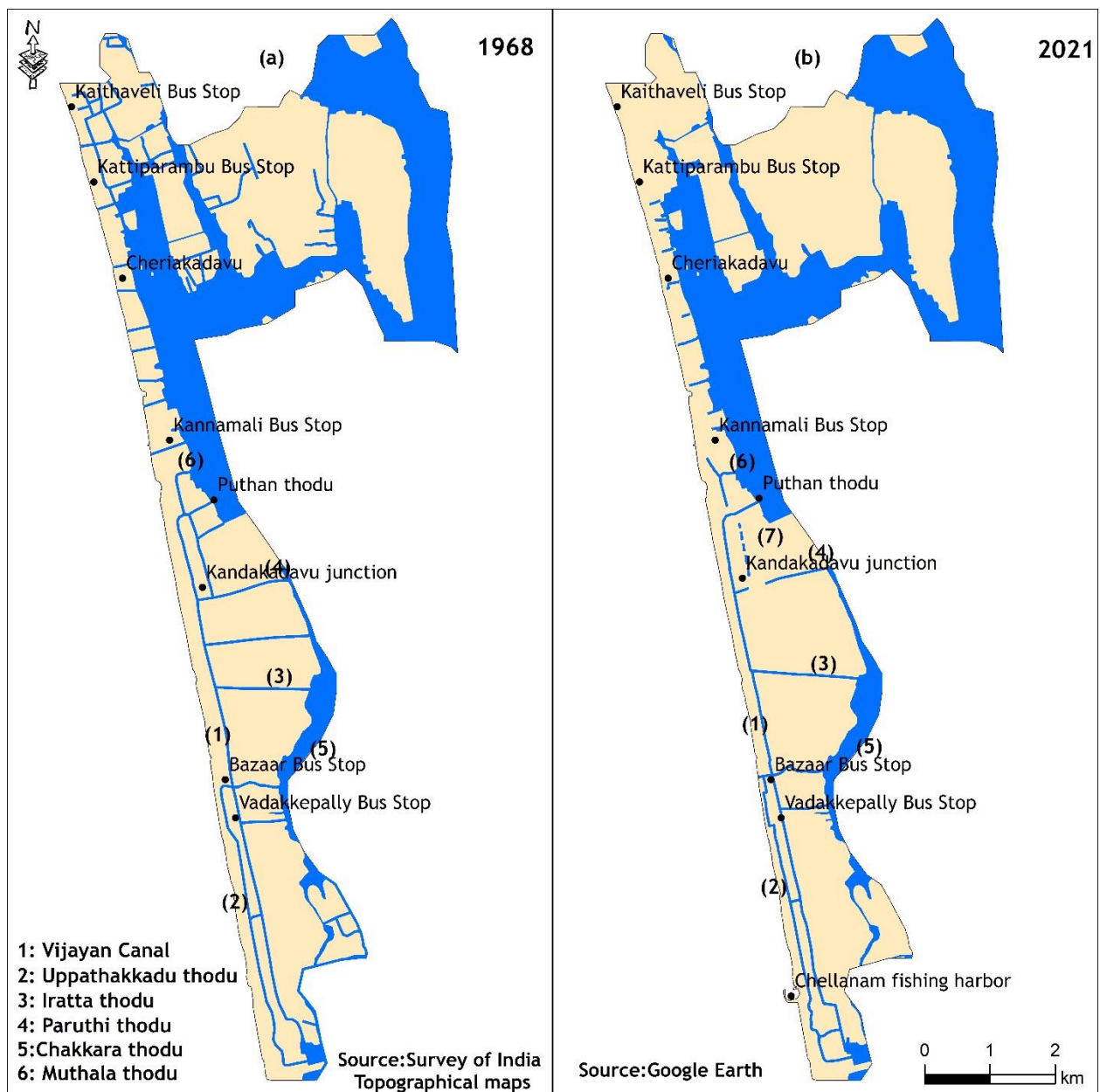


Fig.1 Status of drainage networks in Chellanam during 1968 and 2001

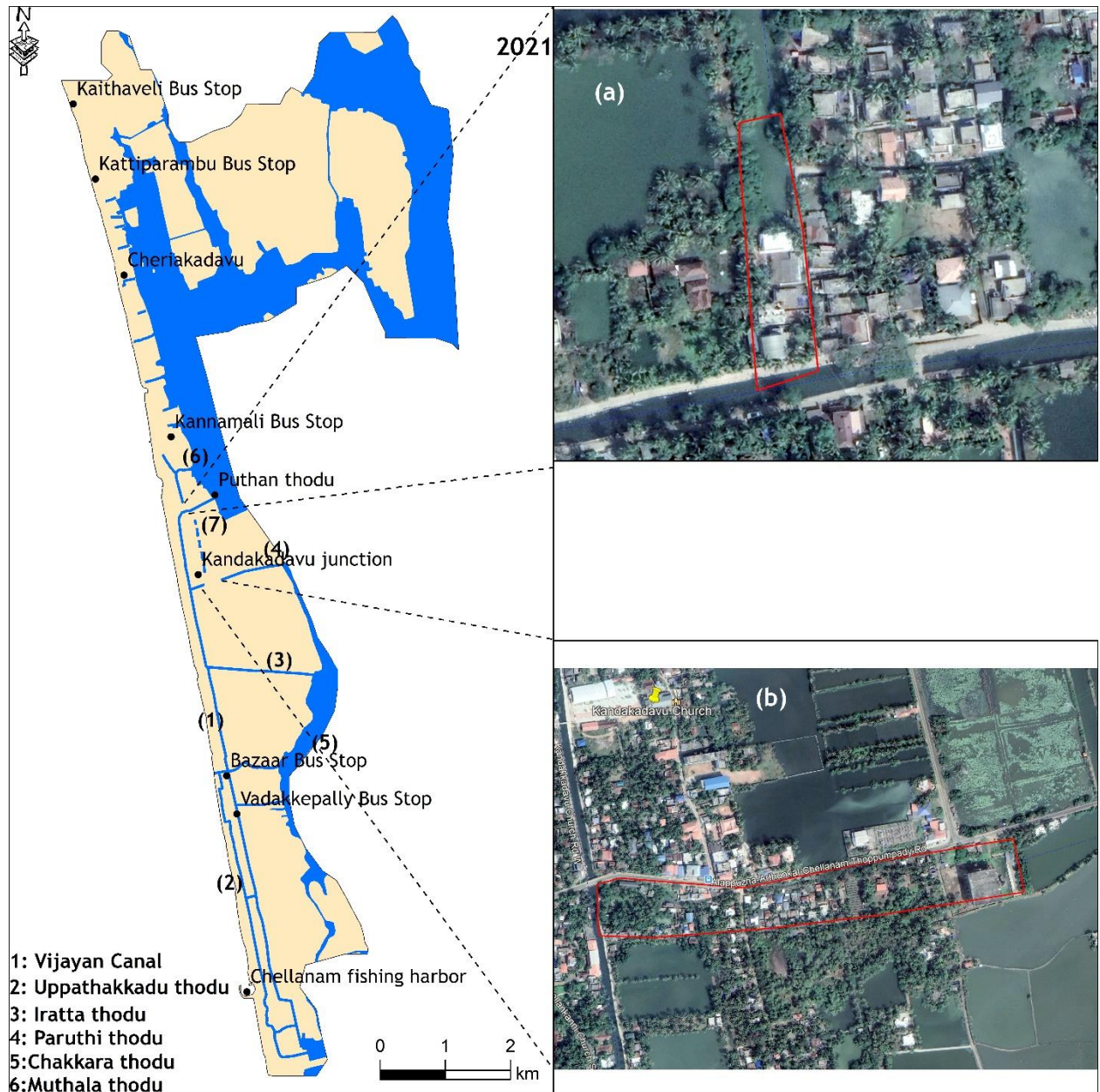


Fig 2 Due to urbanization some parts of the (a) Muthala thodu lost its connection with Vijayan canal and (b) Paruthi thodu lost its connection with Vijayan canal

### 5.3. Recommendations

Develop a management plan for the canal network system for re-engineering smooth flow through the canals along with action plans for its implementation, the major components of which include:

1. Re-establishment of canals for better hydrologic regime of the study area

2. Ensure proper width and optimum depth of major canals including Vijayam canal and Uppathakkadu thodu.
  3. De-siltation of major canals including Vijayam canal, Uppathakkadu thodu and Iratta thodu.
  4. Reestablishment of interconnection between the canals
  5. Detailed bathymetric mapping of Vembanad lake pertaining to Chellanam area for flushing backwaters.
  6. Detailed survey requires on tidal flushing from estuary and Sea.
  7. Detailed landscape change analysis in Chellanam.
- No budget is proposed for this as the work is undertaken by other agencies.

# CHAPTER 6

## BIO-SHIELDING

### 6.1. Introduction

Protection of existing coastline and restoration of eroded beach line are the two major challenges which has to be addressed with prime consideration. Along Chellanam area, of the total 17.3 km beach is now reduced to nearly 1.5km at the south of Chellanam harbour due to the frequent invasion of sea to the landward side. Along with this, construction of fishing Harbour, other coastal development activities and regular dredging for deepening of Shipping channel by Cochin Port Trust accelerated the coastal erosion to a great extent.

Bioshielding the coastline is an efficient, sustainable and ecofriendly soft measure of coastal protection. Bio-shielding is a technology of creating a vegetation belt along the coastline which would help to protect from the coastal erosion due to sea rages, and other realted natural calamities like storms, cyclones, tsunamis etc. Coastal bio-shields can offer a much cheaper and long lasting means of natural disaster mitigation. Bio shields act as a living buffer, preventing coastal erosion and damage to infrastructure and loss of life by reducing the force of the winds and waves passing through them; so that there is much less damage from these destructive forces of nature. In general the coastal area aligned with the sea can be divided into 3 zones viz.,

1. The area below the low tide line (Sea ward portion of the beach),
2. The intertidal zone (areas between the low tide and high tide line)
3. The area lying above high tide line (landward region of the beach).

With regard to the Chellanam coast, the first two zones are not suitable for the purpose of bio-shielding due to its eroded nature. But, zone 3 can be effectively used for the development of greeneries associated with bio-shielding. For bio-shielding, suitable natural vegetations like mangroves and its associates and other salt tolerant varieties of plants, trees and herbs can be planted. Planting of the greeneries should be done by adopting proper management strategies. Nearly eight varieties of mangroves grown naturally in the coastal belt and tidal flats of Chellanam which are shown below

The mangroves and associated plants will be planted along zone 3 with the help of local communities. Studies shows that the varieties of plants such as *Calophyllum inophyllum* (attupunna), *Pandanus tectorius* (kaitha), *Hibiscus tiliaceus* (Thali Pariti), *Clerodendron inerme*

(Puzhamulla), *Thespesia populnea* (poovarasu), *Premna latifolia* (kozhiyappa) etc can be utilized for this purpose. Creepers like *Ipomoea pescaprae* (adambu) should be raised along the beach as sand binding vegetation. Apart from this non-mangroves plant species with economic importance which are native to the region should be raised along the coastline.

## **6.2. Major concerns**

### ***Cooperation from coastal community***

Successful implementation of bioshielding technology for coastal restoration will only be possible through the active participation of the coastal community. Creating awareness about the merits and demerits of bioshielding should be considered with prime importance. Preliminary step of implementation of the technology is to ensure the trust of the people to grow out the vegetation and look after it properly. For this we need to conduct awareness classes to enlighten the people about this green technology through their social commitment. Active involvement of LSGI, other local organisations, family units, cooperative societies, self help groups, Kudumbasree units etc. should be necessary.

## **6.3. Suggested activities**

1. Initially bio-shielding can be done as an experimental trail by planting of six month old mangroves seedling in an area of 1 km (in the mixture of sand and clay filling inside bamboo poles) with a 1x1 m in 30 rows
2. Ensure the Availability of seedlings: Seedlings can be collected from wild as well as from nurseries. Seedling collection from the wild can be carried out with the help of local community.

## **6.4. Expected outcomes**

1. Bio-shielding along the coast will provide protection from severe weather events such as storm surges, high sea spells/waves, invasion of sea to the mainland, to a great extent
2. It will enhance the biodiversity of both plants and animals of the region
3. Bio-shielding by mangrove plants will serve as nursery grounds of many commercially important fishes and shell fishes, which indirectly support the good fish production of the coast
4. It will enhance the aesthetic beauty of the coastal line which would attract income to through tourism.

An amount of Rs. 175 lakhs has been proposed for the bio-shielding programme.

# **CHAPTER 7**

## **AGRICULTURE FOR FOOD AND NUTRITIONAL SECURITY**

### **7.1.Introduction**

In coastal regions like Chellanam, the agriculture activities were restricted only to a few crops in early days. Cultivation of Coconut trees and Pokkali paddy are the two traditional agricultural practices existing in the area from years back. But, nowadays, the boom in the agriculture sector including innovative agriculture practices gave a new insight to the farmers. Agriculture activities of Chellanam is coordinated by the LSGI and Agriculture Department of Kerala.

### **7.2. Cultivation of coconut and its present status**

The yield obtained from the coconut trees from Chellanam was significantly less than that of the average yield obtained from the State. Unlike other regions of the state, Chellanam does not have coconut tree plantation, instead people are planting the coconut trees in their courtyard, bunds of ponds, fields etc. A minimum yield is only obtained with which it is possible to meet the local needs but not for income generation for the people. In general, sandy nature of the coastal substratum is best for high yield of coconut; whereas in the Chellanam coast, the increased proportion of silt and clay in the substratum is not supporting the root system and thus very low yield of crop.

#### ***Suggestions for the improving coconut cultivation***

- ❖ Salt tolerant high yielding varieties of coconut trees can be supplied to the farmers as well as households in subsidised rate through LSGI or through Agriculture Department of Kerala/ Coconut Development Board.
- ❖ Create awareness/training to the people for proper management protocol for the crop.
- ❖ Implementation of state level/national level projects like Keragramam.

### ***Expected outcomes***

- ❖ Income generation through coconut and associated by products like coir, handicrafts, coconut based food products etc.
- ❖ Improve the aesthetic beauty of the region

### **7.3.Pokkali paddy cultivation**

Pokkali paddy cultivation is a traditional practice of paddy cultivation in the low land areas near the coastal plane. Pokkali is a variety of rice endemic to central coastal Kerala and is unique because it can grow in salt water. It is a rotational cultivation system with one season with paddy followed by prawn/fish culture. Normally extensive cultivation of shrimp is practiced in Pokkali rice fields. Shrimp cultivation aids the pokkali rice in providing nutrition since the paddy does not receive any artificial pesticides or fertilizers to grow. Pokkali rice is famous for the salinity tolerant gene SalTol- QTL and is significant for the international rice improvement program for salinity tolerance. As per the information available, a total of 500 acres of pokkali fields are available in the Chellanam area of which 10 acres is now under paddy cultivation. Nowadays the farmers are not interested in doing the paddy cultivation due to many factors such as,

- ❖ Low yield
- ❖ Non availability of workers to carry out the routine works such as planting of seedlings, deweeding, harvesting etc.
- ❖ Prevailing rules and regulations by the LSGI on the use of mechanised tools in the paddy field is one of the major constrain for paddy farmers.
- ❖ High yield of prawn than that of the paddy.

### ***Suggestions***

Based on the information gathered from the traditional fishermen from the region, pokkali rice variety has high consumer demand due to its unique taste and nutritional quality. Due to high demand in the market the pokkali cultivation should be uplifted with the following recommendation measures,

- ❖ Implementation of proper planning and management protocols for the pokkali cultivation.
- ❖ Farmer friendly approach from LSGI
- ❖ Use of high yielding varieties of seedlings.



- ❖ The schemes and grants should reach the targeted population.

#### **7.4. Plantation of trees**

Commercially important trees like Cashew Tree (*Anacardium occidentale*), Mango Tree (*Mangifera indica*), Fig (*Ficus carica*), Coconut Tree (*Cocos nucifera*), Malabar Tamarind Kudampuli (*Garcinia cambogia*), Pummelo (*Citrus maxima*), Noni (*Morinda citrifolia*), Drumstick Tree (*Moringa oleifera*), Date Palm (*Phoenix dactylifera*), Guava (*Psidium guajava*), Chicle (*Manilkara zapota*), Indian Jujube (*Ziziphus mauritiana*), Jamun/Jambolan (*Syzygium cumini*), Indian Gooseberry (*Emblica officinalis*), Karonda (*Carissa carandas*), Curry Tree (*Murraya koenigii*), Seemakonna /fodder tree (*Gliricidia sepium*) etc can be planted in suitable area.

#### **7.5. Nutrigarden in green bags**

This can be done in grow bags since the salt is not suitable for cultivating most of the vegetables. For this purpose suitable sand from other areas can be utilized and proper manures should be given. Krishi Vigyan Kendras at Pattambi and Thavanur has developed a kit viz., ‘Eka kit’ which comprised of the manures and instructions for the produce. The kit is available for the public at a cost of Rs. 250/kit and one kit is sufficient for 10 grow bags.

#### **Suggestions**

- Create awareness programme on importance of nutrigardens
- Availability of grow bags, seeds and manures at subsidized rate by making collaboration with grow bag suppliers, KVKs, Agriculture departments etc.

#### **7.6. Mushroom cultivation**

Mushroom production will also result into provision of high quality food which is nutritious to the coastal people. Oyster mushroom is the second most important mushroom in terms of production in the world and also in India. Oyster mushroom is scientifically known as *Pleurotus*. It is very popular in China, Japan and various other East Asian countries including India. *P. florida* variety is widely cultivated in Kerala since it is grown in summer as well as in winter seasons. Studies have shown that the yield is maximum during monsoon followed by winter and summer seasons.

### ***Suggestions***

The initial challenge is identifying a spawn supplier and hence trainings on spawn production can be given for women in Chellanum area and thus sale of spawn also pave way for income generation other than mushroom production

- ❖ Organizing available resources especially agricultural wastes (paddy straw, banana leaves, cocopeat etc.) to develop a growing system
- ❖ Make different marketing outlets for the mushrooms produced.
- ❖ Mushroom cooperative society can be developed at government level through which marketing of mushroom to hotels, supermarkets etc. can be done.

### **Estimated Budget requirement for one Hectare pokkali cultivation**

(As per the Information collected from traditional pokkali farmers)

<b>Sl. No.</b>	<b>Particulars</b>	<b>Amount (Rs.)</b>
<b>Expenditure</b>		
1	<b>Field draining</b>	
	Outer bund strengthening - 10 labourers (Rs. 1000/labourer)	10,000.00
	Inner bunds – 25 labourers (Rs.1000/labourer)	25,000.00
	Making furrows/channels- 15 labourers (Rs.1000/labourer)	15,000.00
2	Seed cost (Rs.75/kg) - 80 kg/hectare	6000.00
3	Sowing	5000.00
4	Transplanting – 37 labourers (Rs. 600 /labourer)	22,500.00
5	Harvesting and allied work	75,000.00
	<b>Total Expenditure</b>	<b>1,58,500.00</b>
6	Subsidies from Govt.	28,000.00
	<b>Actual expenditure</b>	<b>1,30,500.00</b>
<b>Yield</b>		
	Revenue Generated through sale of Paddy (Rs. 75/Kg)	225,000.00
	Total production – 3000kg/ha	

An amount of Rs. 400 lakhs has been anticipated for revamping agriculture in Chellanam.

# CHAPTER 8

## SUSTAINABLE AQUACULTURE

### 8.1. Introduction

Sustainable aquaculture can provide an alternate means of subsistence to the coastal community predominantly relying on capture fisheries. Involving fishers and the other marginalised communities in aquaculture development can improve the socio-economic status of the region. Group farming activities in the traditional Pokkali cum shrimp/fish farming and cage culture modified to suit the local condition may be promoted. The women SHG's and padashekarasamiti's need to be empowered to venture into aquaculture and value addition activities.

Chellanam Panchayat has a total area of 19.32 Km<sup>2</sup> with a land area of 30% (5.85 Km<sup>2</sup>), Water bodies of 29% (5.53 Km<sup>2</sup>) and pokkali fields and shrimp farms of 41% (7.95 Km<sup>2</sup>) area (Nair, 2009). Thus the potential area available for income-generating and employment creation is mainly from water and thus aquaculture development. The Chellanam area is having a water spread area of 70% (including seasonal pokkali fields) and a land area of 30%.

Integrated paddy cum shrimp rotational farming is a traditional practice in the Pokkali fields of Chellanam for decades. It's an important economic activity of the region after fishing and supports the livelihoods of hundreds of small-scale farmers. Pokkali cum shrimp farming is highly adaptable and can be considered a climate-resilient practice in areas affected by the saline intrusion. The paddy and shrimp/fish produced in pokkali fields can be branded organic by avoiding the use of chemicals and fertilisers. The improved and traditional pokkali varieties with adequate salt tolerance and height along with monodon/vannamei and pearlspot may be introduced. The farmer's societies need to be strengthened with the integration of various stakeholders in the field. Financial and technical support with proper monitoring may be done to revive the pokkali and shrimp cultivation. The introduction of vanamei with restricted water exchange may be attempted in selected farms for strengthening this traditional farming system, which is on the decline for various reasons.

During the monsoon season, when the salinity is very low a crop of paddy is grown here. Shrimps/fish are grown mainly during the rest of the year. However simultaneous farming of another crop of shrimps along with paddy is also practiced to a small extent.

## **8.2. Aquaculture possibilities in Chellanam**

### **Brackishwater Aquaculture**

- Pokkali-shrimp
- Pearlsplit culture and seed production
- Mud crab, shrimp
- Edible oysters, mussels
- Mullet, milkfish, seabass
- Mangrove nursery

### **Freshwater Aquaculture**

- Fish seed rearing
- Ornamental fish culture
- Scampi – pokkali (seasonal)
- One fish- one rice (seasonal)

### **Mariculture**

- Seabass, Grouper, Snapper, Pompano, Cobia cage culture and nursery rearing
- Seaweeds
- Ornamental fishes
- Crabs, lobsters fattening

### ***Aquaculture activity for the fishers and families***

Sea cage farms, Backwater cage farms, Mangrove nursery rearing, oyster farming, seaweed culture, mud crab culture

### ***Role of Development Agencies & Research Institutions***

KUFOS, DoF, FFDA, ADAK, FIRMA, MATSYAFED, KVK, MPEDA, NFDB, NABARD, CMFRI, CIFT

Awareness, training, input assistance, farm visit, monitoring, marketing with all possible media like direct contact, online and offline applications, media and publications, etc.

<b>Aquaculture Potential of Chellanam</b>		
Aquaculture area/activity	Potential	Used/Units
Shrimp farm/ prawn filtration	349 ha	104 ha
Brackishwater cage farm	100 no	16 no
Bio floc	100 no	10 no
RAS units	10 no	Nil
Oyster farming	100 no	Nil
Brackish water ponds (ha)	45 no (35.2 ha)	18 (12.58 ha)
Brackish water area (Public pond)	4no; 309 ha	Nil
Pokkali fields (seasonal)	14 (900 ha)	1 (50 ha)
CAA registered farms	70 acres (26 persons)	

#### **Action Plan for Increasing production, employment generation and fishers income**

Sl No	Aquaculture activity	Area/No.	No. of beneficiaries	Agencies involved	Cost (Lakh)
1	Revival of Pokkali-Shrimp	100 acre	200	KUFOS/ ADAK	100
2	Shrimp farming	50 acre	100	KUFOS/ ADAK	50
3	Brackishwater cage	100	100	KUFOS/ DoF	50
4	Marine cage	10	50	KUFOS/ CMFRI	50
5	Seaweed culture	20	100	KUFOS/ CMFRI	10
6	Biofloc (nursery rearing)	100	100	KUFOS/ DoF	100
7	Molluscan culture	100	100	KUFOS/ CMFRI	50

8	Mangrove nursery	5	10	KUFOS/ Forest D	10
9	Ornamental Fish	20	40	KUFOS/ CMFRI	30
10	Karimeen culture & seed production	100	200	KUFOS/ ADAK	50
11	Lease out defunct hatchery renovate and operate (5 yr)	1	20	KUFOS/ KSCADC	50
Activities to benefit more than 1000 persons at the cost of 550 lakh 2021-26					

Total amount envisaged is Rs. 550 lakhs.

# **CHAPTER 9**

## **WHOLISTIC DEVELOPMENT OF THE WOMEN& CHILDREN**

### **9.1. Introduction**

Chellanam is a coastal village with a total area of 812 hectares (2011 census) and is one among the 25 Grama panchayaths in the Ernakulam district. Although as per the 2011 census, Chellanam accommodates 14928 people in 3446 households; the numbers are much greater in 2021 and is expected to be almost 2.5 times that of in 2011 (from Stakeholders). There are around on an average 450 households/ward. Therefore in 21 wards there around 9450 households with a population nearing 38,000 making it one of the most densely populated villages in Kerala. Nearly half of this population comprises of children (18 years or below). Chellanam area in the last few years has been facing flooding and inundation especially during the monsoon and cyclones. The main occupation of people in the village includes fishing and allied jobs as well as agriculture. In a society where majority don't have steady source of income and continuously facing natural calamities and an uncertainty looming large over housing, life, livelihood makes children of the village one of the most vulnerable groups in the society. Covid-19 pandemic has added to their woes.

The objective of this section is to present the issues related to education, physical and mental development/ health of the Children of Chellanam Grama Panchayath.

### **9.2. Prevailing issues regarding education**

- Not enough institutions for higher education in Chellanam
- Children lack motivation in pursuing higher studies (discontinuing after 10<sup>th</sup> or 12<sup>th</sup>) especially the boys and are forced to take up unskilled jobs.

There are not enough educational institutions for higher studies in Chellanam. Puthenthode Govt. HSS is the only higher secondary school in the entire Panchayath with a student strength of around 1800/year. There are only 2 high schools and 2 CBSE schools in the Panchayath. The rest are either LP or UP schools. There is only one college St.Xavier's College Kandakkadavu, a self -financing college that offers only limited programmes. Children have to travel a lot for attending schools and colleges.

### 9.3. Profile of Schools in Chellanam Panchayath

Sl No	SCHOOL NAME	AFFLIATION & OWNERSHIP	LOCATION
1	Leo English Medium Public School,	CBSE syllabus Private -unaided	Chellanam
2	St. Mary's High School Chellanam	State syllabus Aided	Chellanam
3	St Mary's High School	State syllabus Aided	Kannamaly
4	St. George's LPS	State syllabus Aided	South Chellanam
5	St.Xavier's public school	CBSE Private	Kandakkadavu, Kannamaly, Chellanam
6	Puthenthode Government Higher Secondary School	State syllabus Government	Kandakkadavu, Kannamaly, Chellanam,
7	St.Antony's LPS	State syllabus Aided	Kannamaly
	St.Joseph Girl's UP school	State syllabus Aided	Manachery
8	St.Joseph LPS	State syllabus Aided	Cheriyakadavu
9	St Elizabeth school UP		Kattiparambu



#### **9.4. Prevailing issues regarding physical, mental and cultural enrichment**

- Lack of grounds and other infrastructure for sports and related physical activity
- Lack of centres/clubs/ schools for learning music, dance, art and craft in the vicinity
- Children lack confidence and are in need of training on development of soft skills

The children of Chellanam have shown great interest in sports and are also very talented. Students of Puthenthode Govt. HSS have represented the state at National level in Tennis. They have also done well in football. But, they are facing issues due to lack of proper infrastructure facility and support. Though Tennis Court was sanctioned for Puthenthode Govt. HSS the work has come to a standstill and is facing technical hurdles. Puthenthode Govt. HSS has a large ground but it remains inundated most of time of the year. The children are also artistically inclined but those who are interested have to travel to Thoppumpady or other places for classes.

#### **9.5. Recommendations**

##### ***Academic***

- Upgrade the existing High schools to higher secondary schools. A vocational higher secondary with specialization in fisheries may also be started.
- More colleges to be started in the area.
- Career Guidance programmes to be conducted even at Upper Primary levels
- Free Entrance coaching centre to be started in Chellanam for fishermen students - Students even with 55% marks should be given chance to study here.
- Soft skill development programmes.
- Development of Gymnasium for the youth.

##### ***Sports and arts***

- Tennis and football coaching facility- Panchayat ground may be upgraded with these provisions and coach to be provided.
- Puthenthode Govt. HSS Tennis court work may be restarted and ground may be elevated.
- They need more grounds, especially the Kannamali church ground must be renovated along with St Mary's school ground, North Chellanam.

- Already proposal has been submitted for an open stadium and playground through the Department of Fisheries, Government should implement it on a priority basis (place suggested is Kattiparambu).
- Art school/ centre to be established (Kalasadanam)- for encouraging cultural activities as these activities keep children engaged and prevent them from being involved in other illegal activities- Puthenthode Panchayath building could be utilised for this until a permanent structure is established
- **Chavittu Nadakam** (Stamping Drama) is a highly colourful Keralite Latin Catholic classical art form that originated in Ernakulam district and it is believed that Fort Kochi is the birthplace of Chavittu Nadakam. Chellanam is also an active centre of this particular art form and a proposal has been submitted to the Government of Kerala to start an Academy for **Chavittu Nadakam**. This academy will help protect the dying art form and promote it among the younger generation as well as act as a means for livelihood for the existing **Chavittu Nadakam** artists.
- Facility and certified training programmes in water sports and water adventure sports for children and youth may be started in Chellanam. This can act as an alternate means of employment like life guards, water sports trainers etc.

#### ***Mental/ Psychological development***

- Counselling sessions- As the children are facing insecurities regarding housing, life, livelihood on a regularly they affected psychologically. Regular counselling sessions to boost the morale is required.
- Classes on topics- Gender sensitisation, Sex education, drugs and drug abuse, health and healthy relationship to be held. This can be done in collaboration with schools and also with the churches located in the area.

Further a programme is proposed by KUFOS for the academic development of children in the name of ‘**a day in the lab**’ programme for the high school students of Chellanam.

#### **9.6. Expected outcomes**

- Will be able to ignite young minds.
- Encourage students to take up higher studies.
- Will be able to instil confidence in children to take up small projects on their own.

## **9.7. Proposal for inducing awareness among school children**

### ***Participants***

Five toppers from each class (8th and 9th) selected by their teachers from different High schools in Chellanam Panchayat.

### ***Programme***

This programme will be conducted on the First Saturday of every month. So in total each student will get 12 contact days.

Students will be brought to the KUFOS campus and given an orientation on the first day. They will visit the aquarium and museum. They will then be divided into smaller groups of (5-10). Each group will spend one day in one lab on a rotation basis (Labs of Dept of Aquaculture, Fisheries resource management, Fish processing technology, Aquatic environment management, aquatic animal health management, Marine Biology, Food science and technology, Microbiology & Biochemistry, etc) and will be able to do small experiments. So over one year period they will be able to spend time in all the labs. Students will have to maintain a record of work done. They may be asked to present what they learnt at the end of year.

Short classes may be taken in each lab and students instructed accordingly. These sessions can be handled by the Post Graduate students and monitored by PDF/research scholars. Remuneration is to be paid to students, research scholar/PDFs and lab staff conducting these sessions. Lunch has to be arranged for the students and staff conducting these sessions.

## 9.8. Budget

Travel expense	Rs 30 /student/day + 500 BATA for driver
Remuneration for research scholar/ PDF	Rs 750/ day ( 1 per lab)
Remuneration for PG students	Rs 400/day (2 per lab)
Remuneration for Lab assistant	Rs 600/day ( 1 per lab)
Food	Rs 100/day/student
Institutional charges/overheads	10% of total expenditure
Total	10 Lakhs

## 9.9. Summary and Conclusions

On the basis of these facts we can summarize the immediate priorities in this sector for Chellanam area as:

1. Establishing and upgrading the educational facilities on an emergency basis.
2. Since the children have already shown their talents in sports at various levels, government should establish facilities for training in sports including the renovation of already existing playgrounds in the Panchayath.
3. Training centres for entrance coaching, soft skill development must be established and the Panchayath must start career guidance programmes and counselling centres so as to motivate and guide them for future studies and also helping them to cope up with the uncertainties in life.
4. Another requirement is establishment of training centres in cultural activities – Kalasadanam and also an Academy for Chavittu Nadakam.
5. Facility and certified training programmes in water sports and water adventure sports for children and youth may be started in Chellanam. This can act as an alternate means of employment like life guards, water sports trainers etc.

Total budget requested for women and children empowerment programmes: Rs. 100 lakhs.

## CHAPTER 10

# LIVELIHOOD OPTIONS THROUGH FISHERIES AND FOOD POST-HARVEST TECHNOLOGY

### 10.1. Introduction

Chellanam is on a narrow landform about 10 km in length, which on northern end is of 250 metres wide. It is noted that the village has approximately 200 country fishing boats, 5 mechanized boats and a total of 19 kerosene permits. The village has one fish market.



**Chellanam mini harbour**

Due to the current situation of sea erosion and water flooding, and its after effects, the people of Chellanam are facing immense pressures from all segments of life. Several projects suggested by Government of Kerala and KUFOS are in pipeline as a solution to sea erosion and to ensure comprehensive development of the Chellanamgramapanchayat; and one of the projects suggests to utilize the natural food resources for value-addition, which will not only create job-opportunities but also assist in women empowerment. To meet the challenges faced by fisheries sector, the coastal communities need to be equipped with the know-how of the latest developments and innovations in the field of fisheries. An understanding of the knowledge gaps is also essential for imparting the precise technical guidance through effective technology transfer methods, such as training and demonstration. Technology and management interventions in the harvest, postharvest and marketing areas by research and development institutions will help in uplifting their socio-economic status.

The main occupation of the people living in Chellanam is fishing and agriculture. Also, it is an important source of foreign exchange earnings and employment generation. They follow conventional drying techniques together with artisanal fishing. Being a perishable product, these need to be processed immediately to minimize loss. Employing the best technique in processing will not only extend the shelf life but also preserve the nutritional quality.

An integrated and self-sustainable development project to support thousands of marginalised fishermen/dependant community, and lift them to a respectable living standards is the main idea of this project. It offers equal opportunity for women to become entrepreneurs in fish and related sectors, will create a platform for aqua-farmers/ similar producers to sell their fresh and pure produce, directly to the customers.

Further, turning towards the agri-based development, just like any other part of the State, Chellanam also has coconut production in large proportion. Coconut is a versatile product with multiple uses. Coconut products are used for lot of applications ranging from clothing to animal feed and beauty creams. Coconut oil is marketed for culinary, medicinal and cosmetic applications. The coconut-based sector plays a pivotal role in foreign exchange earnings by offering a wide array of products to the international market. The coconut export included fresh and dried coconut, copra, palm kernel, W/N refined or chemically modified, desiccated coconut, etc. There is immense potential for coconut shell used for the production of carbon black, its utilization as fuel, bakeries, brick yards, lime kilns, iron foundries, etc. are boundless. Similarly, mango though seasonal finds a good demand in both domestic and international market. Due to poor post-harvest management practices and perishable nature of the product, the losses are high. A very nominal amount goes into value-addition. Hence, there is also a huge scope for mango processing and development of value-added products, which will also minimize the wastage. Mango pulp, pickles, chutneys, mango bar, candies, etc. could be some of the value-added products that can be developed.

Keeping their prime interest in mind, the team has come up with two proposals:

- The first proposal is to emphasize on fish processing, value-addition and fish wastes utilization to valuable by-products. The information and training needs in fish processing will be ascertained through a systematic understanding.
- Secondly, emphasis will be given to fruit and vegetable processing and value-addition. In this context, coconut and mango, have been identified as major crops that are abundantly found in the village.

Being perishable, the processes, formulation, etc. need to follow GMP and HACCP standards; hence, the appropriate trainings and workshops various relevant aspects, will also be included along with the implementation of the proposal.

## **10.2. Objectives**

With these in interest, certain objectives have been set forth, and these are as follows:

- To set up facilities for fish, fruit and vegetable postharvest technology and to bring out quality products to match international standards.
- Capacity building of entrepreneurs through technical knowledge, skill training and hand holding support services
- Provide training and capacity building
- Support Farmer Producer Organizations (FPOs), Self Help Groups (SHGs), Producers Cooperatives & Cooperative Societies along their entire value chain to enable microenterprises to avail common services
- To empower women as a process of social change.

## **10.3. Collaboration with other institutions and agencies**

For a more effective and successful implementation of the proposal, collaboration with other agencies also envisaged through policy interventions. In this backdrop, collaboration with the following organizations and agencies is inevitable.

- Central Institute of Fisheries Nautical and Engineering Training (CIFNET)
- National Institute of Fisheries Post Harvest Technology and Training(NIFPHATT)
- Marine Products Export Development Authority (MPEDA)
- Regional Agricultural Research Station, Pilicode
- The Central Plantation Crops Research Institute (CPCRI)

## 10.4. Budget

### Non-recurring

#### I. Cold Chain Facility

Sl.No.	Facility	Amount (Lakhs)
I	<b>Landing Centers (3 Nos.)</b> Stainless steel covered raised platforms for fish auction , ice plants, Plastic crates, cold store	250.00
ii.	<b>Mini harbour</b> Stainless steel covered raised platforms for fish auction,Ice plant 1 (20 ton./day), Ice crusher, Plastic crates Cold store (0-4°C), Cold store (-20°C), Insulated trucks (+12 Degree C to -25 Degree C).	240.00
iii.	<b>Pre-processing Centre</b> Construction (5000 sq.ft), Equipment, Miscellaneous	75.00
iv.	Live fish/products display and marketing units	100.00
v	<b>Recurring expenditure:</b> Manpower, maintenance of machinery, routine sanitation marketing	50.00
	<b>Total cost (recurring &amp; non-recurring)</b>	<b>685.00</b>

#### II. Seafood value addition training-cum-incubation centre

	Item	Amount
I	<b>Recurring:</b> <b>Civil Work :</b> Pilot plant (10000 sq.ft.), Laboratory (1000 sq.ft.), Power back up system, Effluent treatment plant, Water treatment plant	320.00
ii.	Laboratory equipments	100.00
iii.	Training hall equipment and facility	300.00
iv.	Skill Development training	100.00
	<b>Recurring expenditure :</b> Manpower, consumables, electricity etc.	80.00
	<b>Total cost (recurring &amp; non-recurring)</b>	<b>900.00</b>



### III. Seafood waste valorisation

I	<b>Non-recurring</b> Civil Work Tools/equipment	100.00 70.00
ii.	<b>Recurring expenditure :</b> Manpower, consumables, electricity etc.	80.00
	<b>Total</b>	<b>250.00</b>

### IV. Coconut and Mango processing and value addition

I	<b>Non-recurring</b> Equipment and Processing Facility	260.00
ii.	<b>Recurring expenditure :</b> Manpower, consumables, electricity etc.	40.00
	<b>Total</b>	<b>300.00</b>
	<b>GRAND TOTAL (I-4)</b>	<b>2135.00</b>

### 10.5. Expected outcome

The expected outcome of the proposal is to encourage new entrepreneurs as an individual, propriety concern, partnership firm, etc. and also, to support the existing entrepreneurs. Furthermore, to create job opportunities with job security. Women empowerment would also be an expected outcome of this proposal by encouraging and training the women and related associations such as kudumbhasree.

To meet consumer requirements in terms of quality and safety, shelf stability, cost, and no or minimum preservatives/ additives.

The proposal also expects to create brand and assist the community in establishing themselves in both national and international market. Thereby, evolve an approach for technology support which shall have synergy and convergence to address the existing gaps and challenges. Issues relating to product diversification, market promotion, etc. will also be addressed.

Total amount envisaged is Rs. 2135 lakhs.

# **Chapter 11**

## **IMPROVING THE COMMUNITY HEALTH STATUS**

### **11.1. Introduction**

Chellanam is a densely populated fishing village which is situated in the southwest corner of the Ernakulam district, stretching a distance of 17.5 km parallel to the seashore with a width of only one kilometer. The area is highly prone to flood due to sea invasion and coastal erosion, especially during the southwest monsoon. The total population in this village is nearly 47,000 with 16000 families in 21 wards. The village is bestowed with different types of water bodies and agricultural fields. Hence, 80% of the population depends on fishing and the remaining on farming for their livelihood. Therefore the majority of them are economically backward.

During the sea invasion, waves deposit huge piles of silt, plastic waste, and garbage into houses. It takes weeks to clean up this mess. Garbage and waste from septic tanks are also washed in with the flood, blocking toilets and sanitation systems. Hundreds of people will be shifted to the relief camps which lack basic amenities where no Covid protocol could be maintained. Chellanam is one of the worst COVID-19 affected areas in Kerala. Even during the first wave of the pandemic in Kerala, the village had been a major cluster. In the present days, the people need additional care to tackle the post Covid health issues. All these factors have caused serious mental and health issues to the people.

The constant threat of natural calamities has made the people prone to mental, social, physical trauma and economic uncertainty subjecting them to severe health issues. The problem has resulted in psychological and physiological impacts, especially on women and children. Most of them are having various lifestyle diseases, nutritional deficiency diseases and are suffering from psychological issues (personal communications). In addition, there is a fishing harbor where more than 3000 people are working every day. In case of any accidents, the victim has to be taken to a hospital 18 km away from the village. There have been many incidents of death without even receiving the first aid, especially in cardiac arrest cases. This is the most urgent problem of the people which needs to be solved at the earliest.

Presently they have only one primary health centre (PHC) at Chellanam, which is functioning effectively with minimum facilities. The primary health centre at Kandakkadavu, Family welfare centre and Homoeo hospital at Kannamaly and Kottiparambu Ayurveda hospital are functioning with limitations.

The food security of the people of Chellanam is addressed to a great extent by the government through the public distribution system and other schemes, the lack of awareness of people about the nutritional requirement, prevents them from using the resources available which can supply the essential macro and micronutrients. So there is a need to address the problem of nutritional insecurity of the people.

To improve the public health status of the people of Chellanam, few suggestions are listed;

### **11.2. Upgradation of the primary health centre of Chellanam**

Taken into account, the density of people living in Chellanam, the medical facilities of this region is not adequate. It is well understood that this region has only a public health centre running with minimum facilities, hence the people of Chellanam have to depend on other hospitals in and around the Kochi city for better treatment which is several kilometers away making timely treatment difficult. Since 1.5 acres of land is available, It is suggested to upgrade the primary health centre to a multispecialty hospital by incorporating the following;

- a. It has to be upgraded with 50 bed facility
- b. Casualty with 5 beds and minor operating room
- c. Major operation room, Central Sterile Supply Department (CSSD), Post operative ICU
- d. Medical ICU with 5 beds and CCU
- e. General ward Male, Female and Paediatrics
- f. Pharmacy
- g. Lab with Biochemistry, Serology, Haematology
- h. X ray, ECG, Ultrasound
- i. Labour room and NICU
- j. Ambulance and Mobile clinic
- k. Dental Clinic
- l. Reception
- m. Mortuary

- n. Rooms for doctors and other facilities
- o. Diet Clinic
- p. Canteen
- q. Toilets

### ***Doctors***

General Physician, Cardiologist, Gastroenterologist, Paediatrician Dermatologist, Orthopaedics, Ophthalmologist, ENT, RMO, Anaesthetist

### ***Other staff***

Psychologist, Dietician, Pharmacist, Biochemist, Biomedical engineer, Nursing superintendent, Nurses, attenders and cleaning staff on daily wages, Technicians (ECG, X-ray, CT scan, Ultrasound, Lab, Anaesthesia), Driver for ambulance, Electrician, Receptionists, Recording keeping department employees (IP/OP, discharge bill summary etc.), Canteen supervisor and staff.

## **11.3. Upgradation of primary health centres at Kandakkadavu and Kannmali**

Currently the primary health centre at Kandakkadavu collapsed because of the sea erosion of the place and is temporarily functioning at some other place. So there is a need for reconstruction of the said facility with sufficient protection against sea invasion. Along with this facility, a physical fitness center with trainers and a yoga centre with instructors may be included. This should be raised to a facility where people of low economic class have access, so that, they can be motivated for a better life style. This can also help to alleviate the problems of life style diseases. The sub centre of PHC at Kannamaly is also in a highly pathetic situation, which needs to be renovated.

## **11.4. Development of the ayurvedic clinic to a facility with 20 beds**

Ayurveda is a holistic approach that encourages certain lifestyle interventions and natural therapies to regain balance between the body, mind, spirit and the environment. It includes an internal purification process, followed by a special diet, herbal remedies, massage therapy, yoga and meditation. It also has positive effects when used as a complementary therapy in combination with conventional medical care.

Chellanam grama panchayat has a Ayurvedic hospital at present, which we propose to upgrade. The emphasis may be given to

- (a) Kayachikitsa (general medicine), which will deal with the diagnosis and treatment of a variety of general disorders including skin, diabetes, rheumatoid arthritis, etc.
- (b) The second area that can be emphasized may be rheumatoid ailments. Since, the population is close to water bodies and affected with water flooding, the incidents of rheumatoid ailments may be high in them. The back pain and other joint pains might be prevalent in such conditions. Treatment in this regard will also benefit the Chellanam population.
- (c) Nasyam as another treatment to cure headache, ENT related disorders such as migraine, sinusitis, etc.

Along with these, following IP services may also be integrated:

- 1- General ward facility for men (10 beds)
- 2- General ward facility for women (10 beds)
- 3- Paid facility (5 beds)

Yoga and meditation go hand in hand with ayurvedic treatment; hence, facilities for yoga and meditation may also be incorporated. The patients returning need to be trained to continue the yoga and meditation. Hence, a training facility is also necessary. Further, training of children to perform yoga and meditation at school level may also be taken up as a healthy lifestyle.

Other facilities may include

- pharmacy/ dispensary
- panchakarma table or paathi
- other panchakarma ayurvedic treatments such as nasyam-dhara type gokarna, wathi, etc.
- dhara (Kashaya dhara, etc.)
- equipment pain relief (infra-red pain reliever, etc.)

Requirement

- Doctors – 2
- Pharmacists – 4
- Attenders – 2
- Other staff – 3

- Other facilities (Consulting room, Waiting room, room for dispensing medicines and store room, kitchen or cooking area)

Utensils, cooking facility, cleaning facility, packaging room, raw material receiving room, etc.

### **11.5. Full fledged homoeo clinic and pharmacy**

Homeopathy, also known as homeopathic medicine, is a medical system that was developed in Germany more than 200 years ago. Homoeopathy is concerned with treating the whole person rather than the illness alone. The homeopathic remedy is based on all the symptoms of the patient including physical, mental and emotional states as well as past history, family history, and intrauterine history of the patient. Homoeopathic remedies stimulate the body's own immune system and offer a long lasting cure rather than giving temporary relief and thereby improving health and nutritional status.

In Chellanam, a homoeo hospital is functioning at Kannamaly which has to be upgraded with 10 bedded facilities. For this, the following experts and facilities are needed

- Homoeo doctor – 1
- Pharmacist – 4
- Attender – 2
- Lab technicians - 2
- Pharmacy
- Laboratory
- All the room facilities (Consulting room, Waiting room, room for dispensing medicines and storage)

### **11.6. Health and nutrition education training programs for women and children**

Now a day's people are conscious about maintaining their health and they are aware about the role of food in maintaining health. But they are totally unaware about the importance of having a balanced diet. Socioeconomic factors and family size are the major factors influencing food choices and thus in turn food security. Health and nutrition education programmes can be conducted through schools and anganwadies especially for the homemakers. The health and nutritional programmes in our state for the vulnerable groups mainly focuses on supplementary nutrition and in eradication of nutrition deficiency related problems. Achieving food and nutritional security should become a part of such programmes. Health camps should be

organized on a regular basis which could benefit the old, the women, the children and general population alike, especially in wake of the Covid pandemic manifested by severe post Covid health problem.

#### **11.7. Nutritional survey with special emphasis on fish consumption pattern**

Nutritional status is one of the determinants of health status and so assessing nutritional status of the community is inevitable. Moreover, data regarding food and nutritional security scenario of people in Chellanam is lacking and we are submitting a proposal regarding this aspect. The sampling can be done in the following manner. The study will be conducted in the Chellanam Gramapanchayat of Ernakulam district. Out of the total 21 wards in the panchayat, 10 wards will be selected randomly. From each ward, 50 families will be selected randomly and thus a total of 500 families will be selected for the study. Thus, multistage random sampling procedure will be adopted for selection. A sub sample comprising of 50 women in the age group of 25 to 35 years and 50 preschool children in the age group of 3 to 5 years will be selected. While selecting samples, women under special physiological conditions will be avoided. Likewise, samples with specific diseases will also be avoided.

The plan of study is designed on the basis of the specific objectives which comprised of:

- A baseline survey to collect information on the socioeconomic status of the elected families.
    - Details of socio economic conditions of the families like type of family, family size, age, education and occupational status of family members, personal habits, monthly income, possession of house, domestication of animals, savings, indebtedness, monthly expenditure pattern, housing conditions, health facilities available in the locality, availability of safe drinking water and details of morbidity and mortality pattern etc. will be collected.
  - A dietary survey to collect details on the food consumption pattern of the selected families with special reference of fish and fishery products.
    - Food consumption pattern of the families like meal pattern, eating habits, frequency of use of foods, food expenditure pattern, coping strategies adopted during food crisis, preservation and storage practices adopted.
- Interview method with the help of structured and pretested questionnaire will be

used to collect the required information about the socioeconomic status and food consumption pattern of the families.

- Food purchase inventory of the families for a week
  - Details of purchasing pattern of different food items like place of purchase, purchase made by cash/credit, quantity purchased, frequency of purchase, bio resource inflow and outflow and changes observed in the purchasing pattern during different periods.
- A dietary recall survey to collect data on the food and nutritional adequacy of the families by determining the food intake per consumption unit (CU) per day and per capita nutrient intake per day.
- Assessment of nutritional status of the family members through anthropometric measurements

For this, height and weight of adult members, height, weight, mid upper arm circumference, head & chest circumference of pre-school children, height, weight and mid upper arm circumference of older children., crown heel length and weight of aged will be recorded using standard methods.

- One day food weighment survey to assess actual food and nutrient intake of women and preschool children (subsample)
  - Clinical examination of women and preschool children (subsample) to identify specific deficiency symptoms. Clinical examination can be conducted with the help of a qualified medical officer using a schedule formulated for this purpose
  - Biochemical examination of blood of women and preschool children (subsample) for haemoglobin, total protein, albumin/globulin ratio, and creatinine.
- Statistical analysis and interpretation of data using suitable statistical techniques.

## **11.8. Other public health aspects**

### ***a. Drinking water facilities***

Ensure that the entire panchayat is equipped with clean drinking water. Purified drinking water should be provided through underground pipes and connected to every house in the panchayath. The quality of the drinking water should be ensured by periodic quality checking.



### ***b. Sewage treatment***

Centralized sewage systems (CSS), with underground pipes, pumping stations, and treatment plants may be constructed. However, these systems are expensive to build and operate, requiring uninterrupted power, skilled operators, and extensive maintenance. Since CSS may be difficult to be implemented due to the nature of land in Chellanam, subjected to erosion it is advisable to implement a Large capacity Decentralized Wastewater Treatment System (DEWATS) which is a smaller and more affordable system to treat wastewater closer to the point of generation, enabling more effective water reuse for toilet flushing and gardening. Using natural bacteria, plants, and gravity instead of electricity and chemicals, DEWATS can be up to 80%t less expensive to operate than conventional technologies. DEWATS can also help tackle water shortages, because it can reduce the use of freshwater by up to 50 percent for domestic uses locally, like washing, flushing, and gardening. DEWATS can treat, domestic wastewater, wastewater from schools, hospitals, hotels, orphanages, temples, Industries, slaughterhouses, animal farms and markets. DEWATS can treat mixed gray-water and black-water.

### ***c. Toilet with septic tank***

It is suggested to ensure that every house in the Chellanam Panchayath are having proper toilet facilities with eco-friendly septic tanks. Apart from this, sufficient numbers of the public toilet should also to be made.

## Budget

Sl No.	Particulars	Lakhs (Rs)
<b>Non-Recurring</b>		
1	Building & Civil Works For the renovation of primary health centers, Ayurveda and homoeo hospital	1500
2	Plant, Machinery & Furniture	5070
3	Diagnostic Framework	385
4	CSSD	10
5	Special Storage	25
6	OPD, Outpatient check-up rooms with proper preliminary diagnostic devices Multispecialty                                  Dental                                  Chair ENT check-up workstation with audiometer and tympanometry	10
7	In-patient Ward, General (beds) ICU/CCU(beds), Nursery with Intensive Care	35
8	Ambulatory Service	15
9	Mortuary	10
10	Decentralized Wastewater Treatment System	300
11	Drinking water facilities	1000
12	Toilet facilities with septic tank	1200
13	Digital archive facility for data storage	5
<b>Recurring</b>		
12	Manpower	800
13	For surveys and research	20
14	Travel	10
15	Contingency	5
16	Other miscellaneous expenses	10

### **11.9. Expected outcome**

Chellanam Panchayath health uplift programme will turn the entire panchayath into self-reliant communities that bring about integrated development in General and mental health, hygiene, and a clean drinking water facility. With strong financial support from the government, KUFOS will be consolidating its expertise in working with children, women, health, and the environment into one large-scale programme that delivers practical sustainable development solutions.

### **11.10. Assessment**

KUFOS will Initiate a frequent meeting with the local stakeholders (panchayat heads, villagers, and Government and Non-Governmental organizations) periodically assess their requirements, and draw up a plan for a long sustainable development

### **11.11. Awareness:**

KUFOS will be able to sensitize the community about the proposed plan and define their role and participation with permission from the government. Researchers from KUFOS will conduct a periodic baseline survey as a benchmark before implementation.

### **11.12. Activities**

Project activities will be carefully planned after the discussion with the stakeholders and will be implemented as early as possible without any delay with support from field staff and regular monitoring by senior management. All the activities initiated will be continuously monitored and recorded for future development.

### **11.13. Results**

Mid-line and end-line surveys on the nutrition and health status of all people in the panchayath will be taken up by the monitoring and evaluation teams to ensure that the project is in line with the plan. The results will be well documented and archived in digital form for future development processes at the KUFOS facility.

### **11.14. Sustainability**

KUFOS will initiate the formulation of the Chellanam grama Panchayath Health Development Committees right at the inception stage of the project. The committees which include, the various staff from KUFOS, Stakeholders, and doctors are mandated to meet regularly during and after completion of the programme to ensure the sustainability to make Chellanam a model grama panchayath.

An amount of Rs. 17440 lakhs has been anticipated for establishing the facilities.

# CHAPTER 12

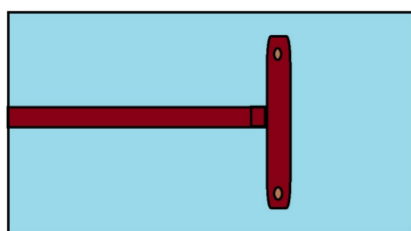
## INNOVATIVE THOUGHTS PROPOSED BY PUBLIC

### 12.1. Seashore protection and wave energy generation

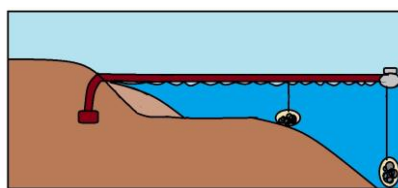
In response to our wide appeals, a few parties have proposed their ideas and thoughts on Chellanam restoration. One among them is Mr. Santhosh Thannikat (9446389679 or [santhosh.thannikat@gmail.com](mailto:santhosh.thannikat@gmail.com)) and team who aim at creating a hybrid technological solution for the protection of seashore and generate energy in the selected sites.

The proposal is to build T shaped groynes (s) using a floating structure which can prevent seashore erosion and wave related destruction of the coastal area and at the same time harness energy using wave, tide, current, air / buoyancy, ballast water pressure or wind.

#### *Primary concept*

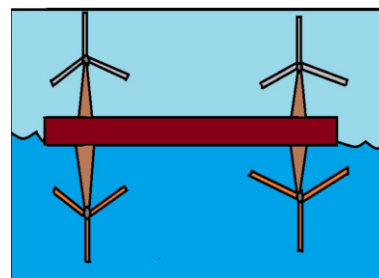


Aerial view



Side elevation

Illustration: Saalini TS



Front elevation

T Shaped groyne jetting out from the coastline into the sea. It is fixed on the seashore and also anchored in the sea. Floating structure will have to be always on the top of the water, even during tidal differences. It can jet out into the sea (say, 100 to 200 meters) and the T end (can have a width of 50 to 100 meters). The generator should have consistent power generation capability and peak load shall be during 6 to 10 pm. Generator can harness power from any of the sources or combined sources (wave, tide, current, air / buoyancy, ballast water pressure or wind). This needs elaborate feasibility study.

## 12.2. Chelploid

Another such concept was proposed by Mr. Antoji K.J. (Ph. 8893863663 e mail: antojikalathinkal@gmail.com) which intends to constructs a solid seawall cum beach road with width of 6 meters and 4 meters high built using Chelploid which has been reported to be effective by them.



The Chelploid design weight goes up to 3 tons with the dimension of 60 cm on one side. Compared to the tetraploid, Chelploid of lighter weight, which is claimed to have withstood the recent cyclone of 100 km/hr namely cyclone Tauktae at its pilot stage itself. A dual Chelploid of higher weight can be used for basement it seems which also needs a detailed study to prove its feasibility.



# **CHAPTER 13**

## **CONCLUSION**

1. Start the shore protection activities proposed by NCCR and KUFOS (Department of Irrigation and other machineries).
2. Efforts may be taken to utilize the dredged sand for beach nourishment and heaping of sand in near shore waters (Holland model) for coastal protection and depth abating of the shore line waters (Cochin Port Trust and other assigned Departments of GoK).
3. Re-establish the canal and drainage systems of Chellanam and nearby areas evacuating the invasions and unauthorized constructions (State Government and Local Self Governments).
4. Appoint a Special Officer for the execution of the above with all statutory powers including evacuation of unauthorized encroachments (Government).
5. Start a real time monitoring and study across the vulnerable coastal stretches of the State to rectify the problems of the respective places (KUFOS).
6. Organize awareness programmes on household basis to educate people on CRZ regulations and Climate change issues. Address the concerns of residents on “Punargeham” project (KUFOS, Department of Fisheries and Department of Disaster Management).
7. Undertake a study on finding out the feasibility of alternative thoughts on shore protection and energy generation proposed by the public (KUFOS).
8. Establish a multi stories and multi-purpose rehabilitation centre with a minimum total area of 9000 sq.m to rehabilitate people on turbulent days. This facility managed by LSGs and KUFOS can be given for other purposes like tourism etc. during the calm seasons.
9. Establish a full-fledged Government hospital and Recreation Centre in Chellanam (Health Department and KUFOS).
10. Promote the aquaculture sector in Chellanam (KUFOS and Department of Fisheries).
11. Revamp the agriculture sector in Chellanam (Department of Agriculture, Kerala Agricultural University and KUFOS).
12. Encourage small scale industries with available raw materials and local inputs (Department of Industries and KUFOS).
13. Take up a programmes to address the mental health, recreation and sports of youth, women and children (KUFOS).

14. Take steps to mould the students from childhood for empowering them towards writing competitive exams like national and state level entrance examinations (KUFOS).
15. Develop 'water consciousness' among the residents through a comprehensive programme and teach them to tackle all sorts of difficulties and contingencies during floods (KUFOS).
16. Take up a study on the socio-economic aspects and health issues in Chellanam Panchayath (KUFOS).
17. Promote bio-shielding with mangroves, associates and other plant communities wherever possible (KUFOS).
18. Propose ideas for other similar coastal villages for the restoration, relief and development (KUFOS).