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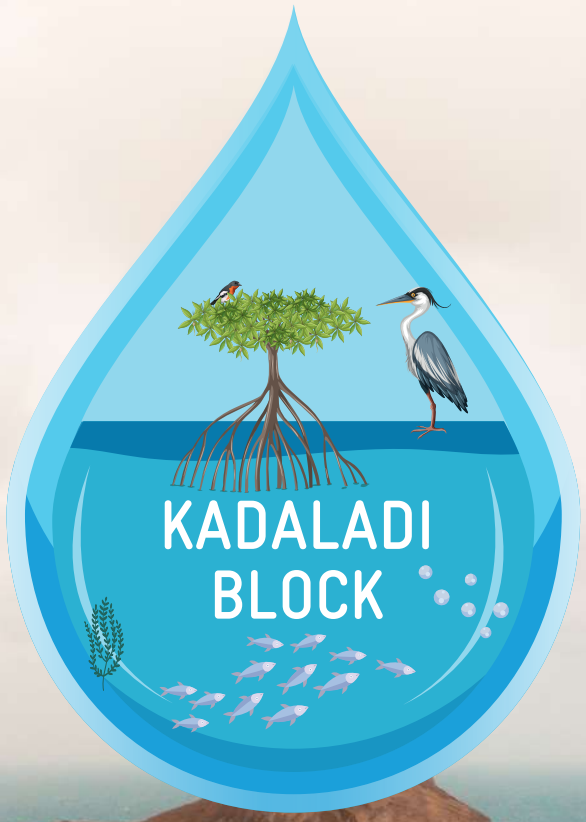
WATER SECURITY AND CLIMATE ADAPTATION IN RURAL INDIA



SUSTAINABLE DEVELOPMENT GOALS

Block Level Composite Water Resources Management Plan under Mahatma Gandhi NREGS

District Rural Development Agency, Ramanathapuram &
WASCA, GIZ, New Delhi

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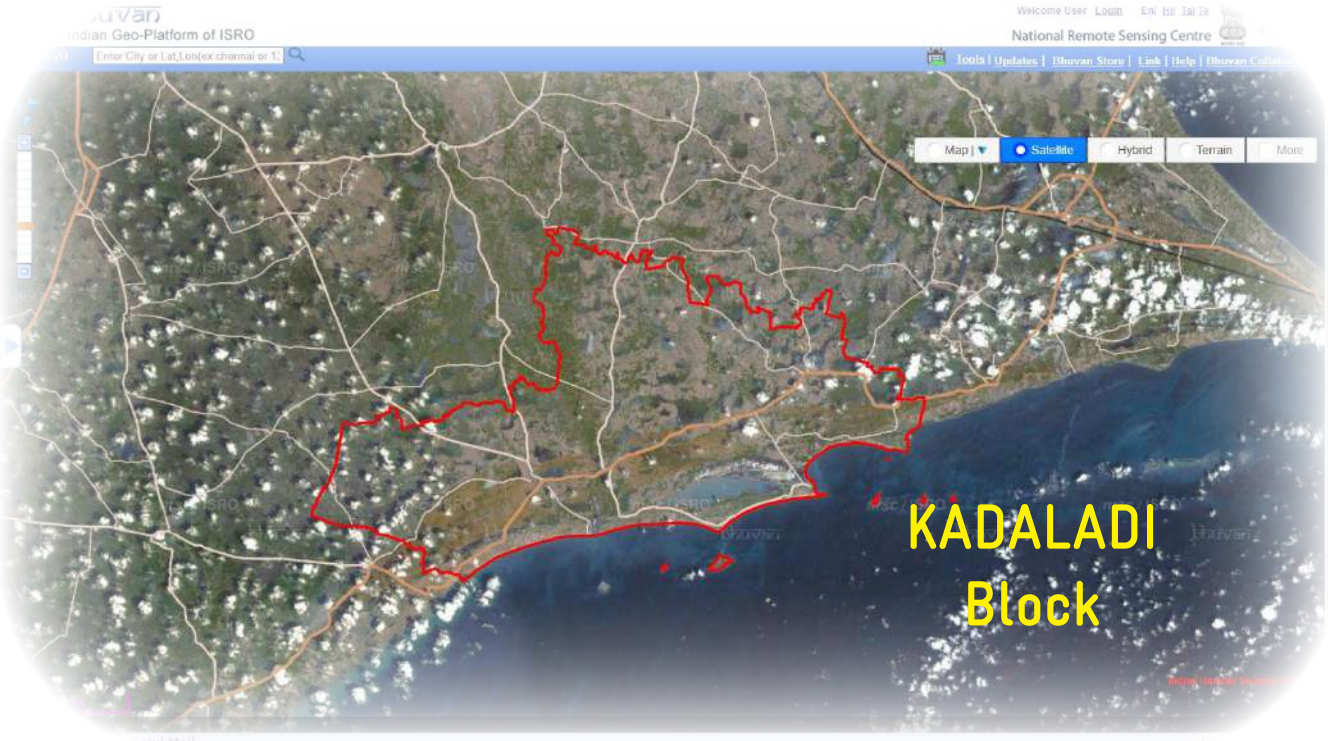
WATER SECURITY AND CLIMATE ADAPTATION IN RURAL INDIA



Block Level Composite Water Resources Management Plan under Mahatma Gandhi NREGS

District Rural Development Agency, Ramanathapuram &
WASCA, GIZ, New Delhi

FOREWORD

Thiru. Praveen P. Nair, IAS
Director of Rural Development
and Panchayat Raj

Tamil Nadu government is implementing the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) by assuring adequate and accessible wage employment while simultaneously creating productive individual and community assets to fulfil the infrastructure and livelihood needs of the people in rural areas. The Government intends to prioritise the strategies under this scheme to focus on creating Climate Resilient Villages and individual income generating assets and works in the coming years in a convergence model.

> "Close to 10 lakh NRM and Non- NRM works are identified, verified, approved by Gram Panchayat"

There will be a reorientation of priorities under MGNREGS with livelihood promotion and poverty alleviation as goals in addition to Natural Resource Management, asset creation and agriculture development. The approach to Natural Resource Management will be on a saturation mode with GIS based planning. The impact of each intervention will be maximised through convergence.

In this context, implementation of Water Security and Climate Adaptation (WASCA) a technical cooperation project GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH) In-do-German Technical Cooperation project in Tamil Nadu is of paramount importance. WASCA is being implemented in Tiruvannamalai and Ramanathapuram district.

The project focused on GP level planning driven by scientific data, climate information, climate risk, climate vulnerability assessments & ranking, watershed approach, water budgeting (Ground and surface water), land use, agriculture, livestock, soil parameters and GIS thematic maps. A Composite Water Resources Management Planning (CWRMP) frame works is adopted. The GP level works thus identified are mapped to climate vulnerabilities, SDG goals and its Indicators, Intended Nationally Determined Contributions (INDC) for climate Change. This mapping exercise is unique and first of its kind in the country for a plan at GP level.

This approach helped to complete 1,289 GP level plans in holistic way for a period of three years. Close to 10 lakh NRM and Non- NRM works are identified, verified, approved by Gram Panchyat. Out of the shelf of projects, in the year 2021-22 FY, 2,80,000 works are uploaded in NREGA soft GIS planning portal. This is one of the largest number of works uploaded by any district or state for the current financial year.

Under WASCA four major interventions are being undertaken in pilot districts.

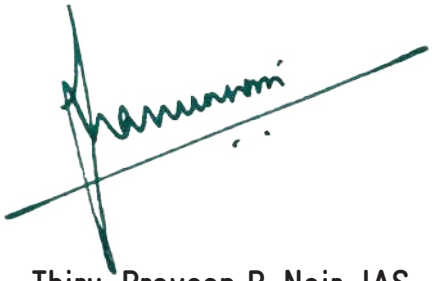
1.	Development of Public and Common lands
2.	Development of Agriculture and allied activities
3.	Development of Rural Infrastructure Management
4.	Development of Climate Resilience Measures

Under the leadership of District Collector, Additional Collector (Development), Engineers of District Rural Development Agencies (DRDA), line departments and GP office bearers the implementation of approved works from WASCA are discussed during monthly district level convergence meetings.

The present Block report is a synthesis of all GPs in the Block discussed in detail on four major heads, Socio-Economic, Climate, Water and Agriculture the key for any rural development. The Block level CWRM book will help the GP, Block officers and Gram Panchayats in planning, implementing works in holistic manner, reducing water scarcity in the district.

I take this opportunity to thank GIZ, the technical partners, District WASCA resource Centres for their continued effort to work with DRDA and State RDPR for making MGNREGS more integrated.

"The block level CWRM book will help the GP, Block officers and Gram Panchayats in planning, implementing works in holistic manner, reducing water scarcity in the district"



Thiru. Praveen P. Nair, IAS
Director of Rural Development
and Panchayat Raj

FOREWORD

Rajeev Ahal
Director,
NRM & Agroecology, GIZ India

The Block Level, Composite Water Resources Management Plan is an unique initiative of District Rural Development Agency, Tiruvannamalai & the Indo German project on Water Security and Climate Adaptation in Rural India (WASCA) implemented by GIZ. This is the culmination of three years of efforts by the project team and government officials, assisted by knowledge partners and a myriad of departments. At the national level, this process is anchored in the Ministry of Rural Development and supported by National Water Mission, Ministry of Jal Shakti.

The state government of Tamil Nadu, with core support from Director Thiru. Praveen Nair I.A.S., Department of Rural Development and a host of water related departments, under the active leadership of the District Collector, Thiru. B.Murugesh, I.A.S., has embarked on this strategic response to the strong crisis of water security which is affected by climate change that we are increasingly witnessing. This Block level report uses strong scientific data and analysis using GIS and statistical data to develop a medium-term picture of water and climate and their interactions. These have driven a scenario projection, to respond to which key thrust areas of actions, with their inherent strategies and resultant activities have been brought together into a plan that will work to change this possible reality.

> "Block level report uses strong scientific data and analysis using GIS and statistical data to develop a medium-term picture of water"

As humans, we have to plan to avert the future potential disasters and capture latent opportunities, using the human, technical and financial resources available to us. As wise humans, we should do it strategically to not only adapt to that reality, but to initiate actions that help to mitigate that possible future also along with.

The Block report focuses on sustainable water resource management, as it is the true driver for all development in a natural resource dependent rural livelihood scenario. The climate actions initiated not through separate climate funds, but by leveraging existing public programmes and schemes, such as Mahatma Gandhi NREGA, to act now and decisively.

We sincerely hope that this innovative Block Level plan is not only a success for itself but shows that way how the state government can plan for all of its .... Blocks!

We look forward to its success!

Rajeev Ahal

Rajeev Ahal
Director,
NRM & Agroecology, GIZ India

MESSAGES

Thiru. S.S. Kumar
Additional Director (MGNREGS),
RD&PR

The Mahatma Gandhi National Rural Employment Guarantee Scheme in Tamil Nadu focuses on Natural Resources Management, Grey Water Management, Farm Ponds in individual lands, afforestation and plantations in community areas, water harvesting and conservation measures. To implement works in saturation mode, it is important to have holistic plans prepared in every Gram Panchayat.

GIZ technical cooperation project on Water Security and Climate Adaptation (WASCA) being implemented in Tiruvannamalai and Ramanathapuram district is an example of holistic GP plans considering the land, water, soil, geology and social aspects.

> **Water Security and Climate Adaptation (WASCA) is an example of holistic GP plans considering the land, water, soil, geology and social aspects**

Through District level GIS resource centres, GIZ with the partners MSSRF build capacity of Block, GP level technical officers of Rural Development Department in completion of 1,289 GP plans. In preparation of GP level plans, Nationally approved Composite Water Resources Management (CWRMP) framework is adopted along with Bhuvan NRSC ISRO GIS platform.

Total 3,00,000 works identified through CWRM are uploaded in NREGA Soft. The works focused on treatment of all-natural drainage lines, rejuvenation of waterbodies, afforestation, trench cutting, gully plugs, recharge-shaft, farm ponds, check dams, farm bunds, soak pits etc. These works identified through GIS planning are verified on ground and approved by Gram Panchayat.

The Block level report provides the details of the parameters used for preparing plans, analysis of the situation, works for over coming the short term and long-term goals of climate resilience and productive assets. This report will be useful for all functionaries implementing MGNREGS.

Thiru. S.S. Kumar
Additional Director (MGNREGS),
RD&PR, Government of Tamil Nadu

MESSAGES

Thiru. R. Harikrishnan
Cheif Engineer,
MGNREGS, RD&PR

Water Security and Climate Adaptation (WASCA) a bilateral project of Ministry of Rural Development (MoRD) (MGNREGS), Ministry of Jalsakthi (National Water Mission) and GIZ (German Corporation for International Cooperation GmbH) started in the year 2019-20 and for next three years.

In our state, Centre for Climate Change and Disaster Management (CCCDM-Anna University) has conducted the scoping study based on 18 Vulnerability parameters (Socio-economic, agriculture, water and climate parameters) and identified the most vulnerable two districts for project implementation. The two districts are Tiruvannamalai in Northern Tamil Nadu and Ramanathapuram South coastal aspirational district. For implementing WASCA project Composite Water Resource Management (CWRM) Plan is used.

> "Whole planning process followed a bottom-up approach in identifying appropriate actions based on scientific analysis"

The CWRM plans assessed both the supply and demand for water using data pertaining to land resources, climate parameters, catchment areas, soil, surface runoff, agriculture and prepared a water budget. Besides, it has identified a set of key water actions for the development of public and common land, agriculture and allied activities and rural infrastructure. The whole planning process followed a bottom-up approach in identifying appropriate actions based on scientific analysis. I consider such decentralized level of planning is necessary in ensuring water security in the context of increasing climate change impacts.

Thiru. R. Harikrishnan
Cheif Engineer,
MGNREGS, RD&PR

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ANNEXURE

ABBREVIATIONS AND ACRONYMS

A - D

%
Percentage

^{0}C
Degree Celsius

AR
Assessment Report

BPL
Below poverty line

CCB
Contour Continuous Bunds

CCCDM
Centre for Climate Change and Disaster Management

CRM
Climate Resilient Measures

CuM
Cubic Meter

CVI
Climate Vulnerability Index

CWRM
Composite Water Resource Management

CWRMP
Composite Water Resource Management Plan

D - H

DEM
Digital Elevation Model

DLSC
District Level Steering Committee

DRD&PR
Department of Rural Development & Panchayat Raj

ET
Evapo-transpiration

FPO
Farmer Producer Organization

FY
Financial Year

GIS
Geographical Information System

GIZ
Deutsche Gesellschaft für Internationale

GP
Gram Panchayat

GW
Ground water

ha
Hectare

ha - M
Hectare Meter

HH
Households

I - M

ICAR
Indian Council for Agriculture Research

IMD
Indian Meteorological Department

INR
Indian Rupees

IPCC
Intergovernmental Panel on Climate Change

IWRM
Integrated Water Resources Management

Kharif crop
Sown in Monsoon and harvested close to Autumn

km
Kilometer

LULC
Land use and land cover

Max
Maximum

MCM
Million Cubic Meter

Mahatma Gandhi NREGA
Mahatma Gandhi Rural Employment Guarantee Act

M - N

Mahatma Gandhi NREGS
Mahatma Gandhi Rural Employment Guarantee Scheme

MI
Micro irrigation

Min
Minimum

mm
Millimeter

MoEFCC
Ministry of Environment, Forest and Climate Change

MoJS
Ministry of Jal Shakti

MoRD
Ministry of Rural Development

Mtrs
Meters

NAPCC
National Action on Climate Change

NARP
National Agricultural Research Project

NDC
Nationally Determined Contributions

NEM
North-East monsoon

N - S

NGO
Non-Governmental Organization

NITI Aayog
National Institution for Transforming India

NRM
Natural Resource Management

NRSC
National Remote Sensing Centre

NWC
National Water Commission

pH
Potential of hydrogen

PWD
Public Works Department

Rabi crop
Sown in winter and harvested in monsoon

RCP
Representative Concentration Pathways

RDPR
Rural Development & Panchayat Raj

RTRWHS
Roof top rain water harvesting structures

RWHS
Rain Water Harvesting System

SAPCC
State Action Plan on Climate Change

S - W

SC
Scheduled Caste

SDG
Sustainable Development Goal

SDMA
State Disaster Management Authority

SDMRI
Suganthi Devadasan Marine Resources Institute

SECC
Socio Economic and Caste Census

SHG
Self Help Group

SLSC
State Level Steering Committee

ST
Scheduled Tribe

SW
Surface water

SWM
South-West monsoon

WASCA
Water Security and Climate Adaptation

WASCA TN
WASCA Tamil Nadu

WRIS
Water Resource Information system

வான்நின்று உலகம் வழங்கி வருதலால்
தான்அமிழ்தம் என்றுணரற் பாற்று

குறள் - 11

The genial rain ambrosia call
The world but lasts while rain shall fall

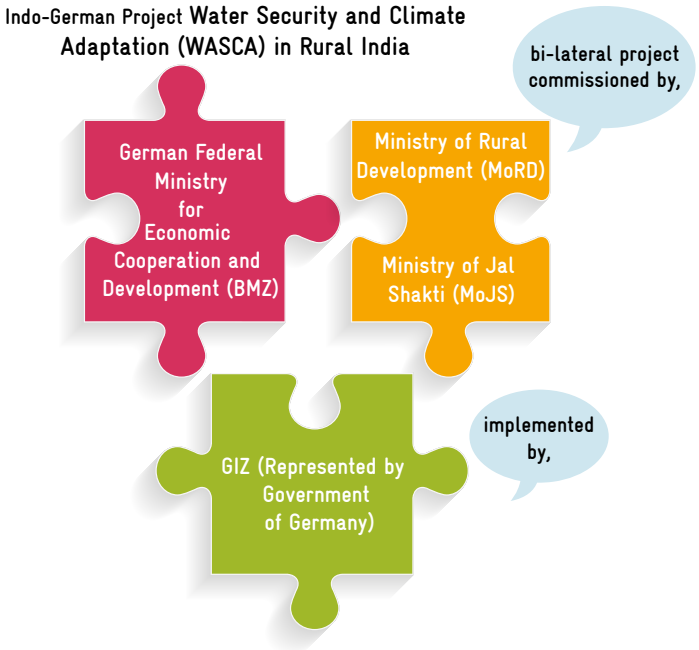
Thirukkural - 11

EXECUTIVE SUMMARY

> "Aims to improve water resource management with respect to water security and climate adaptation"

Water security is an alarming issue and one of the key challenge of the world under climate change scenario. While, the rural areas in particular are of prime concern due to its scarce resources and high natural resource dependency which requires thorough understanding, adapting, and applying technical knowledge in all its dimensions. This involves integrating climate change adaptation into the development planning processes and strategies across all relevant sectors and at all levels.

The Indo-German Project **"Water Security and Climate Adaptation in Rural India" (WASCA)**, is a bi-lateral project commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) in partnership with the Ministry of Rural Development (MoRD) and Ministry of Jal Shakti (MoJS) and implemented by GIZ (Represented by Government of Germany). This project aims to improve water resource management with respect to water security and climate adaptation and to establish a framework for integrating water perspectives into planning and implementing adaptation actions that promotes climate resilience. It is implemented under technical cooperation from BMZ-GIZ with implementation under Mahatma Gandhi National Rural Employment Guarantee Act (MAHATMA GANDHI NREGA/S) and National Water Mission (Catch the Rain Campaign) under MoRD, MoJS respectively. In Tamil Nadu State, the project is jointly implemented by the Department of Rural Development & Panchayat Raj, (DRD&PR) Government of Tamil Nadu, Chennai and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, New Delhi.



Initially, WASCA Tamil Nadu conducted preliminary state level scoping study on State's rural water security under climate lens through 18 influencing indicators to reflect state's rural water security through four interconnected areas viz., climate extremities, water resources, agriculture and socio-economic at the district level. Based on the assessment, Tiruvannamalai and Ramanathapuram districts were prioritized by the State Level Steering Committee headed by the Additional Chief Secretary, RD&PR in November 2019 for implementing the WASCA. Then, the indicators were further explored at Gram Panchayat (GP) level through Composite Water Resource Management (CWRM) approach focusing on Mahatma Gandhi NREGA/S approach to identify the key problems and propose the key actions for implementation in each district.

With focus on water-related climate action and integrated water resource management (IWRM) principles, the project WASCA aims to significantly contribute towards Sustainable Development Goals for ensuring efficient, sustainable, and inclusive water outcomes. Implementation of key water actions support the National Water Mission, one of the eight missions under the National Action Plan for Climate Change (NAPCC) to achieve their objective of promoting basin level IWRM. It also explored possible contributions towards the larger goals of Nationally Determined Contribution's (NDC) climate adaptation through its work on improving water efficiency in agriculture and allied sectors and ecosystem development. The State and District Steering Committee approved the process during May 2020 and the whole progress is jointly accomplished with research organizations and key sectoral experts in February 2021.

Subsequently, the District Collector entrusted the Block level report of water security and climate adaptation for each Blocks. The Block level report is intended for all planners and managers responsible for addressing adaptation in natural resource management and water-dependent economic sector and for those who provide support to achieve a coherent and strategic response to adaptation planning. This report also helps stakeholders to understand the issues related to water security in the context of climate change in rural areas and actions through Mahatma Gandhi NREGA and the need for convergence with concerned line departments.

> **Block level report is intended for all planners and managers responsible for addressing adaptation in natural resource management and water-dependent economic sector**

This report has been structured 9 complete chapters

1

First chapter outlines the generic demographic, socio economic and hydrological aspects of the Block

2

Second chapter addresses the Block's water security through the lens of changing climate. The past and future climate change scenarios are discussed along with climate risks. The 18 vulnerability indicators used in WASCA TN's scoping study are summarized and analysis on Block level vulnerability assessment are briefed

3

Third chapter elaborates the process of CWRM approach and its framework along with categorization of GPs, collection and analysis of spatial and non-spatial data of climate, water, agriculture and socioeconomic areas

4

Fourth chapter discusses the Intergovernmental Panel on Climate Change (IPCC) vulnerability assessment and GP vulnerability scores based on degree of vulnerability through sensitivity and adaptive capacity in 4 areas

5

Fifth chapter explores key water actions under Mahatma Gandhi NREGS convergence and its proposed actions as developments in public and common land, agriculture and allied sectors, rural infrastructures and climate resilient measures

7

Seventh chapter provides the process of GP plan implementation, its integration in to Mahatma Gandhi NREGS soft and about NRM and Non NRM works progress

6

Sixth chapter sketches the projected outcomes of planning and development in public and common land, agriculture and allied sectors, rural infrastructures and its linkage with NDC and SD goals particularly at GP level

8

Eight chapter provides model case study on one Micro-watershed and GP from the Block to illustrate how CWRM planning processes unfolds into analysis, results and impacts from Macro-watershed to the lowest planning unit GP

9

Ninth chapter concludes with the significance of Block level study and recommendations

துப்பார்க்குத் துப்பாய துப்பாக்கித் துப்பார்க்குத்
துப்பாய தூஉம் மழை

குறள் - 12

The rain begets the food we eat
And forms a food and drink concrete

Thirukkural - 12

CHAPTER 1

1 ABOUT THE BLOCK

Kadaladi, a **coastal Block** of Ramanathapuram District lies between **9°5'34.652"N to 9°20'28.949"N latitude and 78°15'20.031"E to 78°43'46.39"E longitude**. This Block has a long coastal stretch in east side along Bay of Bengal (Figure 1.1). The Block is surrounded by Kamudi, Tiruppullani and Mudukulathur Blocks in west and north side. The total geographical area of this flat terrain Block is 69,387.15 ha (693 sq.km). Administratively, this Block comes under Kadaladi taluk, and it has **60 village panchayats including 285 hamlets**.

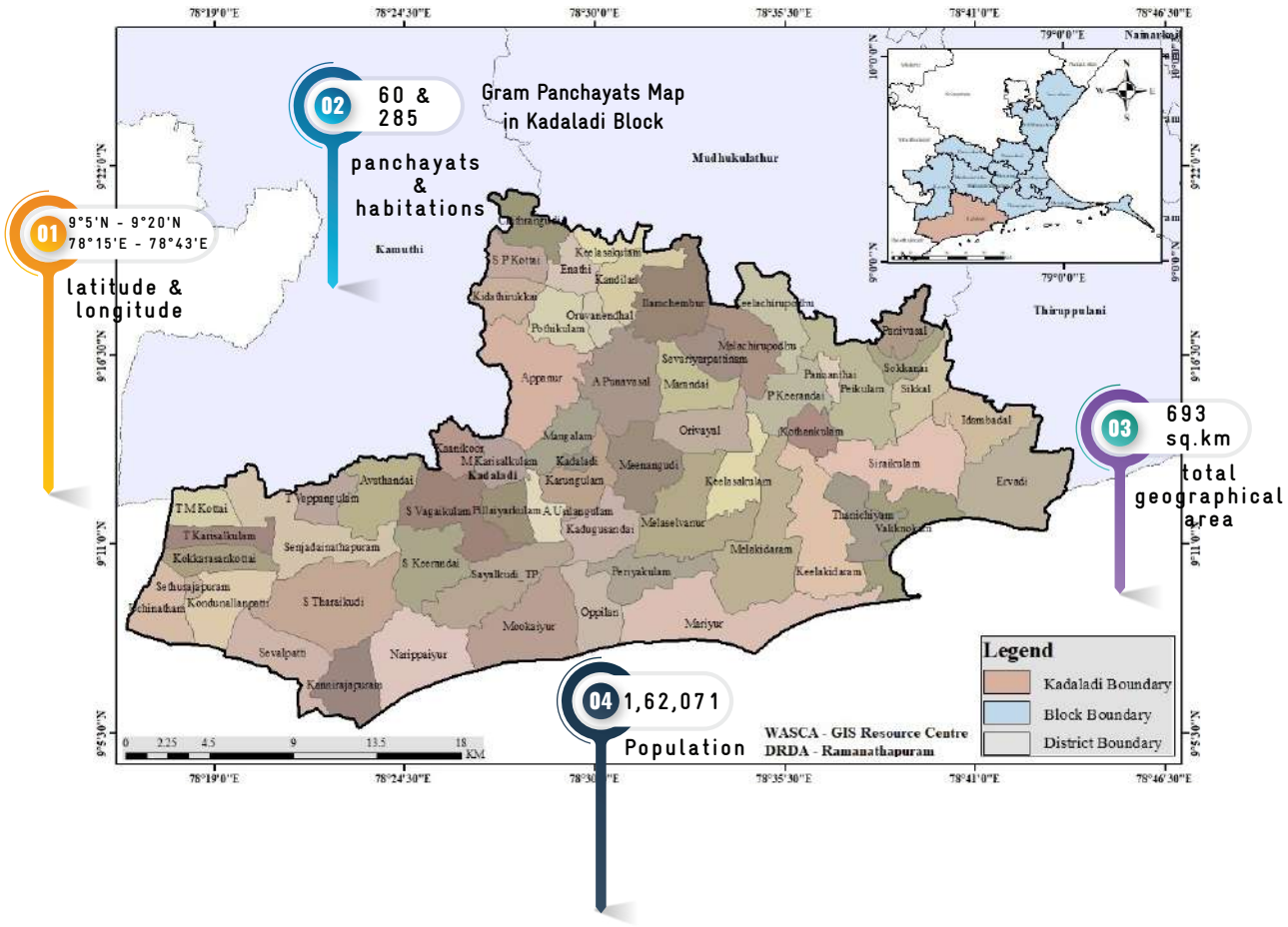


Figure 1.1. Location of Kadaladi Block

According to Census 2011, the population of the Block is 1,62,071. The **population density** of the Block is **233 per sq. km** which is lower than district (331) and State's density (555 per sq.km). The population growth has increased in recent decade and there is **18.82% increase in population** since 2001. The proportion of sex ratio is 983 females per 1000 males. The average **literacy rate of this Block is (75.98%) slightly higher than the national average (72.98%)**. The male literacy rate is 84.32% and female literacy rate is 67.53%. **Scheduled Castes and Scheduled Tribes** accounted for **14.50%** of the total population.

Economically, this is **one of the backward area** as declared by State Planning Commission, Government of Tamil Nadu based on poverty, drought, health and industrially backward parameters. Around **34.39% families are below poverty line (BPL)**. Majority of the area

> Proportion of sex ratio is 983 females per 1000 males

> Average literacy rate of this Block is (75.98%) slightly higher than the national average (72.98%)

is rain fed. Paddy is the major crop, with nearly **67% of irrigated area and 54% of the rainfed area cultivated with paddy**. The other major crops are **jowar, bajra, maize, groundnut and cotton**. Coconut is planted under irrigated condition. **Dry chilli** is the preferable crop in rain fed area. This Block has two agriculture godowns for storage purpose. Dairy, sheep rearing and poultry is also an important occupation with 5 milk societies in the Block and 99,000 liters of milk being produced. Fishing is an another livelihood of this Block. While, this backward region has some important edifices such as **Tamil Nadu Salt Cooperation** in Valinokkam and **Therthangal bird sanctuary** in Keela Selvanoor and Mel Selvanoor.

> Around 34.39% families are below poverty line (BPL)

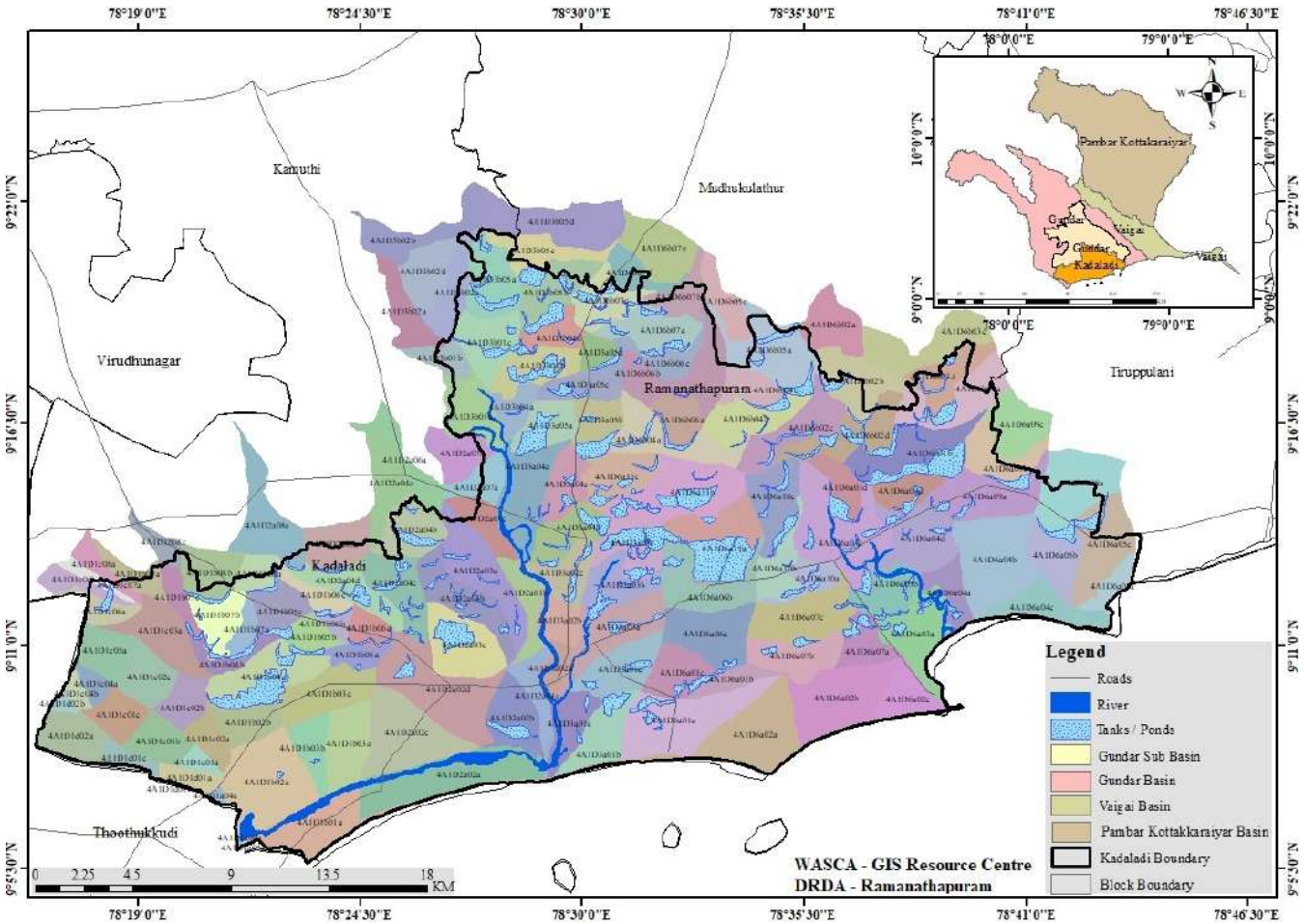
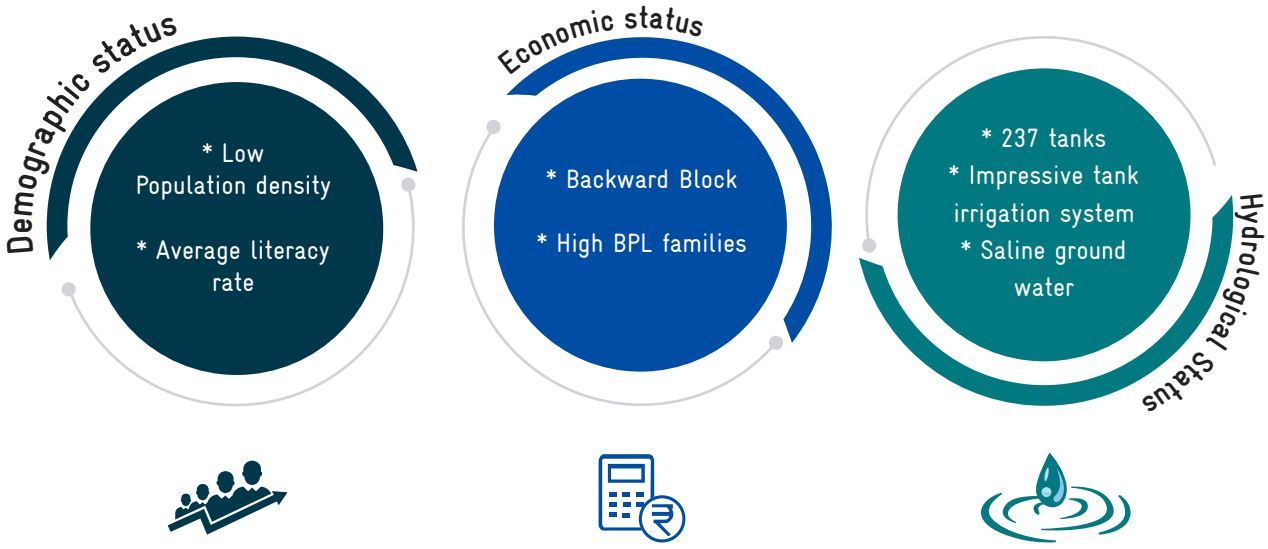


Figure 1.2. Basin, sub basins and Water bodies of the Block

Hydrologically, Kadaladi Block lies in Gundar basin and lower Gundar, Palar, Vembar, Paralayaru, Uthirakosamangaiyaru sub basins covers the Block. Situated in rain shadow area, Ramanathapuram district practiced extraordinary **tank irrigation system** which was built many hundred years ago. The outflow from one tank would serve as the inflow for the next one in the series since the tanks were designed to allow the excess water to flow out after it has reached its capacity. Water harvesting structures the **'Ooranis'** also play a huge role in groundwater conservation and recharge, guarantee availability of safe drinking water and are useful for farmers who do not have water source for irrigation or find it expensive. Over all, there are **237 major and minor tanks** subsists in this Block: 20 Ex-zamin MI tanks, 143 Panchayat MI tanks, and 74 PWD tanks. Figure 1.2 depicts the basin, sub-basins and water bodies of this Block. CGWB's ground water assessment reports indicated that Melachelvanur, S.Tharaikudi, Sikkal, Mudhukulathur south **(4 firkas) are saline** and Aappanur and Muthukulathur north **(2 firkas) area in safe**.

GROUND WATER LEVEL OF THIS BLOCK

SALINE - >100%	Melachelvanur, S.Tharaikudi, Sikkal, Mudhukulathur south
SAFE - <70%	Aappanur, Muthukulathur



வின்இன்று பொய்ப்பின் விரிநீர் வியனுலகத்து
உள்நின்று உடற்றும் பசி

குறள் - 13

Let clouds their visits stay, and dearth
Distresses all the sea-girt earth

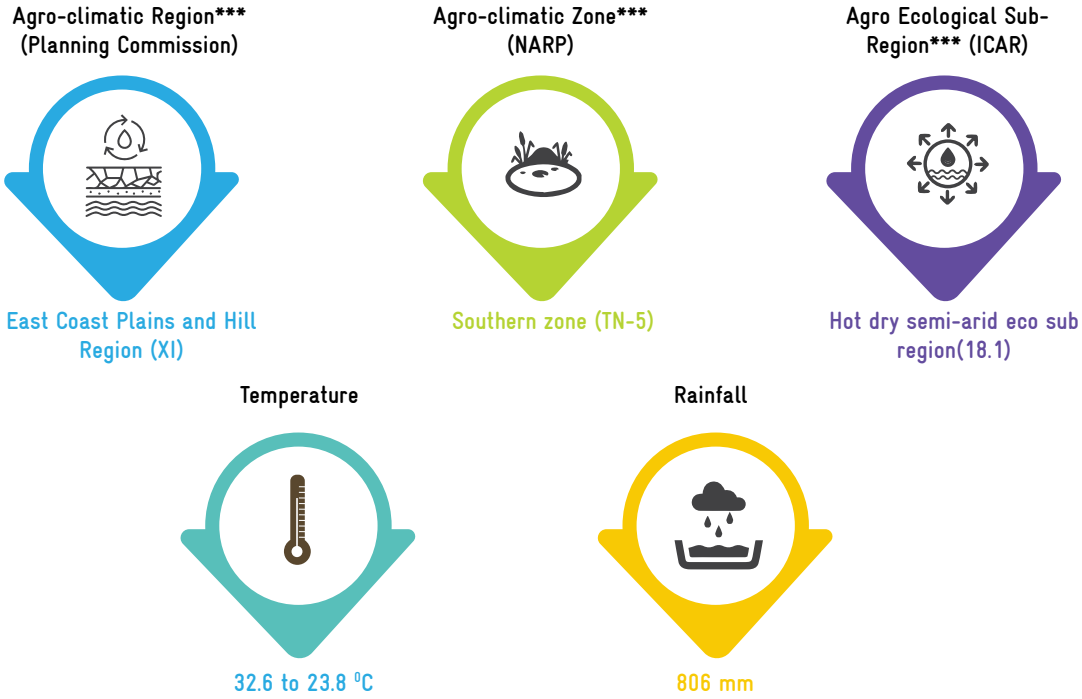
Thirukkural - 13

CHAPTER 2

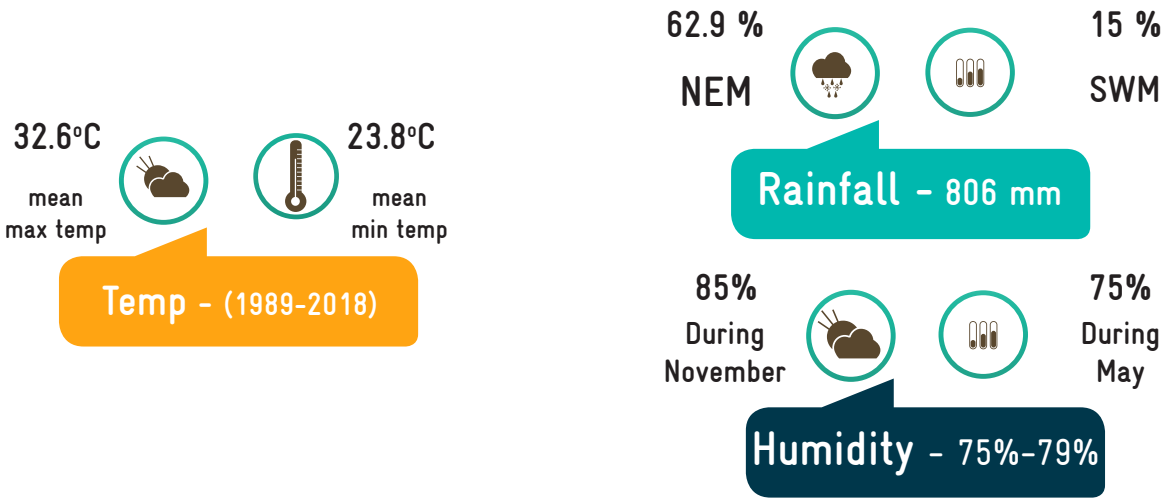
2 CLIMATE AND WATER SECURITY

Water has always been a contentious subject in this region. This semi-arid region is classified as **southern agro-climatic zone of State** and East coast plains and Hills region according to the agro climatic regional classification of Planning Commission. The general climate description of this region is given below (Table 1).

TABLE 1. GENERAL CLIMATE DESCRIPTION



In general, this semi-arid region has dry and hot weather. The mean maximum temperature is 32.6oC and mean minimum temperature is 23.8oC during last 30 years (1989-2018) (IMD). In summer months the maximum temperature goes up to 45oC for few days. The monthly average temperature characteristic during June 2018 to May 2019 is shown in figure 2.1.



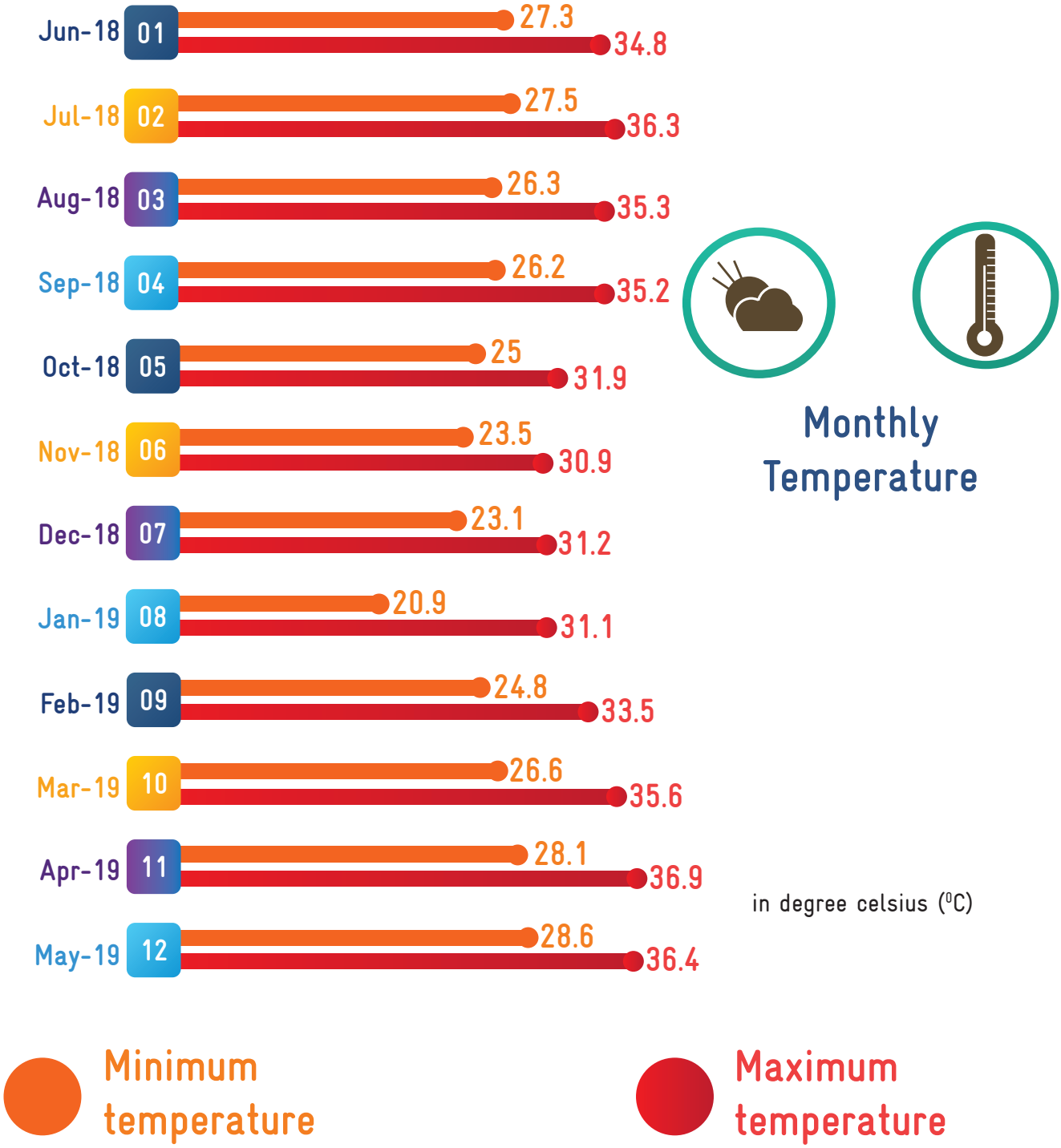


Figure 2.1. Monthly average maximum and minimum temperature

The annual rainfall of this region is 806 mm (IMD) which is less than State's average rainfall. Normally this region receives major rainfall from North East Monsoon (NEM) (October to December) followed by South West Monsoons (SWM) (June to September), winter (January and February) and summer (March to May) months. NEM **contribute a maximum of 62.9 % (507.4mm) of the total annual rainfall and SWM contributes 15% (121.7mm)**. This region normally receives accountable rainfall during Summer (March to May) and winter (January, February) months too. Summer rainfall accounts for 11.8 % (95.5mm) and winter season accounts for 10% (82.2) of the annual rainfall (WRIS, GoI) (Figure 2.2). The **average annual rainfall days are 107 days** in which 84 days are from NEM. 10 days are from summer months, followed by 9 days in SWM and 4 days in winter. Onset of NEM rainfall starts in the first week of October and cessation is at fourth week of December. In general, the humidity percentage ranges between 75% to 79%. the highest relative humidity of 85% is recorded during month of November and the lowest relative humidity of 75% is recorded during month of May in this southern zone.

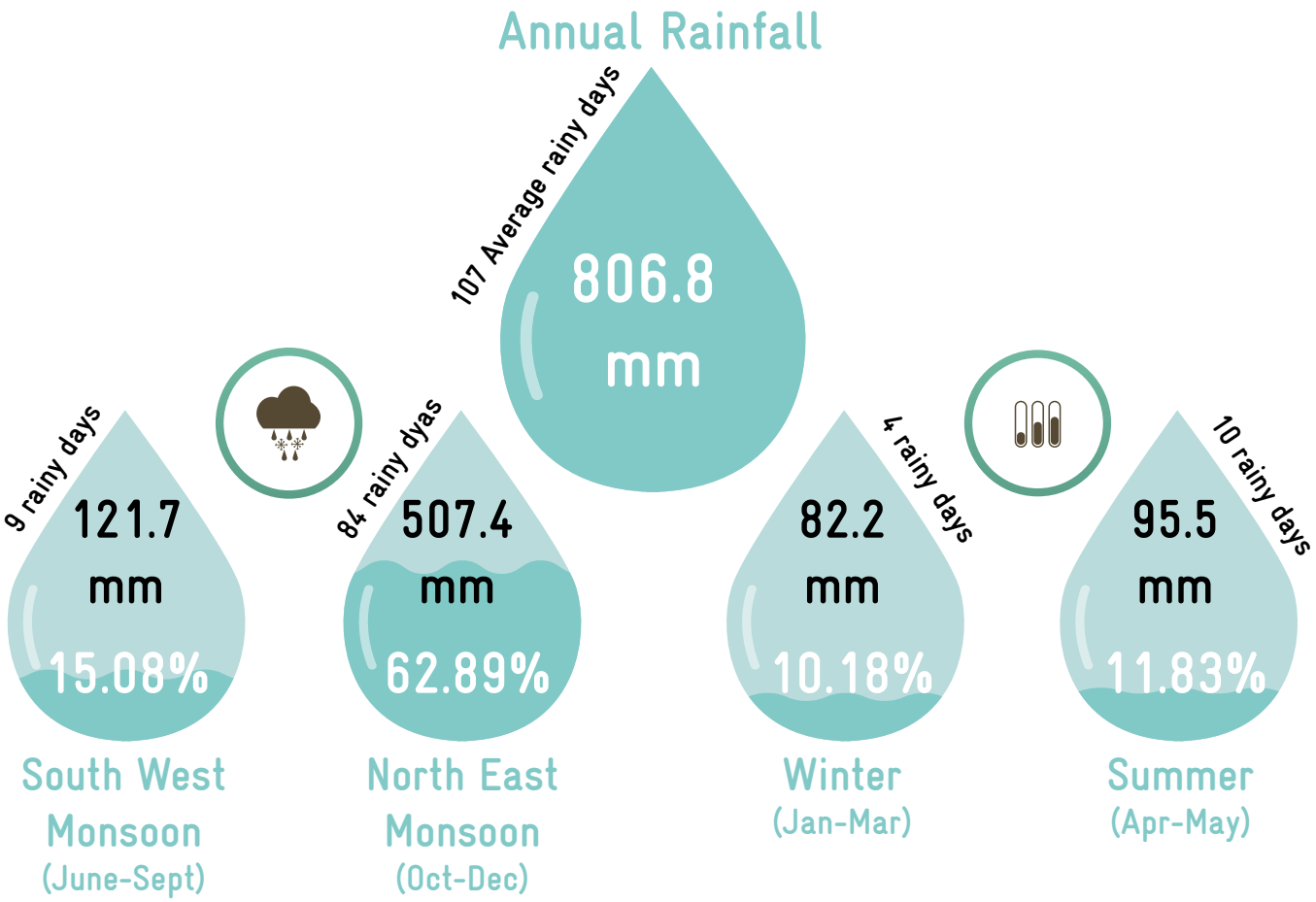


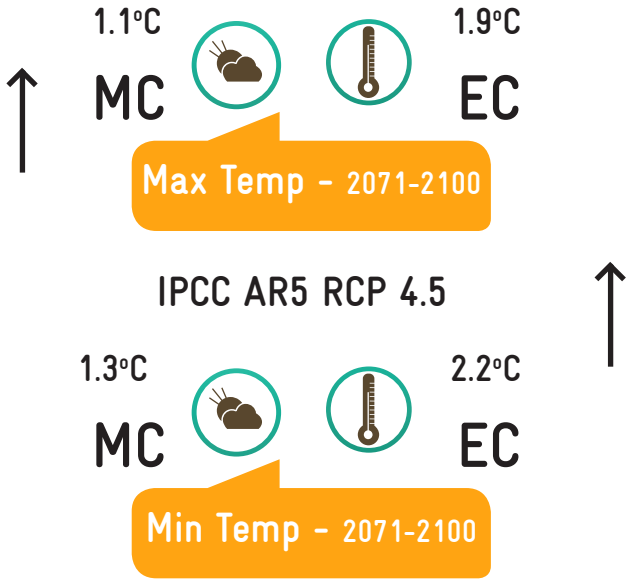
Figure 2.2. Season wise distribution to annual average rainfall

In recent decades, the world is witnessing significant changes in its climate. These changes include increase in average temperature, variations in the rainfall intensity and its frequency. This region is also no exception, and **1.4^{0}C and 0.4^{0}C increase in maximum and minimum temperature** was observed during 1951 to 2015 (IMD). The rainfall variability is also well observed. During 1951 to 2015, **18 deficient rainfall years (below normal rainfall)** were recorded. The deficient rainfall years are highest among the rest of the districts of Tamil Nadu. The consecutive deficient rainfall leads to severe drought, since this region is heavily dependent on NEM rains alone. As rainfall is the major source for determining water storage, existing water resources, major and minor tanks fail along with deficient rainfall years.

The continuous assessment reports of Intergovernmental Panel on Climate Change (IPCC) cautioned that the changes in climate have a key role in intensifying and triggering extreme events, such as floods, droughts, heatwaves, and tropical cyclones, which are all likely to increase in the future also.

Recent IPCC Assessment Report 6 (AR 6) outlines that climate changes will increase in all regions of the globe over the coming decades and that even with 1.5°C of global warming, there will be increasing heat waves, longer warm seasons, and shorter cold seasons – which will become more intense at 2°C of warming.

Climate projection based on global climate models indicated that there would be 1.1oC increase in maximum temperature in mid-century (MC) period (2041-2070) and 1.90C increase in end-century (EC) period (2071-2100) from the baseline scenario under RCP 4.5 climate scenario in this region. The minimum temperature would increase nearly 1.30C and 2.20C during MC and EC periods. Average annual rainfall for IPCC AR5 RCP4.5 scenarios is projected to increase about 1 % towards MC to EC period.



The observed and projected climate changes will have serious impacts in the areas of

* surface and ground water availability
* water quality
* soil moisture
* evapo-transpiration
* sea water intrusion

* 1.4°C increase in maximum temperature during 1951-2015
* 0.4°C increase in minimum temperature during 1951-2015
* 1.5°C increase in max temp during 2041-2070 (RCP4.5)
* 1.9°C increase in max temp during 2071-2100 (RCP 4.5)

Being a water scarce and drought prone region, coupled with saline ground water, these changes in climate pose severe threats to dependent sectors such as agriculture and allied activities, industry, and livelihoods of people, particularly the vulnerable sector.

2.1 CLIMATE RISKS

Increasing temperature, fluctuating rainfall patterns and its extremities creates shorter rainy seasons and longer dry seasons making river basins more vulnerable. This district experiences frequent droughts, cyclones, floods, and storm surges. Being a coastal district, sea level rise also a distressing issue under the changing climate scenario.

* Frequent Droughts
* Cyclones
* Storm surges up to 6m
* Soil erosion
* Flood inundation
* Sea level rise

Drought

Generally, this rain shadow region has a prolonged dry climate. Majority of lands are rain fed that depends on monsoon rainfall especially NEM. Thus, frequent and consecutive monsoon failures (received less than 40% of normal rainfall) coupled with the erratic behavior of the monsoon makes the district more vulnerable to droughts. Once in 3 years' the district faces drought. This had a considerable impact on the ground water levels, reservoir levels, crop conditions, and soil moisture. Sandy soils in the region are more prone to severe drought. The district experienced consecutive droughts in recent decades particularly in 2003, 2009, 2016, 2017 and 2019. All parts are affected by drought and its consequences; there are large area crop losses and drinking water scarcity.

Flood

Though it is a low rainfall region, the district experiences heavy rain and flood during deep depressions/cyclones forms in the Bay of Bengal. State Disaster Management Authority (SDMA), Government of Tamil Nadu has identified 39 locations of Ramanathapuram district as flood vulnerability of medium category (inundation of water from 2 to 3 feet) based on past events (Ramanathapuram District Disaster Management Plan 2020-2021). Out of this 39 locations, 7 locations are in Kadaladi Block.

Cyclones

A tropical cyclone is a multi-hazard weather phenomenon, as it leads to heavy rainfall, gale and storm surge during the landfall. The winds, heavy rainfall and storm surge associated with the cyclone result in flooding of coastal areas, erosion, saline intrusion, loss of life, property, belongings, disruption of communication facilities, damages to agricultural and plantation crops and livestock etc., Being a coastal region, this district faces hazard due to cyclone forms in Bay of Bengal. The 1964 Rameswaram cyclone was regarded as one of the most powerful storms to ever strike India on record and worst hit one in the district. In recent years, some of the tropical cyclones such as Burevi (2020), Gaja (2018) cyclones had its impacts here. This district also experiences storm surges exceeding 6m above the concurrent sea level. IMD, High soil erosion also noticed here. Ministry of Earth Science, Govt. of India prepared Cyclone hazard proneness of districts based on frequency of total cyclones, total severe cyclones, actual/estimated maximum wind strength, Probable Maximum Storm Surge (PMSS) associated with the cyclones and Probable Maximum Precipitation (PMP). The report indicates Ramanathapuram district is highly prone (Cyclone warning in India, IMD, March 2021).

Sea level rise

Sea level rise (SLR) is one of the greatest challenges of the low-lying coastal regions of the world. Recent Intergovernmental Panel on Climate Change (IPCC) 2021 report alarms that there is 0.20 m rise in global mean sea level from 1901 to 2018. The average rate of SLR was 1.3mm/yr (1901-1971) and rose by 03.7mm yr (2006-2018), and it would continue to rise to 2 m by the end of the Century under a very high emissions scenario (SSP5-85 low confidence) (IPCC, 2021). IPCC cautions that coastal areas will get continued SLR throughout the 21st century, contributing to more frequent and severe coastal flooding in low-lying areas and coastal erosion. This coastal region will also face sea level rise and future SLR projection studies indicate that there would be 4.51 cm (low range)/ 7.21cm (medium range) increases for the year 2025 and it would be 30.29 (low range), 49.10 cm (medium range) under IPCC AR5-RCP 4.5 scenario (CCCDM, Anna University). In Ramanathapuram district, about 180 coastal habitations are identified for coastal vulnerability based on their distance from sea shore, soil erosion, saltwater intrusion (Ramanathapuram District Disaster Management Plan 2021-2022). Out of this 180 habitations, 26 habitations are in Kadaladi Block and are considered in this study for the vulnerability assessment.

2.2 WASCA CLIMATE VULNERABILITY INDICATORS

Prior, WASCA TN conducted **preliminary State level scoping study on State's rural water security** under climate lens and identified climate and water security hotspots/potential geographical areas for project demonstration through scientific criteria jointly with **Centre for Climate Change and Disaster Management (CCCDM), Anna University**. The vulnerability of a region to the climate depends on several intrinsic factors such as physical, social, economic, and environmental conditions. On the basis of ground reality and accurate observation, WASCA TN study proposed **18 indicators to reflect State's rural water security through four interconnected CWRM areas namely, climate extremities, water resources, agriculture and socio-economic** to assess climate-water vulnerability at the district level (Table 2).

TABLE 2. BIOPHYSICAL AND SOCIO-ECONOMIC INDICATORS USED IN VULNERABILITY ASSESSMENT

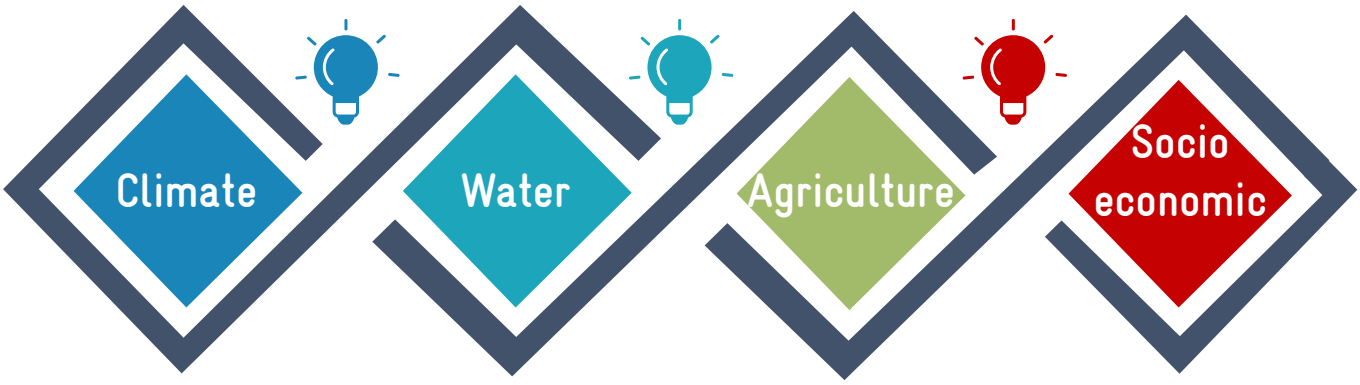
CWRM Area	Indicators of Rural water security vulnerability	Indicators label	Unit	Linked SDG
Climate	Changes in maximum temperature	C1	Degree Celsius	Goal 13
	Changes in minimum temperature	C2	Degree Celsius	Goal 13
	Changes in rainfall	C3	%	Goal 13
	Excess rainfall years	C4	No. of Years	Goal 13
Water Resource	Deficient rainfall years	C5	No. of Years	Goal 13
	Ground water extraction	W1	%	Goal 6
	Ground water Recharge	W2	in cubic meter	Goal 6
	Surface water availability	W3	mm	Goal 6
	Water gap	W4	MCM	Goal 6
	% of contamination	W5	%	Goal 6
Agriculture	Rainfed area	A1	%	Goal 15
	Cropping intensity	A2	%	Goal 2
	Soil moisture	A3	kg/m2	Goal 15
	Evapo-transpiration	A4	kg/m2/s	Goal 15
Socio-economic	Rural proportion	S1	%	Goal 2
	Multidimensional poverty index	S2	Index Value	Goal 1
	Source of drinking water within premises in rural	S3	%	Goal 6
	Marginal farmers landholdings	S4	%	Goal 1

These 18 biophysical and socio economic indicators data were collected at district level and categorized into exposure, sensitivity and adaptive capacity for the analysis. The vulnerability ranking was given based on IPCC protocol of vulnerability assessment methodology. Based on the analysis, Tiruvannamalai and Ramanathapuram districts were selected by the State Level Steering Committee headed by the Secretary RD&PR in Nov 2019 for implementing the WASCA. Subsequently, all the key water actions, CWRM planning and implementation works are envisaged for the above districts through these influencing indicators collectively under four CWRM areas viz. climate, water, agriculture and socio economic.

2.3 COMPRESSIVE ANALYSIS OF BLOCK LEVEL VULNERABILITY

WASCA TN has progressed towards **Block level climate vulnerability mapping** in order to strengthen water resources and build context specific climate resilient models at GP level. The 18 vulnerability indicators at district level under four areas via climate, water, agriculture and socioeconomic are further explored at GP level through Composite Water Resource Management (CWRM) approach by GIZ, Department of Rural Development (Mahatma Gandhi NREGS), National Water Mission, Tamil Nadu along with technical partners of WASCA project jointly with **MS Swaminathan Research Foundation (MSSRF), Sugandhi Devadasan Marine Resources Institute (SDMRI), Prime Meridian and key sectoral experts.** Based on national level workshop on WASCA for GIS based planning using IWRM principles, a Composite Water Resources Management plan framework was customized to suit to Tamil Nadu State's conditions, including climate vulnerability as per the scoping study recommendations, Major CWRM parameters are thus identified under four areas via climate, water, agriculture and socio-economic for advancements towards actions. The major parameters identified at Block level (Table 3) are collected both from primary and secondary sources and analyzed statistically and geospatially.

TABLE 3. MAJOR PARAMETERS IDENTIFIED FOR BLOCK LEVEL VULNERABILITY ASSESSMENT



Climate	Water	Agriculture	Socio economic
Drought, Locations based on past disasters and vulnerability	Watershed and drainage network, traditional water bodies, canal networks, irrigation facilities, catchments area wise available runoff, ground water and surface water utilization, ground water status, ground water availability, evapotranspiration losses, and water demand for drinking, agriculture and livestock, water quality, sea water mixing and salinity	Land resources, land use under different categories, catchment area, means of water extraction, irrigation methods, crop details, status of soil resources including macro and micro nutrients, soil physical condition, soil moisture, and livestock details	Area, population, gender, vulnerable population and household, details of MGNEGRA job seekers, drinking water sources and grey water generation

ஏரின் உழாஅர் உழவர் புயலென்னும்
வாரி வளங்குன்றிக் கால்

குறள் - 14

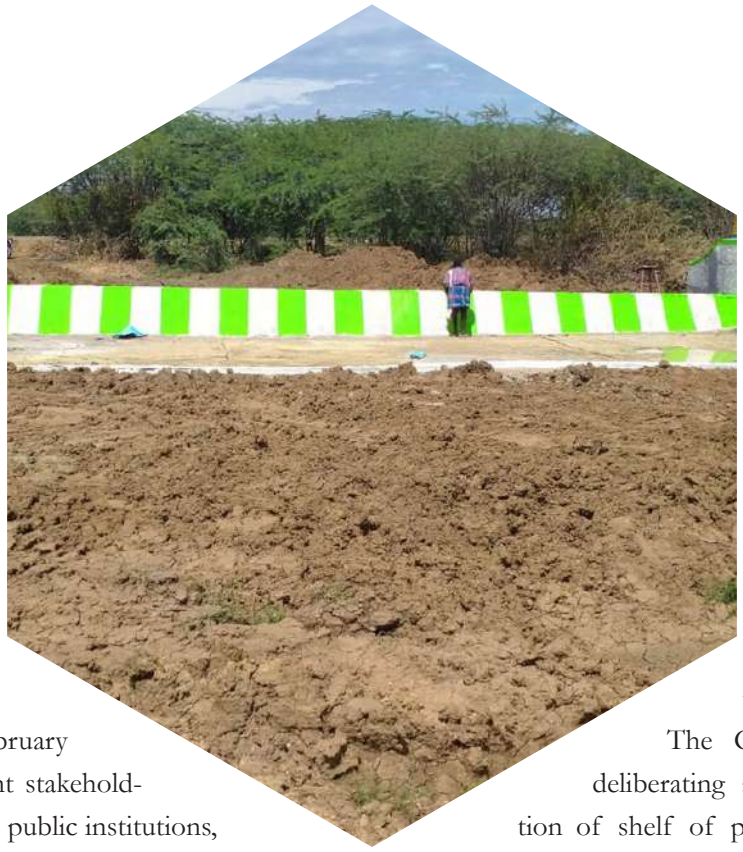
Unless the fruitful shower descend
The ploughman's sacred toil must end

Thirukkural - 14

CHAPTER 3

GRAM PANCHAYAT PLANNING IN MAHATMA GANDHI NREGS

3 GRAM PANCHAYAT PLANNING IN MAHATMA GANDHI NREGS



WASCA, GIZ has evolved a GP based CWRM planning approach for facilitating convergent planning under Mahatma Gandhi NREGA as per recommendation of National Level Workshop organized by MoRD, MoJS, GIZ along with State rural development department of WASCA implementing states in February 2020. Inputs from relevant stakeholders including communities, public institutions, civil society, research organizations, and private agencies were captured while developing the framework. Both Annual Master Circular issued by MoRD during 2021-22 and annual planning circular issued in September 2020 are focused on developing GIS based planning in all Gram Panchayats. The planning exercise for Mahatma Gandhi NREGS will be part of the convergent planning exercise for the Ministry. The thrust is on planning for works related to Natural Resource Management (NRM), agriculture and allied activities and livelihood related works on individual's land leading to sustainable livelihoods as well as provisioning of livestock shelters for the individual households. The NRM related works under Mahatma Gandhi NREGS shall be taken up in convergence with Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), Integrated Watershed Management Programme (IWMP) and Command Area and Water Management (CAD&WM) schemes for better outcomes of the water conservation and water harvesting measures. Technical inputs for planning shall be drawn from the technical resources available in the district under Mahatma Gandhi NREGS, CSO partners and other line department agencies. In case of planning for NRM works, the technical inputs will be drawn from the joint pool of technical personnel of IWMP in Watershed Cell cum Data Centre (WCDC), Mahatma Gandhi NREGS unit, Water Resource Department and the Agriculture Department. The technical inputs relating to Excavation, Renovation & Modernization (ERM)/ water bodies may also be sought from Regional Office of Central Ground Water Commission (CWC). The Gram Panchayats, while deliberating and finalizing prioritization of shelf of projects, will keep Macro and Micro-watersheds of 500-1000 hectares that often comprise 1-10 Gram Panchayats, in perspective.

The special focus on vulnerable households and communities are considered while preparing estimates for anticipated demand, list of works on individual land, and list of other works that provide direct individual benefits. The Convergent Planning Exercise shall make use of automatically included and deprived Households of SECC to ensure full coverage of poor and vulnerable households. Infrastructure built under Mahatma Gandhi NREGS leads to increased water availability for irrigation, groundwater recharge, increased agricultural production, and carbon sequestration. The Ministry of Environment, Forest and Climate Change recognizes Mahatma Gandhi NREGA as one of the 24 key initiatives to address the problem of climate change, while simultaneously improving the livelihoods of the poor. Mahatma Gandhi NREGA, particularly the Category A activities, which are public works relating to natural resource management. Planning and design of works under Mahatma Gandhi NREGS should take into account, impacts of climate change in order to ensure resilience of vulnerable rural communities and make the benefits sustainable in the long run.

262 Total Kinds of works in Schedule-I of Mahatma Gandhi NREGA

182 Kinds of works relate to NRM alone

164 Kinds of works relate to Agriculture and allied works

85 Water related works out of NRM

In pursuance of Schedule-I of Mahatma Gandhi NREGA, 262 kinds of works/ activities have been identified as permissible works, of which 182 kinds of works relate to NRM alone and out of the 182 NRM works, 85 are water related. 164 of the total works are related to Agriculture and allied works. The works taken up under Mahatma Gandhi NREGS should change from taking up individual, standalone works in a typical 'relief works mode' to an INRM perspective. Planned and systematic development of land and harnessing of rainwater following watershed principles should become the central focus of Mahatma Gandhi NREGS work across the country to sustainably enhance farm productivity and income of poor people. Even the works on private lands should be taken up following the principles of watershed management in an integrated manner. To facilitate evidence based scientific NRM planning process, Technological support will be taken from National Remote Sensing Centre, ISRO for identification and holistic. planning of permissible works to be taken up in the watersheds using GIS Technology (BHUVAN). The GIS plans will be comprehensive ones incorporating all eligible works under Mahatma Gandhi NREGS and the same will be implemented in a phased manner. Section 22 of Annual Master Circular provides the key steps for GIS based planning.

The GIS plans will be comprehensive ones incorporating all eligible works under Mahatma Gandhi NREGS and the same shall be implemented in a phased manner

3.1 CWRM APPROACH

CWRM approach for Water Security and Climate Adaptation uses simple scientific tools that can help Block or GP level officer to organize, analyze and prepare draft plan for participatory discussion at Gram Panchayat level. This approach involves analyzing key water challenges using both non spatial and geo spatial data in GIS (Geographical Information System) coupled with extensive ground truth verification. The non-spatial data includes socio-economic, climatic, hydrological, edaphic and agricultural areas which are concurrently used for analysis along with the spatial data obtained from remote sensing in GIS platform. It starts with mapping of the administrative (habitations/panchayat/revenue village, Block/ taluk), agro-ecological (regional and sub-regional, climatic and agricultural zonation's) and hydrological (drainage points/watersheds/sub basin) units keeping Gram Panchayat as the lowest unit of planning and execution. Following this, a detailed socio-economic profile was mapped covering male/female population, proportion of SC and ST population, vulnerable households, access to employment in Mahatma Gandhi NREGS and proportion of works carried out in the village through amount of budget utilized as well as actual works completed. The climatic parameters including maximum and minimum temperature, season-wise rainfall and rainy days, evapotranspiration and soil moisture are used to understand the climate related issues. Then land use, watersheds, drainage networks and surface runoff, existing water supply and storage systems, water management for the key sectors and water demand are assessed and prepare the water budget for the GP (Box 1).

BOX 1. MAJOR COMPONENTS INVOLVED IN CWRM PLANNING WORKOUTS

a. Spatial and non-spatial data collection
b. Spatial data: Bhuvan (NRSC) & WRIS
c. Non-spatial data(Secondary): Govt. sources(published)
d. Non-Spatial data(Primary): Govt. records local level

a. Analysis of water from supply and demand side
b. Water budgeting: Surface & ground water
c. Status of soil moisture availability
d. Status of evapo-transpiration losses

a. Works and its impact on augmenting Water
b. Works and its impact on conserving water
c. Works and its impact promoting efficient use of water - Block level

a. Identification of Key water challenges at GP level
b. Identification of location specific actions at GP level
c. Integration actions at block, sub-basin and district level
d. 262 list of works under Mahatma Gandhi NREGS and
e. List of Works -under various schemes

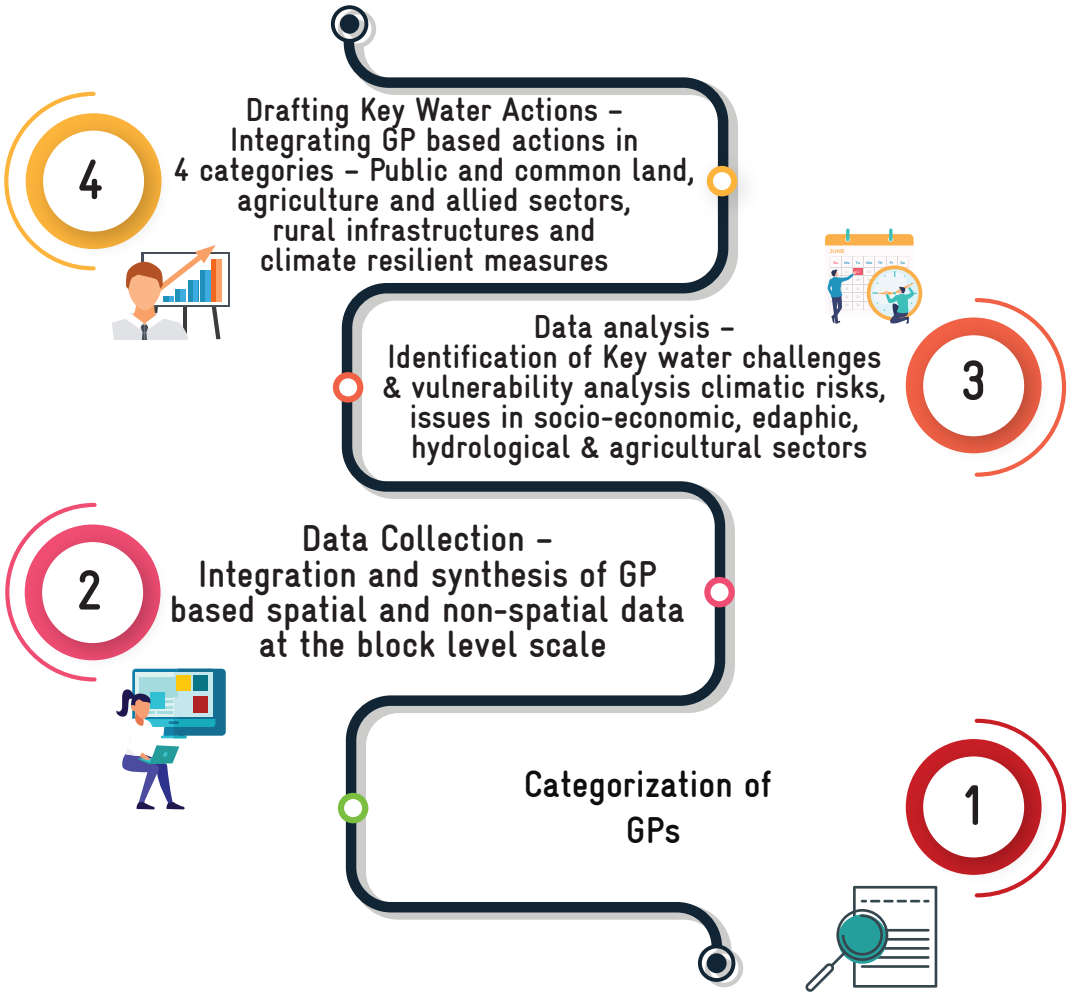
a. Block level
b. Watershed level & Sub-basin level
c. District level and
d. Baseline for assessing the impact

a. Verification
b. Community consultation
c. GP Approval
d. Integration to NREGA software
e. AS and TS

Such a comprehensive analysis in preparing the water budget integrating ground water, surface water through runoff from rainfall, evapotranspiration and soil moisture helps to identify potential areas of action to augment the water resources in public and common land, agriculture and allied sectors and rural infrastructure dimensions. The analysis also helps to understand the areas of interest and appropriate climate resilient measure as an adaptive measure to the emerging climate change scenarios. The water challenge linked water actions are the key in developing the perspective plan for the water secured GPs, serve as shelf of projects. These shelf of projects are again mapped with the available schemes and financial plans for execution adopting convergence and inter-sectoral principles. In the execution process the district level technical and administrative teams are involved in planning, monitoring and evaluation in terms of outcome/ impact mapping. In the execution stage, the approach of saturation of works, planning at watershed approach (ridge to valley), convergence is some of the key aspects which needs attention for a tangible outcome in both Natural Resource Management as well as livelihoods.

The district WASCA resource centers established in the project area, facilitates this whole process for planning and implementation. This comprehensive and integrated approach has been accepted nationally and by state governments as a comprehensive and climate adapted planning approach for water security. The whole process has been categorized in to four stages – pre planning, planning, review and verification and integration and approval (Box 2).

STEPS INVOLVED IN BLOCK LEVEL ANALYSIS THROUGH CWRM APPROACH



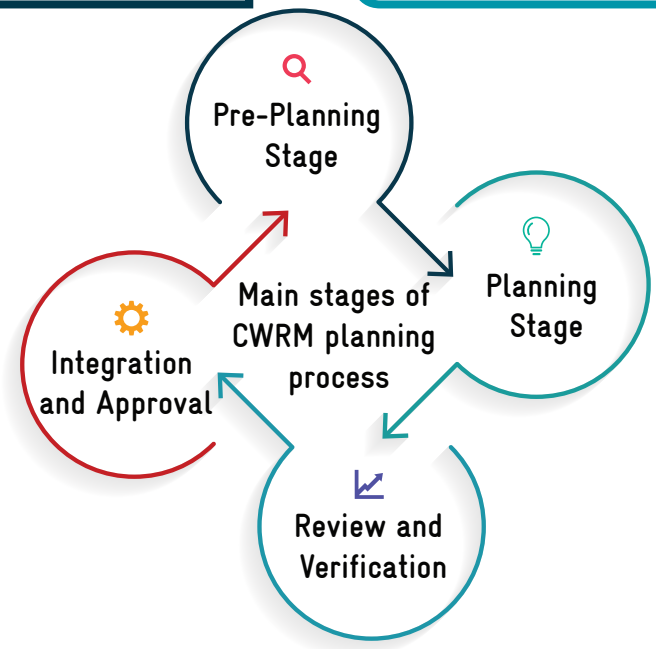
This integrated approach has been accepted Nationally and by State and District Level Steering Committees headed by Additional Chief Secretary RD&PR and District Collectors respectively in the project area of Tamil Nadu State government as a comprehensive and climate adapted planning approach for water security under Mahatma Gandhi NREGS and National Water Mission.

PRE-PLANNING STAGE

1. Categorizing Villages for planning as per Mahatma Gandhi NREGS guidelines
2. Identification of GP, Block, District officers for planning facilitation
3. Capacity Building of officers at State, District implementing Mahatma Gandhi NREGS
4. District specific CWRM framework and indicators suitable to the terrain and geography
5. Identification of Phases for pre pilot GPs for planning (4 GP Plans per Block) as per DLSC and SLSC

PLANNING STAGE

1. Collection on Non-Spatial statistical data as per MoRD guidelines and CWRMP
2. Collection of Spatial as per MoRD guidelines and CWRMP
3. Water Budget Estimation (CWRMP)
4. Conducting district specific studies on Ground Water Assessment as per CWRM
5. Inclusion on Non-NRM activities under Mahatma Gandhi NREGS with CWRMP
6. Identification of Key Water Challenges - CWRMP
7. Identification of Key Water Actions -CWRMP



REVIEW AND VERIFICATION

1. Matching spatial data as per Mahatma Gandhi NREGA- MoRD guidelines on GIS based planning
2. Field Verification, GP level Meetings for inclusion in labour budget 2021-22
3. Approvals of verified works at GP by the Block and GP level officers implementing Mahatma Gandhi NREGS in the project area
4. Integrating verified, approved works into NREGA soft (MORD NIC Portal) for mainstreaming WASCA
5. Regular review on progress at all levels

INTEGRATION AND APPROVAL

1. Preparation of Integrated plans (Block, Watershed)
2. District Level WASCA Plan
3. Approval at GP level for preparation of Labour budget using CWRM frame work outcomes
4. Approval of District plan at DLSC as per above recommendations of GP level
5. Submitting approved District WASCA plan from DLSC to SLSC for financing and convergence

3.2 CATEGORIZATION OF GPS

The CWRM uses both spatial and non-spatial data for developing Gram Panchayat GP level plans. Most of the available non-spatial data are at revenue village level. To synchronize planning at GP keeping data availability and administrative boundary for GIS planning, various GP's are categorized based on revenue village boundaries, for collecting and organizing the datasets. Based on the above factors, five different types of GPs are classified as Type I, II, III, IV and IV. The description on categorization of GP's is annexed (Annexure 1). The type, number, and name GP's in Kadaladi Block is tabulated in Table 4.

TABLE 4: GPS IN KADALADI BLOCK

NUMBER OF GP	GP TYPE	NAME OF THE PANCHAYAT
12	GP and revenue village data and boundary match	Avathandai, Appanur, Chithirangadi, Ervadi, Idambadai, Kannirajpuram, Orivayal, Kadugusandai, Melachirupodhu, Naripayur, Mariyur, T.Karisalkulam
12	Having more than one GPs in one Revenue Village	Kokkarasankottai, Uchinatham, Kondunallanpatti, Sethurajapuram, Panivasal, Sokkanai, S.Tharaikudi, Sevalpatti, Sonaipriyankottai, Kidathirukkai, Marandai, Sevariarpattinam
36	GPs having more than one GP, one Revenue Villages data, boundary	A.Usilangulam, Mookkaiyur, S.Keerandai, Pillayarkulam, S.Vagaikulam, Kanikoor, M.Karisalkutham, A.Punavasi, Kadaladi, Mangalam, Karungulam, Thirumalugandankottai, T.Veppangulam, Senjudainathapuram, Meenagudi, Melaselvanur, Thanichiyam, Pannanthai, P.keerandai, Vallinocham, Kothangulam, Oppilan, Periakulam, Melakidaram, Keelaselvanur, Sikkal, Siraikulam, Oruvanendhal, Pothikulam, Kelakidaram, Enathi, Keelasakkulam, Kandilan, Ilanchembur, Peikulam, Keelachirupothu

3.3 DATA COLLECTION

The CWRM planning framework has four vulnerability areas and integrated both non-spatial and spatial parameters with 18 indicators based on the IWRM and climate adaptation principles. The planning process comprised of the following dimensions in a scientific and organized manner to prepare a meaningful plan at the lowest administrative unit i.e. GP plans.

SPATIAL DATA

The spatial data is supportive evidence to understand the issues in the areas of land use and land cover (LULC), waste land, salt and erosion affected lands, drainage lines, ground water potential, lineament, geomorphology and slope for science-based decision on water actions. The use of different spatial data to assess and confirm the key water challenges along with the non-spatial data given below.

NON SPATIAL DATA

- Characterization of catchment landscapes based on the ten-fold land use classification to know available land area in both public and individual land ownership and its current position in terms of available area and use, its links with surface runoff as good, average and bad runoff.

- Watershed analysis to understand the hydrological and administrative boundaries, know the vulnerable and good Micro-watersheds, its location, distribution of different land use within the Micro-watersheds for planning relevant water actions

- Soil characteristics including the macro and micro nutrient status, physical quality of the land using pH values and textural soil quality to understand its permeability, infiltration and water holding capacity which are crucial for soil moisture content

- The agriculture and livestock datasets help in understanding the quantum of water requirement of the key crops and type of cropping systems adopted, number and type of different livestock resources and its water requirement vis-a-vis its linkage to livelihoods of the vulnerable population in the village

- Grey water generation at GP level to understand the quantum of grey water available and existing methods of its use. This information is essential to plan the effective strategies for recycle and reuse

- Water budgeting at GP level to demonstrate the sector wise water demand and available water through the traditional water harvesting and storage bodies and the potential runoff that can be conserved through appropriate actions on the supply side. The difference between demand and supply at the GP level helps the communities to understand the gap and practice the necessary water actions.

ASSESSMENT OF GROUND WATER QUALITY AND SEA WATER INTRUSION

The vulnerability of the groundwater quality, seawater intrusion in the aquifers were assessed and spatially mapped for the whole district. The water quality samples collected at 380 locations throughout the district during pre-monsoon and post-monsoon season. The collected samples were analyzed using standard methodology for calculating Water Quality Index (WQI) and Sea Water Mixing Index (SMI). This data helps to identify the suitability of water for drinking purpose and to detect the concentration of major ionic constituents in seawater at GP level.

Over all 102 data are collected, **16 parameters are primary** and are collected at GP level by GP level officers. **65 parameters are secondary**, collected from authentic Government sources and its websites; **21 requisite parameters for water budgeting and grey water are calculated** using standard and suitable methods and formula. CWRM parameters and its sources are annexed in Annexure 3.1, 3.2, 3.3. The methods, and formulas used for water budgeting is attached in Annexure 3.4, 3.5, 3.6.

3.4 CWRM PLANNING ANALYSIS – CLIMATE

All the CWRM parameters are intended at Block level. On the other hand, all the climate change observations and projections are at district or regional level. However, data at Block level is not available at present. Thus, the records of past hydro- meteorological disasters and flood vulnerable locations and vulnerable coastal habitations as identified by SDMA 2020 are considered to represent Block's flood, drought, SLR risks due to change in climate(Table.5).

TABLE 5. CLIMATE RISKS AND VULNERABLE LOCATIONS

Flood

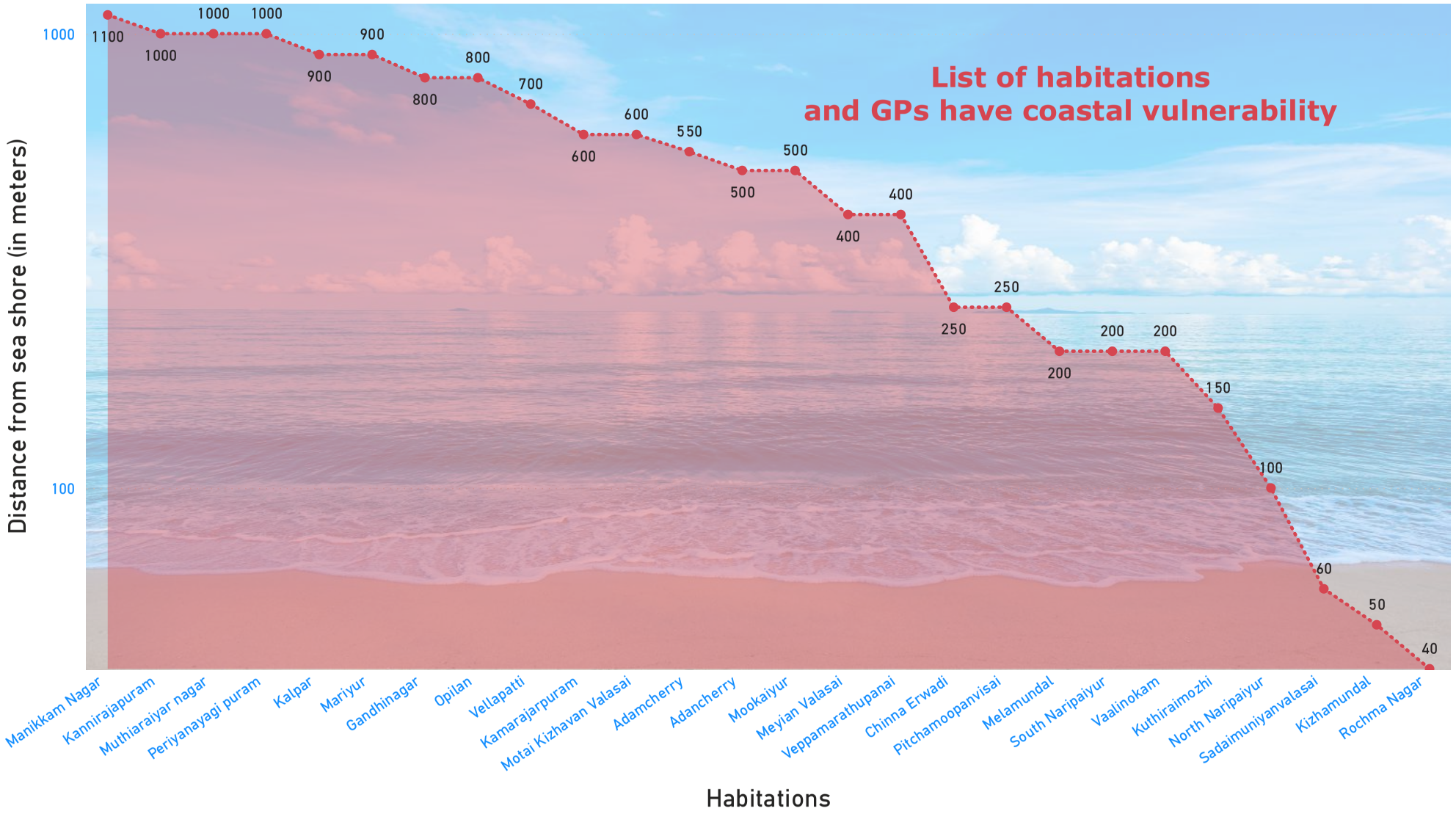
Kannirajpuram, Naripayur, Mariyur, S.Tharaikudi, Mookkaiyur, Vallinocham, Periakulam

Drought

All villages

LIST OF HABITATIONS AND GPS HAVE COASTAL VULNERABILITY

GP name	Habitations
Ervadi	Sadaimuniyanvalasai, Chinna Erwadi, Pitchamoopanvisai, Meyian Valasai, Adamcherry, Kalpar, Motai Kizhavan Valasai, Muthiaraiyar nagar
Kannirajapuram	Rochma Nagar,Kannirajapuram
Mariyur	Gandhinagar, Mariyur
Mookaiyur	Kuthiraimozhi, Mookaiyur
Naripayur	North Naripaiyur, South Naripaiyur, Veppamarathupanai, Vellapatti, Periyanayagipuram, Kamarajarpuram, Manikkam Nagar
Opilan	Opilan
Vallinokam	Vaalinokam, Kizhamundal, Melamundal, Adancherry


List of habitations
and GPs have coastal vulnerability
Distance from sea shore (in meters)
1000
100
1100
1000
1000
1000
900
900
800
800
700
600
600
550
500
500
400
400
250
250
200
200
200
150
100
60
50
40
Manikkam Nagar
Kannirajapuram
Muthiaraiyar nagar
Periyanayagi puram
Kalpar
Mariyur
Gandhinagar
Opilan
Vellapatti
Kamarajarpuram
Motai Kizhavan Valasai
Adamcherry
Adamcherry
Mookaiyur
Meyian Valasai
Veppamarathupanai
Chinna Erwadi
Pitchamoopanvisai
Melamundal
South Naripaiyur
Vaalinokam
Kuthiraimozhi
North Naripaiyur
Sadaimuniyanvalasai
Kizhamundal
Rochma Nagar
Habitations

3.5 CWRM PLANNING ANALYSIS – WATER

For effective planning, the available traditional water storage and conveyance structures along with its supply and demand status for different sectors at Block level are necessary. Both spatial and non-spatial data including details and status on watershed and drainage network, canal network, irrigation facilities, catchments area wise available runoff, conserved runoff, present ground water extraction, water demand for domestic, agriculture and livestock, ground water utilization for human, agriculture and livestock, water quality are collected at fields and from authorized open sources are as follows:

3.5.1 SPATIAL DATA

Spatial data on watershed, drainage and surface water bodies, ground water potential, lineament, geomorphology, terrain, slope is collected to understand the site specific problems and take decisions to draft scientific key water actions together with non-spatial data. The spatial Block level maps downloaded from NRSC, BHUVAN, Govt. of India website are used.

3.5.1.1 Watershed:

Implementation of any water management measure requires a suitable hydrological unit. A properly delineated watershed forms a convenient hydrological unit for computation of water balance parameters and thus implementation of water management schemes. A watershed map is the area of land where all of the water that falls in it and drains off goes into the common outlet. The watershed map has become a pre requisite for any developmental programme such as soil and water conservation, flood control, soil erosion control, because land and water resources have maximum interaction and synergic effect, when developed on watershed basis. About 146 Micro-watersheds covers the Block. This map is used for the interventions based on ridge to valley concept and sequencing the plan accordingly (Figure 3.1).

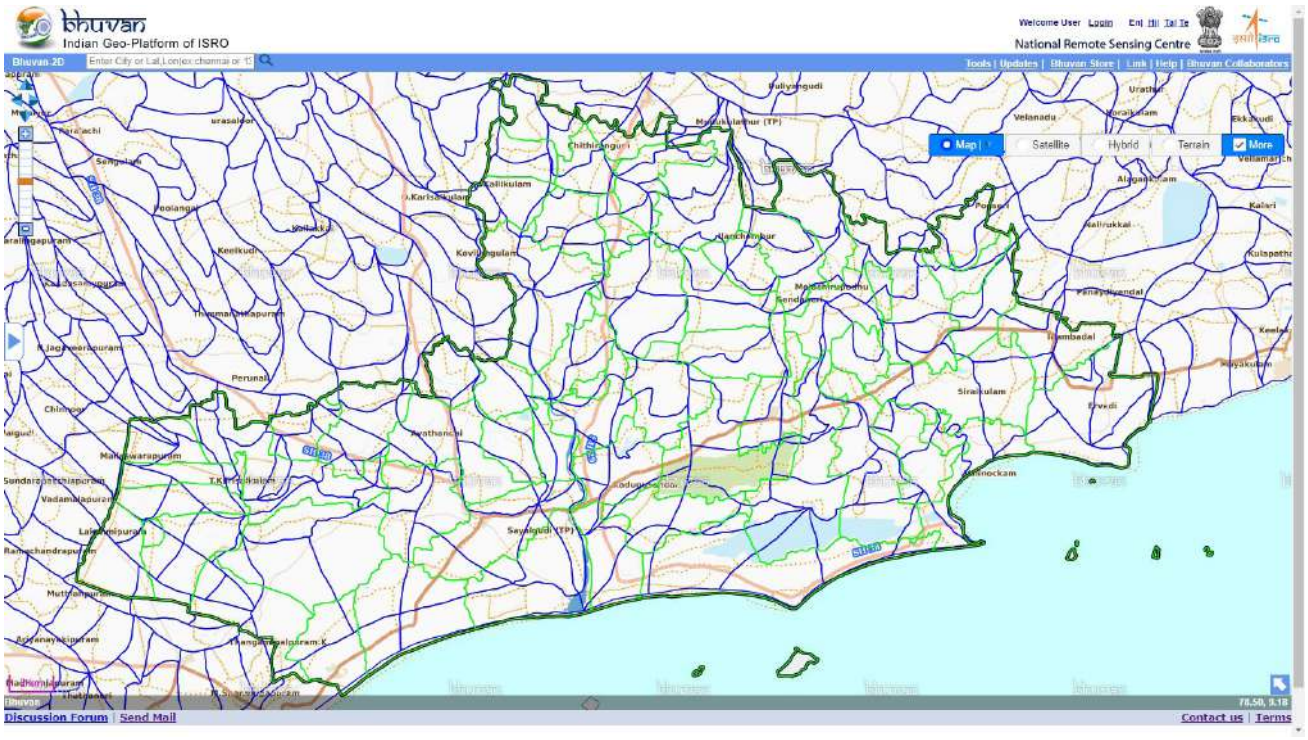


Figure 3.1 Watershed map of Kadaladi Block

3.5.1.2 Drainage and surface water bodies:

The drainage map shows the drainage order, pattern and destiny (0.004). Also, it shows the spread and extent of surface water bodies in the Block (Figure 3.2). This map is widely used to identify the suitable locations for check dams on the drainage, gabion structures and desilting the drains.

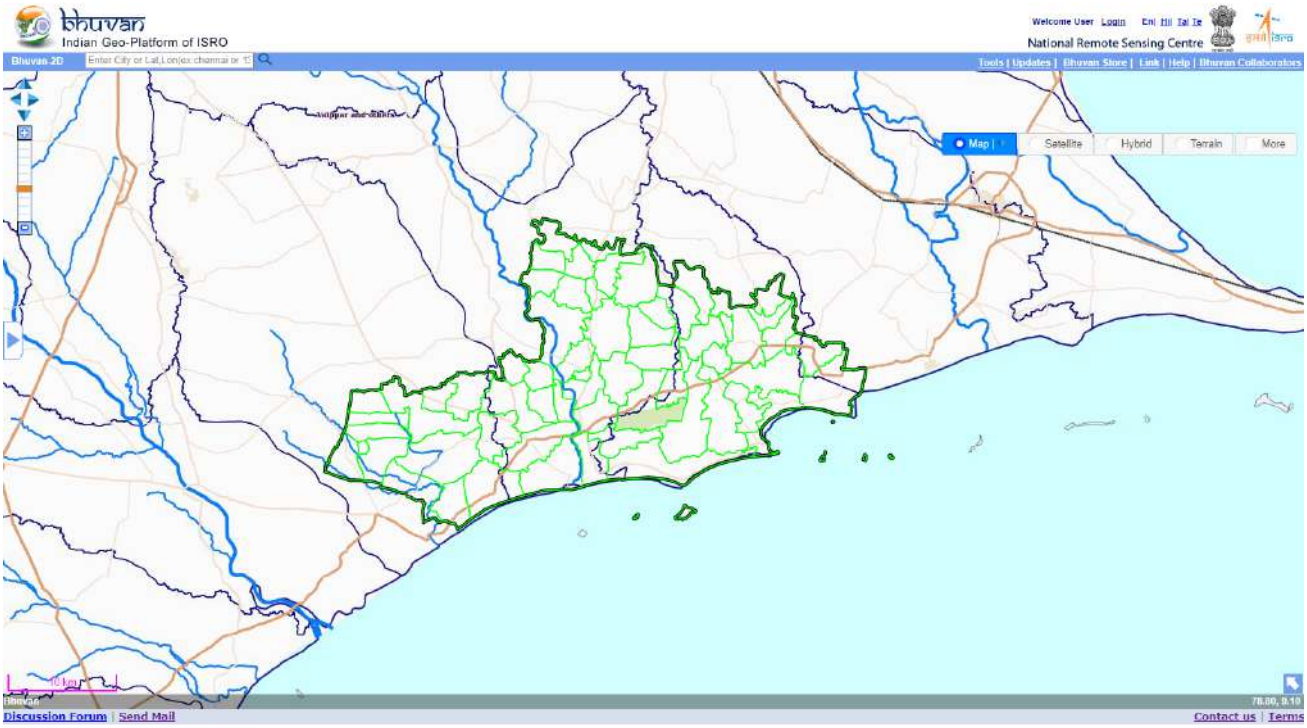


Figure 3.2 Drainage network map

3.5.1.3 Geomorphology:

Geomorphological maps are considered for representing graphical inventories of a landscape depicting land-forms and surface as well as subsurface materials. This Block has coastal, denudation and fluvial origin (Figure 3.3). The GP specific origin and area coverage are listed below. The knowledge of GP specific geomorphic and geologic conditions helps to undertake appropriate work in particular location to reap maximum benefits.

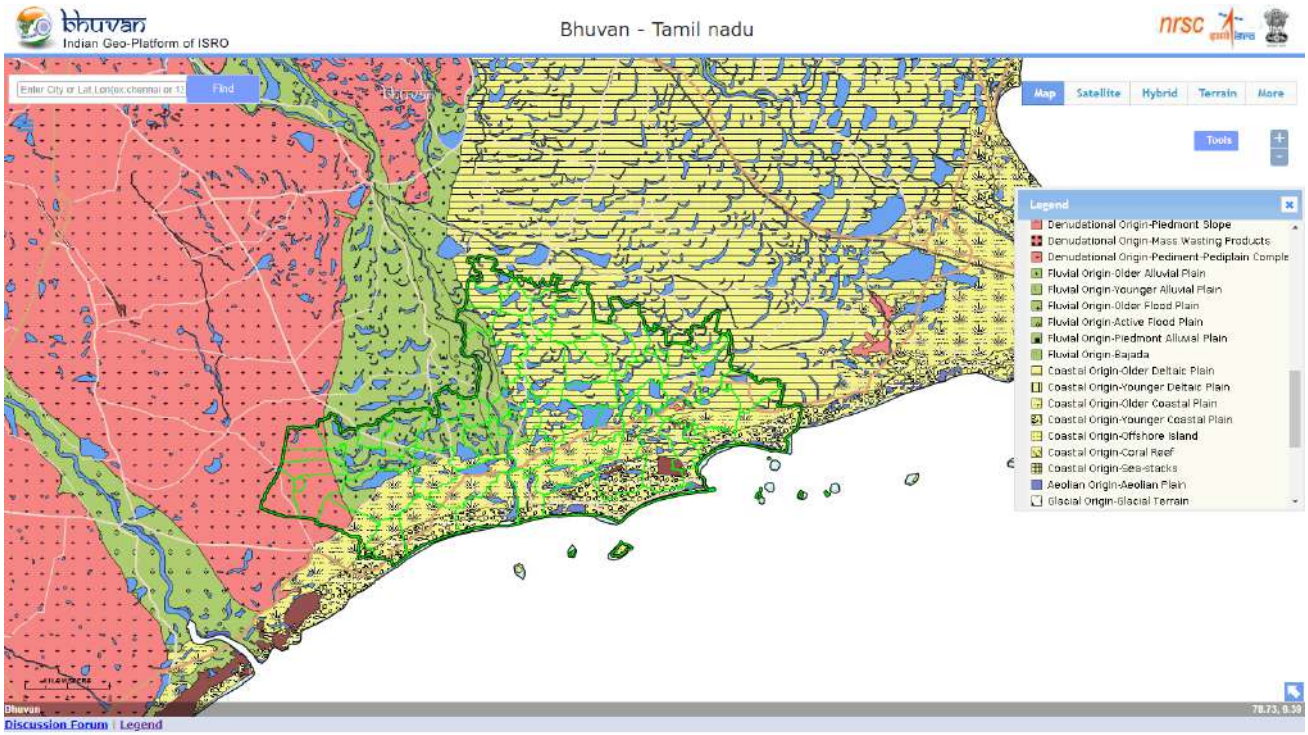


Figure 3.3 Geomorphology map

Origin	Area coverage in %	Gram Panchayat
Fluvial Origin - Older Alluvial Plain	66%	S.Tharaikudi-40% Senjadainathapuram, Silliyanvagaikulam-100% Karunkulam-50% Mangalam, Appanur-60% Kidathirukai-80%
Denudation Origin - Pediment - Pediplain Complex	100%	Sevalpatti, Kondunallanpatti, Uchinatham, Kokkarankottai, T.Karisalkulam, T.M.Kottai
Coastal Origin - Older Deltaic Plain	100%	S.P.Kottai, Chithirangudi, Enathi, Keelasakkulam, Kandilan, Ilemchembur, Sevariyarpattinam, Keela-chirupodhu, Peikulam, P.Keerandai, Orivayal, A.Punavasal, Idambadal
Coastal Origin - Younger Coastal Plain	100%	Kannirajapuram, Naripayur, Mookaiyur, Ervadi, Oppilan, Mariyur, Keelakidaram, Valinockam

3.5.1.4 Lineament:

The lineament map shows the linear feature in a landscape that is an expression of an underlying geological structure such as a fault, fracture, or joints in the Block (Figure 3.4). Structural lineaments and joint/fractures are seen in 40 % area of Senjadainathapuram, T.M.Kottai, Uchinatham, Sevalpatti GPs and 20% area of Appanur, Chithirangudi, S.P.Kottai, Kidathirukai, Mangalam, A.Usilaikulam, S.Tharaikudi, Kokkarankottai, T.Karisalkulam GPs. Geomorphic lineaments with parallel to shoreline are noticed in Mariyur 90%), Melakidaram, Periakulam (30%), Melaselvanur (40%), Siraikulam (60%), Ervadi (80%), Kadugusandai (20%). These observations are widely used to locate points of high water flow especially in groundwater exploration.

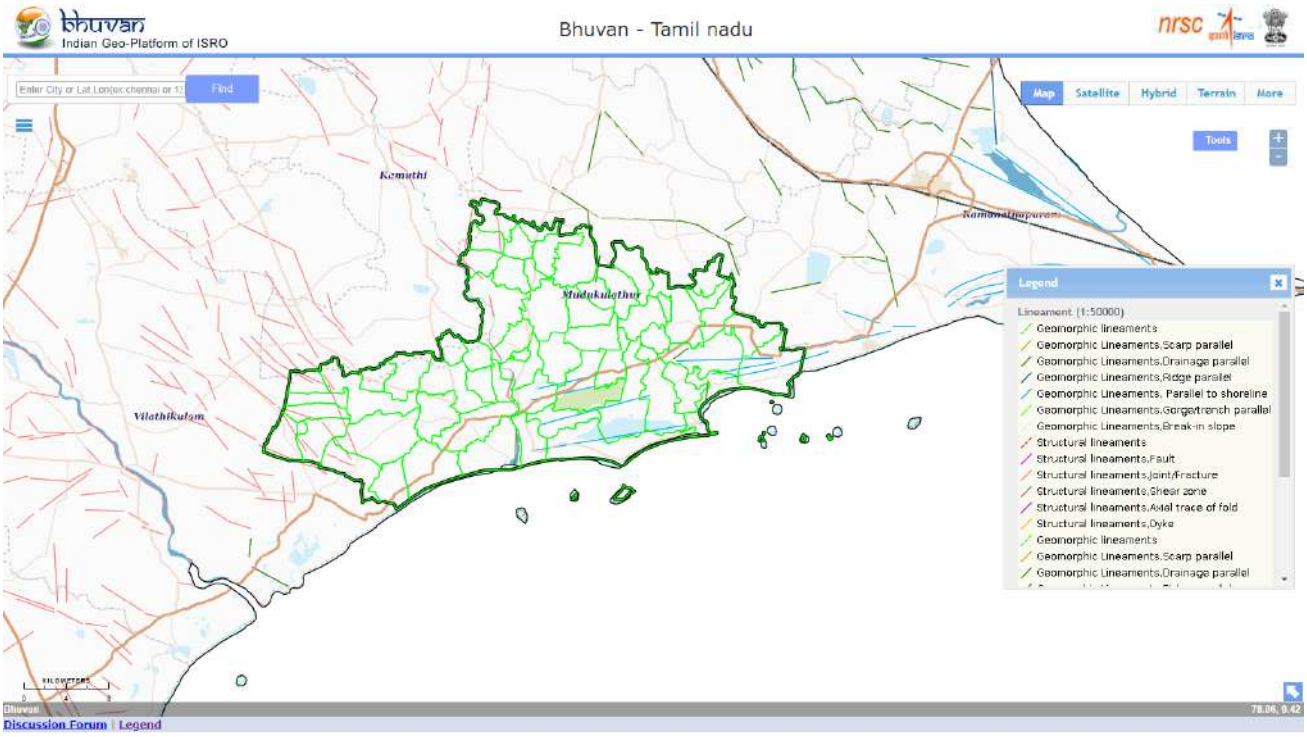


Figure 3.4 Lineament map

3.5.1.5 Ground water perspectives:

The ground water perspectives map provides the required information on geological parameters connected to ground water exploration and the probable ground water prospects (Figure 3.5). The GP specific ground water perspectives area is listed below. This GP specific information is accounted in identification of sites for planning recharge structures to address water scarcity in a more effective manner for the Block.

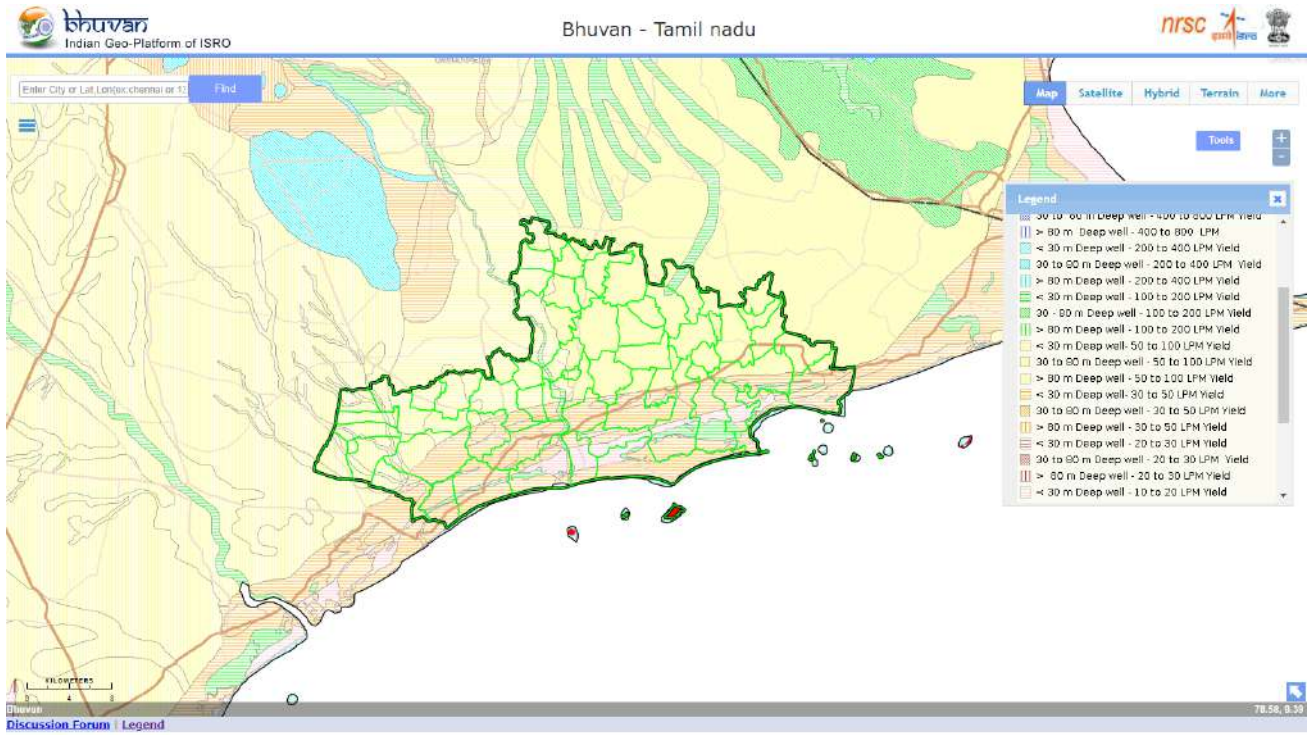


Figure 3.5 Ground water perspective map

Groundwater Prospects	Area in %	Gram Panchayat

< 30m Deep well - 50 to 100 LPM Yield

100%

Karunkulam, Meenangudi, Idambadal, Sikkal, Sokkanai, Panivasal, Peikulam, Kothankulam, P.Keerandai, Keelaselvanur, Orivayal, Meenangudi, Karungulam, M.Karisalkulam, Avathandai, Senjadainathapuram, T.Karisalkulam, Kokkarankottai
Uchinatham, Kondunallanpatti, Appanur, Kidathirukai, Mangalam, Kadaladi, A.Punavasal, Pothikulam, Kidathirukai, Enathi, Ilemchembur, Melachirupodhu, Sevariyarpattinam, Marandai, Orivayal

33%

Silliyanvagaikulam-80, S.Tharaikudi-60, Sevalpatti-50, Pillayarkulam, Melaselvanur, Siraikulam-40, S.Keerandai-30, A.Usilaikulam-30, Melakidaram-30, Ervadi-10

< 30m Deep well - 30-50 LPM Yield

100%

Naripayur, Mariyur, Melaselvanur, Thanichiyam, Vallinockam

44%

Keelakidaram, Ervadi-90, S.Keerandai-70, Melakidaram-60, S.Tharaikudi, Mookaiyur-50, Sevalpatti-40

< 30m Deep well - 10 to 20 LPM yield

50%

Mookaiyur-60, Mariyur-50, Oppilan-40

3.5.1.6 Terrain:

The terrain map shows an area of land divided into terrain map units defined by similar elevation, slope, landform. This map will be useful to understand the terrain to identify the water and soil conservation related activities at GP level (Figure 3.6).

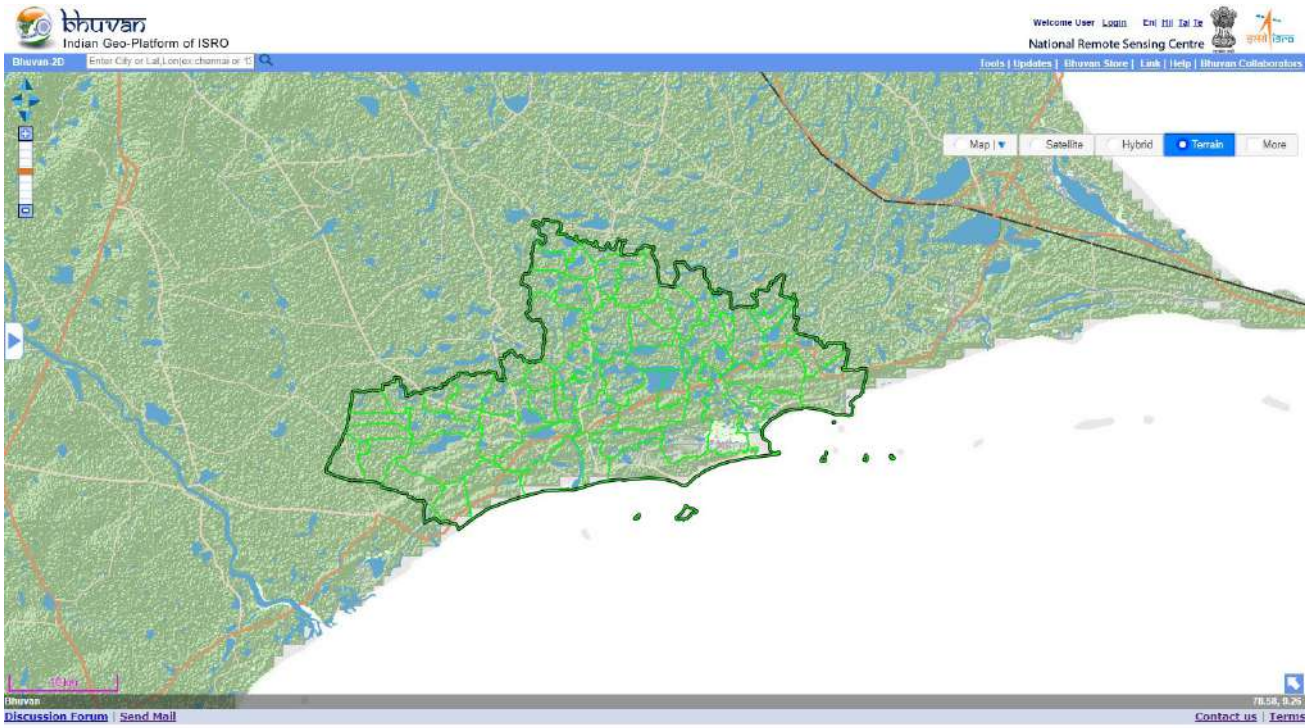


Figure 3.6 Terrain map

3.5.1.7 Slope:

The average slope of a terrain feature is calculated from contour lines on a topo map or DEM. Slope is typically expressed as a percentage, an angle, or a ratio. Slope map illustrates the measure of steepness or the degree of inclination of a feature relative to the horizontal plane. This Block has very flat terrain in the range of 0-1% (Figure 3.7). This information is used for analyzing the soil conservation measures and construction of the water recharge structures such as check dam, farm ponds etc.,

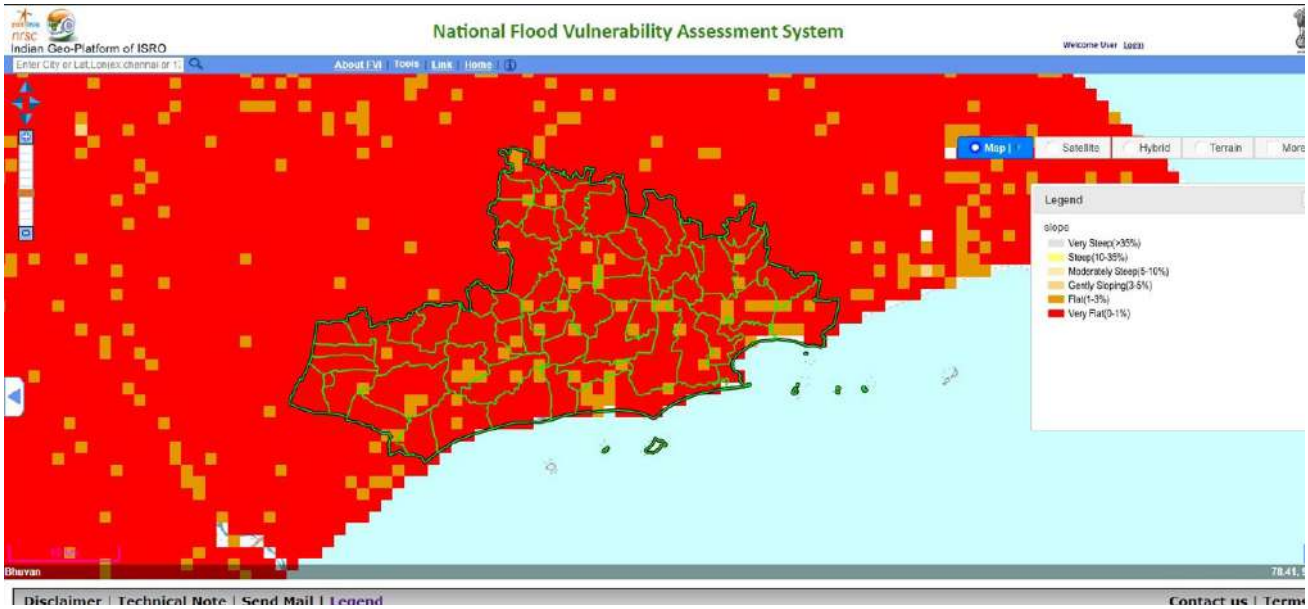


Figure 3.7 Slope map

3.5.1.8 Contour map:

A contour map is illustrated with contour lines which shows valleys and hills, and the steepness or gentleness of slopes. The contour map plays a vital role in planning and identifying the recharge structures, farm ponds and construction of grey water drain network etc., (Figure 3.8).

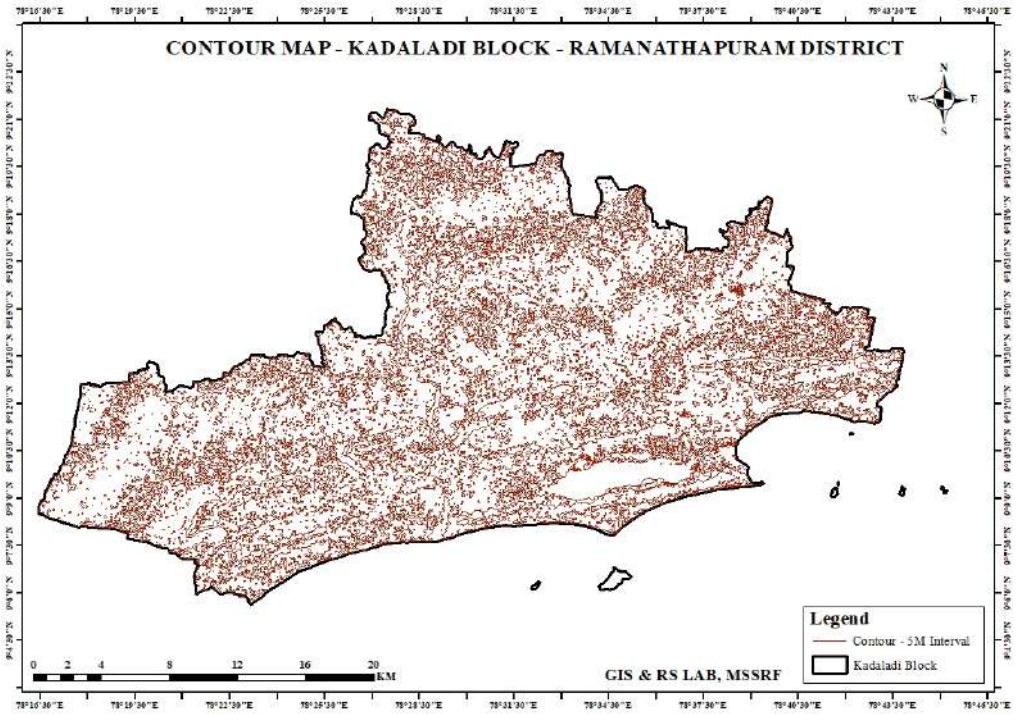


Figure 3.8 Contour map

3.5.2 NON SPATIAL DATA

Apart from geo-spatial maps, the data regarding, status of watershed and drainage network, canal, traditional water bodies, details on irrigation facilities are collected from recognized sources. The runoff and water demands are calculated. Table 6 provides the snapshot of the non-spatial data used to capture current water resources state and its supply and demand side of Kadaladi Block. GP wise current water resources state and its supply and demand side are shown in Annexure 3.7.

TABLE 6. WATER RESOURCES STATUS

S No	Key CWRM Parameter	Total
	Canal Network in meter	
1	Length of Main Canal	1,30,033
2	Length of Minor Canal	1,11,813
3	Length of Distributaries	4,500
4	Water Courses (Field Channels)	1,93,818
	Traditional Water bodies in Numbers	
5	Number of Tanks (PWD & Union)	193
6	Number of Ooranis	360
7	Other Surface Water Bodies	0
	Irrigation Facilities in ha	
8	Area under Tank Irrigation	9,927
9	Area under Canal Irrigation	15
10	Area under Open & Tube Well Irrigation	1,824
	Catchment Area wise Available Runoff in Ha-M	
11	Good Catchment Area	3,640.14
12	Average Catchment Area	1,150.89
13	Bad Catchment Area	5,151.47
	Watershed and Drainage Networks	
14	Length of Natural Drainage Lines in meters	2,52,669
15	Number of Natural Drainage Lines	246
16	Number of Micro-watersheds	410
	Water Demand in Ha-M	
17	Water Demand for Humans	507.70
18	Water Demand for Livestock	54.86
19	Water Demand for Agriculture	32,484.12
20	% G.W Utilization for Drinking	86
21	% G.W Utilization for Livestock	55
22	% G.W Utilization for Agriculture.	16
23	% S.W Utilization for Drinking	14
24	% S.W Utilization for Livestock	45
25	% S.W Utilization for Agriculture	84

3.5.2.1 Existing Water Structures

The Block has structured traditional water storage units as tanks, ponds and ooranis which are the life line of local communities for their lives and livelihoods. This Block has 193 tanks and 360 Ooranis (Figure 3.9)

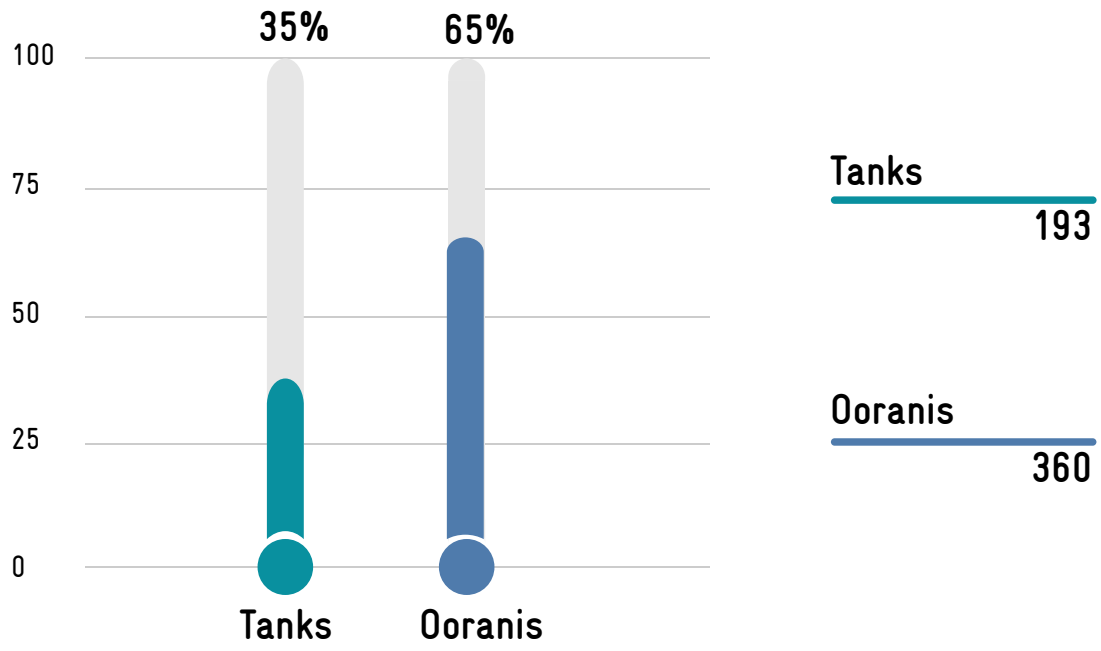


Figure 3.9 Traditional water bodies

3.5.2.2 Sources of Irrigation

The total area under irrigation in the Block is 11765.94 ha, of which 84.37% (9927 ha) is irrigated through tank irrigation and 15.5% (1824 ha) is irrigated by ground water stored in open/tube wells while remaining 0.13% (15 ha) area is irrigated through canal irrigation (Figure 3.10).

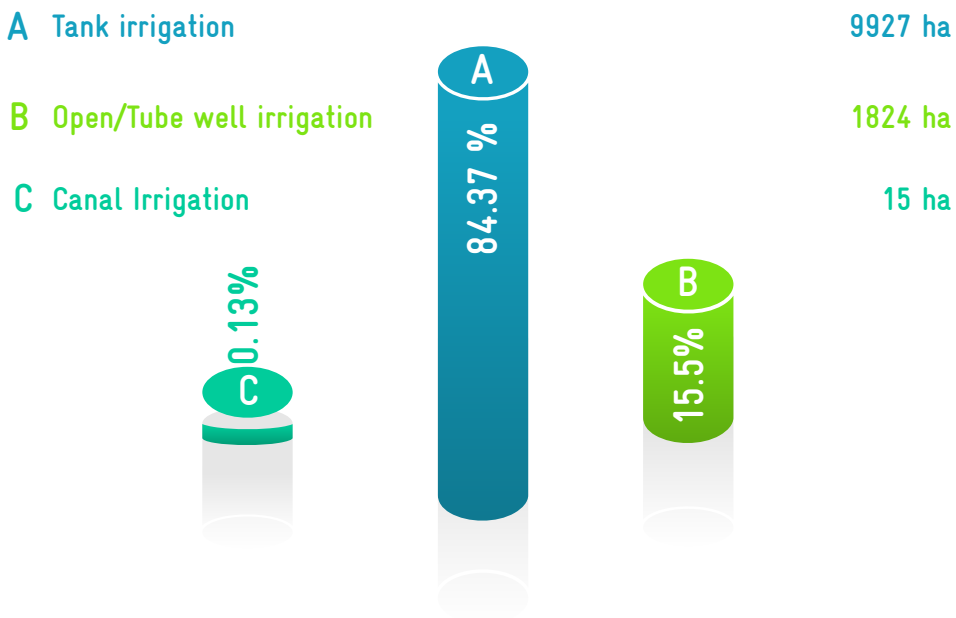


Figure 3.10 Source of irrigation

3.5.2.3 Available Run off

The available runoff in catchment area is 9942.49 Ha-M. and in that 36.61% comes under good catchment area, 11.58% comes under average catchment area and 52% comes under bad catchment area. Since, this Block has nearly half of area under bad catchment area, the runoff generated is also more (Figure 3.11).

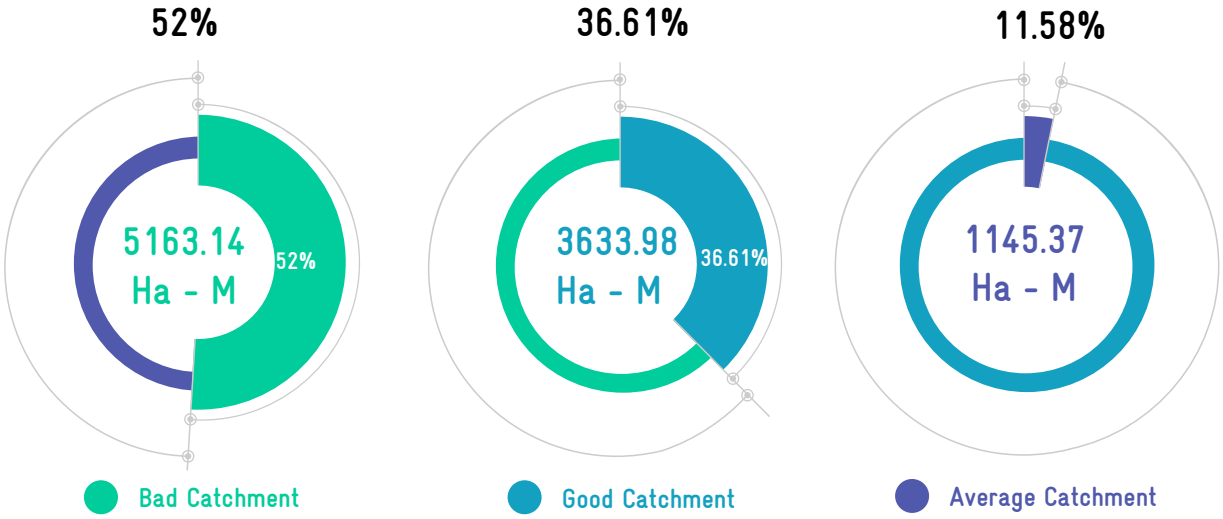
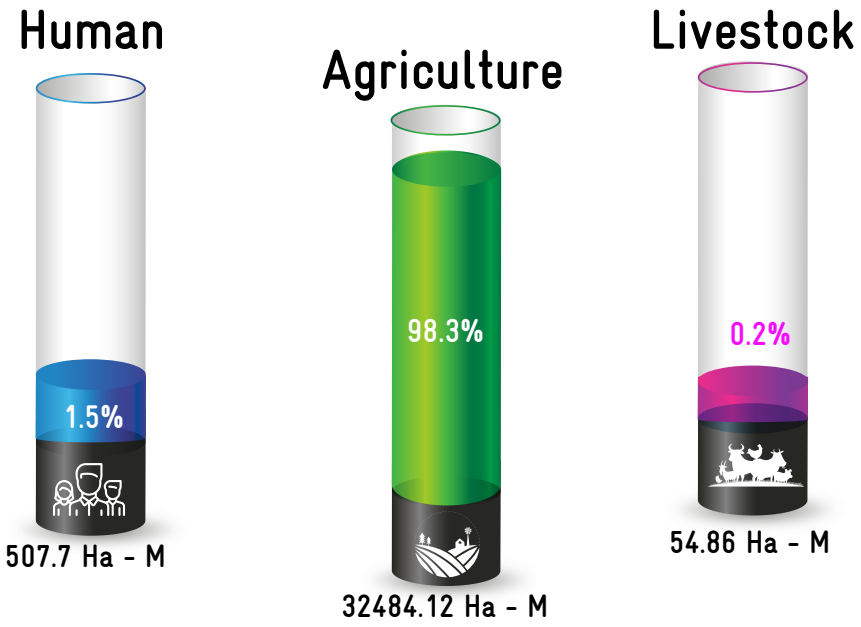


Figure 3.11 Runoff from catchments

3.5.2.4 Water Demand

The total demand for water including domestic, agriculture and livestock purpose is 33047 Ha-M.



For drinking purpose, more groundwater is utilized (86%), than surface water (14%). Agriculture activities depends both ground (55%) and surface water (45%). Livestock's depends more on surface water utilization (84%) than ground water (16%) (Figure 3.12)

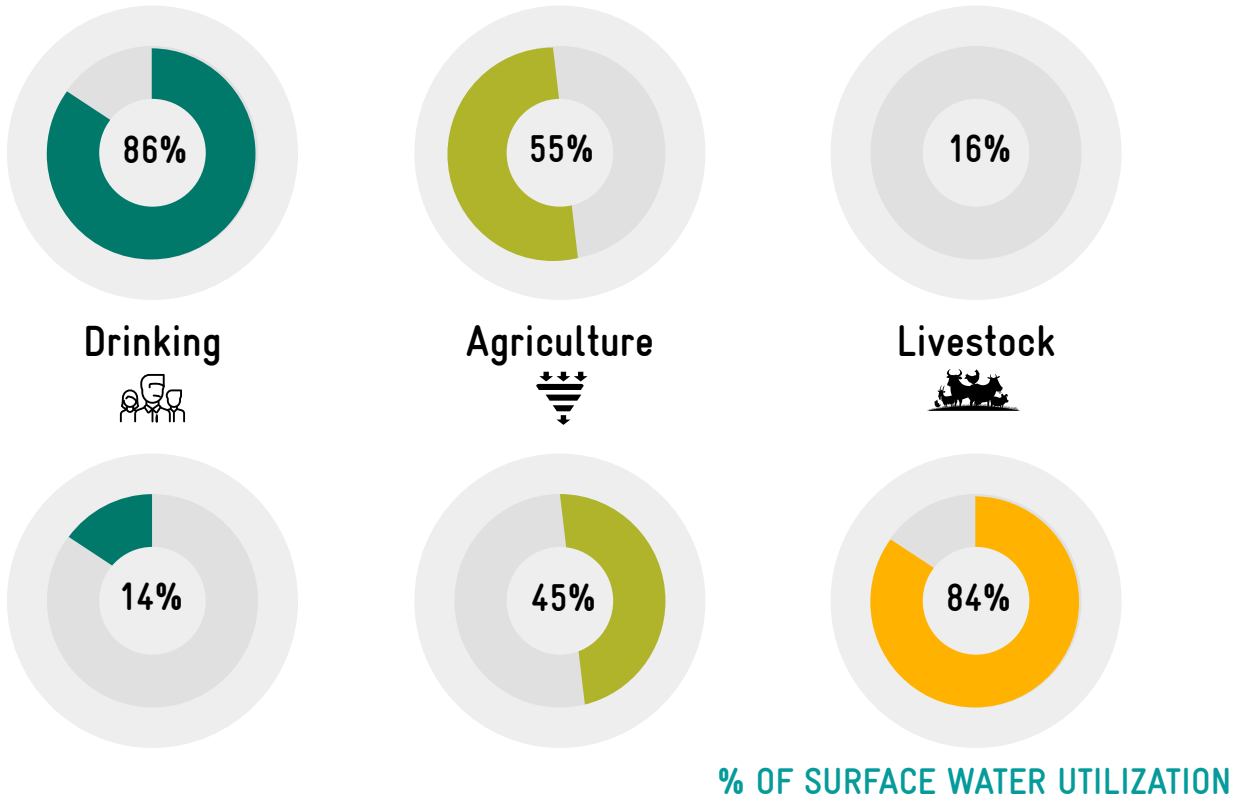


Figure 3.12 Sectoral water utilization

3.5.3 WATER QUALITY

The WQI is defined as a measure of rating that provides the composite influence of individual water quality parameter to overall water quality. WHO (2004) recommends 10 parameters (pH, TDS, HCO3, Cl, SO4, NO3, Ca, Mg, Na and K) to determine the water quality. WQI of Kadaladi Block shows that except for a few places, other locations show medium, poor and very poor water quality. The water quality index for Kadaladi Block is represented in figure 3.13 and GP wise water quality during pre and post monsoons are attached in Annexure 3.8 and 3.9.

EXCELLENT QUALITY	<50
GOOD QUALITY	50- 100
MEDIUM QUALITY	100- 200
POOR QUALITY	200-300
VERY POOR QUALITY	>300

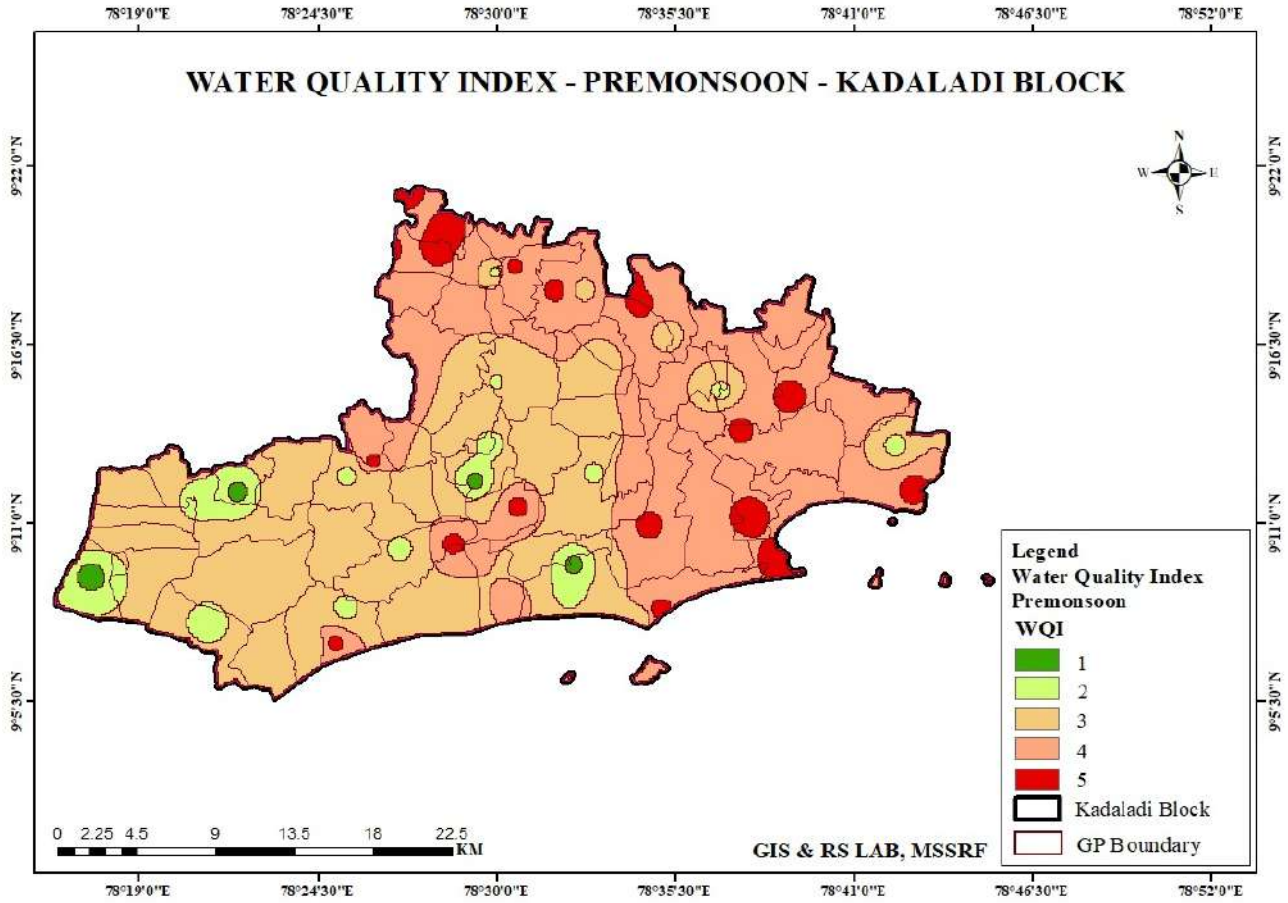


Figure 3.13 Water quality index

3.5.3.2 Salinity:

Though salinity is one of the component in water quality index, the salinity index also depicted to visualize the salinity spread in the Block (Figure 3. 14).

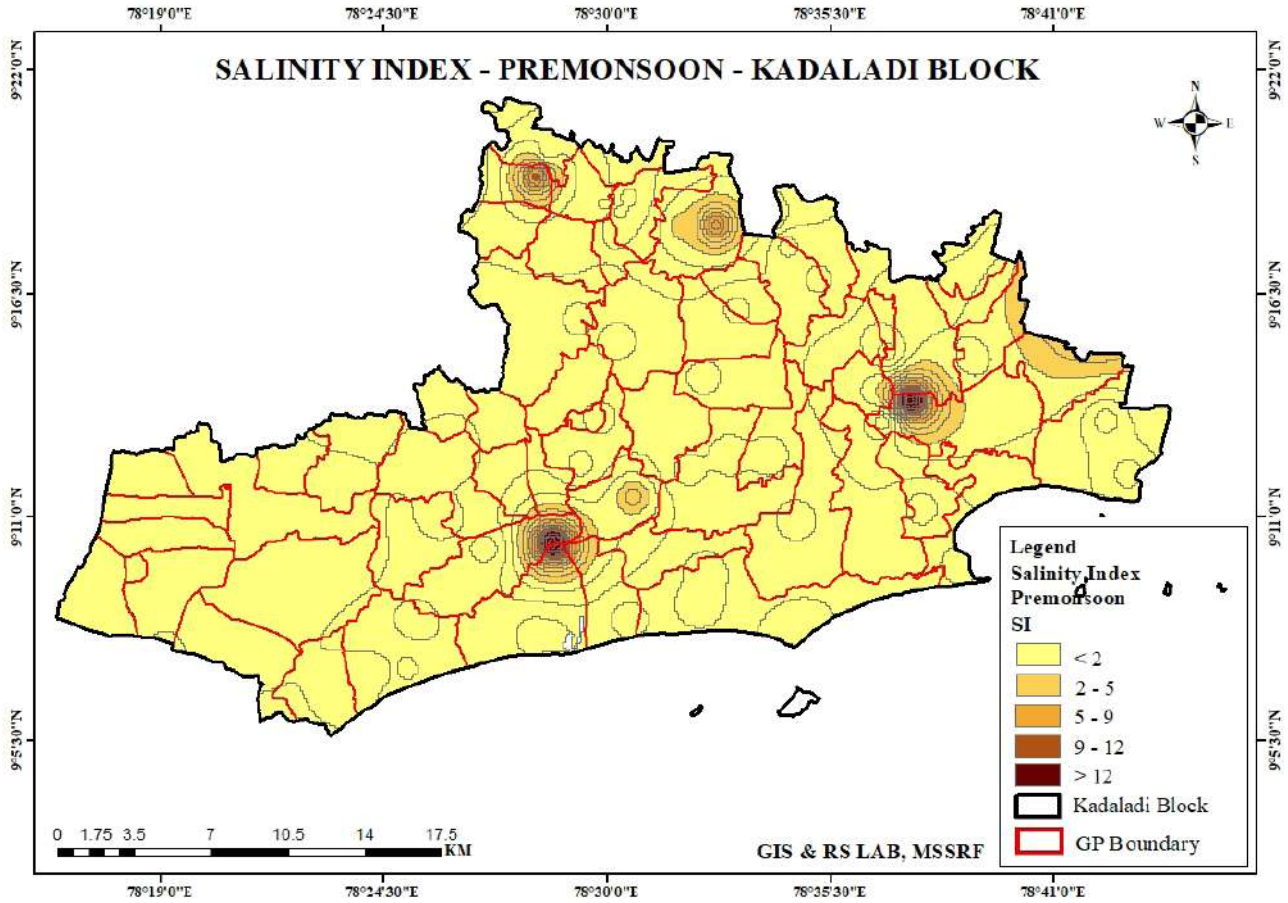


Figure 3.14 Salinity index

3.5.3.3 Seawater mixing index:

SWI parameter is calculated based on mixing of major ionic constituents (Na, Cl, Mg, and SO4) of sea water to ground water. Figure 3.15 represents sea water mixing index of Kadaladi Block and indicates the moderate mixing during pre-monsoon season.

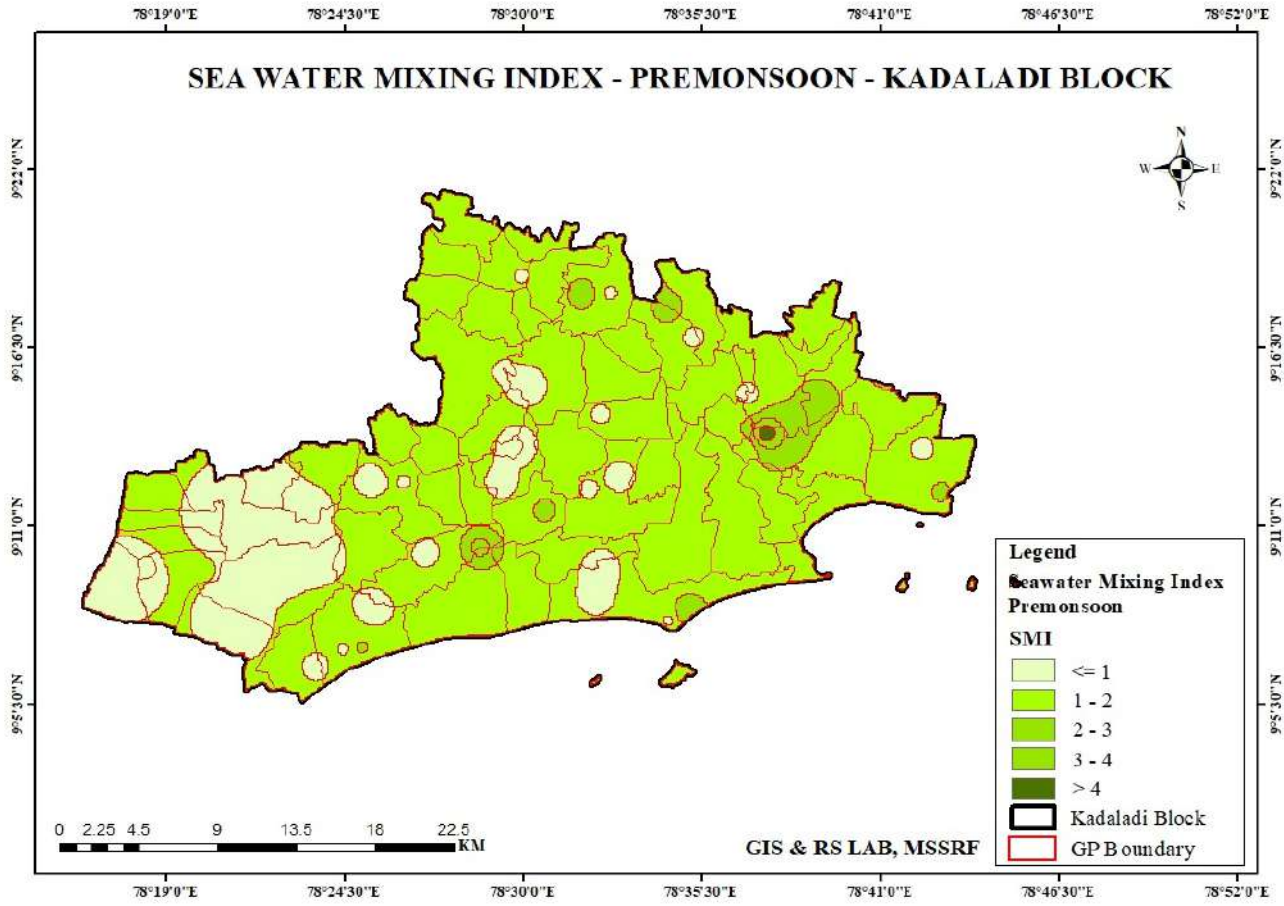


Figure 3.15 Sea water mixing index

3.6 CWRM PLANNING ANALYSIS- AGRICULTURE

Agriculture is the primary livelihood of the households in this Block followed by livestock resources. Considering water and monsoon patterns, the key agriculture factors such as soil, land, crop and livestock related parameters are employed in CWRM planning.

3.6.1 SPATIAL DATA

Spatial data on land use and land cover (LULC), waste land, salt and erosion affected lands and soil texture were collected to understand the site specific problems in order to draft scientific key water actions.

3.6.1.1 Land Use and Land Cover (LULC):

LULC map shows the land use patterns of the Block. This Block is majorly covered by the agricultural crop land and fallow lands (Figure 3.13). The GP wise land use cover is listed below. This LULC map helps the decision makers and planners to concentrate on the fallow land development activities. During the CWRM planning of GPs, the more fallow land activities has been proposed.

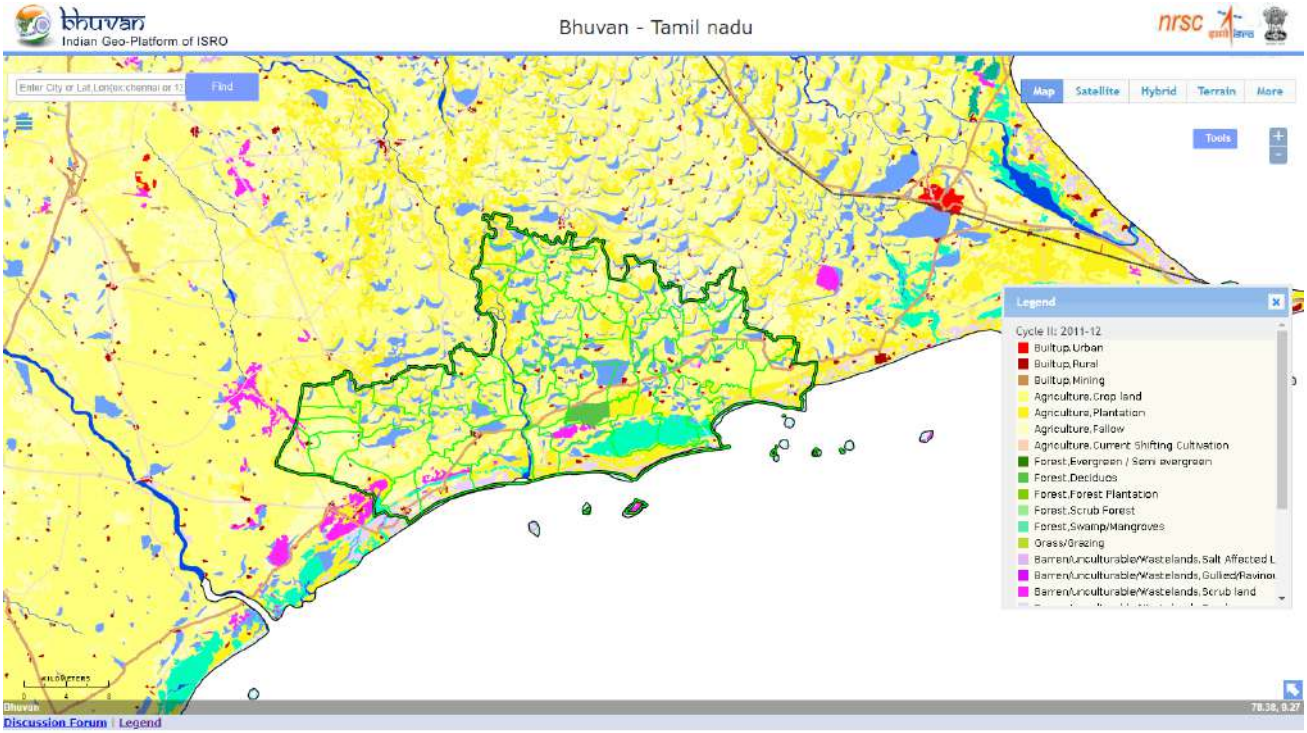


Figure 3.16 Land use and land cover map

Legend - (Parameters)	Area coverage in %	Gram Panchayat
Barren Lands	10.6%	Periakulam - 40% Sevalpatti, Naripayur - 30% Uchinatham - 10% Kokkarankottai, Kannirajapuram, Mookaiyur, Siraikulam - 5%
Agriculture, Fallow lands	14.4%	Kondunallanpatti, Kokkarankottai - 80% Kannirajapuram, Peikulam - 70% Naripayur, Melakidaram, Sevalpatti, Keelachirupodhu - 60% S.Tharaikuadi - 50% Mookaiyur, Ervadi, S.Keerandai, Ilemchembur, Uchinatham - 40% Keelakidaram - 30% Idambadal, Oppilan, Silliyanvagaikulam - 20% A.Usilaikulam - 15% Mariyur, Valinockam, Sirakulam, Thanichiyam, Periakulam, Pillayarkulam, Kadugusandai - 10%
Forest / Swamp / Mangroves	32.5%	Melakidaram - 60% Keelakidaram, Valinockam - 40% Mariyur - 30%

3.6.1.2 Waste land:

The patches under degraded forest and scrub land are identified in this Block as shown in figure 3.14. Approximately 40 % of Periakulam and 20% of the Kadugusandai GP have degraded land. The sandy area was noticed in Mariyur and Naripayur GPs (20%). During planning the GPs, the plantation measures have been taken up in the identified portions of total wasteland of about 623.1 in order to convert these lands into productive land.

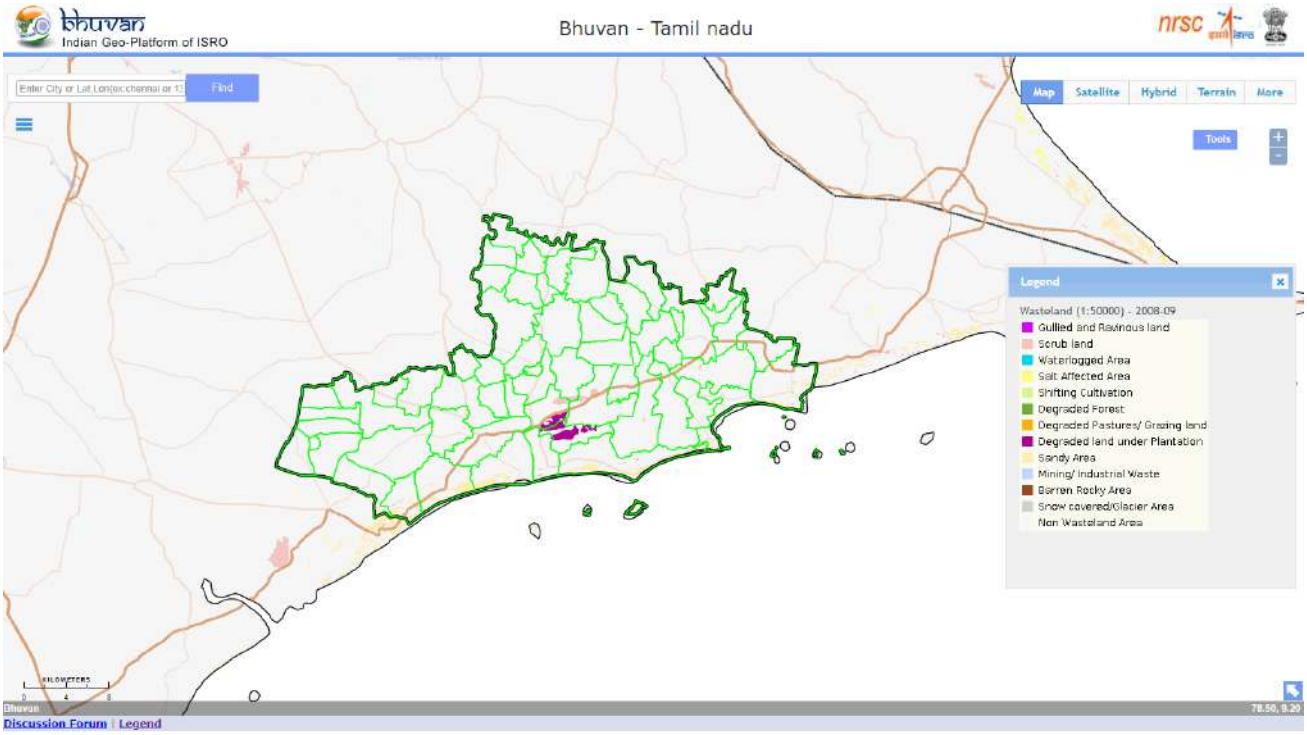


Figure 3.17 Waste land map

3.6.1.3 Salt affected area:

Since this is a coastal Block, 22, 927.33 ha are identified as salt affected area. 90 % of the area of T.Veppangulam and Avathandai are saline followed by S.Vagaikulam, Peikulam (80%), Pillayarkulam(70%), Mookaiyur, Senjadainathapuram, Kanikoor, M.Karisalkulam, Oppilan (60%), S.Keerandai, Melakidaram, P.Keerandai (40%), A.Usilaikulam, Thanichiyam, Siraikulam (30%), Mariyur, Periakulam (20%), and Keelakidaram (10%). While planning the GP actions, these areas have been treated specially and suitable steps are suggested to reduce the salinization (Figure 3.15).

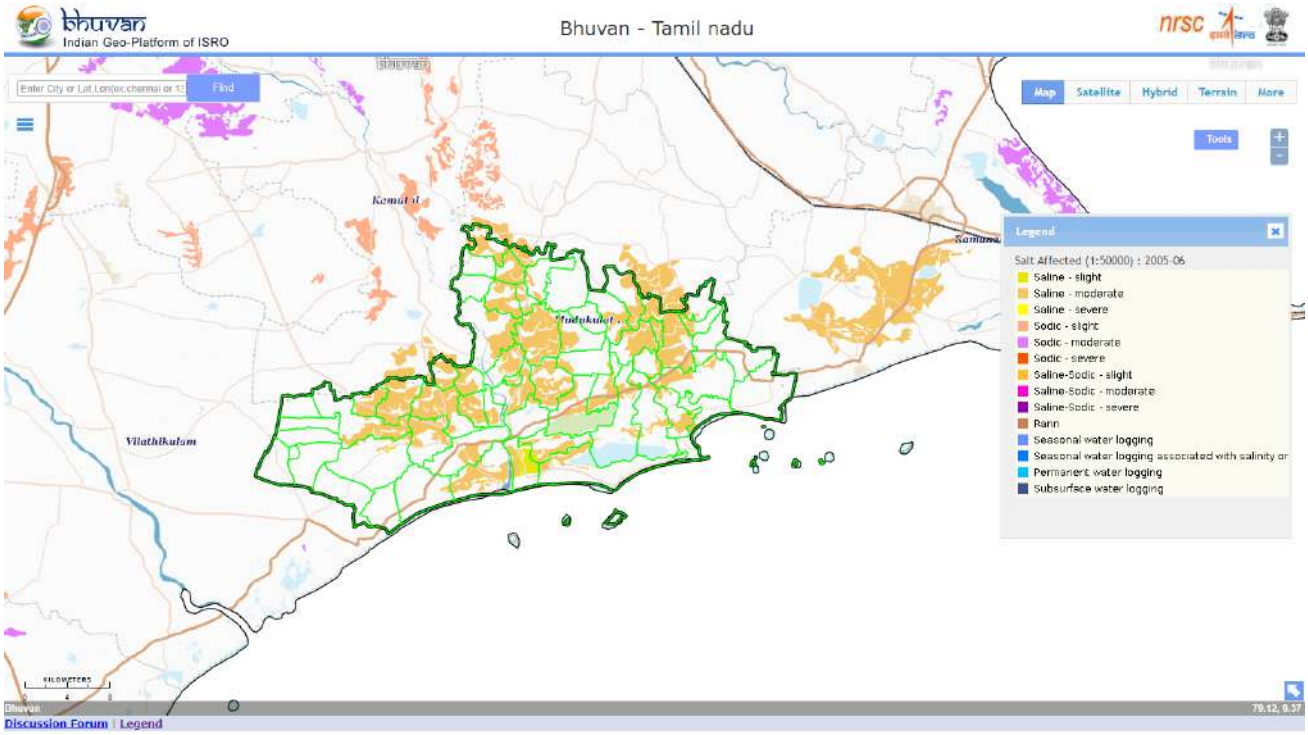


Figure 3.18 Map of Salt affected area

3.6.1.4 Soil erosion:

The erosion map shows the soil erosion capacity with respect to rainfall, soil physical properties, terrain slope, land cover of this Block. The soil erosion map is used for soil conservation and regional planning and water-shed management. In this Block, 2,090.31 ha are under erosion. Sheet erosion is observed in Melaselvanur, Melakidaram (40%), Idambadal (20%) and Sokkanai and Keelaselvanur (10%) (Figure 3.16). Based on this information, suitable measures are proposed to arrest further erosion.

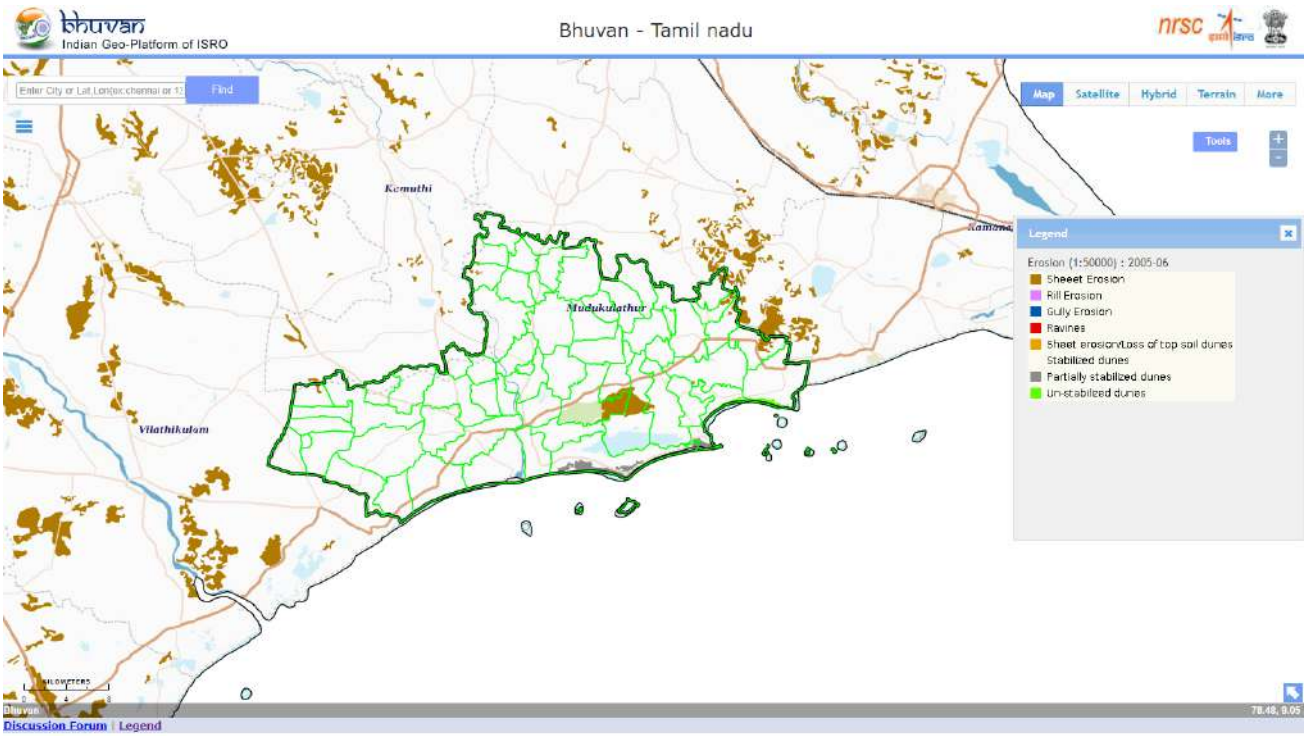


Figure 3.19 Soil erosion map

3.6.1.5 Soil texture:

The district has diverse soil types and predominant in vertisol and alfisol. As for soil texture the proportion of fine type is higher followed by loamy and coarse types (Figure 3.17).

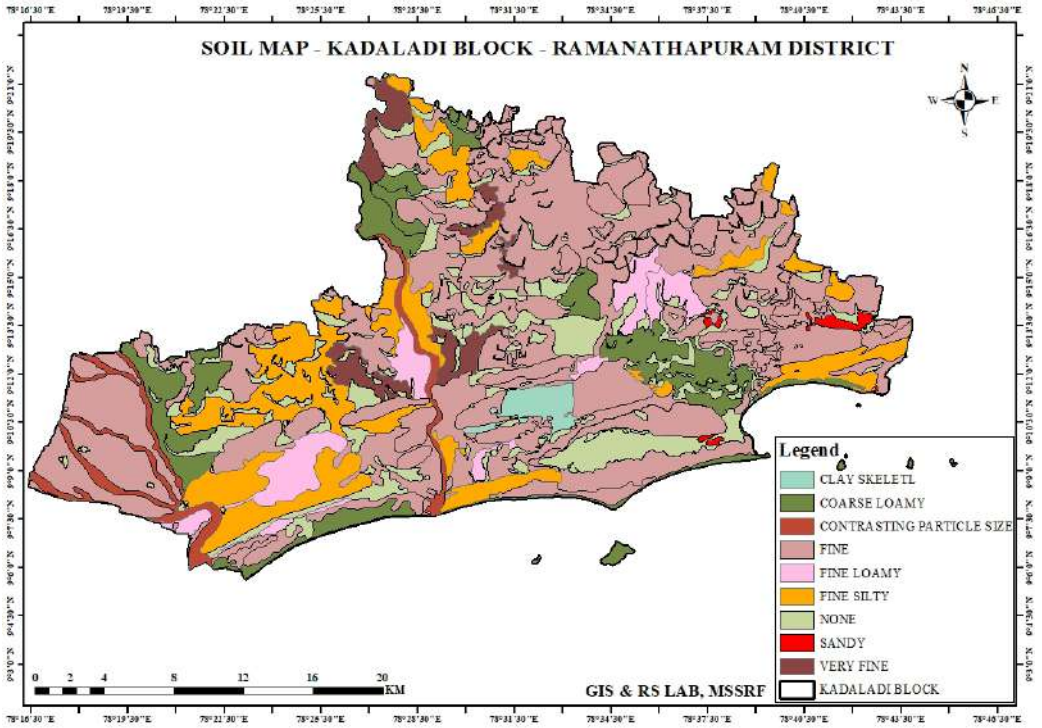


Figure 3.20 Distribution of soil types - textural classification

3.6.2 NON SPATIAL DATA

Apart from geo-spatial maps, the data regarding, status of land resources, catchment area, crop details, soil texture, status of macro and micro nutrients, livestock are collected from recognized sources. The runoff and water demands are calculated. Table 7 provides the snap-shot of the non-spatial data used to capture current agriculture and allied related resources state of Kadaladi Block. The key CWRM parameters of agriculture area for all GPs are tabulated in Annexure (Annexure 3.10).

TABLE 7: AGRICULTURE STATUS

S No	Key CWRM Parameter	Total
	Land Resources in ha	
1	Area under Forest land	2,874.40
2	Area under Non-Agricultural Uses	13,534.03
3	Area under Barren & Un-cultivable Land	0.00
4	Area under Permanent Pastures and Other Grazing Land	7.84
5	Area under Land Under Miscellaneous Tree Crops etc.	5,706.51
6	Area under Cultivable Waste Land	1,039.25
7	Area under Fallows Land other than Current Fallows	10,190.05
8	Area under Current Fallow land	2,356.92
9	Area under Unirrigated Land	23,396.50
10	Area Irrigated by Source	9,004.55

	Catchment Area in ha	
11	Land under Good Catchment	16,408.43
12	Land under Average Catchment	6,753.60
13	Land under Bad Catchment	44,948.02
	Crop Details in ha	
14	Irrigated Area	11,276.88
15	Rain fed area	19,606.06
16	Area under Paddy Cultivation	23,046.90
17	Crop Water Requirement - Irrigated condition in Ha-M	15,462.18
18	Crop Water Requirement – Rain fed condition in Ha-M	17,021.92
	Soil Resources: Status of available Nitrogen in %	
19	Very Low	5
20	Low	84
21	Medium	10
22	High	0
23	Very High	0
	Status of Organic Carbon in %	
24	Very Low	3
25	Low	40
26	Medium	15
27	High	21
28	Very High	21
	Status of Soil Micro Nutrients in %	
29	Sufficient	68
30	Deficient	32
	Status of Physical condition of the soil in %	
31	Acidic Sulphate	0
32	Strongly Acidic	0
33	Highly Acidic	4
34	Moderately Acidic	10
35	Slightly Acidic	7
36	Neutral	19
37	Moderately Alkaline	58
38	Strongly Alkaline	1
	Soil Texture in %	
39	Clay Soil	0
40	Fine Soil	56
41	Coarse loamy Soil	18
42	Soil Water Permeability (Low, Medium Moderate)	Moderate
	Soil moisture and ET	
43	Volumetric Soil Moisture in %	17
44	Estimated Soil Moisture in Ha-M	13,036.26
45	ET Losses in Ha-M	18,929.53
	Means of Water Extraction in %	
46	Gravity	40
47	Lifting	60
	Irrigation Methods in %	
48	Wild Flooding	85

49	Control Flooding	15
	Livestock in Numbers	
50	Cattle Population	7,789
51	Sheep Population	4,4831
52	Goat Population	23,530
53	Poultry	42,687

3.6.2.1 Land Use

The standard land use classification helps to understand the distribution and the extent of different land use categories. As the runoff and water harvesting actions are linked to the land use systems, its distributions across the geographical boundary of the Block are necessary to take the decisions. Of the total land area of 68110 ha, nearly 34.35% of the land area is under unirrigated land; 19.87% of the area is under non- agricultural uses; 14.96% of the area is under fallow lands other than current fallows; 13.22% area is under irrigated by source and 3.46 % is current fallow land. The Block has 4.22% of area under forest land, and no area under barren and uncultivable land. Area under cultivable waste land is 1.53% and the area under permanent pastures and other grazing land shares has very less 0.01% of the total area (Fig 3.18). Of the total land area of 68110 ha, nearly 32.487% are under public and common land and 67.52% are under individual ownership.

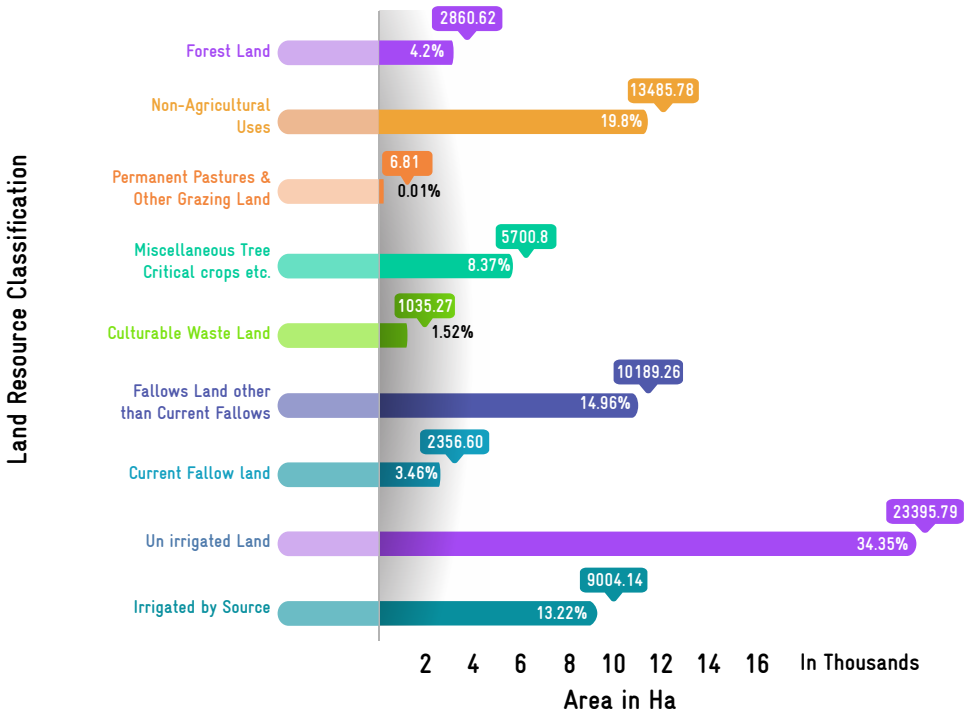


Figure 3.21 Land Utilization

3.6.2.2 Catchment Area

The land use types in each of the GPs are categorized into three different types of runoff types; Good Catchment area, Average Catchment area and Bad Catchment area (Annexure 3.2). Out of the total catchment area of the Block of 68110 ha, about 24% is good catchment, 9.9% is average catchment area and 65.99% is bad catchment area. This Block has more bad catchment area which leads to more runoff and this analysis helps to focus on prioritizing the works in the land use systems under the good and bad catchment areas (Fig 3.19).

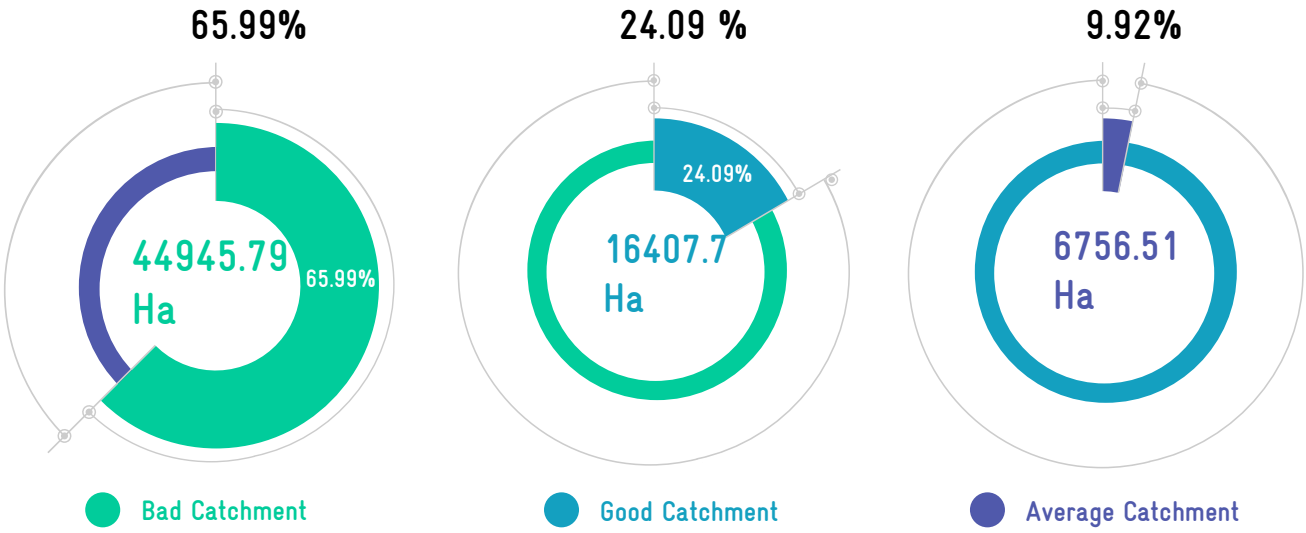


Figure 3.22 Catchment Area

3.6.2.3 Soil moisture

Soil is an important medium to store the available water and the storage capacity varies with the type of soil especially its textural composition. In overall composite water budgeting estimation of stored water in the soil assumes greater significance in this Block because of its significant proportion of area under rain fed cultivation. The annual average volumetric soil moisture of this Block (17%), is taken for estimating the amount of water stored as soil moisture which accounts to 13036.26 Ha-M.

3.6.2.4 ET losses

The loss of water through evapotranspiration is important in the water budgeting. The annual total ET loss during 2018-19 was 804 mm. The average percentage area influences the water loss through ET in the Block is 17% and the total annual losses due to ET alone is 18929.53 Ha-M.

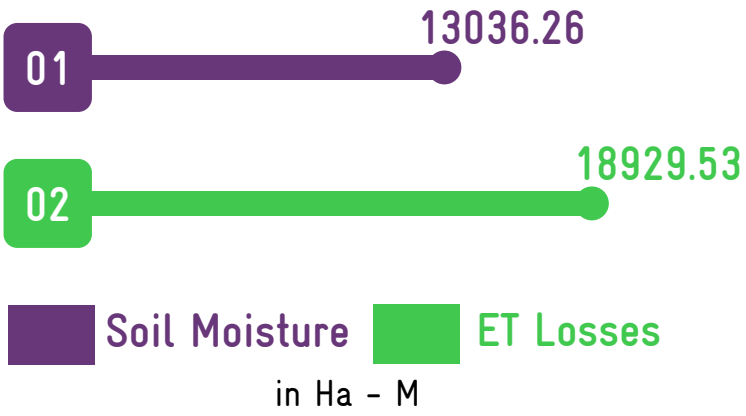


Figure 3.23 Soil Moisture & ET Losses

3.6.2.5 Macro nutrients

The macro soil nutrients such as nitrogen is in very low to medium category in the total number of soil samples tested. The nitrogen status is very low in this Block. The available nitrogen is very low in 84 %, very low in 5 % of the samples tested, and 10% under medium. (Fig 3.20). This indicates that the soil fertility is very poor and further intensive practices makes the soil more vulnerable to degradation over a period of time.

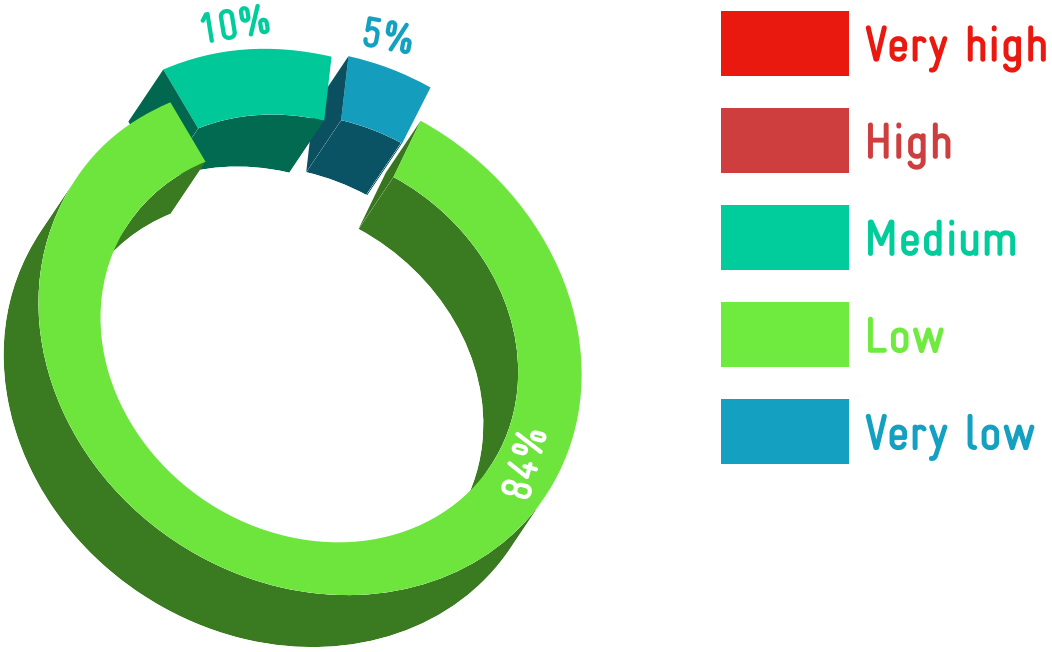


Figure 3.24 Status of available Nitrogen

The soil organic carbon is very low to very high in the total number of tested samples in this Block. Nearly 40% of the soil samples tested are under low category and 3% under very low category. 21% each in high and very high category and 15 % under medium category (Figure 3.21).

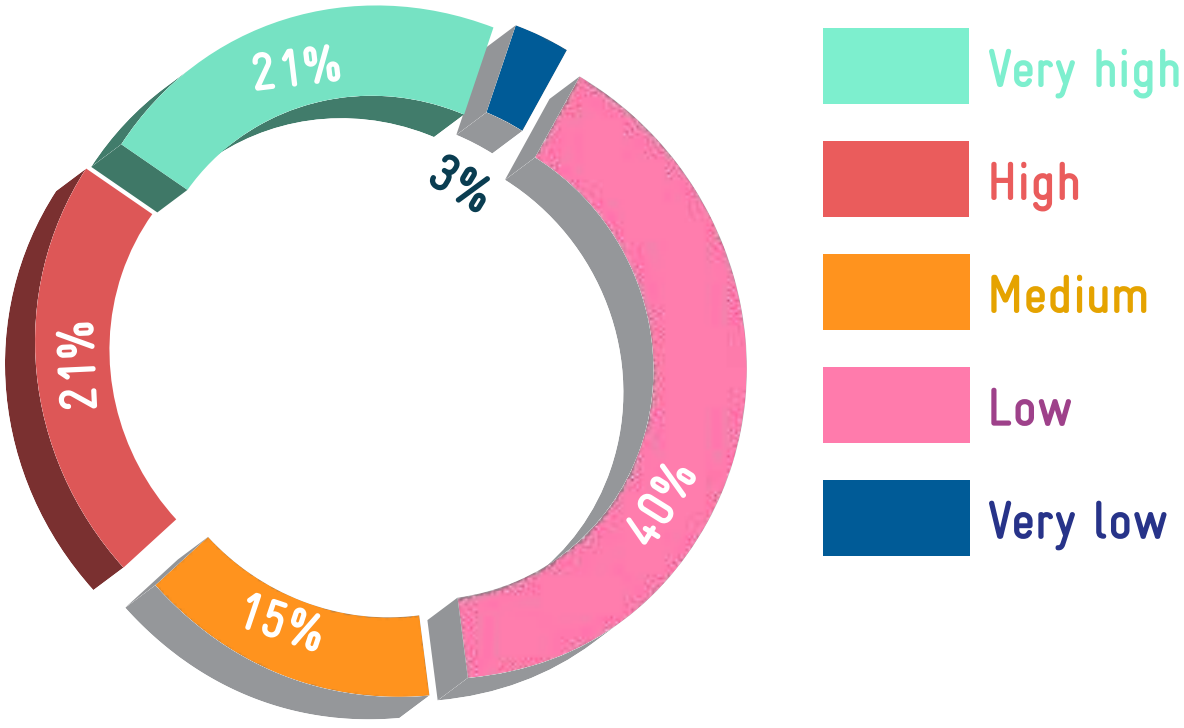


Figure 3.25 Status of soil Organic Carbon

3.6.2.6 Status of the soil micro nutrients

The micro nutrient status of the soil with specific reference to Manganese, Boron and Zinc, Ferrous, Copper, and Sulphate are deficient in 68% and 32% sufficient of the soils tested.

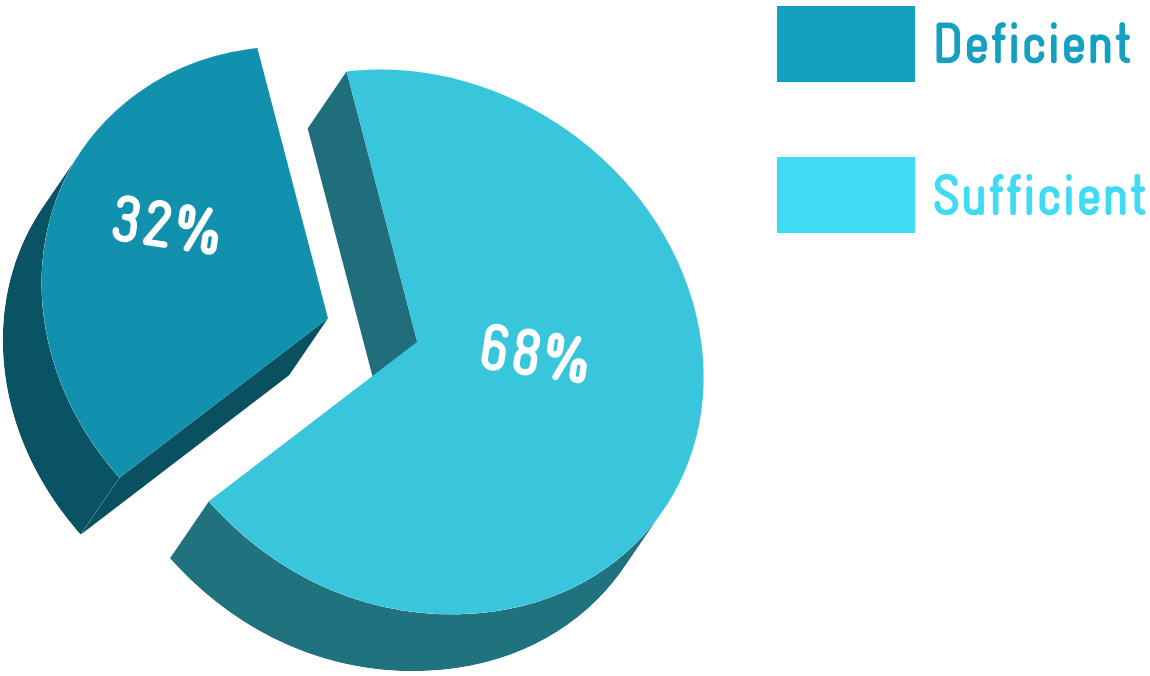


Figure 3.26 Status of soil micro nutrients

3.6.2.7 Physical parameters – pH status

With reference to the physical parameters, 58% of the soil is moderately alkaline in nature, 19% is neutral, 10% is moderately acidic, 7% is slightly acidic, 4% is highly acidic and 1% is strongly alkaline in nature as shown in Figure 3.23.

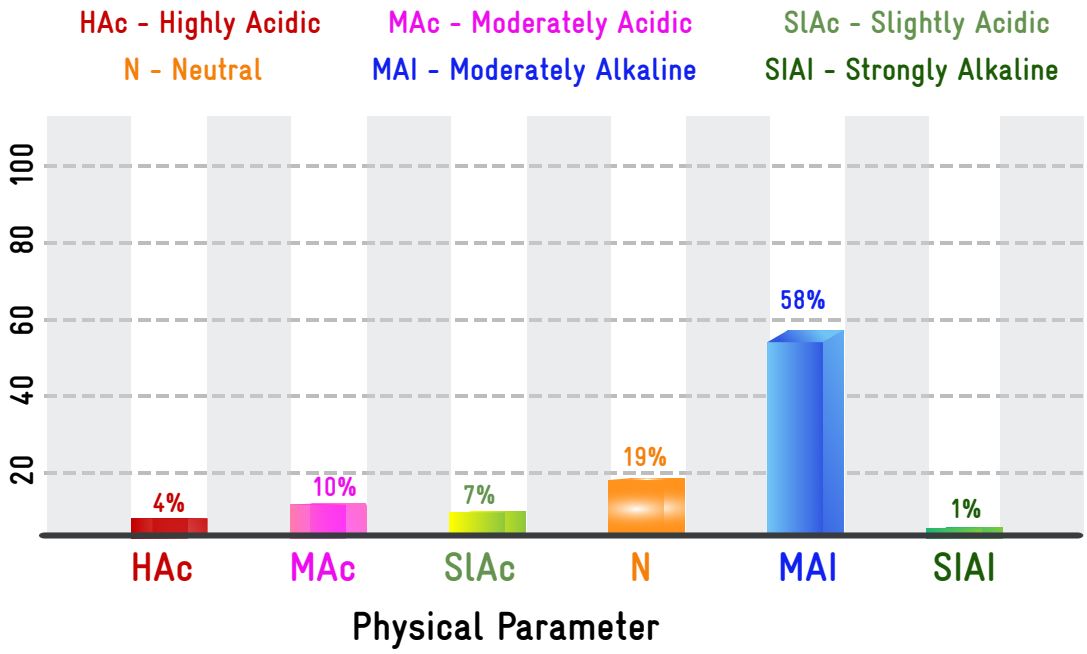


Figure 3.27. Status of pH of soil

3.6.2.8 Cropping pattern and the irrigation

A large area of this Block is cultivated under rain fed cultivation. Of the total area under cultivation, 63.2% is under rain fed cultivation and the remaining36.8% is under irrigated. Paddy is the primary cultivated crop both in irrigated and rain fed condition and accounts to about 59.4% of the total cultivation (Figure 3.24). Dry chilli is the second most cultivated crop (20%) under both irrigated and rain fed condition followed by jowar (3.7%), bajra (2.3%), groundnut (2%), coriander (1.9%), maize (1.7%) cotton (1.2%), coconut (1.2 %), other pulses (1.1%) and other crops in 0.9% of the total cultivated area.

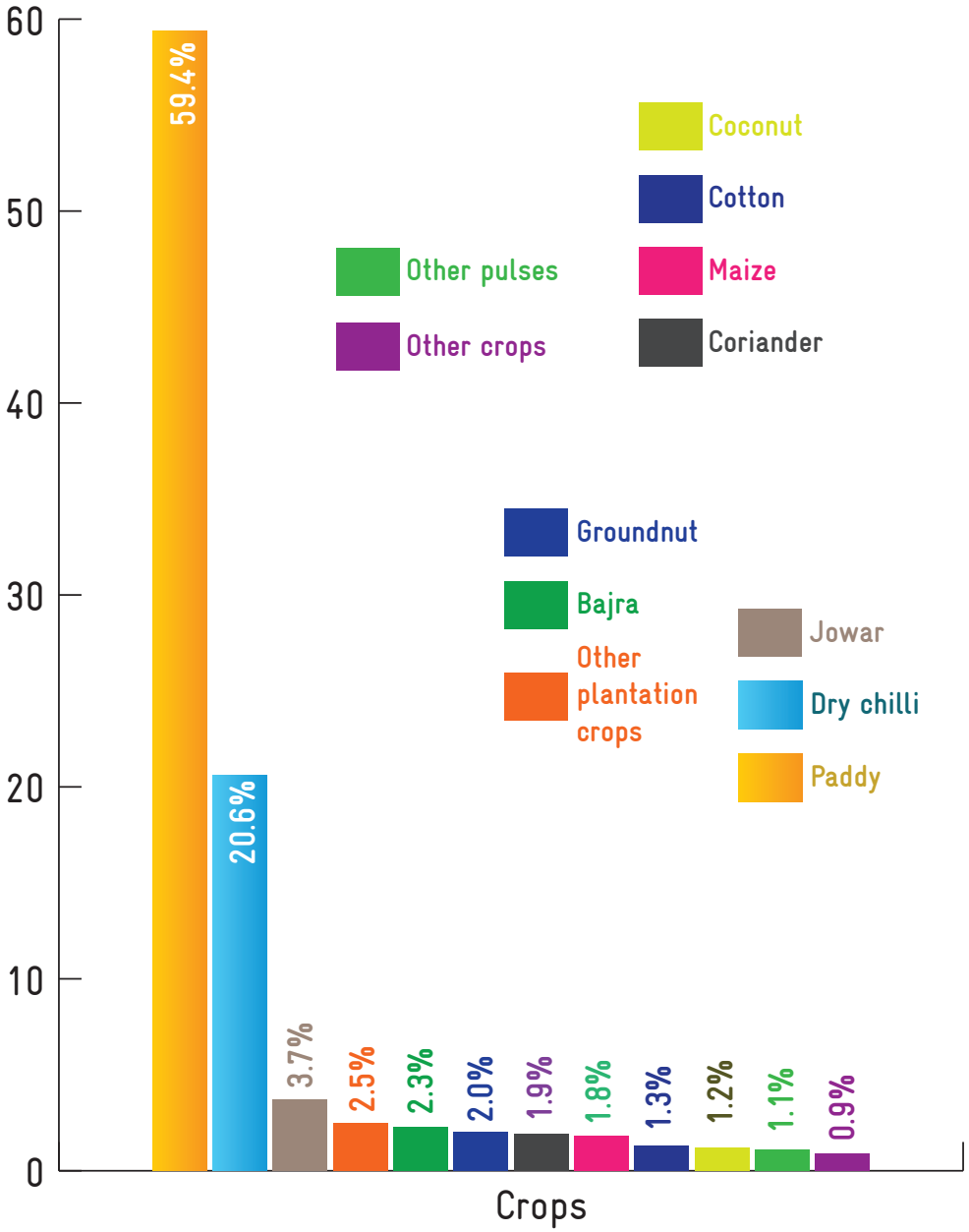


Figure 3.28 Cropping pattern

3.6.2.9 Irrigation Methods

In case of the surface water resources, the wild flooding is the primary method of irrigation. But in case of ground water resources, the predominant type of irrigation is controlled flooding. In the Block, 85% of the irrigation is done by wild flooding and only 11% of the irrigation is done by control flooding (Figure 3.25).-

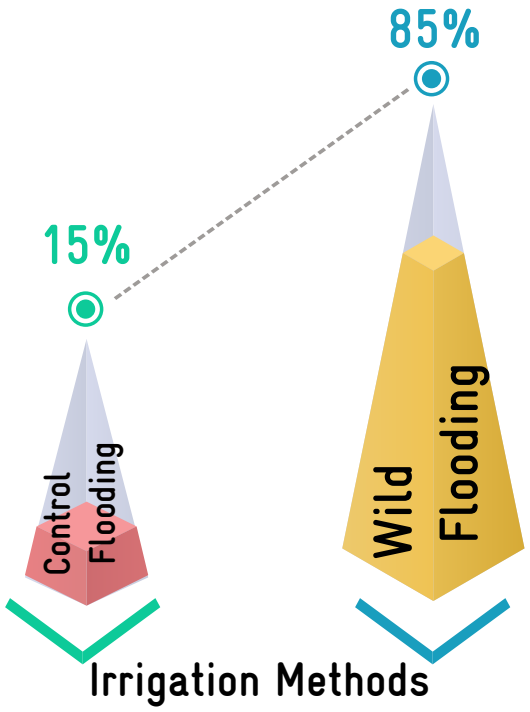


Figure 3.29 Irrigation methods

3.6.2.10 Means of Water Extraction

The water is extracted by two ways, one is by gravity and another is by lifting. The water is drawn from surface water sources such as tanks, ponds etc., by using gravity method and that of ground water sources such as open well, hand pump, bore well by using lifting method. In the Block, since the dependence on ground water sources are more, 60 % of the water extraction methods are under lifting means of extraction and 40% comes under gravity means of extraction (Fig 3.26).

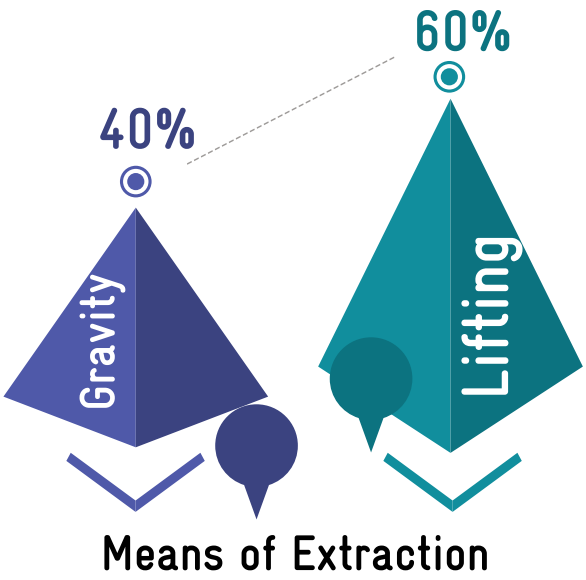


Figure 3.30 Means of water extraction

3.6.2.11 Livestock Details

This Block has considerable proportion of livestock resources of which sheep and poultry constitute major portion of livestock as 38% and 36 % followed by goat population (20%), while cattle population is low (7%) when compare to other livestock. (Figure 3.27). The total water requirement for livestock is 54.86 Ha-M. Of the total water demand, 45% is met through surface water and remaining 55% is met through surface water resources.

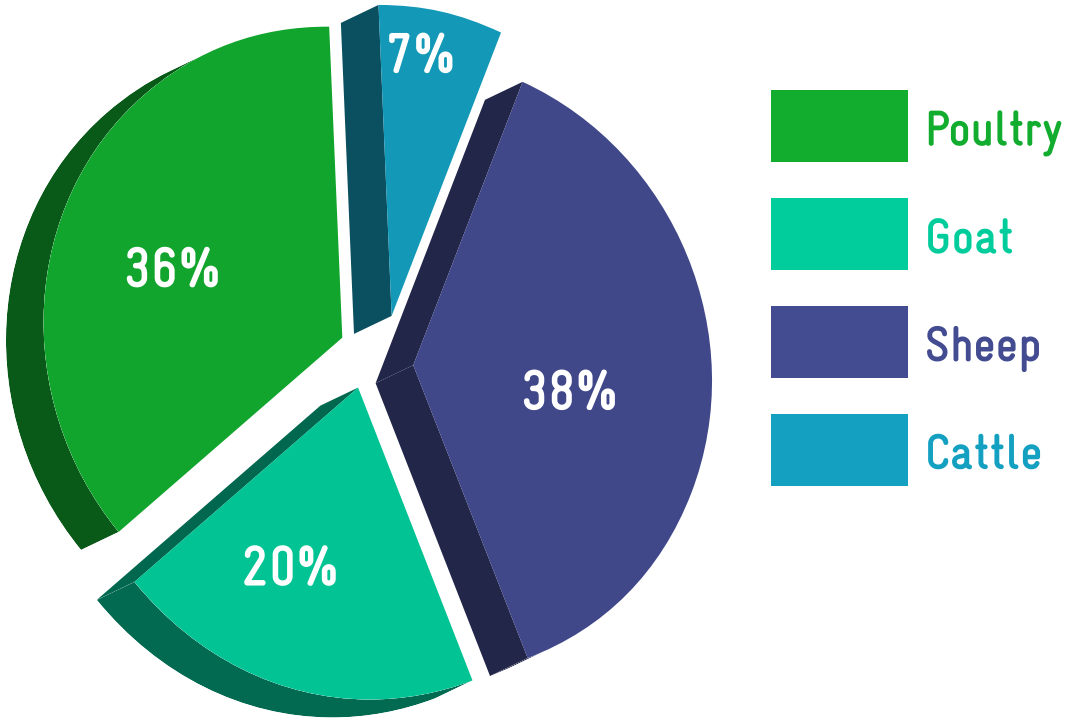


Figure 3.31 Livestock details

3.7 CWRM PLANNING ANALYSIS- SOCIO ECONOMIC

The demographic details such as population, gender, vulnerable population/households, MGNERGA job holders, drinking and grey water details are collected from authentic primary and secondary sources and analyzed. Table 8 lists demographic and socio economic status of Kadaladi Block. GP wise demographic and socio economic status are attached in Annexure 3.11.

TABLE 8. SOCIO ECONOMIC STATUS OF KADALADI BLOCK

S No	Key CWRM Parameter	Total
1	Geographical Area in ha	64,660
2	Male Population	96,598
3	Female Population	94,559
4	Total Population	1,84,946
5	SC Population	29,100
6	ST Population	9
7	Vulnerable population	29,109
8	Households (HH's)	44,543
9	Only one room HH's (SECC)	5,262

10	Female Headed HH's (SECC)	3,180
11	Vulnerable Households (SECC)	4,637
12	% of Vulnerable Households	10%
13	Registered Mahatma Gandhi NREGA Job cards	53,159
14	Active person working in Mahatma Gandhi NREGA job Cards	39,117
15	Drinking Water Sources	18,661
16	HH's have tap water connection for drinking water	27,572
17	HH's dependent on other sources for drinking water	24,347
18	Annual Greywater Generation in Ha-M	339

3.7.1 Population

The total population of this Block is 1.6 lakhs*, of which the proportion of women is slightly higher than men. In the CWRM planning process due attention is given for the intersecting variables such as gender, class, caste and marital status and availability of safe drinking water resources. In the Block, about 16% of the total population are under vulnerable category due to caste variable (Fig 3.28).

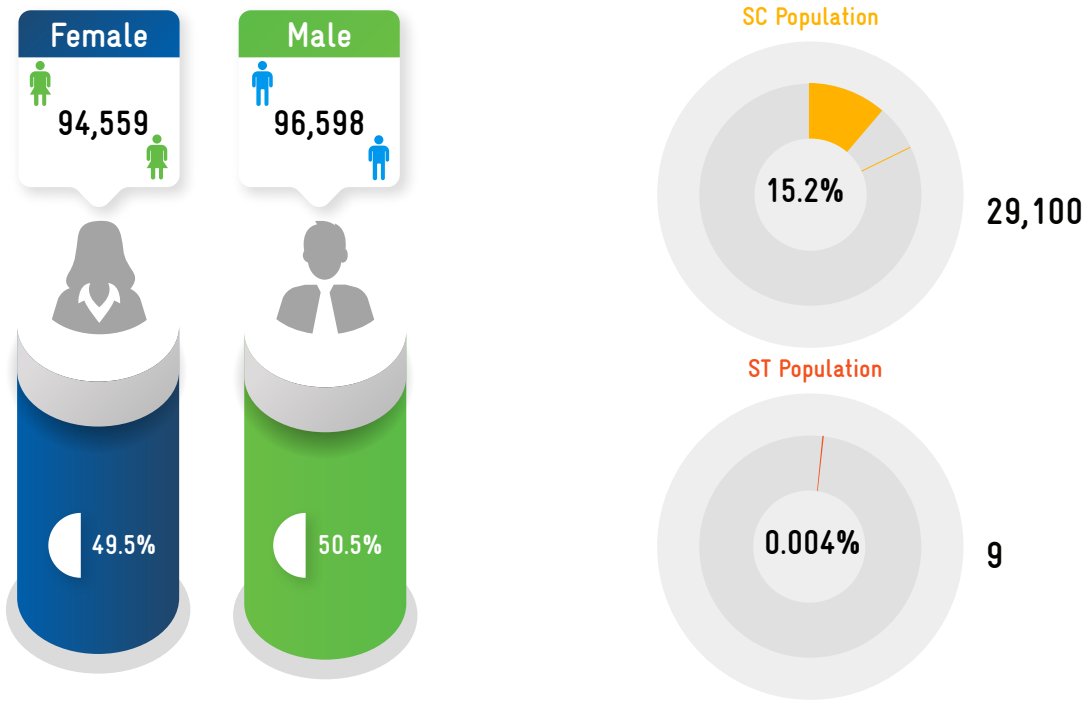


Figure 3.32 Population details

3.7.2 Households

There are a total of 44543 households in which 12% households have only one room. Around 7% households are headed by women and 10% are vulnerable households (Figure.3.29)

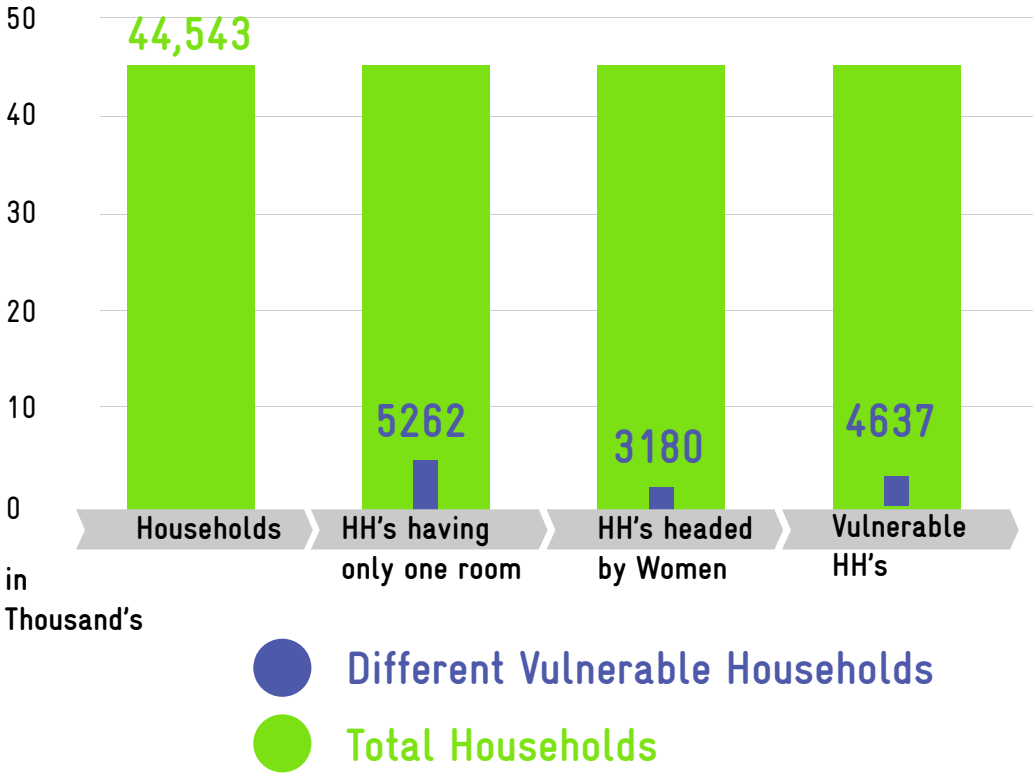


Figure 3.33 Details of Households

3.7.3 Status of Mahatma Gandhi NREGA - Job card status

In the Block of the total population of 1.6 lakhs, 53159 are registered for job cards in Mahatma Gandhi NREGA scheme. Among the registered job card holders, 74% of the job cards are in active category (Figure 3.30)

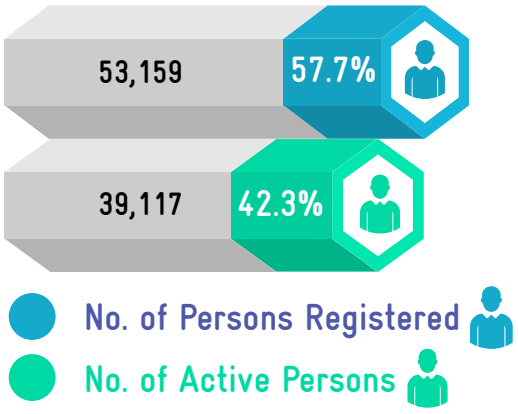


Figure 3.34 Status of MGNERGA job cards

3.7.4 Drinking Water Sources

About 27,572 households have tap water connection and 24,347 households depend on other sources. The other sources include RTRWHS / Tanka (Roof Rain Water Harvesting Systems, Hand pump, Open well, Bore well, Tank/ Pond/ Oorani, Springs and River/ Streams

Tap water connection

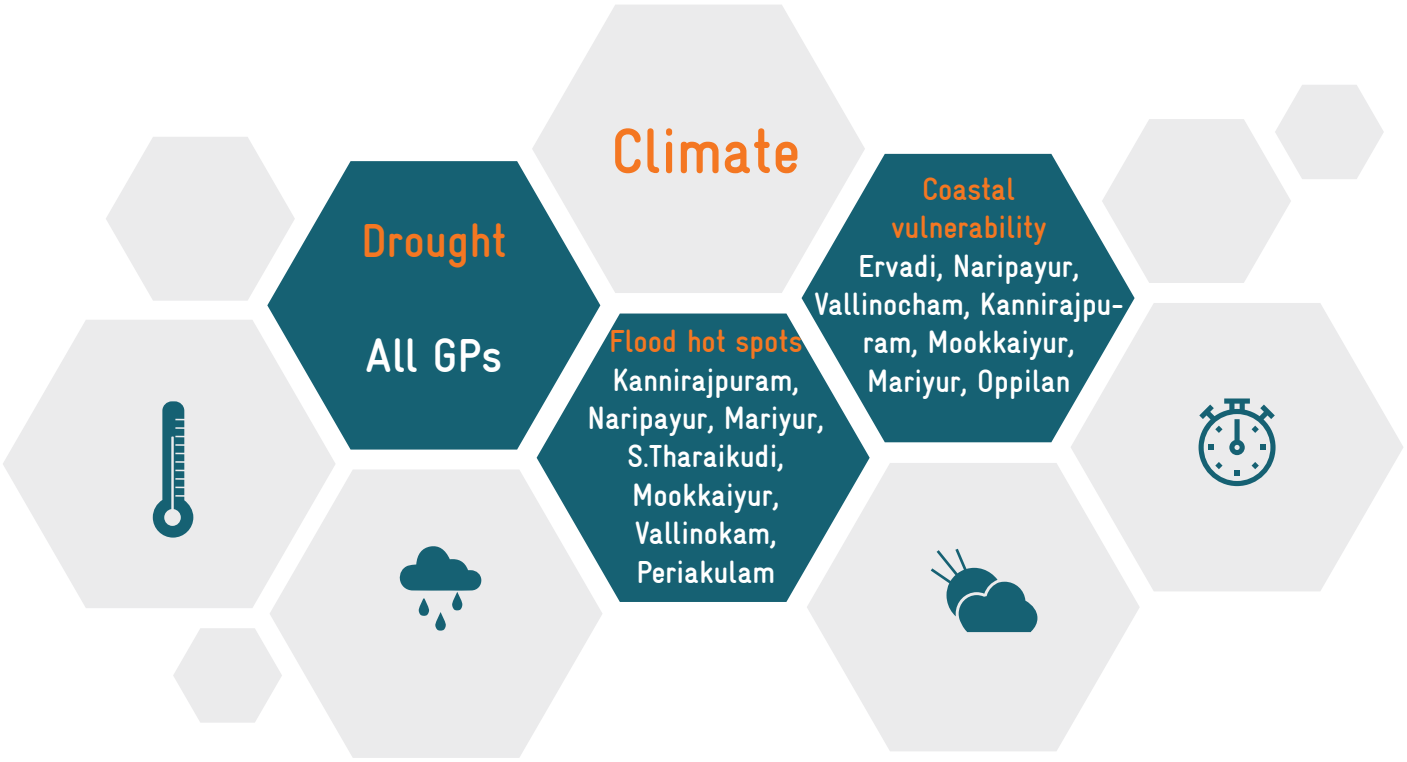
27,572 Households

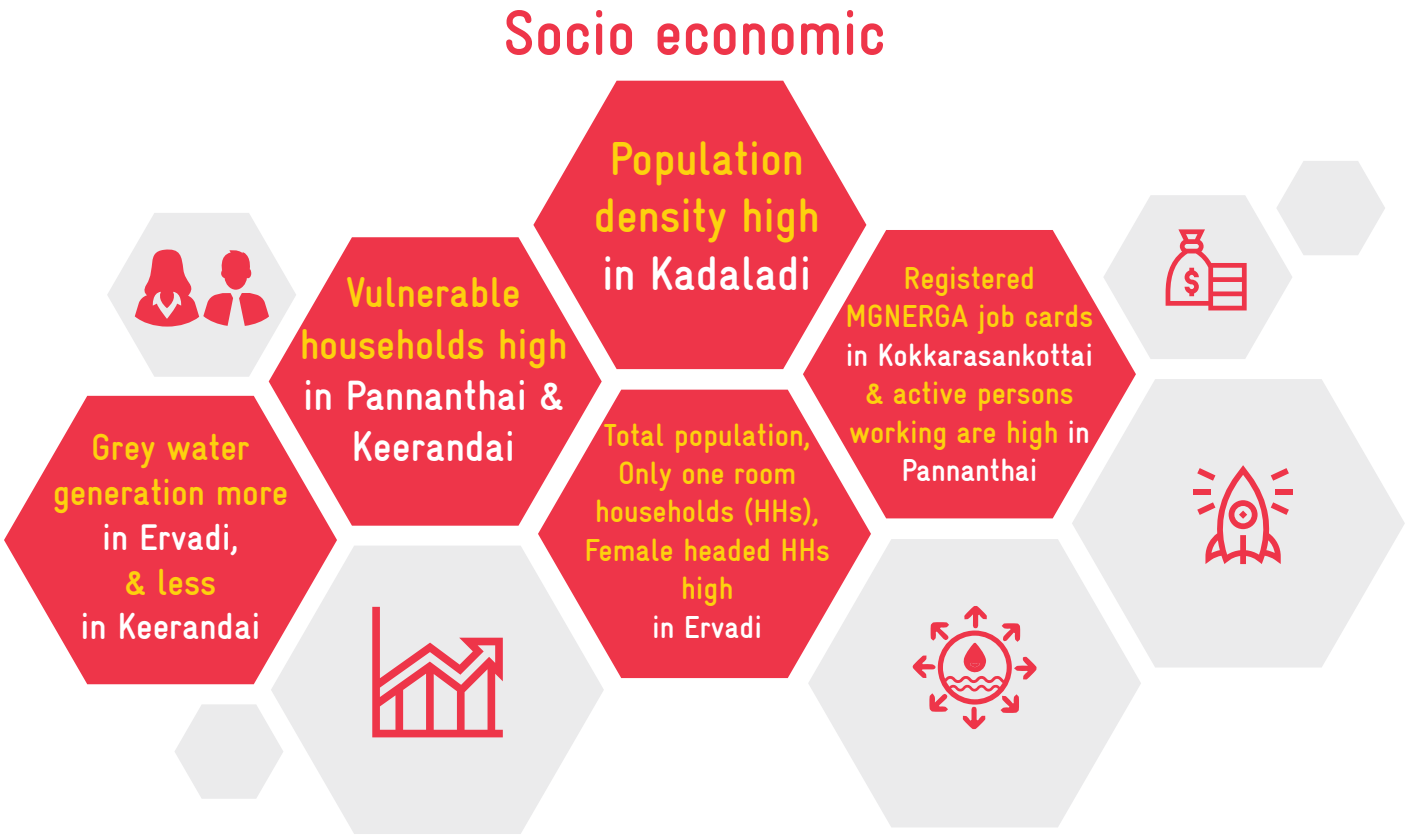
Other sources include RTRWHS / Tanka (Roof Rain Water Harvesting Systems, Hand pump, Open well, Bore well, Tank/ Pond/ Oorani, Springs and River/ Streams

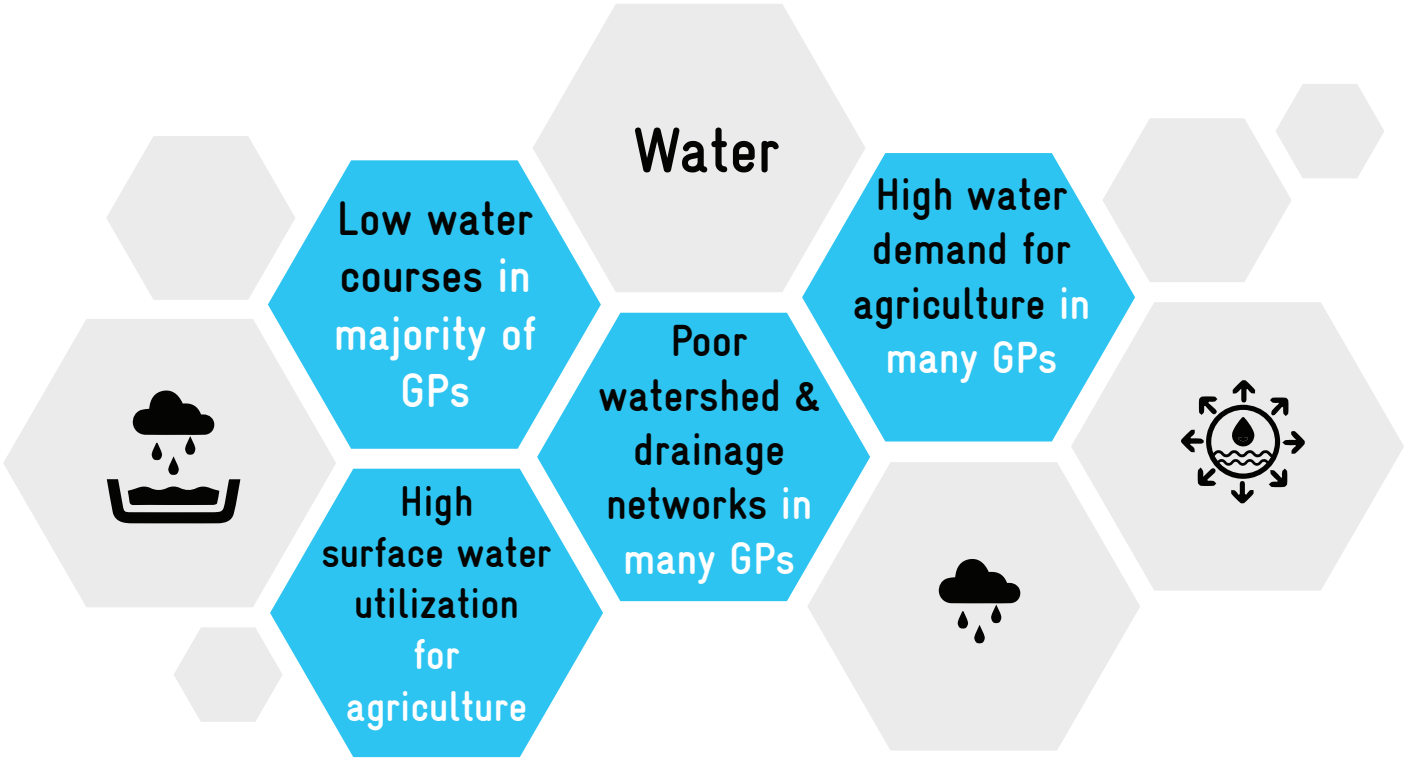
24,347 Households

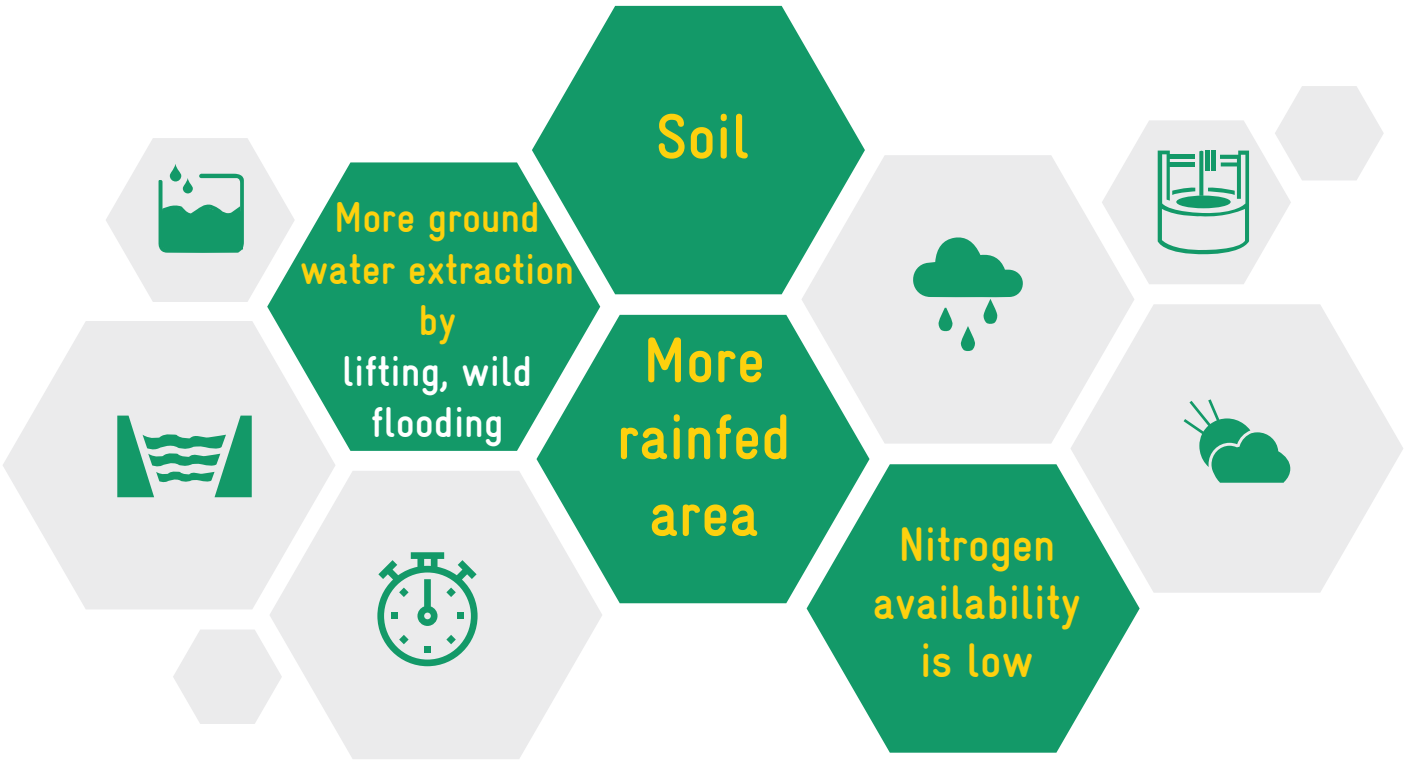
3.7.5 Annual Greywater Generation

The grey water generation estimated across this Block is 339 Ha-M which is available for reuse or recycle.


Climate
Drought
All GPs
Flood hot spots
Kannirajpuram, Naripayur, Mariyur, S.Tharaikudi, Mookkaiyur, Vallinokam, Periakulam
Coastal vulnerability
Ervadi, Naripayur, Vallinocham, Kannirajpu-ram, Mookkaiyur, Mariyur, Oppilan


Socio economic
Population density high in Kadaladi
Vulnerable households high in Pannanthai & Keerandai
Grey water generation more in Ervadi, & less in Keerandai
Total population, Only one room households (HHs), Female headed HHs high in Ervadi
Registered MGNERGA job cards in Kokkarasankottai & active persons working are high in Pannanthai


Water
Low water courses in majority of GPs
High water demand for agriculture in many GPs
Poor watershed & drainage networks in many GPs
High surface water utilization for agriculture


Soil
More ground water extraction by lifting, wild flooding
More rainfed area
Nitrogen availability is low

கெடுப்பதூஉம் கெட்டார்க்குச் சார்வாய்மற் றாங்கே
எடுப்பதூஉம் எல்லாம் மழை

குறள் - 15

Destruction it may sometimes pour
But only rain can life restore

Thirukkural - 15

CHAPTER 4

4 VULNERABILITY RANKING OF GP

The vulnerability assessment has been carried out using IPCC methodology. Intergovernmental panel on Climate Change (IPCC) defined Vulnerability as 'the propensity or predisposition to be adversely affected' (IPCC 2014). Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and the lack of capacity to cope and adapt. It is determined by sensitivity and adaptive capacity of the system (Figure 4.1).

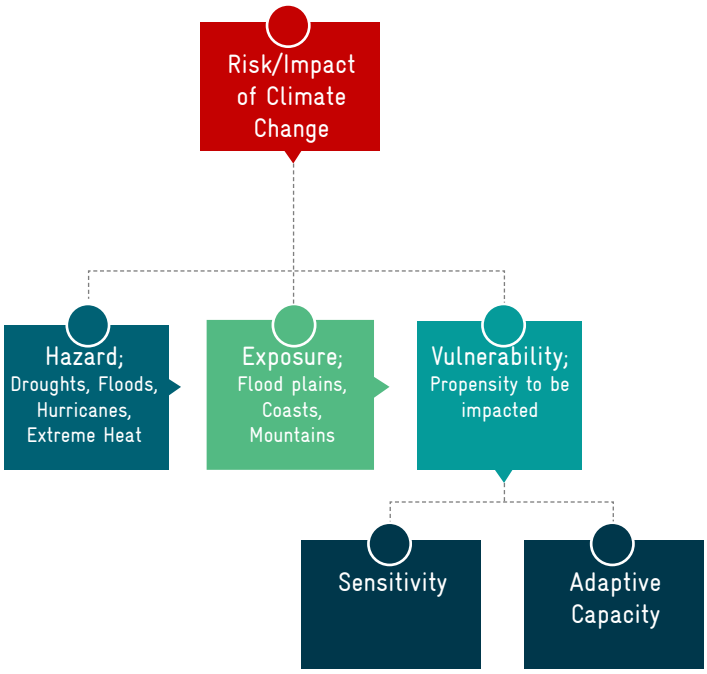


Figure 4.1 Vulnerability of the system as defined by IPCC

Generally, vulnerability assessments are made to identify

- current and potential hotspots
- entry points for intervention
- drivers of vulnerability
- priorities adaptation interventions

The CWRM parameters which has been explored through rigorous study were considered here to address the key water challenges at GP level. About 73 spatial and non-spatial parameters/ indicators under 4 dimensions via climate (3), water (28), agriculture (31) and socio-demographic (11) are categorized into adaptive capacity, sensitivity and exposure indicators for vulnerability analysis as per IPCC norms. Table 9 lists CWRM parameters/ indicators, its rationale to vulnerability, source of data and its linkage with WASCA TN's primary 18 indicators.

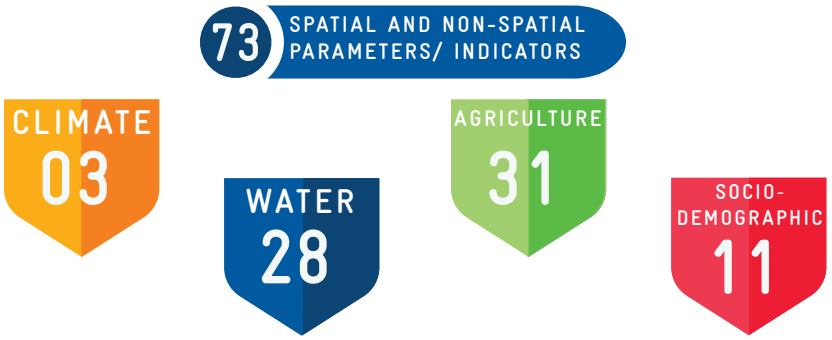


TABLE 9. CWRM PARAMETERS SELECTED FOR BLOCK LEVEL VULNERABILITY

	Key CWRM Parameter	Unit	Vulnerability component	Linked CVI	Source
Climate	Drought	Number	Sensitivity	C1, C2, C3,C5	SDMA, Govt. of Tamil Nadu
	Flood	Number	Sensitivity	C3,C4	SDMA, Govt. of Tamil Nadu
	Coastal vulnerable locations	Number	Sensitivity	C1, C2,	SDMA, Govt. of Tamil Nadu
Water	**Canal Network**				
	Length of Main Canal	meter	Adaptive Capacity	W3	Primary data - Block level officer/ GP level assistants
	Length of Minor Canal	meter	Adaptive Capacity	W3	Primary data - Block level officer/ GP level assistants
	Length of Distributaries	meter	Adaptive Capacity	W3	Primary data - Block level officer/ GP level assistants
	Water Courses (Field Channels)	meter	Adaptive Capacity	W3	Primary data - Block level officer/ GP level assistants
	Traditional water bodies				
	Number of Tanks (PWD & Union)	Number	Adaptive Capacity	W3, W2,S4	Primary data - Block level officer/ GP level assistants
	Number of Ooranis	Number	Adaptive Capacity	W3,W2, S3, S4, A3	Primary data - Block level officer/ GP level assistants
	Other Surface Water Bodies	Number	Adaptive Capacity	W3, W2, S4, S3, A2	Primary data - Block level officer/ GP level assistants
	Irrigation Facilities				
	Area under Tank Irrigation	ha	Sensitivity	W3,W5, A4,	Census 2011, Govt. of India
	Area under Canal Irrigation	ha	Sensitivity	W3, W5, A4	Census 2011, Govt. of India
	Area under Open & Tube Well Irrigation	ha	Sensitivity	W1, W2,	Census 2011, Govt. of India
	Catchment Area wise Available Runoff				
	Good Catchment Area	ha - M	Adaptive Capacity	C3, C4, C5,W2, W3	Calculated
	Average Catchment Area	Ha-M	Adaptive Capacity	C3, C4, C5, W2, W3	Calculated
	Bad Catchment Area	Ha-M	Sensitivity	C3, C4, C5, W2, W3	Calculated

Water	**Watershed and Drainage Networks**				
	Length of Natural Drainage Lines	meter	Adaptive Capacity	C4, W2	NRSC, WRIS
	Number of Natural Drainage Lines	Number	Adaptive Capacity	C4, W2	NRSC, WRIS
	Number of Micro-watersheds	Number	Adaptive Capacity	C3, W2,W3	NRSC, WRIS
	Water Demand				
	Water Demand for Humans	ha - M	Sensitivity	W4	Primary data Calculated
	Water Demand for Livestock	ha - M	Sensitivity	W4	Primary data Calculated
	Water Demand for Agriculture	ha - M	Sensitivity	W4	Primary data Calculated
	G.W Utilization for Drinking	%	Sensitivity	W1,W4	Primary data Calculated
	G.W Utilization for Livestock	%	Sensitivity	W1,W4	Primary data Calculated
	G.W Utilization for Agriculture	%	Sensitivity	W1,W4	Primary data Calculated
	S.W Utilization for Drinking	%	Sensitivity	W3,W4	Primary data Calculated
	S.W Utilization for Livestock	%	Sensitivity	W3,W4	Primary data Calculated
	S.W Utilization for Agriculture	%	Sensitivity	W3, W4	Primary data Calculated
	Water Quality Index	Index	Sensitivity	W5	Primary data - calculated
	Salinity Index	Index	Sensitivity	W5	Primary data - calculated
	Sea water Mixing Index	Index	Sensitivity	W5	Primary data - calculated
Agriculture	**Land Resources**				
	Area under Forest land	ha	Adaptive Capacity	C1,C2, C3, C4,C5,W3	Census 2011, Govt. of India
	Area under Non-Agricultural Uses	ha	Adaptive Capacity	C1,C2, C3, C4,C5,W3	Census 2011, Govt. of India
	Area under Barren & Un-cultivable Land	ha	Adaptive Capacity	C1,C2, C3, C4,C5,W3	Census 2011, Govt. of India
	Area under Permanent Pastures and Other Grazing Land	ha	Adaptive Capacity	C1,C2, C3, C4,C5,W3	Census 2011, Govt. of India
	Area under Land Under Miscellaneous Tree Crops etc.	ha	Adaptive Capacity	C1,C2, C3, C4,C5,W3	Census 2011, Govt. of India
	Area under Cultivable Waste Land	ha	Adaptive Capacity	C1,C2, C3, C4,C5,W3,W2	Census 2011, Govt. of India
	Area under Fallows Land other than Current Fallows	ha	Sensitivity	W1,W3,W4,A2	Census 2011, Govt. of India
	Area under Current Fallow land	ha	Sensitivity	W1,W3,W4,A2	Census 2011, Govt. of India
	Area under Unirrigated Land	ha	Sensitivity	A2	Census 2011, Govt. of India

Agriculture	Area Irrigated by Source	ha	Sensitivity	A2	Census 2011, Govt. of India
	Catchment Area				
	Land under Good Catchment	ha	Adaptive Capacity	C3,W2, W3	addition of first 3 land classes
	Land under Average Catchment	ha	Adaptive Capacity	C3,W2, W3	addition of next 3 land classes
	Land under Bad Catchment	ha	Sensitivity	C3,W2, W3	addition of last 4 land classes
	Crop Details				
	Irrigated Area	ha	Sensitivity	A2,W1,W3	Primary data
	Rain fed area	ha	Sensitivity	A1, C3, C4, C5	Primary data
	Area under Paddy Cultivation	ha	Sensitivity	A2, W1, W3	Primary data
	Soil Resources: Status of Available Nitrogen				
	Very Low to Low	%	Sensitivity	C1,C2,A2,A3	Soil health portal, Ministry of Agriculture &Farmers Welfare, Govt. of India
	Medium to high	%	Adaptive capacity	C1,C2,A2,A3	Soil health portal, Ministry of Agriculture &Farmers Welfare, Govt. of India
	Status of Organic Carbon				
	Very Low to Low	%	Sensitivity	A2, A3	Soil health portal, Ministry of Agriculture &Farmers Welfare, Govt. of India
	Medium to high	%	Adaptive capacity	A2, A3	Soil health portal, Ministry of Agriculture &Farmers Welfare, Govt. of India
	Status of Soil Micro Nutrients				
	Deficient	%	Sensitivity	A2, A3	Soil health portal, Ministry of Agriculture &Farmers Welfare, Govt. of India
	Status of Physical condition of the soil				
	Moderately Acidic	%	Sensitivity	A2	Soil health portal, Ministry of Agriculture &Farmers Welfare, Govt. of India
	Slightly Acidic	%	Adaptive capacity	A2	Soil health portal, Ministry of Agriculture &Farmers Welfare, Govt. of India

	Neutral	%	Adaptive capacity	A2	Soil health portal, Ministry of Agriculture &Farmers Welfare, Govt. of India
	Moderately Alkaline	%	Adaptive capacity	A2	Soil health portal, Ministry of Agriculture &Farmers Welfare, Govt. of India
	Strongly Alkaline (SIAI)	%	Sensitivity	A2	Soil health portal, Ministry of Agriculture &Farmers Welfare, Govt. of India
	Soil Texture				
	% of Clay Soil	%	Sensitivity	C3, W3,A3,S4	NRSC, WRIS
	% of Fine Soil	%	Adaptive Capacity	C3, W3,A3,S4	NRSC, WRIS
	% of Coarse loamy	%	Adaptive Capacity	C3, W3,A3,S4	NRSC, WRIS
	Soil Water Permeability	Low, Moderate, high	Adaptive Capacity	C3, W3,A3,S4	Standard table
	Soil moisture and ET				
	Estimated Soil Moisture	ha - M	Adaptive Capacity	A3, C1, C2, C3, C4, C5	Calculated
	ET Losses	ha - M	Sensitivity	A4, C1, C2, C3	Calculated
Agriculture	**Means of Water Extraction**				
	Gravity	%	Sensitivity	W1, W3	Calculated
	Lifting	%	Sensitivity	W2	Calculated
	Irrigation Methods				
	Wild Flooding	%	Sensitivity	W4, A3	Calculated
	Control Flooding	%	Adaptive capacity	W4	Calculated
	Livestock				
	Cattle Population	Number	Sensitivity	S2, S4	Farmers portal, Ministry of Ag-riculture &Farmers Welfare, Govt. In-dia
	Sheep Population	Number	Sensitivity	A1,S2, S4	Farmers portal, Ministry of Ag-riculture &Farmers Welfare, Govt. In-dia
	Poultry	Number	Sensitivity	A1, S2, S4	Farmers portal, Ministry of Ag-riculture &Farmers Welfare, Govt. In-dia
	Goat Population	Number	Sensitivity	A1, S2, S4	Farmers portal, Ministry of Ag-riculture &Farmers Welfare, Govt. In-dia

Socio economic	**Demographic**				
	Population density	ha	Sensitivity	S1	Census 2011, Govt. of India
	Female Proportion	Number	Sensitivity	SI	Census 2011, Govt. of India
	Vulnerable Population proportion (SC/ST)	Number	Sensitivity	S1, S2	Census 2011, Govt. of India
	Economic				
	% of Only one room HH's	Number	Sensitivity	S2	SECC 2011 , Govt. of India
	% of Female Headed HH's	Number	Sensitivity	S2	SECC 2011 , Govt. of India
	% of Vulnerable House-holds	%	Sensitivity	S2	SECC 2011 , Govt. of India
	MGNERGA				
	% Registered Mahatma Gandhi NREGA Job cards to the total population	Persons	Adaptive capacity	S2	MGNREGA portal
	% Active person working in Mahatma Gandhi NREGA job Cards to the registered job cards	Persons	Adaptive capacity	S2	MGNREGA portal
	Water accessibility				
	Drinking Water Sources	Number	Adaptive ca-pacity	S3	Primary data - Block level officer/ GP level assistants
	HH's have tap water connection for drinking water	Number	Adaptive ca-pacity	S3	Primary data - Block level officer/ GP level assistants
	HH's dependent on other sources for drinking water	Number	Sensitivity	S3	Primary data - Block level officer/ GP level assistants
	Annual Greywater Generation	ha - M	Sensitivity	S2, S3	Calculated

The identified indicators are from different sources and measured in different units. As the vulnerability assessment is about ranking, the indicators have to be in common units. This is done through normalization. The normalized indicators are aggregated and categorized to different vulnerability level. The methodology vulnerability assessment is given in Annexure 4. The vulnerable GPs are ranked based on vulnerability scores. Ervadi, Pannanthai, Naripayur and P. Keerandai GPs have very high vulnerability to climate risks (Figure 4.2).

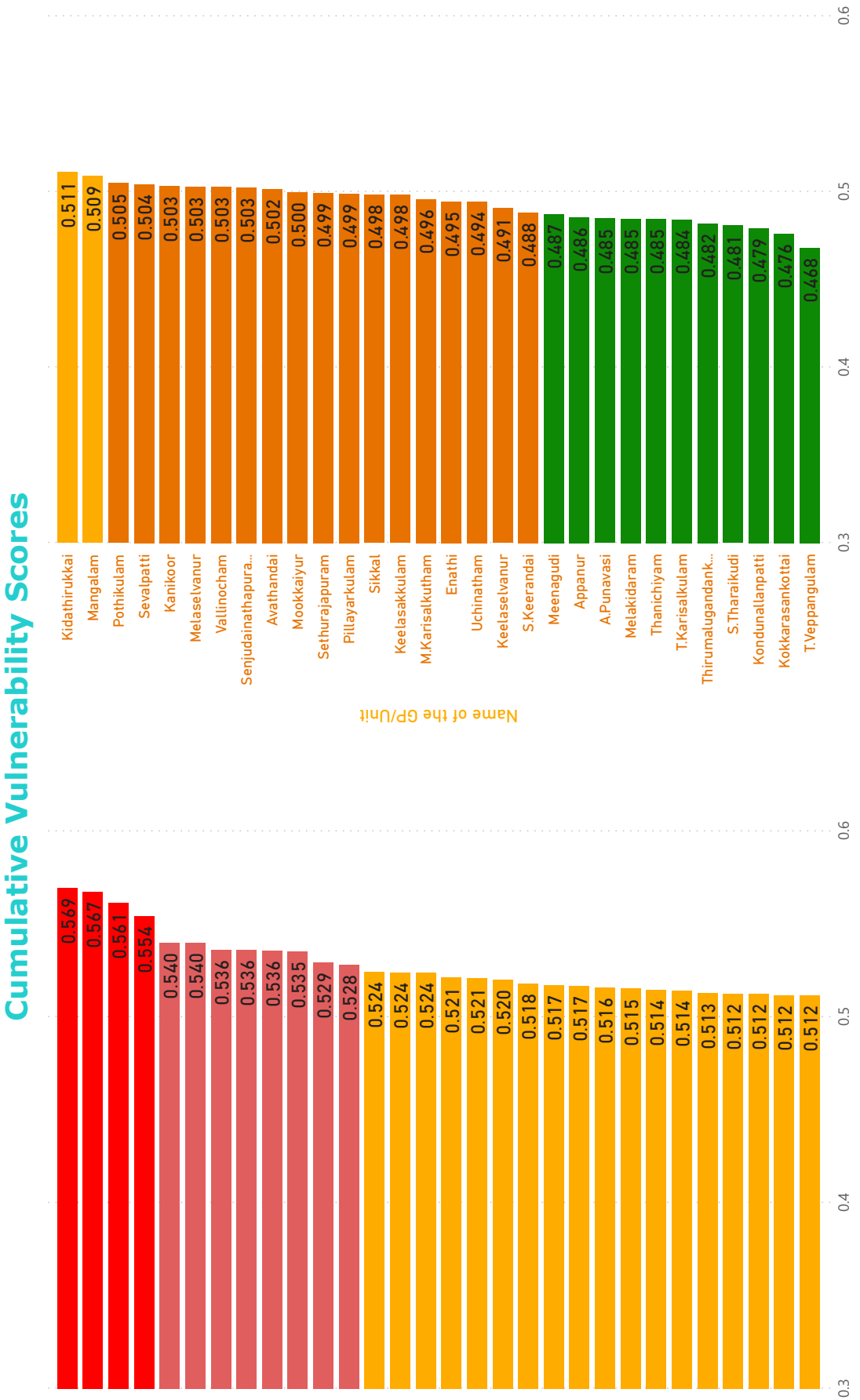


Figure 4.2 - Final cumulative vulnerability scores

Sectoral vulnerability

The vulnerability indices were calculated with climate risks, water resource, agriculture and socio economic dimensions and are shown in Figure 4.3 and tabulated in Table 10 to identify area wise vulnerable GPs.

Climate risks vulnerability

The climate risk vulnerability index shows that all villages in this Block are by affected droughts in last decades. While 7 locations have coastal vulnerability and flood vulnerability. On the whole Naripayur, Vallinocham GPs have very high climate vulnerability followed by Kannirajpuram, Mookkaiyur, Mariyur GPs.

NARIPAYUR
VALLINOCHAM
KANNIRAJPURAM
MOOKKAIYUR
MARIYUR

Water resource vulnerability

The water resources vulnerability index shows that
GP has very high water resource vulnerability followed by Ervadi, Ilanchembur, Peikulam, Keelachirupothu, Panivasal, Mangalam. Sokkanai and Siraikulam GPs

ERVADI
ILANCHEMBUR
PEIKULAM
KEELACHIRUPOTHU
PANIVASAL
MANGALAM
SOKKANAI
SIRAIKULAM

Agriculture resources vulnerability

In agriculture and allied sectors, Sethurajapuram and Pannanthai shows very high vulnerability followed by Naripayur, Kelakidaram, Ilanchembur, Kandilan, Kidathirukkai, Kannirajpuram, Periakulam GPs

SETHURAJAPURAM
PANNANTHAI
NARIPAYUR
KELAKIDARAM
ILANCHEMBUR
KANDILAN
KIDATHIRUKKAI
KANNIRAJPURAM
PEIKULAM

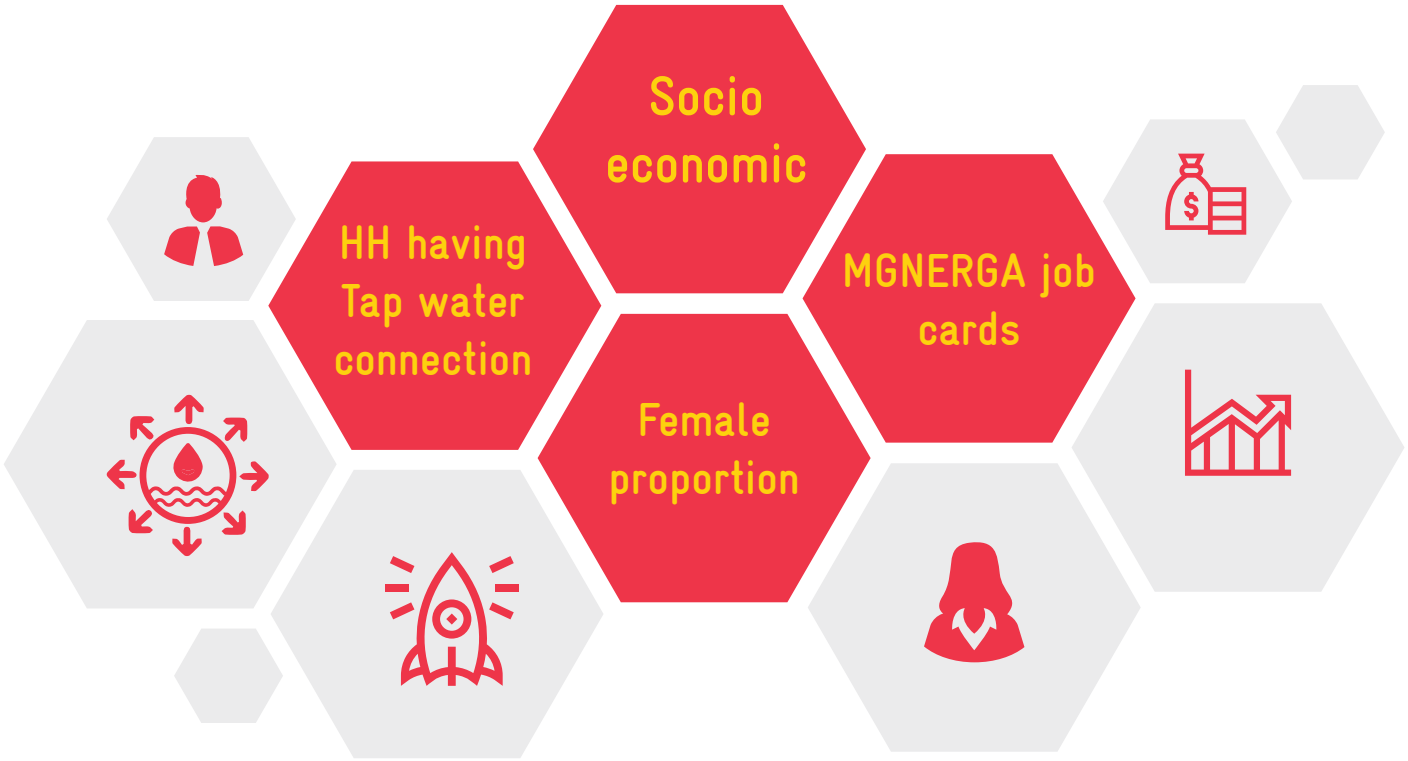
Socio-economic vulnerability

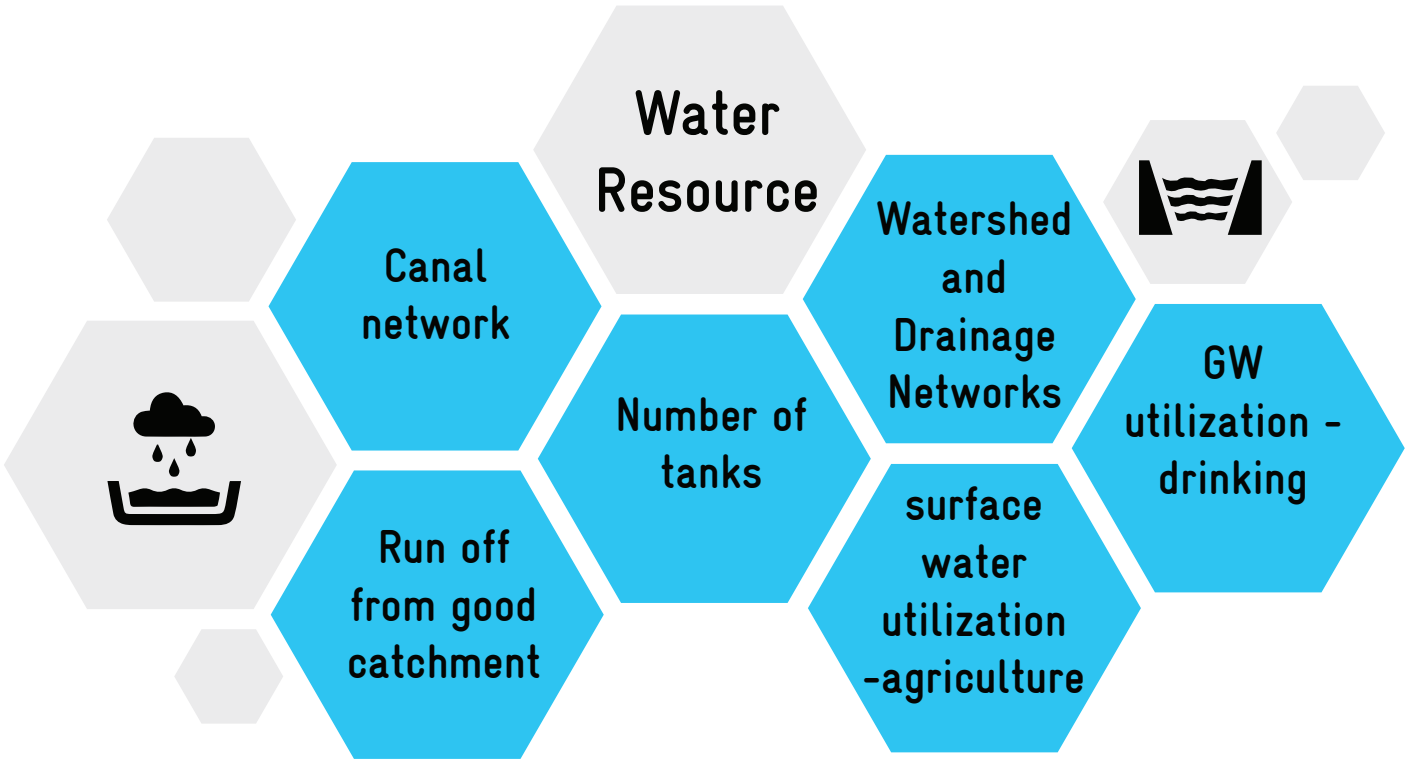
Pannanthai GP has very high socio economic vulnerability followed by P.Keerandai, Mariyur, Ervadi, Idambadai, Melaselvanur and Melachirupodhu GPs

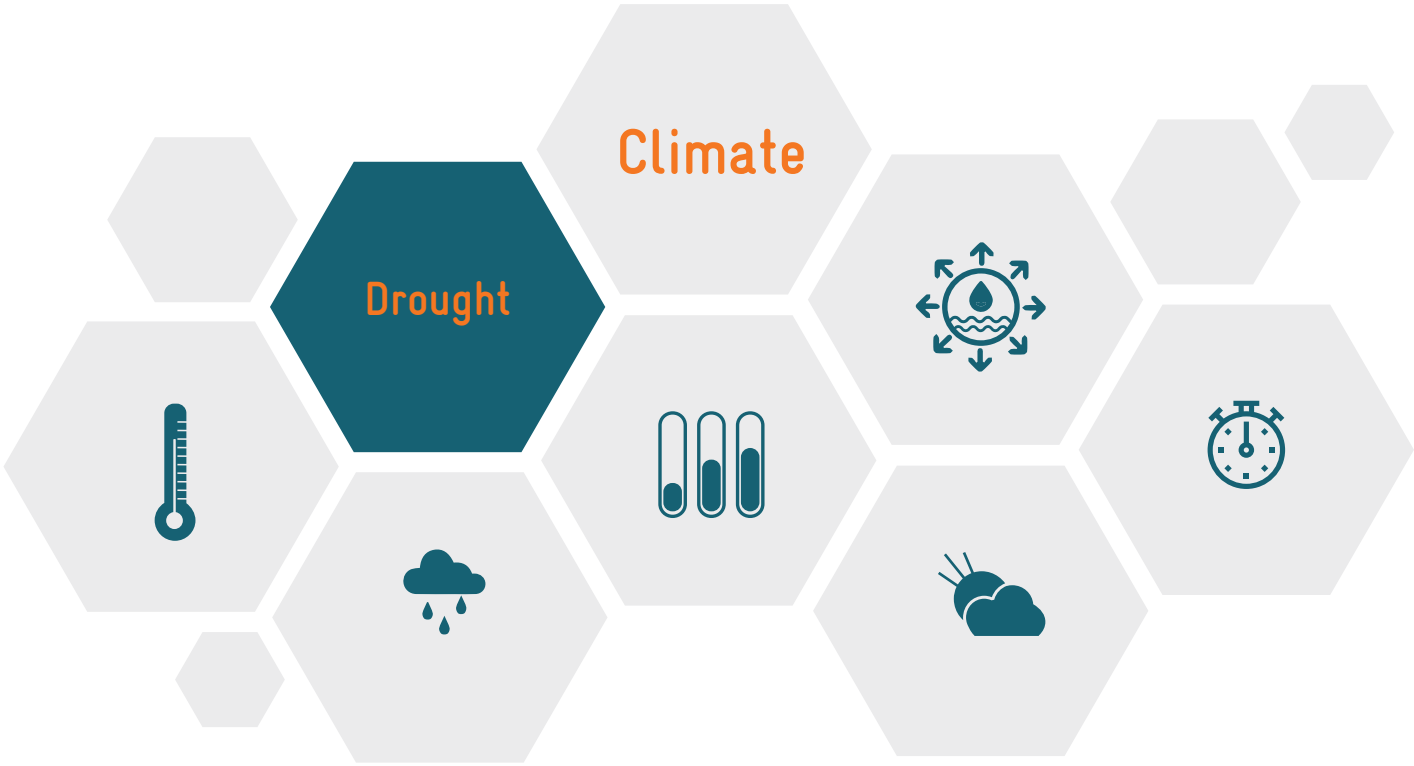
PANNANTHAI
P.KEERANDAI
MARIYUR
ERVADI
IDAMBADAI
MELASELVANUR
MELACHIRUPODHU

Figure 4.3 GP wise vulnerability Scores

Contributing indicators to the total vulnerability







Based on the vulnerability assessment, high attention has been provided to identify more shelf of works/actions in the resource management in order to reduce the vulnerability and increase its adaptive capacity towards climate change

விசும்பின் துளிவீழின் அல்லால்மற் றாங்கே
பசும்புல் தலைகாண்பு அரிது

குறள் - 16

No grassy blade its head will rear
If from the cloud no drop appear

Thirukkural - 16

CHAPTER 5

KEY WATER ACTIONS UNDER MAHATMA GANDHI NREGS, CONVERGENCE

5 KEY WATER ACTIONS UNDER MAHATMA GANDHI NREGS, CONVERGENCE

After identifying the key water issues at GP level through vulnerability analysis, the area for key water action treatments are proposed. The comprehensive and holistic understanding of the key water challenges adopting the eco-system approach enable to identify water action works in public and common land (afforestation, soil and water conservation, improving the traditional water storage and catchment assets etc.,), agriculture and allied sector (farm ponds, artificial recharge structures, on-farm plantation, irrigation methods, livestock - fodder development etc.,) and rural infrastructure (on safe drinking water and efficient handling of grey water). Out of 68110 ha available land in Kadaladi Block, 12819.24 ha (18.8%) area is proposed for treatment under WASCA TN– CWRM planning. Major portion of key water actions area proposed is in the area under common and public uses. A smaller amount land under individual ownership is also proposed for significant pilot treatments. The detailed land wise proposal for WASCA treatments is given in the Table 11. GP wise proposed area for treatment is also attached in Annexure 5.1. All works proposed GP wise based on watershed and livelihood approach are in Annexure 5.3.

TABLE 10. PROPOSED AREA FOR WASCA TREATMENT

Land Use	WASCA proposed Treatment Area (ha)	Total available land (ha)
Forest Land	1,144.26	2,874.40
Non-Agricultural Uses	1,171.33	13,534.03
Barren & Un-cultivable Land	0.00	0.00
Permanent Pastures and Other Grazing Land	6.66	7.84
Land under miscellaneous tree, crops etc.	4,850.30	5,706.51
Cultivable Waste Land	883.38	1,039.25
Fallows Land other than Current Fallows	9,87.68	10,190.05
Current Fallow land	292.40	2,356.92
Unirrigated Land	2,568.35	23,396.50
Irrigated by Source	914.89	9,004.55

Almost 85 % of each area under cultivable waste land, permanent pastures and other grazing lands and land under miscellaneous tree crops are prioritized for treatment followed by 40% area under forest land. Nearly 12% of the current fallow land, 11% of unirrigated land, 10% of the area under irrigated by source and fallow land other than current fallows and 9% of area under non agriculture uses are recommended for treatment. (Figure 5.1).

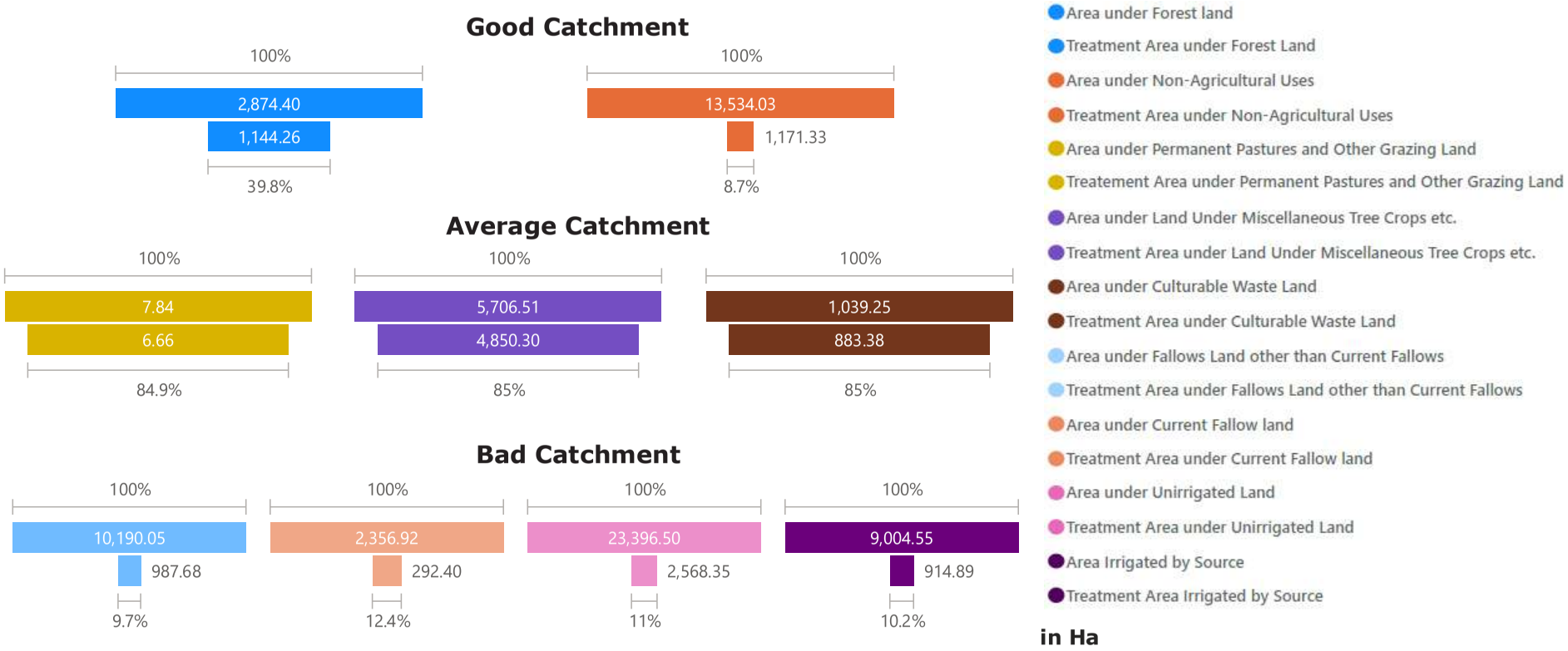


Figure 5.1 % of area under WASCA treatment

Expected Runoff Conservation after WASCA treatment

The productive developmental activities are designated as key water actions in WASCA proposed area. With the above proposed treatment area, the expected runoff harvested due to WASCA intervention would be around 3324.07 Ha-M which is 33.43 % of the total runoff. Of the expected runoff conservation, 43.79% comes from good catchment area, 26.25% comes under average catchment area and 29.96% comes under bad catchment area.

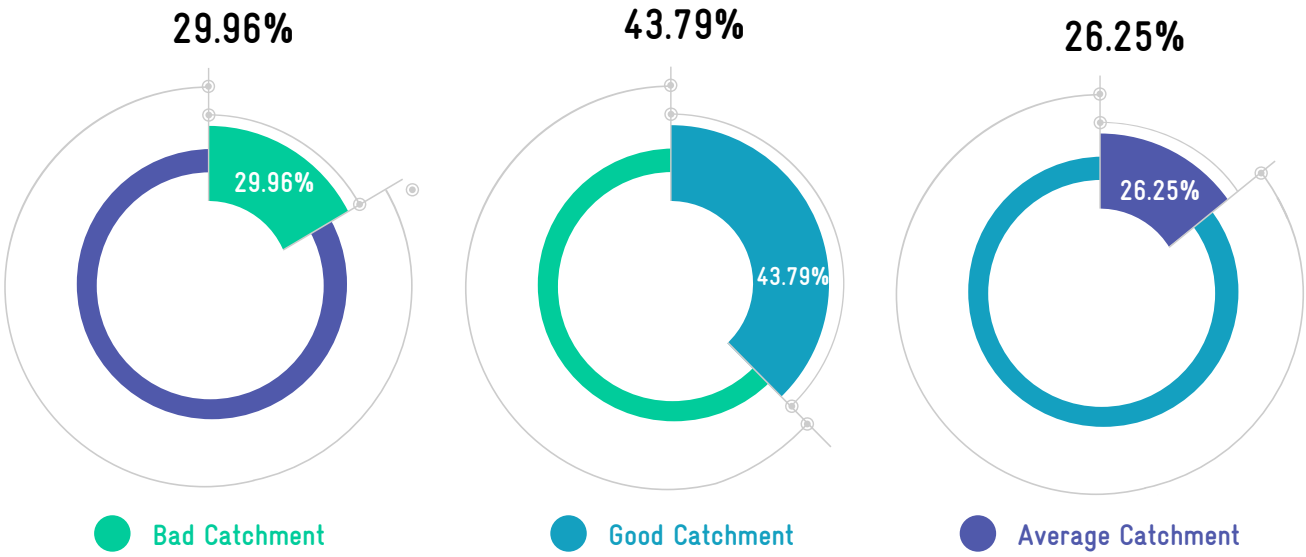


Figure 5.2 Expected conservation after WASCA treatmentv

The GP wise expected runoff conservation after completion of WASCA treatment is shown in Figure 5.3 (Annexure 5.2)

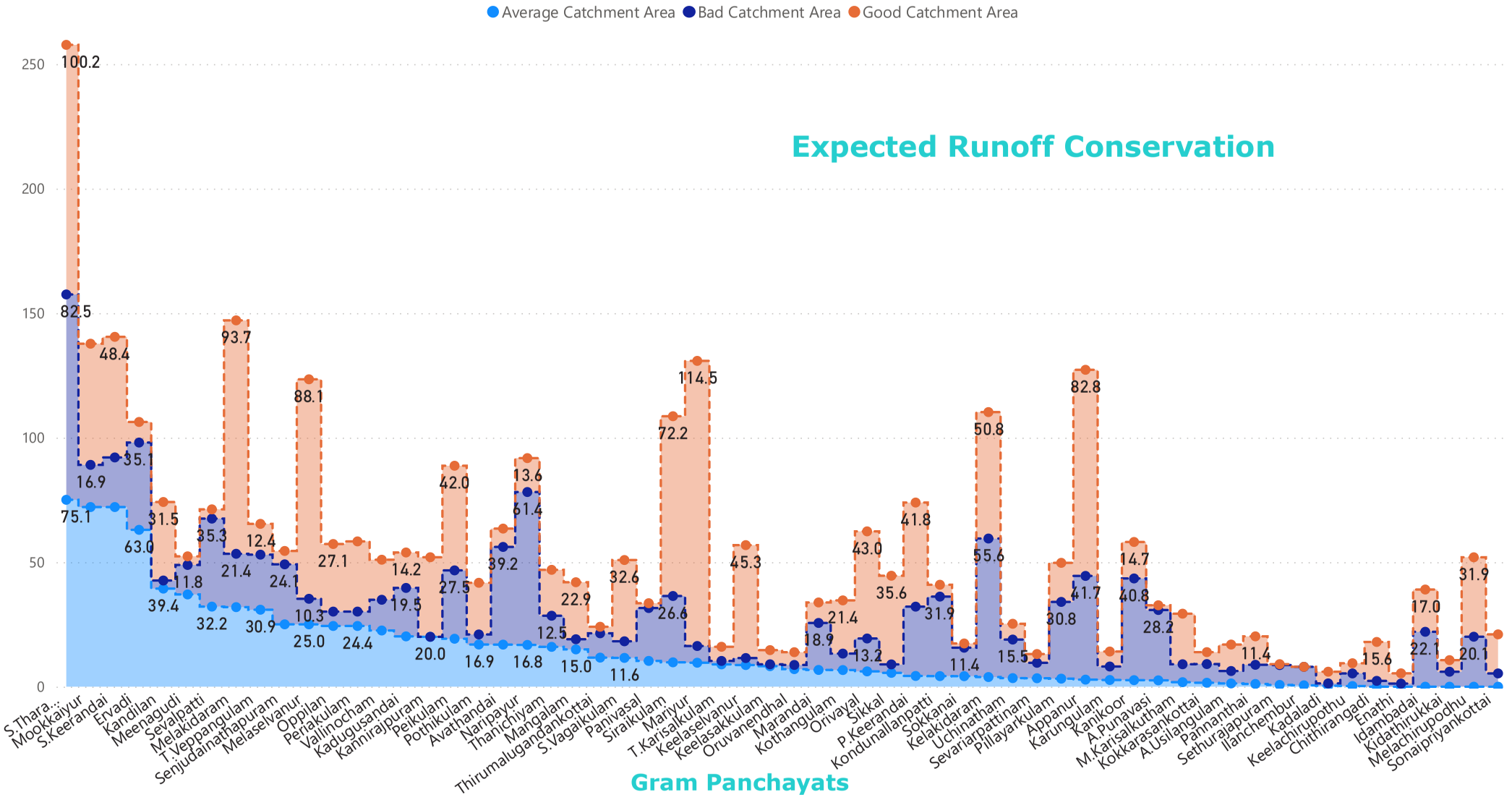


Figure 5.3 Expected GP wise runoff conservation after WASCA treatment

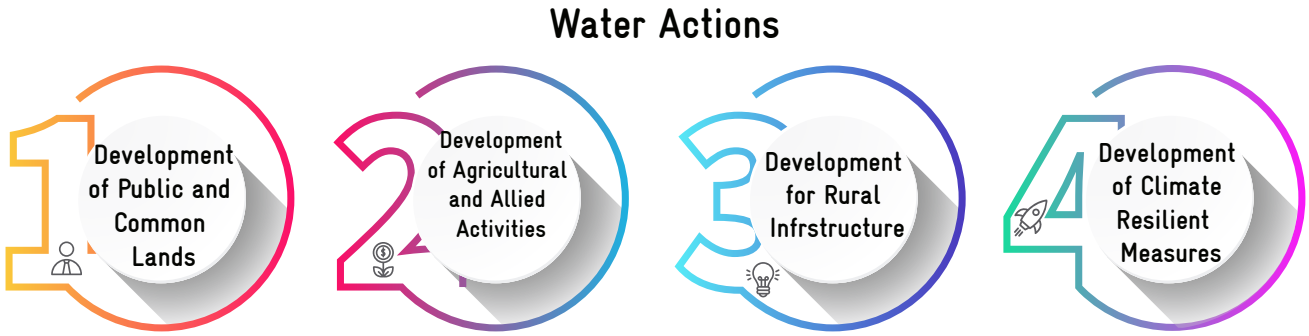
Mahatma Gandhi NREGS Annual circular 2020-21 (Clause 6.3)

Planning and design of works under Mahatma Gandhi NREGS should take into account, impacts of climate change in order to ensure resilience of vulnerable rural communities and make the benefits sustainable in the long run. Specifically, the following things should be ensured:

I. Historical and projected climate change data, especially incidence of droughts and floods, along with vulnerability assessment at the district, Block or gram panchayat level should be used in the planning and design of Mahatma Gandhi NREGS works

II. Different kinds of complementary Natural Resource Management (NRM) works such as land development with plantation on the bunds, farm ponds, and compost pits should be combined, in order to ensure durability of assets and resilience of communities that depend on such assets.

The key water actions proposed under 4 categories through Mahatma Gandhi NREGS convergence of considering its models under Right to Plan and Prepare a Shelf of Projects (Clause 6) are



5.1 DEVELOPMENT OF PUBLIC & COMMON LANDS

The effective water augmentation measures that are proposed in public and common lands via massive tree plantation, restoration of water bodies etc., are listed in Table 12.

DEVELOPMENT OF PUBLIC AND COMMON LANDS

TABLE 11. DETAILS OF WORK PROPOSED TO DEVELOP PUBLIC AND COMMON LANDS

	NO. OF WORKS	PERSON DAYS PER UNIT	UNIT COST IN INR (LAKHS)	ESTIMATED COST IN INR (LAKHS)	ESTIMATED PERSON DAYS
CONTOUR CONTINUOUS BUNDS (CCB) FOR AFFORESTATION AREA (METER)	8,320	10	0.025	208.1	83,204
COMPOSTING (NUMBER OF UNITS)	1,548	15	0.17	263.16	23,220
AFFORESTATION IN PUBLIC/COMMON LANDS(ha)	2,316	3,344	8.6	19,917.60	77,44,704
BLOCK PLANTATION (COMMUNITY) (ha)	5,625	4,320	11.1	62,437.50	2,43,00,000
SILVI-PASTURE DEVELOPMENT (ha)	7	6,664	17.1	119.70	46,648
LINEAR PLANTATION (KM)	84	703	1.8	150.48	58,771
CANAL BUND PLANTATION (ha)	308	2,930	7.5	2,309.48	9,02,235
IRRIGATION CHANNEL PLANTATION (METER)	19,382	6	0.015	290.73	1,16,291
AVENUE PLANTATION (KM)	275	703	1.8	494.69	1,93,204
NURSERY DEVELOPMENT (NUMBER OF UNITS)	1,145	2,344	15	17,179.13	26,84,525
RESTOTARATION OF WATER BODIES: A) PWD AND TANKS (NUMBER)	193	800	5	965	1,54,400
RESTORATION OF WATER BODIES: OORANIS (NUMBER)	360	200	2	720	72,000
RESTORATION OF WATER BODIES: PONDS (NUMBER)	0	200	1	0	0
ARTIFICIAL RECHARGE STRUCTURE (NUMBER OF UNITS)	136	391	2.5	340	53,176
WATER COURSE - IRRIGATION CHANNELS - DESILTING (METER)	19,382	3	0.0075	145.36	58,145
DRAINAGE LINE TREATMENT (DLT) (MTRS)	4,938	5	0.03	148.14	24,691

COASTAL WATERSHED WORKS

NURSERY DEVELOPMENT - COASTAL PLANTATION (NUMBER OF UNITS)	795	7,813	20	127.2656	49,716.30664
MANGROVE PLANTATIONS (HA)	81	6,250	16	1,296	5,06,250
RIVERSIDE PLANTATION (HA)	0	703	1.8	0	0
COASTLINE SHELTER BELT PLANTATION (HA)	16	2,930	7.5	120	46,880
BUND PLANTATION WET LANDS (KM)	49,396	2,930	0.1875	926.175	1,44,73,028
WETLAND PLANTATION (INNER) (HA)	1,562	2,930	7.5	442.55	1,72,889.533
COASTAL WETLAND - BUND STRENGTHENING (KM)	54,891	977	0.0625	343.06875	53,62,850.7
WETLAND INLET IMPROVEMENT WORKS (NUMBER OF UNITS)	1,562	3,906	10	15,620	61,01,172
CHECK DAM FOR CONTROLLING SEA WATER INTRUSION (NUMBER OF UNITS)	0	234	1.5	15	2,340
CONSTRUCTION OF FISH DRYING YARD (NUMBER OF UNITS)	0	331	2.12	48.76	7,613
AGRO FORESTRY IN INDIVIDUAL LANDS (HA)	795	2,930	7.5	5,962.5	23,29,350

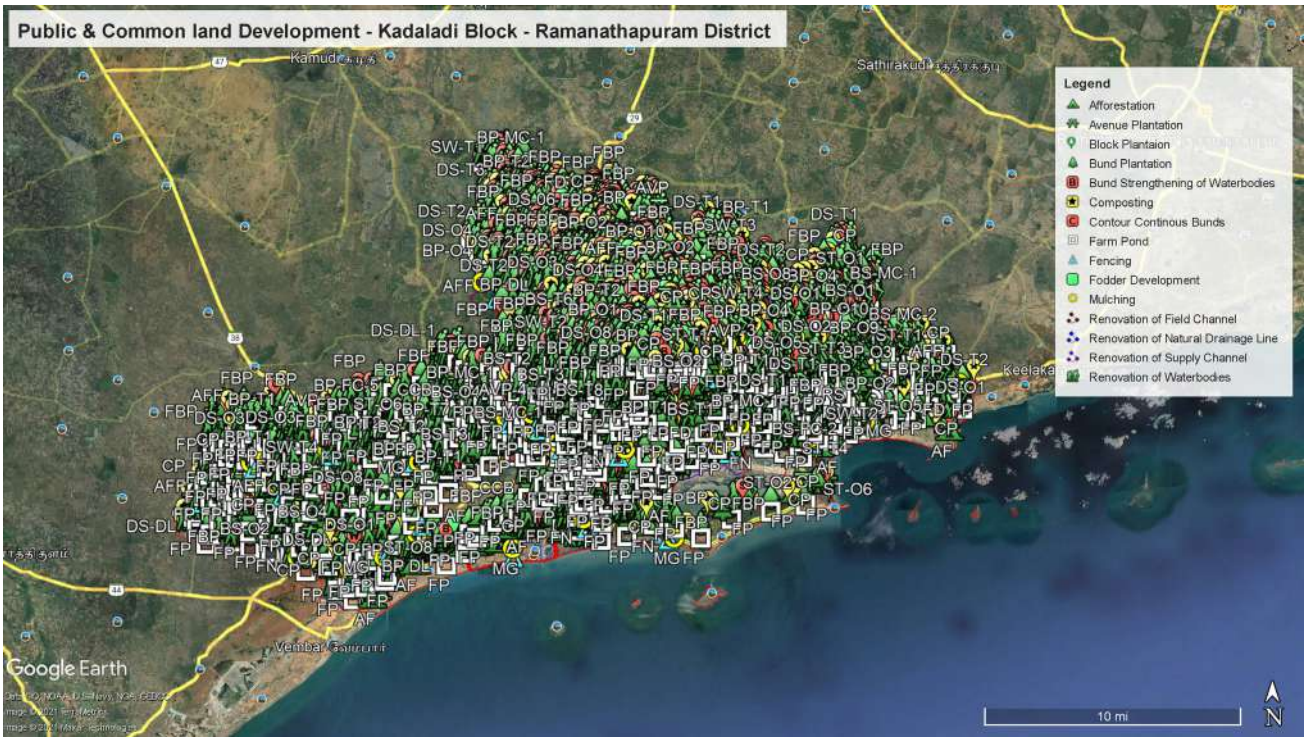


Figure 5.4 Map of proposed Developments in Public and Common Land

5.2 DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

Based on the assessment, the works which enhance the agriculture and allied sectors particularly for irrigation, soil and live stocks are proposed in the lands under individual ownership (Table 13).

DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

TABLE 12. DETAILS OF WORKS PROPOSED TO DEVELOP AGRICULTURE AND ALLIED ACTIVITIES

	NO. OF WORKS	PERSON DAYS PER UNIT	UNIT COST IN INR (LAKHS)	ESTIMATED COST IN INR (LAKHS)	ESTIMATED PERSON DAYS
FARM BUNDING WITH BOUNDARY TRENCHES - INDIVIDUAL (ha)	4,831	586	1.5	7,246.50	28,30,966
MICRO IRRIGATION (ha)	367	0	1	367	0
CONSTRUCTION OF FARM PONDS - INDIVIDUAL (NUMBER OF UNITS)	1,567	781	2	3,134	12,23,827
LAND DEVELOPMENT - INDIVIDUAL (ha)	2,013	3,906	10	20,130	78,62,778
DRY LAND HORTICULTURE/AGRO-FORESTRY - INDIVIDUAL (ha)	2,413	3,321	8.5	20,510.50	80,13,573
AZOLLA UNITS - INDIVIDUAL (NUMBER OF UNITS)	202	23	0.15	30.30	4,646
NADEP VERMI-COMPOST (NUMBER OF UNITS)	202	27	0.18	36.36	5,454
FODDER DEVELOPMENT - COMMUNITY & INDIVIDUAL	202	2,344	1.48	298.96	4,73,488
CATTLE SHELTERS (NUMBER OF UNITS)	202	331	2.12	428.24	66,862
GOAT SHEEP SHELTERS (NUMBER OF UNITS)	2,784	355	2.27	6,319.68	9,88,320
CATTLE TROUGH (NUMBER OF UNITS)	202	6	0.05	10.10	1,212
POULTRY SHED (NUMBER OF UNITS)	905	10	0.09	81.45	9,050

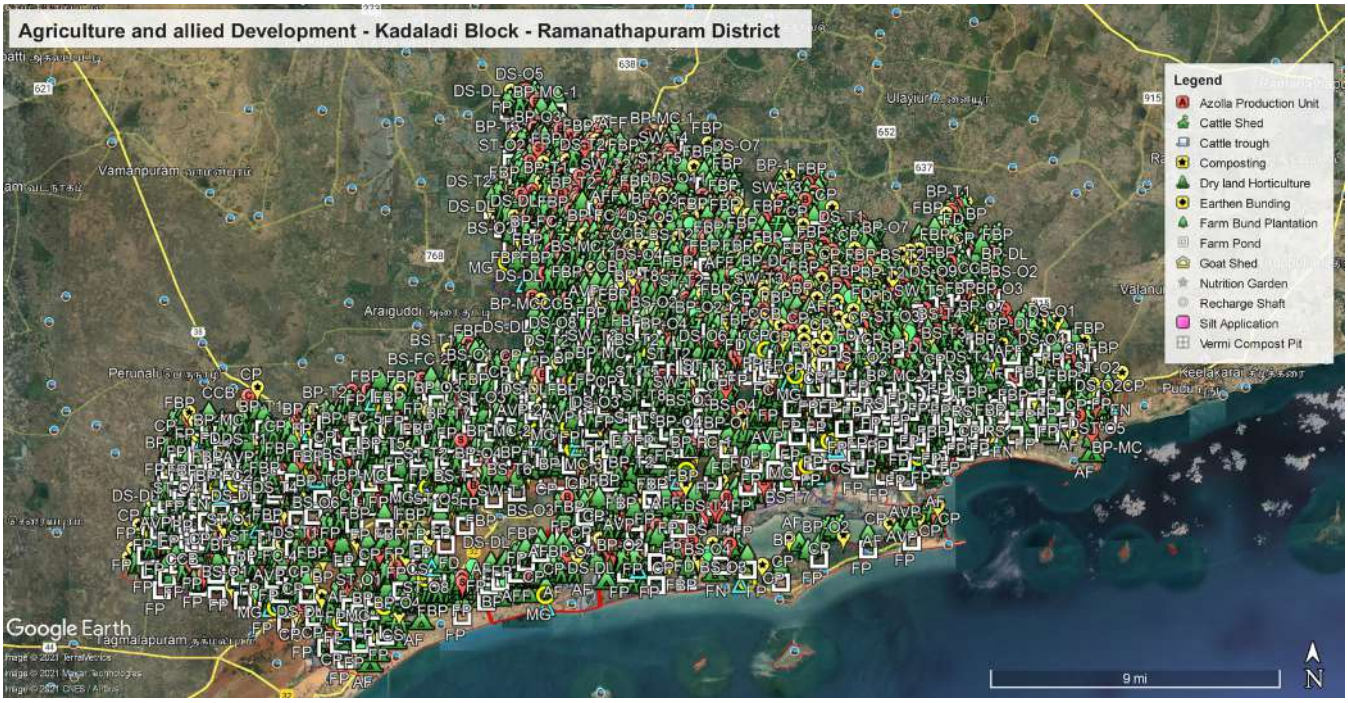


Figure 5.5 Map of proposed Developments in Agriculture and allied Sectors

5.3 DEVELOPMENT OF RURAL INFRASTRUCTURE

The prominent works on constructing structures for water harvest and grey water management are proposed as in Table 14.

DEVELOPMENT OF RURAL INFRASTRUCTURE

TABLE 13. DETAILS OF WORK PROPOSED TO DEVELOP RURAL INFRASTRUCTURE

	NO. OF WORKS	PERSON DAYS PER UNIT	UNIT COST IN INR (LAKHS)	ESTIMATED COST IN INR (LAKHS)	ESTIMATED PERSON DAYS
SOAK PITS (COMMUNITY) (NUMBER OF UNITS)	447	20	0.13	58.11	8,940
SOAK PITS (INDIVIDUAL) (NUMBER OF UNITS)	4,468	16	0.1	446.80	71,488
ROOF RAIN WATER HARVESTING (NUMBER OF UNITS)	120	625	4	480	75,000
TANKA - COMMUNITY LEVEL (NUMBER OF UNITS)	47	382	8.5	399.5	17,954

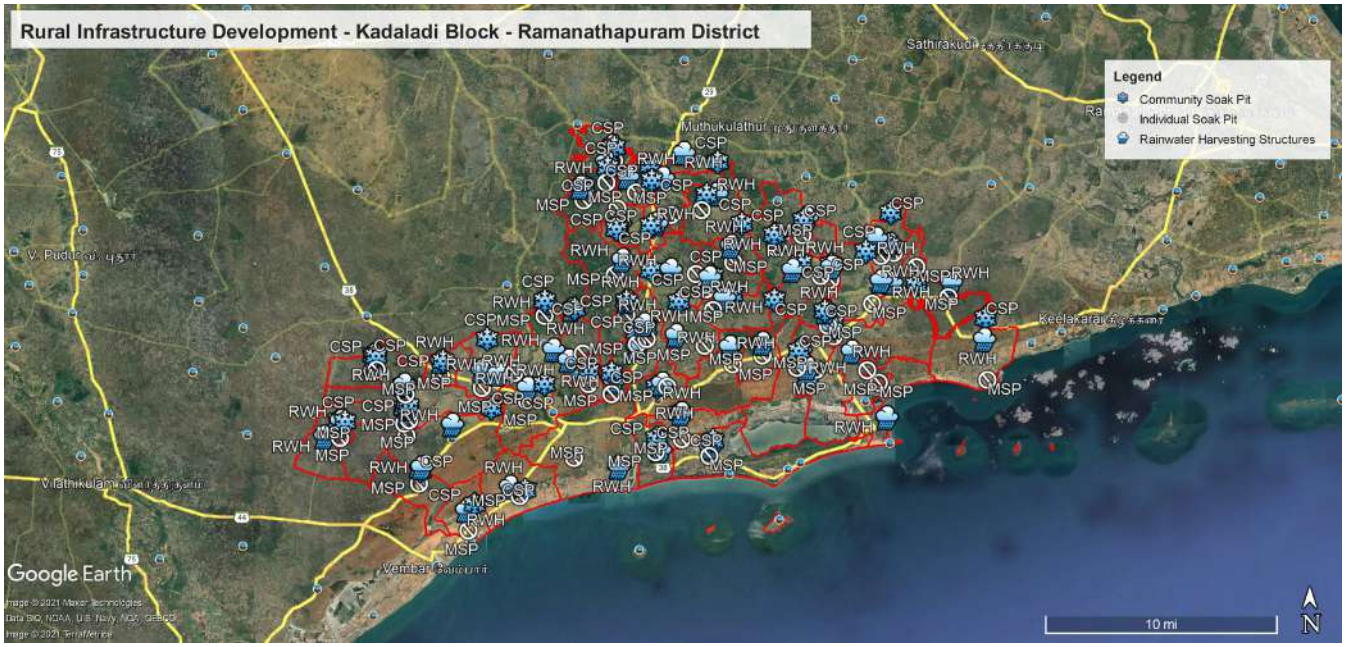


Figure 5.6 Map of Proposed Developments in Rural Infrastructure

5.4 DEVELOPMENT OF CLIMATE RESILIENCE MEASURES

Climate resilient measures are proposed to cope up the system with future climate risks such as droughts, heat-waves and floods. As Ramanathapuram district is one of the drought prone area and frequently exposed to severe droughts, more measures are proposed to manage droughts and its subsequent impacts. The climate resilient measures are proposed to cover-up maximum of GPs in order to cope with droughts. CRM such as mega-forests, mini-forests, horticulture park, shelter belt plantation, avenue plantation, Block and village level nurseries are proposed in this Block in saturation mode. The proposed activities and its details are given in table 15.

TABLE 14. PROPOSED CRM AT KADALADI BLOCK

Proposed CRM	GP	Particulars of CRM
Mega forest	9	9 mega forest with 5000 plants on 1 acre of land in 9 Panchayats
Mini forest	60	130 mini forests with 500 plants on 0.5 acre of land in all 60 Panchayat
Shelter belt plantation	Ervadi, Valiknokam, Naripayur, Kannirajapuram	Shelter belt plantation with 22.27 km length covers Ervadi, Valinockam, Naripayur, Kannirajapuram Panchayats
Horticulture park		Mookaiyur
Block level Nursery	Ervadi	Nursery in Ervadi Panchayat with 2 acres of land

Village level nursery	60	In all 60 panchayats with Papaya, Moringa, Pomegranate, Guava, Custard Apple seeds
Avenue plantation		64 km
Tanka	47	Each one Tanka in 47 GPs

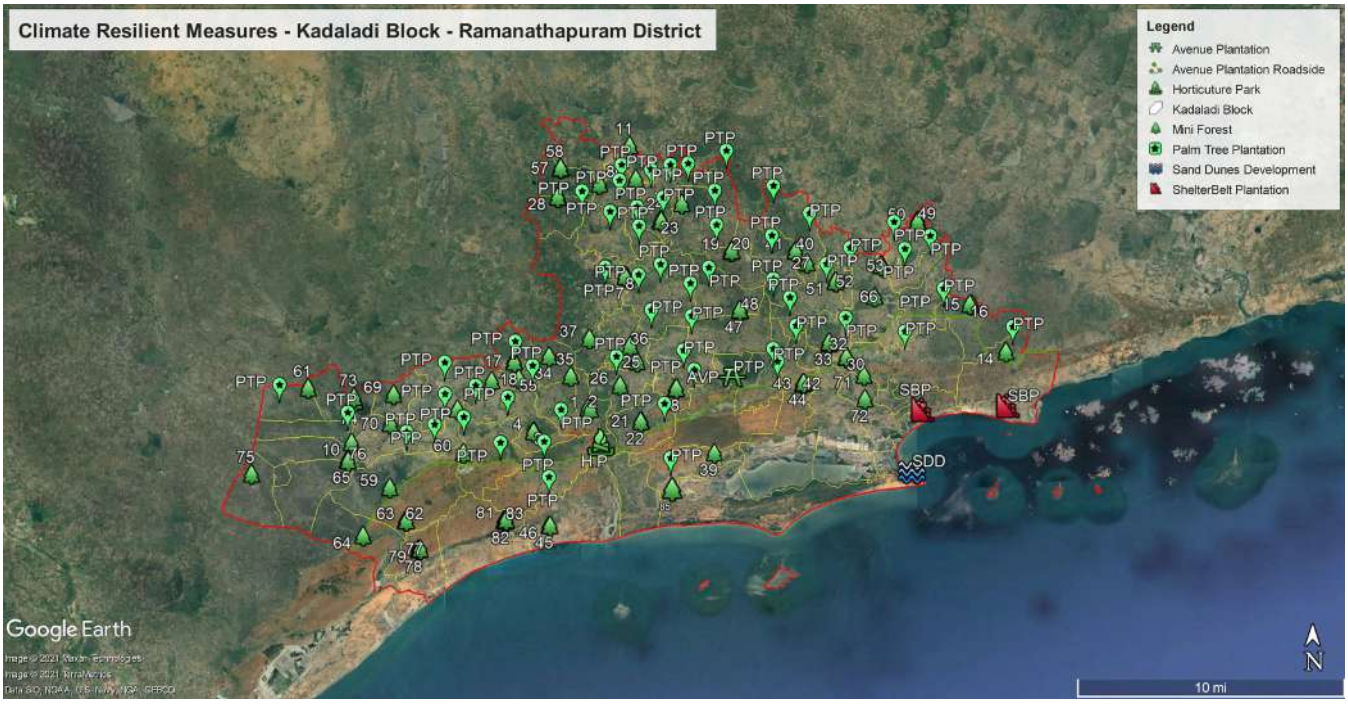


Figure 5.7 Map of proposed Climate Resilient Measures

நெடுங்கடலும் தன்நீர்மை குன்றும் தடிந்தெழிலி
தான்நல்கா தாகி விடின்

குறள் - 17

The ocean's wealth will waste away
Except the cloud its stores repay

Thirukkural - 17

CHAPTER 6

PROJECTED OUTCOMES OF THREE YEAR PERSPECTIVE PLAN

6 PROJECTED OUTCOMES OF THREE YEAR PERSPECTIVE PLAN

In view of Mahatma Gandhi NREGS's guidelines, key water actions are proposed based on climate vulnerability assessment and challenges at GP level for three years' period from 2021- 2022 to 2023-2024. At the end of the implementation period during 2024, the following productive outcomes are envisaged on successful accomplishment of all proposed key water actions. The anticipated outcome will reduce the water security vulnerability and increase the resilience of the GPs under current and projected climatic change scenarios.

6.1 OUTCOMES OF DEVELOPMENT OF PUBLIC AND COMMON LANDS

OUTCOMES OF DEVELOPMENT OF PUBLIC AND COMMON LANDS

	INDICATOR		OUTCOMES/ IMPACT
1	Proportion of Land development under WASCA treatment	1	12819.24 ha (18.82 %) of the total area treated under WASCA
2	Percentage reduction of run off	2	3324.07 Ha-M i.e. 33.43 % of the total runoff harvested due to WASCA interventions
3	Number of water bodies restored	3	193 water bodies restored
4	Area under afforestation	4	2316 ha area under afforestation
5	Area under silvi-pasture development	5	7 ha under silvi-pasture plantation
6	Length of drainage line treated	6	197498 meters length of drainage line treated

12819.24 ha AREA TREATED

3324.07 ha - M TOTAL RUNOFF HARVESTED

193 WATER BODIES RESTORED

2316 ha AREA AFFORESTATION

7 ha SILVI-PASTURE PLANTATION

197498 meters DRAINAGE LINE TREATED

COASTAL WATERSHED WORKS

	INDICATOR		OUTCOMES/ IMPACT
1	Check dam	1	10 check dams for controlling sea water intrusion
2	Shelter belt plantation	2	16 ha under shelter belt plantation
3	Area under mangrove plantation	3	81 ha under mangrove plantation

10 CHECK DAMS

16 ha SHELTER BELT PLANTATION

81 ha MANGROVE PLANTATION

6.2 OUTCOMES OF DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

OUTCOMES OF DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

	INDICATOR	OUTCOMES/ IMPACT
1.	Assessment of sources of water for livestock and agriculture demand	1567 farm ponds established which target the harvest of 1378960 cu m of water which has the potential to irrigate 4831 ha area in both kharif and rabi seasons
2.	No of structures established for on-farm *(in-situ)* water harvesting in dry lands	202 compost units for soil health improvement
3.	Improvement in soil health	4831 ha Farm bunding with trenches
4.	Changes in the irrigation practices	482600 ha under dry land horticulture
5.	Dry land development with agro-forestry	202 vulnerable households established fodder plots
6.	Households established fodder plots	

1567 FARM PONDS

202 COMPOST UNITS

4831 ha FARM BUNDING

482600 ha DRY LAND HORTICULTURE

202 FODDER PLOTS

6.3 OUTCOMES OF RURAL INFRASTRUCTURE DEVELOPMENT

OUTCOMES OF RURAL INFRASTRUCTURE DEVELOPMENT

	INDICATOR	OUTCOMES/ IMPACT
1.	Number of villages having liquid waste management systems	447 common and 4468 individual soak pits established for recycle of grey water benefiting 44644 households
2.	Roof rain water harvesting measures	120 common roof rainwater harvesting and storage structures with a target to harvest and store 1.1 Ha-M of rainwater for use
3.	Tanka	47 Tanka in 47 GPs
4.	Nutri garden	44543 Households established nutri-gardens in homesteads and planted 222715 saplings

447 COMMON & **4468** INDIVIDUAL SOAK PITS

120 COMMON ROOF RAINWATER HARVESTING

44543 NUTRI-GARDENS

47 TANKAS

222715 SAPLINGS

6.4 OUTCOMES OF CLIMATE RESILIENCE MEASURES

OUTCOMES OF CLIMATE RESILIENCE MEASURES

	INDICATOR
1.	Climate resilient measures are identified for climate risks

	OUTCOMES/ IMPACT
1.	6 models are identified via., Mega forest, mini forests, horticulture park, avenue plantation, shelter belt plantation, nurseries at village and Block level
2.	9 mega forest in 9 villages
3.	130 mini forest in 60 villages
4.	1 horticulture park
5.	64 km of avenue plantation
6.	22.27 km length shelter belt plantation in 4 villages
7.	60 nursery in 60 villages

6 CRM MODELS

9 MEGA FOREST

130 MINI FOREST

1 HORTICULTURE PARK

64 Km AVENUE PLANTATION

22.27 km SHELTER BELT PLANTATION

60 NURSERY

Estimated person days

The total estimated person days required for the above propose activities are 8,72,02,907 as specified below

Estimated Cost

The total estimated cost budgeted for the above propose activities is Rs. 1,90,168 Lakhs as specified below

CWRM THEMES	Estimated person days	Estimated cost in lakhs
Development of public and common land including coastal watersheds	6,55,67,303	1,30,590
Development of agriculture and allied activities	2,14,80,176	58,593
Development of rural infrastructure	1,55,428	985
TOTAL	8,72,02,907	1,90,168

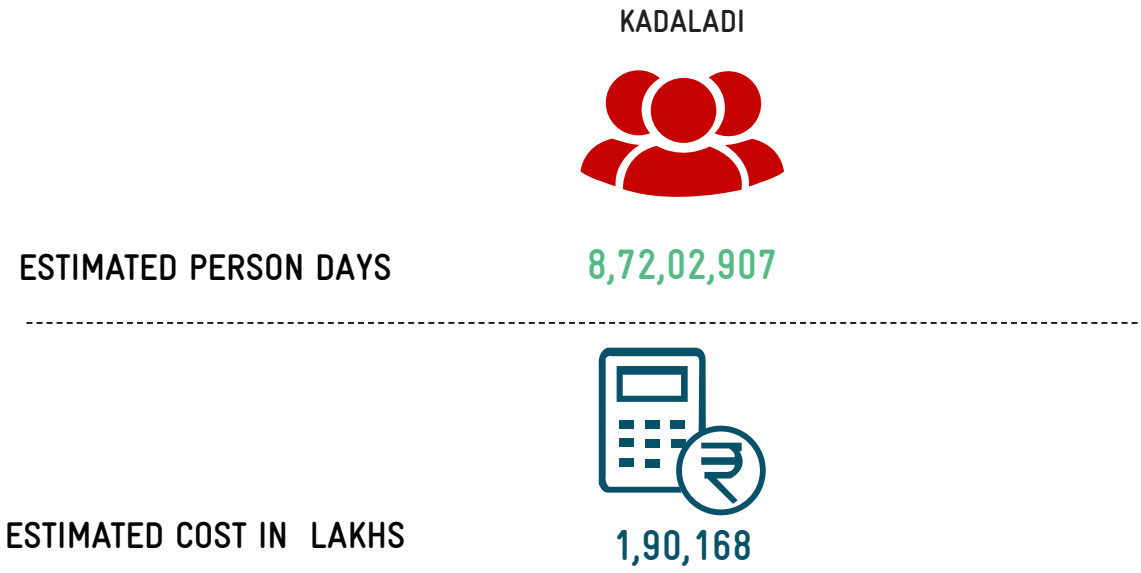


Figure 6.1 & 6.2 Estimated person days & cost for all water actions

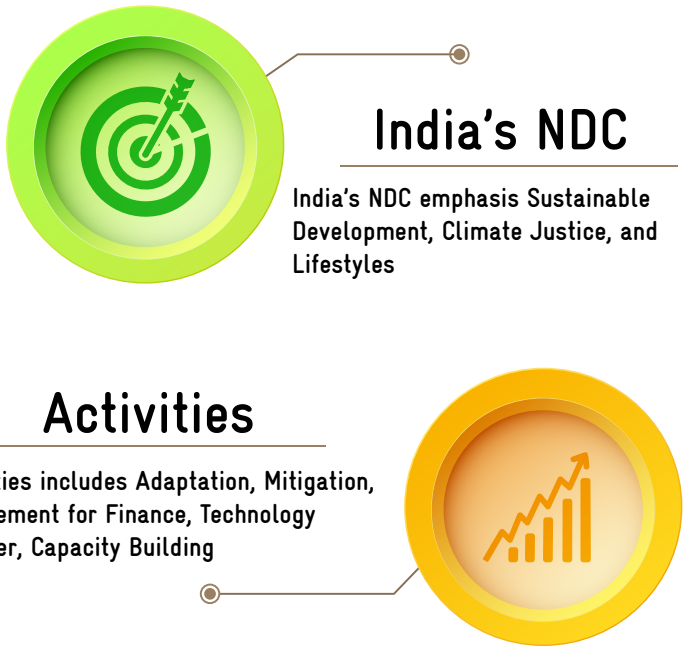
6.5 LINKAGES TO SDGS, NDCS

The 2030 Agenda and the Paris Agreement put forth an innovative and complementary framework for accelerating action and achieving ambitious sustainable development objectives. Under the 2030 Agenda, a series of 17 global Sustainable Development Goals (SDG) have been agreed that are to be universally achieved. Under the Paris Agreement countries are committed to reduce greenhouse gas emissions through Nationally Determined Contribution (NDC)s in order to strengthen resilience to climate change. Both The SDGs and Paris Agreements demands urgent climate action and linking WASCA activities with these two agendas are is indispensable.

6.5.1 NATIONALLY DETERMINED CONTRIBUTION GOALS AND WASCA TN'S PROGRESS THROUGH NDC

2015 was a historic year in which 196 Parties came together under the Paris Agreement to transform their development trajectories so that they set the world on a course towards sustainable development, aiming at limiting warming to 1.5 to 2 degrees C above pre-industrial levels. Through the Paris Agreement, Parties also agreed to a long-term goal for adaptation – to increase the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production. Additionally, they agreed to work towards making finance flows consistent with a pathway towards low greenhouse gas emissions and climate- resilient development. Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of these long-term goals. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. The Paris Agreement (Article 4, paragraph 2) requires each Party to prepare, communicate and maintain successive NDCs that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.

Internationally, the recent process on NDC Enhancement (2020) significantly acknowledge the climate change vulnerability on national sectors including agriculture, energy, and urban areas, especially through impacts on water resources. The role that water and water-related activities play in national economies has been increasingly recognized in most Nationally Determined Contributions (NDCs). Many parties included measures related to flooding and drought and chose to include qualitative information on the likely effect of climate change on key sectors.

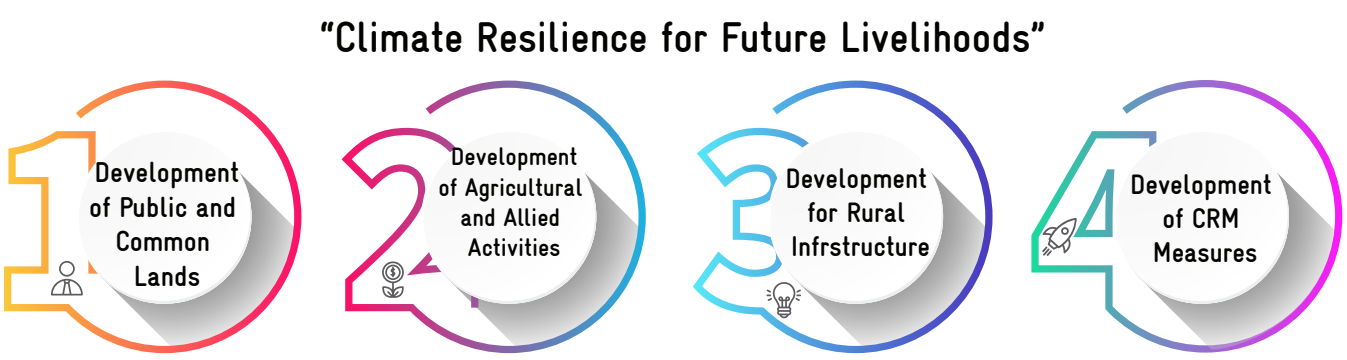


WASCA TN marching on the road to support India's NDC vision by,

1. Supporting creation of an additional carbon sink of 2.5–3 billion tonnes through additional forest and tree cover
2. Enhancing investments in development programs for climate change adaptation in vulnerable sectors
3. Implementing programs to achieve the sustainable natural resource management and efficient utilization of natural resources, leading to a reduction in the "ecosystem footprint"
4. Providing qualitative information on the likely effect of climate risks on key sectors via, water, agriculture and allied sector and socio economic

6.5.2 WASCA TN SUPPORTS SDG

WASCA – TN's four major actions for making "Climate Resilience for Future Livelihoods" are envisaged through SDGs. The water actions,



TN WASCA achieves the above actions closely with Mahatma Gandhi NREGA programme of Ministry of Rural Development and National Water Mission programme of Ministry of Jal Shakti (MoJS). These two ministries are the key stakeholders for WASCA. Apart from these two ministries, the works under WASCA TN are closely linked with Ministry of Agriculture and Ministry of Environment Forest and Climate Change (MoEFCC). The commitments of the above mentioned four ministries towards SDG goals achievements are mapped in connection with the interventions under WASCA Tamil Nadu. The intervention under WASCA TN has direct and indirect contribution to the SDGs and its national targets set as per NITI Aayog.

6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.A, 6.B

SDG GOAL 6

SDG 6 by 2030 : Ensure availability and sustainable management of water and sanitation for all

6.1	Achieve universal and equitable access to safe and affordable drinking water for all
6.2	Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

6.3	Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
6.4	Increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
6.5.1	Degree of integrated water resources management implementation
6.6	Protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
6.a	Expand international cooperation and capacity-building support to developing countries in water-and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
6.b	Support and strengthen the participation of local communities in improving water and sanitation management

Indicators performed in district and Block level vulnerability assessment of WASCA TN also used in SDG India 20-21 report (Table 15).

TABLE 15. COMMON VULNERABILITY INDICATORS USED IN WASCA TN & SDG INDIA 20-21

Head count ratio as per the Multidimensional Poverty Index (%)	
	Persons provided employment as a percentage of persons who demanded employment under Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)

Percentage of rural population getting safe and adequate drinking water within premises through Piped Water Supply

Percentage of rural population having improved source of drinking water

Percentage of ground water withdrawal against availability

Percentage of Blocks/mandals/talukas over-exploited

Percentage of area covered under afforestation schemes to the total geographical area

Percentage of degraded land over total land area

Percentage increase in area of desertification

The indicators used district level vulnerability assessment along with its linked SDGs are already tabulated in (Table 2). Gram panchayats (GPs) across the country have begun preparing gram panchayat development plans (GPDP), presenting an opportunity for the GPs to synchronize their plans with SDGs. UN and Govt. of India desires to set GP-level targets with measurable indicators that will have vertical and horizontal linkages, convergence possibilities, resource mobilization potential and feasible action by the GPs. WASCA TN has put a roadmap towards GP level target for rural water security. The detailed proposed water actions in CWRM assessed based on the vulnerability dimensions are linked with climate vulnerability index, SGDs are tabulated in Table 16, 17, 18.

TABLE 16. WATER ACTIONS ON DEVELOPMENT OF PUBLIC & COMMON LANDS & ITS LINKED SDG

Name of the work	Number of CWRM works	Climate Vulnerability Index Impacting (WASCA TN)	Linked SDG Goal
Contour Continuous Bunds (CCB) for Afforestation area (Meter)	8,320	W3	SDG 1,2, 6,13&15
Composting (Number of units)	1,548	W1	SDG1& 6
Afforestation in Public/common lands (ha)	2,316	C1,C2,C3, W3,	SDG 1, 2,6,13&15
	230	C1,C2,C3,W3,S2	SDG 1,2, 6 &13, 15
Block Plantation (Community) (ha)	178	C1,C2,C3,W3	SGG 12 &15
	5,625	C1,C2,C3,W3,S2	SDG 1,2, 6 &13, 15
Silvi-pasture Development (ha)	7	C1,C2,C3,W3	SGG 12 &15
Linear Plantation (km)	84	C1,C2,C3,W3,S2	SDG 1,2,6,12 &13, 15

Canal Bund Plantation (ha)	308	C1,C2,C3,W3,S2	SDG 1, 6&13, 15
Irrigation Channel Plantation (Meter)	19,382	C	SDG 1,2& 6, 15
Avenue plantation (km)	275	C1,C2,C3,W3,S2	SDG 1, 6&13
Nursery Development (Number of units)	1,145	C1,S2,S4	SDG 1,2 &6
Restoration of water bodies :PWD and Tanks (Number)	193	S2, S1	SDG 6, 1, 13
Restoration of water bodies: Ooranis	360	S2, S1	
Restoration of water bodies : Ponds(Number)	0	S2, S1	SDG 6,1, 13
Artificial Recharge Structure (Number of units)	136	W3	SDG 1, 2, & 6
Water Course - Irrigation Channels - Desilting (Meter)	19,382	C1,C2,C3,W3,S2	SDG 1, 6&13
Drainage Line Treatment (DLT) (Meter)	4,938	W1,W3,W4	SDG1 & 6
Coastal watersheds			
Nursery development -Coastal plantation (Number of units)	795	C1,S2,S4	SDG 1, 6, 13,
Mangrove plantations (ha)	81	C1,C2,C3,W3,S2	SDG 1, 6, 13, 14, 15
Riverside plantation (ha)	0	W3,S2	SDG 1, 6, 13, 14, 15
Coastline Shelter belt Plantation (ha)	16	W3,S2	SDG 1, 6, 13, 14, 15
Bund Plantation wet lands (km)	49396	W3,S2	SDG 1, 6, 13, 14, 15
Wetland plantation (inner) (ha)	1562	W3,S2	SDG 1, 6, 13, 14, 15
Coastal wetland - Bund strengthening (km)	54891	W3,S2	SDG 1, 6, 13, 14, 15
Wetland Inlet improvement works(Number of units)	1562	W3,S2	SDG 1, 6, 13, 14, 15
Check dam for controlling sea water intrusion (Number of units)	0	W5	SDG 1, 6, 13, 14, 15
Construction of Fish Drying Yard (Number of units)	0	S2	SDG 1, 2, 4, 12
Agro Forestry in Individual lands (ha)	795	S2	SDG 1, 2, 6, 13

TABLE 17. WATER ACTIONS ON DEVELOPMENT OF AGRICULTURAL AND ALLIED SECTOR & ITS LINKED SDG

Name of the Work	Number of CWRM works	CVI	SDG
Farm Bunding with Boundary Trenches - Individual (ha)	4,831	A1,A3,W1,W3	SDG 1,2&6
Micro Irrigation (ha)	367	A1,A3,A5,W5	SDG 1, 2&6
Construction of Farm Ponds - Individual (Number of units)	1,567	A1,A3,W5,W1, W3	SDG 2& 6
Land development - Individual (ha)	2,013	W1,W5,A1,A3,S2,S4	SDG 2, 6& 15
Dry land Horticulture/Agro-forestry - Individual (ha)	2,413	A1,A3,A4,W1,S4,S2,C1	SDG 1& 2,15
Azolla units - Individual (Number of units)	202	A3,A4,S4	SDG 1& 2

NADEP Vermi compost (Number of units)	202	A3, W1, S4	SDG 1& 2,6
Fodder development - Community & Individual	202	A3, S4	SDG 1& 2, 15
Cattle Shelters (Number of units)	202	S4	SDG 1& 2
Goat Sheep Shelters (Number of units)	2,784	S4	SDG 1& 2
Cattle Trough (Number of units)	202	W5,S4	SDG 1& 2
Poultry Shed (Number of units)	905	S2,S4	SDG 1& 2

TABLE 18. WATER ACTIONS ON RURAL WATER MANAGEMENT & ITS LINKED SDG

Name of the Work	Number of CWRM works	CVI	SDG
Soak Pits (Community) (Number of units)	447	W3,S2	SDG 1& 6
Soak Pits (Individual) (Number of units)	4,468	W3,S2	SDG 1& 6
Roof Rain Water Harvesting (Number of units)	120	W3,S1,S3	SDG 1& 6

சிறப்பொடு பூசனை செல்லாது வானம்
வறக்குமேல் வானோர்க்கும் ஈண்டு

குறள் - 18

The earth beneath a barren sky
Would offerings for the gods deny

Thirukkural - 18

CHAPTER 7

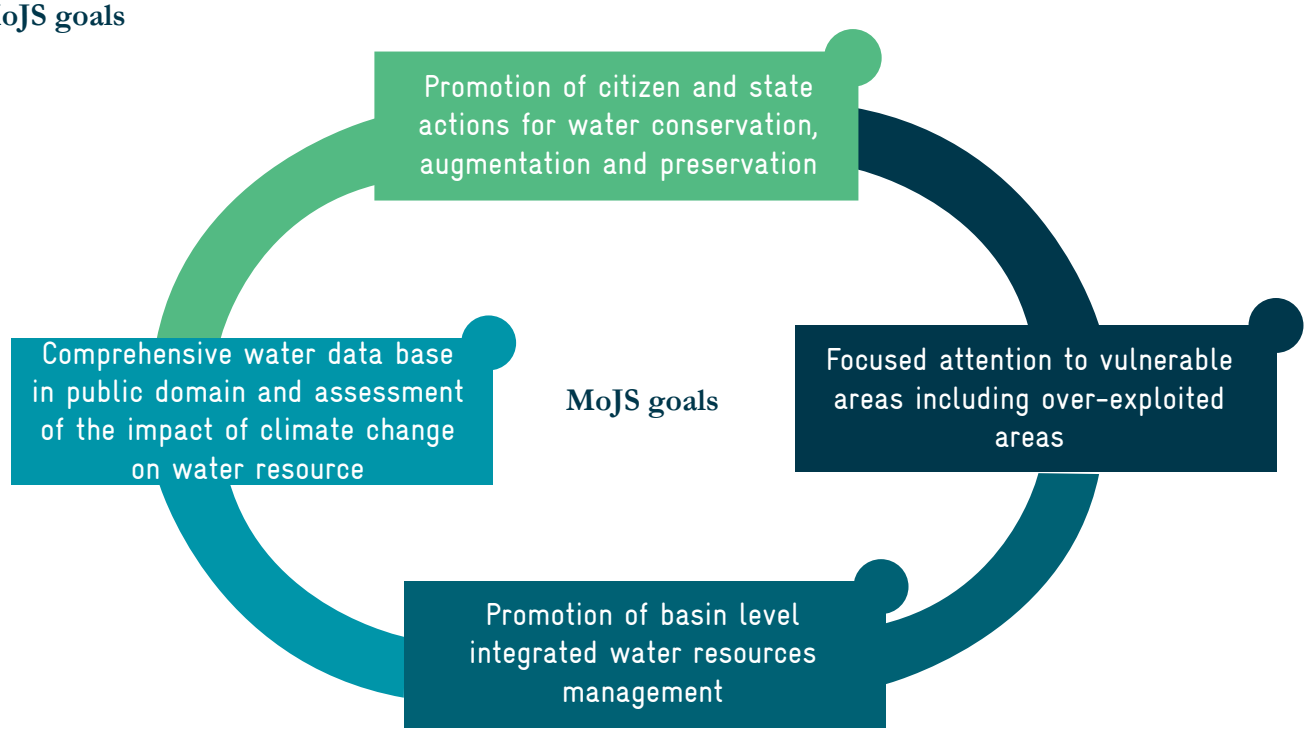
7 IMPLEMENTATION OF GP PLANS

Execution of GP plans includes integrating all verified, approved works in MORD's web enabled application NREGA Soft (https://nrega.nic.in) for mainstreaming WASCA. The target GPs are identified first, the status of GIS based plans and total works along with its expenditure and category wise estimation cost of works as per GIS Plan, GIS based planning cumulative report are uploaded as given below;

7.1 INTEGRATION INTO NREGA SOFT

WASCA is progressing towards digitizing and integrating GP level GIS based plans, NRM and Non NRM works in to Mahatma Gandhi NREGS portal. The performance and implementation of GP plans of Kadaladi Block is listed in Table 19 and work progress during past the 3 financial years are shown in Figure 7.1.

TABLE 19. GIS PLAN IMPLEMENTATION- KEY PARAMETERS PERFORMANCE IN KADALADI BLOCK



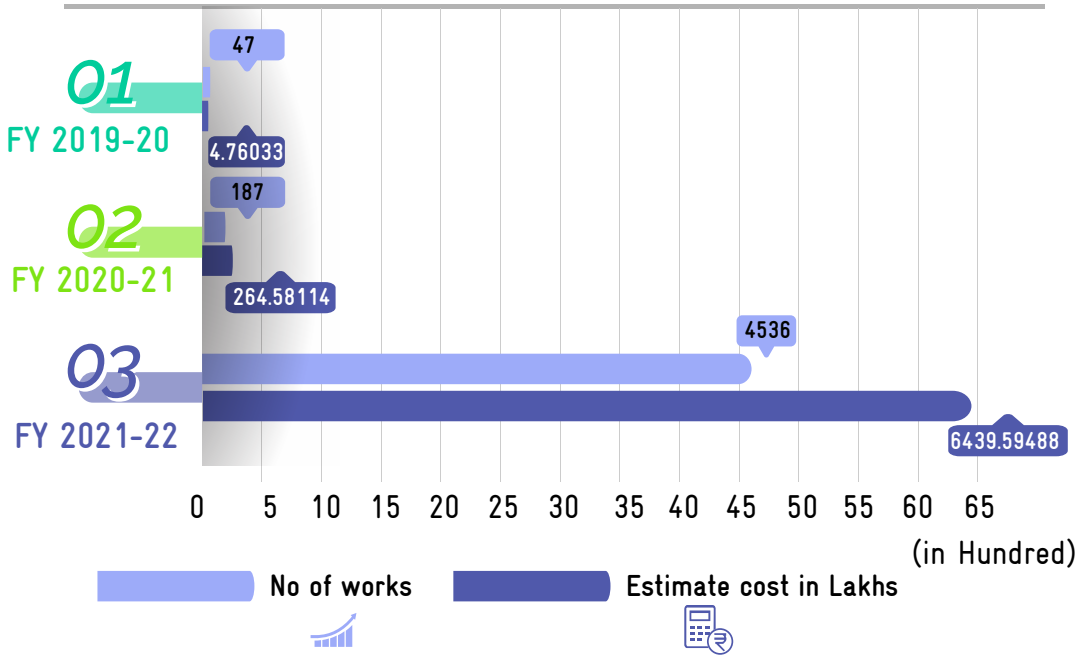


Figure 7.1. Work progress in last 3 years

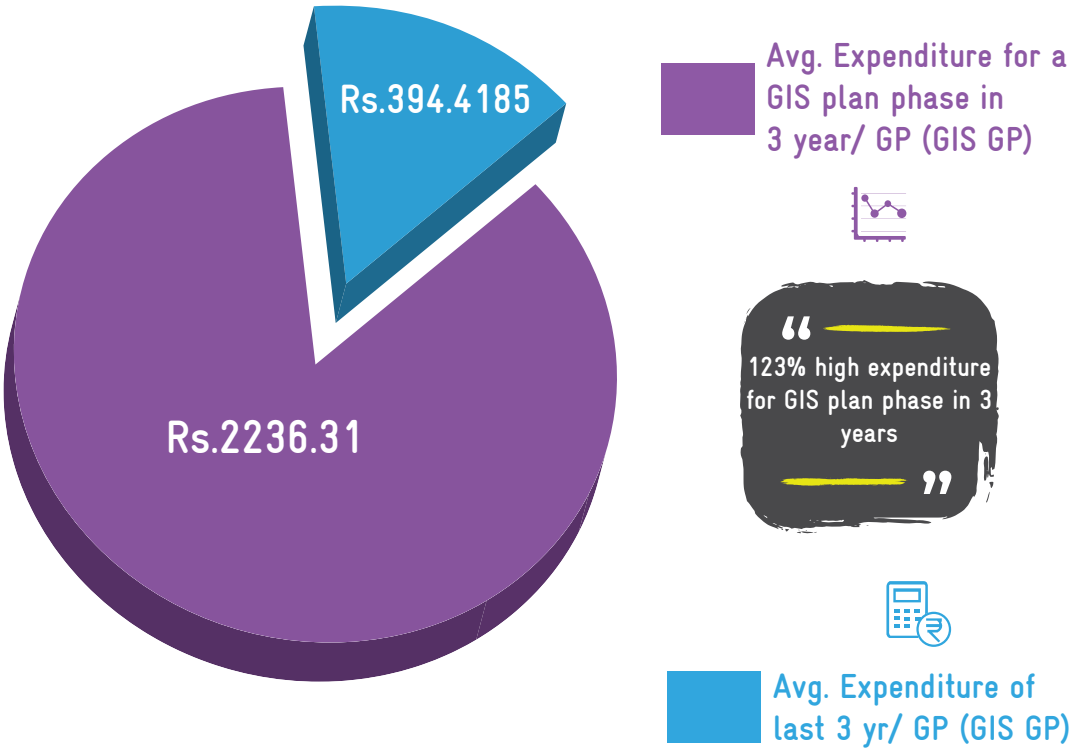
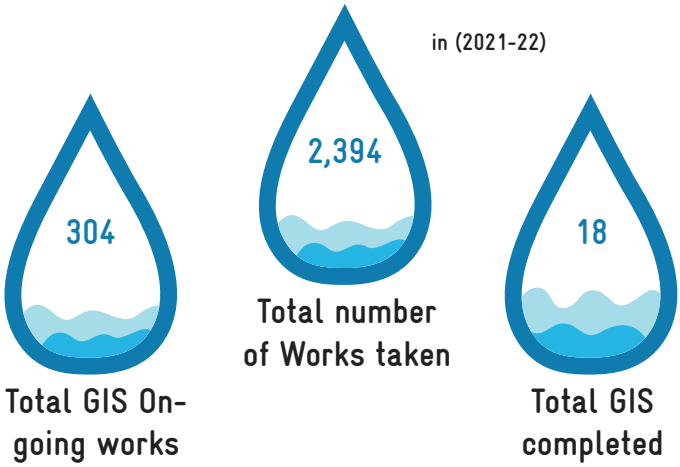


Figure 7.2. Average Expenditure for GIS plan in last 3 years



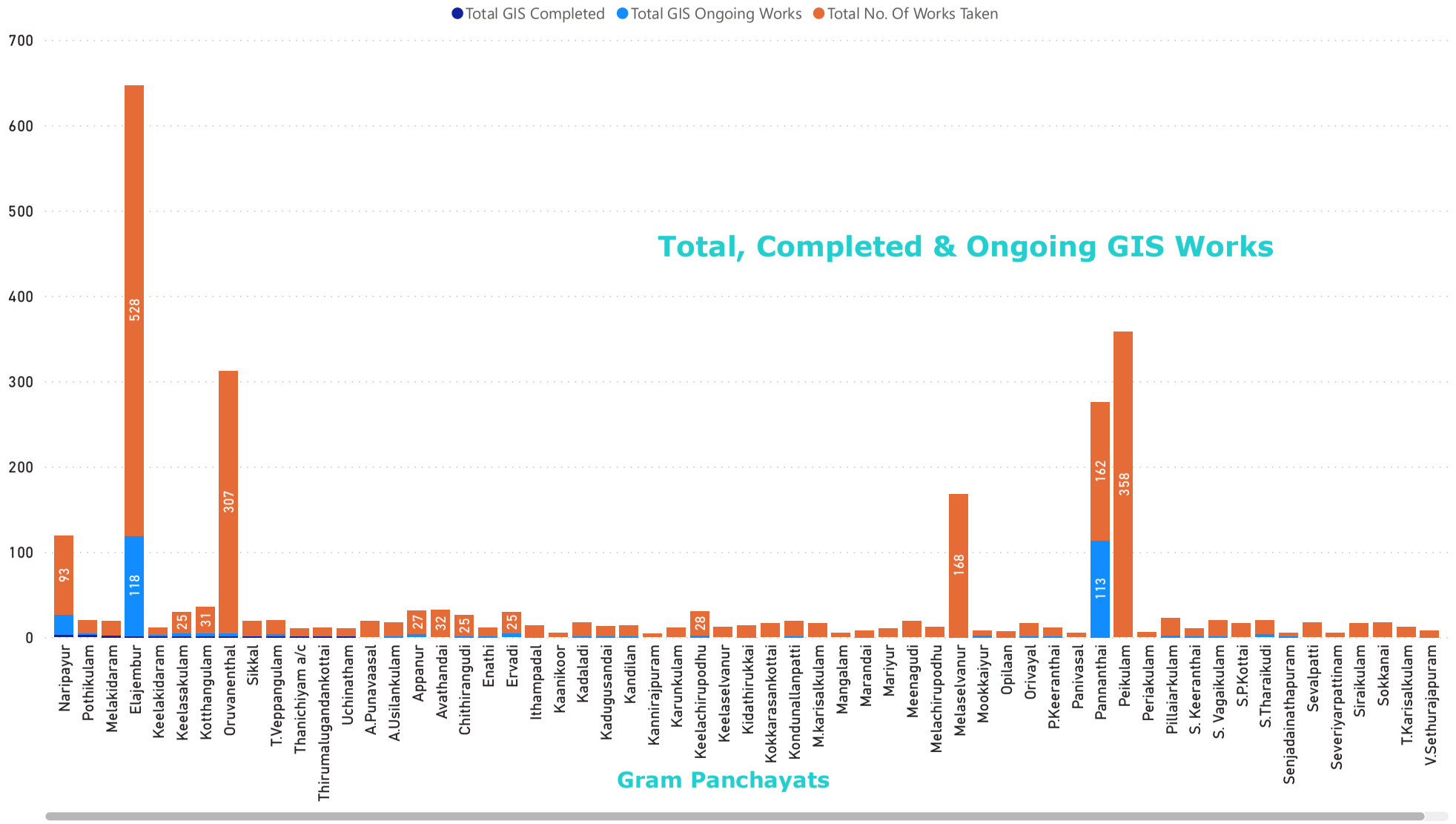
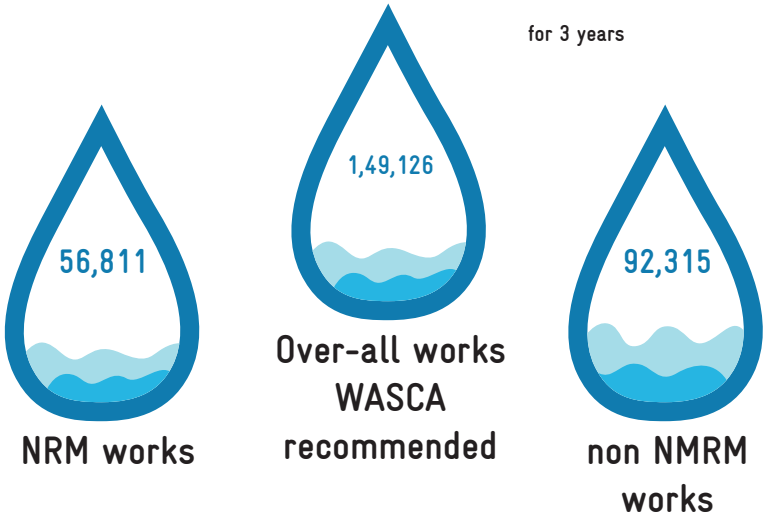


Figure 7.3. GP wise total, completed and ongoing GIS works

7.2 NRM AND NON NRM WORKS

Overall, WASCA recommended 1,49,126 works for 3 years, out of that 56,811are NRM works and 92,315 are non NRM works. A total of 3,347 works are uploaded so far for the financial year 2021-22.



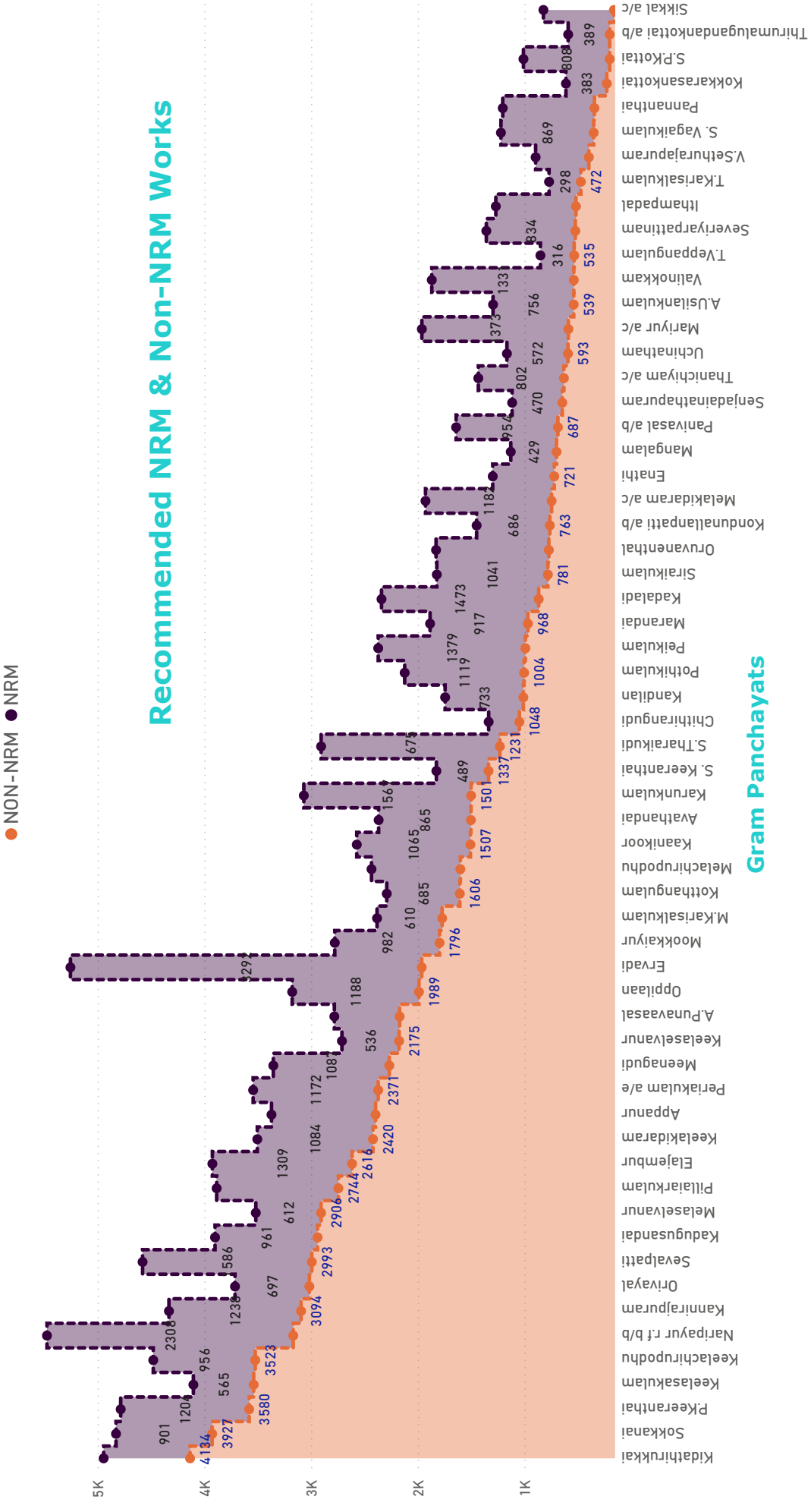


Figure 7.4. GP wise recommended NRM and non NRM works

7.3 ONGOING WORKS

The list and place of ongoing works in this Block are shown in Table 20.

TABLE 20. DETAILS OF ONGOING WORKS IN KADALADI BLOCK

Description	GP
Coastal Shelter Belt Plantation	Ervadi
	Naripayur
Block Level Nursery	S P Kottai
Horticulture Parks	Naripayur
Mega Forest (5000 Plants) – 8 Locations	Kadugusandai
	Keelakidaram
	Kondunallanpatti
	Melakidaram
	Orivayal
	Pillaiyarkulam
	Sevalpatti
	Sikkal
Farm Ponds (Community)	Total Farm Ponds– 6
Farm Ponds (Individual)	Total Farm Ponds– 26

7.4 CATCH THE RAIN

The NWM's campaign "Catch The Rain" with the tag-line "Catch the rain, where it falls, when it falls" is to nudge the states and stakeholders to create appropriate Rain Water Harvesting Structures (RWHS) suitable to the climatic conditions and sub-soil strata before monsoon season. Under this campaign, drives to make check dams, water harvesting pits, rooftop RWHS etc., removal of encroachments and de-silting of tanks to increase their storage capacity; removal of obstructions in the channels which bring water to them from the catchment areas etc., repairs to step-wells and using defunct bore wells and unused wells to put water back to aquifers etc., are to be taken up with the active participation of people. Expenditure towards progressive works on Catch the rain campaign of Kadaladi Block is shown in figure 7.5

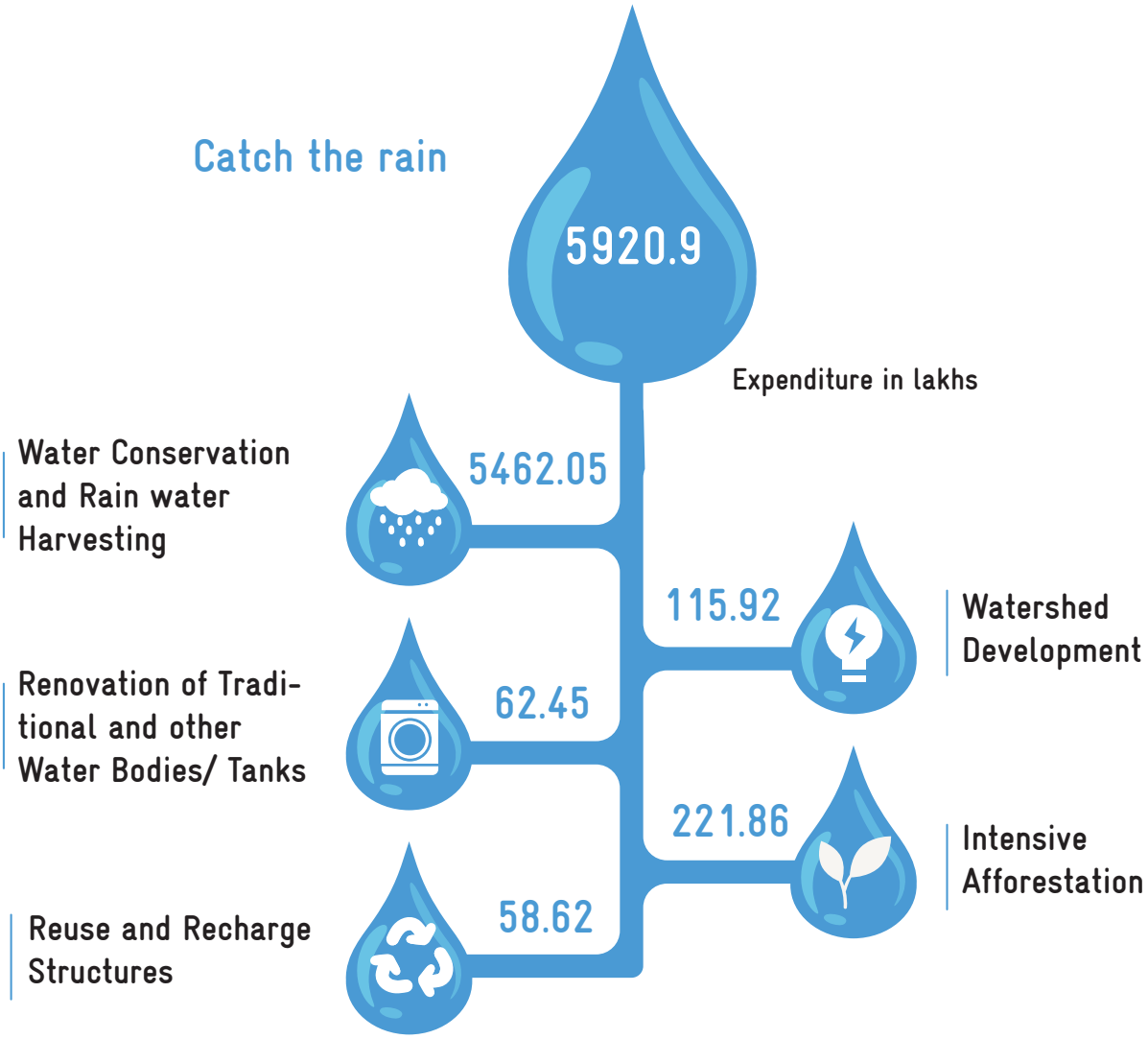


Figure 7.5: Expenditure on Catch the Rain in Kadaladi

தானம் தவம்இரண்டும் தங்கா வியன்உலகம்
வானம் வழங்கா தெனின்

குறள் - 19

Were heaven above to fail below
Nor alms nor penance earth would show

Thirukkural - 19

CHAPTER 8

8 CASE STUDY

This chapter illustrates how CWRM planning processes unfolds the analysis, results and impacts from Macro-watershed to the lowest planning unit GP through case studies. Case studies explains the need for integrated multi-tier approach to addresses the issues of water conservation through climate changes lens. Case studies on Micro-watersheds and GP are expounded holistically through Macro-watersheds to warrant long-term benefits. This intergraded approach will help in watershed assessment, management and monitoring of implementation projects efficiently.

8.1 MACRO-WATERSHEDS IN KADALADI BLOCK

Kadaladi block has four river sub-basins on Vembar, Gundar, Gridhambal and Therkku Upper Watersheds and its covers 145 micro-watersheds. Under Vembar watershed (4A1D1) with 42 Micro-watersheds covering an area of 23232.18 Ha. Under Gundar watershed (4A1D2) with 19 Micro-watersheds covering an area of 12702.10 Ha. Under Gridhambal watershed (4A1D3) consists of 30 micro-watersheds covering an area of 18063.25 Ha. Under Therkku Upper watershed (4A1D6) with 54 Micro-watersheds covering an area of 30749.21 Ha. In Kadaladi block out of 60 GPs, 12 GPs fall under Vembar Watershed (4A1D1), 10 GPs under Gundar watershed (4A1D2), 15 GPs under Gridhambal watershed (4A1D3) and 23 GPs under Therkku Upper watershed (4A1D6) (Table 22).

TABLE 21. GENERAL DESCRIPTION OF MACRO-WATERSHEDS COVERING KADALADI BLOCK

Macro-watershed	Area in ha	No. of Micro-watershed
Vembar	23232.18	42
Gundar	12702.10	19
Grindhambal	18063.25	30
Therkku Uppar	30749.21	54

TABLE 22. WATERSHED COVERING NUMBER OF GPS IN KADALADI BLOCK

Watershed Name	No. of GPs in Kadaladi Block
Vembar	12
Gundar	10
Grindhambal	15
Therkku Uppar	23

The map below shows the boundary of Vembar, Gundar, Gridhambal and Therkku Upper Watersheds boundaries on Kadaladi Block boundary. The micro watershed based works are identified using Basin, Sub-basin, and Micro Watershed with GP administrative boundaries through Composite Water Resources Management plan approach.

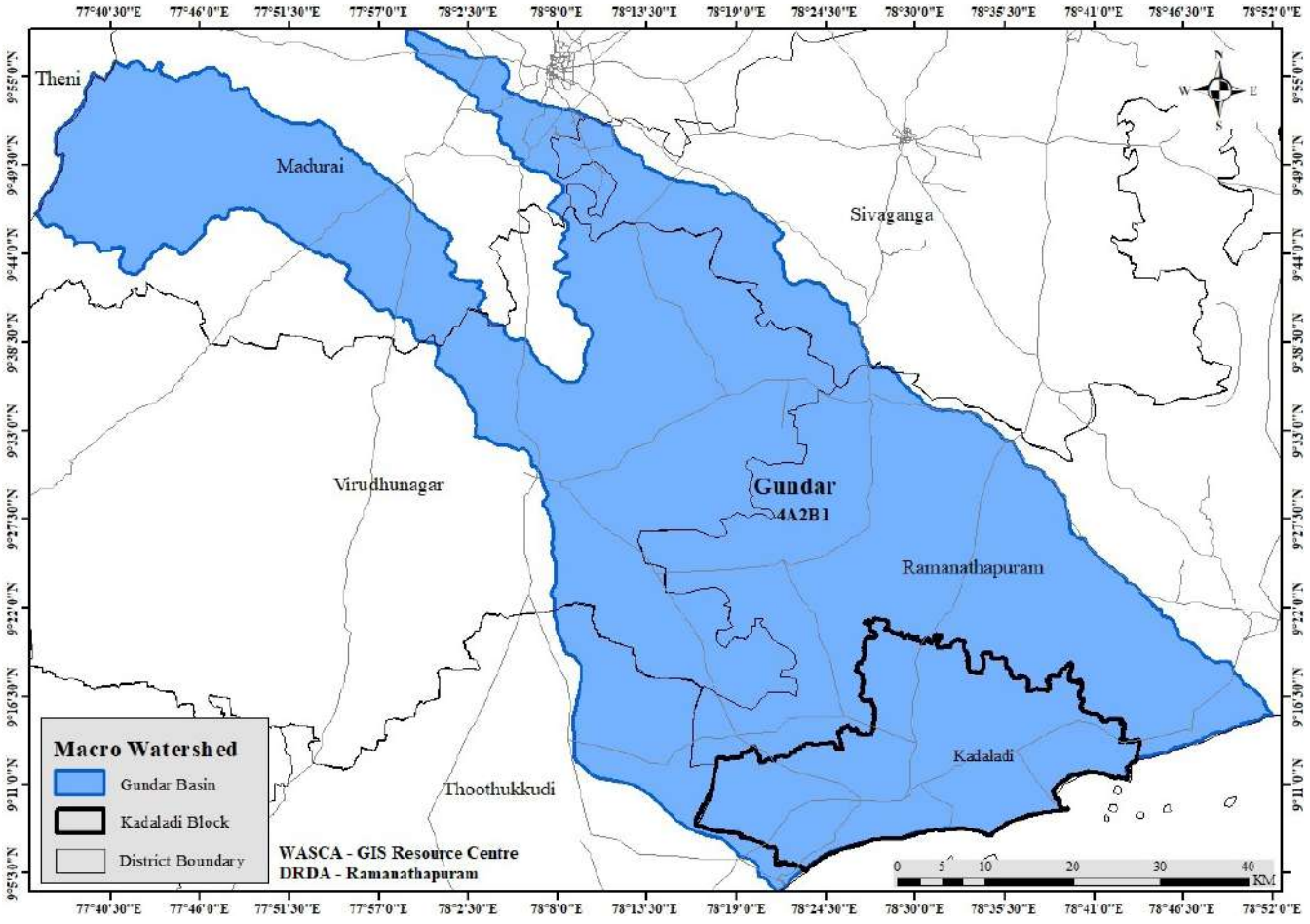


Figure 8.1. Macro-watershed Map Ramanathapuram district

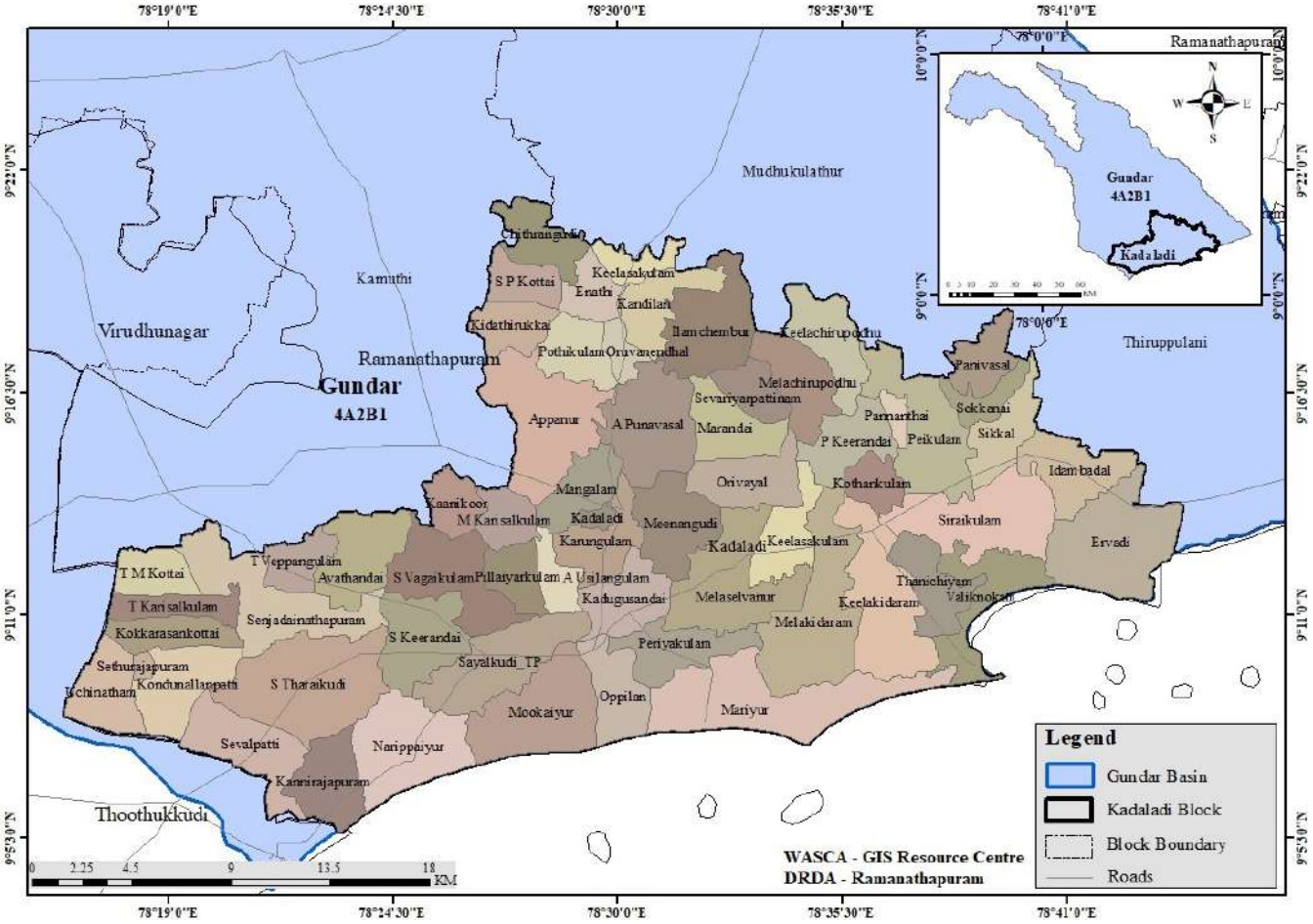


Figure 8.2. Macro-watershed map- Kadaladi Block

All the proposed works are identified using basin, sub-basin, and Micro-watershed with GP administrative boundaries through Composite Water Resources Management plan approach. The ridge details, GPs proposed works in all Macro-watersheds in Kadaladi are listed in Table 23 to 34.

TABLE 23. RIDGE DETAILS OF VEMBAR MACRO-WATERSHED IN KADALADI BLOCK

S.No	Micro-watershed Code	Micro-watershed Area in ha	Type of Ridge
1	4A1D1b08c	29.33887671	Lower Ridge
2	4A1D1c08a	60.28578156	Lower Ridge
3	4A1D1c07a	54.15127946	Lower Ridge
4	4A1D1c06b	77.37717586	Lower Ridge
5	4A1D1b09a	151.9864769	Lower Ridge
6	4A1D1b08b	213.0017649	Lower Ridge
7	4A1D1b08a	160.212454	Lower Ridge
8	4A1D1c06a	230.990596	Lower Ridge
9	4A1D1b06c	278.6141312	Lower Ridge
10	4A1D1b07c	263.7439949	Lower Ridge
11	4A1D1b05c	526.5650904	Lower Ridge
12	4A1D1b07b	480.7463998	Lower Ridge
13	4A1D1c03a	738.5457089	Lower Ridge
14	4A1D1b07a	189.9896838	Lower Ridge
15	4A1D1b06b	123.2396931	Lower Ridge
16	4A1D1b06a	284.0623243	Lower Ridge
17	4A1D1c05a	482.9376916	Lower Ridge
18	4A1D1b05b	311.1778135	Lower Ridge
19	4A1D1c04b	129.0458471	Lower Ridge
20	4A1D1b04b	218.9975536	Lower Ridge
21	4A1D1b05a	253.5894652	Lower Ridge
22	4A1D1d02b	79.35370791	Lower Ridge
23	4A1D1c02c	509.4863747	Lower Ridge
24	4A1D1c04a	172.3717923	Lower Ridge
25	4A1D1b03c	767.0713723	Lower Ridge
26	4A1D1c01c	422.7758041	Lower Ridge
27	4A1D1d02a	563.902925	Lower Ridge
28	4A1D1b04a	963.7599641	Lower Ridge
29	4A1D1c02b	399.9193441	Lower Ridge
30	4A1D1b02b	437.5828495	Lower Ridge
31	4A1D1b03a	675.5874217	Lower Ridge
32	4A1D1c01b	466.2592089	Lower Ridge
33	4A1D1b03b	401.1574124	Lower Ridge
34	4A1D1b02a	1388.909425	Lower Ridge
35	4A1D1d01c	196.8441116	Lower Ridge
36	4A1D1c01a	145.4371818	Lower Ridge
37	4A1D1d01a	223.6601777	Lower Ridge
38	4A1D1d01b	0.805283688	Lower Ridge
39	4A1D1c02a	316.2560918	Lower Ridge
40	4A1D1b01a	946.8654504	Lower Ridge
41	4A1D1a04a	58.9137978	Lower Ridge
42	4A1D1a03a	9.232526697	Lower Ridge

TABLE 24. GRAM PANCHAYATS FALLING UNDER VEMBAR WATERSHED UNDER KADALADI BLOCK

S.NO	GP Name	Type of Ridge
1	SENJADAINATHAPURAM	Lower Ridge
2	TIRUMALUGANDANKOTTAI	Lower Ridge
3	T VEPPANGULAM	Lower Ridge
4	T KARISALKULAM	Lower Ridge
5	S KEERANTHAI	Lower Ridge
6	KOKKARASANKOTTAI	Lower Ridge
7	UCHINATHAM	Lower Ridge
8	V SETHURAJAPURAM	Lower Ridge
9	KONDUNALANPATTI	Lower Ridge
10	S THARAIKUDI	Lower Ridge
11	KANNIRAJAPURAM	Lower Ridge
12	SEVALPATTI	Lower Ridge

TABLE 25. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH RIDGE TYPES FALLING UNDER VEMBAR MACRO-WATERSHED

Work wise Ridge Details of Vembar in Kadaladi Block				
S.No	Name of the Work Proposed	Type of Ridge	Units	Extent
1	Contour Continuous Bunds (CCB) for Afforestation area	Lower Ridge	Mtrs	4681
2	Afforestation in Public/common lands	Lower Ridge	ha	468
3	Drainage Line Treatment (DLT)	Lower Ridge	Mtrs	62
4	Block Plantation (Community)	Lower Ridge	ha	1663
5	Avenue plantation	Lower Ridge	km	52
6	Composting	Lower Ridge	Nos	238
7	Canal Bund Plantation	Lower Ridge	km	10.2
8	Restoration of water bodies: Tanks and Ooranis	Lower Ridge	Nos	74
9	Artificial Recharge Structure	Lower Ridge	Nos	46
10	Farm Bunding with Boundary Trenches - Individual	Lower Ridge	ha	618
11	Construction of Farm Ponds - Individual	Lower Ridge	Nos	232
12	Land development - Individual	Lower Ridge	ha	289
13	Azolla units - Individual	Lower Ridge	Nos	28
14	NADEP Vermi compost	Lower Ridge	Nos	27
15	Fodder development - Community & Individual	Lower Ridge	Nos	28
16	Cattle Shelters	Lower Ridge	Nos	28
17	Goat Sheep Shelters	Lower Ridge	Nos	239
18	Cattle Trough	Lower Ridge	Nos	28
19	Soak Pits (Community)	Lower Ridge	Nos	70
20	Soak Pits (Individual)	Lower Ridge	Nos	705
21	Roof Rain Water harvesting	Lower Ridge	Nos	24
22	Agro Forestry	Lower Ridge	ha	8
23	Nutri Garden	Lower Ridge	Nos	7048
24	Silt application	Lower Ridge	Nos	113
25	Mini Forest	Lower Ridge	ha	12
26	Fish Drying Yard	Lower Ridge	Nos	6
27	Bird Watching Tower	Lower Ridge	Nos	2

28	Fish Processing Unit	Lower Ridge	Nos	6
29	Sand Dune Development	Lower Ridge	Nos	6
30	Wetland Bund Strengthening	Lower Ridge	km	12.9
31	Wetland Bund Plantation	Lower Ridge	Nos	4308
32	Wetland Inlet	Lower Ridge	Nos	2

TABLE 26. RIDGE DETAILS OF MICRO-WATERSHED IN KADALADI BLOCK FALLING UNDER GUNDAR MACRO-WATERSHED

S.NO	Micro-watershed Code	Micro-watershed Area in ha	Type of Ridge
1	4A1D2a06a	16.00294796	Lower Ridge
2	4A1D2a08a	64.43630218	Lower Ridge
3	4A1D2a07b	61.50624035	Lower Ridge
4	4A1D2a05a	299.7632097	Lower Ridge
5	4A1D2a04a	11.31397345	Lower Ridge
6	4A1D2a07a	210.856651	Lower Ridge
7	4A1D2a04b	473.1257734	Lower Ridge
8	4A1D2a01c	277.4093968	Lower Ridge
9	4A1D2a03a	906.7727805	Lower Ridge
10	4A1D2a03b	745.7788692	Lower Ridge
11	4A1D2a04c	690.6913377	Lower Ridge
12	4A1D2a04d	548.6944974	Lower Ridge
13	4A1D2a01b	399.1911887	Lower Ridge
14	4A1D2a03c	885.8573076	Lower Ridge
15	4A1D2a02d	1388.139165	Lower Ridge
16	4A1D2a01a	381.9365223	Lower Ridge
17	4A1D2a02c	1144.804448	Lower Ridge
18	4A1D2a02b	651.4250001	Lower Ridge
19	4A1D2a02a	1310.802083	Lower Ridge

TABLE 27. LIST OF GPS WITH TYPE OF RIDGE FALLING UNDER MACRO-WATERSHED GUNDAR UNDER KADALADI BLOCK

S.No	Gram Panchayat	Type of Ridge
1	KANIKOOR	Lower Ridge
2	AVATHANDAI	Lower Ridge
3	APPANUR	Lower Ridge
4	M KARISALKULAM	Lower Ridge
5	A USILANGULAM	Lower Ridge
6	PILLAIYARKULAM	Lower Ridge
7	S VAGAIKULAM	Lower Ridge
8	SAYALGUDI TP	Lower Ridge
9	MOOKAIYUR	Lower Ridge
10	NARIPPAIYUR	Lower Ridge

TABLE 28. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH RIDGE TYPES FALLING UNDER GUNDAR MACRO-WATERSHED

S.No	Name of the Work Proposed	Type of Ridge	Units	Extent
1	Contour Continuous Bunds (CCB) for Afforestation area	Lower Ridge	Mtrs	1361
2	Afforestation in Public/common lands	Lower Ridge	ha	136.1
3	Drainage Line Treatment (DLT)	Lower Ridge	km	44.8
4	Block Plantation (Community)	Lower Ridge	ha	1322
5	Avenue plantation	Lower Ridge	km	29.6
6	Composting	Lower Ridge	Nos	407
7	Canal Bund Plantation	Lower Ridge	km	50
8	Nursery Development	Lower Ridge	Nos	10
9	Restoration of water bodies: Tanks and Ooranis	Lower Ridge	Nos	83
10	Artificial Recharge Structure	Lower Ridge	Nos	40
11	Farm Bunding with Boundary Trenches - Individual	Lower Ridge	ha	1137.9
12	Construction of Farm Ponds - Individual	Lower Ridge	Nos	407
13	Land development - Individual	Lower Ridge	ha	509
14	Dryland Horticulture/Agroforestry - Individual	Lower Ridge	ha	568
15	Azolla units - Individual	Lower Ridge	Nos	39
16	NADEP Vermi compost	Lower Ridge	Nos	39
17	Fodder development - Community & Individual	Lower Ridge	Nos	39
18	Cattle Shelters	Lower Ridge	Nos	39
19	Goat Sheep Shelters	Lower Ridge	Nos	658
20	Cattle Trough	Lower Ridge	Nos	39
21	Soak Pits (Community)	Lower Ridge	Nos	73
22	Soak Pits (Individual)	Lower Ridge	Nos	725
23	Roof Rain Water harvesting	Lower Ridge	Nos	18
24	Agro Forestry	Lower Ridge	ha	78
25	Fencing	Lower Ridge	km	1.3
26	Nutri Garden	Lower Ridge	Nos	72456
27	Silt application	Lower Ridge	Nos	204
28	Mini Forest	Lower Ridge	ha	10
29	Check Wall	Lower Ridge	Nos	1
30	Fish Drying Yard	Lower Ridge	Nos	5
31	Bird Watching Tower	Lower Ridge	Nos	1
32	Fish Processing Unit	Lower Ridge	Nos	3
33	Sand Dune Development	Lower Ridge	Nos	5
34	Shelter Belt	Lower Ridge	km	2.3
35	Wetland Bund Strengthening	Lower Ridge	km	13
36	Wetland Bund Plantation	Lower Ridge	Nos	4614
37	Wetland Inlet	Lower Ridge	Nos	4
38	Wetland Outlet	Lower Ridge	Nos	4

TABLE 29. RIDGE DETAILS OF MICRO-WATERSHED IN KADALADI BLOCK FALLING UNDER GRIDHAMBAL MACRO-WATERSHED

S.NO	Micro-watershed Code	Micro-watershed Area in ha	Type of Ridge
1	4A1D3b02b	2.38386	Lower Ridge
2	4A1D3b05d	0.53532	Lower Ridge
3	4A1D3b05a	672.79267	Lower Ridge
4	4A1D3b02c	103.66360	Lower Ridge
5	4A1D3b05c	215.88592	Lower Ridge
6	4A1D3b02d	9.25163	Lower Ridge
7	4A1D3b02a	11.18271	Lower Ridge
8	4A1D3b05b	518.83289	Lower Ridge
9	4A1D3b04c	341.25952	Lower Ridge
10	4A1D3b01c	670.90353	Lower Ridge
11	4A1D3a05d	227.49418	Lower Ridge
12	4A1D3b01b	177.32067	Lower Ridge
13	4A1D3b04b	578.02260	Lower Ridge
14	4A1D3a05c	497.69132	Lower Ridge
15	4A1D3b01a	546.88728	Lower Ridge
16	4A1D3b04a	318.27240	Lower Ridge
17	4A1D3a05b	514.15834	Lower Ridge
18	4A1D3a05a	506.05685	Lower Ridge
19	4A1D3a04a	943.60837	Lower Ridge
20	4A1D3a04c	500.72702	Lower Ridge
21	4A1D3a04b	560.71582	Lower Ridge
22	4A1D3a03c	609.81002	Lower Ridge
23	4A1D3a02c	529.30636	Lower Ridge
24	4A1D3a02b	374.77406	Lower Ridge
25	4A1D3a03b	575.36439	Lower Ridge
26	4A1D3a03a	890.62791	Lower Ridge
27	4A1D3a01c	701.24545	Lower Ridge
28	4A1D3a02a	250.81374	Lower Ridge
29	4A1D3a01a	523.86728	Lower Ridge
30	4A1D3a01b	621.43274	Lower Ridge

TABLE 30. LIST OF GPS WITH TYPE OF RIDGE FALLING UNDER MACRO-WATERSHED GRIDHAMBAL UNDER KADALADI BLOCK

S.No	Gram Panchayat	Type of Ridge
1	CHITHRANGUDI	Lower Ridge
2	S P KOTTAI	Lower Ridge
3	KIDATHIRUKAI	Lower Ridge
4	ENATHI	Lower Ridge
5	KANDILAN	Lower Ridge
6	POTHIKULAM	Lower Ridge
7	ORUVANENDHAL	Lower Ridge
8	A PUNAVASAL	Lower Ridge
9	MANGALAM	Lower Ridge
10	KADALADI	Lower Ridge

11	KARUNGULAM	Lower Ridge
12	MEENANGUDI	Lower Ridge
13	KADUGUSANDAI	Lower Ridge
14	PERIYAKULAM	Lower Ridge
15	OPPILAN	Lower Ridge

TABLE 31. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH RIDGE TYPES FALLING UNDER MACRO-WATERSHED GRIDHAMBAL IN KADALADI BLOCK

Work wise Ridge Details of Gridhambal in Kadaladi Block				
S.No	**Name of the Work Proposed**	**Type of Ridge**	**Units**	**Extent**
1	Contour Continuous Bunds (CCB) for Afforestation area	Lower Ridge	Mtrs	1145
2	Afforestation in Public/common lands	Lower Ridge	ha	114.5
3	Drainage Line Treatment (DLT)	Lower Ridge	Mtrs	29834
4	Block Plantation (Community)	Lower Ridge	ha	1100.99
5	Avenue plantation	Lower Ridge	km	67538
6	Composting	Lower Ridge	Nos	213
7	Canal Bund Plantation	Lower Ridge	km	130
8	Nursery Development	Lower Ridge	Nos	15
9	Restoration of water bodies: Tanks and Ooranis	Lower Ridge	Nos	142
10	Artificial Recharge Structure	Lower Ridge	Nos	153
11	Farm Bunding with Boundary Trenches - Individual	Lower Ridge	ha	713.6
12	Construction of Farm Ponds - Individual	Lower Ridge	Nos	218
13	Land development - Individual	Lower Ridge	ha	266.73
14	Dryland Horticulture/Agroforestry - Individual	Lower Ridge	ha	356.5
15	Azolla units - Individual	Lower Ridge	Nos	46
16	NADEP Vermi compost	Lower Ridge	Nos	46
17	Fodder development - Community & Individual	Lower Ridge	Nos	46
18	Cattle Shelters	Lower Ridge	Nos	46
19	Goat Sheep Shelters	Lower Ridge	Nos	710
20	Cattle Trough	Lower Ridge	Nos	46
21	Soak Pits (Community)	Lower Ridge	Nos	117
22	Soak Pits (Individual)	Lower Ridge	Nos	1174
23	Roof Rain Water harvesting	Lower Ridge	Nos	30
24	Agro Forestry	Lower Ridge	ha	50.5
25	Fencing	Lower Ridge	km	7.5
26	Nutri Garden	Lower Ridge	Nos	11743
27	Silt application	Lower Ridge	Nos	106.5
28	Mini Forest	Lower Ridge	ha	15
29	Check Wall	Lower Ridge	Nos	2
30	Fish Drying Yard	Lower Ridge	Nos	2
31	Bird Watching Tower	Lower Ridge	Nos	1
32	Fish Processing Unit	Lower Ridge	Nos	2
33	Sand Dune Development	Lower Ridge	Nos	3
34	Shelter Belt Plantation	Lower Ridge	km	3.5

TABLE 32. RIDGE DETAILS OF MICRO-WATERSHED IN KADALADI BLOCK FALLING UNDER TERKKU UPPER MACRO-WATERSHED

S.NO	Micro-watershed Code	Micro-watershed Area in ha	Type of Ridge
1	4A1D6b07e	1.614874655	Lower Ridge
2	4A1D6b07d	59.55151277	Lower Ridge
3	4A1D6b07b	251.8512107	Lower Ridge
4	4A1D6b05c	0.014523059	Lower Ridge
5	4A1D6b07c	456.9666686	Lower Ridge
6	4A1D6b02a	22.03411224	Lower Ridge
7	4A1D6b06b	875.8755775	Lower Ridge
8	4A1D6b05a	778.9001826	Lower Ridge
9	4A1D6b07a	671.4281918	Lower Ridge
10	4A1D6b04c	412.33658	Lower Ridge
11	4A1D6b04b	610.4229153	Lower Ridge
12	4A1D6b06a	426.1060572	Lower Ridge
13	4A1D6b06c	326.9043046	Lower Ridge
14	4A1D6b02b	284.6346771	Lower Ridge
15	4A1D6b02c	781.4459285	Lower Ridge
16	4A1D6b04a	758.2217479	Lower Ridge
17	4A1D6a11c	619.8076501	Lower Ridge
18	4A1D6b03d	450.7827975	Lower Ridge
19	4A1D6b01a	445.3269515	Lower Ridge
20	4A1D6b03c	30.49246957	Lower Ridge
21	4A1D6a09c	39.62748502	Lower Ridge
22	4A1D6b02d	684.0129354	Lower Ridge
23	4A1D6b01b	991.1210846	Lower Ridge
24	4A1D6a03d	401.1392742	Lower Ridge
25	4A1D6a11b	1245.192594	Lower Ridge
26	4A1D6a10c	726.2968311	Lower Ridge
27	4A1D6a09d	376.6134145	Lower Ridge
28	4A1D6a11a	1094.522029	Lower Ridge
29	4A1D6a06a	857.4692798	Lower Ridge
30	4A1D6a06b	827.8032974	Lower Ridge
31	4A1D6a10b	442.7338546	Lower Ridge
32	4A1D6a10a	312.4996702	Lower Ridge
33	4A1D6a09b	460.7016911	Lower Ridge
34	4A1D6a08a	528.8930492	Lower Ridge
35	4A1D6a09a	844.2093297	Lower Ridge
36	4A1D6a05c	639.9803412	Lower Ridge
37	4A1D6a03c	1387.618489	Lower Ridge
38	4A1D6a04d	847.0352598	Lower Ridge
39	4A1D6a04b	1259.807788	Lower Ridge
40	4A1D6a05b	542.5215962	Lower Ridge
41	4A1D6a05a	264.8828274	Lower Ridge
42	4A1D6a04a	404.9105787	Lower Ridge
43	4A1D6a03b	526.0616878	Lower Ridge
44	4A1D6a07c	942.0726113	Lower Ridge
45	4A1D6a04c	597.9842276	Lower Ridge

46	4A1D6a01c	542.7864764	Lower Ridge
47	4A1D6a03a	793.9393458	Lower Ridge
48	4A1D6a07a	402.1998461	Lower Ridge
49	4A1D6a07b	633.1315354	Lower Ridge
50	4A1D6a02b	1180.035065	Lower Ridge
51	4A1D6a02c	485.0993661	Lower Ridge
52	4A1D6a01b	285.8848279	Lower Ridge
53	4A1D6a02a	1266.100973	Lower Ridge
54	4A1D6a01a	1322.779509	Lower Ridge

TABLE 33. LIST OF GPS WITH TYPE OF RIDGE FALLING UNDER MACRO-WATERSHED TERKKU UPPER UNDER KADALADI BLOCK

Gram Panchayats falling under Terkku Upper Watershed in Kadaladi Block		
S.No	**Gram Panchayat**	**Type of Ridge**
1	KEELASAKULAM	Lower Ridge
2	ILANCHEMBUR	Lower Ridge
3	KEELACHIRUPODHU	Lower Ridge
4	SAVARIYARPATTINAM	Lower Ridge
5	PANNANTHAI	Lower Ridge
6	MELACHIRUPODHU	Lower Ridge
7	PANIVASAL	Lower Ridge
8	P KEERANTHAI	Lower Ridge
9	MARANTHAI	Lower Ridge
10	PEIKULAM	Lower Ridge
11	ORIVAYAL	Lower Ridge
12	KELASELVANUR	Lower Ridge
13	MELASELVANUR	Lower Ridge
14	KOTHANGULAM	Lower Ridge
15	SIKKAL	Lower Ridge
16	IDAMBADAL	Lower Ridge
17	SIRAIKULAM	Lower Ridge
18	THANICHIYAM	Lower Ridge
19	MELAKIDARAM	Lower Ridge
20	ERVADI	Lower Ridge
21	KEELAKIDARAM	Lower Ridge
22	VALIKNOKAM	Lower Ridge
23	MARIYUR	Lower Ridge

TABLE 34. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH RIDGE TYPES FALLING UNDER MACRO-WATERSHED TERKKU UPPER IN KADALADI BLOCK

Work wise Ridge Details of Terkku Upper in Kadaladi Block				
Sl.No	**Name of the Work Proposed**	**Type of Ridge**	**Units**	**Extent**
1	Contour Continuous Bunds (CCB) for Afforestation area	Lower Ridge	Mtrs	1596.55
2	Afforestation in Public/common lands	Lower Ridge	ha	1596.55
3	Drainage Line Treatment (DLT)	Lower Ridge	Mtrs	60363
4	Block Plantation (Community)	Lower Ridge	ha	1616.45
5	Avenue plantation	Lower Ridge	km	123

6	Composting	Lower Ridge	Nos	680
7	Canal Bund Plantation	Lower Ridge	km	23.9
8	Nursery Development	Lower Ridge	Nos	60
9	Restoration of water bodies: Tanks and Ooranis	Lower Ridge	Nos	224
10	Artificial Recharge Structure	Lower Ridge	Nos	349
11	Farm Bunding with Boundary Trenches - Individual	Lower Ridge	ha	2326
12	Construction of Farm Ponds - Individual	Lower Ridge	Nos	700
13	Land development - Individual	Lower Ridge	ha	935.7
14	Dryland Horticulture/Agroforestry - Individual	Lower Ridge	ha	1162.9
15	Azolla units - Individual	Lower Ridge	Nos	85
16	NADEP Vermi compost	Lower Ridge	Nos	64
17	Fodder development - Community & Individual	Lower Ridge	Nos	90
18	Cattle Shelters	Lower Ridge	Nos	86
19	Goat Sheep Shelters	Lower Ridge	Nos	1157
20	Cattle Trough	Lower Ridge	Nos	86
21	Soak Pits (Community)	Lower Ridge	Nos	190
22	Soak Pits (Individual)	Lower Ridge	Nos	1896
23	Roof Rain Water harvesting	Lower Ridge	Nos	46
24	Agro Forestry	Lower Ridge	ha	718
25	Fencing	Lower Ridge	km	30
26	Nutri Garden	Lower Ridge	Nos	23
27	Silt application	Lower Ridge	Nos	298
28	Mini Forest	Lower Ridge	ha	23
29	Check Wall	Lower Ridge	Nos	7
30	Fish Drying Yards	Lower Ridge	Nos	10
31	Fish Processing Unit	Lower Ridge	Nos	8
32	Sand Dune Development	Lower Ridge	Nos	13
33	Shelter Belt	Lower Ridge	km	5.5
34	Wetland Bund Strengthening	Lower Ridge	km	22.6
35	Wetland Bund Plantation	Lower Ridge	Nos	7543
36	Wetland Inlet	Lower Ridge	Nos	2
37	Wetland Outlet	Lower Ridge	Nos	2
38	Bird Watching Tower	Lower Ridge	Nos	3

8.2 MODEL MICRO-WATERSHED - KUTHIRAIMOZHI MICRO-WATERSHED KADALADI BLOCK, RAMANATHAPURAM DISTRICT

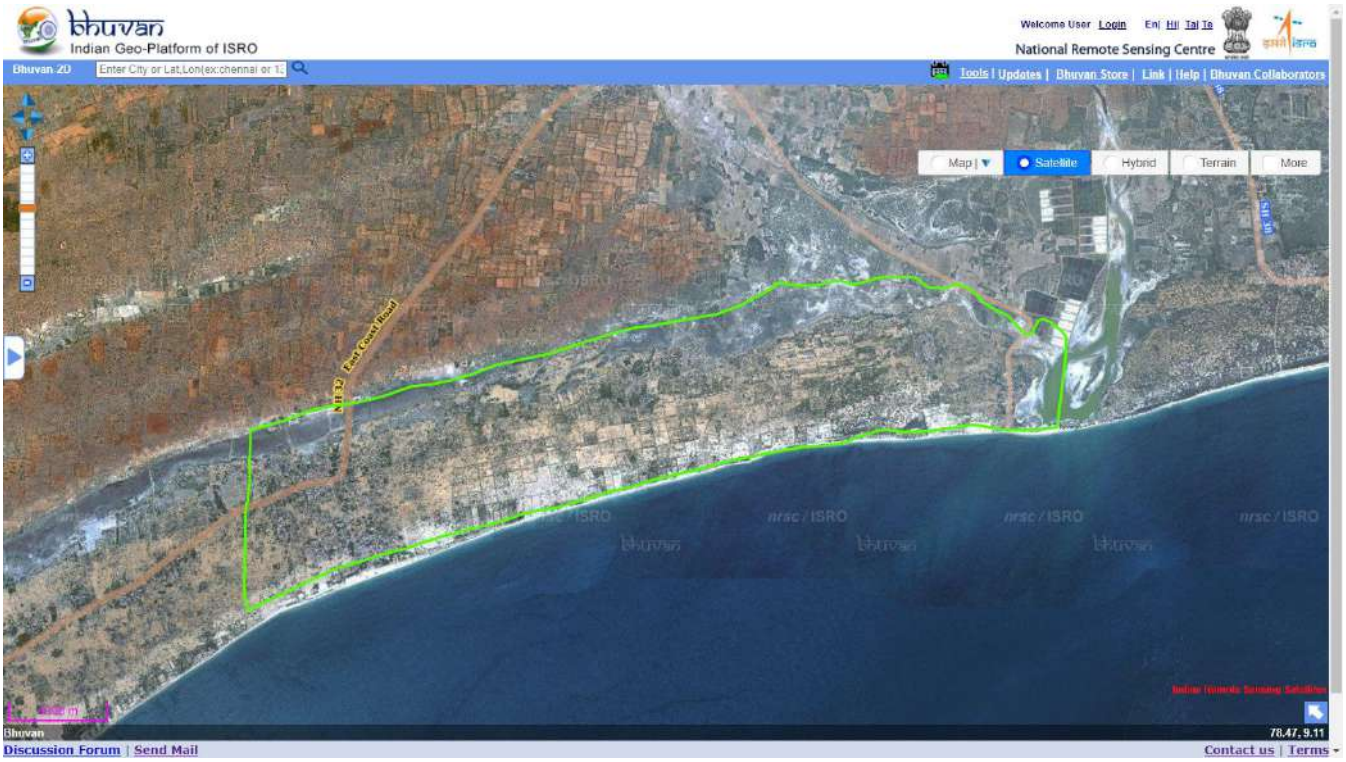


Figure 8.3. Satellite image of Kuthiraimozhi Micro-watershed

The Micro-watershed case study addresses the issues of water conservation and climate change through integrated approach. The decentralized Micro-watershed planning has been conceived holistic development and management to ensure long-term benefits. The micro-watershed plan sequenced from ridge to valley for proper implementation of different development programs. This includes coordination of various natural components like groundwater, surface water, geology, hydrogeology, catchment, land use, soil, population, salt affected along with various water resource supply and demand component. The ultimate goal is to achieve and maintain a balance between resources development to increase the welfare of the population.

KUTHIRAIMOZHI MICRO-WATERSHED

Kuthiraimozhi Micro-watershed falls under Naripayur Gram Panchayat and Mookaiyur Gram Panchayat, Kadaladi Block in Ramanathapuram District (Figure 8.6 & 8.7). This Micro-watershed is the part of Gundar Macro-watershed in Gundar sub-basin. The general information, geology, hydrogeology, natural drainage line, catchment area, ground water status, water budget of are Kuthiraimozhi Micro-watershed is given below in separate sections followed by proposed works, ridge wise proposed treatment area, estimated cost and required person days and key outcomes (Table 35 to 48). The key spatial parameter representations of Micro-watershed alosng with proposed plan are shown in Figure 8.8 to 8.13. The key CWRM parameters for the GPs falling in this Micro-watershed is annexed in 7.

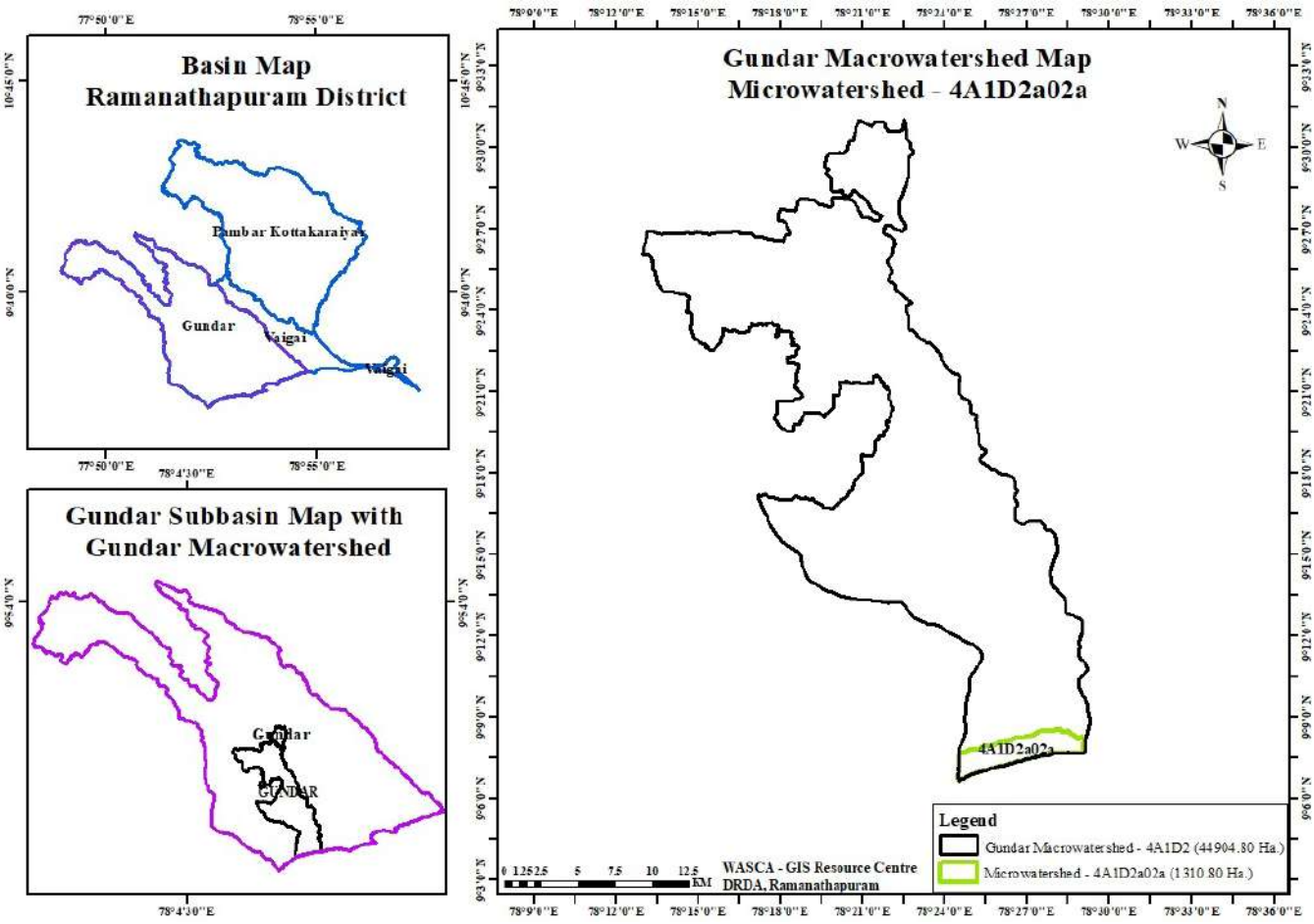


Figure 8.4. Location of Kuthiraimozhi Micro-watershed

TABLE 35. GENERAL INFORMATION OF THE MICRO-WATERSHED

Sl.No	Description	Name/ Number/ Quantity/ Status
1	Name of the Micro-watershed	**Kuthiraimozhi Micro-watershed**
2	Micro-watershed Number	**4A1D2a02a**
3	Name of the Basin	Gundar
4	Name of the sub-basin	Gundar
5	Name of the Macro-watershed	Gundar
6	Number of GPs covered under the Micro-watershed	2
7	Name of the GPs	1. Naripaiyur, 2. Mookaiyur
8	Latitude of Micro-watershed (From To)	9°6'39.354"N to 9°8'34.904"N
9	Longitude of Micro-watershed (From To)	78°24'17.975"E to 78°29'7.165"E
10	Total area of the Micro-watershed in ha	1,310.80 ha
11	Percentage of Micro-watershed area in Naripayur GP	44%
12	Percentage of Micro-watershed area in Mookaiyur GP	56%
13	Area of Micro-watershed falling in Naripayur GP	572 ha
14	Area of Micro-watershed falling in Mookaiyur GP	738 ha
15	Length of the Coastal Line on Naripayur GP	3,932 m
16	Length of the Coastal Line on Mookaiyur GP	4,346 m
17	Total Population of Naripayur GP	9,861
18	Total Population of Mookaiyur GP	3,251
19	Annual Average Rainfall	821 mm
20	Annual maximum Temperature	32.6 °C
21	Annual Minimum Temperature	23.8 °C

22	Evapotranspiration Losses of Naripayur GP (Ha-M)	29.48 Ha-M
23	Evapotranspiration Losses of Mookaiyur GP (Ha-M)	40.12 Ha-M
24	Volumetric soil moisture availability	23%
25	Climate Risk	Drought and heat waves
26	CVI Index Value for Naripayur (Based on WASCA Climate study)	41.98 (High Agriculture Vulnerability)
27	CVI Index Value for Mookaiyur (Based on WASCA Climate study)	37.49 (High Agriculture Vulnerability)
28	Agro-Climatic Zone	Southern Zone (TN 05)
29	Agro Ecological Sub-Region (ICAR)	Hot dry semi-arid eco sub region(18.1)
30	Status of Ground water in Naripayur GP	Saline
31	Status of Ground water in Mookaiyurr GP	Saline

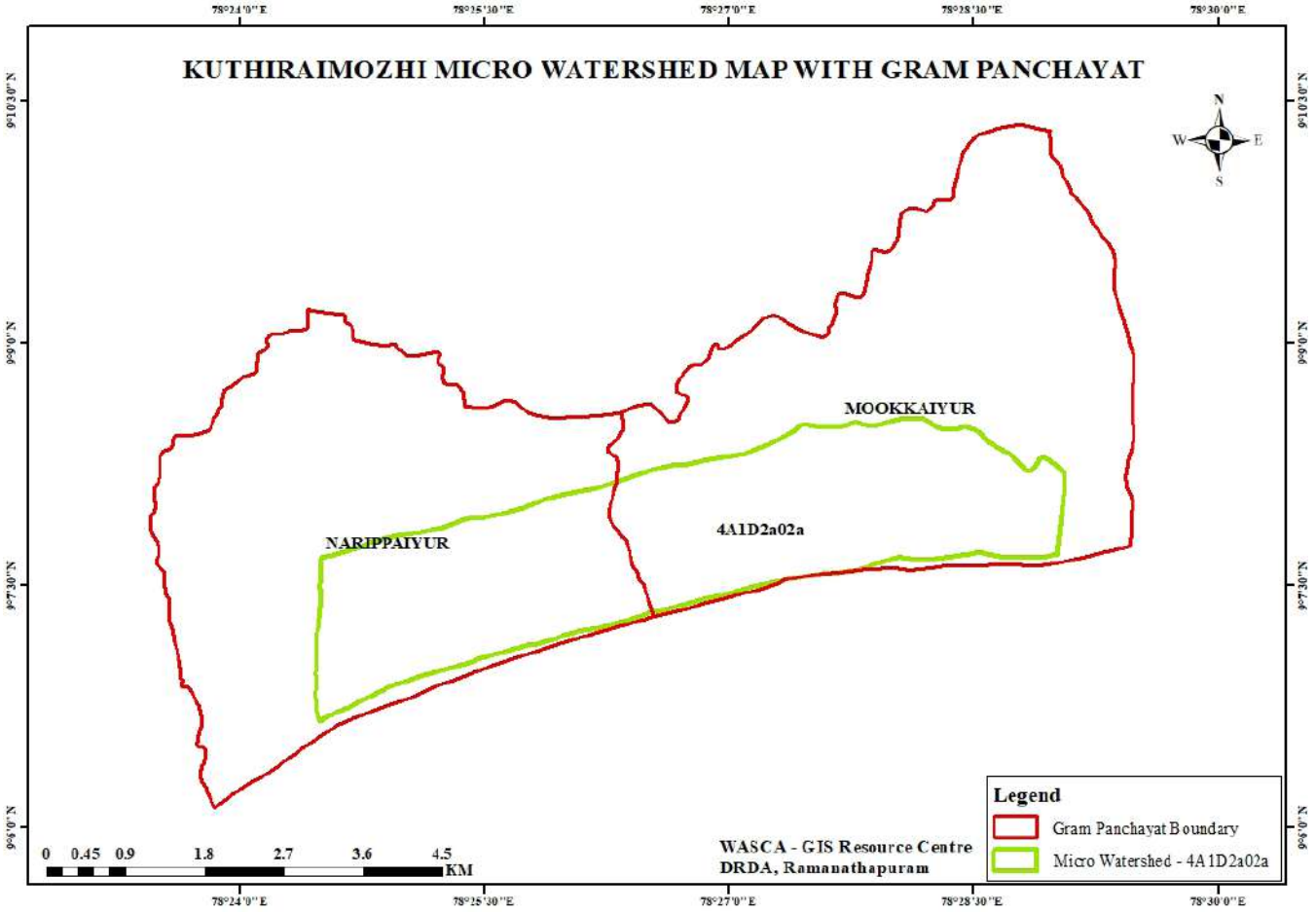


Figure 8.5. Kuthiraimozhi Micro-watershed with GPs

TABLE 36. GEOLOGY, HYDROGEOLOGY OTHER CHARACTERISTICS IN MICRO-WATERSHED

1	Type of Geomorphology	Coastal Origin - Younger Coastal Plain
2	Geomorphology occurrence in %	100%
3	Geology Quality	
4	Principle Aquifer	Alluvium
5	Salt Affected Area passing through the Micro-watershed	356 ha (Lower ridge)
6	Type of lineaments passing through the Micro-watershed	None
7	Barren & waste lands	433 ha (Lower ridge)

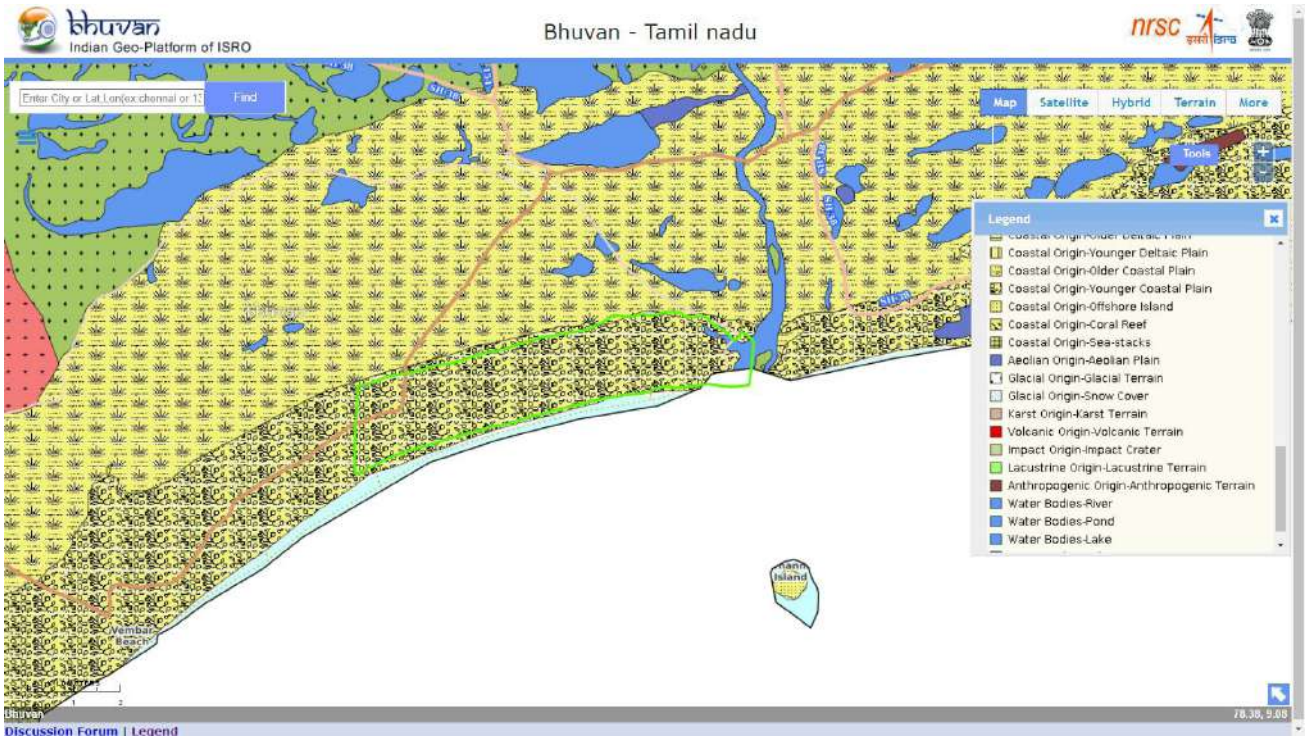


Figure 8.6. Geomorphology map of Micro-watershed

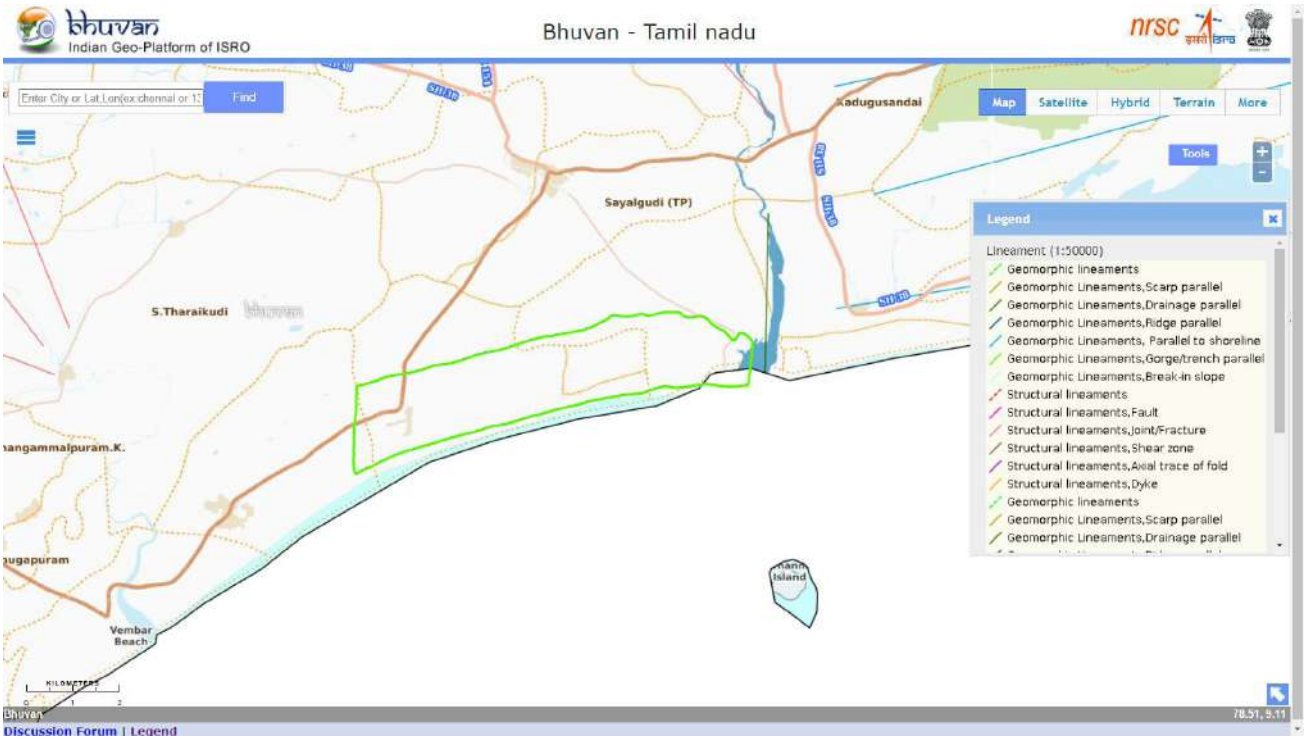


Figure 8.7. Lineament map of Micro-watershed

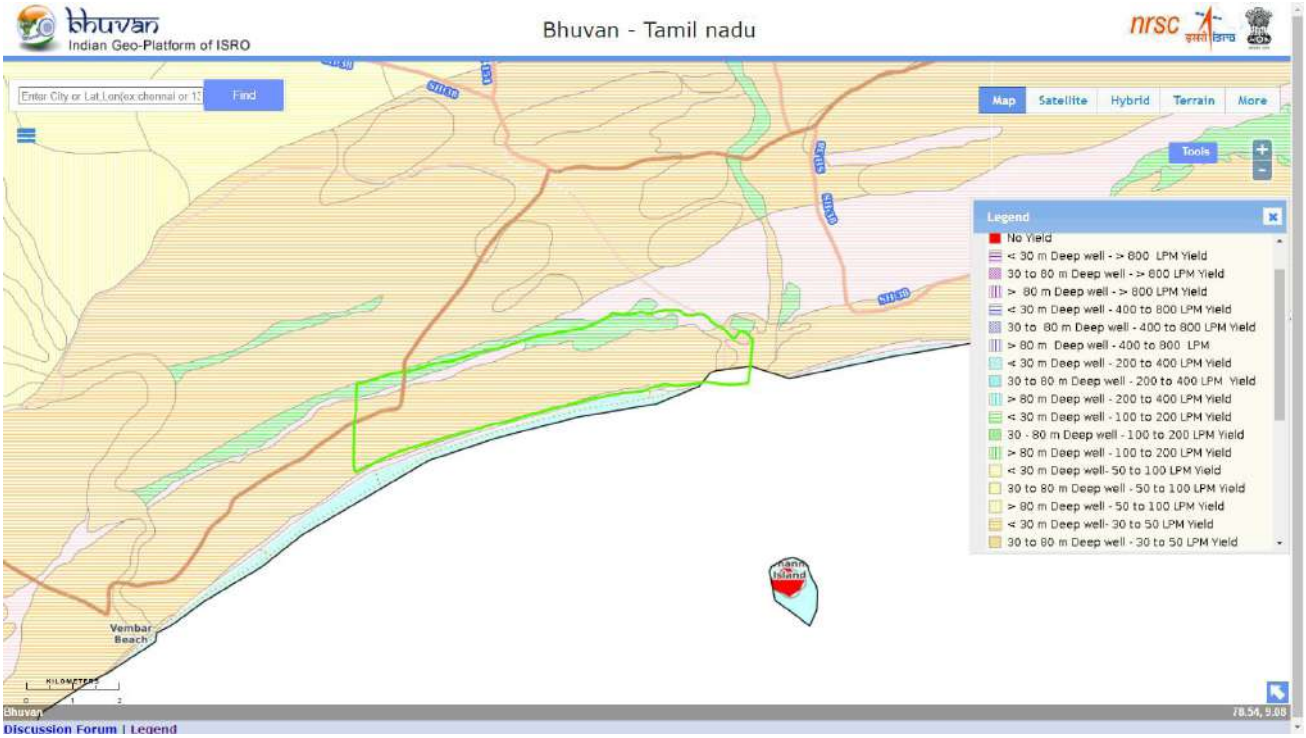


Figure 8.8 Ground water perspective map of Micro-watershed

TABLE 37. EXISTING WATER HARVESTING STRUCTURES IN MICRO-WATERSHED

Existing Water Harvesting Structures in Naripayur GP			
S.No.	Name of Structure	Existing Structures	
		No.	Area in ha
1	Oorani	6	4.86
2	Check Dam	2	0.75
	Total	**8**	**5.61**
Existing Water Harvesting Structures in Mookaiyur GP			
1	Oorani	3	1.97
2	Farm Pond	3	1.82
3	Check Dam	3	1.11
	Total	**9**	**4.9**

TABLE 38. CATCHMENT AREA PROFILE

Catchment area in ha	Naripayur GP	Mookaiyur GP
Good catchment area	15.1	148.9
Average catchment area	82.3	82.7
Bad catchment area	141.7	97.1

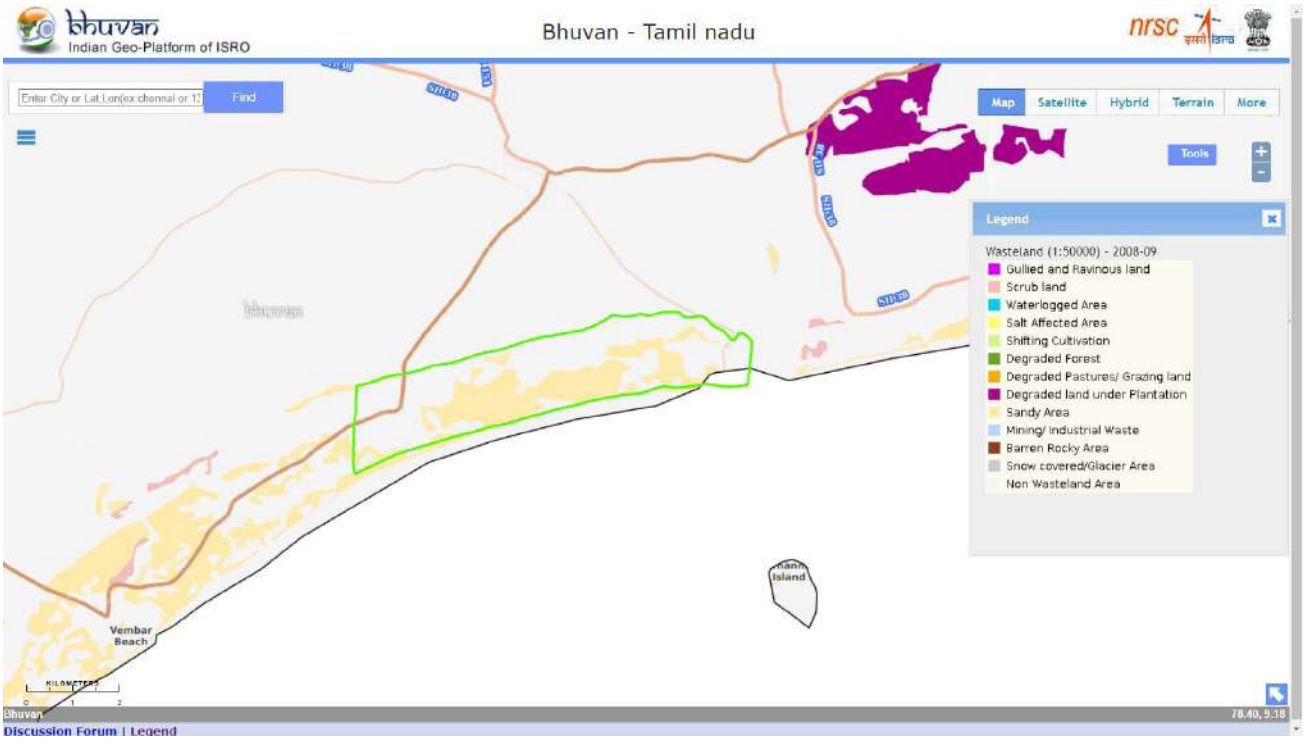


Figure 8.9. Waste land map of Micro-watershed

TABLE 39. WETLANDS AND RIVER (STREAM) IN MICRO-WATERSHED

Wetlands and River (Stream) in Micro-watershed		
1	No.of Wetland Falling in the Micro-watershed	5
2	Total Area of the Wetland in the Micro-watershed	175.57 ha
3	Length of 2nd Order Drain Passing through Wetland	3142 m
4	No. of Higher Order Stream (River)	Gundar River

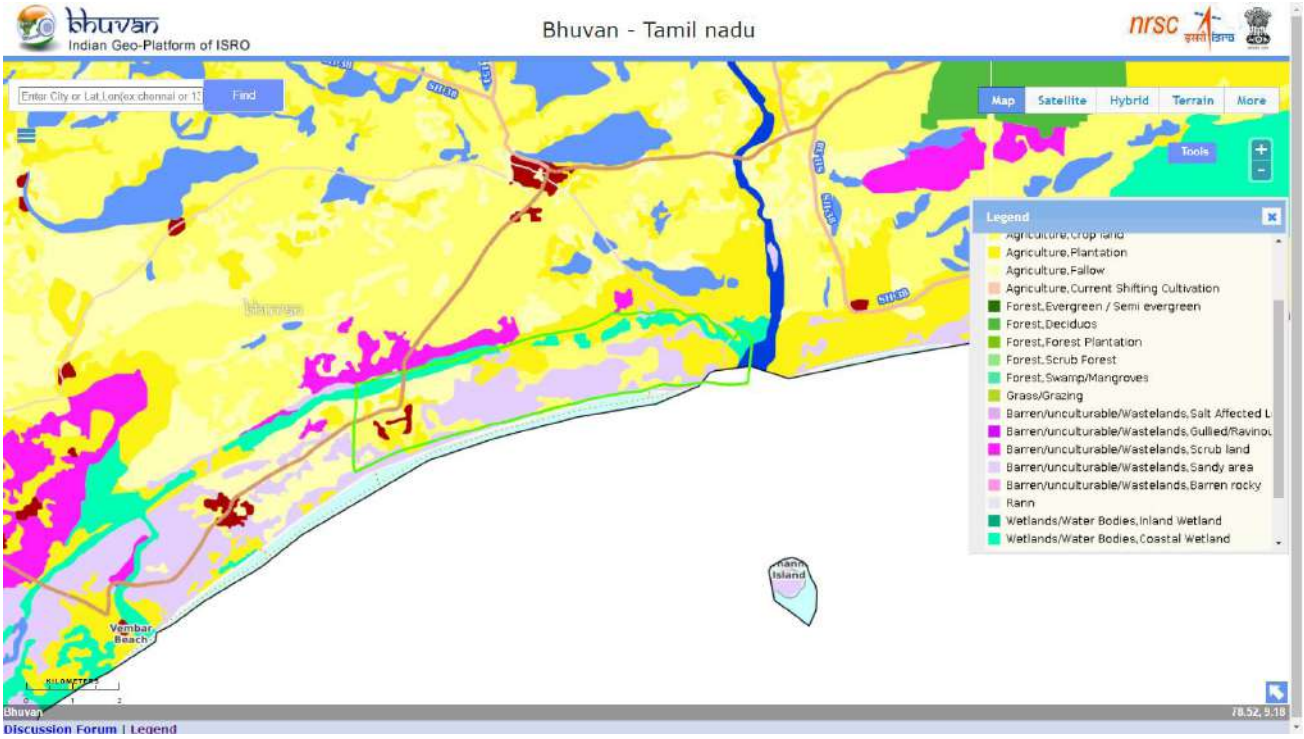


Figure 8.10. Land use and land cover map of Micro-watershed

TABLE 40. GROUND WATER STATUS OF MICRO-WATERSHED

Ground Water Status of Micro-watershed	
Name of the Firka (Assessment Unit) falling under Micro-watershed	Sayalkudi
Recharge from other sources during monsoon season	557.05
Recharge from other sources during non-monsoon season	208.22

TABLE 41. SALINITY AND SEA WATER INTRUSION IN THE MICRO-WATERSHED

Salinity and Sea Water Intrusion in the Micro-watershed	
Pre monsoon Water Quality Index	Poor and Very Poor Quality
Post monsoon Water Quality Index	Medium and Good Quality
Pre monsoon Sea Water Mixing Index	<=1
Post monsoon Sea Water Mixing Index	<=1

TABLE 42. GP WATER BUDGET

		Naripayur	Mookaiyur
1	Water for Human	26.99 Ha-M	8.9 Ha-M
2	Water for Agriculture	122.8 Ha-M	202.9 Ha-M
3	Water for Animal	3.18 Ha-M	1.69 Ha-M
4	Village wise water required	153 Ha-M	213.5 Ha-M
5	Available run-off from rain water (derived from Strange method)	239.1 Ha-M	328.6 Ha-M
6	Harvested Runoff from Water Harvesting Activities	3.5 Ha-M	230 Ha-M
7	Potential Harvesting from proposed Interventions	161 Ha-M	137.7 Ha-M
8	Total Water harvested	164.5 Ha-M	367.7 Ha-M
9	Water demand and Supply Difference	-11.5	-154.2 Ha-M
10	Water Demand Supply Gap Status	deficient	deficient
11	Per capita Water Availability in cum	242.47 Cum	1010.76 Cum
12	International Standard per capita water Availability in cum	1700 Cum	1700 Cum
13	Water Availability Gap	-1,544.84 Cum	-1043.28 Cum
14	Water security status	Water Stress	Water Stress

TABLE 43. PROPOSED WORKS IN MICRO-WATERSHED GP WISE

		Naripayur	Mookaiyur
1	Proposed works in Upper Ridge	0 Number	0 Number
2	Proposed works in Middle Ridge	0 Number	0 Number
3	Proposed works in Lower Ridge	75 Number	65 Number
4	Total works	75 Number	65 Number

TABLE 44. TREATMENT AREA, ESTIMATED COST AND PERSON DAYS

	Naripayur	Mookaiyur
Upper Ridge		
No Upper ridge Falling in the GP		
Middle Ridge		
No Middle ridge Falling in the GP		
Lower Ridge		
Estimated cost for Lower ridge area	108.25 Lakhs	89.20 Lakhs
Total area in Lower ridge	572 ha	738 ha
Estimated Person days generated for Treatment of Lower Ridge	30,943	23,890
Treatment cost for Lower ridge per ha	0.189 Lakh/ha	0.120 Lakh/ha

Naripayur GP	Treatment cost (INR in lakhs)	Estimated person days
Upper Ridge	NA	NA
Middle Ridge	NA	NA
Lower Ridge	0.189 lakh/ha	30,943
TOTAL	0.189 lakh/ha	30,943

Mookaiyur GP	Treatment cost (INR in lakhs)	Estimated person days
Upper Ridge	NA	NA
Middle Ridge	NA	NA
Lower Ridge	0.120 lakh/ha	23,890
TOTAL	0.120 lakh/ha	23,890

TABLE 45. NATURE AND NUMBER OF WORKS IN MICRO-WATERSHED

Description	Number
Arable, Non arable & DLT	79
Livelihood Activities	19
Rural Greywater Management Activities	45

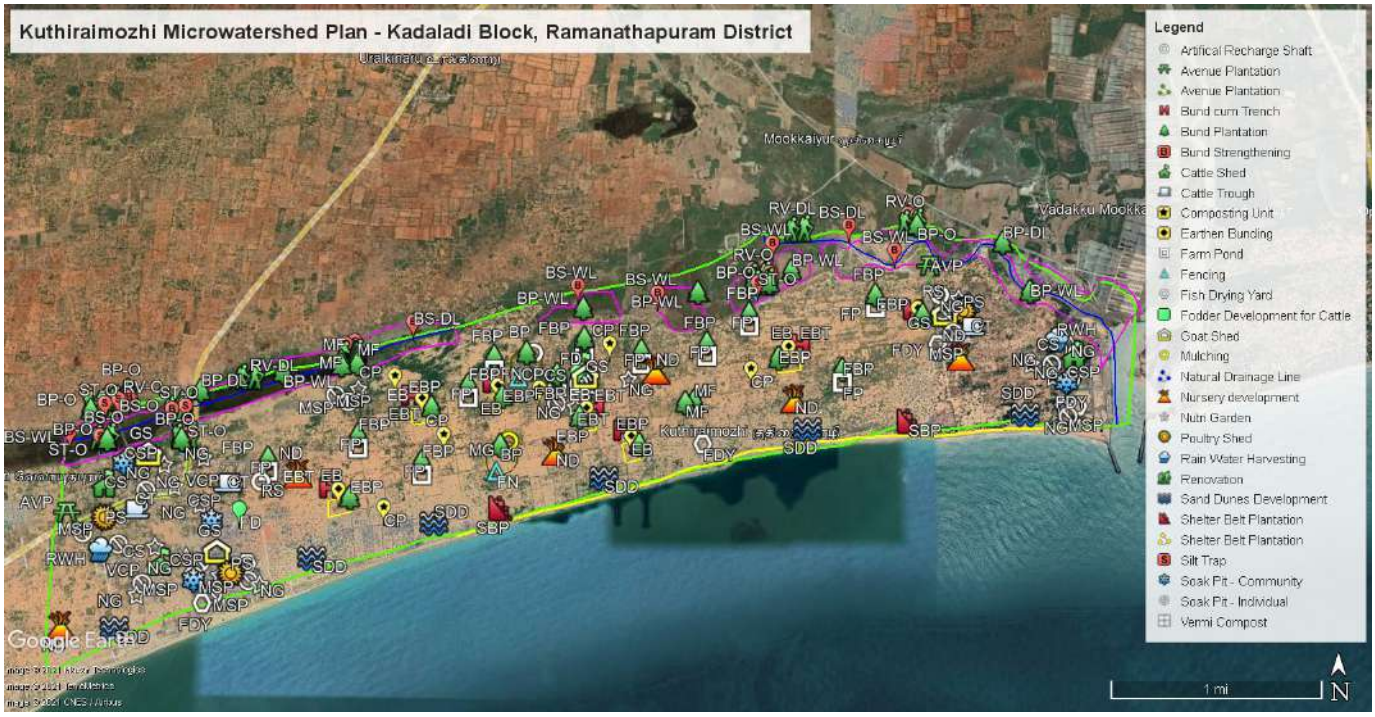
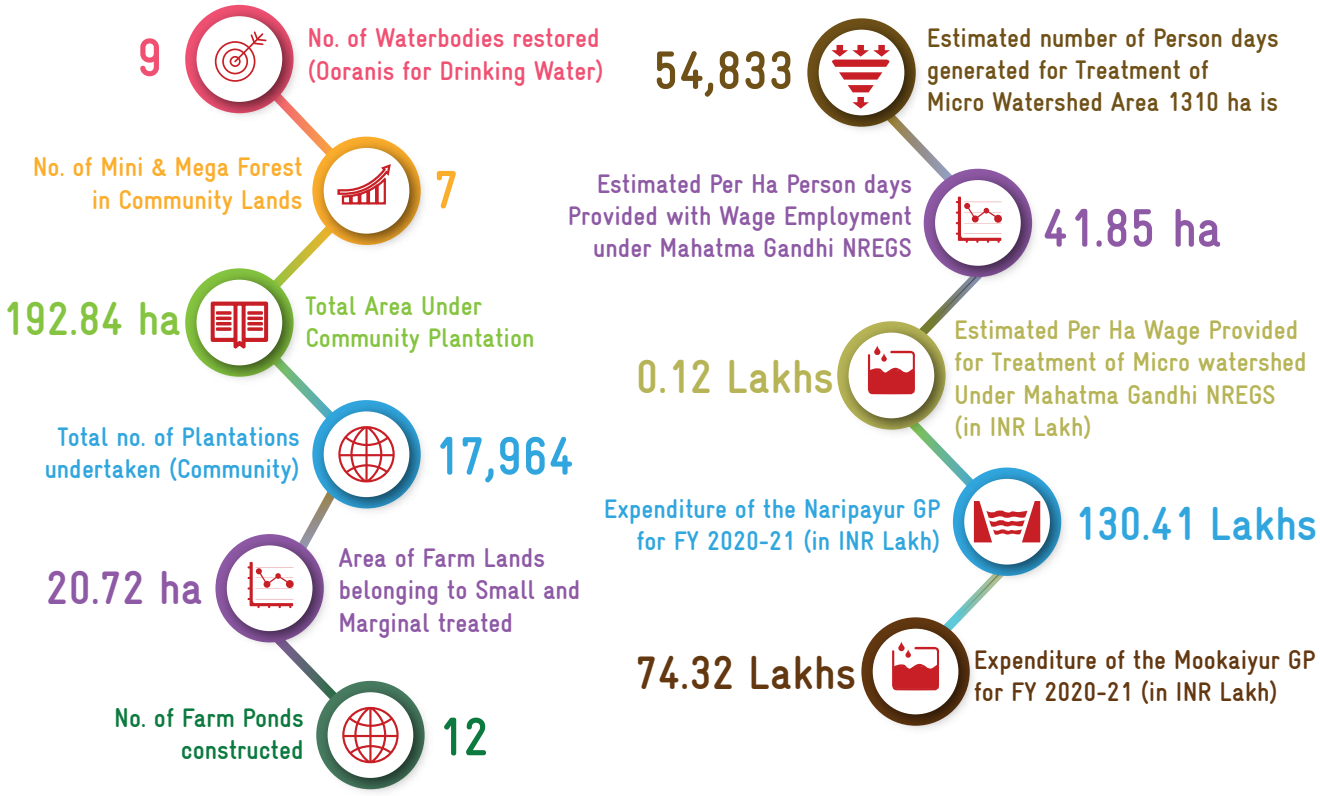


Figure 8.11. Micro-watershed plan

TABLE 46. KEY OUTCOMES OF INTERVENTION



Expenditure for FY 2020-21 (in INR lakh)

Naripayur GP	130.41 lakhs
Mookaiyur GP	74.32 lakhs

TABLE 47. ESTIMATES OF KUTHIRAIMOZHI MICRO-WATERSHED IN NARIPAYUR GRAM PANCHAYAT

Sl. No	Name of the Work Proposed	Type of Ridge	Status of Work	Units	Extent	No. of works as per KML	Estimate cost in Lakhs	Person days
NRM works in Public and Community Lands								
1	Restoration of Traditional water bodies: (Oorani)	Lower	Not commenced	Number	6	6	42.00	15,200
2	Oorani bund Plantation	Lower	Not commenced	Number	504	6	2.32	120
3	Avenue plantation	Lower	Not commenced	km	1.52	1	1.80	80
4	Block Plantation	Lower	Not commenced	ha	5.31	1	15.26	292
5	Compost Pit in Block Plantation Area	Lower	Not commenced	Number	1	1	0.06	132
6	Mini Forest	Lower	Completed	Number	2,500	5	11.50	7,900
7	Wetland Boundary Plantation (Mini forest)	Lower	Not commenced	Number	1,720	1	7.91	3,440
8	Roof Rain Water Harvesting in GP Building	Lower	Not commenced	Number	1	1	0.31	15
Sub total						**22**	**81.16**	**27,179**
Coastal Watershed Activities								
9	Establishment of Village Nursery *	Lower	Ongoing	Number	4	4	-	-
10	Coastal Shelter Belt Plantation *	Lower	Not commenced	km	4.34	1	-	-
11	Sand Dunes Development *	Lower	Not commenced	Number	3.00	3	-	-
Sub total						**8**	**0.00**	**0**
Works in Individual Farmer lands (Agriculture and Allied Activities)								
12	Recharge Shaft for bore well farmers for Salinity Reduction	Lower	Not commenced	Number	2.0	2	0.72	44
13	Farm Bunding with Boundary Trenches - Individual	Lower	Not commenced	ha	7.3			
				Number	3.0	3	6.70	2,520
14	Construction of Farm Ponds - Individual	Lower	Not commenced	Number	4.0	4	2.04	672

15	NADEP Vermi compost	Lower	Not commenced	ha	0.5	2	2.40	70
16	Fodder development - Individual	Lower	Not commenced	ha	2.0	1	0.20	10
Sub total						**12**	**12.06**	**3316**
Total no. of works for treatment of Micro-watershed (Arable, Non arable & DLT)						**42**	**93.22**	**30,495**
Livelihood enhancement activities for Individual Farmers (Coastal Area)								
17	Fish Drying Yard	Lower	Not commenced	Number	2	2	7.00	238
18	Cattle Shelters	Lower	Not commenced	Number	2	2	4.32	106
	Poultry Shed	Lower	Not commenced	Number	2	2	4.00	112
	Goat Sheep Shelters	Lower	Not commenced	Number	2	2	4.74	106
19	Cattle Trough	Lower	Not commenced	Number	2	2	0.40	20
Sub total						**10**	**13.46**	**344**
Rural Greywater and Roof Rainwater Management								
20	Soak Pits (Individual)	Lower	Not commenced	Number	10	10	1.08	70
21	Soak Pits (Community)	Lower	Not commenced	Number	3	3	0.39	24
22	Nutri Garden	Lower	Not commenced	Number	10	10	0.10	10
Sub total						**23**	**1.57**	**104**
Total no. of works under Naripayur GP for Micro-watershed development (IWRM)						**75**	**108.25**	**30,943**
*** Estimates yet to be prepared**								

TABLE 48. ESTIMATES OF KUTHIRAIMOZHI MICRO-WATERSHED IN MOOKAIYUR GRAM PANCHAYAT

NRM works in Public and Community Lands								
Sl. No	**Name of the Work Proposed**	**Type of Ridge**	**Status of Work**	**Units**	**Extent**	**No. of works as per KML**	**Estimate cost in Lakhs**	**Person days**
1	Restoration of Traditional water bodies: (Oorani)	Lower	Not commenced	Number	3	3	21.00	7,600
2	Oorani bund Plantation	Lower	Not commenced	Number	243	3	1.12	60
3	Avenue plantation	Lower	Not commenced	km	0.80	1	0.95	40
4	Block Plantation	Lower	Not commenced	ha	4.88	1	14.05	264
5	Compost Pit in Block Plantation Area	Lower	Not commenced	Number	3	1	0.18	396

6	Mini Forest	Lower	Completed	Number	1,000	2	4.60	3,160
7	Wetland Boundary Plantation (Mini forest)	Lower	Not commenced	Number	4,272	4	19.65	7,210
8	Roof Rain Water Harvesting in GP Building	Lower	Not commenced	Number	1	1	0.31	15
Sub total						**16**	**61.86**	**18,745**
Coastal Watershed Activities								
9	Establishment of Village Nursery *	Lower	Ongoing	Number	2	2	-	-
10	Coastal Shelter Belt Plantation *	Lower	Not commenced	km	0.70	1	-	-
11	Sand Dunes Development *	Lower	Not commenced	Number	3.00	3	-	-
Sub total						**6**	**0.00**	**0.00**
Works in Individual Farmer lands (Agriculture and Allied Activities)								
12	Recharge Shaft for bore well farmers for Salinity Reduction	Lower	Not commenced	Number	1	1	0.36	22
13	Farm Bunding with Boundary Trenches - Individual	Lower	Not commenced	ha	8.42			
				Number	4	4	8.80	3,360
14	Construction of Farm Ponds - Individual	Lower	Not commenced	Number	8	8	4.08	1,344
15	NADEP Vermi compost	Lower	Not commenced	ha	0.5	1	1.20	35
16	Fodder development - Individual	Lower	Not commenced	ha	2	1	0.20	10
Sub total						**15**	**14.64**	**4771**
Total no. of works for treatment of Micro-watershed (Arable, Non arable & DLT)						**37**	**76.50**	**23,516**
Livelihood enhancement activities for Individual Farmers (Coastal Area)								
17	Fish Drying Yard	Lower	Not commenced	Number	3	3	10.50	357
18	Cattle Shelters	Lower	Not commenced	Number	2	2	4.32	106
	Poultry Shed	Lower	Not commenced	Number	1	1	2.00	56
	Goat Sheep Shelters	Lower	Not commenced	Number	2	2	4.74	106
19	Cattle Trough	Lower	Not commenced	Number	1	1	0.20	10
Sub total						**9**	**11.26**	**278**

Rural Greywater and Roof Rainwater Management								
20	Soak Pits (Individual)	Lower	Not commenced	Number	10	10	1.08	70
21	Soak Pits (Community)	Lower	Not commenced	Number	2	2	0.26	16
22	Nutri Garden	Lower	Not commenced	Number	10	10	0.10	10
Sub total						**22**	**1.44**	**96**
Total no. of works under Mookaiyur GP for Micro-watershed development (IWRM)						**68**	**89.20**	**23,890**

* Estimates yet to be prepared

TOTAL NO. OF WORKS FOR MICRO-WATERSHED DEVELOPMENT (IWRM)

	No. of works as per KML	Estimate cost in INR (Lakhs)	Person days
Naripayur GP	75	108.25	30,943
Mookaiyur GP	68	89.20	23,890

8.3 MODEL GP

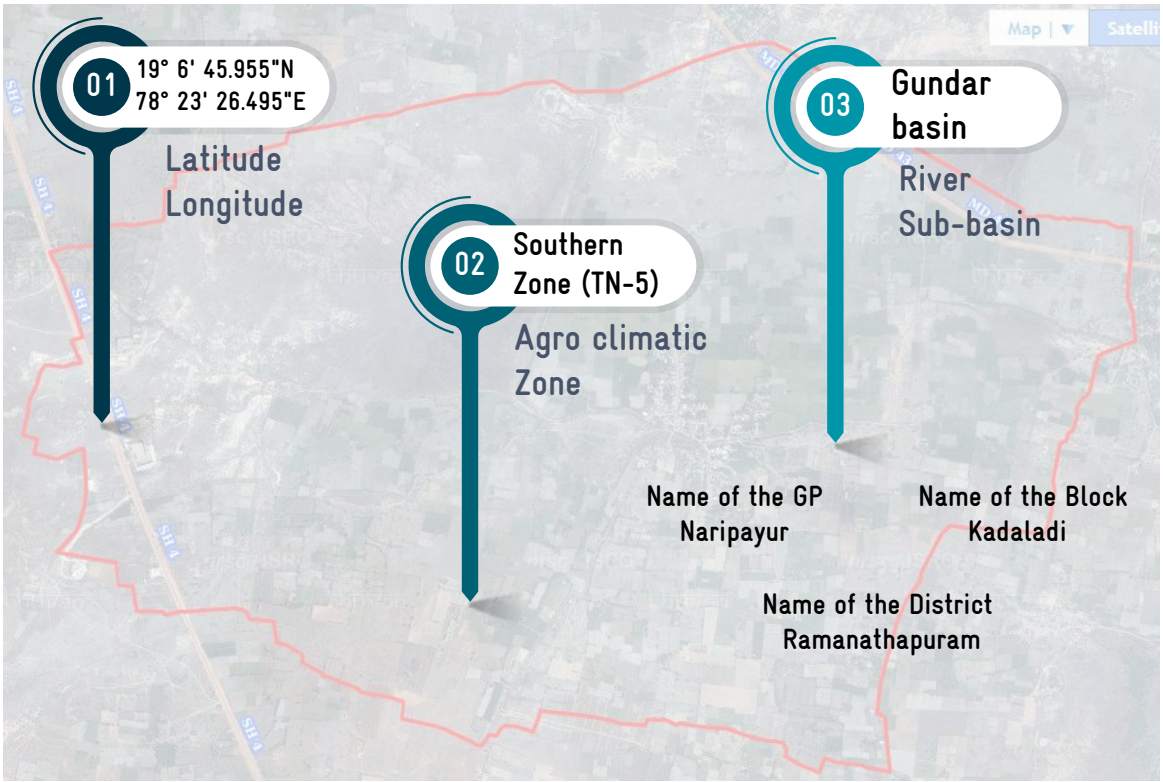
NARIPAYUR GP, KADALADI BLOCK, RAMANATHAPURAM DISTRICT

Figure 8.12. Satellite image of Naripayur GP

8.3.1 BACKGROUND OF GRAM PANCHAYAT - NARIPAYUR

The Naripayur GP is located in Kadaladi Block of Ramanathapuram district, Tamil Nadu. The total geographic area of this village is about 1798 ha. The total population is 9861 in which 5010 are males, 4851 are females as per Population Census 2011. The total number of HH in the village is 2130. Table 49 describes the general characteristics of model GP.

TABLE 49. GENERAL DESCRIPTION OF NARIPAYUR GP



8.3.2 CWRM PLANNING - SPATIAL DATA

8.3.2.1 Land Use and Land Cover Map: The land use land cover (LU&LC) map provides the information about the current landscape and the existing land use pattern. The map clearly shows that the Naripayur GP is covered by the area under the forest, barren waste land, and fallow land About 30% of this GP is covered by barren land. The fallow land development activities and barren land to productive land activities have been planned using the CWRM.

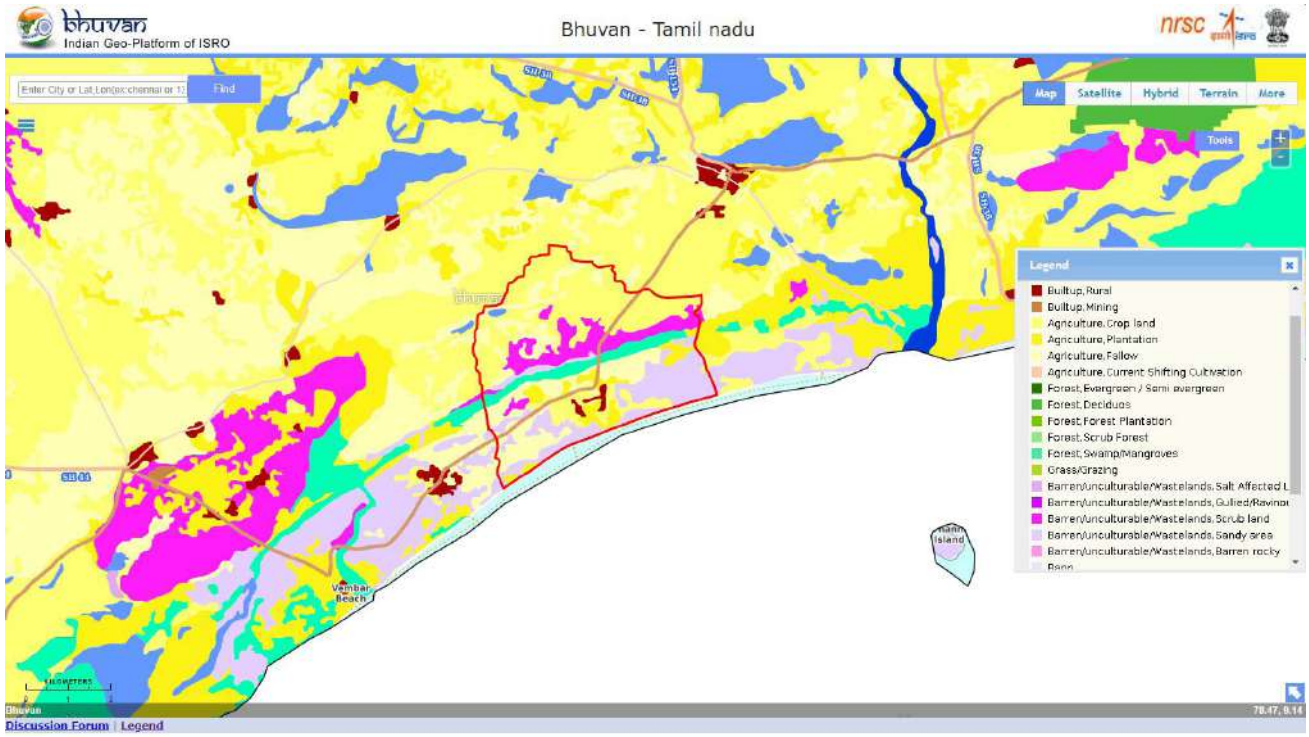


Figure 8. 13. Land use and land cover map of Naripayur GP

8.3.2.2 Area under erosion: The erosion map shows the soil erosion capacity with respect to rainfall, soil physical properties, terrain slope, land cover of Ramanathapuram district. The soil erosion map is used for soil conservation and regional planning and watershed management.

Figure 8. 14. Soil erosion map of Naripayur GP

8.3.2.3 Salt affected area: SSalt affected areas are one of the most important degraded areas where soil productivity is reduced due to either salinization or solidity or both. In Naripaiyur GP, it is observed that the land is slightly sodic salinized. While planning the GP, this area has been treated specially and given alternative cropping and other steps have been suggested to reduce the salinization.

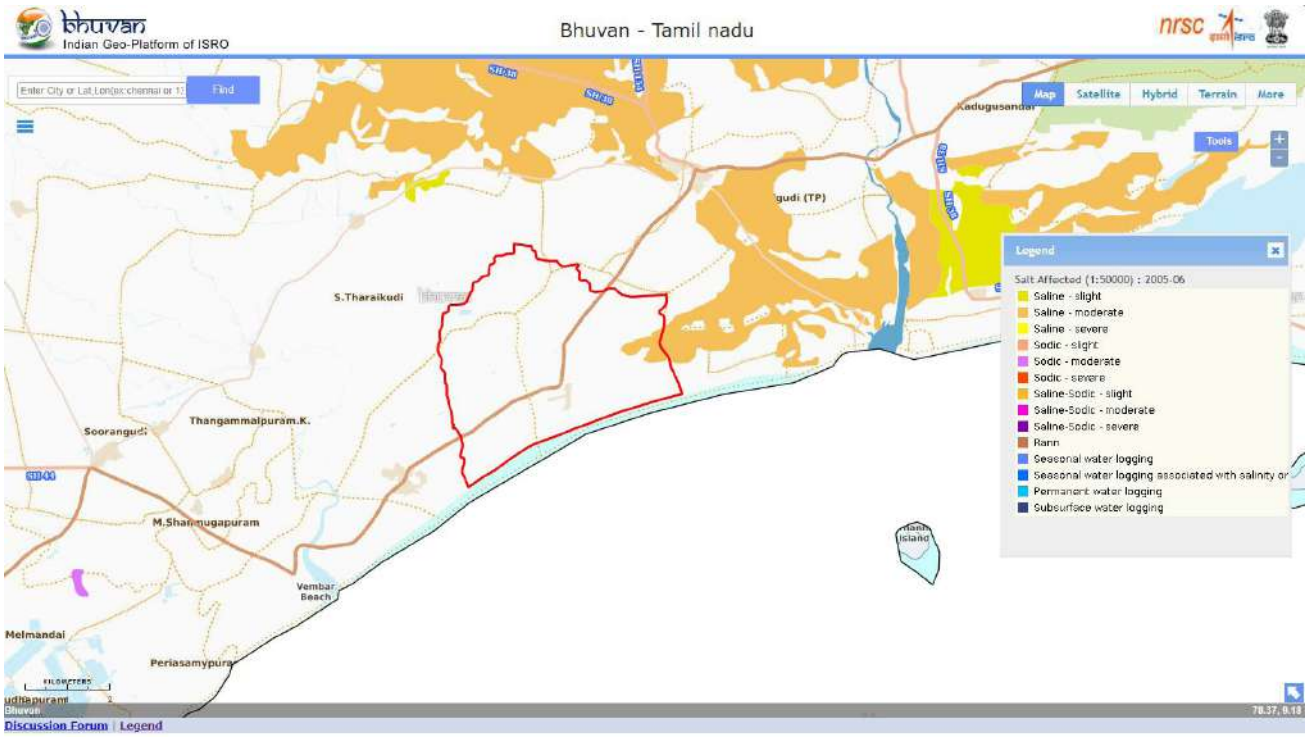


Figure 8.15. Salt affected area map of Naripayur GP

8.3.2.4 Geomorphology: The geomorphology map is the graphical inventories of a landscape depicting landforms and surface as well as subsurface materials. It determines the character of soil, vegetation, water percolation and land cover. The Naripayur GP covers the younger coastal planning in the southern part and older coastal plain in the northern part. The geomorphic map helps to undertake appropriate work in particular location to reap maximum benefits.

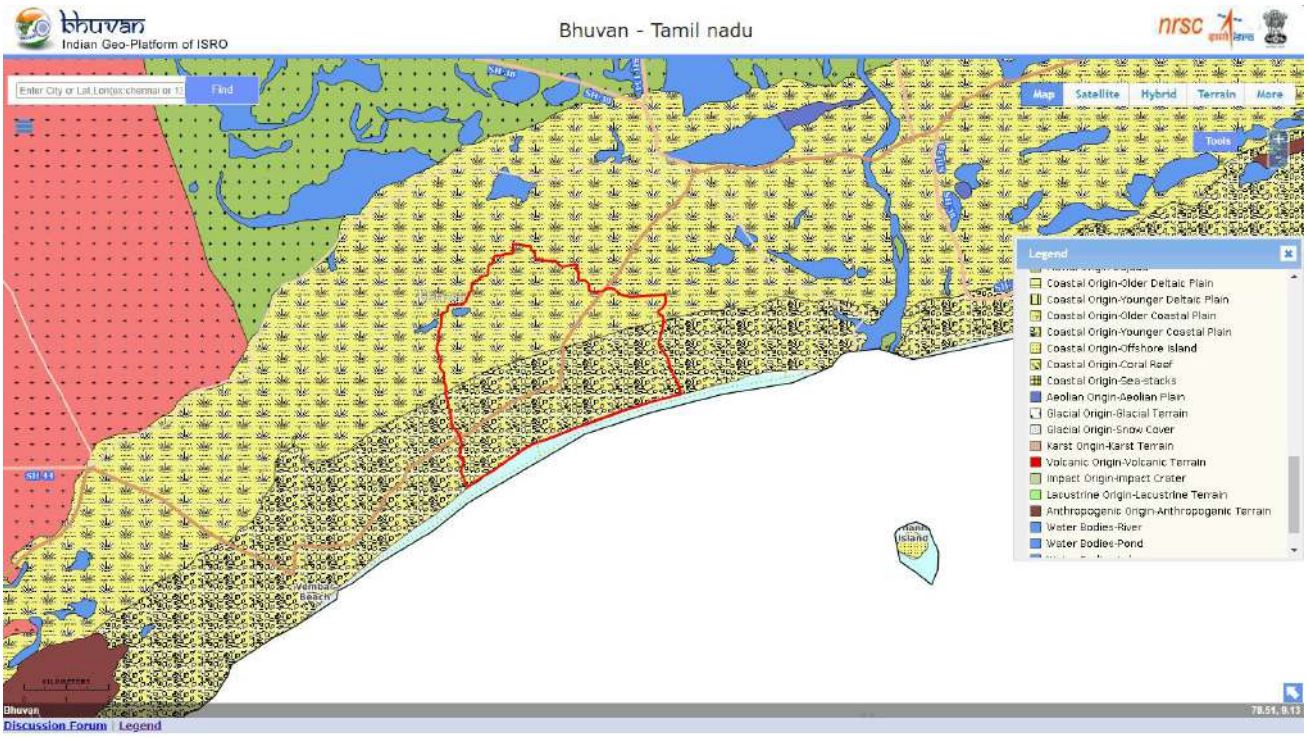


Figure 8.16. Geomorphology map of Naripayur GP

8.3.2.5 Lineament: A lineament map shows the linear feature in a landscape that is an expression of an underlying geological structure such as a fault, fracture, or joint. In Naripaiyur GP, the lineament is absent.

Figure 8.17. Lineament map of Naripayur GP

8.3.2.6 Ground water prospect: The map provides the required information on geological parameters connected to ground water exploration and the probable ground water prospects and helps in identification of sites for planning recharge structures to address water scarcity in a more effective manner. This GP has three types of groundwater prospectus. The northern and southern side of the GP is < 30m deep well and 50 to 100 liters per minute yield, in the middle part of the GP <30m deep well and 100 to 200 liters per minute yield potential in this GP.

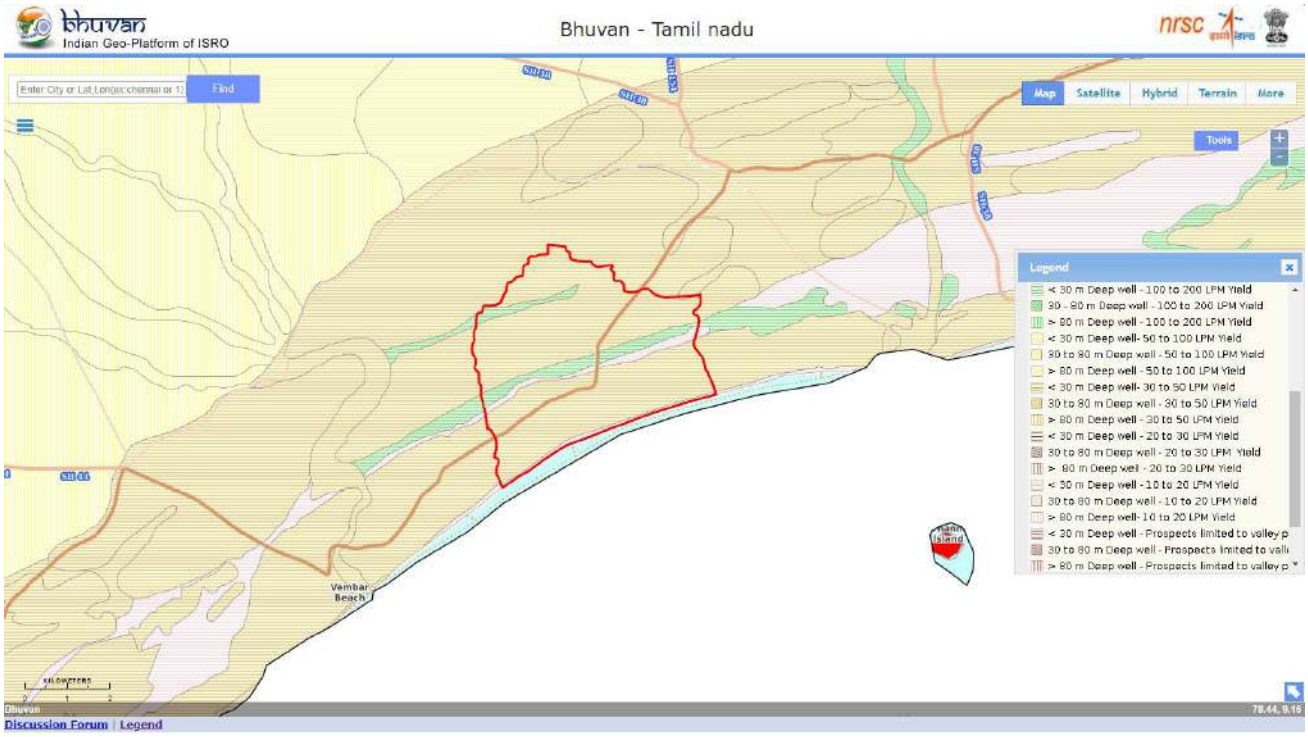


Figure 8.18. Ground water map of Naripayur GP

8.3.2.7 Wasteland: The southern part of the GP (20%) with salt affected areas are identified. During planning the GPs, the plantation measures have been taken up in the identified wastelands to convert into productive land.

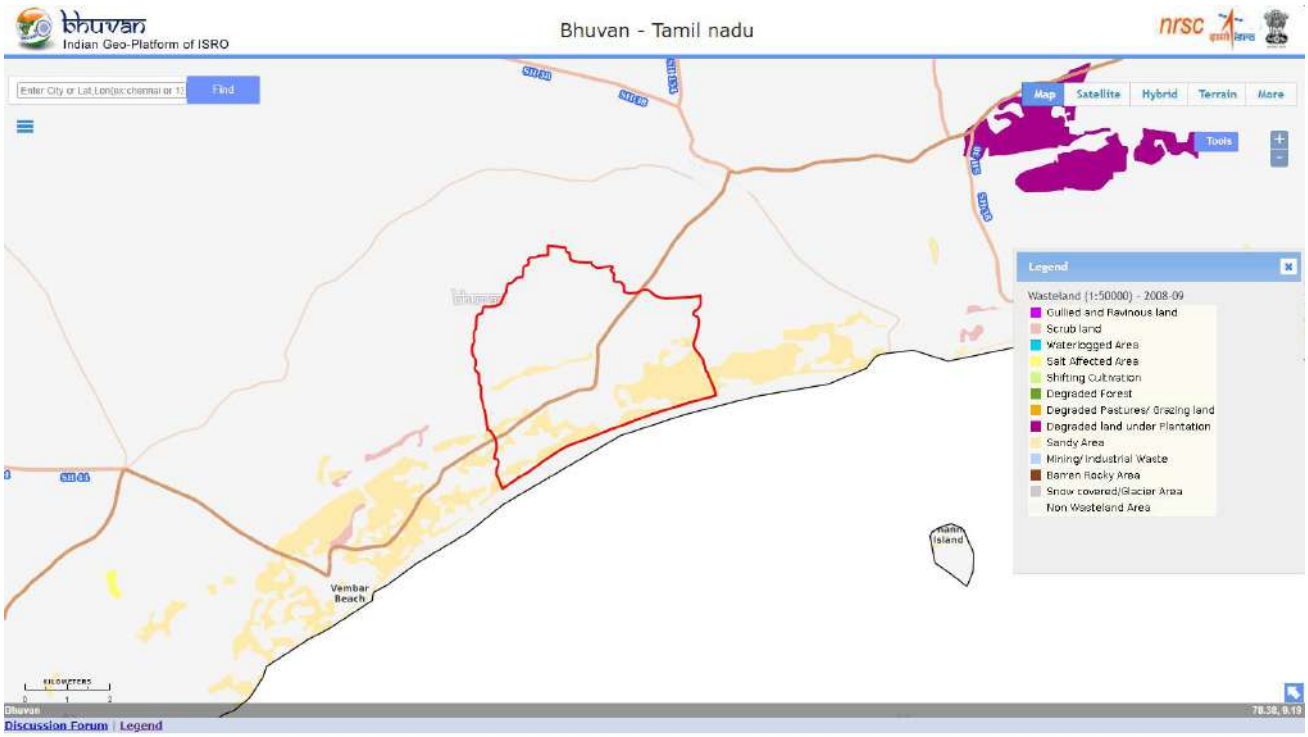


Figure 8.19. Wasteland map of Naripayur GP

8.3.2.8 Watershed: A watershed map is the area of land where all of the water that falls in it and drains off of it goes into the common outlet. The map is used for the interventions in the Naripayur GP based on ridge to valley concept and develop relevant soil and water conservation plan accordingly. There are five Micro-watersheds in the village

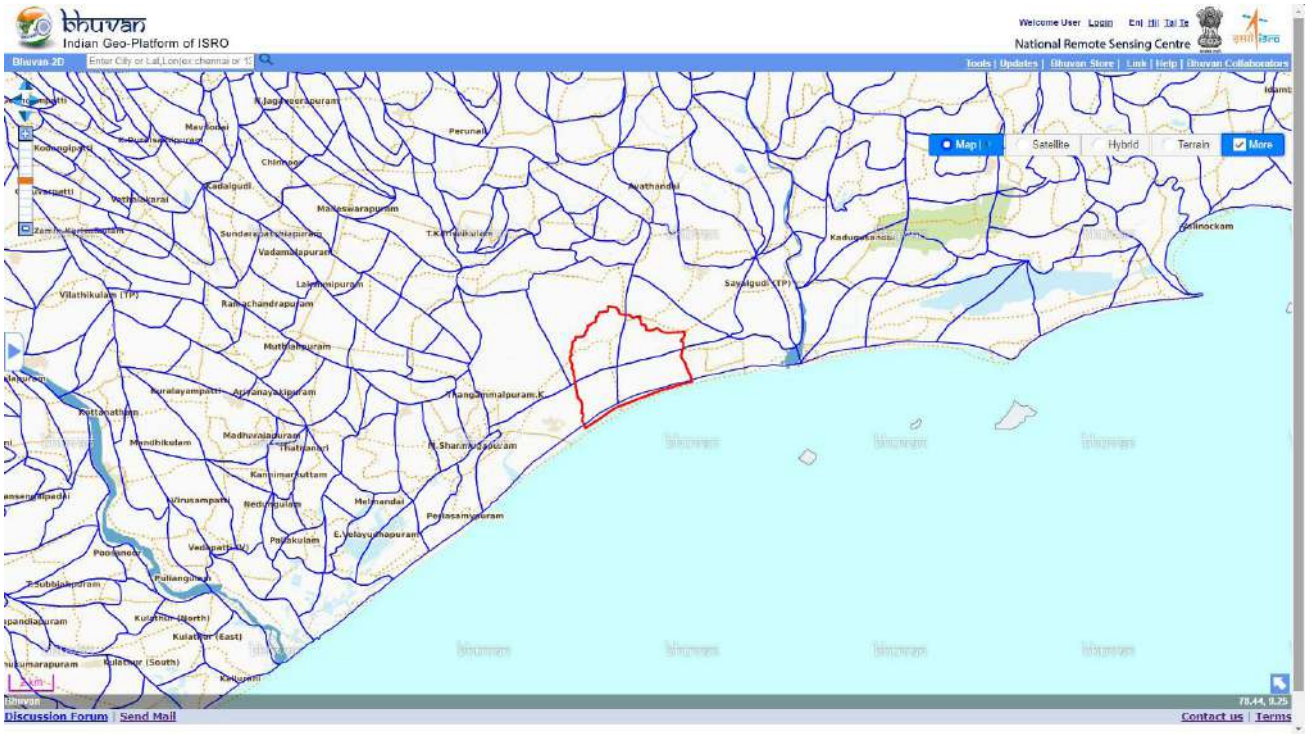


Figure 8.20. Watershed map of Naripayur GP

8.3.2.9 Slope: The slope map illustrates the measure of steepness or the degree of inclination of a feature relative to the horizontal plane. Slope is typically expressed as a percentage, an angle, or a ratio. The average slope of a terrain feature is calculated from contour lines on a topo map or DEM. For Naripayur GP, it clearly shows a very flat slope of 0 to 1 %. The slope is considered for planning the soil conservation measures and construction of the water recharge structures such as check dam, farm ponds etc.

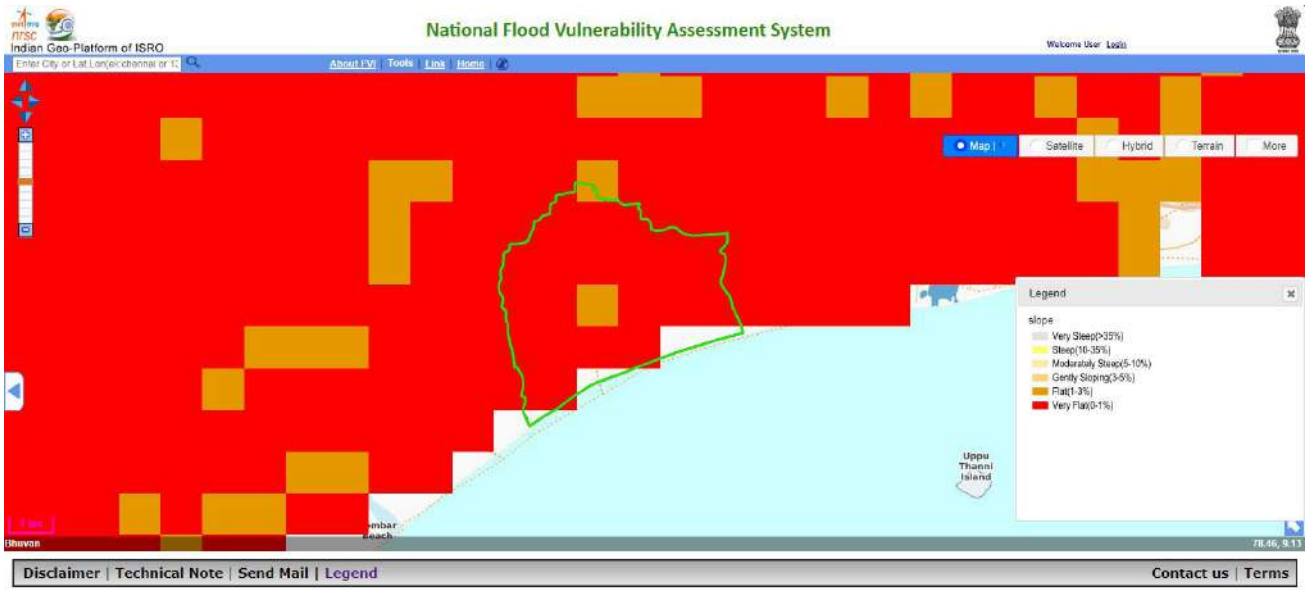


Figure 8.21. Slope map of Naripayur GP

8.3.3 CWRM PLANNING- NON-SPATIAL DATA

The non-spatial data covered four important themes – socio economic, climate, water and agriculture with 116 parameters (Table 50). These non-spatial data are concurrently used for analysis along with the spatial data mentioned above to identify the key water challenges, prepare water budget by understanding the supply and demand and develop water actions to the different land use and slope categories. The process started with mapping of the administrative (habitations/panchayat/revenue village, Block/taluk), agro-ecological (regional and sub-regional, climatic and agricultural zonation's) and hydrological (drainage points/watersheds/sub basin) units keeping GP as the lowest unit of planning and execution.

TABLE 50. NON SPATIAL PARAMETERS OF NARIPAYUR GP

Key CWRM Parameter	Total
Climate Vulnerability Area (CVA) - 1 : Socio-Economic	
Geographical Area (ha)	1798
Male Population	5010
Female Population	4851
Total Population	9861
SC Population	604
ST Population	7
Vulnerable population	611
Households (HH's)	1769
Only one room HH's	115

Female Headed HH's	93
Vulnerable Households	108.4
% of Vulnerable Households	0.06
Registered Mahatma Gandhi NREGA Job cards	1276
Active person working in Mahatma Gandhi NREGA job Cards	700
Drinking Water Sources	223
Ground Water - Drinking source	2
Surface water - Drinking source	0
Sum of drinking water sources	2
HH's have tap water connection for drinking water	1668
HH's dependent on other sources for drinking water	748
Annual Greywater Generation (Ha-M)	18.6
Climate Vulnerability Area (CVA) 2: Climate	
Average Annual Rainfall (mm)	821
Average Annual Temperature (^{0}C)	28.2
Climate Vulnerability Area (CVA) 3: Water Resources	
Canal Network in meters	
Length of Main Canal	0
Length of Minor Canal	0
Length of Distributaries	0
Water Courses (Field Channels)	1250
Traditional waterbodies in numbers	
Number of Tanks (PWD & Union)	0
Number of Ooranis	11
Other Surface Water Bodies	0
Irrigation Facilities in ha	
Area under Tank Irrigation	5.89
Area under Canal Irrigation	0
Area under Open & Tube Well Irrigation	0
Water Quality	
Chemical Contaminants	0
Bacterial and Other Contaminants	0
Catchment Area wise Available Runoff in Ha-M	
Good Catchment Area	15.1
Average Catchment Area	82.3
Bad Catchment Area	141.7
Watershed and Drainage Networks	
Length of Natural Drainage Lines in meter	0
Number of Natural Drainage Lines	0
Number of Micro-watersheds	5

Water Demand in Ha-M	
Water Demand for Humans	26.99449
Water Demand for Livestock	3.18
Water Demand for Agriculture	122.8275
% G.W Utilization for Drinking	1
% G.W Utilization for Livestock	0.35
% G.W Utilization for Agriculture.	0.03
% S.W Utilization for Drinking	0
% S.W Utilization for Livestock	0.65
% S.W Utilization for Agriculture	0.97
Climate Vulnerability Area (CVA) 4: Agriculture	
Land Resources in ha	
Area under Forest land	0
Area under Non-Agricultural Uses	68.06
Area under Barren & Un-cultivable Land	0
Area under Permanent Pastures and Other Grazing Land	0
Area under Land Under Miscellaneous Tree Crops etc.	411
Area under Cultivable Waste Land	72
Area under Fallows Land other than Current Fallows	571.62
Area under Current Fallow land	7.9
Area under Unirrigated Land	661.59
Area Irrigated by Source	5.89
Catchment Area in ha	
Land under Good Catchment	68.06
Land under Average Catchment	483
Land under Bad Catchment	1247
Crop Details in ha	
Irrigated Area	3.9
Rainfed area	201.415
Area under Paddy Cultivation	36.65
Crop Water Requirement - Irrigated condition in Ha-M	3.84
Crop Water Requirement - Rainfed condition in Ha-M	118.9875
Soil Resources: Status of Available Nitrogen in %	
Very Low	0
Low	1
Medium	0
High	0
Very High	0

Status of Organic Carbon in %	
Very Low	0.523077
Low	0.430769
Medium	0.046154
High	0
Very High	0
Status of Soil Micro Nutrients in %	
Sufficient	0.54
Deficient	0.46
Status of Physical condition of the soil in %	
Acidic Sulphate	0
Strongly Acidic	0.1846
Highly Acidic	0.1846
Moderately Acidic	0
Slightly Acidic	0.1077
Neutral	0
Moderately Alkaline	0.5231
Strongly Alkaline	0
Soil Texture in %	
% of Clay Soil	0
% of Fine Soil	0.72
% of Coarse loamy	0.15
Soil Water Permeability	Moderate
Soil moisture and ET	
Volumetric Soil Moisture in %	0.17
Estimated Soil Moisture in Ha-M	865.48
ET Losses in Ha-M	292.65
Means of Water Extraction in %	
Gravity	1
Lifting	0
Irrigation Methods in %	
Wild Flooding	1
Control Flooding	0
Livestock in Number	
Cattle Population	308
Sheep Population	4442
Goat Population	1105
Poultry	2438

8.3.4 KEY WATER CHALLENGES

Socio-Economic

- High population density (548 person per ha)
- Male population is slightly higher than female population,
- 6.2 % of the population belongs to the SC category and according to SECC data,
- 6% of the households are vulnerable, 5% HH are female headed
- 7% HH have only one room
- Handling grey water from 2130 households living in the coast needs attention

Climate

The groundwater development status is over-exploited, evapotranspiration is high and soil moisture is low during five months in a year.

Agriculture and Allied Sector

- Less common and public land
- 73 % is under individual land of which 32 % is in drylands
- Area under fallow lands other than current fallow (31.8%) and area under unirrigated land (36.7%) is high
- More bad catchment area (69%)
- Rainfed area (98%)
- Low soil Nitrogen and carbon
- Half of the soil is alkaline
- Wild flooding

Water

- No major, minor canals, distributaries in this GP
- 11 ooranis in the GP
- Drinking water depends on 100% groundwater
- 97% of surface water utilized for agriculture
- More water for agriculture (122-82 Ha-M)
- 239.1 Ha-M of water is an available runoff in which 59.3% of the runoff is from the bad catchment, 34.4% of the runoff is from the average catchment and 6.3% of the conservation is from the bad catchment

8.3.5 PERSPECTIVE PLAN - WORKS PROPOSED: WATER ACTIONS

The appropriate and site-specific works are identified for the development of public and common land, agriculture and allied activities, rural infrastructures, and climate-resilient measures to reduce the vulnerability in the GP. About 27% of the total land area is taken for WASCA activities like plantation, conservation works. The total proposed area for treatment is 486.53 ha. 46 % of the proposed work is under public and common land development

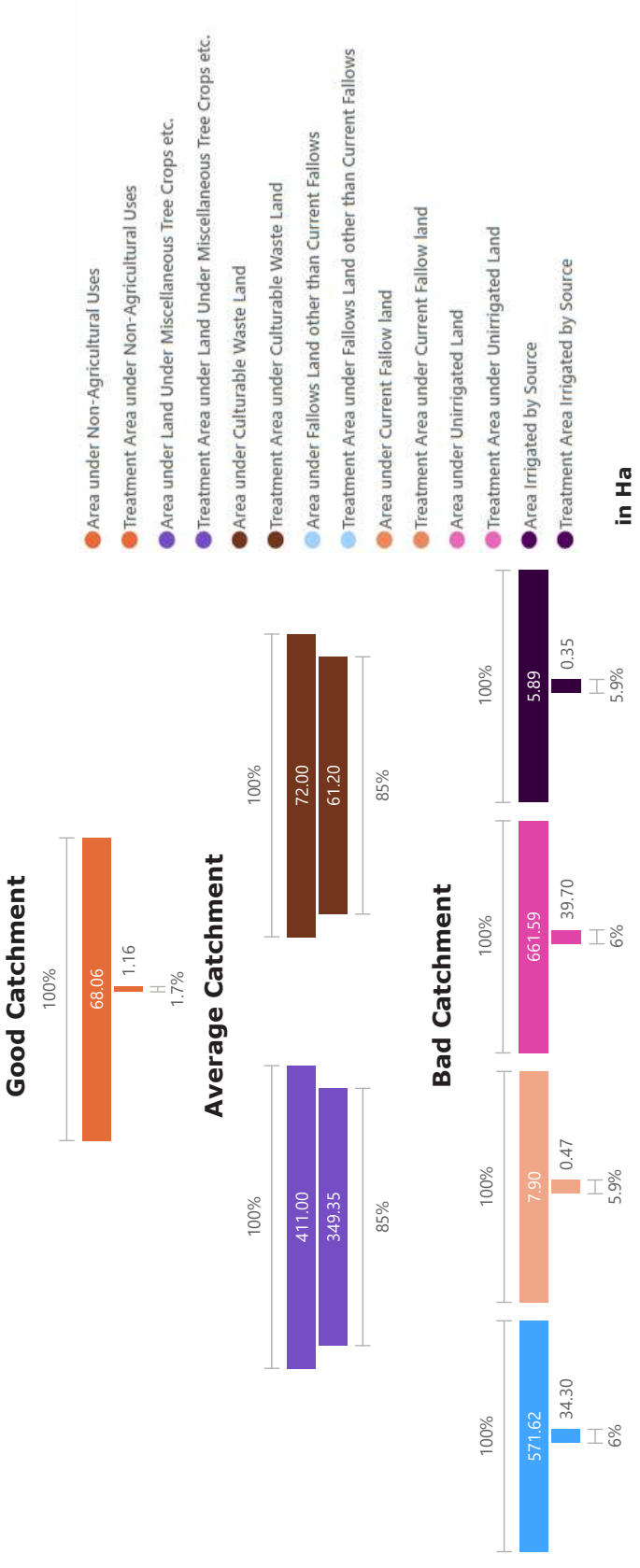


Figure 8.22. Proposed treatment area in Naripayur GP

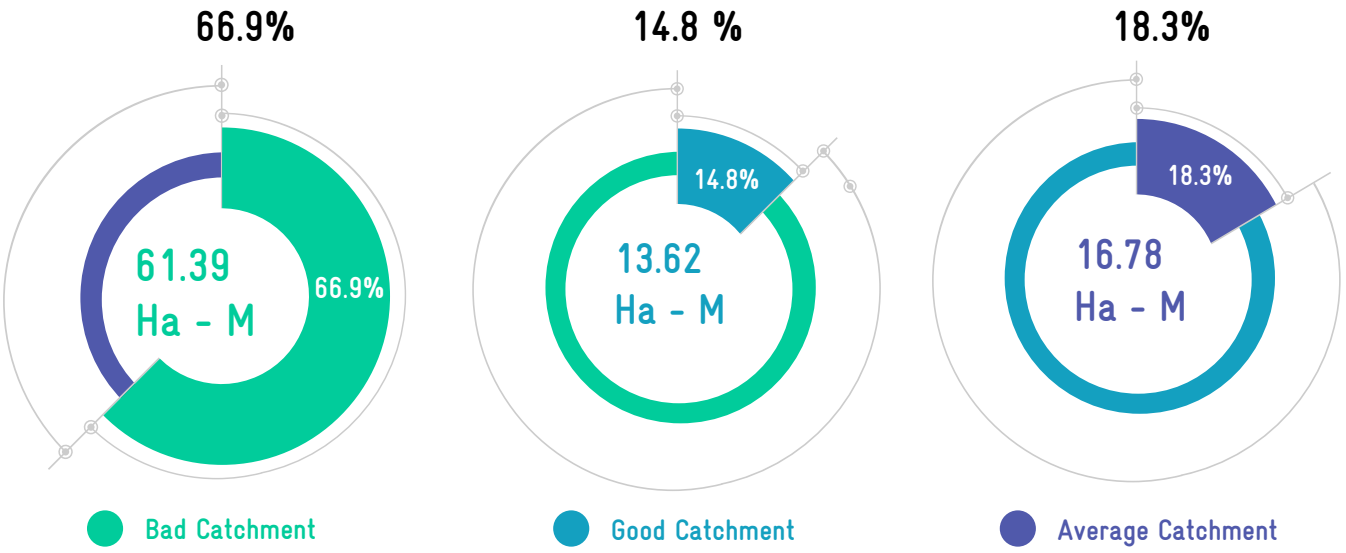


Figure 8.23. Expected runoff conservation after treatment in Naripayur GP

The table 51 shows the detailed perspective plan and estimates of the work, budget, and person-days for three years from 2021-2022 to 2023-2024 in the Naripayur GP. Since it is a vulnerable village, attention was given to include appropriate works to improve the common and public land development.

TABLE 51. PERSPECTIVE PLAN OF NARIPAYUR GP - FY (2021-2024)

CWRM Water Action 1: Improvement of Public & Common Lands Development							
S.No	**Name of the Work**	**Climate Vulnerability Index Impacting (WASCATN)**	**SDG Goal**	**Type of Ridge**	**No. of Works**	**Estimated cost in lakhs of Rupees (INR)**	**Estimated Person Days**
1	Contour Continuous Bunds (CCB) for Afforestation area (Mtrs)	W3	SDG 1,2, 6,13&15	Lower ridge	5	0.12	46
2	Composting(Number of units)	W1	SDG1& 6	Lower ridge	30	5.10	450
3	Afforestation in Public/common lands(ha)	C1,C2.C3. W3	SDG 1, 2,6,13&15	Lower ridge	1	9.98	3879
4	Block Plantation (Community) (ha)	C1,C2.C3. W3,S2	SDG 1,6&13	Lower ridge	11	22	2200
5	Avenue plantation (km)	C1,C2.C3. W3,S2	SDG 1, 6&13	Lower ridge	5	9.37	3658
6	Restoration of water bodies: b. Ponds (Number)	S2, S1	SDG 1, 13 &14	Lower ridge	9	18.00	1800
7	Artificial Recharge Structure (Number of units)	W3	SDG 1,2& 6	Lower ridge	11	22.00	2200
8	Drainage Line Treatment (Meter)	W1,W3,W4	SDG1 & 6	Lower ridge	127	3.80	634
Coastal Watershed Works							
9	Coastline Shelterbelt Plantation (ha)	S2, S1	SDG 1, 13 &14	Lower ridge	2	15	5860
10	Coastal Wetland - Bund strengthening (km)	S4,S1	SDG 1& 14	Lower ridge	1	0.56	8793

11	Bund Plantation wet lands	S4,S1	SDG1 & 6	Lower ridge	9	0.56	8793
12	Construction of Fish Drying Yard (Number of units)	S4,S1,	SDG1& 14	Lower ridge	4	8.48	1655
13	Agro Forestry in Individual lands (ha)	C1,C2.C3. W3,S2, S4,	SDG 6,13 &15	Lower ridge	1	8.70	3399
Sub Total Water Action -1					**214**	**541**	**87994**
CWRM Water Action 2: Agricultural and allied Sector development							
1	Farm Bunding with Boundary Trenches - Individual (ha)	A1,A3,W1,W3	SDG 1,2&6	Lower ridge	8	12.00	4688
2	Construction of Farm Ponds - Individual (Number of units)	A1,A3,W5,W1, W3	SDG 2& 6	Lower ridge	8	16	6248
3	Land development - Individual (ha)	W1,W5,A1,A3, S2,S4	SDG 2, 6&13	Lower ridge	2	20.00	7812
4	Dry land Horticulture/ Agro-forestry - Individual (ha)	A1,A3,A4,W1, S4,S2,C1	SDG 1& 2	Lower ridge	1	8.50	3321
5	Azolla units - Individual (Number of units)	A3,A4,S4	SDG 1& 2	Lower ridge	8	1.20	184
6	NADEP Vermicompost (Number of units)	A3, W1, S4	SDG 1& 2	Lower ridge	8	1.44	216
7	Fodder development - Community & Individual	A3, S4	SDG 1& 2	Lower ridge	8	11.84	18752
8	Cattle Shelters (Number of units)	S4	SDG 1& 2	Lower ridge	8	0.40	48
9	Goat Sheep Shelters (Number of units)	S4	SDG 1& 2	Lower ridge	15	34.05	5325
10	Cattle Trough(Number of units)	W5,S4	SDG 1& 2	Lower ridge	8	1.44	216
11	Poultry Shed (Number of units)	S2,S4	SDG 1& 2	Lower ridge	61	5.49	610
Sub Total Water Action -2					**135**	**128**	**49852**
CWRM Water Action 3: Rural Water Management							
1	Soak Pits (Community) (Number of units)	W3,S2	SDG 1& 6	Lower ridge	21	2.73	420
2	Soak Pits (Individual) (Number of units)	W3,S2	SDG 1& 6	Lower ridge	213	21.30	3408
3	Roof Rain Water Harvesting (Number of units)	W3,S1,S3	SDG 1& 6	Lower ridge	2	8.00	1250
	Community Tanka (Rajasthan Model)	W3,S1,S3	SDG 1& 6	Lower ridge	1	30.00	300
Sub Total Water Action -3					**237**	**62**	**5378**
Overall Total - GP					**586**	**731**	**143224**

8.3.6 SUMMARY OF WORKS IDENTIFIED AND ESTIMATED PERSON-DAYS FOR 2021-2024

Regarding CWRM themes, of the total number of projects identified, 44 % works are in public and common land, and only 6 % in agriculture and allied sector while it is 49 % under rural infrastructure (Table 52). Table 6 provides the detailed perspective plan and estimates of the work, budget, and personal days for three years from 2021-2022 to 2023-2024 in the Naripayur GP. Since it is a coastal village, attention was given to include appropriate works to improve the coastal resources.

TABLE 52. SUMMARY OF WORKS IDENTIFIED AND ESTIMATED PERSON-DAYS FOR 2021-22 TO 2023-2024 FOR NARIPAYUR GP

CWRM themes	No of works	Estimated budget (INR in lakhs)	Estimated person days
Public and common land development	214	541	87994
Agriculture and Allied sector development	135	128	49852
Rural water management	237	62	5378
TOTAL	586	731	143224

8.3.7 IMPACTS

The proposed water actions based on the above key water challenges cover three years from 2021-2022 to 2023-2024. At the end of the implementation period the following impacts are envisaged (Table 53). It is expected that the impacts have potentially reduced the vulnerability and improved the resilience of the system to the projected climatic change events and ensured water security.

TABLE 53. KEY WATER ACTIONS AND INDICATORS

WASCA CWRM ACTION PLAN

DEVELOPMENT OF PUBLIC AND COMMON LAND

	INDICATOR		OUTCOMES/ IMPACT
1	Number of water bodies restored in the village	1	28% of the total area treated under WASCA (479.06 ha)
2	Quantum of water harvested/recharge	2	82.84 Ha-M surface runoff is harvested due to WASCA interventions
3	The proportion of land treated under WASCA	3	11 water bodies restored
4	Area under afforestation	4	1.16 ha area under afforestation
5	Length of drainage line treated	5	5068 m length of drainage lines treated

28% TOTAL AREA TREATED

82.84 Ha-M AFFORESTATION

11 WATER BODIES RESTORED

1.16 ha AFFORESTATION

5068 M DRAINAGE LINES TREATED

WASCA CWRM ACTION PLAN

DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

	INDICATOR		OUTCOMES/ IMPACT
1.	Assessment of sources of water for livestock and agriculture demand	1.	30 farm ponds established
2.	No structures were established for on-farm *(in-situ)* water harvesting in drylands	2.	30 compost units for soil health improvement
3.	Improvement in soil health	3.	74.82 ha Farm bunding with trenches
4.	Changes in the irrigation practices	4.	37 ha under dryland horticulture
5.	Dryland development with agro-forestry	5.	77 vulnerable households established fodder plots
6.	Households established fodder plots		

30 FARM PONDS

30 COMPOST UNITS

74.82 ha FARM BUNDING

37 ha DRYLAND HORTICULTURE

77 FODDER PLOTS

WASCA CWRM ACTION PLAN

DEVELOPMENT OF RURAL INFRASTRUCTURE

	INDICATOR
1.	Number of units having complete liquid waste management systems
2.	Roof rainwater harvesting measures
3.	Greywater drains
4.	Nutri gardens

	OUTCOMES/ IMPACT
1.	21 common and 213 individual soak pits were established for recycling greywater benefiting 2130 households
2.	2 common roof rainwater harvesting and storage and 500 individual level roof rainwater harvesting
3.	2130 Households established Nutri-gardens in homesteads

21 COMMUNITY & **213**
INDIVIDUAL SOAK PITS

2 COMMON & **500**
INDIVIDUAL LEVEL ROOF
RAINWATER HARVESTING

2130
NUTRI-GARDENS

WASCA CWRM ACTION PLAN

DEVELOPMENT OF CLIMATE-RESILIENT MEASURES

	INDICATOR
1.	Number of climate-resilient measures identified

	OUTCOMES/ IMPACT
1.	Coastal watershed pilot type 3 is being implemented

TYPE 3
COASTAL WATERSHED
PILOT IMPLEMENTED

8.3.8 MAHATMA GANDHI NREGS PROPOSALS

The following table 54 provides both the perspective plan for three years and the annual plan for one year from 2021-2022 on the shelf of projects/number of works and number of person-days.

TABLE 54. PROPOSAL FOR THE MAHATMA GANDHI NREGS, NARIPAYUR GP

	No of works	No of person days
Perspective plan	586	1,43,224
Annual plan	195	47,741

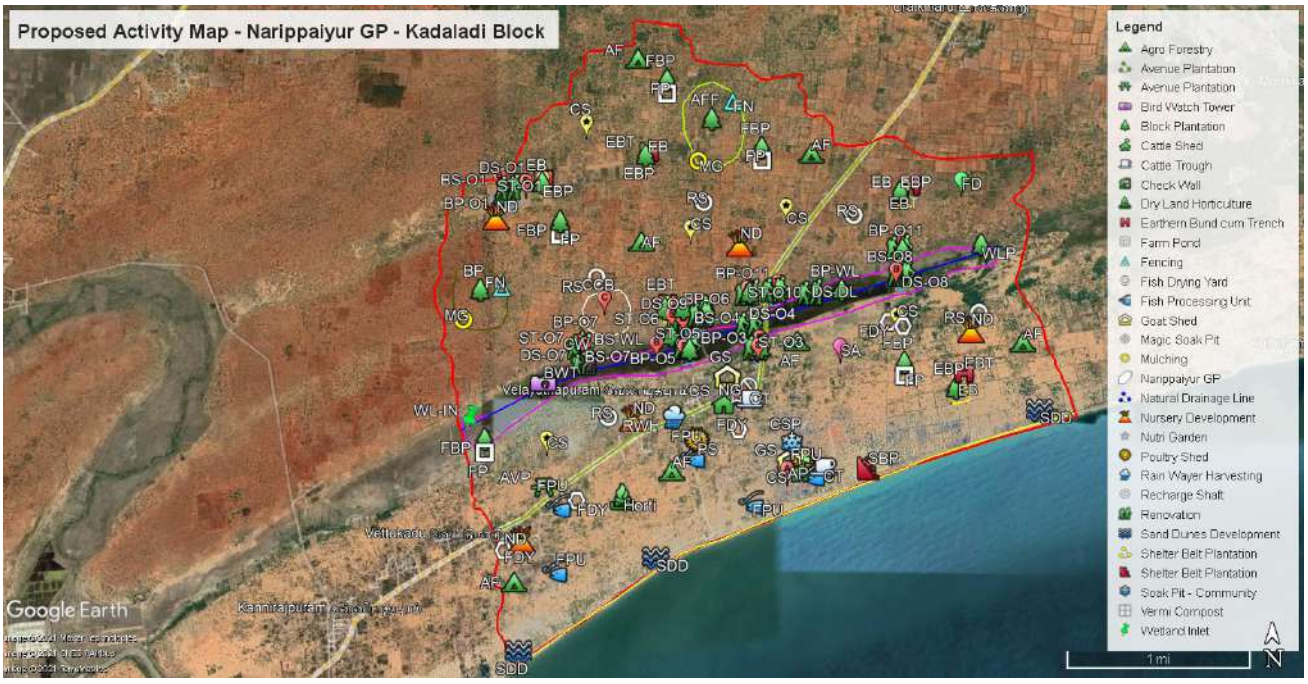
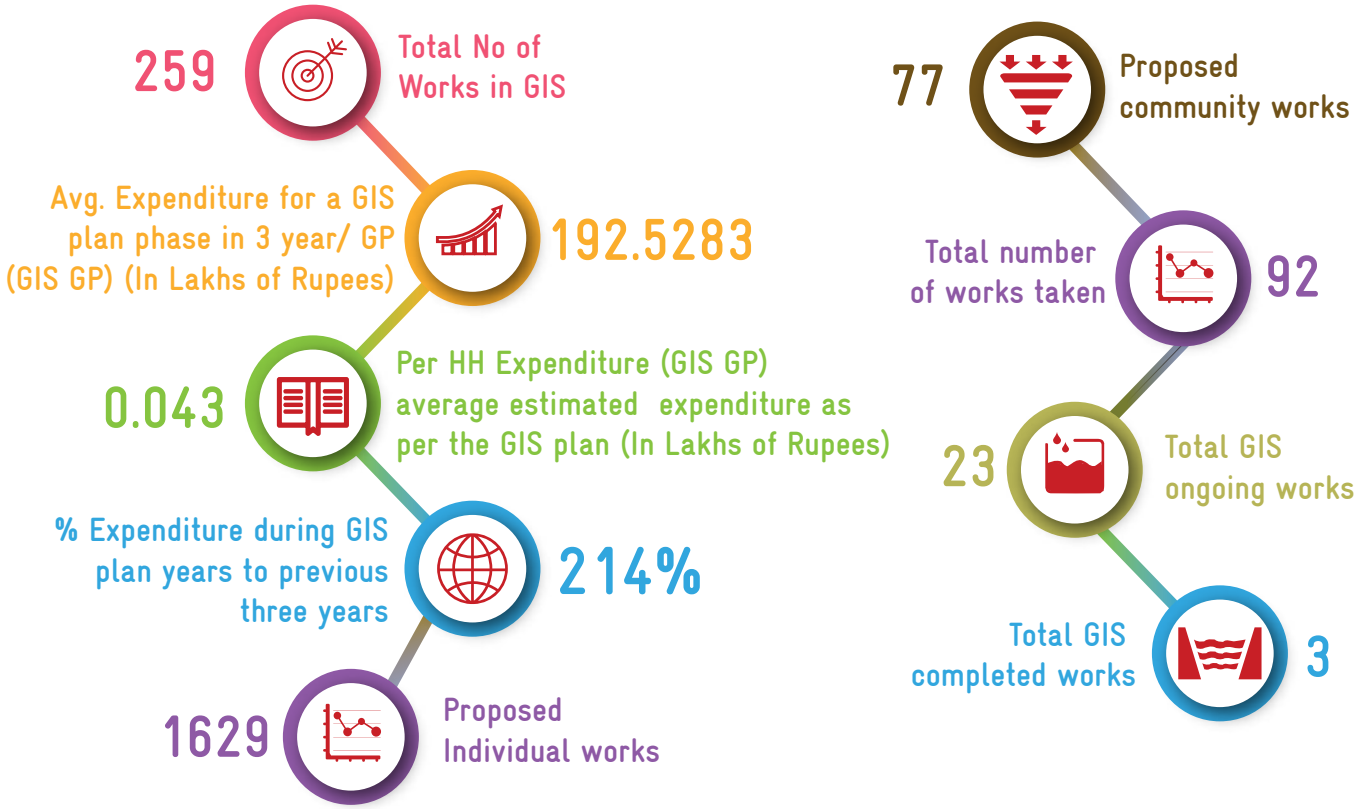


Figure 8.24. Action plan of Naripayur GP

8.3.9 GIS PLAN IMPLEMENTATION

The GIS plan implementation and performance in Kadaladi Block is represented in table 55.

TABLE 55. GIS PLAN IMPLEMENTATION AND KEY PARAMETERS PERFORMANCE IN NARIPAYUR GP



நீர்இன்று அமையாது உலகெனின் யார்யார்க்கும்
வான்இன்று அமையாது ஒழுக்கு

குறள் - 20

Water is life that comes from rain
Sans rain our duties go in vain

Thirukkural - 20

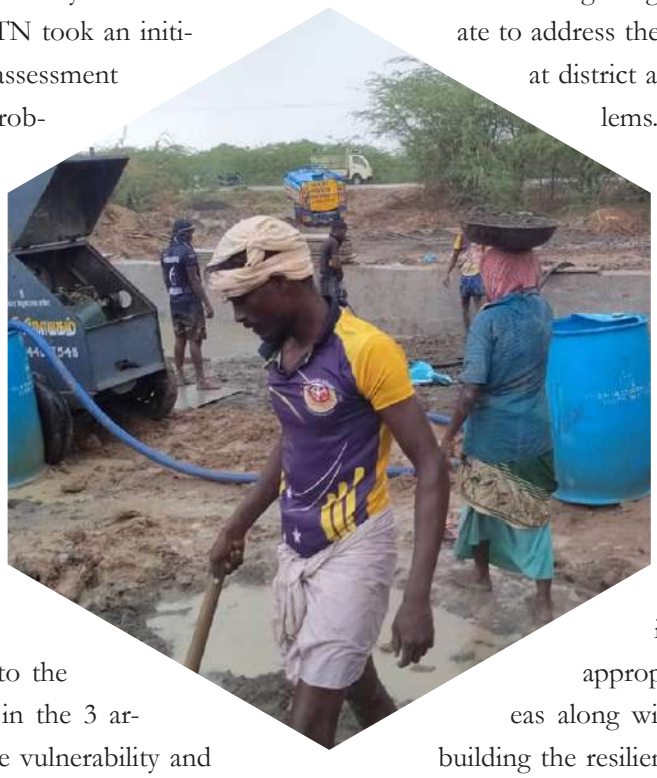
CHAPTER 9

CONCLUSION

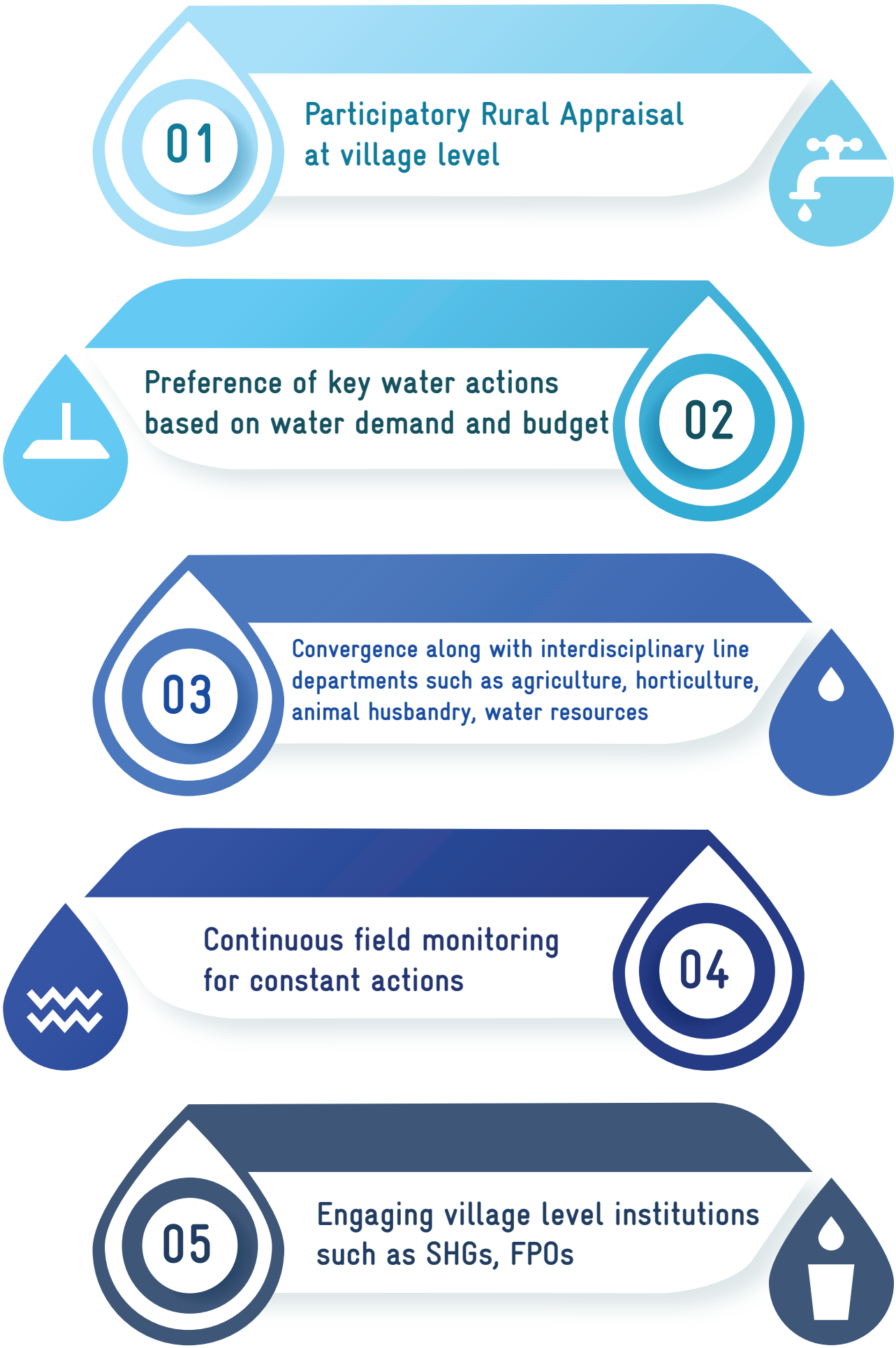
CONCLUSION

> **"WASCA TN took an initiate to address the problem holistically through comprehensive vulnerability assessment at district and block level to identify the vulnerable area and its key problems"**

In recent decades, the water demand is increasing at a fast rate due to rapid surge of population, industrial and economic growth. The evident changes in climate change and its extremities are bringing more threats to water security. Frequent monsoon failures lead to acute water scarcity and severe droughts. Thus, dependency on ground water has increased many folds during recent years that has resulted in lowering of ground water levels and even drying up of wells. WASCA TN took an initiate to address the problem holistically through comprehensive vulnerability assessment at district and Block level to identify the vulnerable area and its key problems. The 18 biophysical and socio economic indicator of four interrelated areas via water, agriculture, socio economic and climate used at district level are further expanded to 110 parameters at Block level. The spatial and non-spatial CWRM parameters for above mentioned interrelated areas are used to represent risk, sensitivity and adaptive capacity of the GPs, which eventually reflects rural water security. The key problems of the Blocks are identified and the best possible adaptation options 'key water actions' are intended under WASCA initiatives in public and common land, agriculture and allied sector, rural infrastructure areas. All the indicators/parameters and key water action are aligned to the appropriate SDG and India's NDC. The developmental activities in the 3 areas along with climate resilient measures will contribute in reducing the vulnerability and building the resilience of the local communities at the GP level. The GP planning and integration at the Block level based on macro and Micro-watershed enables to adopt ecosystem approach in promoting nature based solutions. The productive impacts are visualized through convergence approach by mobilizing necessary finance, knowledge and technologies at the end of the three years of implementation. This integrated Block level approach will be more effective with Block level climate information which is not currently available.



Recommendations towards stable development and its progressive outcome are


01
Participatory Rural Appraisal at village level
Preference of key water actions based on water demand and budget
02
03
Convergence along with interdisciplinary line departments such as agriculture, horticulture, animal husbandry, water resources
Continuous field monitoring for constant actions
04
05
Engaging village level institutions such as SHGs, FPOs

ANNEXURES

ANNEXURE 1

TYPES OF GPS

Type of GP	Description
I	Both GP and revenue village data and boundary match
II	Having more than one GPs in one Revenue Village
III	One GP is falling under more than Type 1 one Revenue Village
IV	GPs having more than one GP, one Revenue Villages data, boundary
V	Newly formed GP after 2011 census publication

* Note: The CWRM uses spatial and non-spatial data for developing Gram Panchayat level plans. Most of the data for non-spatial are available at revenue village level in the project area. To synchronize planning at GP keeping data availability and administrative boundary for GIS planning, various GP's are categorized based on revenue village boundaries, for collecting and organizing the datasets. Based on the above factors, five different types of GPs are classified as above.

ANNEXURE 3.1

KEY CWRM PARAMETER FROM SECONDARY SOURCES

Key CWRM Parameter	Secondary Source
Socio economic	
Geographical Area	Census-2011, MoHA, GOI *https://censusindia.gov.in/2011census/dchb/DCHB.html*
Male Population	
Female Population	
Total Population	
SC Population	
ST Population	
Vulnerable population	
Households (HH's)	Socio-economic caste census (SECC) 2011 *https://secc.gov.in/homePageLgd.htm*
Only one room HH's	
Female Headed HH's	
Vulnerable Households	
% of Vulnerable Households	
Registered Mahatma Gandhi NREGA Job cards	*http://mnregaweb4.nic.in/netnrega/app_issue.aspx?page=s&lflag=eng&state_name=TAMIL%20NADU&state_code=29&fin_year=2020-2021&source=national&Digest=3ics8+9Z9fEQ8yzj5E3qcQ*
Active person working in Mahatma Gandhi NREGA job Cards	
Water Resources	
Irrigation Facilities	Census-2011, MoHA, GOI *https://censusindia.gov.in/2011census/dchb/DCHB.html*
Area under Tank Irrigation	
Area under Canal Irrigation	
Area under Open & Tube Well Irrigation	
Water Quality	*https://ejalshakti.gov.in/IMISReports/Reports/WaterQuality/WQ/rpt_WQ_DistrictProfile_S.aspx?Rep=0&RP=Y*
Chemical Contaminants	
Bacterial and Other Contaminants	
Watershed and Drainage Networks	NRSC, ISRO, GoI
Length of Natural Drainage Lines	
Number of Natural Drainage Lines	
Number of Micro-watersheds	
Agriculture	
Land Resources	*https://censusindia.gov.in/2011census/dchb/DCHB.html*
Area under Forest land	
Area under Non-Agricultural Uses	
Area under Barren & Un-cultivable Land	
Area under Permanent Pastures and Other Grazing Land	
Area under Land Under Miscellaneous Tree Crops etc.	
Area under Cultivable Waste Land	
Area under Fallows Land other than Current Fallows	
Area under Current Fallow land	
Area under Unirrigated Land	
Area Irrigated by Source	

Soil Resources: Status of Available Nitrogen	*https://soilhealth.dac.gov.in/NewHomePage/NutriPage*
Very Low (VL)	
Low (L)	
Medium (M)	
High (H)	
Very High (VH)	
Status of Organic Carbon	
Very Low (VL)	
Low (L)	
Medium (M)	
High (H)	
Very High (VH)	
Status of Soil Micro Nutrients	
Sufficient	
Deficient	
Status of Physical condition of the soil	*https://soilhealth.dac.gov.in/NewHomePage/NutriPage*
Acidic Sulphate	
Strongly Acidic	
Highly Acidic	
Moderately Acidic	
Slightly Acidic	
Neutral	
Moderately Alkaline	
Strongly Alkaline	
Soil Texture	NRSC
% of Clay Soil	
% of Fine Soil	
% of Coarse loamy	
Soil Water Permeability	standard table
Soil moisture and ET	*https://indiawris.gov.in/wris/#/*
Volumetric Soil Moisture	
Livestock	*https://farmer.gov.in/livestockcensus.aspx*
Cattle Population	
Sheep Population	
Goat Population	
Poultry	

ANNEXURE 3.2

KEY CWRM PARAMETERS FROM PRIMARY SOURCES

Key CWRM Parameter	Primary Data
Water sources	
Drinking Water Sources	Block level officer/ GP level assistants
HH's have tap water connection for drinking water	
HH's dependent on other sources for drinking water	
Canal network	
Length of Main Canal	Block level officer/ GP level assistants
Length of Minor Canal	
Length of Distributaries	
Water Courses (Field Channels)	
Traditional water bodies	
Number of Tanks (PWD & Union)	Block level officer/ GP level assistants
Number of Ooranis	
Other Surface Water Bodies	
Crop details	
Irrigated Area	Village G return data
Rainfed area	
Area under Paddy Cultivation/irrigated	
Ground Water Quality	Sample collection and analysis

ANNEXURE 3.3

KEY CWRM PARAMETER GENERATED - PRIMARY DATA

Key CWRM Parameter	Methods/Formulas Used
Water Demand	Standard Norms are in Annexure 3.4
Water Demand For Drinking	
Water Demand for Livestock	
Water Demand For Agriculture	
% G.W Utilization for Drinking	
% G.W Utilization for Livestock	
% G.W Utilization for Agriculture.	
% S.W Utilization for Drinking	
% S.W Utilization for Livestock	
% S.W Utilization for Agriculture	
Annual Greywater Generation	Standard Norms are in Annexure 3.5
Available Runoff	Strange table method (based on rainfall, land area)
Run Off Conserved	Formula (based on tank storage, built up, linear measurement)
Estimated Soil Moisture	calculation & formula
ET Losses	calculation & formula
Means of Water Extraction (Gravity/ Lifting)	(Number of Gravity or lifting /Total number of extraction)*100
Irrigation Methods (Wild/Control)	(corresponding irrigation area/ total irrigation area)*100
Water Quality Index	Standard formula are in Annexure 3.3
Sea water mixing index	
Salinity	

ANNEXURE 3.4

STANDARD NORMS FOR CALCULATING WATER DEMAND

	Water Users	Total Annual Requirement (HaM)
1	Human	population*0.0027375
2	Animals	Total water requirement for animals
3	Agriculture	Total volume of water in agriculture (Both irrigated and rainfed)
4	Others (Industrial)	
	Total water De-mand	Addition of all 4 category
	Water Users	**Requirement met by Ground Water**
1	Human	water demand for human* Ground water percentage (coming from drinking water sources)
2	Animals	water demand for animals* Ground water percentage (coming from Livestock table)
3	Agriculture	Total volume of water in irrigated source
4	Others (Industrial)	
	Total water De-mand	Addition of all 4 category
	Water Users	**Requirement met by Surface Water**
1	Human	water demand for human* Surface water percentage (coming from drinking water sources)
2	Animals	water demand for animals* surface water percentage (coming from Livestock table)
3	Agriculture	Total volume of water in rainfed source
4	Others (Industrial)	
	Total water De-mand	Addition of all 4 category
	Water Users	**% of Ground Water**
1	Human	Ground water percentage (coming from drinking water sources)
2	Animals	Ground water percentage (coming from Livestock table)
3	Agriculture	(Total volume of water in irrigated source/Total ground water requirement)*100
4	Others (Industrial)	
	Total water De-mand	Addition of all 4 category
	Water Users	**Requirement met by Surface Water**
1	Human	Surface water percentage (coming from drinking water sources)
2	Animals	surface water percentage (coming from Livestock table)
3	Agriculture	(Total volume of water in rainfed source/Total surface water requirement)*100
4	Others (Industrial)	
	Total water De-mand	Addition of all 4 category

* Based on the land use, slope, and soil type, the catchments are classified as good, average and bad. In the CWRM framework, we used land use as a key factor for the classicization of catchments.

Good catchment area: It consists of the runoff generated from sloppy lands with dense forest cover and areas where the ground is covered with a reduced rate of infiltration. It includes area under forest, area under non-agricultural use, barren and un-cultivable lands, and area under permanent pastures and other grazing land areas.

Average catchment area: It denotes the land uses related to the types of land under miscellaneous tree crops, culturable waste, and fallow land other than current fallow areas where the land surfaces are undulated terrain, moderately sloppy along with a medium infiltration rate.

Bad catchment area: It covers the area where the terrain is flat with very less vegetative cover, the land use categories under current fallow, total unirrigated and irrigated area with less surface runoff

ANNEXURE 3.5

STANDARD NORMS FOR GREY WATER GENERATION CALCULATION

	Waste water generation Source	Per day/unit waste water generation in L (Standard Value)
1	Bathing	15
2	Washing	10
3	Toilet	10
4	Cleaning	5
5	Cooking and cleaning Utensils	5
6	Others	5
	Total	**50**
	Waste water generation Source	**Daily volume of Grey water in L**
1	Bathing	Bathing water requirement in litres * Total population
2	Washing	washing water requirement in litres * Total population
3	Toilet	Toilet water requirement in litres * Total population
4	Cleaning	Cleaning water requirement in litres * Total population
5	Cooking and cleaning Utensils	cooking and cleaning utensils water requirement in litres * Total population
6	Others	other purpose water requirement in litres * Total population
	Total	**50*total population**
	Waste water generation Source	**Annual Grey water in CuM**
1	Bathing	(Daily volume of grey water for bathing in litres *365) / 1000
2	Washing	(Daily volume of grey water for washing in litres *365) / 1001
3	Toilet	(Daily volume of grey water for toilet in litres *365) / 1002
4	Cleaning	(Daily volume of grey water for cleaning in litres *365) / 1003
5	Cooking and cleaning Utensils	(Daily volume of grey water for cooking and washing utensils in litres *365) / 1004
6	Others	(Daily volume of grey water for other purposes in litres *365) / 1005
	Total	**(Total daily volume of grey water in litres *365)/ 1000**
	Annual Grey water generated in HaM	**Annual Grey water in Cum/10000**

ANNEXURE 3.6

WATER QUALITY STANDARDS AND FORMULA USED

RELATIVE WEIGHTS ASSIGNED FOR DIFFERENT WATER QUALITY PARAMETERS

S. No.	Physical and chemical pa-rameters	World Health Organization (WHO 2004)	Weight (w)	Relative weight (wi)
1	pH	8.5	4	0.133
2	Total dissolved solids (mg/l)	500	5	0.167
3	Bicarbonate (mg/l)	200	1	0.033
4	Chloride (mg/l)	200	4	0.133
5	Sulphate (mg/l)	200	3	0.1
6	Nitrate (mg/l)	45	3	0.1
7	Calcium (mg/l)	75	2	0.067
8	Magnesium (mg/l)	30	2	0.067
9	Sodium (mg/l)	200	4	0.133
10	Potassium (mg/l)	100	2	0.067

$$SI_i = W_i \times Q_i \qquad WQI = \sum_{i=1}^{n} SI_i$$

Where qi is the quality rating, Ci is the concentration of individual element in water samples represented in mg/l and Si is the drinking water standard for individual chemical constituents (in mg/l)

Sea water mixing index (SMI) (Park et al. (2005)

$$SMI = a\ X\frac{C\ Na}{T\ Na} + b\ X\frac{C\ Mg}{T\ Mg} + c\ X\frac{C\ Cl}{T\ Cl} + d\ X\frac{CSO_4}{TSO_4}$$

The measurements a, b, c and d represent the relative concentration percentage of Na+, Mg2+, Cl- and SO42- assumed

ANNEXURE 3.7

GP WISE STATUS OF WATER RESOURCE AND ITS SUPPLY AND DEMAND

S No	Gram Panchayat	Canal network				Tradational Water bodies		
Key CWRM Parameter		Length of Main Canal	Length of Minor Canal	Length of Distributaries	Water Courses (Field Channels)	Number of Tanks (PWD & Union)	Number of Ooranis	Other Surface Water Bodies
	Unit	meter	meter	meter	meter	Number	Number	Number
Type 1	Avathandai	0	0	0	2320	4	8	0
	Appanur	0	5000	0	500	6	10	0
	Chithirangadi	0	9000	0	0	3	5	0
	Ervadi	0	3000	0	5000	2	9	0
	Idambadai	2000	0	0	4000	1	9	0
	Kannirajpuram	0	0	0	0	2	6	0
	Orivayal	0	1863	0	6500	3	8	0
	Kadugusandai	3000	0	0	4230	2	3	0
	Melachirupodhu	5000	0	0	2548	4	5	0
	Naripayur	0	0	0	0	0	11	0
	Mariyur	0	7000	0	12000	5	9	0
	T.Karisalkulam	883	0	0	720	2	3	0
Type 2	Kokkarasankottai	3000	1500	0	500	0	4	0
	Uchinatham	3000	0	0	500	0	4	0
	Kondunallanpatti	5000	22000	3000	500	0	6	0
	Sethurajapuram	2500	0	0	500	0	0	0
	Panivasal	2500	0	0	4500	3	6	0
	Sokkanai	2500	0	0	4500	2	4	0
	S.Tharaikudi	7000	3000	0	3000	1	8	0
	Sevalpatti	8000	4000	1500	500	0	7	0
	Sonaipriyankottai	0	0	0	2000	2	3	0
	kidathirukkai	800	7500	0	800	2	4	0
	Marandai	3000	0	0	5000	2	6	0
	Sevariarpattinam	0	250	0	500	1	3	0

S No	Gram Panchayat	Canal network				Tradational Water bodies		
Key CWRM Parameter		Length of Main Canal	Length of Minor Canal	Length of Distributaries	Water Courses (Field Channels)	Number of Tanks (PWD & Union)	Number of Ooranis	Other Surface Water Bodies
	Unit	metre	metre	metre	metre	Number	Number	Number
Type 4	A.Usilangulam	2500	0	0	9500	1	3	0
	Mookkaiyur	0	800	0	500	2	7	0
	S.Keerandai	0	800	0	500	2	7	0
	Pillayarkulam	4000	0	0	8000	6	4	0
	S.Vagaikulam	0	3000	0	500	7	2	0
	Kanikoor	4000	0	0	5000	3	4	0
	M.Karisalkutham	1500	800	0	3000	1	4	0
	A.Punavasi	7000	0	0	5000	8	8	0
	Kadaladi	4000	1000	0	1500	1	3	0
	Mangalam	6500	0	0	4500	5	5	0
	Karungulam	0	3500	0	1000	4	7	0
	Thirumalugandankot-tai	0	2500	0	500	2	3	0
	T.Veppangulam	0	1000	0	1500	2	3	0
	Senjudainathapuram	0	2000	0	1300	7	5	0
	Meenagudi	0	1500	0	1500	12	6	0
	Melaselvanur	0	1000	0	500	1	7	0
	Thanichiyam	500	1300	0	4350	6	5	0
	pannanthai	0	2000	0	4000	2	2	0
	P.keerandai	3000	3000	0	2500	3	6	0
	Vallinocham	0	800	0	3000	5	6	0
	Kothangulam	600	3000	0	5500	1	5	0
	Oppilan	2500	0	0	1000	3	7	0
	Periakulam	2000	0	0	11000	4	3	0
	Melakidaram	6000	0	0	7000	9	6	0
	Keelaselvanur	12000	0	0	8500	5	8	0
	Sikkal	0	10000	0	5000	2	13	0

S No	Gram Panchayat	Canal network				Tradational Water bodies		
Key CWRM Parameter		Length of Main Canal	Length of Minor Canal	Length of Distributaries	Water Courses (Field Channels)	Number of Tanks (PWD & Union)	Number of Ooranis	Other Surface Water Bodies
	Unit	metre	metre	metre	metre	Number	Number	Number
Type 4	Siraikulam	2200	0	0	1300	6	12	0
	Oruvanendhal	2000	0	0	4000	1	4	0
	Pothikulam	7000	0	0	4000	4	10	0
	Kelakidaram	0	2000	0	3000	4	8	0
	Enathi	3000	1000	0	6000	4	8	0
	Keelasakkulam	6000	0	0	500	4	4	0
	Kandilan	2050	0	0	5250	5	6	0
	Ilanchembur	3500	1500	0	7000	4	15	0
	Peikulam	0	1200	0	2000	6	5	0
	Keelachirupothu	0	4000	0	4000	4	8	0

S No	Gram Panchayat	Irrigation Facilities			Catchment Area wise Available Runoff		
Key CWRM Parameter		Area under Tank Irrigation	Area under Canal Irrigation	Area under Open & Tube Well Irrigation	Good Catchment Area	Average Catchment Area	Bad Catchment Area
	Unit	ha	ha	ha	ha - M	ha - M	ha - M
Type 1	Avathandai	127.35	0	4.45	39.4	19.4	112.1
	Appanur	295.78	0	37	130.5	57.2	130.2
	Chithirangadi	216.49	0	11.7	23	0	75.9
	Ervadi	414.83	0	5.73	24.1	72.2	200.9
	Idambadai	109.3	0	0	32.1	0	102.3
	Kannirajpuram	11.72	0	0	90.035604	28.2864	48.872992
	Orivayal	245.35	0	5.05	51.1	7.1	98.9
	Kadugusandai	56.04	0	7	18.1	23.2	94.8
	Melachirupodhu	248.63	0	0	40.1	0	97.8
	Naripayur	5.89	0	0	15.1	82.3	141.7
	Mariyur	41.66	0	0	377.1	11	31.1
	T.Karisalkulam	17.9	0	0	13.2	16.9	67.9
Type 2	Kokkarasankottai	0	0	62.5	8.3	3.1	73.7
	Uchinatham	1.13	0	1.14	12.5	4.6	110.5
	Kondunallanpatti	12.14	0	3.23	16.7	6.1	147.3
	Sethurajapuram	1.95	0	0	4.2	1.5	36.8
	Panivasal	3.54	0	169.3	9.2	13.5	62.9
	Sokkanai	1.91	0	91.15	4.9	7.3	33.9
	S.Tharaikudi	80.9371	0	0	133.1	79.4	199.9
	Sevalpatti	60.7	0	0	57.1	34	85.7
	Sonaipriyankottai	149.85	0	0	24.5	0.2	56.8
	kidathirukkai	169	0	21	27.7	0.2	64.1
	Marandai	215.9	0	6.8	26.7	6.8	92.9
	Sevariarpattinam	77.95	0	32	14.4	3.6	50

S No	Gram Panchayat	Irrigation Facilities			Catchment Area wise Available Runoff		
Key CWRM Parameter		Area under Tank Irrigation	Area under Canal Irrigation	Area under Open & Tube Well Irrigation	Good Catchment Area	Average Catchment Area	Bad Catchment Area
	Unit	ha	ha	ha	ha - M	ha - M	ha - M
Type 4	A.Usilangulam	566.5	0	4.85	21.2	1.5	48.6
	Mookkaiyur	80.9	0	4.85	148.9	82.7	97.1
	S.Keerandai	89.05	0	48.35	148.9	82.7	97.1
	Pillayarkulam	343.983	0	63	26.8	3.7	53.6
	S.Vagaikulam	153	0	0	62.8	13.3	108.3
	Kanikoor	96	0	20	27.9	3	71.1
	M.Karisalkutham	109	0	8.09	28.3	2.1	70.2
	A.Punavasi	448.21	0	2.79	115	5.4	134.8
	Kadaladi	80.9	0	28.3	8.1	0.4	11.8
	Mangalam	323.7	4.85	217.42	57.1	17.2	56.8
	Karungulam	206.49	0	6.9	51.2	3.1	75.3
	Thirumalugandankot-tai	41.9	0	0	19.1	12.8	61.5
	T.Veppangulam	76	0	0	18	35.2	39.3
	Senjudainathapuram	297.4	0	0	75.1	28.9	178.7
	Meenagudi	313	0	0	4.6	42.5	115.4
	Melaselvanur	197	0	32	239.8	28.7	100
	Thanichiyam	171.62	0	74.41	49.7	18.3	71.7
	pannanthai	67.71	0	2.25	14	1.3	24.2
	P.keerandai	505.81	0	249.34	52.4	4.9	87.5
	Vallinocham	89.36	0	49.8	68.7	25.9	109.3
	Kothangulam	93.07	0	22.46	37.9	7.7	37.9
	Oppilan	122	0	0	69.9	28	93.8
	Periakulam	76	0	0	69.9	28	93.8
	Melakidaram	212.84	0	34.22	272.2	36.6	109.9
	Keelaselvanur	234.74	0	2.72	67	10	54.8
	Sikkal	244.8	0	7.99	60.5	6.4	66.2

S No	Gram Panchayat	Irrigation Facilities			Catchment Area wise Available Runoff		
Key CWRM Parameter		Area under Tank Irrigation	Area under Canal Irrigation	Area under Open & Tube Well Irrigation	Good Catchment Area	Average Catchment Area	Bad Catchment Area
	Unit	ha	ha	ha	ha - M	ha - M	ha - M
Type 4	Siraikulam	231.17	0	39.97	179.2	11.2	136.6
	Oruvanendhal	110.37	0	0	13.1	8.1	27.3
	Pothikulam	224.8	0	0	31.5	19.4	65.5
	Kelakidaram	180	5	0	216.7	26.9	106.1
	Enathi	168.66	0	52.5	15.7	0	61.1
	Keelasakkulam	103.53	0	31.95	12.8	9.4	37.2
	Kandilan	199.53	0	40.32	33.7	45.2	63.4
	Ilanchembur	451.7	0	318.373	0.4	0.6	144.7
	Peikulam	220	0	3.5	94.1	21.6	125
	Keelachirupothu	230	5	0	34.8	0.3	98.9

S No	Gram Panchayat	Watershed and Drainage Networks			Water Demand		
Key CWRM Parameter		Length of Natural Drainage Lines	Number of Natural Drainage Lines	Number of Mi-cro-watersheds	Water Demand for Humans	Water Demand for Livestock	Water Demand for Agriculture
	Unit	metre	Number	Number	ha - M	ha - M	ha - M
Type 1	Avathandai	3727.46	6	10	6.9	1.17	498.14
	Appanur	15393.7	13	11	9.11	2.14	656.82
	Chithirangadi	10117.14	8	7	1.64	0.71	319.07
	Ervadi	1306.96	3	8	36.59	4.89	206.41
	Idambadai	2258.1	4	5	5.21	0.86	258.54
	Kannirajpuram	671.38	1	3	13.922925	2.45989013	50.325
	Orivayal	354.7	1	5	5.49	0.68	928.09
	Kadugusandai	3152.46	4	6	7.36	1.16	409.11
	Melachirupodhu	0	0	7	5.39	0.46	738.13
	Naripayur	0	0	5	26.9944875	3.18	122.8275
	Mariyur	0	0	7	13.95	1.37	194.48
	T.Karisalkulam	4642.91	6	7	2.4309	0.38	294.0485
Type 2	Kokkarasankottai	8623.9	12	7	2.28	0.13	355.49
	Uchinatham	22934.28	16	6	2.77	0.2	540.79
	Kondunallanpatti	12469.147	7	8	4.42	0.35	581.99
	Sethurajapuram	758.2	1	4	4.42	0.09	581.99
	Panivasal	1221.17	1	5	9.23	1.08	708.51
	Sokkanai	280.48	2	4	9.23	0.58	708.51
	S.Tharaikudi	10963.58	6	9	8.68	1.16	624.23
	Sevalpatti	14860.75	10	10	8.68	0.5	624.23
	Sonaipriyankottai	6321.7	6	5	7.76	0.78	101.24
	kidathirukkai	8558.83	7	7	7.76	0.88	181.49
	Marandai	3232.97	4	6	8.67	0.36	606
	Sevariarpattinam	5521.39	6	6	8.67	0.19	1189.7

S No	Gram Panchayat	Watershed and Drainage Networks			Water Demand		
Key CWRM Parameter		Length of Natural Drainage Lines	Number of Natural Drainage Lines	Number of Micro-watersheds	Water Demand for Humans	Water Demand for Livestock	Water Demand for Agriculture
	Unit	metre	Number	Number	ha - M	ha - M	ha - M
Type 4	A.Usilangulam	6207.96	3	5	7.05	0.39	339.38
	Mookkaiyur	2547.11	1	9	8.9	1.69	202.9
	S.Keerandai	3991.38	4	10	1.52	0.39	410.97
	Pillayarkulam	2588.7	1	3	7.05	0.35	339.38
	S.Vagaikulam	5555.94	4	10	7.75	0.37	788.04
	Kanikoor	2377.34	2	5	5.32	0.7	217.48
	M.Karisalkutham	2862.58	2	5	5.32	0.9	217.48
	A.Punavasi	1511.59	4	11	5.01	1.42	1159.79
	Kadaladi	410.43	1	2	16.06	0.27	557.95
	Mangalam	6220.42	11	6	2.38	0.1	557.95
	Karungulam	3855.79	6	7	16.06	1.72	557.95
	Thirumalugandankottai	16036.22	11	7	3.56	0.19	291.48
	T.Veppangulam	3930.64	3	8	3.18	0.68	213.98
	Senjudainathapuram	11594.64	15	14	3.56	0.92	929.67
	Meenagudi	1238.36	2	8	9.56	1.13	744.25
	Melaselvanur	0	0	11	4.64	1.72	426.73
	Thanichiyam	0	0	8	6.75	0.48	426.73
	pannanthai	183.49	0	2	8.39	0.51	921.25
	P.keerandai	4923.27	7	7	8.39	1.83	921.25
	Vallinocham	0	0	8	17.03	1.09	121
	Kothangulam	3383.48	6	2	6.75	0.47	333.02
	Oppilan	0	0	1	13.33	1.36	482.88
	Periakulam	0	0	8	13.33	1.36	482.88
	Melakidaram	1103.37	0	11	9.14	1.27	633.02
	Keelaselvanur	677.04	2	7	5.41	0.92	397.47
	Sikkal	4064.78	5	7	6.3	0.46	702.19

S No	Gram Panchayat	Watershed and Drainage Networks			Water Demand		
Key CWRM Parameter		Length of Natural Drainage Lines	Number of Natural Drainage Lines	Number of Micro-watersheds	Water Demand for Humans	Water Demand for Livestock	Water Demand for Agriculture
	Unit	metre	Number	Number	ha - M	ha - M	ha - M
Type 4	Siraikulam	6946.5	7	7	6.44	0.37	545.74
	Oruvanendhal	0	0	5	10.11	0.18	816.8
	Pothikulam	3952.21	5	7	10.11	0.44	816.8
	Kelakidaram	2261.93	2	10	10.42	1.45	702.46
	Enathi	303.33	1	5	5.45	0.74	652.29
	Keelasakkulam	1144.21	2	5	5.45	0.27	652.29
	Kandilan	2922.91	3	7	6.6	0.78	816.8
	Ilanchembur	505.11	1	7	10.56	0.91	832.39
	Peikulam	6521.19	7	10	14.68	0.96	832.59
	Keelachirupothu	5475.41	4	7	8.58	0.31	958.73

S No	Gram Panchayat	GW Utilization			SW Utilization		
Key CWRM Parameter		Drinking	Livestock	Agriculture	Drinking	Livestock	Agriculture
	Unit	%	%	%	%	%	%
Type 1	Avathandai	86	53	3	14	47	97
	Appanur	100	65	11	0	35	89
	Chithirangadi	100	50	5	0	50	95
	Ervadi	100	68	1	0	32	99
	Idambadai	100	30	0	0	70	100
	Kannirajpuram	92	22	0	8	78	100
	Orivayal	77	74	2	23	26	98
	Kadugusandai	82	49	11	18	51	89
	Melachirupodhu	100	20	0	0	80	100
	Naripayur	100	35	3	0	65	97
	Mariyur	100	32	0	0	68	100
	T.Karisalkulam	35	21	13	65	79	87
Type 2	Kokkarasankottai	67	88	100	33	12	0
	Uchinatham	35	88	50	65	12	50
	Kondunallanpatti	88	54	21	12	46	79
	Sethurajapuram	45	54	0	55	46	100
	Panivasal	42	80	98	58	20	2
	Sokkanai	42	80	98	58	20	2
	S.Tharaikudi	99	80	0	1	20	100
	Sevalpatti	95	80	0	5	20	100
	Sonaipriyankottai	100	80	0	0	20	100
	kidathirukkai	6	80	11	94	20	89
	Marandai	1	52	3	99	48	97
	Sevariarpattinam	33	52	29	67	48	71

S No	Gram Panchayat	GW Utilization			SW Utilization		
Key CWRM Parameter		Drinking	Livestock	Agriculture	Drinking	Livestock	Agriculture
	Unit	%	%	%	%	%	%
Type 4	A.Usilangulam	91	91	91	9	9	9
	Mookkaiyur	99	58	6	1	42	94
	S.Keerandai	99	61	35	1	39	65
	Pillayarkulam	98	39	15	2	61	85
	S.Vagaikulam	84	32	0	16	68	100
	Kanikoor	86	76	17	14	24	83
	M.Karisalkutham	91	59	7	9	41	93
	A.Punavasi	100	41	1	0	59	99
	Kadaladi	99	59	26	1	41	74
	Mangalam	94	60	40	6	40	60
	Karungulam	100	60	3	0	40	97
	Thirumalugandankot-tai	83	76	0	17	24	100
	T.Veppangulam	90	82	0	10	18	100
	Senjudainathapuram	100	55	0	0	45	100
	Meenagudi	99	50	0	1	50	100
	Melaselvanur	99	35	14	1	65	86
	Thanichiyam	100	81	30	0	19	70
	pannanthai	100	44	3	0	56	97
	P.keerandai	95	44	33	5	56	67
	Vallinocham	91	60	36	9	40	64
	Kothangulam	100	54	19	0	46	81
	Oppilan	95	49	0	5	51	100
	Periakulam	96	49	0	4	51	100
	Melakidaram	99	50	14	1	50	86
	Keelaselvanur	98	43	1	2	57	99
	Sikkal	100	55	3	0	45	97

S No	Gram Panchayat	GW Utilization			SW Utilization		
Key CWRM Parameter		Drinking	Livestock	Agriculture	Drinking	Livestock	Agriculture
	Unit	%	%	%	%	%	%
Type 4	Siraikulam	100	74	15	0	26	85
	Oruvanendhal	100	78	0	0	22	100
	Pothikulam	100	79	0	0	21	100
	Kelakidaram	100	49	0	0	51	100
	Enathi	45	13	24	55	87	76
	Keelasakkulam	100	35	24	0	65	76
	Kandilan	100	22	17	0	78	83
	Ilanchembur	100	46	41	0	54	59
	Peikulam	100	43	2	0	57	98
	Keelachirupothu	100	24	0	0	76	100

ANNEXURE 3.8

LOCATION WISE WATER QUALITY IN KADALADI BLOCK DURING PRE-MONSOON SEASON

S.No.	Name of the GP	Name of the locations	Latitude	Longitude	pH	Salinity	EC (µS/cm)	TDS (ppm)
1	Sevalpatti	Sevalpatti	E 78° 21' 8.647"	N 9° 7' 56.521"	7.87	0	512	312
2	Kannirajpuram	Kannirajpuram	E 78° 23' 39.034"	N 9° 6' 42.073"	7.15	0	3503	1987
3	Narippaiyur	Vettukadu	E 78° 24' 27.637"	N 9° 7' 14.138"	7.58	0	2416	1407
4	Narippaiyur	Narippaiyur	E 78° 24' 58.727"	N 9° 7' 17.465"	7.43	2	37044	21640
5	Narippaiyur	Near Narippaiyur	E 78° 25' 20.021"	N 9° 8' 22.06"	7.54	0	394	250
6	Mookaiyur	VadakkuMookkaiyur	E 78° 28' 12.216"	N 9° 8' 9.996"	7.07	0	2936	1861
7	Mookaiyur	Mookkaiyur	E 78° 28' 40.058"	N 9° 8' 2.602"	6.97	0	3002	1734
8	Oppilan	Oppilan	E 78° 30' 29.983"	N 9° 8' 31.237"	7.32	0	5150	3170
9	Mariyur	T Mariyur	E 78° 32' 12.187"	N 9° 8' 53.357"	7.41	0	736	413
10	Mariyur	MelaMundhal	E 78° 34' 26.616"	N 9° 8' 6.277"	6.93	0	1506	842
11	Mariyur	Mundhal	E 78° 34' 58.411"	N 9° 8' 19.389"	6.97	0	28130	17610
12	Valiknokam	Valinokkam	E 78° 38' 41.382"	N 9° 9' 51.472"	7.08	0	6230	3780
13	Valiknokam	Valinokkam Salt Pan	E 78° 37' 43.342"	N 9° 11' 14.611"	6.93	0	8470	5270
14	Melakidaram	Near Melakidaram	E 78° 34' 39.239"	N 9° 10' 57.254"	6.58	0	8390	5370
15	Kadugusandai	Kaduguchanthai	E 78° 30' 37.544"	N 9° 11' 30.703"	6.39	5	18810	11030
16	Mookaiyur	Katalati (Kuthiraimozhi)	E 78° 32' 21.176"	N 9° 9' 42.353"	7.6	0	623	357
17	Mariyur	Peiryakulam	E 78° 28' 38.69"	N 9° 10' 21.619"	7.67	15	38470	23560
18	Sayalkudi_TP	Sayalkudi	E 78° 27' 0.619"	N 9° 10' 13.548"	7.65	0	772	476
19	Sethurajapuram	Sethurajapuram	E 78° 23' 42.562"	N 9° 10' 5.048"	7.18	0	1955	1171
20	Avathandai	Kuruvadi	E 78° 23' 30.091"	N 9° 11' 36.65"	7.51	0	1204	763
21	S Tharakudi	Tharakudi	E 78° 22' 27.019"	N 9° 9' 30.614"	6.83	0	1799	1099
22	T Karisalkulam	Karusalkulam	E 78° 17' 28.705"	N 9° 10' 52.558"	7.42	0	2680	1624
23	Uchinatham	Uchanatham	E 78° 17' 29.965"	N 9° 9' 21.643"	7.73	0	566	341
24	T Veppangulam	T Veppakulam	E 78° 21' 59.846"	N 9° 11' 58.067"	7.81	0	397	216
25	Tirumalugandankottai	T.M.Kottai	E 78° 20' 46.91"	N 9° 11' 43.508"	7.63	0	1662	1014
26	Uchinatham	Pillayarkulam	E 78° 26' 11.548"	N 9° 12' 53.636"	7.53	0	6570	4120
27	S Vagaikulam	Vagaikulam	E 78° 26' 16.843"	N 9° 12' 25.585"	7.74	0	1455	831
28	S Vagaikulam	S Alangkulam	E 78° 25' 23.858"	N 9° 12' 27.133"	7.54	0	683	412

S.No.	Name of the GP	Name of the locations	Latitude	Longitude	pH	Salinity	EC (µS/cm)	TDS (ppm)
29	Kadaladi	Samathuvapuram(Near Kadaladi	E 78^0 29' 20.134"	N 9^0 12' 18.007"	7.8	0	539	304
30	Kadaladi	Kadaladi	E 78^0 29' 47.429"	N 9^0 13' 25.925"	7.81	0	789	495
31	Kadaladi	Pasumpon Nagar	E 78^0 31' 57.248"	N 9^0 12' 8.323"	7.62	0	2208	1302
32	Melaselvanur	Melaselvanur	E 78^0 32' 59.086"	N 9^0 12' 32.612"	7.5	0	683	421
33	Kelaselvanur	Kelaselvanur	E 78^0 33' 59.875"	N 9^0 12' 32.753"	7.29	0	3911	2455
34	Siraikulam	Kothankulam	E 78^0 36' 45.853"	N 9^0 13' 21.184"	7.18	0	3164	1649
35	Sikkal	Sikkal	E 78^0 37' 27.286"	N 9^0 13' 52.259"	7.12	15	39350	24690
36	Ervadi	Ervadi	E 78^0 42' 15.955"	N 9^0 13' 23.174"	7.57	0	858	521
37	Ervadi	ChinnaErvadi	E 78^0 42' 49.241"	N 9^0 12' 5.684"	6.61	0	7750	4860
38	Sikkal	Sikkal	E 78^0 38' 58.258"	N 9^0 14' 54.175"	6.93	2	15030	9490
39	Peikulam	Thirunallar	E 78^0 36' 53.395"	N 9^0 15' 3.971"	6.49	0	719	451
40	Melachirupodhu	Melachirupodhu	E 78^0 35' 10.979"	N 9^0 16' 51.949"	8.03	0	1068	628
41	Orivayal	Orivayal	E 78^0 32' 21.754"	N 9^0 14' 27.798"	7.82	0	1624	1007
42	Savariarpattinam	Savariarpattanam	E 78^0 33' 10.642"	N 9^0 16' 7.356"	7.47	0	2847	1797
43	Appanoor	Appanoor	E 78^0 29' 23.276"	N 9^0 15' 47.538"	7.13	2	1724	1007
44	A Punavasal	Punavasal	E 78^0 30' 14.756"	N 9^0 15' 22.802"	7.48	0	3319	1063
45	A Punavasal	Punavasal near	E 78^0 30' 2.65"	N 9^0 15' 21.874"	7.83	0	607	368
46	Ilamchembur	Elanjempur	E 78^0 31' 48"	N 9^0 18' 10.325"	7.04	4	15860	9200
47	Ilamchembur	Pookkulam	E 78^0 32' 39.552"	N 9^0 18' 11.826"	6.8	9	1900	1152
48	Melachirupodhu	Kookondan	E 78^0 34' 25.705"	N 9^0 17' 40.87"	6.83	0	31890	19880
49	Chithirangudi	Chithirangudi	E 78^0 28' 32.135"	N 9^0 20' 0.254"	7.11	2	12240	7720

S.No.	Name of the GP	Name of the locations	TA (mg/l)	CO3 (mg/l)	HCO 3 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)
1	Sevalpatti	Sevalpatti	465	96	334	210	80	45	36
2	Kannirajpuram	Kannirajpuram	327	95	213	418	191	107	156
3	Narippaiyur	Vettukadu	411	118	274	270	120	90	288
4	Narippaiyur	Narippaiyur	392	131	236	2163	1102	483	421
5	Narippaiyur	Near Narippaiyur	407	99	293	164	76	42	43
6	Mookaiyur	VadakkuMookkaiyur	313	56	233	350	160	90	222
7	Mookaiyur	Mookkaiyur	306	47	229	358	164	92	268
8	Oppilan	Oppilan	357	65	262	614	281	157	282
9	Mariyur	T Mariyur	386	141	231	88	40	23	148
10	Mariyur	MelaMundhal	302	95	182	180	82	46	210
11	Mariyur	Mundhal	307	68	200	3353	200	358	1965
12	Valiknokam	Valinokkam	314	66	234	743	340	190	264
13	Valiknokam	Valinokkam Salt Pan	302	56	187	420	80	45	1287
14	Melakidaram	Near Melakidaram	270	69	176	1000	457	256	456
15	Kadugusandai	Kaduguchanthai	256	84	133	2242	1025	574	523
16	Mookaiyur	Katalati (Kuthiraimozhi)	416	114	286	74	34	19	108
17	Mariyur	Peiryakulam	436	116	283	4586	2096	1174	763
18	Sayalkudi_TP	Sayalkudi	433	121	281	350	240	67	36
19	Sethurajapuram	Sethurajapuram	332	95	216	233	107	60	146
20	Avathandai	Kuruvadi	306	56	211	246	164	35	181
21	S Tharakudi	Tharakudi	296	95	171	310	200	67	206
22	T Karisalkulam	Karusalkulam	391	103	254	319	146	82	286
23	Uchinatham	Uchanatham	442	121	284	67	31	17	98
24	T Veppangulam	T Veppakulam	456	114	324	47	22	12	89
25	Tirumalugandankottai	T.M.Kottai	426	96	314	198	91	51	156
26	Uchinatham	Pillayarkulam	406	98	298	480	360	45	916
27	S Vagaikulam	Vagaikulam	442	102	298	173	79	44	256
28	S Vagaikulam	S Alangkulam	421	99	287	137	88	33	129

S.No.	Name of the GP	Name of the locations	TA (mg/l)	CO3 (mg/l)	HCO 3 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)
29	Kadaladi	Samathuvapuram(Near Kadaladi	456	118	314	64	29	16	96
30	Kadaladi	Kadaladi	457	114	324	94	43	24	89
31	Kadaladi	Pasumpon Nagar	420	92	293	263	120	67	250
32	Melaselvanur	Melaselvanur	400	87	298	81	37	21	166
33	Kelaselvanur	Kelaselvanur	350	96	228	466	213	119	436
34	Siraikulam	Kothankulam	332	96	216	377	172	97	386
35	Sikkal	Sikkal	317	66	236	4691	2144	1201	2532
36	Ervadi	Ervadi	410	113	285	102	47	26	186
37	Ervadi	ChinnaErvadi	272	74	184	470	320	90	1404
38	Sikkal	Sikkal	303	86	197	1792	819	459	908
39	Peikulam	Thirunallar	260	86	145	86	39	22	36
40	Melachirupodhu	Melachirupodhu	474	93	358	630	320	291	36
41	Orivayal	Orivayal	458	115	324	194	89	50	262
42	Savariarpattinam	Savariarpattanam	397	89	295	339	155	87	287
43	Appanoor	Appanoor	320	95	198	258	118	66	267
44	A Punavasal	Punavasal	398	85	286	396	181	101	205
45	A Punavasal	Punavasal near	459	114	328	72	33	19	99
46	Ilamchembur	Elanjempur	312	96	188	270	120	112	2287
47	Ilamchembur	Pookkulam	291	97	172	226	104	58	186
48	Melachirupodhu	Kookondan	296	68	192	3802	1738	973	122
49	Chithirangudi	Chithirangudi	317	59	236	1459	667	374	989

S.No.	Name of the GP	Name of the locations	K(mg/l)	S04 (mg/l)	Cl (mg/l)	NO3 (mg/l)	WQI	SMI
1	Sevalpatti	Sevalpatti	4	49	106	33	64.9	0.156018262
2	Kannirajpuram	Kannirajpuram	6	26	724	26	184.3	0.393127079
3	Narippaiyur	Vettukadu	30	36	627	45	164	0.414255696
4	Narippaiyur	Narippaiyur	8	28	3836	36	1232	1.723748423
5	Narippaiyur	Near Narippaiyur	4	33	130	8	51.5	0.135352445
6	Mookaiyur	VadakkuMookkaiyur	12	72	782	18	182.7	0.521770114
7	Mookaiyur	Mookkaiyur	3	96	877	13	188	0.618919665
8	Oppilan	Oppilan	6	58	1047	5	270	0.626518242
9	Mariyur	T Mariyur	30	34	180	23	64.7	0.185033112
10	Mariyur	MelaMundhal	26	83	408	21	108.2	0.390274225
11	Mariyur	Mundhal	53	66	4202	35	1121	2.393733018
12	Valiknokam	Valinokkam	17	35	1260	15	317.4	0.662612489
13	Valiknokam	Valinokkam Salt Pan	58	75	2372	5	456.3	1.447943216
14	Melakidaram	Near Melakidaram	10	136	1880	12	452.7	1.165884188
15	Kadugusandai	Kaduguchanthai	12	142	3560	39	885.1	1.894001624
16	Mookaiyur	Katalati (Kuthiraimozhi)	6	11	133	9	50.1	0.109157394
17	Mariyur	Peiryakulam	14	99	6182	88	1733	2.992484978
18	Sayalkudi_TP	Sayalkudi	4	25	295	5	88.8	0.184531714
19	Sethurajapuram	Sethurajapuram	11	28	361	17	112.9	0.248187302
20	Avathandai	Kuruvadi	8	83	404	38	111.7	0.377360489
21	S Tharakudi	Tharakudi	10	36	605	17	140.3	0.375437326
22	T Karisalkulam	Karusalkulam	14	87	495	37	162.5	0.462061518
23	Uchinatham	Uchanatham	9	47	103	16	49.9	0.164612186
24	T Veppangulam	T Veppakulam	9	12	120	9	41.2	0.098806644
25	Tirumalugandankottai	T.M.Kottai	10	8	330	6	100	0.198818416
26	Uchinatham	Pillayarkulam	27	53	1826	28	384.6	1.08408582
27	S Vagaikulam	Vagaikulam	17	64	362	34	109.7	0.35002133
28	S Vagaikulam	S Alangkulam	5	25	236	6	68	0.184554408

S.No.	Name of the GP	Name of the locations	K(mg/l)	S04 (mg/l)	Cl (mg/l)	NO3 (mg/l)	WQI	SMI
29	Kadaladi	Samathuvapuram(Near Kadaladi	3	18	126	10	46.6	0.115796922
30	Kadaladi	Kadaladi	6	26	102	10	54.6	0.121900103
31	Kadaladi	Pasumpon Nagar	12	87	457	23	143.2	0.433385505
32	Melaselvanur	Melaselvanur	16	23	239	5	64.1	0.190888628
33	Kelaselvanur	Kelaselvanur	27	81	1084	36	253.8	0.725679154
34	Siraikulam	Kothankulam	18	167	784	64	204.8	0.760886191
35	Sikkal	Sikkal	24	22	8244	43	2022.3	4.175516957
36	Ervadi	Ervadi	17	26	276	16	76	0.217921922
37	Ervadi	ChinnaErvadi	54	76	2560	58	505.4	1.566571691
38	Sikkal	Sikkal	16	56	3654	41	819.1	1.858276815
39	Peikulam	Thirunallar	20	16	242	8	56	0.137710805
40	Melachirupodhu	Melachirupodhu	6	8	262	10	149.5	0.185921354
41	Orivayal	Orivayal	17	62	543	14	125.9	0.417002189
42	Savariarpattinam	Savariarpattanam	25	21	882	24	190.7	0.479481527
43	Appanoor	Appanoor	8	41	574	12	131.2	0.392550677
44	A Punavasal	Punavasal	13	16	625	8	144.5	0.350704339
45	A Punavasal	Punavasal near	6	26	186	23	57.5	0.155433356
46	Ilamchembur	Elanjempur	18	29	4368	79	817.1	2.43348641
47	Ilamchembur	Pookkulam	9	14	429	43	123.1	0.258470841
48	Melachirupodhu	Kookondan	15	50	4726	19	1374.8	2.108427194
49	Chithirangudi	Chithirangudi	8	26	1751	21	600.1	1.095173503

ANNEXURE 3.9

LOCATION WISE WATER QUALITY IN KADALADI BLOCK DURING POST-MONSOON SEASON

S.No.	Name of the GP	Name of the locations	Latitude	Longitude	pH	Salinity	EC (µS/cm)	TDS (ppm)
1	Sevalpatti	Sevalpatti	E 78° 21' 8.647"	N 9° 7' 56.521"	7.25	0	558	346
2	Kannirajpuram	Kannirajpuram	E 78° 23' 39.034"	N 9° 6' 42.073"	7.36	0	773	479
3	Narippaiyur	Vettukadu	E 78° 24' 27.637"	N 9° 7' 14.138"	6.88	0	2690	1668
4	Narippaiyur	Narippaiyur	E 78° 24' 58.727"	N 9° 7' 17.465"	6.91	3	5800	3596
5	Narippaiyur	Near Narippaiyur	E 78° 25' 20.021"	N 9° 8' 22.06"	7.75	0	552	342
6	Mookaiyur	VadakkuMookkaiyur	E 78° 28' 12.216"	N 9° 8' 9.996"	7.12	0	1220	756
7	Mookaiyur	Mookkaiyur	E 78° 28' 40.058"	N 9° 8' 2.602"	7.16	0	1342	832
8	Oppilan	Oppilan	E 78° 30' 29.983"	N 9° 8' 31.237"	6.91	0	3665	2272
9	Mariyur	T Mariyur	E 78° 32' 12.187"	N 9° 8' 53.357"	7.48	0	2767	1716
10	Mariyur	MelaMundhal	E 78° 34' 26.616"	N 9° 8' 6.277"	7.65	0	3350	2077
11	Mariyur	Mundhal	E 78° 34' 58.411"	N 9° 8' 19.389"	7.59	0	1770	1097
12	Valiknokam	Valinokkam	E 78° 38' 41.382"	N 9° 9' 51.472"	7.44	0	5540	3435
13	Valiknokam	Valinokkam Salt Pan	E 78° 37' 43.342"	N 9° 11' 14.611"	7.06	0	6240	3869
14	Melakidaram	Near Melakidaram	E 78° 34' 39.239"	N 9° 10' 57.254"	7.27	0	706	438
15	Kadugusandai	Kaduguchanthai	E 78° 30' 37.544"	N 9° 11' 30.703"	7.42	0	534	331
16	Mookaiyur	Katalati (Kuthiraimozhi)	E 78° 32' 21.176"	N 9° 9' 42.353"	7.27	0	2665	1652
17	Mariyur	Peiryakulam	E 78° 28' 38.69"	N 9° 10' 21.619"	7.07	6	25220	15636
18	Sayalkudi_TP	Sayalkudi	E 78° 27' 0.619"	N 9° 10' 13.548"	7.14	0	361	224
19	Sethurajapuram	Sethurajapuram	E 78° 23' 42.562"	N 9° 10' 5.048"	7.19	0	781	484
20	Avathandai	Kuruvadi	E 78° 23' 30.091"	N 9° 11' 36.65"	7.33	0	437	271
21	S Tharakudi	Tharakudi	E 78° 22' 27.019"	N 9° 9' 30.614"	6.84	0	1155	716
22	T Karisalkulam	Karusalkulam	E 78° 17' 28.705"	N 9° 10' 52.558"	7.39	0	677	420
23	Uchinatham	Uchanatham	E 78° 17' 29.965"	N 9° 9' 21.643"	7.34	0	522	324
24	T Veppangulam	T Veppakulam	E 78° 21' 59.846"	N 9° 11' 58.067"	7.64	0	830	515
25	Tirumalugandankottai	T.M.Kottai	E 78° 20' 46.91"	N 9° 11' 43.508"	7.61	0	334	207
26	Uchinatham	Pillayarkulam	E 78° 26' 11.548"	N 9° 12' 53.636"	6.7	0	1051	652
27	S Vagaikulam	Vagaikulam	E 78° 26' 16.843"	N 9° 12' 25.585"	7.63	0	2550	1581
28	S Vagaikulam	S Alangkulam	E 78° 25' 23.858"	N 9° 12' 27.133"	7.31	0	461	286

S.No.	Name of the GP	Name of the locations	Latitude	Longitude	pH	Salinity	EC (µS/cm)	TDS (ppm)
29	Kadaladi	Samathuvapuram(Near Kadaladi	E 78^0 29' 20.134"	N 9^0 12' 18.007"	6.67	0	2670	1655
30	Kadaladi	Kadaladi	E 78^0 29' 47.429"	N 9^0 13' 25.925"	7.07	0	1790	1110
31	Kadaladi	Pasumpon Nagar	E 78^0 31' 57.248"	N 9^0 12' 8.323"	7.56	0	2436	1510
32	Melaselvanur	Melaselvanur	E 78^0 32' 59.086"	N 9^0 12' 32.612"	7.62	0	848	526
33	Kelaselvanur	Kelaselvanur	E 78^0 33' 59.875"	N 9^0 12' 32.753"	7.54	0	358	222
34	Siraikulam	Kothankulam	E 78^0 36' 45.853"	N 9^0 13' 21.184"	7.61	1	6910	4284
35	Sikkal	Sikkal	E 78^0 37' 27.286"	N 9^0 13' 52.259"	7.34	8	19030	11799
36	Ervadi	Ervadi	E 78^0 42' 15.955"	N 9^0 13' 23.174"	7.09	0	537	333
37	Ervadi	ChinnaErvadi	E 78^0 42' 49.241"	N 9^0 12' 5.684"	7.56	4	14000	8680
38	Sikkal	Sikkal	E 78^0 38' 58.258"	N 9^0 14' 54.175"	6.76	1	9350	5797
39	Peikulam	Thirunallar	E 78^0 36' 53.395"	N 9^0 15' 3.971"	6.72	0	318	197
40	Melachirupodhu	Melachirupodhu	E 78^0 35' 10.979"	N 9^0 16' 51.949"	6.8	0	7090	4396
41	Orivayal	Orivayal	E 78^0 32' 21.754"	N 9^0 14' 27.798"	7.65	0	9240	5729
42	Savariarpattinam	Savariarpattanam	E 78^0 33' 10.642"	N 9^0 16' 7.356"	7.2	0	690	428
43	Appanoor	Appanoor	E 78^0 29' 23.276"	N 9^0 15' 47.538"	6.67	18	25290	15680
44	A Punavasal	Punavasal	E 78^0 30' 14.756"	N 9^0 15' 22.802"	7.14	0	2862	1774
45	A Punavasal	Punavasal near	E 78^0 30' 2.65"	N 9^0 15' 21.874"	7.12	0	576	357
46	Ilamchembur	Elanjempur	E 78^0 31' 48"	N 9^0 18' 10.325"	7.27	0	3780	2344
47	Ilamchembur	Pookkulam	E 78^0 32' 39.552"	N 9^0 18' 11.826"	8.02	0	230	143
48	Melachirupodhu	Kookondan	E 78^0 34' 25.705"	N 9^0 17' 40.87"	7.02	0	5110	3168
49	Chithirangudi	Chithirangudi	E 78^0 28' 32.135"	N 9^0 20' 0.254"	6.73	5	31990	19834

S.No.	Name of the GP	Name of the locations	TA (mg/l)	CO3 (mg/l)	HCO 3 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)
1	Sevalpatti	Sevalpatti	127	8	115	53	18	26	24.2
2	Kannirajpuram	Kannirajpuram	163	12	138	56	24	26	36
3	Narippaiyur	Vettukadu	439	80	319	164	86	64	237
4	Narippaiyur	Narippaiyur	593	183	380	471	187	270.2	251.5
5	Narippaiyur	Near Narippaiyur	142	26	114	52	18	25.7	23.9
6	Mookaiyur	VadakkuMookkaiyur	289	17	251	98	39	46.8	62.9
7	Mookaiyur	Mookkaiyur	256	42	183	102	52	37	83
8	Oppilan	Oppilan	576	83	455	296	118	170.7	178.9
9	Mariyur	T Mariyur	485	86	383	142	79	46	146
10	Mariyur	MelaMundhal	573	48	493	278	108	156.1	145.3
11	Mariyur	Mundhal	242	42	179	164	83	67	186
12	Valiknokam	Valinokkam	492	116	362	371	152	203	240.3
13	Valiknokam	Valinokkam Salt Pan	567	89	462	506	201	290.7	270.6
14	Melakidaram	Near Melakidaram	183	16	146	64	23	32.9	30.6
15	Kadugusandai	Kaduguchanthai	127	8	110	50	28	17	24
16	Mookaiyur	Katalati (Kuthiraimozhi)	587	38	419	202	86	97	134
17	Mariyur	Peiryakulam	1179	262	896	1591	713	862	934
18	Sayalkudi_TP	Sayalkudi	68	5	57	35	18	11	32
19	Sethurajapuram	Sethurajapuram	172	11	161	65	25	34	42
20	Avathandai	Kuruvadi	109	6	96	59	36	17	22
21	S Tharakudi	Tharakudi	276	50	216	85	42	31	102
22	T Karisalkulam	Karusalkulam	184	10	162	91	49	28	33
23	Uchinatham	Uchanatham	151	36	102	45	18	16	26
24	T Veppangulam	T Veppakulam	188	16	161	77	26	36	65
25	Tirumalugandankottai	T.M.Kottai	94	5	78	52	32	11	26
26	Uchinatham	Pillayarkulam	279	56	190	71	25	32	66
27	S Vagaikulam	Vagaikulam	335	57	263	209	86	106	136
28	S Vagaikulam	S Alangkulam	113	7	93	53	18	19	28

S.No.	Name of the GP	Name of the locations	TA (mg/l)	CO3 (mg/l)	HCO 3 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)
29	Kadaladi	Samathuvapuram(Near Kadaladi	321	38	262	197	83	99	136
30	Kadaladi	Kadaladi	317	26	275	148	53	76	94
31	Kadaladi	Pasumpon Nagar	386	56	314	166	86	63	159
32	Melaselvanur	Melaselvanur	213	23	171	78	28	33	41
33	Kelaselvanur	Kelaselvanur	96	13	71	45	19	12	16
34	Siraikulam	Kothankulam	567	99	450	528	226	289	326
35	Sikkal	Sikkal	1094	273	783	1379	626	734	986
36	Ervadi	Ervadi	119	8	109	53	23	16	29
37	Ervadi	ChinnaErvadi	866	206	637	614	306	291	826
38	Sikkal	Sikkal	925	234	676	676	356	304	426
39	Peikulam	Thirunallar	79	11	63	36	15	8	12
40	Melachirupodhu	Melachirupodhu	662	180	466	510	227	265	348
41	Orivayal	Orivayal	873	232	625	679	294	367	435
42	Savariarpattinam	Savariarpattanam	173	10	143	63	24	29	37
43	Appanoor	Appanoor	1123	213	894	1851	896	934	1121
44	A Punavasal	Punavasal	631	93	510	207	103	89	117
45	A Punavasal	Punavasal near	167	28	115	55	29	14	23
46	Ilamchembur	Elanjempur	696	137	514	301	173	114	216
47	Ilamchembur	Pookkulam	63	9	48	28	13	6	10
48	Melachirupodhu	Kookondan	573	173	362	370	186	171	235
49	Chithirangudi	Chithirangudi	865	159	692	1226	621	593	643

S.No.	Name of the GP	Name of the locations	K(mg/l)	S04 (mg/l)	Cl (mg/l)	NO3 (mg/l)	WQI	SMI
1	Sevalpatti	Sevalpatti	5.3	37	50	9	41.4	0.097
2	Kannirajpuram	Kannirajpuram	8.2	33	68	12	47.2	0.226
3	Narippaiyur	Vettukadu	33	74.4	350	49.0776	144.2	0.543
4	Narippaiyur	Narippaiyur	55.1	194	649.7	31.562	287.8	0.961
5	Narippaiyur	Near Narippaiyur	10	26.57	49.4	13	40.6	0.095
6	Mookaiyur	VadakkuMookkaiyur	13	53.84	109.2	16.635	69	0.335
7	Mookaiyur	Mookkaiyur	21	73	139	19	75.9	0.412
8	Oppilan	Oppilan	34.8	142	328.3	19.941	182.7	0.599
9	Mariyur	T Mariyur	16	129.2	261	56.16	133.3	0.4
10	Mariyur	MelaMundhal	31.8	163	300.1	18.23	169.5	0.528
11	Mariyur	Mundhal	27	114	340	37.3672	121.6	2.286
12	Valiknokam	Valinokkam	60	167	456.4	28	249.8	0.671
13	Valiknokam	Valinokkam Salt Pan	89	168	660	86	318	1.831
14	Melakidaram	Near Melakidaram	6.7	46.84	63.3	3.844	45.3	0.543
15	Kadugusandai	Kaduguchanthai	7	26	61	4	37.3	0.59
16	Mookaiyur	Katalati (Kuthiraimozhi)	25.3	153	286	78	150.3	0.4
17	Mariyur	Peiryakulam	121	222	3556	138	1136.4	2.877
18	Sayalkudi_TP	Sayalkudi	8	17	62	3	31	0.084
19	Sethurajapuram	Sethurajapuram	11	51.76	69.9	8	49.7	0.234
20	Avathandai	Kuruvadi	6	23	49	6	35.1	0.232
21	S Tharakudi	Tharakudi	8	81	152	13	69.6	0.361
22	T Karisalkulam	Karusalkulam	8	31	71	5	46.3	0.358
23	Uchinatham	Uchanatham	4	14	58	7	35.6	0.144
24	T Veppangulam	T Veppakulam	12	48	94	12	55.9	0.185
25	Tirumalugandankottai	T.M.Kottai	4	22	52	2	31.1	0.206
26	Uchinatham	Pillayarkulam	11	41	78	3	54.6	1.015
27	S Vagaikulam	Vagaikulam	18	71	280	14	131.5	0.478
28	S Vagaikulam	S Alangkulam	3	16	49	7	34.5	0.173

S.No.	Name of the GP	Name of the locations	K(mg/l)	S04 (mg/l)	Cl (mg/l)	NO3 (mg/l)	WQI	SMI
29	Kadaladi	Samathuvapuram(Near Kadaladi	23	82	267	16	131.1	0.317
30	Kadaladi	Kadaladi	17	66	179	11	94.8	0.248
31	Kadaladi	Pasumpon Nagar	19	76	286	13	126.7	0.474
32	Melaselvanur	Melaselvanur	8	43	73	6	50.9	0.248
33	Kelaselvanur	Kelaselvanur	3	18	36	2	28.6	0.481
34	Siraikulam	Kothankulam	61	219	889	57	347.7	1.07
35	Sikkal	Sikkal	133	234	3461	103	963.5	4.629
36	Ervadi	Ervadi	6	27	56	4	36.1	0.244
37	Ervadi	ChinnaErvadi	104	153	1282	136	578.4	2.251
38	Sikkal	Sikkal	101	216	987	124	443.1	1.652
39	Peikulam	Thirunallar	6	16	29	6	25.5	0.066
40	Melachirupodhu	Melachirupodhu	87	158	789	75	342.4	0.606
41	Orivayal	Orivayal	97	137	903	59	426.3	0.89
42	Savariarpattinam	Savariarpattanam	9	58	72	12	47.6	0.383
43	Appanoor	Appanoor	148	216	3192	126	1156.5	2.192
44	A Punavasal	Punavasal	56	184	263	31	144.4	0.513
45	A Punavasal	Punavasal near	6	26	49	12	37.9	0.15
46	Ilamchembur	Elanjempur	78	183	394	54	197.3	2.708
47	Ilamchembur	Pookkulam	2	8	21	4	23.3	0.208
48	Melachirupodhu	Kookondan	68	186	437	76	246.7	0.529
49	Chithirangudi	Chithirangudi	73	212	1314	71	1020.4	1.935

ANNEXURE 3.10

GP WISE STATUS OF AGRICULTURE RESOURCE

S No	Gram Panchayat	Land Resources								
Key CWRM Parameter		Area under Forest land	Area under Non-Agricultural Uses	Area under Permanent Pastures and Other Grazing Land	Area under Land Under Miscellaneous Tree Crops etc.	Area under Culturable Waste Land	Area under Fallows Land other than Current Fallows	Area under Current Fallow land	Area under Unirrigated Land	Area Irrigated by Source
	Unit	ha	ha	ha	ha	ha	ha	ha	ha	ha
Type 1	Avathandai	0	177.61	0	113.55	0.15	0	248.7	606.45	131.8
	Appanur	0	588.44	0	317	18.87	451.92	85.95	275.54	332.78
	Chithirangadi	0	103.88	0	0	0.03	104.5	113.51	222.18	228.19
	Ervadi	0	108.53	0	423.75	0	0	0	950.86	420.56
	Idambadai	0	144.75	0	0	0	4.49	244.08	542.74	109.3
	Kannirajpuram	340.89	64.95	0	142	24	205.83	0.71	211.96	11.72
	Orivayal	0	230.12	0	26.48	14.96	172.72	0	447.9	250.4
	Kadugusandai	0	81.39	0	131.91	4.06	479.19	0	292.24	63.04
	Melachirupodhu	0	180.97	0	0	0.12	0	269.36	342.78	248.63
	Naripayur	0	68.06	0	411	72	571.62	7.9	661.59	5.89
	Mariyur	1139.5	560.45	0	53.79	10.98	76.69	0	108.81	88.7
	T.Karisalkulam	0	59.5	0	91.73	7.48	30.21	0	549.67	17.9
Type 2	Kokkarasankottai	0	37.63	0	16	2	87.26	0.76	559.58	0.76
	Uchinatham	0	56.45	0	24	3	130.9	1.13	839.37	1.14
	Kondunallanpatti	0	75.26	0	32	4	174.53	1.51	1119.16	1.52
	Sethurajapuram	0	18.82	0	8	1	43.63	0.38	279.79	0.38
	Panivasal	0	41.366	0	79.3	0	157.963	3.5425	223.119	169.3055
	Sokkanai	0	22.274	0	42.7	0	85.057	1.9075	120.141	91.1645
	S.Tharaikudi	412.118	187.929	0	396.9	69.3	657.979	0.553	925.722	175

S No	Gram Panchayat	Land Resources								
Key CWRM Parameter		Area under Forest land	Area under Non-Agricultural Uses	Area under Permanent Pastures and Other Grazing Land	Area under Land Under Miscellaneous Tree Crops etc.	Area under Culturable Waste Land	Area under Fallows Land other than Current Fallows	Area under Current Fallow land	Area under Unirrigated Land	Area Irrigated by Source
	Unit	ha	ha	ha	ha	ha	ha	ha	ha	ha
Type 2	Sevalpatti	176.622	80.541	0	170.1	29.7	281.991	0.237	396.738	75
	Sonaipriyankottai	0	111	0	0	1	143	18	189	150
	kidathirukkai	0	125	0	0	1	161	21	214	169
	Marandai	0	120	0	35	5	59	0	614	145
	Sevariarpattinam	0	64.88	0	18.9	2.46	32	0	330.53	77.95
Type 4	A.Usilangulam	0.58	95.1	0	8.27	0.53	155.8	40.34	186.54	45.5
	Mookkaiyur	57.44	613.54	0	449.91	35.42	235.69	48.54	481.03	89.26
	S.Keerandai	57.44	613.54	0	449.91	35.42	235.69	48.54	481.03	89.26
	Pillayarkulam	0	120.76	0	18.09	3.64	123.7	22.14	263.07	63.25
	S.Vagaikulam	0	283.17	0	63.7	14.1	152.47	0	646.84	153.78
	Kanikoor	0	125.68	0	0	17.67	77.35	51.92	449.38	46.96
	M.Karisalkutham	0	127.63	0	2.6	9.65	144.34	54.52	363.61	55.05
	A.Punavasi	0	518.19	0	1.89	29.77	132.86	91	507.74	455.18
	Kadaladi	0	36.58	0	0	2.47	6.74	1.11	63.39	32.23
	Mangalam	0	257.25	0	86.24	14.51	115.07	0.43	166.99	217.42
	Karungulam	0	230.97	0	2.22	15.91	46.06	6.99	403.45	206.49
	Thirumalugandankottai	0	86.065	0	63.82	11.14	153.45	0	346.035	41.975
	T.Veppangulam	0	81	0	188	19	59	1	210	76
	Senjudainathapuram	0	338.4192	7.84	147.6242	13.8972	298.2218	0	977.2622	297.3496
	Meenagudi	0	20.75	0	217.56	31.69	348.25	0	353.92	313.59
	Melaselvanur	0	1080.94	0	144.22	24.21	480.76	32.79	169.6	197.21
	Thanichiyam	0	224.09	0	107.66	0	87.35	71.62	297.42	174.41
	pannanthai	0	62.89	0	7.39	0	27.96	2.25	115.24	67.71

S No	Gram Panchayat	Land Resources								
Key CWRM Parameter		Area under Forest land	Area under Non-Agricultural Uses	Area under Permanent Pastures and Other Grazing Land	Area under Land Under Miscellaneous Tree Crops etc.	Area under Culturable Waste Land	Area under Fallows Land other than Current Fallows	Area under Current Fallow land	Area under Unirrigated Land	Area Irrigated by Source
	Unit	ha	ha	ha	ha	ha	ha	ha	ha	ha
Type 4	P.keerandai	0	236	0	28.66	0.38	102.63	8.01	410	249.34
	Vallinocham	0	309.79	0	106.06	45.81	475.93	0.35	436.11	49.8
	Kothangulam	13.8	157.2	0	43.28	1.7	58.81	22.46	158.95	93.07
	Oppilan	0	315.05	0	139.95	24.15	241.28	0	507.11	76.91
	Periakulam	0	315.05	0	139.95	24.15	241.28	0	507.11	76.91
	Melakidaram	20.69	1206.34	0	184.38	30.53	334.6	34.22	385.47	212.85
	Keelaselvanur	0	301.87	0	51.3	7.21	118.48	2.74	126.47	234.46
	Sikkal	0	272.54	0	37.4	0	92.14	7.99	237.6	244.8
	Siraikulam	0	807.7	0	65.87	0	172.52	39.97	758.59	231.17
	Oruvanendhal	0	59.095	0	40.5	6.9725	51.4725	0	78.535	110.37
	Pothikulam	0	141.828	0	97.2	16.734	123.534	0	188.484	264.888
	Kelakidaram	655.32	321.68	0	152.95	4.84	277.38	84.12	345.04	227.49
	Enathi	0	70.79	0	0	0	210.19	52.5	106.61	168.66
	Keelasakkulam	0	57.67	0	0	55.43	116.67	31.95	75.32	103.53
	Kandilan	0	152.06	0	24.3	240.68	144.32	40.32	173.55	199.53
	Ilanchembur	0	1.8219	0	0	3.7958	4.2724	451.7	499.2355	318.373
	Peikulam	0	424.23	0	101.5	25	52.69	39.05	624.86	383.99
	Keelachirupothu	0	156.95	0	0	1.73	379.61	49.12	271.04	170.651

S No	Gram Panchayat	Catchment Area			Crop Details				
Key CWRM Parameter		Land under Good Catchment	Land under Average Catchment	Land under Bad Catchment	Irrigated Area	Rainfed area	Area under Paddy Cultivation/ irrigated	Crop Water Requirement - Irrigated condition	Crop Water Requirement - Rainfed condition
	Unit	ha	ha	ha	ha	ha	ha	ha - M	ha - M
Type 1	Avathandai	177.61	113.7	986.95	147.45	353.2	397.405	189.52925	308.615
	Appanur	588.44	335.87	1146.19	391.25	219.58	435.65	459.075	197.745
	Chithirangadi	103.88	0.03	668.38	159.035	84.535	237.8	235.93525	83.133
	Ervadi	108.53	423.75	1371.42	134.14	176.95	81.715	97.39225	109.0145
	Idambadai	144.75	0	900.61	94.53	222.1	116.97	82.25725	176.279
	Kannirajpuram	405.84	166	430.22	7.81	92.84	0	3.905	46.42
	Orivayal	230.12	41.44	871.02	301	497.8	763.7	439.1	488.99
	Kadugusandai	81.39	135.97	834.47	151.6	366.31	249.05	124.545	284.569
	Melachirupodhu	180.97	0.12	860.77	240.005	391.155	595.455	359.25425	378.8775
	Naripayur	68.06	483	1247	3.9	201.415	36.65	3.84	118.9875
	Mariyur	1699.95	64.77	274.2	69.4	90.61	159.65	104.1	90.376
	T.Karisalkulam	59.5	99.21	597.78	78.57	396.235	2.225	39.5635	254.485
Type 2	Kokkarasankottai	37.63	18	648.36	157.925	423.18	0.34	83.90775	271.586
	Uchinatham	56.45	27	972.54	241.358	635.906	5.1	132.74655	408.0436
	Kondunallanpatti	75.26	36	1296.72	1.905	907.705	91.235	1.143	580.85075
	Sethurajapuram	18.82	9	324.18	1.905	907.705	91.235	1.143	580.85075
	Panivasal	41.366	79.3	553.93	255	388.105	525.105	350.5	358.005
	Sokkanai	22.274	42.7	298.27	255	388.105	525.105	350.5	358.005
	S.Tharaikudi	600.047	466.2	1759.254	182.21	732.265	177.125	133.883	490.348
	Sevalpatti	257.163	199.8	753.966	182.21	732.265	177.125	133.883	490.348
	Sonaipriyankottai	111	1	500	54.6	55.701	51.251	59.745	41.496
	kidathirukkai	125	1	565	98.2	108.805	81.505	104.13	77.36
	Marandai	120	40	818	111.2	439.2	550.4	166.8	439.2
	Sevariarpattinam	64.88	21.36	440.48	233.4	839.6	1073	350.1	839.6

S No	Gram Panchayat	Catchment Area			Crop Details				
Key CWRM Parameter		Land under Good Catchment	Land under Average Catchment	Land under Bad Catchment	Irrigated Area	Rainfed area	Area under Paddy Cultivation/ irrigated	Crop Water Requirement - Irrigated condition	Crop Water Requirement - Rainfed condition
	Unit	ha	ha	ha	ha	ha	ha	ha - M	ha - M
Type 4	A.Usilangulam	95.68	8.8	428.18	81.25	252.155	263.99	121.875	217.504
	Mookkaiyur	670.98	485.33	854.52	75.8	89.38	164.9	113.7	89.198
	S.Keerandai	670.98	485.33	854.52	110.265	251.58	353.675	163.3975	247.5695
	Pillayarkulam	120.76	21.73	472.16	81.25	252.155	263.99	121.875	217.504
	S.Vagaikulam	283.17	77.8	953.09	178.29	542.16	687.8	266.632	521.412
	Kanikoor	125.68	17.67	625.61	56.8	134.1	188.1	85.2	132.28
	M.Karisalkutham	127.63	12.25	617.52	56.8	134.1	188.1	85.2	132.28
	A.Punavasi	518.19	31.66	1186.78	440.55	502.3	939.55	657.49	502.3
	Kadaladi	36.58	2.47	103.47	240.4	201.25	435.65	360.6	197.35
	Mangalam	257.25	100.75	499.91	240.4	201.25	435.65	360.6	197.35
	Karungulam	230.97	18.13	662.99	240.4	201.25	435.65	360.6	197.35
	Thirumalugandankottai	86.065	74.96	541.46	18.96	426.46	50.24	27.417	264.06
	T.Veppangulam	81	207	346	62.4	123.5	181.1	93.6	120.38
	Senjudainathapuram	338.4192	169.3614	1572.8336	247.4	580.19	786.3	361.92	567.754
	Meenagudi	20.75	249.25	1015.76	305.2	286.45	591.65	457.8	286.45
	Melaselvanur	1080.94	168.43	880.36	180.1	158.4	335.45	269.07	157.66
	Thanichiyam	224.09	107.66	630.8	180.1	158.4	335.45	269.07	157.66
	pannanthai	62.89	7.39	213.16	323	436.75	759.75	484.5	436.75
	P.keerandai	236	29.04	769.98	323	436.75	759.75	484.5	436.75
	Vallinocham	309.79	151.87	962.19	14	100	114	21	100
	Kothangulam	171	44.98	333.29	195.975	39.055	235.03	293.9625	39.055
	Oppilan	315.05	164.1	825.3	130.25	287.5	417.75	195.375	287.5
	Periakulam	315.05	164.1	825.3	130.25	287.5	417.75	195.375	287.5
	Melakidaram	1227.03	214.91	967.14	195.975	339.055	535.03	293.9625	339.055
	Keelaselvanur	301.87	58.51	482.15	192.415	108.85	301.265	288.6225	108.85
	Sikkal	272.54	37.4	582.53	313.005	251.89	526.02	462.9195	239.268

S No	Gram Panchayat	Catchment Area			Crop Details				
Key CWRM Parameter		Land under Good Catchment	Land under Average Catchment	Land under Bad Catchment	Irrigated Area	Rainfed area	Area under Paddy Cultivation/ irrigated	Crop Water Requirement - Irrigated condition	Crop Water Requirement - Rainfed condition
	Unit	ha	ha	ha	ha	ha	ha	ha - M	ha - M
Type 4	**Siraikulam**	807.7	65.87	1202.25	68.53	476	489.6	100.518	445.2225
	Oruvanendhal	59.095	47.4725	240.3775	401	215.3	616.3	601.5	215.3
	Pothikulam	141.828	113.934	576.906	401	215.3	616.3	601.5	215.3
	Kelakidaram	977	157.79	934.03	233.875	351.65	585.525	350.8125	351.65
	Enathi	70.79	0	537.96	305.18	200.7	494.43	454.89	197.4
	Keelasakkulam	57.67	55.43	327.47	305.18	200.7	494.43	454.89	197.4
	Kandilan	152.06	264.98	557.72	401	215.3	616.3	601.5	215.3
	Ilanchembur	1.8219	3.7958	1273.5809	327.78	484.945	556.98	408.9	423.49375
	Peikulam	424.23	126.5	1100.59	325.345	363.967	660	474.207	358.3802
	Keelachirupothu	156.95	1.73	870.421	340.15	448.5	788.65	510.225	448.5

S No	Gram Panchayat	Soil Resources: Status of Available Nitrogen					Status of Organic Carbon				
Key CWRM Parameter		Very Low (VL)	Low (L)	Medium (M)	High (H)	Very High (VH)	Very Low (VL)	Low (L)	Medium (M)	High (H)	Very High (VH)
	Unit	%	%	%	%	%	%	%	%	%	%
Type 1	Avathandai	23.53	76.47	0	0	0	5.88	94.12	0	0	0
	Appanur	0	100	0	0	0	0	100	0	0	0
	Chithirangadi	0.94	99.06	0	0	0	0	100	0	0	0
	Ervadi	5.04	94.96	0	0	0	5.04	47.90	45.38	1.68	0
	Idambadai	0	100	0	0	0	1.54	93.85	3.08	0	1.54
	Kannirajpuram	5.26	94.74	0	0	0	3.45	74.14	22.41	0	0
	Orivayal	0	100	0	0	0	5.33	84	10.67	0	0
	Kadugusandai	1.39	98.61	0	0	0	8.33	80.56	9.72	0	1.39
	Melachirupodhu	6.40	93.60	0	0	0	0.80	33.60	65.60	0	0
	Naripayur	0	100	0	0	0	52.31	43.08	4.62	0	0
	Mariyur	0	100	0	0	0	4.55	72.73	22.73	0	0
	T.Karisalkulam	0	100	0	0	0	0	28.17	71.83	0	0
Type 2	Kokkarasankottai	9.72	90.28	0	0	0	10.65	81.48	6.48	0.93	0.46
	Uchinatham	9.72	90.28	0	0	0	10.65	81.48	6.48	0.93	0.46
	Kondunallanpatti	6.32	93.68	0	0	0	11.19	86.78	2.03	0	0
	Sethurajapuram	6.32	93.68	0	0	0	11.19	86.78	2.03	0	0
	Panivasal	6.29	93.71	0	0	0	0.70	47.55	51.75	0	0
	Sokkanai	6.29	93.71	0	0	0	0.70	47.55	51.75	0	0
	S.Tharaikudi	13.01	76.83	9.76	0	0.41	2.03	6.91	26.02	16.67	48.37
	Sevalpatti	13.01	76.83	9.76	0	0.41	2.03	6.91	26.02	16.67	48.37
	Sonaipriyankottai	0	100	0	0	0	0	0	0	25	75
	kidathirukkai	0	100	0	0	0	0	100	0	0	0
	Marandai	20.22	79.78	0	0	0	20.11	75	4.89	0	0
	Sevariarpattinam	20.22	79.78	0	0	0	20.11	75	4.89	0	0

S No	Gram Panchayat	Soil Resources: Status of Available Nitrogen					Status of Organic Carbon				
Key CWRM Parameter		Very Low (VL)	Low (L)	Medium (M)	High (H)	Very High (VH)	Very Low (VL)	Low (L)	Medium (M)	High (H)	Very High (VH)
	Unit	%	%	%	%	%	%	%	%	%	%
Type 4	A.Usilangulam	1.23	62.96	35.80	0	0	0	2.47	1.23	81.48	14.81
	Mookkaiyur	1.90	62.86	35.24	0	0	0	0.95	14.29	49.52	35.24
	S.Keerandai	1.90	62.86	35.24	0	0	0	0.95	14.29	49.52	35.24
	Pillayarkulam	1.23	62.96	35.80	0	0	0	2.47	1.23	81.48	14.81
	S.Vagaikulam	0	99.05	0.95	0	0	0	0	5.31	0	94.69
	Kanikoor	0	86.05	13.95	0	0	0	0	0	100	0
	M.Karisalkutham	0	86.05	13.95	0	0	0	0	0	100	0
	A.Punavasi	0	100	0	0	0	0.93	8.84	54.42	35.81	0
	Kadaladi	0	90.91	9.09	0	0	0	0	4.55	90.91	4.55
	Mangalam	0	100	0	0	0	0	91.11	8.89	0	0
	Karungulam	0	100	0	0	0	0	91.11	8.89	0	0
	Thirumalugandankottai	10.92	89.08	0	0	0	0	52.32	26.49	0	21.19
	T.Veppangulam	0	45.71	45.71	0	8.57	2.86	0	0	2.86	94.29
	Senjudainathapuram	7.37	92.63	0	0	0	0	100	0	0	0
	Meenagudi	11.49	70.95	17.57	0	0	0	0	0	0.68	99.32
	Melaselvanur	0	100	0	0	0	0	98.86	1.14	0	0
	Thanichiyam	0	38.37	48.84	12.79	0	0	0	16.28	52.33	31.40
	pannanthai	0	100	0	0	0	14.29	84.62	1.10	0	0
	P.keerandai	14.29	84.62	1.10	0	0	0	2.20	51.65	34.07	12.09
	Vallinocham	0	100	0	0	0	0	0	0	77.66	22.34
	Kothangulam	0	100	0	0	0	1.30	84.42	13.64	0.65	0
	Oppilan	1.42	56.03	41.13	1.42	0	0.71	1.42	2.84	6.38	88.65
	Periakulam	1.42	56.03	41.13	1.42	0	2.63	31.58	10.53	23.68	31.58
	Melakidaram	1.30	84.42	13.64	0.65	0	0	4.55	63.64	10.39	21.43
	Keelaselvanur	0	98.88	1.12	0	0	0	1.12	0	1.12	97.75
	Sikkal	0	29.41	69.12	1.47	0	0	0	1.47	2.21	96.32

S No	Gram Panchayat	Soil Resources: Status of Available Nitrogen					Status of Organic Carbon				
Key CWRM Parameter		Very Low (VL)	Low (L)	Medium (M)	High (H)	Very High (VH)	Very Low (VL)	Low (L)	Medium (M)	High (H)	Very High (VH)
	Unit	%	%	%	%	%	%	%	%	%	%
Type 4	Siraikulam	2.20	69.23	28.57	0	0	0	0	0	100	0
	Oruvanendhal	0.84	97.49	1.67	0	0	0.42	2.51	20.92	23.85	52.30
	Pothikulam	0.84	97.49	1.67	0	0	0.42	2.51	20.92	23.85	52.30
	Kelakidaram	3.69	53.92	41.47	0.92	0	0.46	10.55	13.30	20.64	55.05
	Enathi	0.57	69.54	29.89	0	0	0	0	0	95.98	4.02
	Keelasakkulam	0.57	69.54	29.89	0	0	0	0	0	95.98	4.02
	Kandilan	46.11	53.89	0	0	0	0	0	0	0.60	99.40
	Ilanchembur	1.54	98.46	0	0	0	3.85	93.08	3.08	0	0
	Peikulam	9.92	90.08	0	0	0	0.83	32.23	56.20	10.74	0
	Keelachirupothu	33.33	66.67	0	0	0	2.26	36.09	61.65	0	0

S No	Gram Panchayat	Status of Soil Micro Nutrients		Status of Physical condition of the soil							
Key CWRM Parameter		Sufficient	Deficient	Acidic Sulphate (AS)	Strongly Acidic (SrAc)	Highly Acidic (HAc)	Moderate-ly Acidic (MAc)	Slighly Acidic (SlAc)	Neutral (N)	Mod-erately Alkaline (MAI)	Strongly Alkaline (SIAI)
	Unit	%	%	%	%	%	%	%	%	%	%
Type 1	Avathandai	68	32	0	0	0	0	0	0	100	0
	Appanur	78	22	0	0	0	0	0	42.77	57.23	0
	Chithirangadi	76	24	0	0	0	1	0	0	99	0
	Ervadi	69	31	0	0	1.70	0	0.80	0.80	86.40	10.20
	Idambadai	59	41	0	0	0	1.54	6.15	0	89.23	3.08
	Kannirajpuram	50	50	0	0	3.45	60.34	24.14	1.72	10.34	0
	Orivayal	80	20	0	0	0	0	0	0	100	0
	Kadugusandai	72	28	0	0	1.39	1.39	1.39	0	94.44	1.39
	Melachirupodhu	66	34	0	0	0	8	68	0	24	0
	Naripayur	54	46	0	18.46	18.46	0	10.77	0	52.31	0
	Mariyur	88	12	4.55	0	0	0	0	0	95.45	0
	T.Karisalkulam	71	29	0	0	0	0	0	0	100	0
Type 2	Kokkarasankottai	65	35	0	0	0	5.12	1.86	0.47	89.77	2.79
	Uchinatham	65	35	0	0	10.26	28.21	6.41	0	48.72	6.41
	Kondunallanpatti	66	34	0	0	0	11.89	6.29	0.35	81.47	0
	Sethurajapuram	66	34	0	0	0	11.89	6.29	0.35	81.47	0
	Panivasal	68	32	0	0	2.78	19.44	8.33	1.39	68.06	0
	Sokkanai	68	32	0	0	2.78	19.44	8.33	1.39	68.06	0
	S.Tharaikudi	63	37	0	0.41	4.88	13.82	19.51	0	61.38	0
	Sevalpatti	63	37	0	0.41	4.88	13.82	19.51	0	61.38	0
	Sonaipriyankottai	55	45	0	0	0	0	0	100	0	0
	kidathirukkai	55	45	0	0	0	0	0	100	0	0
	Marandai	85	15	0	0	2.17	1.63	0	91.30	4.89	0
	Sevariarpattinam	85	15	0	0	2.17	1.63	0	91.30	4.89	0

S No	Gram Panchayat	Status of Soil Micro Nutrients		Status of Physical condition of the soil							
Key CWRM Parameter		Sufficient	Deficient	Acidic Sulphate (AS)	Strongly Acidic (SrAc)	Highly Acidic (HAc)	Moderate-ly Acidic (MAc)	Slighly Acidic (SlAc)	Neutral (N)	Mod-erately Alkaline (MAI)	Strongly Alkaline (SIAI)
	Unit	%	%	%	%	%	%	%	%	%	%
Type 4	A.Usilangulam	55	45	0	0	8.64	1.23	0	0	90.12	0
	Mookkaiyur	70	30	0.96	0	10.58	38.46	18.27	11.54	20.19	0
	S.Keerandai	70	30	0.96	0	10.58	38.46	18.27	11.54	20.19	0
	Pillayarkulam	55	45	0	0	8.64	1.23	0	0	90.12	0
	S.Vagaikulam	82	18	0	0	0	0	0	94.78	5.22	0
	Kanikoor	65	35	0	0	0	0	0	41.86	58.14	0
	M.Karisalkutham	65	35	0	0	0	0	0	41.86	58.14	0
	A.Punavasi	75	25	0	0	0	1.88	1.88	0.94	95.31	0
	Kadaladi	81	19	0	0	4.55	4.55	0	88.64	2.27	0
	Mangalam	81	19	0	0	4.44	4.44	0	86.67	4.44	0
	Karungulam	81	19	0	0	4.44	4.44	0	86.67	4.44	0
	Thirumalugandankottai	74	26	0	0	0	0	0	40.83	59.17	0
	T.Veppangulam	70	30	8.57	0	0	22.86	2.86	0	65.71	0
	Senjudainathapuram	63	37	0	0	0	21.05	3.16	7.37	68.42	0
	Meenagudi	84	16	0	0.68	0	0	0	0	99.32	0
	Melaselvanur	76	24	1.14	0	0	0	0	4.55	94.32	0
	Thanichiyam	77	23	0	0	0	1.16	0	0	98.84	0
	pannanthai	52	48	0	1.10	1.10	0	3.30	0	94.51	0
	P.keerandai	52	48	0	1.10	1.10	0	3.30	0	94.51	0
	Vallinocham	80	20	0	0	0	23.08	0	76.92	0	0
	Kothangulam	66	34	0	0	3.90	22.08	6.49	2.60	64.94	0
	Oppilan	64	36	0	0	4.26	23.40	15.60	2.84	53.90	0
	Periakulam	64	36	0	0	4.26	23.40	15.60	2.84	53.90	0
	Melakidaram	66	34	0	0	3.90	22.08	6.49	2.60	64.94	0
	Keelaselvanur	84	16	0	0	0	0	0	0	100	0
	Sikkal	74	26	0	0	0	64.71	32.35	1.47	1.47	0

S No	Gram Panchayat	Status of Soil Micro Nutrients		Status of Physical condition of the soil							
Key CWRM Parameter		Sufficient	Deficient	Acidic Sulphate (AS)	Strongly Acidic (SrAc)	Highly Acidic (HAc)	Moderate-ly Acidic (MAc)	Slighly Acidic (SlAc)	Neutral (N)	Mod-erately Alkaline (MAI)	Strongly Alkaline (SIAI)
	Unit	%	%	%	%	%	%	%	%	%	%
Type 4	Siraikulam	62	38	0	0	43.96	53.85	0	1.10	1.10	0
	Oruvanendhal	66	34	0	0	0	0	0	22.78	76.79	0.42
	Pothikulam	66	34	0	0	0	0	0	22.78	76.79	0.42
	Kelakidaram	61	39	0.45	0	46.36	2.73	3.64	20.45	25.91	0.45
	Enathi	43	57	0	0	0	9.77	19.54	4.60	66.09	0
	Keelasakkulam	43	57	0	0	0	9.77	19.54	4.60	66.09	0
	Kandilan	75	25	0	0	0	0	0	42.47	7.53	50
	Ilanchembur	80	20	0	0	0	0.77	0	0	98.46	0.77
	Peikulam	69	31	0	0	0.81	0.81	1.63	0.81	95.93	0
	Keelachirupothu	57	43	0	0	0	10.29	63.24	2.21	23.53	0.74

S No	Gram Panchayat	Soil Texture				Soil moisture and ET			Means of Water Extraction	
Key CWRM Parameter		% of Clay Soil	% of Fine Soil	% of Coarse loamy	Soil Water Permeability	Volumetric Soil Moisture	Estimated Soil Moisture	ET Losses	Gravity	Lifting
	Unit	%	%	%	Low, Moderate, high	%	ha - M	ha - M	%	%
Type 1	Avathandai	0	91.29	0.24	Moderate	17	445	186.19	44	56
	Appanur	0	52.14	33.52	Moderate	17	483.02	250.71	35	65
	Chithirangadi	0	90.49	0.75	Moderate	17	235.09	113.07	50	50
	Ervadi	0	51	4	Moderate	17	1144.44	370.88	83.33	16.67
	Idambadai	0	85.26	0	Moderate	17	470.12	152.35	25	75
	Kannirajpuram	0	77.34	11.43	Moderate	17	158.527775	476.64342	100	0
	Orivayal	0	42.93	32.74	Moderate	17	468.5	154.35	57.89	42.11
	Kadugusandai	2.17	88	0	Moderate	17	504.45	164.16	50	50
	Melachirupodhu	0	90	0	Moderate	17	449.32	145.63	75	25
	Naripayur	0	72	15	Moderate	17	865.48	292.65	100	0
	Mariyur	0.07	80	7	Moderate	17	726	250.1	27	73
	T.Karisalkulam	0	73	18	Moderate	17	117.907475	359.92422	83.33	16.67
Type 2	Kokkarasankottai	0	75.78	10.88	Moderate	17	112.73	300.85	0	100
	Uchinatham	0	73.15	0	Moderate	17	169.09	451.27	20	80
	Kondunallanpatti	0	73.61	3.90	Moderate	17	225.45	601.7	12	88
	Sethurajapuram	0	91.59	0	Moderate	17	56.36	150.42	33	67
	Panivasal	0	90.54	0	Moderate	17	107.12	246.24	2	98
	Sokkanai	0	91.77	0	Moderate	17	57.68	132.59	2	98
	S.Tharaikudi	0	64.91	18.77	Moderate	17	446.19	996.88	5	95
	Sevalpatti	0.07	61.43	0.65	Moderate	17	191.22	427.24	33	67
	Sonaipriyankottai	0	83.31	0	Moderate	17	84.79	177.07	100	0
	kidathirukkai	0	37.15	52.82	Moderate	17	95.62	199.68	3	97
	Marandai	0	84.19	5.88	Moderate	17	145.09	414.31	48	52
	Sevariarpattinam	0	98.22	0	Moderate	17	78.13	223.09	0	100

S No	Gram Panchayat	Soil Texture				Soil moisture and ET			Means of Water Extraction	
Key CWRM Parameter		% of Clay Soil	% of Fine Soil	% of Coarse loamy	Soil Water Permeability	Volumetric Soil Moisture	Estimated Soil Moisture	ET Losses	Gravity	Lifting
	Unit	%	%	%	Low, Moderate, high	%	ha - M	ha - M	%	%
Type 4	A.Usilangulam	0	64.46	15.66	Moderate	17	74.3852	125.74458	62	38
	Mookkaiyur	0	51.84	14.15	Moderate	17	237.5393	562.52808	61	38
	S.Keerandai	0	33.94	21.56	Moderate	17	237.5393	562.52808	61	38
	Pillayarkulam	0	1.98	32.57	High	17	83.9613	179.78202	58	42
	S.Vagaikulam	0	22.24	13.62	Moderate	17	175.2513	451.17504	58	42
	Kanikoor	0	1.38	33.51	High	17	109.3576	259.08948	58	42
	M.Karisalkutham	0	34.33	59.67	High	17	107.0609	219.89772	58	42
	A.Punavasi	0	11.64	62.84	High	17	207.1348	503.63082	67	33
	Kadaladi	0	45.77	23.24	Moderate	17	1898	49.91364	55	45
	Mangalam	0	4.91	5.61	High	17	102.1122	245.6793	6	94
	Karungulam	0	6.36	7.92	High	17	115.7904	319.54752	1	99
	Thirumalugandankottai	0	0	22.16	High	17	104.7914	235.85526	5	95
	T.Veppangulam	0	8.05	57.64	High	17	94.01	247.428	14	86
	Senjudainathapuram	0	16.39	28.34	High	17	296.17315	746.499672	0	100
	Meenagudi	0	33.72	63.14	High	17	215.0517	462654	77	23
	Melaselvanur	0	16.16	32.36	High	17	178.2943	266.75766	66	34
	Thanichiyam	0	28.50	57.72	High	17	125.5382	302.49378	13	87
	pannanthai	0	0	95.57	High	17	37.4935	99.35748	87	13
	P.keerandai	0	7.27	43.43	High	17	135.8334	359.136	36	64
	Vallinocham	0	14.70	24.47	High	17	189.3902	309834	45	55
	Kothangulam	0	82	0	Moderate	17	66.6519	161.3502	40	60
	Oppilan	0	8.71	1.98	Moderate	17	168.198	377.91234	55	45
	Periakulam	20	70	0	Moderate	17	168.198	377.91234	64	36
	Melakidaram	0	40.09	40	High	17	204.4658	419.36958	25	75
	Keelaselvanur	0.22	55	14.48	Moderate	17	91.9122	215.18406	62	38
	Sikkal	0	81.69	0	Moderate	17	105.3881	271.3356	62	38

S No	Gram Panchayat	Soil Texture				Soil moisture and ET			Means of Water Extraction	
Key CWRM Parameter		% of Clay Soil	% of Fine Soil	% of Coarse loamy	Soil Water Permeability	Volumetric Soil Moisture	Estimated Soil Moisture	ET Losses	Gravity	Lifting
	Unit	%	%	%	Low, Moderate, high	%	ha - M	ha - M	%	%
Type 4	Siraikulam	0	86	1.57	Moderate	17	215.5804	551.03886	4	96
	Oruvanendhal	0	90	0	Moderate	17	48.9345	119.74941	0	100
	Pothikulam	0	75	12.04	Moderate	17	117.4428	287.398584	13	87
	Kelakidaram	0	45.07	28.56	Moderate	17	297.0138	720.7776	0	100
	Enathi	0	59.28	15.44	Moderate	17	91.4532	143.69094	22	78
	Keelasakkulam	0	51.64	38.73	Moderate	17	65.093	93.3597	27	73
	Kandilan	0	86	1.76	Moderate	17	139.859	207.43236	20	80
	Ilanchembur	0	93.95	0	Moderate	17	217.154039	426.791637	62	38
	Peikulam	0	90.50	0	Moderate	17	208.6053	579.6027	40	60
	Keelachirupothu	0	96.55	0	Moderate	17	148.26567	230.562702	20	80

S No	Gram Panchayat	Irrigation Methods		Livestock			
Key CWRM Parameter		Wild Flooding	Control Flooding	Cattle	Sheep	Goat	Poultry
	Unit	%	%	Number	Number	Number	Number
Type 1	Avathandai	71	29	172	893	541	1685
	Appanur	89	11	379	760	1048	1911
	Chithirangadi	95	5	96	741	242	259
	Ervadi	98	1.36	887	464	3854	3141
	Idambadai	25	75	71	844	764	969
	Kannirajpuram	100	0	138	4793	484	2437
	Orivayal	98	2	52	1104	94	421
	Kadugusandai	89	11	152	667	419	1018
	Melachirupodhu	100	0	24	802	199	290
	Naripayur	100	0	308	4442	1105	2438
	Mariyur	100	0	119	2324	218	810
	T.Karisalkulam	100	0	82	68	139	226
Type 2	Kokkarasankottai	0	100	32	0	36.8	141.6
	Uchinatham	50	50	49.2	0	55.2	212.4
	Kondunallanpatti	78	22	52	308.8	109	494.4
	Sethurajapuram	100	0	13	77.2	27.2	123.6
	Panivasal	2	98	235.3	278.2	285	757.25
	Sokkanai	98	2	126.7	149.8	154	407.75
	S.Tharaikudi	100	0	253.4	299.6	307	815.5
	Sevalpatti	100	0	108.6	128	132	349.5
	Sonaipriyankottai	100	0	170	201	206	548
	kidathirukkai	88	12	192	227	233	617
	Marandai	92	8	51	268	162	817
	Sevariarpattinam	70	30	27	144	87	440

S No	Gram Panchayat	Irrigation Methods		Livestock			
Key CWRM Parameter		Wild Flooding	Control Flooding	Cattle	Sheep	Goat	Poultry
	Unit	%	%	Number	Number	Number	Number
Type 4	A.Usilangulam	99	1	59	296	167	410
	Mookkaiyur	95	5	267	936	635	1237
	S.Keerandai	95	5	65	90	296	988
	Pillayarkulam	85	15	37	427	146	228
	S.Vagaikulam	100	0	33	538	138	264
	Kanikoor	83	17	146	254	161	800
	M.Karisalkutham	94	6	144	644	334	738
	A.Punavasi	99	1	158	1870	372	761
	Kadaladi	75	25	44	112	138	211
	Mangalam	60	40	17	43	53	81
	Karungulam	97	3	281	718	876	1343
	Thirumalugandankottai	100	0	39	53	62	220
	T.Veppangulam	100	0	153	13	244	2284
	Senjudainathapuram	100	0	139	701	396	706
	Meenagudi	100	0	156	843	441	1117
	Melaselvanur	86	14	164	2448	420	512
	Thanichiyam	70	30	105	17	226	339
	pannanthai	96	4	61	498	271	286
	P.keerandai	66	34	218	1807	959	1010
	Vallinocham	64	36	179	520	626	712
	Kothangulam	80	20	70	344	227	287
	Oppilan	100	0	182	892	896	1234
	Periakulam	100	0	182	892	896	1234
	Melakidaram	86	14	176	1363	309	759
	Keelaselvanur	98	2	107	1195	233	199
	Sikkal	97	3	69	338	214	202

S No	Gram Panchayat	Irrigation Methods		Livestock			
Key CWRM Parameter		Wild Flooding	Control Flooding	Cattle	Sheep	Goat	Poultry
	Unit	%	%	Number	Number	Number	Number
Type 4	Siraikulam	85	15	74	65	188	224
	Oruvanendhal	75	25	39	62	42	96
	Pothikulam	100	0	94	148	100	231
	Kelakidaram	100	0	196	986	970	1005
	Enathi	76	24	26	1514	235	223
	Keelasakkulam	76	24	26	334	136	101
	Kandilan	83	17	47	1421	239	262
	Ilanchembur	58	42	113	784	538	488
	Peikulam	98	2	112	1096	388	331
	Keelachirupothu	100	0	21	585	57	235

ANNEXURE 3.11

GP WISE DEMOGRAPHIC AND SOCIO ECONOMIC STATUS

S No	Key CWRM Parameter	Geographical Area	Male Population	Female Population	Total Population	SC Population	ST Population	Vulnerable popupation	Households (HH's) (SECC)	Only one room HH's (SECC)	Female Headed HH's (SECC)
	Unit	ha	Number	Number	Number	Number	Number	Number	Number	Number	Number
Type 1	Avathandai	1278	1211	1308	2519	413	0	413	640	89	43
	Appanur	2071	1664	1665	3329	124	0	124	791	4	44
	Chithirangadi	772	288	311	599	184	0	184	599	4	44
	Ervadi	2301	6689	6677	13366	1078	0	1078	2517	574	125
	Idambadai	1045	888	1014	1902	715	0	715	489	136	30
	Kannirajpuram	1002.06	2593	2493	5086	77	0	77	1069	25	59
	Orivayal	1143	1049	957	2006	415	0	415	906	158	35
	Kadugusandai	1052	1368	1319	2687	123	0	123	586	175	30
	Melachirupodhu	1042	959	1010	1969	363	0	363	527	131	57
	Naripayur	1798	5010	4851	9861	604	7	611	1769	115	93
	Mariyur	2039	2510	2587	5097	507	0	507	1200	305	112
	T.Karisalkulam	756	448	440	888	6	0	6	234	1	16
Type 2	Kokkarasankottai	775.28	412	423	834	292	0	292	343	7	30
	Uchinatham	998.91	493	518	1011	180	0	180	242	5	37
	Kondunallanpatti	1261.60	798	815	1613	118	0	118	411	47	27
	Sethurajapuram	107.20	798	815	1613	118	0	118	411	47	27
	Panivasal	687.15	1701	1670	3371	730	0	730	824	102	79
	Sokkanai	475.52	1701	1670	3371	730	0	730	824	102	79
	S.Tharaikudi	107.20	3169	3105	3169	1895	0	1895	1380	74	58
	Sevalpatti	1391.86	3169	3105	3169	1895	0	1895	1380	74	58
	Sonaipriyankottai	625.53	1423	1412	2835	474	0	474	767	30	56
	kidathirukkai	711.10	1423	1412	2835	474	0	474	767	30	56
	Marandai	1039.29	1619	1549	3168	751	0	751	1262	117	70
	Sevariarpattinam	620.18	1619	1549	3168	751	0	751	738	28	43

S No	Key CWRM Parameter	Geographical Area	Male Population	Female Population	Total Population	SC Population	ST Population	Vulnerable popupation	Households (HH's) (SECC)	Only one room HH's (SECC)	Female Headed HH's (SECC)
	Unit	ha	Number	Number	Number	Number	Number	Number	Number	Number	Number
Type 4	A.Usilangulam	500	1314	1261	2575	653	0	653	639	77	40
	Mookkaiyur	2017	1683	1568	3251	297	0	297	715	167	17
	S.Keerandai	1385	287	269	556	0	0	0	156	37	18
	Pillayarkulam	660	1314	1261	2575	653	0	653	639	77	40
	S.Vagaikulam	1641	1397	1433	2830	751	0	751	693	13	99
	Kanikoor	580	1014	930	1944	28	0	28	412	31	65
	M.Karisalkutham	659	1014	930	1944	28	0	28	412	31	65
	A.Punavasi	1737	929	902	1831	42	0	42	416	41	25
	Kadaladi	142	2938	2929	5867	614	1	615	1262	117	70
	Mangalam	858	408	462	870	106	0	106	236	15	18
	Karungulam	962	2938	2929	5867	614	1	615	1262	117	70
	Thirumalugandankottai	679	637	664	1301	64	0	64	307	0	25
	T.Veppangulam	611	577	583	1160	216	0	216	436	12	60
	Senjudainathapuram	2122	637	664	1301	64	0	64	307	0	25
	Meenagudi	1307	1783	1708	3491	518	0	518	412	31	65
	Melaselvanur	2064	856	838	1694	458	0	458	412	31	65
	Thanichiyam	962	1236	1229	2465	365	0	365	550	122	31
	pannanthai	203	1586	1480	3066	976	0	976	731	294	68
	P.keerandai	1007	1586	1480	3066	976	0	976	731	294	68
	Vallinocham	1219	3177	3044	6221	10	0	10	1165	170	39
	Kothangulam	528	1236	1229	2465	365	0	365	550	122	31
	Oppilan	1011	2455	2414	4869	48	0	48	899	53	71
	Periakulam	1063	2455	2414	4869	48	0	48	899	53	71
	Melakidaram	2420	1655	1685	3340	373	0	373	820	188	79
	Keelaselvanur	905	1021	955	1976	769	0	769	462	24	26
	Sikkal	874	1190	1111	2301	307	0	307	1103	380	91

S No	Key CWRM Parameter	Geograph-ical Area	Male Population	Female Population	Total Population	SC Population	ST Popula-tion	Vulnerable popupation	House-holds (HH's) (SECC)	Only one room HH's (SECC)	Female Headed HH's (SECC)
	Unit	ha	Number	Number	Number	Number	Number	Number	Number	Number	Number
Type 4	**Siraikulam**	2055	1187	1167	2354	801	0	801	534	115	64
	Oruvanendhal	347	1895	1797	3692	346	0	346	1056	66	67
	Pothikulam	849	1895	1797	3692	346	0	346	1056	66	67
	Kelakidaram	2063	1873	1934	3807	521	0	521	947	56	72
	Enathi	609.03	1003	485	1488	337	0	337	507	3	29
	Keelasakkulam	426	1003	988	1991	337	0	337	507	3	29
	Kandilan	911	1210	1200	2410	627	0	627	544	18	50
	Ilanchembur	1279	1888	1969	3857	52	0	52	544	18	50
	Peikulam	1802	2799	2562	5361	1562	0	1562	773	20	51
	Keelachirupothu	1103	1520	1613	3133	1811	0	1811	773	20	51

S No	Key CWRM Parameter	Vulnerable Households (SECC)	% of Vulnerable Households (SECC)	Registered MGNREGA Job cards	Active person working in MGNREGA job Cards	Drinking Water Sources	HH's have tap water connection for drinking water	HH's dependent on other sources for drinking water	Annual Greywater Generation
	Unit	Number	%	Persons Number	Persons Number	Number	Number	Number	ha - M
Type 1	Avathandai	75.2	12	1150	936	83	607	285	4.59
	Appanur	16	2	1614	1307	8	100	100	6.08
	Chithirangadi	16	3	758	522	5	150	300	1.09
	Ervadi	439	17	1892	1270	209	445	745	24.39
	Idambadai	104.2	21	635	445	43	200	50	3.47
	Kannirajpuram	35.2	3.29	794	522	52	300	900	9.28195
	Orivayal	121.1	13	848	658	48	300	510	3.66
	Kadugusandai	131.5	22	1133	805	33	100	600	4.9
	Melachirupodhu	108.8	21	832	654	9	60	50	4
	Naripayur	108.4	6	1276	700	223	1668	748	18.6
	Mariyur	247.1	21	1000	250	1690	1100	370	9.3
	T.Karisalkulam	5.5	2	574	422	21	120	134	1.62
Type 2	Kokkarasankottai	13.9	4.05	235	165	6	0	310	1.52
	Uchinatham	14.6	6.03	555	375	17	0	0	1.85
	Kondunallanpatti	41	9.98	499	325	69	300	260	2.94
	Sethurajapuram	41	9.98	354	299	11	0	308	2.94
	Panivasal	95.1	11.54	680	571	116	265	225	6.15
	Sokkanai	95.1	11.54	968	636	116	265	255	6.15
	S.Tharaikudi	69.2	5.01	1553	1175	213	500	875	5.78
	Sevalpatti	69.2	5.01	913	717	213	500	875	5.78
	Sonaipriyankottai	37.8	4.93	395	264	249	245	0	5.17
	kidathirukkai	37.8	4.93	1258	1088	1172	1600	1700	5.17
	Marandai	102.9	8.15	731	543	231	226	396	5.78
	Sevariarpattinam	32.5	4.40	665	494	698	200	200	5.78

S No	Key CWRM Parameter	Vulnerable Households (SECC)	% of Vulnerable Households (SECC)	Registered MGNREGA Job cards	Active person working in MGNREGA job Cards	Drinking Water Sources	HH's have tap water connection for drinking water	HH's dependent on other sources for drinking water	Annual Greywater Generation
	Unit	Number	%	Persons Number	Persons Number	Number	Number	Number	ha - M
Type 4	A.Usilangulam	65.9	10	413	312	22	500	170	4.7
	Mookkaiyur	122	17	781	657	235	544	542	5.93
	S.Keerandai	31.3	20	599	405	235	140	542	1.01
	Pillayarkulam	65.9	10	861	668	49	420	400	4.7
	S.Vagaikulam	38.8	6	753	546	57	650	748	5.16
	Kanikoor	41.2	10	608	505	29	460	598	3.54
	M.Karisalkutham	41.2	10	532	432	64	200	247	3.5
	A.Punavasi	36.2	9	1066	812	14	100	80	3.34
	Kadaladi	102.9	8	837	698	392	3900	600	10.71
	Mangalam	15.9	7	635	385	33	200	163	1.59
	Karungulam	102.9	8	1074	757	1116	750	800	10.71
	Thirumalugandankottai	7.5	2	365	276	18	20	0	2.37
	T.Veppangulam	26.4	6	915	620	77	56	0	2.12
	Senjudainathapuram	7.5	2	377	235	2	0	0	2.37
	Meenagudi	41.2	10	1022	874	747	800	980	6.37
	Melaselvanur	41.2	10	963	780	808	400	1350	3.09
	Thanichiyam	94.7	17	662	469	52	200	0	4.5
	pannanthai	226.2	31	308	146	752	739	50	5.6
	P.keerandai	226.2	31	897	649	39	300	124	5.6
	Vallinocham	130.7	11	1558	1266	56	583	250	11.35
	Kothangulam	94.7	17	1087	870	102	200	0	4.5
	Oppilan	58.4	6	672	554	58	625	200	8.89
	Periakulam	58.4	6	672	554	126	1000	750	8.89
	Melakidaram	155.3	19	987	721	919	600	500	6.1
	Keelaselvanur	24.6	5	1095	706	92	459	360	3.61
	Sikkal	293.3	27	1416	1135	1975	555	550	4.19

S No	Key CWRM Parameter	Vulnerable Households (SECC)	% of Vulnerable Households (SECC)	Registered MGNREGA Job cards	Active person working in MGNREGA job Cards	Drinking Water Sources	HH's have tap water connection for drinking water	HH's dependent on other sources for drinking water	Annual Greywater Generation
	Unit	Number	%	Persons Number	Persons Number	Number	Number	Number	ha - M
Type 4	**Siraikulam**	99.7	19	963	797	166	200	0	4.3
	Oruvanendhal	66.3	6	804	612	416	335	110	6.74
	Pothikulam	66.3	6	1182	928	42	225	0	6.74
	Kelakidaram	60.8	6	975	723	910	420	180	6.94
	Enathi	10.8	2	677	519	148	450	400	3.63
	Keelasakkulam	10.8	2	1174	724	20	465	400	3.63
	Kandilan	27.6	5	776	641	348	340	412	4.4
	Ilanchembur	27.6	5	1971	1379	1494	510	950	7.03
	Peikulam	29.3	4	748	593	603	350	850	9.78
	Keelachirupothu	29.3	4	1422	1026	910	625	845	5.72

ANNEXURE 4

IPCC VULNERABILITY ASSESSMENT METHODOLOGY

Normalization of Indicators:

In order to make the indicators free from the units, normalization has done. The normalization process varies depending on the nature of relationship of that particular indicator with the vulnerability. The following formula are used,

- for indicators with positive relationship with vulnerability

$$x_{ij}^{P} = \frac{Xij - Min\, i\{Xij\}}{(Max\, i\{Xij\} - Min\, i\{Xij\}}$$

- for indicators with negative relationship with vulnerability

$$x_{ij}^{n} = \frac{Max\, i\{Xij\} - Xij}{Max\, i\{Xij\} - Min\{Xij\}}$$

X_{ij} is the value of j^{th} indicator for i^{th} GP and X^{P}_{ij} is the normalized value

X_{ij} is the value of j^{th} indicator for i^{th} GP and x^{n}_{ij} is the normalized value

ANNEXURE 5.1

GP WISE WASCA PROPOSED TREATMENT AREA

S No	Key CWRM Parameter	Treatment Area under Forest Land	Treatment Area under Non-Agricultural Uses	Treatment Area under Barren & Un-cultivable Land	Treatment Area under Permanent Pastures and Other Grazing Land	Treatment Area under Land Under Miscellaneous Tree Crops etc.	Treatment Area under cultivable Waste Land	Treatment Area under Fallows Land other than Current Fallows	Treatment Area under Current Fallow land	Treatment Area under Unirrigated Land	Treatment Area Irrigated by Source
	Unit	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha
Type 1	Avathandai	0	3.02	0	0	96.52	0.13	0	29.84	72.77	15.82
	Appanur	0	42.17	0	0	269.45	16.04	9.04	1.72	5.51	6.66
	Chithirangadi	0	1.77	0	0	0	0.03	3.14	3.41	6.67	6.85
	Ervadi	0	1.85	0	0	360.19	0	0	0	161.65	71.5
	Idambadai	0	2.46	0	0	0	0	0.94	51.26	113.98	22.95
	Kannirajpuram	136.356	1.105449	0	0	120.7	20.4	6.777564	0.023379	6.979413	0.385916
	Orivayal	0	3.91	0	0	22.51	12.72	22.45	0	58.23	32.55
	Kadugusandai	0	1.38	0	0	112.12	3.45	95.84	0	58.45	12.61
	Melachirupodhu	0	3.08	0	0	0	0.1	0	53.87	68.56	49.73
	Naripayur	0	1.16	0	0	349.35	61.2	34.3	0.47	39.7	0.35
	Mariyur	455.8	9.54	0	0	45.72	9.33	16.1	0	22.85	18.63
	T.Karisalkulam	0	1.01	0	0	77.97	6.36	0.6	0	10.99	0.36
Type 2	Kokkarasankottai	0	0.64	0	0	13.6	1.7	3.49	0.03	22.38	0.03
	Uchinatham	0	0.96	0	0	20.4	2.55	7.85	0.07	50.36	0.07
	Kondunallanpatti	0	1.28	0	0	27.2	3.4	17.45	0.15	111.92	0.15
	Sethurajapuram	0	0.32	0	0	6.8	0.85	4.36	0.04	27.98	0.04
	Panivasal	0	0.7	0	0	67.41	0	18.96	0.43	26.77	20.32
	Sokkanai	0	0.38	0	0	36.3	0	10.21	0.23	14.42	10.94
	S.Tharaikudi	164.85	3.19	0	0	337.37	58.91	32.9	0.03	46.29	8.75
	Sevalpatti	70.65	1.37	0	0	144.59	25.25	14.1	0.01	19.84	3.75
	Sonaipriyankottai	0	1.88	0	0	0	0.97	7.13	0.92	9.47	7.49
	kidathirukkai	0	2.12	0	0	0	1.09	8.04	1.03	10.68	8.45
	Marandai	0	2.05	0	0	29.84	3.88	4.75	0	49.11	11.58
	Sevariarpattinam	0	1.1	0	0	16.07	2.09	1.28	0	13.22	3.12

S No	Key CWRM Parameter	Treatment Area under Forest Land	Treatment Area under Non-Agricultural Uses	Treatment Area under Barren & Un-cultivable Land	Treatment Area under Permanent Pastures and Other Grazing Land	Treatment Area under Land Under Miscellaneous Tree Crops etc.	Treatment Area under cultivable Waste Land	Treatment Area under Fallows Land other than Current Fallows	Treatment Area under Current Fallow land	Treatment Area under Unirrigated Land	Treatment Area Irrigated by Source
	Unit	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha
Type 4	A.Usilangulam	0.23	1.62	0	0	7.03	0.45	15.58	4.03	18.65	4.55
	Mookkaiyur	22.98	54.82	0	0	382.42	30.11	40.07	8.25	81.77	15.17
	S.Keerandai	22.98	54.82	0	0	382.42	30.11	47.14	9.71	96.21	17.85
	Pillayarkulam	0	2.06	0	0	15.38	3.09	69.27	12.4	147.32	35.42
	S.Vagaikulam	0	3.73	0	0	54.15	11.99	9.15	0	38.81	9.23
	Kanikoor	0	2.14	0	0	0	15.02	43.32	29.08	251.66	26.3
	M.Karisalkutham	0	2.17	0	0	2.21	8.2	14.43	5.45	36.36	5.5
	A.Punavasi	0	43.39	0	0	1.61	25.3	10.63	7.28	40.62	36.41
	Kadaladi	0	1.76	0	0	0	2.1	0.54	0.09	5.07	2.58
	Mangalam	0	21.86	0	0	73.3	12.34	8.05	0.03	11.69	15.22
	Karungulam	0	10.46	0	0	1.89	13.52	3.22	0.49	28.24	14.45
	Thirumalugandankottai	0	1.46	0	0	54.25	9.47	3.07	0	6.92	0.84
	T.Veppangulam	0	1.38	0	0	159.41	16.16	1.17	0.02	4.21	1.52
	Senjudainathapuram	0	5.75	0	6.66	125.48	11.81	5.96	0	19.55	5.95
	Meenagudi	0	0.35	0	0	184.93	26.94	34.83	0	35.39	31.36
	Melaselvanur	0	282.91	0	0	122.59	20.58	48.08	3.28	16.96	19.72
	Thanichiyam	0	6.26	0	0	91.51	0	14.85	12.17	50.56	29.65
	pannanthai	0	1.17	0	0	6.28	0	8.67	0.7	35.72	20.99
	P.keerandai	0	5.63	0	0	24.36	0.32	31.81	2.48	127.1	77.3
	Vallinocham	0	4.63	0	0	90.15	38.94	52.35	0.04	47.97	5.48
	Kothangulam	0	11.53	0	0	36.79	1.45	10	3.82	27.02	15.82
	Oppilan	0	11.13	0	0	118.96	20.53	14.48	0	30.43	4.61
	Periakulam	0	11.13	0	0	118.96	20.53	14.48	0	30.43	4.61
	Melakidaram	8.28	308.74	0	0	156.72	25.95	63.57	6.5	73.24	40.44

S No	Key CWRM Parameter	Treatment Area under Forest Land	Treatment Area under Non-Agricultural Uses	Treatment Area under Barren & Un-cultivable Land	Treatment Area under Permanent Pastures and Other Grazing Land	Treatment Area under Land Under Miscellaneous Tree Crops etc.	Treatment Area under cultivable Waste Land	Treatment Area under Fallows Land other than Current Fallows	Treatment Area under Current Fallow land	Treatment Area under Unirrigated Land	Treatment Area Irrigated by Source
	Unit	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha
Type 4	**Keelaselvanur**	0	40.66	0	0	43.61	6.13	5.92	0.14	6.32	11.72
	Sikkal	0	24.44	0	0	31.79	0	4.61	0.4	11.88	12.24
	Siraikulam	0	129.98	0	0	55.99	0	32.78	7.59	144.13	43.92
	Oruvanendhal	0	1.01	0	0	34.43	5.93	3.09	0	4.71	6.62
	Pothikulam	0	2.41	0	0	82.62	14.22	7.41	0	11.31	15.89
	Kelakidaram	262.13	5.47	0	0	130.01	4.11	13.87	4.21	17.25	11.37
	Enathi	0	1.2	0	0	0	0	4.2	1.05	2.13	3.37
	Keelasakkulam	0	0.98	0	0	0	47.11	2.33	0.64	1.51	2.07
	Kandilan	0	2.59	0	0	20.66	204.57	7.22	2.02	8.68	9.98
	Ilanchembur	0	0.03	0	0	0	3.23	0.21	22.59	24.96	15.92
	Peikulam	0	20.54	0	0	86.28	21.25	2.63	1.95	31.24	19.2
	Keelachirupothu	0	2.67	0	0	0	1.47	18.98	2.46	13.55	8.53

Land Resources - WASCA Treatment Proposed Area	logic
Treatment Area under Forest Land	40% of the total Area (area after removal of potential voids)
Treatment Area under Non-Agricultural Uses	Identifying Additional Area available for recharge & plantation(if area is above 20 %: consider all the additional area for treatment(ex 24.86 %, 4.86 % is proposed): if the % area is between 15-20 % only, consider 50 % of additional area)
Treatment Area under Barren & Un-cultivable Land	75% of the total Area (area after removal of potential voids)
Treatment Area under Permanent Pastures and Other Grazing Land	75% of the total Area (potential area for treatment after removal of voids)
Treatment Area under Land Under Miscellaneous Tree Crops etc.	75% of the total Area (non- voids area)
Treatment Area under Cultivable Waste Land	75% of the total Area (non- voids area)
Treatment Area under Fallows Land other than Current Fallows	Factor arrived as per Vulnerability Assessment in Table 1 and out of which 50% is for horticulture or AF
Treatment Area under Current Fallow land	Factor arrived as per Vulnerability Assessment in Table 1 and out of which 50% is for horticulture or AF
Treatment Area under Unirrigated Land	Factor arrived as per Vulnerability Assessment in Table 1 and out of which 50% is for horticulture or AF
Treatment Area Irrigated by Source	Bore Well Farmer Factor arrived as per Vulnerability Assessment in Table 1 and out of which 50% is for horticulture or AF

ANNEXURE 5.2

GP WISE EXPECTED RUNOFF CONSERVATION AFTER WASCA TREATMENT

GP type	GP name	Good Catchment Area ha - M	Average Catchment Area ha - M	Bad Catchment Area ha - M
Type 1	Avathandai	7.36	16.90	39.23
	Appanur	82.76	2.84	41.65
	Chithirangadi	15.63	0.00	2.34
	Ervadi	8.27	62.99	35.05
	Idambadai	16.97	0.00	22.05
	Kannirajpuram	31.95	20.04	0.00
	Orivayal	43.02	6.16	13.20
	Kadugusandai	14.23	20.21	19.46
	Melachirupodhu	31.90	0.00	20.07
	Naripayur	13.62	16.78	61.39
	Mariyur	114.50	9.63	6.71
	T.Karisalkulam	5.68	8.96	1.39
Type 2	Kokkarasankottai	4.79	1.59	7.50
	Uchinatham	6.34	3.45	15.48
	Kondunallanpatti	4.76	4.26	31.92
	Sethurajapuram	0.36	0.71	7.98
	Panivasal	1.94	10.36	21.23
	Sokkanai	1.70	4.23	11.43
	S.Tharaikudi	100.23	75.05	82.46
	Sevalpatti	3.72	32.16	35.34
	Sonaipriyankottai	15.69	0.00	5.33
	kidathirukkai	4.66	0.00	6.01
	Marandai	8.23	6.73	18.87
	Sevariarpattinam	3.52	3.40	6.20
Type 4	A.Usilangulam	10.63	1.31	4.99
	Mookkaiyur	48.65	72.14	16.94
	S.Keerandai	48.43	72.14	19.92
	Pillayarkulam	15.69	3.23	30.82
	S.Vagaikulam	32.63	11.57	6.67
	Kanikoor	14.65	2.63	40.84
	M.Karisalkutham	20.30	1.82	7.20
	A.Punavasi	1.90	2.56	28.24
	Kadaladi	4.69	0.37	0.96
	Mangalam	22.89	14.98	4.08
	Karungulam	6.02	2.70	5.41
	Thirumalugandankottai	2.62	11.68	9.77
	T.Veppangulam	12.36	30.91	22.12
	Senjudainathapuram	5.37	25.05	24.09
	Meenagudi	3.46	37.05	11.84
	Melaselvanur	88.14	25.04	10.26
	Thanichiyam	18.43	16.00	12.50
	pannanthai	11.42	1.10	7.70
	P.keerandai	41.80	4.32	27.83
	Vallinocham	16.08	22.57	12.34

Type 4	**Kothangulam**	21.36	6.69	6.61
	Oppilan	27.14	24.39	5.77
	Periakulam	28.19	24.39	5.77
	Melakidaram	93.73	31.95	21.42
	Keelaselvanur	45.34	8.70	2.81
	Sikkal	35.60	5.56	3.40
	Siraikulam	72.19	9.79	26.63
	Oruvanendhal	5.12	7.06	1.68
	Pothikulam	20.75	16.94	4.04
	Kelakidaram	50.77	3.88	55.62
	Enathi	4.12	0.00	1.25
	Keelasakkulam	5.69	8.24	0.76
	Kandilan	31.53	39.39	3.25
	Ilanchembur	0.00	0.56	7.42
	Peikulam	42.02	19.26	27.45
	Keelachirupothu	4.09	0.26	5.07

ANNEXURE 5.3

GP WISE WASCA RECOMMENDATION AND WORKS UPLOADED

Activity	Avathandai		Appanur		Chithirangadi		Ervadi		Idambadai	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	2415	3.02	33732	42.17	1414	1.77	1478	1.85	1969	2.46
Agroforestry	0	0	0	0	0	0	0	0	0	0
Artificial recharge structure	0	0	0	0	5	11.7	2	5.73	0	0
Aveneu plantation	0	0	560	2241	0	0	327	1306.96	2118	8472
Azolla units	4	43	9	95	2	24	22	222	2	18
Block Plantation	77316	96.65	228392	285.49	560	2241	288150	360.19	0	0
Canal Bed levelling	1	0	1	5000	1	0	1	883	1	0
Canal Bund Plantation	0	0	0	5000	0	0	221	883	0	0
Canal side plantation	0	0	0	0	0	0	0	0	0	0
Cattle Shelters	4	43	9	95	2	24	22	222	2	18
Cattle Trough	4	43	9	95	2	24	22	222	2	18
Community Soak Pits	6	607	8	841	2	184	29	2853	5	498
Composting	41	118.43	7	22.92	5	20.05	120	300.67	18	189.13
Construction of farm ponds	41	118.43	7	22.92	5	20.05	120	300.67	18	189.13
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	604	3.02	8433	42.17	354	1.77	369	1.85	492	2.46
Deepening of waterbodies	12	27.585	16	14.5	2	0	11	22.365	0	0
Desiltation of waterbodies	12	27.585	16	14.5	2	0	11	22.365	0	0
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	0	0	3848	15393	633	2530	327	1306.96	0	0
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land horticulture	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	24	59	5	11	4	10	60	150	38	95
Earthern Bund plantation	0	0	0	0	0	0	0	0	0	0
Farm Bunding	47	118.43	9	22.92	8	20.05	120	300.67	76	189.13

Activity	Avathandai		Appanur		Chithirangadi		Ervadi		Idambadai	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Fencing	40	99.54	125	311.62	1	1.77	145	362.03	1	2.46
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	4	43	9	95	2	24	22	222	2	18
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	76	764	124	1238	6	61	41	409	98	975
Grass seeding	0	0	0	0	0	0	0	0	0	0
Gully Plugs	0	0	0	0	0	0	0	0	0	0
Individual Soak pits	61	607	84	841	18	184	285	2853	50	498
Inlet development with silt trap of Waterbodies	12	27.585	16	14.5	2	0	11	27.96	0	0
Irrigation channels	0	0	0	0	0	0	349	1396	0	0
Kitchen - Nutri Garden 5 planst per HH	3035	607	4205	841	920	184	14265	2853	2490	498
Land development	21	51.31	3	8.13	3	6.6	60	150.34	38	94.56
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	6	15.82	3	6.66	3	6.85	29	71.5	9	22.95
Mini Forest	0	0	0	0	0	0	0	0	0	0
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	401	80211.5	268422.21	1342.11	4348.08	21.74	1466	293262.48	23	4610.89
Mulching (Individual)	7106	17765	3439	1375	3008	1203	18040	45101	28	69
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	607	1	841	1	184	1	2853	1	498
Poultry shed	42	421	48	478	1	13	16	157	24	242
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	25000	2	25000	2	25000	2	25000	2	25000
Silt application	21	51.31	3	8.13	3	6.6	0	0	38	94.56

Activity	Avathandai		Appanur		Chithirangadi		Ervadi		Idambadai	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Sunken pit	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	4	20.81	6	12	0	0	2	0	0	0
Vermi compost	4	43	9	95	2	24	1	222	2	18
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0
Water Harvesting Structure (WHS)	0	0	0	0	0	0	0	0	0	0
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	12	13.7925	16	7.25	2	0	11	20.615	0	0
Agro forestry	0	0	0	0	0	0	1478	1.85	0	0
Bird watching tower	0	0	0	0	0	0	1		0	0
Cage culture	0	0	0	0	0	0	0	0	0	0
Check wall	0	0	0	0	0	0	2	0	0	0
Constructed wetland	0	0	0	0	0	0	0	0	0	0
Farm ponds	0	0	0	0	0	0	0	0	0	0
Fish drying yard	0	0	0	0	0	0	5		0	0
Fish processing units	0	0	0	0	0	0	5		0	0
Integrated Farming system	0	0	0	0	0	0	0	0	0	0
Integrated Mangrove Fish Farming System	0	0	0	0	0	0	0	0	0	0
Mangrove plantations	0	0	0	0	0	0	1478	1.85	0	0
Nursery development - fishery	0	0	0	0	0	0	0	0	0	0
Nursery development - plantation	0	0	0	0	0	0	1478	1.85	0	0
Riverside plantation	0	0	0	0	0	0	0	0	0	0
Sand dune Development	0	0	0	0	0	0	4	0	0	0
Sea weed cultivation related activities	0	0	0	0	0	0	0	0	0	0
Shelter belts	0	0	0	0	0	0	5	0	0	0
Village/eco beach development	0	0	0	0	0	0	0	0	0	0

Activity	Kannirajpuram		Orivayal		Kadugusandai		Melachirupodhu		Naripayur	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	109969	137.46	3130	3.91	1107	1.38	2461	3.08	927	1.16
Artificial recharge structure	0	0	2	5.05	1	3	0	0	0	0
Aveneu plantation	1048	4192	1833	7330	1758	7032	764	3054	1301	5204
Azolla units	3	35	1	13	4	38	1	6	8	77
Block Plantation	112880	141.1	7045	35.22	0	0	0	0	328440	410.55
Canal Bed levelling	1	0	1	1863	1	2444	1	4530	1	0
Canal side plantation	0	0	0	0	0	0	0	0	0	0
CanalBund Plantation	0	0	466	1863	611	2444	1133	4530	0	0
Cattle Shelters	3	35	1	13	4	38	1	6	8	77
Cattle Trough	3	35	1	13	4	38	1	6	8	77
Composting	6	14.17	32	113.23	62	166.89	49	172.15	30	74.82
Construction of farm ponds	6	14.17	32	113.23	67	166.89	69	172.15	30	74.82
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	27492	137.46	782	3.91	277	1.38	615	3.08	232	1.16
Deepening of waterbodies	8	41.5	8	175	5	189.36	9	232.5	11	2.75
Desiltation of waterbodies	8	41.5	8	175	5	189.36	9	232.5	11	2.75
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	1489	5955	1619	6477.43	1169	4674	0	0	1267	5068
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land horticulture	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	3	7	23	57	33	83	34	86	15	37
Farm Bunding	6	14.17	45	113.23	67	166.89	69	172.15	30	74.82
Fencing	103	258.16	16	39.14	1	1.38	1	3.08	140	350.51
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	3	35	6	13	4	38	1	6	8	77
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	29	288	6	65	8	75	6	60	222	2216
Grass seeding	0	0	0	0	0	0	0	0	0	0

Activity	Kannirajpuram		Orivayal		Kadugusandai		Melachirupodhu		Naripayur	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Gully Plugs	0	0	0	0	0	0	0	0	0	0
Inlet development with silt trap of Waterbodies	8	41.5	8	27.96	5	189.36	9	232.5	11	2.75
Irrigation channels	0	0	1625	6500	611	2444	635	2538	0	0
Kitchen - Nutri Garden 5 planst per HH	5840	1168	2475	495	3190	638	2645	529	10650	2130
Land development	3	6.89	16	40.34	31	77.14	24	61.21	15	37.23
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	0	0.39	13	32.55	5	12.61	20	49.73	0	0.35
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	1123	224589.35	65	13072.43	487	97304	24	4799	1662	332374.7
Mulching (Individual)	850	2125	6794	16985	10014	25034	10329	25823	4489	11223
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	1168	1	495	1	638	1	529	1	2130
Poultry shed	12	122	2	21	5	51	1	15	61	610
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	2500	2	2500	2	2500	2	2500	2	2500
Silt application	3	6.89	0	0	0	0	0	0	15	37.23
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
soak pits (Community)	12	1168	5	495	6	638	5	529	21	2130
Soak pits (Individual)	117	1168	50	495	64	638	53	529	213	2130
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	2	40	4	0	0	0	0	0	0	0
Vermi compost	3	35	1	13	4	38	1	6	8	77
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0

Activity	Kannirajpuram		Orivayal		Kadugusandai		Melachirupodhu		Naripayur	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Water Harvesting Structure (WHS)	0	0	0	0	92459.6	115.57	81.6	0.1	0	0
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	8	20.75	8	70	5	94.68	9	116.25	11	1.38
Waterbody Bund strengthening	0	5495	0	0	0	0	0	0	0	0
Wetland plantation	0	48.2	0	0	0	0	0	0	0	0
Chedkdam	0	0	0	0	0	0	0	0	0	0
Wetland bund plantation	1373.75	5495	0	0	0	0	0	0	0	0
Wetland inlet	2	28.2	0	0	0	0	0	0	0	0
wetland outlet	2	28.2	0	0	0	0	0	0	0	0
Stream bank plantation	0	0	0	0	0	0	0	0	0	0

Activity	Mariyur		T.Karisalkulam		Kokkarasankottai		Uchinatham		Kondunallanpatti	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	372271	465.34	810	1.01	512	0.64	768	0.96	1024	1.28
Artificial recharge structure	0	0	0	0	0	0	0	0	0	0
Aveneu plantation	3575	14299	1161	4642.91	203	810	1578	6310	1797	7187
Azolla units	3	30	2	21	1	8	1	12	1	13
Block Plantation	44044	55.05	67462.8	84.33	12240	15.3	18360	22.95	24480	30.6
Canal Bed levelling	1	0	1	883	1	0	1	2600	1	0
Canal side plantation	0	0	0	0	0	0	0	0	0	0
CanalBund Plantation	0	0	221	883	0	0	650	2600	0	0
Cattle Shelters	3	30	2	21	1	8	1	12	1	13
Cattle Trough	3	30	2	21	1	8	1	12	1	13
Composting	16	57.58	5	11.96	10	25.93	23	58.35	52	129.67
Construction of farm ponds	16	57.58	5	11.96	10	25.93	23	58.35	52	129.67
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	93068	465.34	203	1.01	128	0.64	192	0.96	256	1.28
Deepening of waterbodies	14	18.5	5	33.52	0	0	0	0	0	0
Desiltation of waterbodies	14	18.5	5	33.52	0	0	0	0	0	0
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	0	0	1161	4642.91	969	3874	1174	4694	1914	7655
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	12	29	2	6	5	13	12	29	26	65
Farm Bunding	23	57.58	5	11.96	10	25.93	23	58.35	52	129.67
Fencing	204	511.06	34	85.34	6	14.24	9	21.36	11	28.48
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	3	30	2	21	1	8	1	12	1	13
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	80	799	2	17	4	37	6	55	19	186
Grass seeding	0	0	0	0	0	0	0	0	0	0
Gully Plugs	0	0	0	0	0	0	0	0	0	0

Activity	Mariyur		T.Karisalkulam		Kokkarasankottai		Uchinatham		Kondunallanpatti	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Inlet development with silt trap of Waterbodies	14	18.5	5	27.96	0	0	0	0	0	0
Irrigation channels	0	0	180	720	0	0	187.5	750	0	0
Kitchen - Nutri Garden 5 planst per HH	6265	1253	1170	234	1550	310	2210	442	2165	433
Land development	8	19.48	2	5.98	5	12.95	12	29.14	26	64.76
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	7	18.63	0	0.36	0	0.03	0	0.07	0	0.15
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	420449.44	2102.25	353	70660.43	70	14082.8	113	22688.69	147	29454.09
Mulching (Individual)	8637	3455	717	1793	1556	3890	3501	8753	7780	19451
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	1253	1	234	1	310	1	442	1	433
Poultry shed	20	203	1	11	4	35	5	53	12	124
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	25000	2	25000	2	25000	2	25000	2	25000
Silt application	8	19.48	0	0	5	12.95	12	29.14	26	64.76
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
soak pits (Community)	13	1253	2	234	3	310	4	442	4	433
Soak pits (Individual)	125	1253	23	234	31	310	44	442	43	433
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	5	15	2	0	0	0	0	0	0	0
Vermi compost	3	30	1	21	1	8	1	12	1	13
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0
Water Harvesting Structure (WHS)	0	0	0	0	0	0	0	0	0	0

Activity	Mariyur		T.Karisalkulam		Kokkarasankottai		Uchinatham		Kondunallanpatti	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	14	9.25	5	18.41	0	0	0	0	0	0
Agro forestry	927	1.16	0	0	0	0	0	0	0	0
Check wall	1	0	0	0	0	0	0	0	0	0
Farm ponds	0	0	0	0	0	0	0	0	0	0
Mangrove plantations	927	1.16	0	0	0	0	0	0	0	0
Riverside plantation	0	0	0	0	0	0	0	0	0	0
Fish drying yard	5	0	0	0	0	0	0	0	0	0
Bird watching tower	1	0	0	0	0	0	0	0	0	0
Fish processing units	3	0	0	0	0	0	0	0	0	0
Sand dune Development	5	0	0	0	0	0	0	0	0	0
Village/eco beach development	0	0	0	0	0	0	0	0	0	0
Cage culture	0	0	0	0	0	0	0	0	0	0
Nursery development - fishery	0	0	0	0	0	0	0	0	0	0
Nursery development - plantation	927	1.16	0	0	0	0	0	0	0	0
Shelter belts	5	0	0	0	0	0	0	0	0	0
Integrated Mangrove Fish Farming System	0	0	0	0	0	0	0	0	0	0
Sea weed cultivation related activities	0	0	0	0	0	0	0	0	0	0
Integrated Farming system	0	0	0	0	0	0	0	0	0	0
Constructed wetland	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	0	0	0	0	0	0	0	0	0	0
Bund Plantation	0	0	0	0	0	0	0	0	0	0
Wetland - inside plantation	0	0	0	0	0	0	0	0	0	0
Inlet mgt	0	0	0	0	0	0	0	0	0	0
outlet mgt	0	0	0	0	0	0	0	0	0	0

Activity	Sethurajapuram		Panivasal		Sokkanai		S.Tharaikudi		Sevalpatti	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	256	0.32	563	0.7	303	0.38	2556	168.04	1095	72.02
Artificial recharge structure	0	0	0	0	0	0	0	0	0	0
Aveneu plantation	592	2369	474	1894	558	2230	2729	10915	657	2628
Azolla units	0	3	6	59	3	32	6	63	3	27
Block Plantation	6120	7.65	53924	67.41	29036	36.3	317016	396.27	135864	169.83
Canal Bed levelling	1	0	1	1961	1	744	1	0	1	0
Canal side plantation	0	0	0	0	0	0	0	0	0	0
CanalBund Plantation	0	0	490	1961	186	744	0	0	0	0
Cattle Shelters	0	3	6	59	3	32	6	63	3	27
Cattle Trough	0	3	6	59	3	32	6	63	3	27
Composting	13	32.42	18	66.47	10	35.79	32	87.96	14	37.7
Construction of farm ponds	13	32.42	18	66.47	10	35.79	32	87.96	14	37.7
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	64	0.32	141	0.7	76	0.38	639	168.04	274	72.02
Deepening of waterbodies	0	0	0	0	0	0	0	0	0	0
Desiltation of waterbodies	0	0	0	0	0	0	0	0	0	0
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	0	0	0	0	0	0	1310	5239	4104	16415
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	6	16	13	33	7	18	18	44	8	19
Farm Bunding	13	32.42	27	66.47	14	35.79	35	87.96	15	37.7
Fencing	3	7.12	27	68.11	15	36.67	136	340.56	58	145.95
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	0	3	6	59	3	32	6	63	3	27
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	5	47	35	355	19	191	38	382	16	164
Grass seeding	0	0	0	0	0	0	0	0	0	0
Gully Plugs	0	0	0	0	0	0	0	0	0	0

Activity	Sethurajapuram		Panivasal		Sokkanai		S.Tharaikudi		Sevalpatti	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Inlet development with silt trap of Waterbodies	0	0	0	0	0	0	0	0	0	0
Irrigation channels	0	0	170	680	46.75	187	1283.75	5135	0	0
Kitchen - Nutri Garden 5 planst per HH	2165	433	4070	814	4070	814	7390	1478	7390	1478
Land development	6	16.19	9	23.08	5	12.43	16	39.61	7	16.97
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	0	0.04	8	20.32	4	10.94	4	8.75	2	3.75
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	35	6968.15	279	55810.33	152	30322.43	1620	323970.33	710	142000.11
Mulching (Individual)	1945	4863	3988	9971	2148	5369	5278	13194	2262	5655
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	433	1	814	1	814	1	1478	1	1478
Poultry shed	3	31	19	189	10	102	20	204	9	87
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	25000	2	25000	2	25000	2	25000	2	25000
Silt application	6	16.19	9	23.08	5	12.43	16	39.61	7	16.97
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
soak pits (Community)	4	433	8	814	8	814	15	1478	15	1478
Soak pits (Individual)	43	433	81	814	81	814	148	1478	148	1478
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	0	0	0	0	0	0	0	0	0	0
Vermi compost	0	3	6	59	3	32	6	63	3	27
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0
Water Harvesting Structure (WHS)	0	0	0	0	0	0	0	0	0	0

Activity	Sethurajapuram		Panivasal		Sokkanai		S.Tharaikudi		Sevalpatti	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	0	0	0	0	0	0	0	0	0	0
Agro forestry	0	0	0	0	0	0	4	0	4	0
Check wall	0	0	0	0	0	0	0	0	0	0
Farm ponds	0	0	0	0	0	0	0	0	0	0
Mangrove plantations	0	0	0	0	0	0	0	0	0	0
Riverside plantation	0	0	0	0	0	0	0	0	0	0
Fish drying yard	0	0	0	0	0	0	3	0	3	0
Bird watching tower	0	0	0	0	0	0	1	0	1	0
Fish processing units	0	0	0	0	0	0	3	0	3	0
Sand dune Development	0	0	0	0	0	0	3	0	3	0
Village/eco beach development	0	0	0	0	0	0	0	0	0	0
Cage culture	0	0	0	0	0	0	0	0	0	0
Nursery development - fishery	0	0	0	0	0	0	0	0	0	0
Nursery development - plantation	0	0	0	0	0	0	0	0	0	0
Shelter belts	0	0	0	0	0	0	0	0	0	0
Integrated Mangrove Fish Farming System	0	0	0	0	0	0	0	0	0	0
Sea weed cultivation related activities	0	0	0	0	0	0	0	0	0	0
Integrated Farming system	0	0	0	0	0	0	0	0	0	0
Constructed wetland	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	0	0	0	0	0	0	2584.8	6462	2584.8	6462
Bund Plantation	0	0	0	0	0	0	2154	6462	2154	6462
Wetland - inside plantation	0	0	0	0	0	0	0.681	68.1	0.681	68.1
Inlet mgt	0	0	0	0	0	0	1	68.1	1	68.1
outlet mgt	0	0	0	0	0	0	0	68.1	0	68.1

Activity	Sonaipriyankottai		Kidathirukkai		Marandai		Sevariarpattinam		A.Usilangulam	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	1503	1.88	1695	2.12	1639	2.05	882	1.1	1481	1.85
Artificial recharge structure	0	0	0	0	0	0	0	0	2	4.85
Aveneu plantation	1513	6051	135	541	922	3686	1189	4757	560	2241
Azolla units	4	43	5	48	1	13	1	7	1	15
Block Plantation	777	0.97	876	1.09	26975	33.72	14525	18.16	5984	7.48
Canal Bed levelling	1	4661	1	1085	1	3785	1	576	1	0
Canal side plantation	0	0	0	0	0	0	0	0	0	0
CanalBund Plantation	1165	4661	271	1085	946	3785	144	576	0	0
Cattle Shelters	4	43	5	48	1	13	1	7	1	15
Cattle Trough	4	43	5	48	1	13	1	7	1	15
Composting	7	25	8	28.2	22	65.44	6	17.62	15	42.82
Construction of farm ponds	7	25	8	28.2	22	65.44	6	17.62	15	42.82
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	376	1.88	424	2.12	410	2.05	221	1.1	370	1.85
Deepening of waterbodies	0	0	0	0	0	0	0	0	4	40.61
Desiltation of waterbodies	0	0	0	0	0	0	0	0	4	40.61
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	557	2228	1026	4103	1077	4306	1239	4954	1266	5062
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	5	13	6	14	13	33	4	9	9	21
Farm Bunding	10	25	11	28.2	26	65.44	7	17.62	17	42.82
Fencing	1	1.88	1	2.12	13	31.88	7	17.17	4	8.88
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	4	43	5	48	1	13	1	7	1	15
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	26	256	29	290	23	229	12	123	24	241
Grass seeding	0	0	0	0	0	0	0	0	0	0
Gully Plugs	0	0	0	0	0	0	0	0	0	0

Activity	Sonaipriyankottai		Kidathirukkai		Marandai		Sevariarpattinam		A.Usilangulam	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Inlet development with silt trap of Waterbodies	0	0	0	0	0	0	0	0	4	40.61
Irrigation channels	216.25	865	0	0	165.5	662	95.5	382	0	0
Kitchen - Nutri Garden 5 planst per HH	3615	723	3615	723	3835	767	3835	767	3250	650
Land development	4	8.76	4	9.87	11	26.93	3	7.25	8	19.13
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	3	7.49	3	8.45	5	11.58	1	3.12	2	4.55
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	29	5714.96	21	4243.27	159	31878.24	91	18139.25	9599.02	48
Mulching (Individual)	1500	3751	1692	4229	3927	9816	1057	2643	6423	2569
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	723	1	723	1	767	1	767	1	650
Poultry shed	14	137	15	154	20	204	11	110	10	103
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	25000	2	25000	2	25000	2	25000	2	25000
Silt application	4	8.76	4	9.87	11	26.93	3	7.25	8	19.13
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
soak pits (Community)	7	723	7	723	8	767	8	767	7	650
Soak pits (Individual)	72	723	72	723	77	767	77	767	65	650
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	0	0	0	0	0	0	0	0	1	39.6
Vermi compost	4	43	5	48	1	13	1	7	1	15
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0
Water Harvesting Structure (WHS)	0	0	0	0	0	0	0	0	0	0
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	0	0	0	0	0	0	0	0	4	20.305

Activity	Mookkaiyur		S.Keerandai		Pillayarkulam		S.Vagaikulam		Kanikoor	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	62237	77.8	62237	77.8	1644	2.06	2986	3.73	1711	2.14
Artificial recharge structure	2	4.85	19	48.35	25	63	0	0	8	20
Aveneu plantation	980	3920	994	3976	319	1275	1555	6221	938	3752
Azolla units	7	67	2	16	1	9	1	8	4	37
Block Plantation	330021	412.53	330021	412.53	14774	18.47	52909	66.14	12018	15.02
Canal Bed levelling	1	0	1	0	1	0	1	0	1	0
Canal side plantation	0	0	0	0	0	0	0	0	0	0
CanalBund Plantation	0	0	0	0	0	0	0	0	0	0
Cattle Shelters	7	67	2	16	1	9	1	8	4	37
Cattle Trough	7	67	2	16	1	9	1	8	4	37
Composting	52	145.27	61	170.9	92	264.4	19	57.19	130	350.35
Construction of farm ponds	52	145.27	61	170.9	92	264.4	19	57.19	130	350.35
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	15559	77.8	15559	77.8	411	2.06	746	3.73	428	2.14
Deepening of waterbodies	9	125.85	9	125.85	10	451.82109	9	127.97	7	360.85623
Desiltation of waterbodies	9	125.85	9	125.85	10	451.82109	9	127.97	7	360.85623
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	2717	10868	760	3041	708	2832	392	1569	892	3569
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	29	73	34	85	53	132	11	29	70	175
Farm Bunding	58	145.27	68	170.9	106	264.4	23	57.19	140	350.35
Fencing	184	460.22	184	460.22	7	17.43	23	57.88	1	2.14
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	7	67	2	16	1	9	1	8	4	37
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	87	869	32	319	25	253	27	273	22	225
Grass seeding	0	0	0	0	0	0	0	0	0	0
Gully Plugs	0	0	0	0	0	0	0	0	0	0

Activity	Mookkaiyur		S.Keerandai		Pillayarkulam		S.Vagaikulam		Kanikoor	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Inlet development with silt trap of Waterbodies	9	125.85	9	125.85	10	451.82109	9	127.97	7	360.85623
Irrigation channels	0	0	0	0	0	0	0	0	0	0
Kitchen - Nutri Garden 5 planst per HH	3540	708	735	147	3250	650	3600	720	2350	470
Land development	26	65.05	31	76.53	46	114.49	10	23.98	65	162.02
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	6	15.17	7	17.85	14	35.42	4	9.23	11	26.3
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	393598.19	1967.99	393612.19	1968.06	17137.31	85.69	57810.66	289.05	14947.21	74.74
Mulching (Individual)	21790	8716	25635	10254	39661	15864	8578	3431	52552	21021
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	708	1	147	1	650	1	720	1	470
Poultry shed	31	309	25	247	6	57	7	66	20	200
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	25000	2	25000	2	25000	2	25000	2	25000
Silt application	26	65.05	31	76.53	46	114.49	10	23.98	65	162.02
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
soak pits (Community)	7	708	1	147	7	650	7	720	5	470
Soak pits (Individual)	71	708	15	147	65	650	72	720	47	470
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	2	121.4	2	121.4	6	450	7	123.61	3	356
Vermi compost	7	67	2	16	1	9	1	8	4	37
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0
Water Harvesting Structure (WHS)	0	0	0	0	0	0	0	0	0	0

Activity	Mookkaiyur		S.Keerandai		Pillayarkulam		S.Vagaikulam		Kanikoor	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	9	62.925	9	62.925	10	225.910545	9	63.985	7	180.428115
Agro forestry	62237	77.8	0	0	0	0	0	0	0	0
Check wall	1	0	0	0	0	0	0	0	0	0
Farm ponds	0	0	0	0	0	0	0	0	0	0
Mangrove plantations	62237	77.8	0	0	0	0	0	0	0	0
Riverside plantation	0	0	0	0	0	0	0	0	0	0
Fish drying yard	5	0	0	0	0	0	0	0	0	0
Bird watching tower	1	0	0	0	0	0	0	0	0	0
Fish processing units	3	0	0	0	0	0	0	0	0	0
Sand dune Development	5	0	0	0	0	0	0	0	0	0
Village/eco beach development	0	0	0	0	0	0	0	0	0	0
Cage culture	0	0	0	0	0	0	0	0	0	0
Nursery development - fishery	0	0	0	0	0	0	0	0	0	0
Nursery development - plantation	62237	77.8	0	0	0	0	0	0	0	0
Shelter belts	5	0	0	0	0	0	0	0	0	0
Integrated Mangrove Fish Farming System	0	0	0	0	0	0	0	0	0	0
Sea weed cultivation related activities	0	0	0	0	0	0	0	0	0	0
Integrated Farming system	0	0	0	0	0	0	0	0	0	0
Constructed wetland	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	5538	13844	0	0	0	0	0	0	0	0
Bund Plantation	4615	13844	0	0	0	0	0	0	0	0
Wetland - inside plantation	1.27	127.27	0	0	0	0	0	0	0	0
Inlet mgt	4	127.27	0	0	0	0	0	0	0	0
outlet mgt	4	127.27	0	0	0	0	0	0	0	0

Activity	M.Karisalkutham		A.Punavasi		Kadaladi		Mangalam		Karungulam	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	1738	2.17	34711	43.39	1412	1.76	17488	21.86	8369	10.46
Artificial recharge structure	3	8.09	1	2.79	11	28.3	87	217.42	83	206.49
Aveneu plantation	1208	4833	534	2136	534	2136	1160	4638	1523	6090
Azolla units	4	36	4	40	1	11	0	4	7	70
Block Plantation	8328	10.41	21527	26.91	1680	2.1	68513	85.64	12329	15.41
Canal Bed levelling	1	0	1	0	1	0	1	0	1	0
Canal side plantation	0	0	0	0	0	0	0	0	0	0
CanalBund Plantation	0	0	0	0	0	0	0	0	0	0
Cattle Shelters	4	36	4	40	1	11	0	4	7	70
Cattle Trough	4	36	4	40	1	11	0	4	7	70
Composting	22	61.75	23	94.94	2	8.28	8	34.99	13	46.41
Construction of farm ponds	22	61.75	23	94.94	2	8.28	8	34.99	13	46.41
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	434	2.17	8678	43.39	353	1.76	4372	21.86	2092	10.46
Deepening of waterbodies	5	82.11	16	6	4	37.7	10	74.75	11	8.5
Desiltation of waterbodies	5	82.11	16	6	4	37.7	10	74.75	11	8.5
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	116	462	378	1511.79	0	0	399	1597	1147	4587
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	12	31	19	47	2	4	7	17	9	23
Farm Bunding	25	61.75	38	94.94	3	8.28	14	34.99	19	46.41
Fencing	2	4.38	18	44.99	1	1.76	38	95.16	5	12.35
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	4	36	4	40	1	11	0	4	7	70
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	50	495	84	840	17	166	6	64	106	1056
Grass seeding	0	0	0	0	0	0	0	0	0	0
Gully Plugs	0	0	0	0	0	0	0	0	0	0

Activity	M.Karisalkutham		A.Punavasi		Kadaladi		Mangalam		Karungulam	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Inlet development with silt trap of Waterbodies	5	82.11	16	6	4	37.7	10	74.75	11	8.5
Irrigation channels	0	0	1250	5000	0	0	0	0	0	0
Kitchen - Nutri Garden 5 planst per HH	2350	470	1995	399	7090	1418	1130	226	7090	1418
Land development	11	28.12	12	29.26	1	2.85	4	9.89	6	15.98
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	2	5.5	15	36.41	1	2.58	6	15.22	6	14.45
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	12393.15	61.97	57411.23	287.06	3786.3	18.93	87560.14	437.8	22661.39	113.31
Mulching (Individual)	9263	3705	14241	5697	1242	497	5249	2100	6962	2785
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	470	1	399	1	1418	1	226	1	1418
Poultry shed	18	185	19	190	5	53	2	20	34	336
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	25000	2	25000	2	25000	2	25000	2	25000
Silt application	11	28.12	12	29.26	1	2.85	4	9.89	6	15.98
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
soak pits (Community)	5	470	4	399	14	1418	2	226	14	1418
Soak pits (Individual)	47	470	40	399	142	1418	23	226	142	1418
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	1	80.9	8	4	1	34.3	5	10.09	4	1.5
Vermi compost	4	36	4	40	1	11	0	4	7	70
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0
Water Harvesting Structure (WHS)	0	0	0	0	0	0	0	0	0	0
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	5	41.055	16	3	4	18.85	10	37.375	11	4.25

Activity	Thirumalugandankottai		T.Veppangulam		Senjudainathapuram		Meenagudi		Melaselvanur	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	1170	1.46	1101	1.38	4603	5.75	282	0.35	226324	282.91
Artificial recharge structure	0	0	0	0	0	0	0	0	13	32
Aveneu plantation	527	2106	568	2272	1161	4645	2803	11213	1907	7626
Azolla units	1	10	4	38	3	35	4	39	4	41
Block Plantation	50973	63.72	140454	175.7	109835	143.96	169492	211.87	114535	143.17
Canal Bed levelling	1	0	1	702	1	6015	1	0	1	0
Canal side plantation	0	0	0	0	0	0	0	0	0	0
CanalBund Plantation	0	0	176	702	1504	6015	0	0	0	0
Cattle Shelters	1	10	4	38	3	35	4	39	4	41
Cattle Trough	1	10	4	38	3	35	4	39	4	41
Composting	10	10.83	2	6.92	10	31.46	28	101.58	27	88.04
Construction of farm ponds	4	10.83	2	6.92	10	31.46	28	101.58	27	88.04
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	293	1.46	275	1.38	1151	5.75	71	0.35	56581	282.91
Deepening of waterbodies	0	0	0	0	0	0	18	7	8	90.2
Desiltation of waterbodies	0	0	0	0	0	0	18	7	8	90.2
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	892	3566	331	1324	1518	6071	433	1732	1791	7162
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	2	5	1	3	6	16	20	51	18	44
Farm Bunding	4	10.83	3	6.92	13	31.46	41	101.58	35	88.04
Fencing	22	55.71	64	160.78	52	131.23	74	185.28	162	405.49
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	1	10	4	38	3	35	4	39	4	41
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	8	76	25	247	57	571	65	652	103	1032
Grass seeding	0	0	0	0	0	0	0	0	0	0
Gully Plugs	0	0	0	0	0	0	0	0	0	0

Activity	Thirumalugandankottai		T.Veppangulam		Senjudainathapuram		Meenagudi		Melaselvanur	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Inlet development with silt trap of Waterbodies	0	0	0	0	0	0	18	7	8	90.2
Irrigation channels	0	0	151.5	606	168	672	0	0	0	0
Kitchen - Nutri Garden 5 planst per HH	1665	333	1295	259	1665	333	4250	850	2120	424
Land development	2	4.99	1	2.7	5	12.75	14	35.11	14	34.16
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	0	0.84	1	1.52	2	5.95	13	31.36	8	19.72
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	269	53761.28	714	142829.61	595	119099.8	173818.91	869.09	344875.98	1724.38
Mulching (Individual)	650	1624	415	1039	1887	4719	15236	6095	13205	5282
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	333	1	259	1	333	1	850	1	424
Poultry shed	5	55	57	571	18	176	28	279	13	128
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	25000	2	25000	2	25000	2	25000	2	25000
Silt application	2	4.99	1	2.7	5	12.75	14	35.11	14	34.16
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
soak pits (Community)	3	333	3	259	3	333	9	850	4	424
Soak pits (Individual)	33	333	26	259	33	333	85	850	42	424
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	0	0	0	0	0	0	12	5	1	60.2
Vermi compost	1	10	4	38	3	35	4	39	4	41
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0
Water Harvesting Structure (WHS)	0	0	0	0	0	0	0	0	0	0
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	0	0	0	0	0	0	18	3.5	8	45.1

Activity	Thanichiyam		Pannanthai		P.Keerandai		Vallinocham		Kothangulam	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	5005	6.26	937	1.17	4501	5.63	3706	4.63	9224	11.53
Artificial recharge structure	70	174.41	1	2.25	100	249.34	20	49.8	9	22.46
Aveneu plantation	2230	8921	677	2706	701	2805	2013	8052	363	1453
Azolla units	3	26	2	15	5	55	4	45	2	18
Block Plantation	73206	91.51	5025	6.28	19744	24.68	103270	129.09	30586	38.23
Canal Bed levelling	1	0	1	0	1	0	1	0	1	0
Canal side plantation	0	0	0	0	0	0	0	0	0	0
CanalBund Plantation	0	0	0	0	0	0	0	0	0	0
Cattle Shelters	3	26	2	15	5	55	4	45	2	18
Cattle Trough	3	26	2	15	5	55	4	45	2	18
Composting	31	107.23	18	66.08	65	238.69	40	105.84	16	56.66
Construction of farm ponds	31	107.23	18	66.08	65	238.69	40	105.84	16	56.66
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	1251	6.26	234	1.17	1125	5.63	927	4.63	2306	11.53
Deepening of waterbodies	11	42.58	4	45.78	9	170.74	11	59.7	6	72.33
Desiltation of waterbodies	11	42.58	4	45.78	9	170.74	11	59.7	6	72.33
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	507	2028	0	0	1791	7162	1198	4791	0	0
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	21	54	13	33	48	119	21	53	11	28
Farm Bunding	43	107.23	26	66.08	95	238.69	42	105.84	23	56.66
Fencing	39	97.76	3	7.45	12	29.98	38	94.78	19	48.32
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	3	26	2	15	5	55	4	45	2	18
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	23	230	40	396	141	1411	76	756	31	313
Grass seeding	0	0	0	0	0	0	0	0	0	0
Gully Plugs	0	0	0	0	0	0	0	0	0	0

Activity	Thanichiyam		Pannanthai		P.Keerandai		Vallinocham		Kothangulam	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Inlet development with silt trap of Water-bodies	11	42.58	4	45.78	9	170.74	11	59.7	6	72.33
Irrigation channels	0	0	0	0	0	0	0	0	0	0
Kitchen - Nutri Garden 5 planst per HH	2800	560	3695	739	3695	739	5335	1067	2800	560
Land development	16	38.79	9	22.54	32	80.7	20	50.18	8	20.42
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	12	29.65	8	20.99	31	77.3	2	5.48	6	15.82
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	81690.54	408.45	6798.29	33.99	27373.49	136.87	110913.23	554.57	40912.5	204.56
Mulching (Individual)	16085	6434	9912	3965	35804	14321	15876	6350	8499	3400
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	560	1	739	1	739	1	1067	1	560
Poultry shed	8	85	7	72	25	253	18	178	7	72
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	25000.00	2	25000.00	2	25000.00	2	25000.00	2	25000.00
Silt application	16	38.79	9	22.54	32	80.7	20	50.18	8	20.42
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
soak pits (Community)	6	560	7	739	7	739	11	1067	6	560
Soak pits (Individual)	56	560	74	739	74	739	107	1067	56	560
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	6	30.5	2	40	3	166.7	5	40	1	54.83
Vermi compost	3	26	2	15	5	55	4	45	2	18
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0
Water Harvesting Structure (WHS)	0	0	0	0	0	0	0	0	0	0
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	11	21.29	4	22.89	9	85.37	11	29.85	6	36.165

Activity	Oppilan		Periakulam		Melakidaram		Keelaselvanur		Sikkal	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	8905	11.13	16435	20.54	253618	317.02	32531	40.66	19553	24.44
Artificial recharge structure	0	0	1	3.5	14	34.22	1	2.72	0	0
Aveneu plantation	1239	4955	1341	5365	1498	5993	2207	8827	2152	8609
Azolla units	5	46	3	28	4	44	3	27	8	85
Block Plantation	111589	139.49	86020	107.53	146141	182.68	39787	49.73	25432	31.79
Canal Bed levelling	1	0	1	0	1	0	1	0	1	0
Canal side plantation	0	0	0	0	0	0	0	0	0	0
CanalBund Plantation	0	0	0	0	0	0	0	0	0	0
Cattle Shelters	5	46	3	28	4	44	3	27	8	85
Cattle Trough	5	46	3	28	4	44	3	27	8	85
Composting	18	49.52	14	55.03	57	183.76	5	24.11	7	29.13
Construction of farm ponds	18	49.52	14	55.03	57	183.76	5	24.11	7	29.13
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	2226	11.13	4109	20.54	63404	317.02	8133	40.66	4888	24.44
Deepening of waterbodies	10	102.1	11	155	15	75	13	150	0	0
Desiltation of waterbodies	10	102.1	11	155	15	75	13	150	0	0
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	1424	5695	609	2437	0	0	0	0	810	3238
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	10	25	11	28	37	92	5	12	6	15
Farm Bunding	20	49.52	22	55.03	74	183.76	10	24.11	12	29.13
Fencing	52	130.09	43	106.82	189	473.75	34	84.27	22	56.23
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	5	46	3	28	4	44	3	27	8	85
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	112	1119	66	662	65	650	53	532	0	0
Grass seeding	0	0	0	0	0	0	0	0	0	0
Gully Plugs	0	0	0	0	0	0	0	0	0	0

Activity	Oppilan		Periakulam		Melakidaram		Keelaselvanur		Sikkal	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Inlet development with silt trap of Waterbodies	10	102.1	11	155	15	75	13	150	0	0
Irrigation channels	0	0	0	0	0	0	0	0	0	0
Kitchen - Nutri Garden 5 planst per HH	5235	1047	6125	1225	4080	816	2295	459	2775	555
Land development	9	22.45	7	17.92	29	71.66	2	6.19	3	8.44
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	2	4.61	8	19.2	16	40.44	5	11.72	5	12.24
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	124211.46	621.06	105456.9	527.28	403587.5	2017.94	75950.98	379.75	49668.85	248.34
Mulching (Individual)	7428	2971	8254	3302	27563	11025	3616	1446	4369	1748
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	1047	1	1225	1	816	1	459	1	555
Poultry shed	31	309	8	83	19	190	5	50	0	0
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	25000.00	2	25000.00	2	25000.00	2	25000.00	2	25000.00
Silt application	9	22.45	7	17.92	29	71.66	2	6.19	3	8.44
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
soak pits (Community)	10	1047	12	1225	8	816	5	459	6	555
Soak pits (Individual)	105	1047	123	1225	82	816	46	459	56	555
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	3	66	11	125	9	50	5	100	2	150
Vermi compost	5	46	3	28	4	44	3	27	8	85
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0
Water Harvesting Structure (WHS)	0	0	0	0	0	0	0	0	0	0

Activity	Oppilan		Periakulam		Melakidaram		Keelaselvanur		Sikkal	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	10	51.05	11	77.5	15	37.5	13	75	0	0
Agro forestry	4	0	0	0	253618	317.02	0	0	0	0
Check wall	2	0	0	0	2	0	0	0	0	0
Farm ponds	0	0	0	0	0	0	0	0	0	0
Mangrove plantations	0	0	0	0	0	0	0	0	0	0
Riverside plantation	0	0	0	0	0	0	0	0	0	0
Fish drying yard	2	0	0	0	0	0	0	0	0	0
Bird watching tower	1	0	0	0	1	0	0	0	0	0
Fish processing units	2	0	0	0	0	0	0	0	0	0
Sand dune Development	3	0	0	0	3	0	0	0	0	0
Village/eco beach development	0	0	0	0	0	0	0	0	0	0
Cage culture	0	0	0	0	0	0	0	0	0	0
Nursery development - fishery	0	0	0	0	0	0	0	0	0	0
Nursery development - plantation	3	0	0	0	253618	317.02	0	0	0	0
Shelter belts	1	0	0	0	0	0	0	0	0	0
Integrated Mangrove Fish Farming System	0	0	0	0	0	0	0	0	0	0
Sea weed cultivation related activities	0	0	0	0	0	0	0	0	0	0
Integrated Farming system	0	0	0	0	0	0	0	0	0	0
Constructed wetland	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	0	0	0	0	5380	13449	0	0	0	0
Bund Plantation	0	0	0	0	4483	13449	0	0	0	0
Wetland - inside plantation	0	0	0	0	9.45	945	0	0	0	0
Inlet mgt	0	0	0	0	1	945	0	0	0	0
outlet mgt	0	0	0	0	1	945	0	0	0	0

Activity	Siraikulam		Oruvanendhal		Pothikulam		Kelakidaram		Enathi	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	103983	129.98	805	1.01	1931	2.41	214082	267.6	964	1.2
Artificial recharge structure	92	231.17	44	110.37	0	0	0	0	21	52.5
Aveneu plantation	1805	7218	756	3023	1073	4290	1099	4395	997	3988
Azolla units	2	19	1	10	2	24	5	49	1	7
Block Plantation	44792	55.99	32281	40.35	77475	96.84	107294	134.12	0	0
Canal Bed levelling	1	0	1	0	1	0	1	750	1	938
Canal side plantation	0	0	0	0	0	0	0	0	0	0
CanalBund Plantation	0	0	0	0	0	0	188	750	235	938
Cattle Shelters	2	19	1	10	2	24	5	49	1	7
Cattle Trough	2	19	1	10	2	24	5	49	1	7
Composting	74	228.43	3	14.42	7	34.61	14	46.7	3	10.76
Construction of farm ponds	74	228.43	3	14.42	7	34.61	14	46.7	3	10.76
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	25996	129.98	201	1.01	483	2.41	53521	267.6	241	1.2
Deepening of waterbodies	18	163.33	5	163.33	14	76	12	80	12	10.88
Desiltation of waterbodies	18	163.33	5	163.33	14	76	12	80	12	10.88
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	2398	9591	0	0	294	1177	1047	4189	0	0
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	46	114	3	7	7	17	9	23	2	5
Farm Bunding	91	228.43	6	14.42	14	34.61	19	46.7	4	10.76
Fencing	74	185.97	14	35.43	34	85.03	159	397.61	0	1.2
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	2	19	1	10	2	24	5	49	1	7
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	20	204	6	58	14	137	122	1217	61	614
Grass seeding	0	0	0	0	0	0	0	0	0	0
Gully Plugs	0	0	0	0	0	0	0	0	0	0

Activity	Siraikulam		Oruvanendhal		Pothikulam		Kelakidaram		Enathi	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Inlet development with silt trap of Waterbodies	18	163.33	5	163.33	14	76	12	80	12	10.88
Irrigation channels	0	0	0	0	0	0	136.25	545	165	660
Kitchen - Nutri Garden 5 planst per HH	2975	595	4985	997	4985	997	4750	950	2425	485
Land development	37	92.25	2	3.9	4	9.36	7	17.66	1	3.69
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	18	43.92	3	6.62	6	15.89	5	11.37	1	3.37
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	154166.48	770.83	34582.69	172.91	82865.5	414.33	322955.28	1614.78	2675.39	13.38
Mulching (Individual)	34264	13706	2163	865	5192	2077	7005	2802	1614	646
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	595	1	997	1	997	1	950	1	485
Poultry shed	6	56	2	24	6	58	25	251	6	56
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	25000.00	2	25000.00	2	25000.00	2	25000.00	2	25000.00
Silt application	37	92.25	2	3.9	4	9.36	7	17.66	1	3.69
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
soak pits (Community)	6	595	10	997	10	997	10	950	5	485
Soak pits (Individual)	60	595	100	997	100	997	95	950	49	485
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	6	135.94	1	135.94	4	66	0	0	4	5.44
Vermi compost	2	19	1	10	2	24	5	49	1	7
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0
Water Harvesting Structure (WHS)	0	0	0	0	0	0	0	0	0	0

Activity	Siraikulam		Oruvanendhal		Pothikulam		Kelakidaram		Enathi	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	18	81.665	5	81.665	14	38	12	40	12	5.44
Agro forestry	103983	129.98	0	0	0	0	214082	267.6	0	0
Check wall	1	0	0	0	0	0	1	0	0	0
Farm ponds	0	0	0	0	0	0	0	0	0	0
Mangrove plantations	0	0	0	0	0	0	0	0	0	0
Riverside plantation	0	0	0	0	0	0	0	0	0	0
Fish drying yard	0	0	0	0	0	0	0	0	0	0
Bird watching tower	0	0	0	0	0	0	0	0	0	0
Fish processing units	0	0	0	0	0	0	0	0	0	0
Sand dune Development	0	0	0	0	0	0	0	0	0	0
Village/eco beach development	0	0	0	0	0	0	0	0	0	0
Cage culture	0	0	0	0	0	0	0	0	0	0
Nursery development - fishery	0	0	0	0	0	0	0	0	0	0
Nursery development - plantation	103983	129.98	0	0	0	0	214082	267.6	0	0
Shelter belts	0	0	0	0	0	0	0	0	0	0
Integrated Mangrove Fish Farming System	0	0	0	0	0	0	0	0	0	0
Sea weed cultivation related activities	0	0	0	0	0	0	0	0	0	0
Integrated Farming system	0	0	0	0	0	0	0	0	0	0
Constructed wetland	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	0	0	0	0	0	0	3672	9179	0	0
Bund Plantation	0	0	0	0	0	0	3060	9179	0	0
Wetland - inside plantation	0	0	0	0	0	0	35392	354	0	0
Inlet mgt	0	0	0	0	0	0	1	354	0	0
outlet mgt	0	0	0	0	0	0	1	354	0	0

Activity	Keelasakkulam		Kandilan		Ilanchembur		Peikulam		Keelachirupothu	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Afforestation	785	0.98	2070	2.59	25	0.03	16435	20.54	2137	2.67
Artificial recharge structure	13	31.95	16	40.32	127	318.373	1	3.5	0	0
Aveneu plantation	721	2884	906	3625	0	0	1341	5365	917	3667
Azolla units	1	7	1	12	3	28	3	28	1	5
Block Plantation	37691	47.11	180184	225.23	645	3.23	86020	107.53	1176	1.47
Canal Bed levelling	1	2490	1	3899	1	5000	1	0	1	2068
Canal side plantation	0	0	0	0	0	0	0	0	0	0
CanalBund Plantation	623	2490	975	3899	1250	5000	0	0	517	2068
Cattle Shelters	1	7	1	12	3	28	3	28	1	5
Cattle Trough	1	7	1	12	3	28	3	28	1	5
Composting	2	6.55	7	27.89	15	63.68	14	55.03	14	43.52
Construction of farm ponds	2	6.55	7	27.89	15	63.68	14	55.03	14	43.52
Construction/renovation open well	0	0	0	0	0	0	0	0	0	0
Continous contour trenches (CCT)	0	0	0	0	0	0	0	0	0	0
Contour Continous Bunds (CCB)	196	0.98	518	2.59	6	0.03	4109	20.54	534	2.67
Deepening of waterbodies	8	165	11	130	19	15.75	11	155	12	10
Desiltation of waterbodies	8	165	11	130	19	15.75	11	155	12	10
Drain for Regulating Domestic waste water flow	0	0	0	0	0	0	0	0	0	0
Drainage Line Treatment (DLT)	0	0	0	0	126	505.11	609	2437	554	2216
Drinking Water Scheme Panghat	0	0	0	0	0	0	0	0	0	0
Dry land Horticulture/Agro-forestry	1	3	6	14	13	32	11	28	9	22
Farm Bunding	3	6.55	11	27.89	25	63.68	22	55.03	17	43.52
Fencing	0	0.98	9	23.24	1	3.26	43	106.82	1	2.67
Field terracing	0	0	0	0	0	0	0	0	0	0
Fodder development for cattle	1	7	1	12	3	28	3	28	1	5
Gabion	0	0	0	0	0	0	0	0	0	0
Goat Sheep Shelters	22	220	59	594	73	734	66	662	20	203
Grass seeding	0	0	0	0	0	0	0	0	0	0
Gully Plugs	0	0	0	0	0	0	0	0	0	0

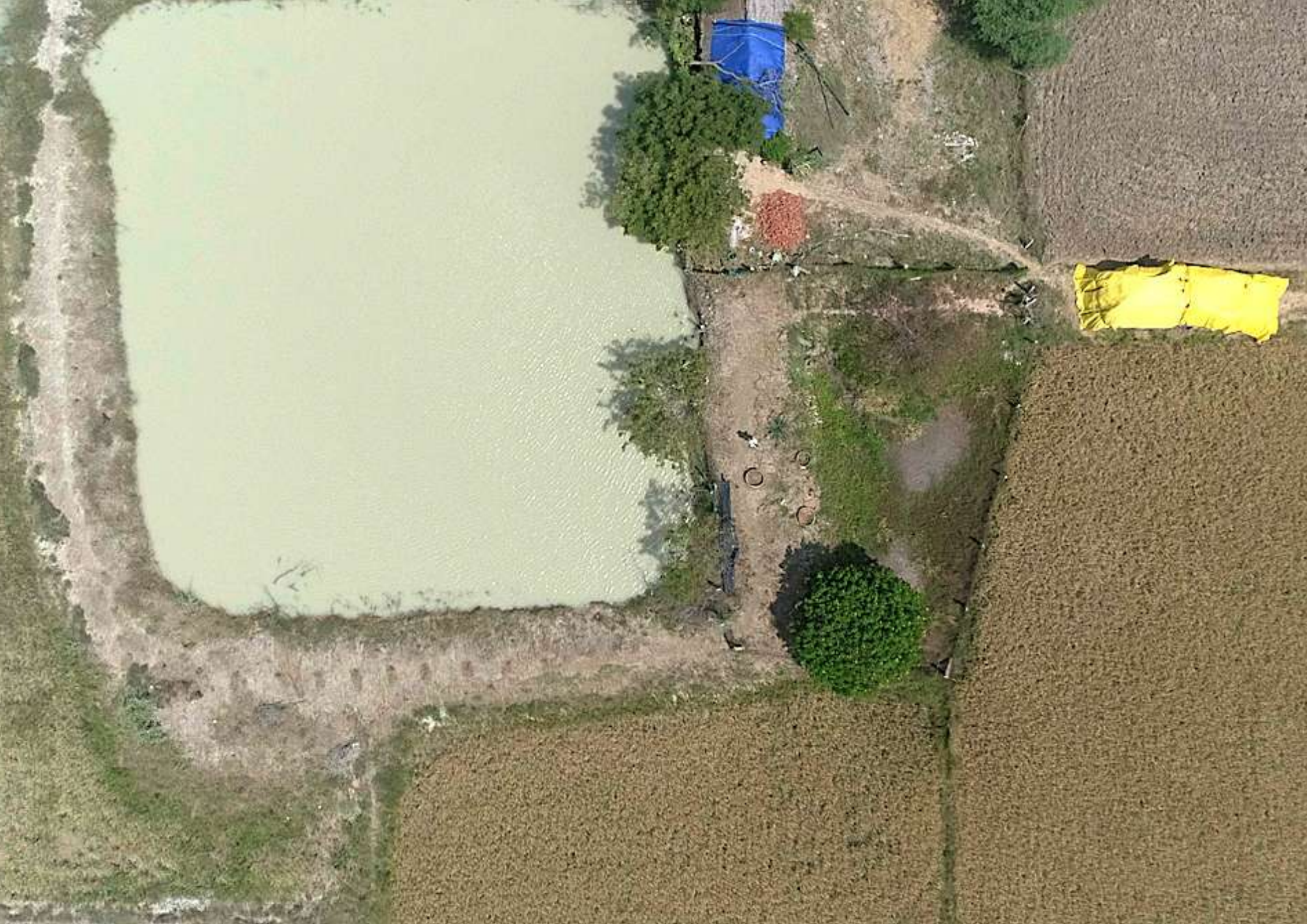
Activity	Keelasakkulam		Kandilan		Ilanchembur		Peikulam		Keelachirupothu	
	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha	Numbers	Area In ha
Inlet development with silt trap of Waterbodies	8	165	11	130	19	15.75	11	155	12	10
Irrigation channels	150	600	584.5	2338	1750	7000	0	0	60	240
Kitchen - Nutri Garden 5 planst per HH	2425	485	2955	591	4945	989	6125	1225	4105	821
Land development	1	2.24	4	8.95	13	31.84	7	17.92	7	17.49
Linear Plantation	0	0	0	0	0	0	0	0	0	0
Loose Stone Check Dam (LSCD)	0	0	0	0	0	0	0	0	0	0
Micro Irrigation	1	2.07	4	9.98	6	15.92	8	19.2	3	8.53
Mini Percolation Tank (MPT)	0	0	0	0	0	0	0	0	0	0
Minor repair of cracks in canals	0	0	0	0	0	0	0	0	0	0
Mulching (Community)	40139.74	200.7	184575.32	922.88	2806.34	14.03	105456.9	527.28	5780.49	28.9
Mulching (Individual)	982	393	4183	1673	32	13	8254	3302	6528	2611
Nursery development	0	0	0	0	0	0	0	0	0	0
Nutri Garden	1	485	1	591	1	989	1	1225	1	821
Poultry shed	3	25	7	66	12	122	8	83	6	59
Repairing outlets, gates & regulators of Canal	0	0	0	0	0	0	0	0	0	0
Rooftop Rainwater Harvesting	2	25000	2	25000	2	25000	2	25000	2	25000
Silt application	1	2.24	4	8.95	13	31.84	7	17.92	7	17.49
Silvi-pasture Development	0	0	0	0	0	0	0	0	0	0
soak pits (Community)	5	485	6	591	10	989	12	1225	8	821
Soak pits (Individual)	49	485	59	591	99	989	123	1225	82	821
Staggerred Contour Trenches (SgCT)	0	0	0	0	0	0	0	0	0	0
Sub surface barriers	0	0	0	0	0	0	0	0	0	0
Surplus/waste weir	4	125	5	100	4	12	11	125	4	6
Vermi compost	1	7	1	12	3	28	3	28	1	5
Wastewater drains	0	0	0	0	0	0	0	0	0	0
Water Aborption Trench (WAT)	0	0	0	0	0	0	0	0	0	0
Water Harvesting Structure (WHS)	0	0	0	0	0	0	0	0	0	0
Water point	0	0	0	0	0	0	0	0	0	0
Waterbody Bund strengthening	8	82.5	11	65	19	7.875	11	77.5	12	5

ANNEXURE 8

CWRM KEY INDICATORS FOR GP'S IN KUTHIRAMOZHI MICRO-WATERSHED

S.No	Description	Naripayur	Mookaiyur
Section 1: Soil Profile			
Soil Resources: Status of Available Nitrogen in %			
1	Very Low (VL)	0	20
2	Low (L)	63	26
3	Medium (M)	0	58
4	High (H)	0	0
5	Very High (VH)	0	0
Status of Organic Carbon in %			
6	Very Low (VL)	97	0
7	Low (L)	24	0
8	Medium (M)	3	23
9	High (H)	0	98
10	Very High (VH)	0	100
Status of Soil Micro Nutrients in %			
11	Sufficient	54	70
12	Deficient	46	30
Status of Physical condition of the soil in %			
13	Acidic Sulphate	0	1
14	Strongly Acidic	18	0
15	Highly Acidic	18	11
16	Moderately Acidic	0	38
17	Slightly Acidic	11	18
18	Neutral	0	12
19	Moderately Alkaline	52	20
20	Strongly Alkaline	0	0
Soil Texture in %			
21	Clay Soil	0	0
22	Fine Soil	72%	52
23	Coarse loamy	15	14
24	Soil Water Permeability	Moderate to low (5-20 mm/hr)	Moderate to low (5-20 mm/hr)
Means of Water Extraction in %			
25	Gravity	100	61
26	Lifting	0	38
Irrigation Methods in %			
27	Wild Flooding	100	95
28	Control Flooding	0	5
Livestock in numbers			
29	Cattle Population	308	267
30	Sheep Population	4442	936
31	Goat Population	1105	635
32	Poultry	2438	1237

Land Resources in ha			
33	Area under Forest land	0	57.44
34	Area under Non-Agricultural Uses	68.06	613.54
35	Area under Barren & Un-cultivable Land	0	0
36	Area under Permanent Pastures and Other Grazing Land	0	0
37	Area under Land Under Miscellaneous Tree Crops etc.	411	449.91
38	Area under Cultivable Waste Land	72	35.42
39	Area under Fallows Land other than Current Fallows	571.62	235.69
40	Area under Current Fallow land	7.9	48.54
41	Area under Unirrigated Land	661.59	481.03
42	Area Irrigated by Source	5.89	89.26



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