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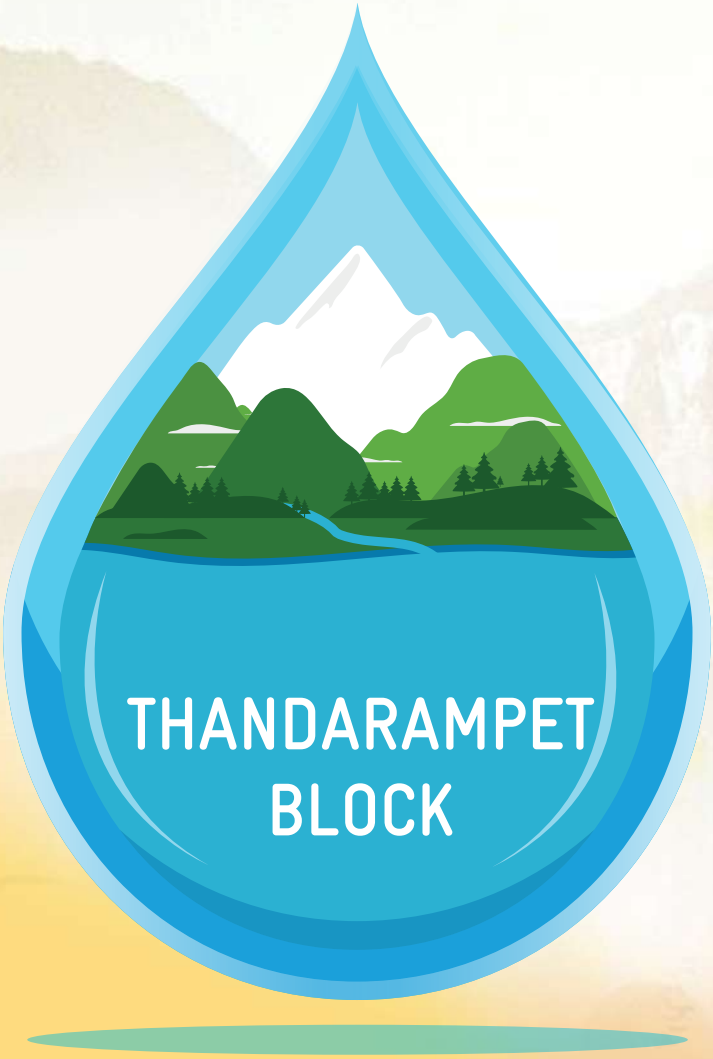
WATER SECURITY AND CLIMATE ADAPTATION IN RURAL INDIA



SUSTAINABLE DEVELOPMENT GOALS

Block Level Composite Water Resources Management Plan under Mahatma Gandhi NREGS

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

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Registered offices:
Directorate of Rural Development and Panchayat Raj
Panagal Building, 4th and 5th floor, Jeenis Road, Saidapet, Chennai-600015
T : +91 44 24336105/24337436/24337440/24336102; E : drd@tn.nic.in; I: https://tnrd.gov.in/

Bonn and Eschborn, Germany
Water Security and Climate Adaptation in Rural India
A2/18, Safdarjung Enclave, New Delhi 110 029, India
T : +91 11 4949 5353; F : + 91 11 4949 5391; E : info@giz.de; I : www.giz.de

Responsible:
Thiru. Praveen Nair I.A.S
Director, Rural Development & Panchayat Raj Department, Govt of Tamil Nadu
E: mgnrgs.drd@gmail.com

Thiru. B Murugesh I.A.S
District Collector, Tiruvannamalai, Govt of Tamil Nadu
Email: collrtvm@nic.in

Mr. Rajeev Ahal
Director, Natural Resource Management and Agroecology, GIZ India
E: rajeev.ahal@giz.de

Authors:
Dr. Anushiya J, Consultant - Climate & NRM, Mr. Pradeep M S, Consultant - RS & GIS, Mrs. Sabari V K - Editorial Support

GIZ
Mr. V.R. Sowmithri - Technical Expert, Dr. Radha Priya P - Jr. Technical Expert

MSSRF
Dr. Rengalakshmi R - Director, Mr. Nagarajan R, Mr. Nandeesha P, Mr. Karunamoorthi M, Mr. Samu Jebaraj V, Mr. Arun Siddharth R, Ms. Yogalakshmi R, Mr. Kumaragurubaran R

Content Review:
GIZ
Krishan Tyagi

Directorate of Rural Development and Panchayath Raj
Thiru. Kumar S S - ADRD (MGNREGS), Thiru. Harikrishnan R - CE, Thiru. Saravanakumar A - SE,
Thiru. Ashokan N - AD (MGNREGS)

District Rural Development Agency
Thiru. M. Prathap I.A.S - Additional Collector, Thiru. Ramakrishnan P - EE, Thiru. Harikrishnan K - AE

Design and Layout:
Mr. Manikandan T

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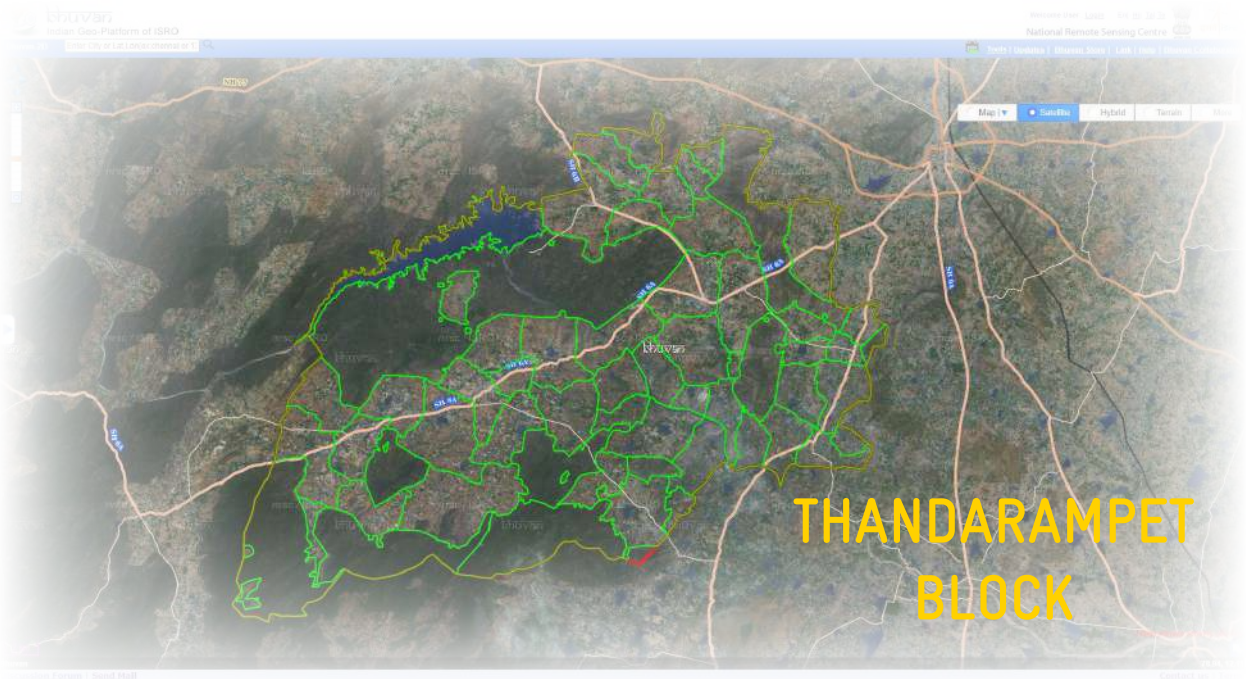
WATER SECURITY AND CLIMATE ADAPTATION IN RURAL INDIA



Block Level Composite Water Resources Management Plan under Mahatma Gandhi NREGS

District Rural Development Agency, Tiruvannamalai &
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) Indo-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.

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

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.

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
Director,
NRM & Agroecology, GIZ India

FOREWORD

Thiru. B. Murugesh, IAS
District Collector,
Tiruvannamalai

Tiruvannamalai is the second largest district in Tamil Nadu. The topography of Tiruvannamalai is almost plain sloping from west to east. Tiruvannamalai experiences hot and dry weather condition throughout the year. It is dry land region where farmers cultivate a single crop groundnut and some part of the district cultivate paddy coinciding north east monsoon. Groundwater plays an important role in the food production of the district. Ground water level and water quality ground water discharge and recharge are critical aspects of climate change. 85 % cultivation area of the district is met through groundwater.

All eighteen Blocks in the district are categorized as over exploited or critical as per latest state reports on groundwater status. Mahatma Gandhi NREGA is key scheme in the district, providing unskilled wage employment, asset creation for poor and marginal. The district has implemented in campaign mode in convergence, farm pond construction.

> "GIS based planning in 860 GPs, works identified under CWRM are verified, approved at Gram Sabha"

To enhance scientific works identification in MGNREGS, with technical support of GIZ under WASCA bilateral project, the Composite Water Resource Management (CWRM) approach is used for analyzing various parameters including spatial and temporal changes and also technique to provide solution for improving the four water (Ground water, Surface water, Rain water and Soil Moisture).

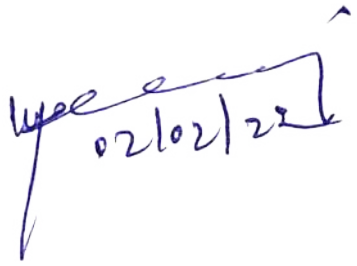
Through GIS based planning in 860 GPs, works identified under CWRM are verified, approved at Gram Sabha. These works would potentially reduce 38% surface runoff to be harvested or recharged by various interventions through ridge to valley watershed approach.

Hence, the developed CWRM plan at GP level would help to improve the statues of Water,Socio Economic, Climate, and Agricultural parameters in the district. The developed GP level plan by using CWRM is an integrated approach covering NRM (Narural Resource Management) and non NRM works.

The Innovative approach of climate Resilient measures (CRM) is helping the district to mitigate the cli-

mate hazard. The micro level systematic planning at GP level really brings a change in the climate aspects in the district. Water is the key factor for all development works, increasing the ground and surface water capacity would boost the economy and enhance climatic condition throughout the district.

Hence, all the GPs plans are analyzed, synthesized with mapping of SDG goals, INDC contributions to climate change in form of Block level report. The Block level reports really help rural development department and other convergence departments to do the systematic planning by using the data and technique. Wishes the contributors who have involved in bringing out this report for district development.



Thiru. B. Murugesh, IAS
District Collector,
Tiruvannamalai

MESSAGES

Thriu. M .Prathap, IAS
Additional Collector (Development) /
Project Director, DRDA

The present climate change crisis is inextricably linked to water. It induces extreme weather events, reduces the predictability of water availability, decreases water qualityand threatens sustainable development, biodiversity and enjoyment of the human rights to safe drinking water and sanitation. Building resilience towards Water Security and Climate Adaptation is inevitable for an integrated water resource management which WASCA is targeting. WASCA pilot study started in the district during January 2019 with developing inclusive Composite Water Resources Management (CWRM) plans for all GPs in this district. It also supported in building the capacity of the Engineers in GIS based planning adopting. The district officials with the technical support of WASCA Resourcecenter in the district has completed the CWRM plans for all theGPs. The CWRM plans assessed both the supply and demand a water budget at GP level. The prepared suitable key actions are identified for the development of public and common land, agriculture and allied activities and rural infrastructureat GP level through scientific process including hydrological, agricultural and socio economic perspectives. These GP plans are verified at the ground level by the Block and GP officials of DRDA and are consolidated at Block and district levels for prioritizing the actions and planning. The expected outcome of the WASCA project on completion will form a major chunk of DRDA of districts water security particularly the works related to cascade tank development, fallowland development, roof rain water harvesting, watershed works for treating drainage lines,improving dry lands with farm trench cum bund, farm ponds, pasture development,Block plantation with soil conservation. This demonstration project on water security and climate adaptation and its convergence approach at Panchayat level could be scaled-up and replicated. Subsequently, the Block level reports are envisioned to water resources planners and other stakeholders works on challenges of adapting to climate change with a portfolio of potential actions to reduce vulnerability. I assure this booklet of good practice example will guide the best adaptation practices towards climate resilience. I wish the entire team, stakeholders, experts, technical people involved in generating this good learning practice.

Block level reports are envisioned to water resources planners and other stakeholders works on challenges of adapting to climate change

M. P—

Thriu. M .Prathap, IAS
Additional Collector (Development) /
Project Director, DRDA

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 Comprehensive Water Resources Management (CWRMP) frame works 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 traditional 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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ABBREVIATIONS AND ACRONYMS

A - D

%
Percentage

^{0}C
Degree Celsius

AR
Assessment Report

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

DEM
Digital Elevation Model

D - H

DLSC
District Level Steering Committee

DLT
Drainage Line Treatment

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

Govt.
Government

GP
Gram Panchayat

GW
Ground Water

ha
Hectare

I - M

ha.m
Hectare Meter

HH
Households

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

KML
Keyhole Markup Language

LULC
Land use and land cover

M - N

Max
Maximum

MCM
Million Cubic Meter

MC
Mid Century

Mahatma Gandhi NREGA
Mahatma Gandhi Rural Employment Guarantee Act

Mahatma Gandhi NRGES
Mahatma Gandhi Rural Employment Guarantee Scheme

Min
Minimum

mm
Millimeter

MoEFCC
Ministry of Environment, Forest and Climate Change

MoJS
Ministry of Jal Shakti

MoRD
Ministry of Rural Development

M
Meters

NAPCC
National Action on Climate Change

N - S

NARP
National Agricultural Research Project

NADEP
Nadepkaka

NDC
Nationally Determined Contributions

NEM
North-East monsoon

NGO
Non-Governmental Organization

NITI
National Institution for Transforming India

No.
Number

NRM
Natural Resource Management

NRSC
National Remote Sensing Centre

NWC
National Water Commission

PWD
Public Works Department

Rabi crop
Sown in winter and harvested in monsoon

S - U

RDPR
Rural Development & Panchayat Raj

RF
Reserve Forest

RTRWHS
Roof top rain water harvesting structures

RWHS
Rain Water Harvesting System

SAPCC
State Action Plan on Climate Change

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

S - W

SLSC
State Level Steering Committee

ST
Scheduled Tribe

SWM
South-West monsoon

UN
United Nations

SW
Surface Water

TN
Tamil Nadu

WASCA
Water Security and Climate Adaptation

WCWH
Water Conservation and Water Harvesting

வான்நின்று உலகம் வழங்கி வருதலால்
தான்அமிழ்தம் என்றுணரற் பாற்று

குறள் - 11

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

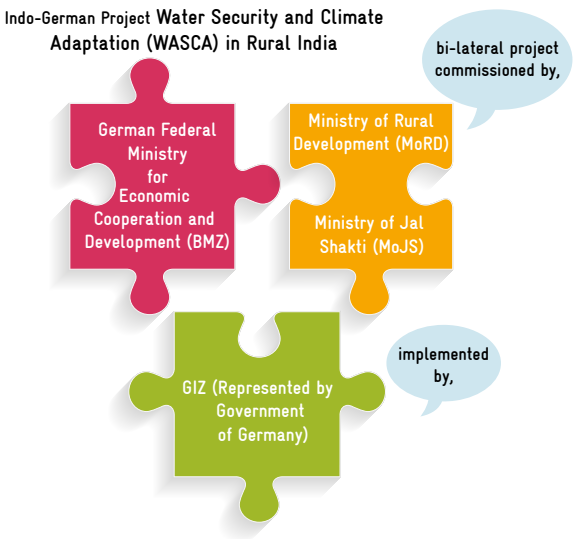
Thirukkural - 11

EXECUTIVE SUMMARY

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

Water security is one of the most alarming issues and key challenges that the world is facing today given the rapid changes in climate. India is not an exception and is facing a similar challenge. Water security is of prime concern especially in the rural areas due to scarce resources and a high dependency on natural resources. To mitigate the ill effects of climate change and focus on efforts to improve water resource management requires a thorough understanding of all key issues. Climate change adaptation and water security strategies have to be evolved with the help of technical knowledge and integrated into the development planning processes across the Nation, State and local level, for holistic and sustainable impacts.

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 with an effort 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 (MGNREGA/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.



Initially WASCA Tamil Nadu conducted a preliminary state level scoping study on the State's Rural Water Security using the 18 vulnerable indicators, which covered four important and interconnected parameters/areas of Climate extremities, water resource, agriculture and socio-economic at the District level. Based on the outcomes of the assessment, Tiruvannamalai and Ramanathapuram Districts were given priority by the State Level Steering Committee headed by the Additional Chief Secretary, RD&PR in November 2019 for implementing the WASCA. These 18 indicators were further studied at the Gram Panchayat (GP) level integrating the Composite Water Resource Management (CWRM) and MGNREGA/S approach to identify the key problems and propose 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 also 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) of 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 was jointly accomplished with research organizations and key sectoral experts in February 2021.

Subsequently, the District Collector, Tiruvannamalai, entrusted preparing Block level reports of water security and climate adaptation for each Block. This Block level report is intended for all planners and managers responsible for addressing issues of 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 all stakeholders involved to understand the issues related to water security in the context of climate change in rural areas and actions through Mahatma Gandhi NREGS and the need for convergence with the 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 is structured with nine chapters

1

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

2

The Second chapter addresses 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

The 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

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

5

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

7

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

6

The 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

The 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

The 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

Thandrampet is a Block and taluk headquarters of Thiruvannmalai District of Tamil Nadu. Block is situated 16 km away from district headquarters Thiruvannamalai or geographically lies between 11°59'13.241"N to 12°12'5.612"N and 78°45'5.893"E to 79°2'1.345"E. The Block is surrounded by Thiruvannamalai and Chengam Blocks (Figure 1.1). The total geographical area of the Block is 53,100 ha (531 Km^2) and comprised with 47 GPs and 267 habitations.

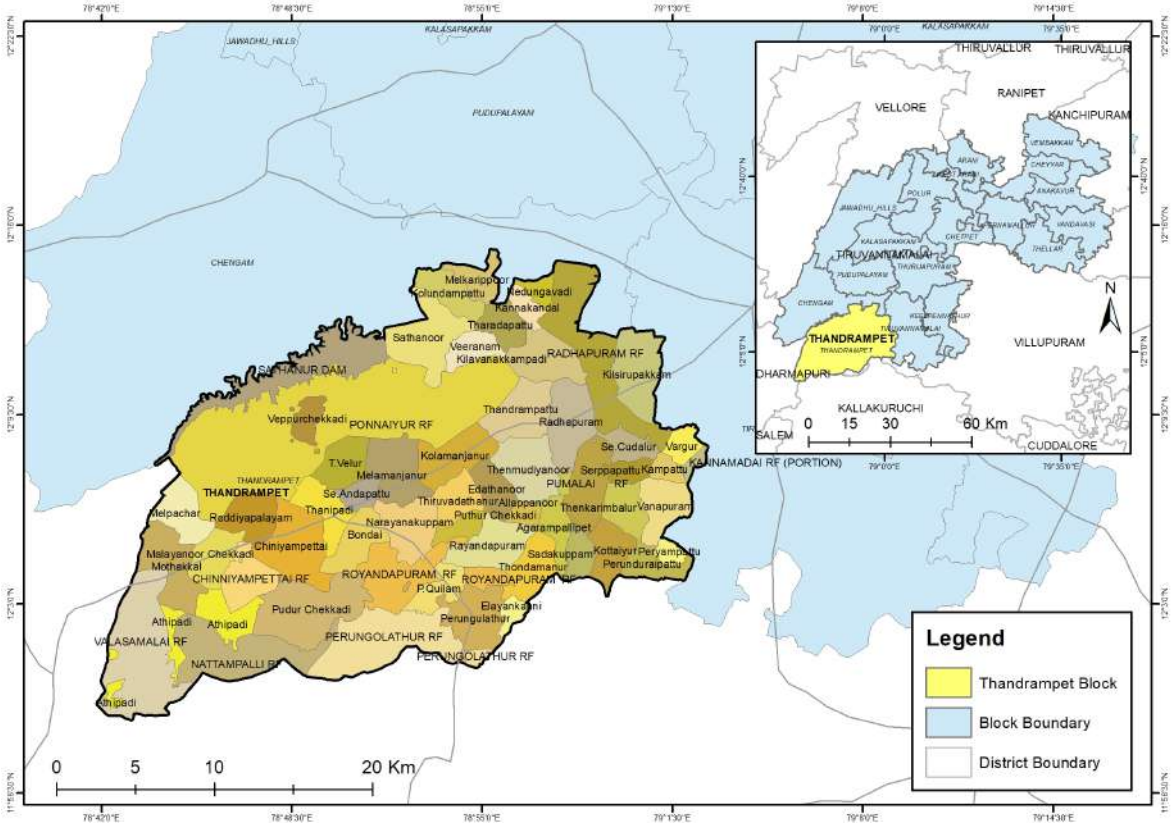


Figure 1.1. Thandarampet Block and it's environ

According to census 2011, the population of Thandrampet Block is 1,78,731. The population density of the Block is 337 per Km^2 which is much lower than the district population density (473 per Km^2) and State's density (555 per Km^2). It is noticed that the increase in the population percentage of 17 % since 2001. The male population is slightly higher (50.18 %) than the female population (49.81%). The proportion of sex ratio is 992 females per 1000 males, which is slightly higher compared to the district average sex-ratio (994 females per 1,000 males). Block literacy rate is comparatively lower (50 %) then the average literacy rate nation (72.98%), whereas females are less literate (43.54%) than male (56.46%). Scheduled Castes and Scheduled Tribes accounted for 23.4% of the total population (Thiruvannamalai district profile 2020).

Economically, Thandrampet is among the low revenue earning blocks of the Tiruvannamalai district. Agriculture and allied activities, are the primary occupation followed by livestock rearing. Paddy is the irrigation predominant crop with 32.2% of the total irrigated area. The other major crops such as ground nut (24%) sugarcane (24%), maize. 79% of rain fed area is cultivated with groundnut. Significant cultivated areas of coconut, banana, turmeric, dry chilli, and ragi cultivation can also be seen.

> The proportion of sex ratio is 977 females per 1000 males, which is slightly lower compared to the district average sex-ratio (994 females per 1,000 males).

> At 69.79%, the average literacy rate of the Block is lower than the national average (72.98%).

Groundnut and pulses are cultivated both under irrigated and rainfed conditions. A livestock count of 60,041 was recorded during 2019-20 in which cattle count is more in number. of 39,665, also Block has 44 milk societies and societies collect 19,139 li of milk per day. The area is traditional enrich with temples and known for two temples, Lord Veera Ragava Perumal Kovil & Veerabathara Swami Kovil.

> 59.76 % of the irrigated area cultivated with paddy.

Thandrampet comes under Aliyar, Kottapattikallar, Musukundanadhi, Pambanar and Varattar, Pambar to Thirukovilur, and Thurinjalar sub basins in Pennaiyar Basin. It has 3 macro watersheds namely Pamban, Thurinjalar and Kallar and 156 micro-watersheds (Figure 1.2).

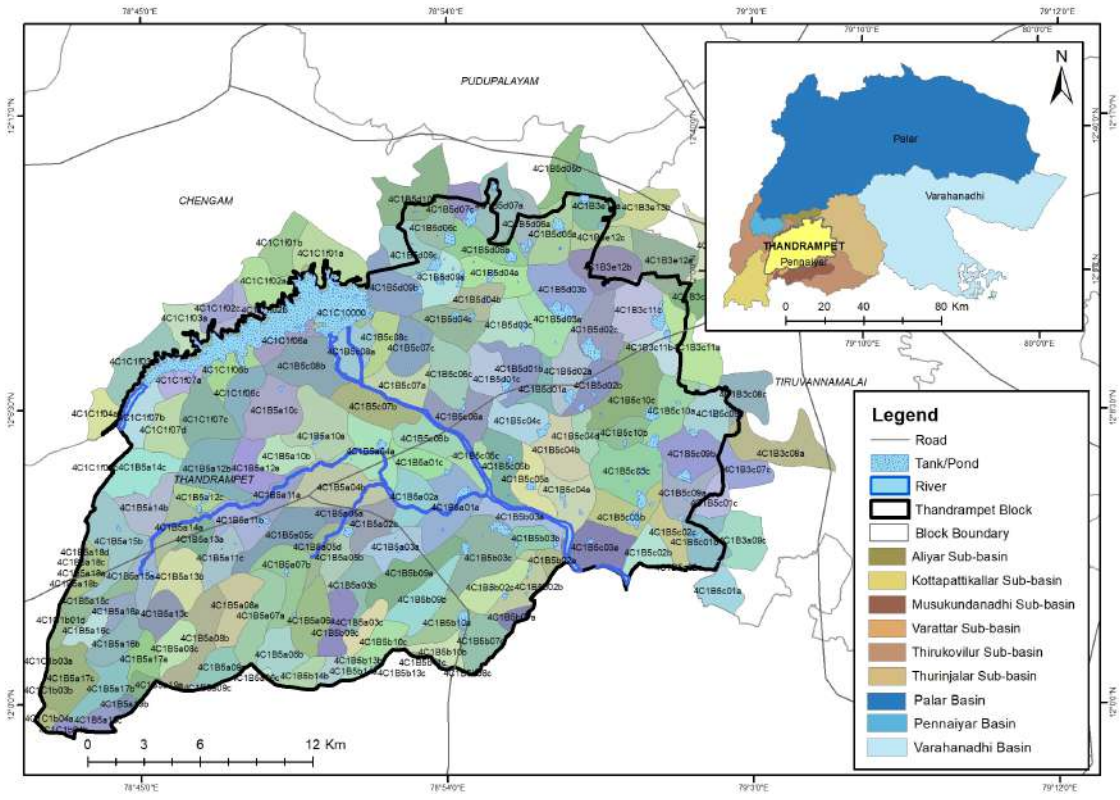


Figure 1.2. Watersheds- Thandarampet Block

Pennaiar and Pambar_Ponnaiyar rivers flowing through the Block. One of the main reservoirs Sathanur Dam is 14 km from Thandrampet. There are 93 traditional waterbodies/tanks in the Block, in which a Radhapuram tank is the largest with an area of 105 ha. Other important tanks are Mudhalaimadai (83 ha), Kilvanakkampadi (81 ha), Puthur Chekkadi (77 ha) and Perungulathur tank (71 ha) (Figure 1.3). The ground water levels in Thandrampet Block is in an over exploited stage.

GROUND WATER LEVEL OF THIS BLOCK

OVER EXPLOITED- › 100%	Thandrampet

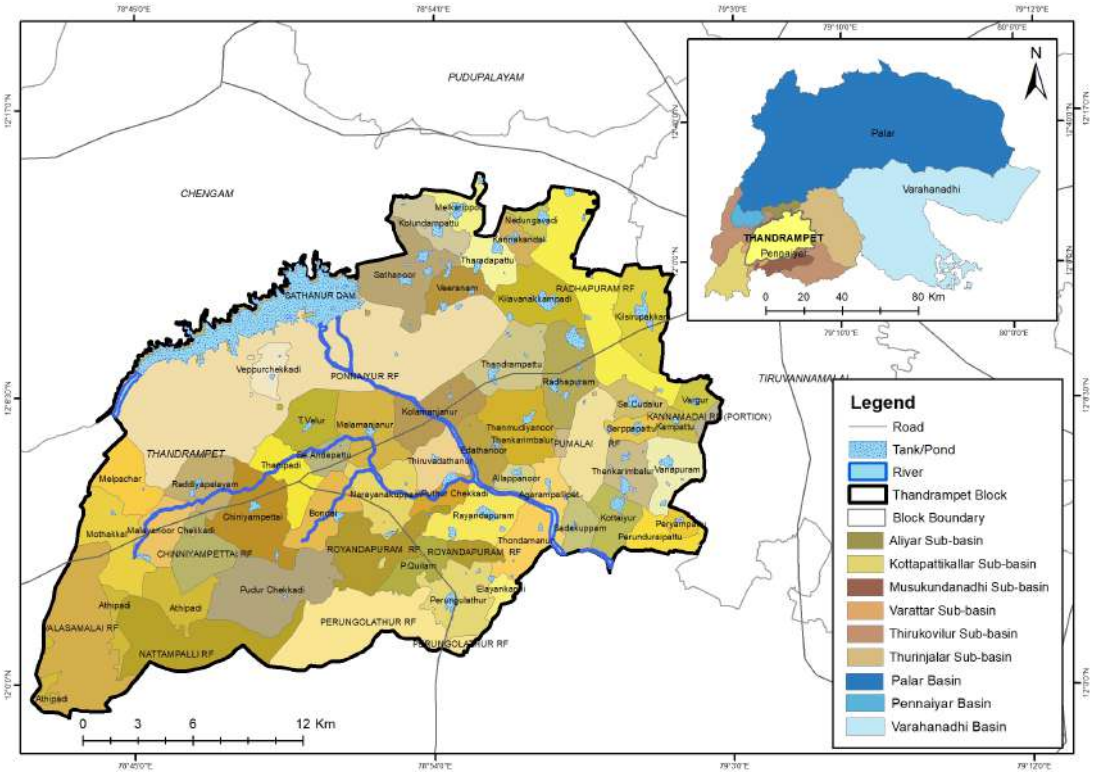
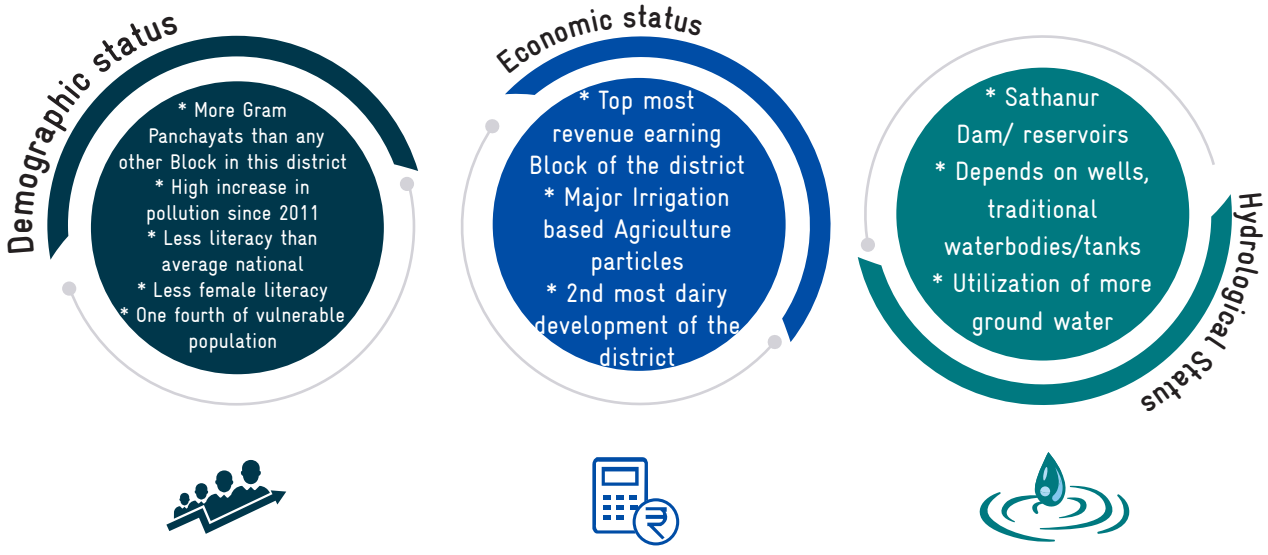


Figure 1.3. Spatial distribution of waterbodies



விண்இன்று பொய்ப்பின் விரிநீர் வியனுலகத்து
உள்நின்று உடற்றும் பசி

குறள் - 13

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

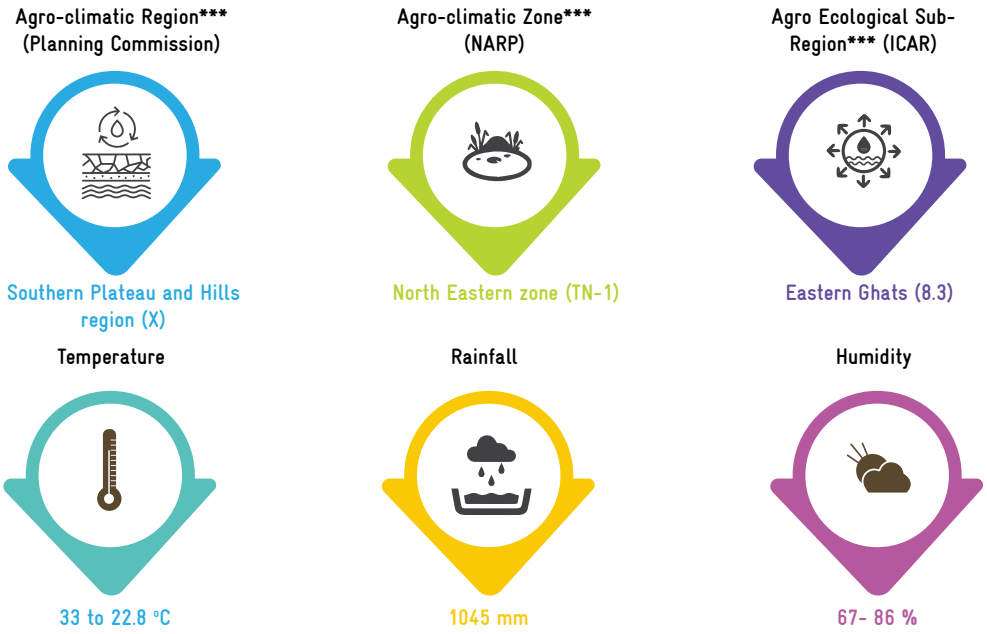
Thirukkural - 13

CHAPTER 2

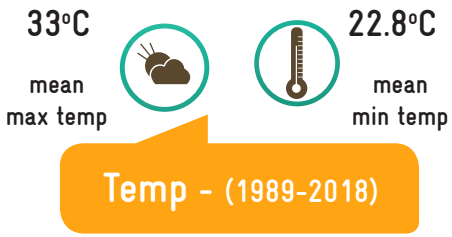
2 CLIMATE AND WATER SECURITY

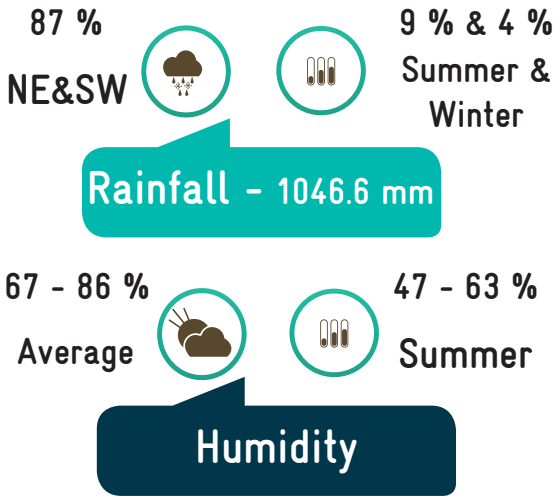
This region has typical tropical climate, witnessing by warm and moist conditions throughout the year. According to agro climatic regional classification of planning commission Block located in the North-Eastern agro-climatic zone of State and Southern Plateau and hills region. The general climate description of this region is given below (Table 1).

TABLE 1. GENERAL CLIMATE DESCRIPTION



The mean maximum temperature is 33°C and mean minimum temperature is 22.8°C during last 30 years (1989-2018) (IMD). In summer months the maximum temperature goes up to 45°C for fewer days. The monthly average temperature characteristic during 2020 are shown in Figure 2.1. June to August Months witnessed the higher temperature comparatively to months of the 2020 year, while the minimum temperature observed in February, March Months.





Normally this region receives major rainfall from North-East Monsoon (NEM) (October to December) and South-West Monsoons (SWM) (June to September). Past records show the annual average rainfall of this region is 1,047 mm (WRIS, GoI). Both North-East and South-West Monsoons contribute nearly 87 % of the annual rainfall in which SWM is slightly stronger. While summer (March to May) rainfall accounts 9 % of the total rainfall and winter (January, February) season has low contribution (4%) to the annual rainfall (Figure 2.2). The average relative humidity is 67- 86 % and during summer it ranges between 47-63 %.

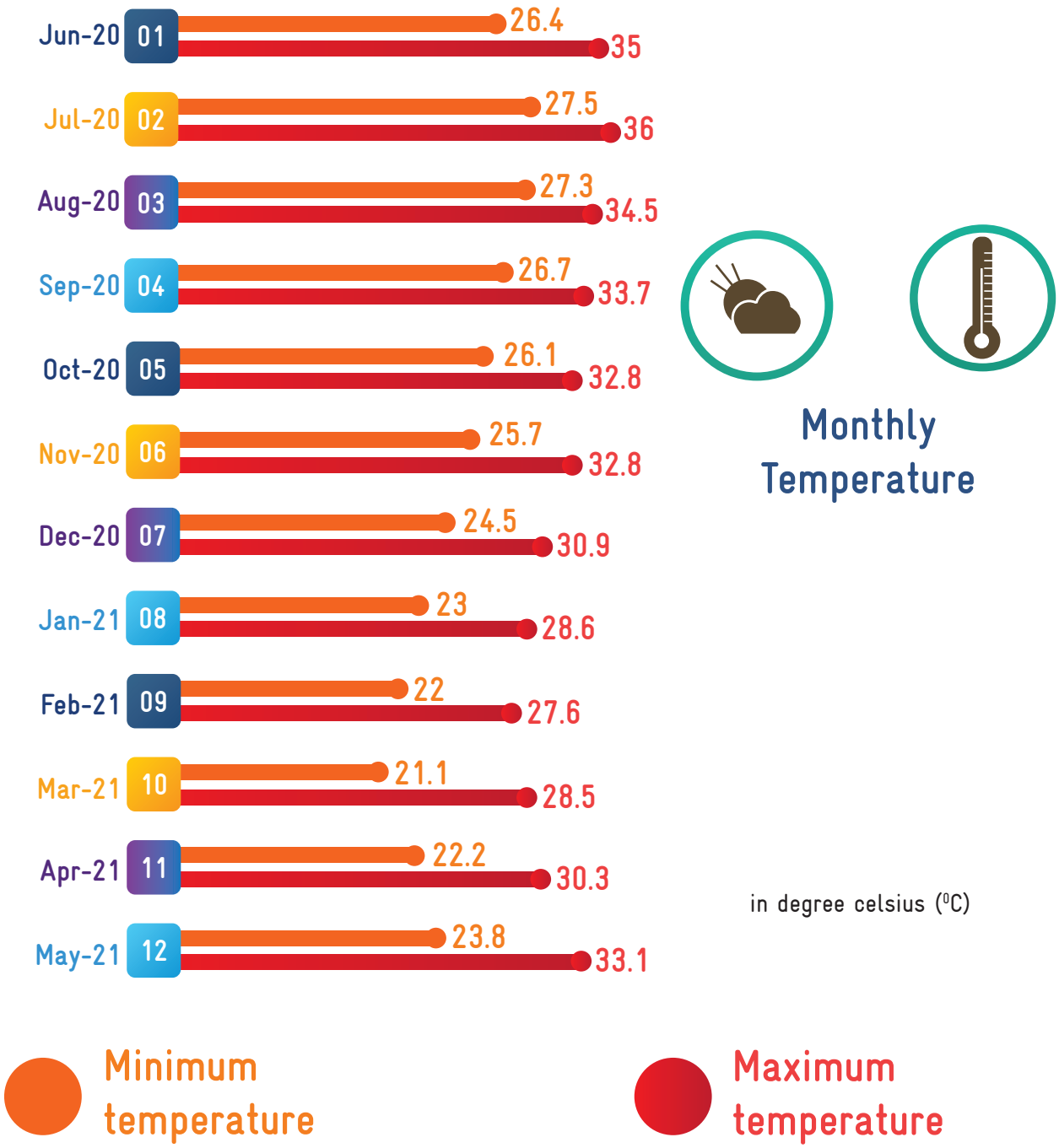


Figure 2.1. Average monthly temperature

The average annual rainfall days are 172 days in which 72 days are from NEM and 82 days are from SWM months. Onset of SWM rainfall starts in the 1st week of June and cessation would be in the 1st week of October. Onset of NEM rainfall starts in the 2nd week of October and cessation would be in the 4th week of December. Though the number of rainy days is slightly lesser than SWM, the intensity is more in NEM.

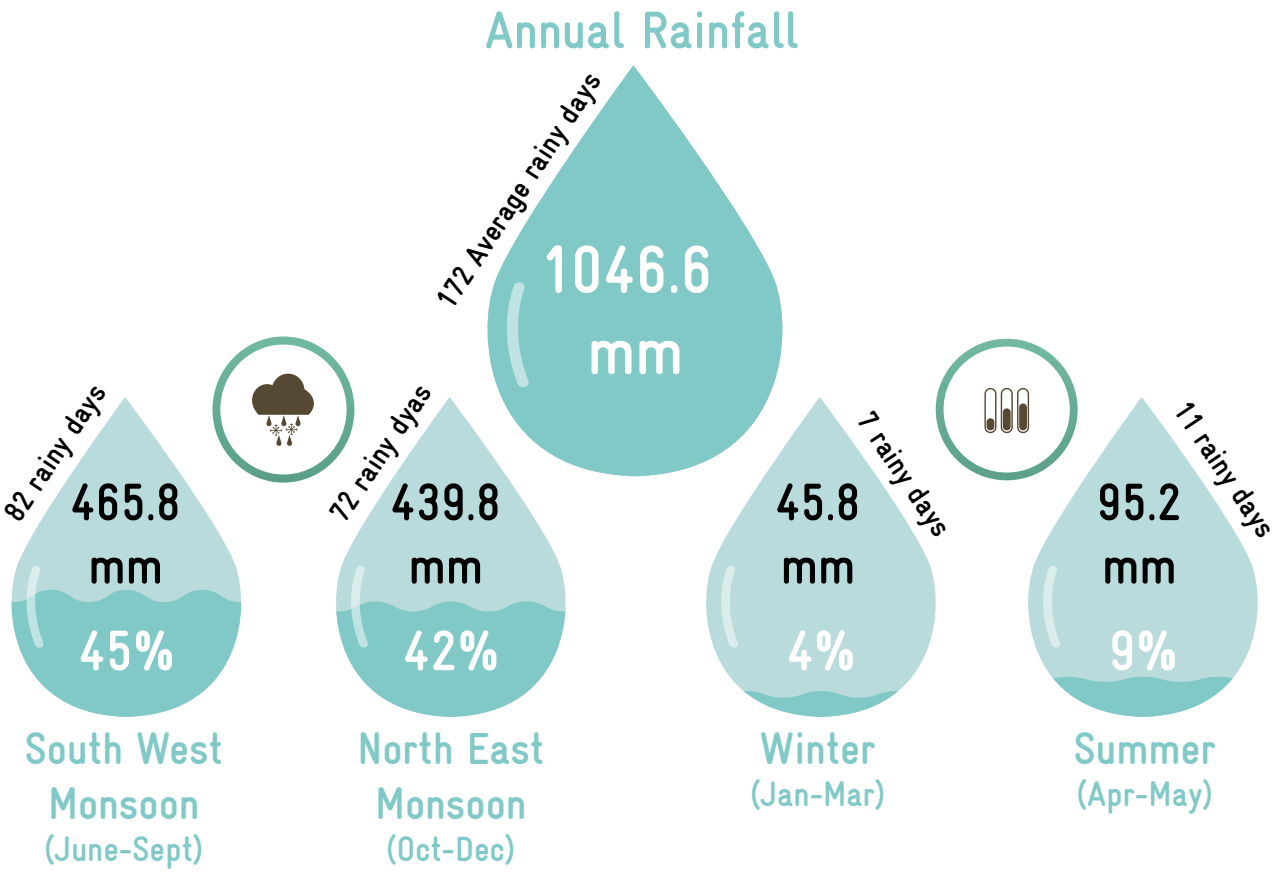


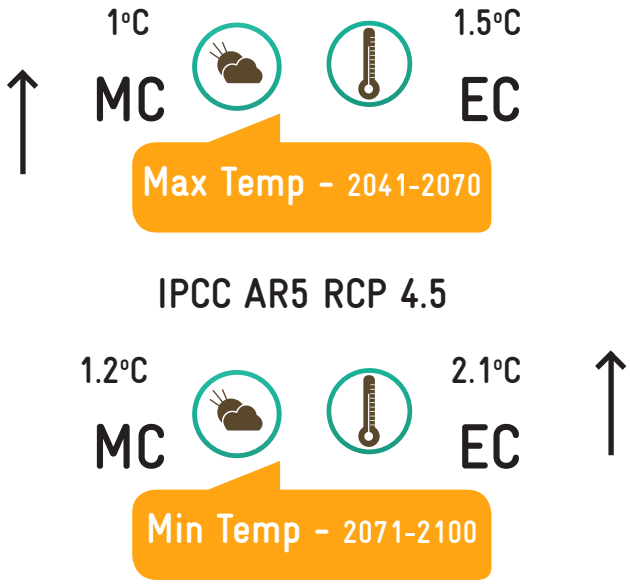
Figure 2.2. Season-wise distribution of annual rainfall

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 an increase in maximum and minimum temperature of 1.2^{0}C and 0.5^{0}C was observed during 1951 to 2015 (IMD). The rainfall variability is also well observed. During 1951 to 2015, there were 15 excess rainfall years (above normal rainfall) and 15 deficient rainfall years (below normal rainfall) recorded. The consecutive excess and deficient rainfall leads to rainfall variability and its extremities. Since this region is heavily dependent on monsoon rains, it is prone to droughts when the monsoons fail. As rainfall is the major source for determining water storage, existing water resources such as rivers, dams and 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 outlines the climate change will increase in all regions of the globe over the coming decades and that with 1.5^{0}C global warming, there will be increasing heat waves, long warm seasons, and shorter cold seasons – which will become more intense at 2^{0}C of warming.

Climate projection based on global climate models indicated that there would be 1°C increase in maximum temperature in mid-century (MC) period (2041-2070) and 1.5°C 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 1.2°C and 2.1°C during MC and EC periods. Average annual rainfall for IPCC AR5 RCP4.5 scenarios is projected to increase about 13 % towards MC and increase by about 21 % towards EC period.



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

* surface and ground water availability
* river flow
* water quality
* soil moisture
* evapo-transpiration

* 1.2°C increase in maximum temperature during 1951-2015
* 0.5°C increase in minimum temperature during 1951-2015
* 1°C increase in max temp during 2041-2070 (RCP4.5)
* 1.5°C increase in max temp during 2071-2100 (RCP 4.5)

As a result, these impacts pose severe risks 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 season's makes river basins more vulnerable. This district experiences climate hazards in the past such as floods, drought and heat waves.

* Flood
* Drought
* Heat waves

Flood

Being situated approximately 100 km from Bay of Bengal, this region experiences heavy rain and flood during deep depressions/cyclones forms in the Bay of Bengal. In recent decades, all parts were severely affected during 2005, 2010, 2015 heavy rainfall events and Thane (2011) and Vardah (2016) cyclones. State Disaster Management Authority, Government of Tamil Nadu identified 75 locations of Tiruvannamalai district as flood vulnerability spots. Out of this 6 GPs in Thandarampet Block are moderately vulnerable to floods.

Drought

Low rainfall coupled with the erratic behavior of the monsoon in the state makes Tamil Nadu the most vulnerable to drought. This district is coming under drought vulnerable area when received less than 40% of normal rainfall and experienced frequent drought in the past years particularly in the year 2003, 2009. But severe drought is experienced in the year 2016- 2017. All parts are affected by drought and its consequences; there are large area crop losses and drinking water scarcity. In Thandarampet Block, all GP's are prone to drought.

Heat Wave

A heat wave is a period of abnormal high temperatures, more than the normal maximum temperatu-re that occurs during the (hot weather) summer season. Heat waves typically occur between March and June. The extreme temperatures and resultant atmospheric conditions adversely affect people living in these regions as they cause physiological stress, sometimes resulting in death. Normally, all parts of this district witnesses heat waves. All GPs in Thandarampet Block are prone to heatwaves.

2.2 WASCA CLIMATE VULNERABILITY INDICATORS

During 2019, 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

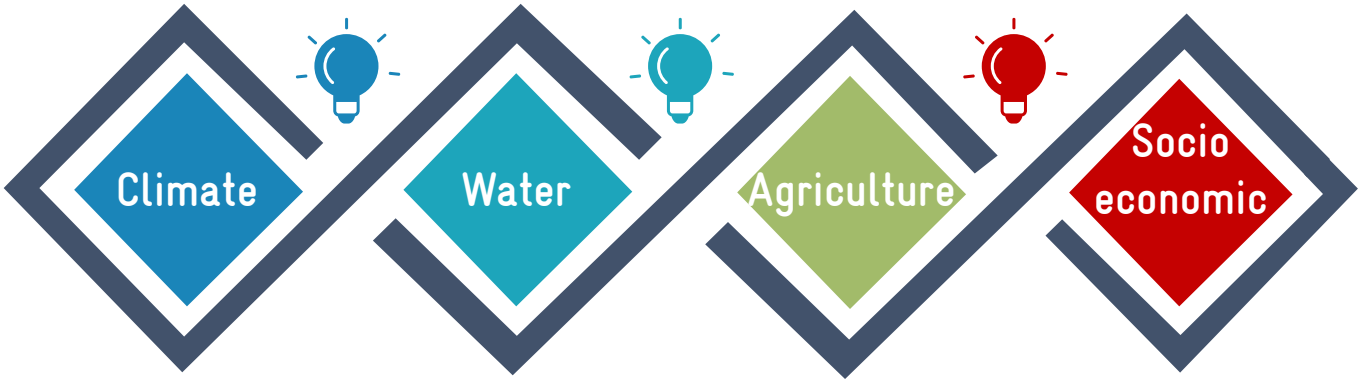
CWRM	Indicators of Rural water security vulnerability	Indicators label	Linked SDG
Climate	Changes in max temperature (^{O}C)	C1	Goal 13
	Changes in min temperature (^{O}C)	C2	
	Changes in rainfall (%)	C3	
	Excess rainfall years	C4	
	Deficient rainfall years	C5	
Water	Ground water extraction (%)	W1	Goal 6
	Ground water Recharge (m^3)	W2	
	Surface water availability (mm)	W3	
	Water gap (mcm)	W4	
	% of contamination	W5	
Agriculture	Rainfed area (%)	A1	Goal 15
	Cropping intensity (%)	A2	Goal 2
	Soil moisture (Kg/m^2)	A3	Goal 15
	Evapo-transpiration (Kg/m^2)	A4	
Socio-economic	Rural proportion (%)	S1	Goal 2
	Multidimensional poverty index	S2	Goal 1
	Source of drinking water within premises in rural (%)	S3	Goal 6
	Marginal farmers land holdings (%)	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, Ramanathapuram and Tiruvannamalai 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 COMPREHENSIVE 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 socio- economic are further explored at GP level through Composite Water Resource Management (CWRM) approach by GIZ, Department of Rural Development (MGNREGS), National Water Mission, Tamil Nadu along with technical partners of WASCA project namely jointly MS Swaminathan Research Foundation (MSSRF), 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
Changes in temperature, rainfall and its extremities	Watershed, micro-watershed, and drainage network, traditional waterbodies, canal networks, irrigation facilities, catchments area wise available runoff, ground water and surface water utilization, ground water status, ground water availability, evapo-transpiration losses, and water demand for drinking, agriculture and livestock	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 MGNREGA 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

CONVERGENCE OF WASCA AND MAHATMA GANDHI NREGA

3 CONVERGENCE OF WASCA AND MAHATMA GANDHI NREGA

GIZ has evolved a GP-based CWRM planning approach for facilitating convergent planning under MGNREGA for WASCA. This is as per the recommendations of National Level Workshop organized in February 2020, by MoRD, MoJS, GIZ, along with State rural development department of WASCA. While developing the framework, inputs from all relevant stakeholders were considered including communities, public institutions, civil society, research organizations, and private agencies. The basis on which GIS based planning was developed for all GPs is the Annual Master Circular issued during 2021-22 and the Annual Planning Circular issued in September 2020 by MoRD.

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 & allied activities and livelihood related works on individual lands leading to sustainable livelihoods as well as provisioning of livestock shelters for the individual households. The NRM related works under MGNREGS will be taken up in convergence with other programmes such as 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 at farm level. PMKSY aims to achieve a high degree of effective water availability and use for Indian farms especially in water scarce regions. IWMP, Mission Water Conservation, Har Khetko Pani and Per Drop More Crop are the four pillars of PMKSY. Technical inputs for planning is to be drawn from the technical resources available in the district under MGNREGS, 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, and Water Resource Department and the Agriculture Department. The technical inputs relating to Excavation, Renovation & Modernization (ERM) of waterbodies may also be sought from the regional office of Central Ground Water Commission (CWC). The GPs will keep in perspective the Macro and Micro-watersheds of 500-100 ha that comprises of 1-10 GPs, while deliberating and finalizing prioritization of shelf of projects.

Special focus is given to vulnerable households and communities 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 playing a significant role in improving the livelihood conditions of the vulnerable people. 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.

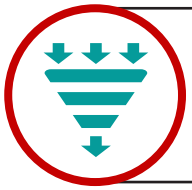
262 Total Kinds of works in Schedule-I of Mahatma Gandhi NREGA

182 Kinds of works relate to NRM alone

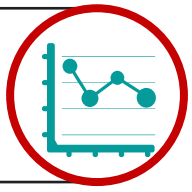
164 Kinds of works related to Agriculture & allied works

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 are related to NRM alone. Among NRM works, 85 activities focus on water conservation and harvesting while 164 works are related to Agriculture and allied works. As MGNREGA activities benefit both the community and individual`s levels. This should typically change 'relief works mode' to an integrated NRM perspective. Planned and systematic development of land and harnessing of rain-water 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 shall be taken from National Remote Sensing Centre, ISRO for identification and holistic planning of permissible works in the watersheds using web-GIS platform (Bhuvan Geoportal). The GIS (Geographical Information System) plans shall be comprehensive ones incorporating all eligible works under Mahatma Gandhi NREGS and the same shall be implemented in a phased manner. Section 22 of Annual Master Circular provides the key steps for GIS based planning.



The Geographical Information System (GIS) plans shall be comprehensive ones incorporating all eligible works under Mahatma Gandhi NREGS and the same shall be implemented in a phased manner.

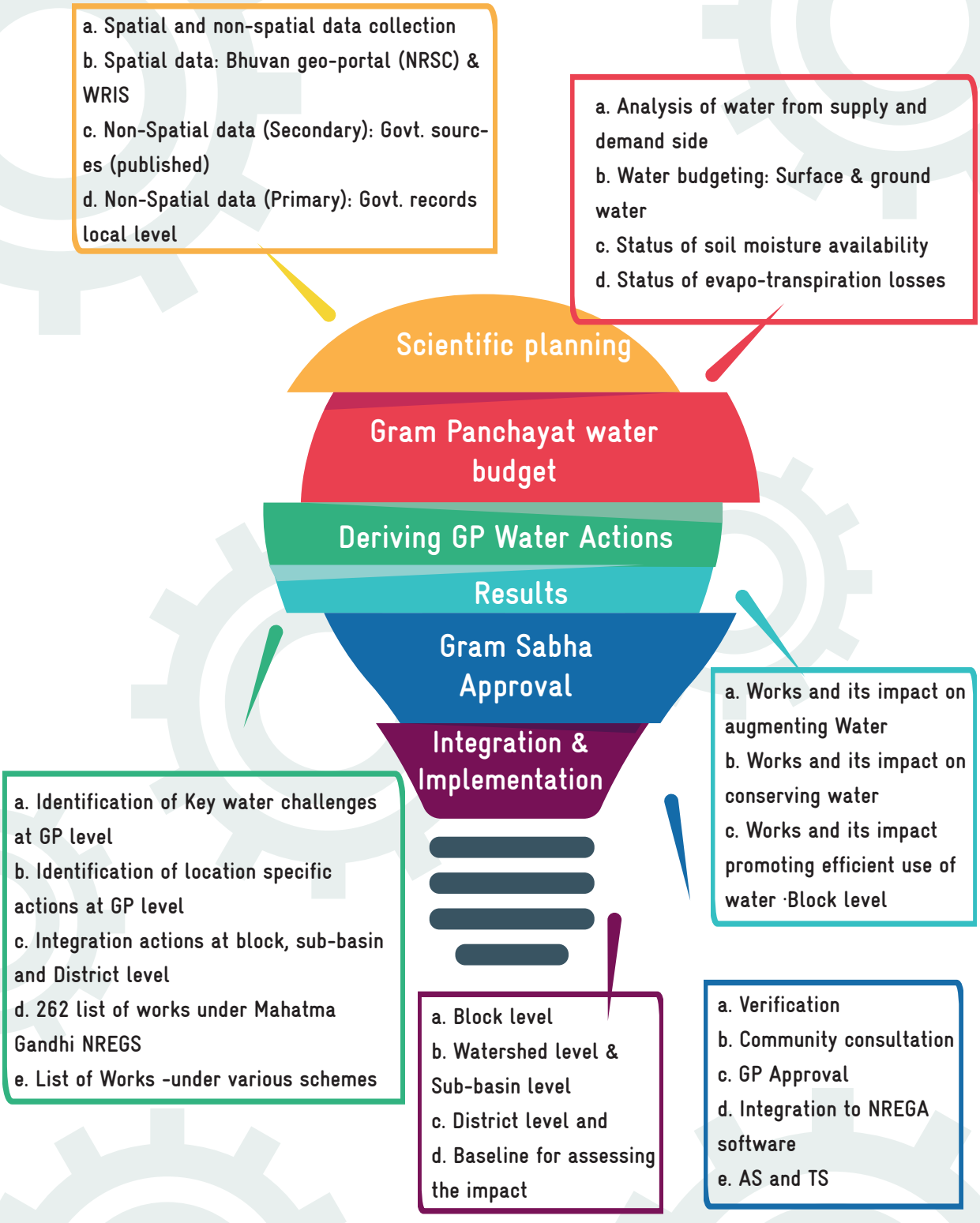


3.1 COMPOSITE WATER RESOURCE MANAGEMENT APPROACH FOR WASCA

CWRM approach for WASCA uses simple scientific tools that can help Block or GP level officer to organize, analyze and prepare a developmental draft plan for participatory discussion at GP level. This approach involves analyzing key water challenges using both non-spatial and geo-spatial data in GIS, coupled with extensive ground truth verification. The non-spatial data includes the 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 GP 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, evapo-transpiration

and soil moisture are used to understand the climate related issues. The next step is to assess land use, watersheds, drainage networks and surface runoff, existing water supply and storage systems, water management for the key sectors and water demand and prepare the water budget for the GP (Box 1).

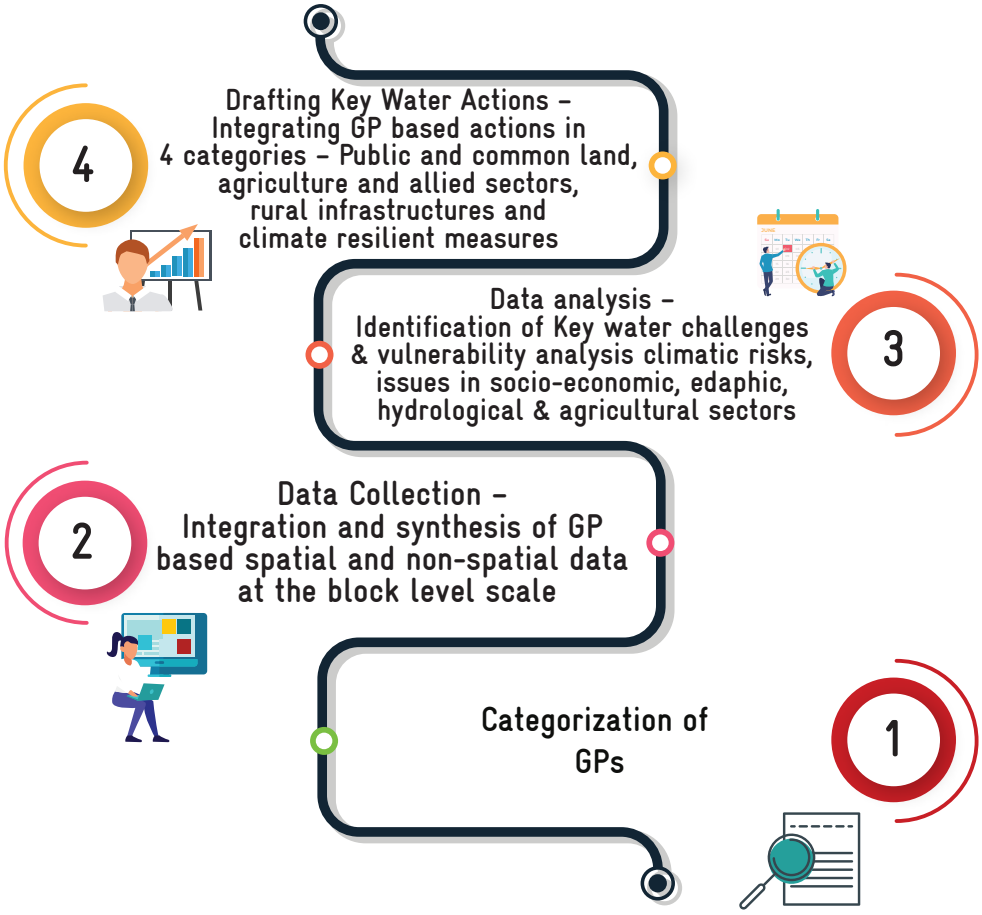
BOX 1. MAJOR COMPONENTS INVOLVE IN CWRM PLANNING WORKOUTS



Such a comprehensive analysis helps in preparing the water budget integrating ground water, surface water through runoff from rainfall, evapo-transpiration and soil moisture which further helps to identify potential areas of action to augment the water resources in public /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, to serve as shelf of projects. These shelves of projects are again mapped with the available schemes and financial plans for execution, adopting convergence and inter-sectoral principles. The district level technical and administrative teams are involved in all the processes of planning, execution, 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), and convergence are some of the key aspects that needs attention for a tangible outcome in both NRM as well as livelihoods.

The District WASCA resource centres 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 into 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 by National, State, and District Level Steering Committees headed by Additional Chief Secretary RD&PR and District collector respectively in the project area of Tamil Nadu government as a comprehensive and climate adapted planning approach for water security under Mahatma Gandhi NREGS and National Water Mission.

BOX 2. STAGES OF CWRM PLANNING PROCESS

PRE-PLANNING STAGE

1. Categorizing GPs for planning as per Mahatma Gandhi NREGS guidelines
2. Human resource and capacity building at administrative levels for planning facilitation
3. Capacity Building of State, District level officers towards implementing the Mahatma Gandhi NREGS
4. Building 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 as per DLSC and SLSC

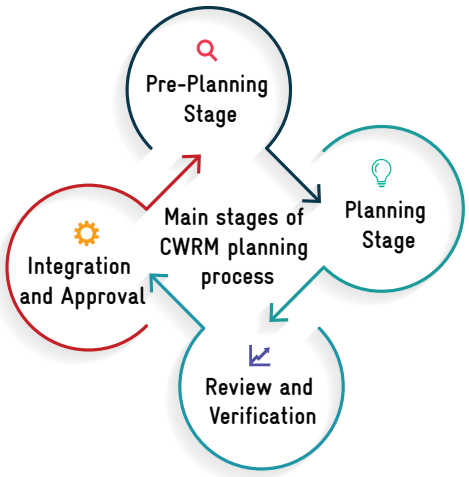
PLANNING STAGE

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 (as per CWRMP guidelines)
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

FOUR LEVELS OF CWRM PLANNING UNDER WASCA

1. DEVELOPING PLANS AT LOWEST ADMINISTRATIVE LEVEL: GP LEVEL PLANS

2. INTEGRATING GP LEVEL PLANS AT BLOCK LEVEL



FOUR LEVELS OF CWRM PLANNING UNDER WASCA

3. INTEGRATING GP PLANS AT WATERSHED AND SUB-BASIN (CATCHMENT) LEVEL ON NRM

4. INTEGRATING GP PLANS TO DEVELOP WASCA DISTRICTS CWRM PLANS

INTEGRATION AND APPROVAL

1. Preparation of Integrated plans (at Block, Watershed levels)
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

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 NRGES
4. Integrating verified, approved works into NREGA soft (MORD NIC Portal) for mainstreaming WASCA
5. Regular review on progress at each level

3.2 CATEGORIZATION OF GPs

The CWRM uses both spatial and non-spatial data for developing GP level plans. Most of the non-spatial data are available at the 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). Details of categorization of GPs in Thandarampet Block is tabulated in Table 4.

TABLE 4. CATEGORIZATION OF THANDARAMPET BLOCK GPs

NUMBER OF GP	GP TYPE	NAME OF THE PANCHAYAT
38	GP and revenue village data and boundary match (Type-I)	Agarampallipattu, Chinniyampettai, Allappanur, Bondai, Edathanur, Kambattu, Kanakkandal, Keelvanakkambadi, Malayanoorchekkadi, Kolundampattu, Melamanjanur, Melkaripur, Nedungavadi, Perayampattu, Puthurchekkadi, Radhapuram, Reddiapalayam, Royandapuram, Sathanur, Se.Andapattu, Se.Gudalur, Thanipadi, Tharadapattu, Thenkarimbalur, Thenmudiyanur, Thiruvadathanur, Thondamanur, Varagur, Veeranam, Veppurchekkadi, Velur T
2	Having more than one GPs in one Revenue Village (Type-II)	Perungolathur, Elayankannai, P Quilam
13	One GP is falling under more than Type 1 one Revenue Village (Type-III)	Athipadi, Keelsirupakkam, Kolamanjanoor, Kottaiyur, Melpasar, Mothakkal, Narayankuppam, Pudurchekkdi, Sadakuppam, Serpattu, Thandarampet, Vanapuram, Perunduraipattu

3.3 DATA COLLECTION – SPATIAL & NON SPATIAL

The CWRM planning framework has four vulnerability areas, integrating both non-spatial and spatial parameters with 18 indicators based on the IWRM and climate adaptation principles. The planning process comprises 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 datasets are supportive evidence to understand the existing conditions and issues in the area/ region. Considering the spatial datasets such as morphology, ground water potential, slope terrain, erosion, Land Use and Land Cover (LULC), waste land, salt and erosion affected lands, drainage lines, and slope will play a significant role in contributing to preparation of the most appropriate and suitable science-based decision plans towards holistic development of the region, emphasized with the water actions. The use of different spatial data to assess and confirm the key water challenges along with the non-spatial data is discussed 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 based analysis is to understand the hydrological and administrative boundaries. This aids in understanding the profile and condition of the watershed at macro or micro level 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 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

Over all data from 99 parameters were collected, in which 13 parameters are from primary source and collected from GP administrative units by GPs officers, 65 parameters are secondary source and collected from Govt. sources and authentic websites and the remaining 21 requisite parameters for water budgeting and grey water were calculated using standards/suitable methods or formulas. CWRM parameters and its data sources is attached in the Annexure 3.1 to 3.3. The methods, and formulas used for water budgeting is attached in Annexure 3.4 and for grey water generation in Annexure 3.5.

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. Current data at the Block level is not available at present. Hence, previous hydro-meteorological disasters are considered to denote Block's change in climate (temperature, rainfall) extremities and its risks, which was recorded by State Disaster Management Agency, 2020 (Table 5).

TABLE 5. CLIMATE RISKS AND VULNERABLE GP'S

Flood	Drought	Heat Wave
Thiruvadathanur, Edathanur, Agarampallipattu, Puthur chekkadi, Thondamanur, Royandapuram	All GPs	All GPs

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 is 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 domestic, agriculture and livestock are collected from authorized open sources and analyzed at Block level.

3.5.1 SPATIAL DATA

Spatial data of geomorphology, lineament, terrain, slope drainage network, surface waterbodies, ground water potential, and watershed were collected to understand the site-specific problems and together with non-spatial data, take decisions to draft scientific key water actions. Available Bhuvan source thematic spatial maps/website view was referred to understand, interpret and analyze the spatial parameters of the Block.

3.5.1.1 Geomorphology: Geomorphology deals with the scientific study of "landforms and landscapes, including their description, type, and genesis". Landform is the end product resulting from the interactions of the natural surface genesis and the type of rock. The scope of geomorphology was further expended with landform maps, which are widely used in various fields of hydrology, pedology, geoscience, urban and regional planning etc. Broadly, Thandarampet Block is engrossed with structural, denudational, and fluvial origin landform units (Figure 3.1). Most of GPs engrossed with denudational origin pediment or pediplain complex. Water flow influenced fluvial landform of banks of River and waterbodies area is noticed. Fundamental information of landform by its units will act as critical input in the identification of suitable sites for NRM activates under CWRM plan preparation.

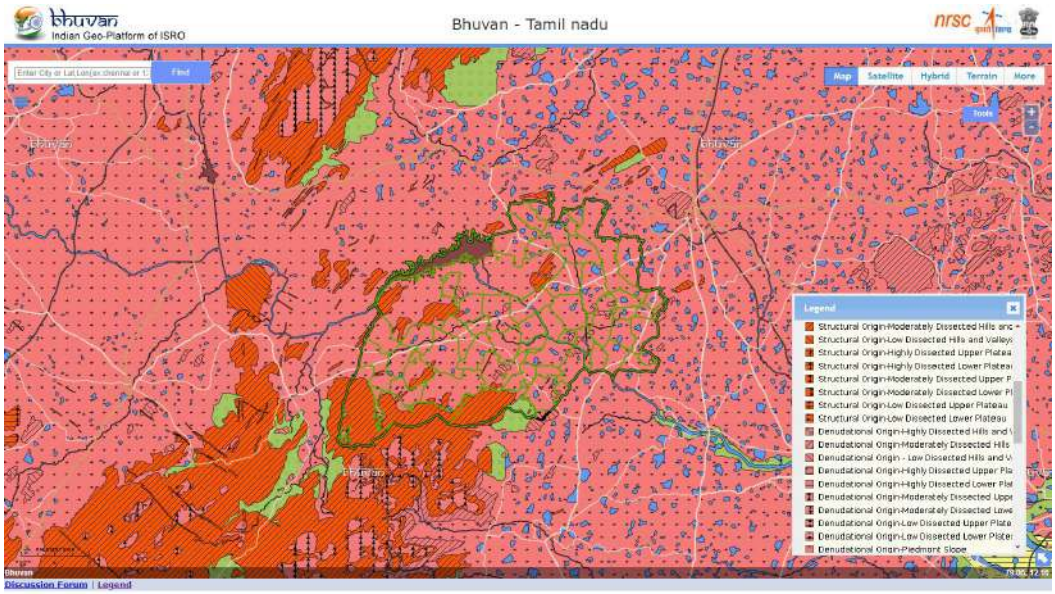


Figure 3.1. Geomorphology map

Landform unit	Area in %	Gram Panchayat
Structural origin- moderately dissected hills and valleys		
	20%	Puduchekkadi
Denudational origin Pediment Pediplain complex		
	100%	All GPs

3.5.1.2 Lineament: The lineament is also a lithological unit which reveals the hidden architecture of rock basement, representation of an underlying geological structure such as a fault, fracture (Figure 3.2). Lineament plays a significant role in identification of ground water and oil exploration sources. Lineament is represented with linear feature where two different landform converges or diverges. This site allows water to percolate at a high rate. GP wise lineament type is illustrated in the below table. These observations are widely used to locate points of high-water flow especially in groundwater exploration.

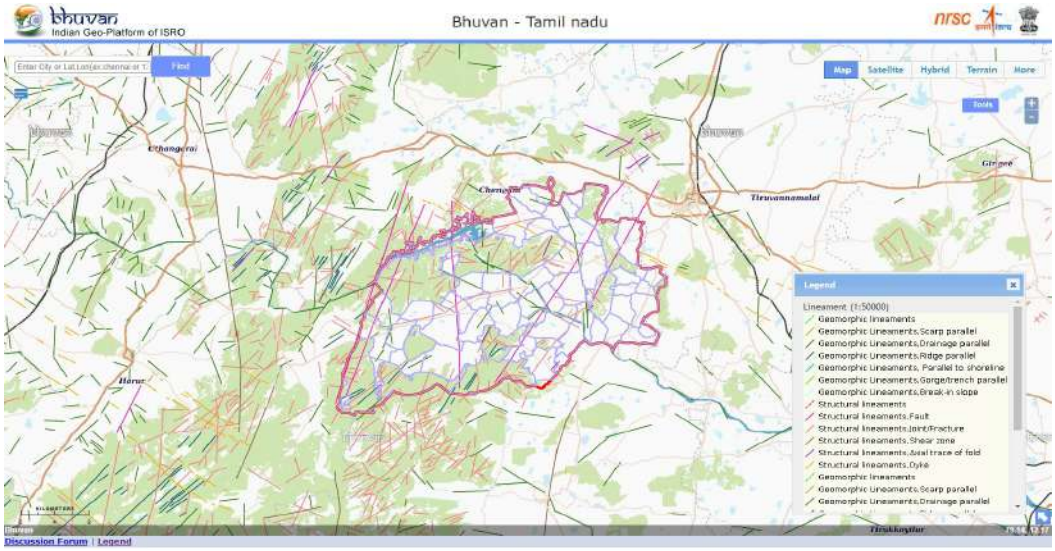


Figure 3.2. Lineament map

Lineament type	Gram Panchayat
Structural lineaments, Fault	Chinnayampettai, Edathanur, Keelva-nakambadi, Melpasar, Mothakal, Puduchekkadi, Thandrampattu, Thanipadi, Thenmudiyanur
Geomorphic lineaments, Drainage parallel	Athipadi, Bondai, Mal-yanoorchekkadi, Melpasar, P.Quilam, Puduchekkadi, Thandrampaet, Tharadapattu, Tharayank-uppam, Thiruvadathanur, Velur T
Structural lineaments, Joint/ Fracture	Melmanjanoor, Sathanur

3.5.1.3 Terrain: The terrain map is a product of Digital Elevation Model (DEM), which gives information related to elevation from above sea level. A terrain of same range is noticed in the Block area at the available scale map. This map will be useful in identification of better suitable sites for proposing the water and soil conservation related activities. Thandarampet Block terrain map is shown in Figure 3.3.

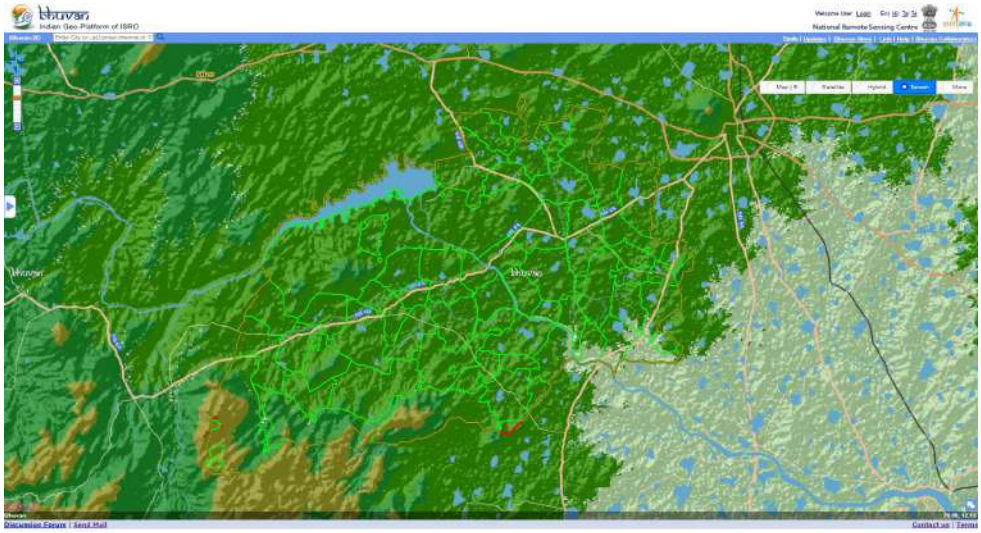


Figure 3.3. Terrain map

3.5.1.4 Contour map: The contour is the most important element in the cartographic representation of the terrain and only one which determines relief forms such as valleys and hills, and the steepness or gentleness of slopes in geometrically. A contour map is illustrated with contour lines which shows the elevation of that earth surface from above sea level. The constant vertical distance between two consecutive contours, i.e. their height difference, is called contour interval. Density of the contour lines are related to the geomorphologic units. The mountain/ hilly areas are witnessed in high density, same is noticed in the Block. The contour map also plays a vital role in delineation of watershed & its units, used in planning and identifying the recharge structures, farm ponds and construction of grey water drain network etc., (Figure 3.4).

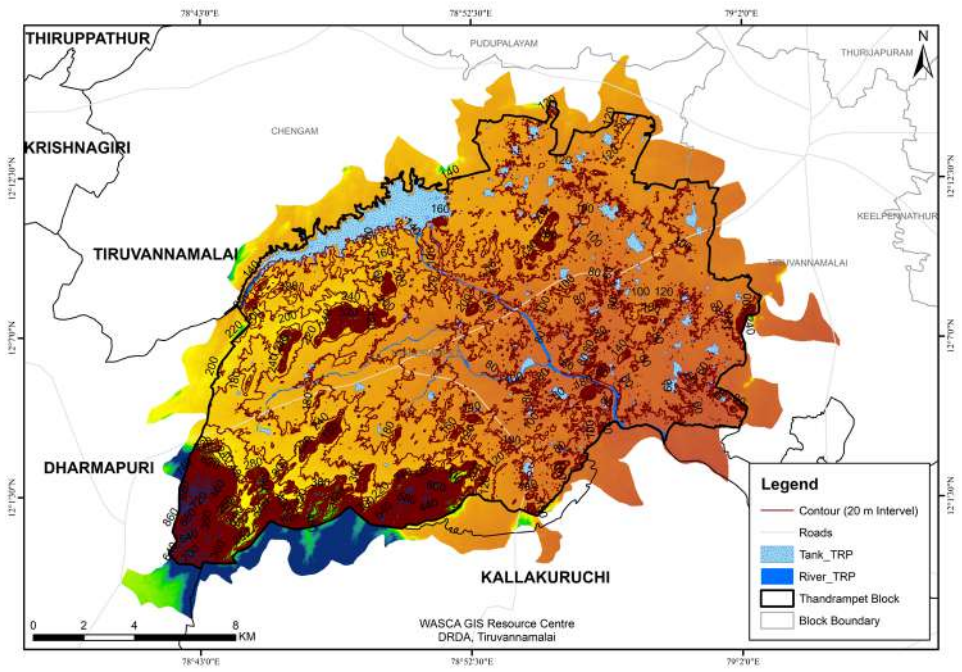


Figure 3.4. Contour map

3.5.1.5 Slope: The average slope of a terrain feature is calculated from contour lines on a topology map or DEM. Slope is typically expressed in percentage, angle, or in ratio. Slope map illustrates the measure of steepness or the degree of inclination of a feature relative to the horizontal plane. It is noticed that with respect to the landform units the slope varies in the Block (Figure 3.5). Flat and very flat slope ranges were noticed in the

Block, GP wise detailed is shown in the below illustration. Slope information plays a significant role in identification of soil eroded sites, depth profiles, also used in analyzing / proposing the soil conservation measures such as check dam, bunding land development farm ponds etc.

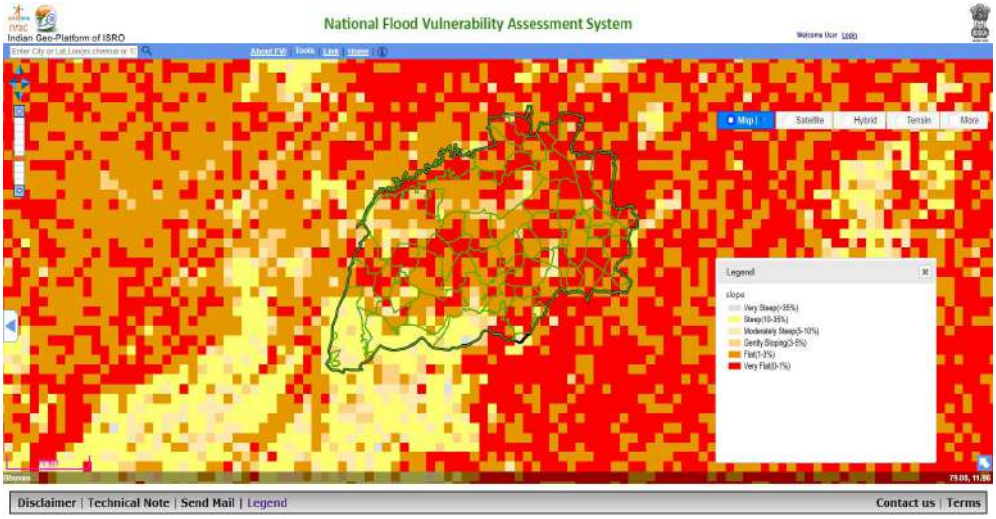


Figure 3.5. Slope map

Slope range	Area in %	Gram Panchayat
Very Flat (0-1%)	90%	Keelvanakambadi, Kilsirupakkam, Kolunthampattu, Malayanoorchekkadi, Melkaripur, Mothakal, Perungolathur, Se. Andapattu, Thenkarimbalur, Thenmudiyanur, Veeranam
Flat (1-3%)	57%	Chinnayampettai, Edathanur, Kolamanjanoor, Puduchekkadi, Sathanur - 60%, Melamajanoor, Thiruvadathanur - 50%
Steep (10-35%)	10%	Elayankanni, Puduchekkadi

3.5.1.6 Drainage Network : The drainage network pattern of a region is particularly dependent on the lithological characteristics, regional slope, structural control, climate condition etc. Dendritic or tree pattern drainage system was observed in the Thandarampet Block. High dense network in North-West GPs, most of GPs with moderate high and North-East two GPs with moderate low dense drainage network is witnessed

(Figure 3.6). The dendritic pattern is characterized by irregular branching of tributary streams in all directions. Drainage network is referred to while identifying suitable sites for soil and water conservation measurements such as dams, ponds, bunding, restoration of gullied region etc.

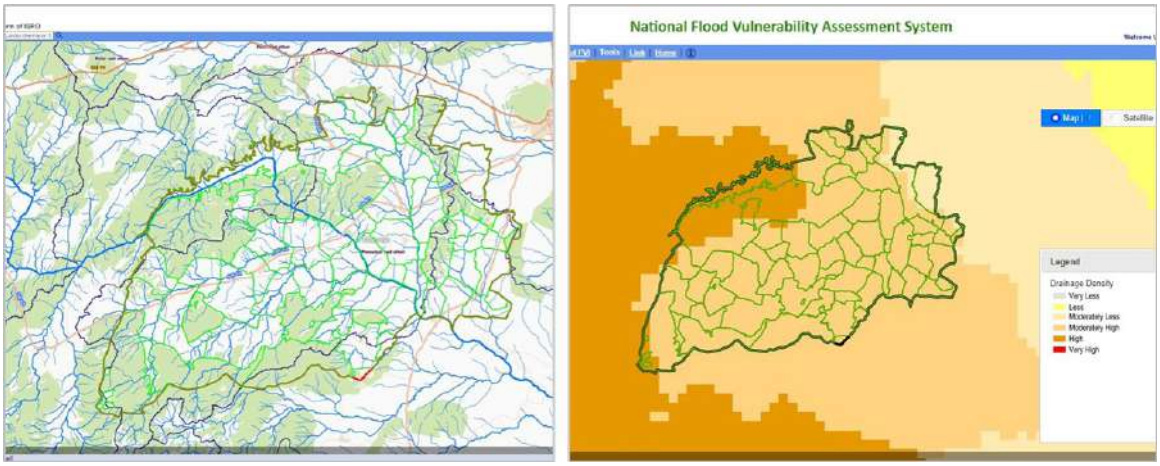


Figure 3.6. Drainage network and density map

3.5.1.7 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. Also, in achieving a better sustainability in development mainly NRM at the grass root level, watersheds are recognized as viable and effective management units and adopted in most of the developmental programmes such as IWMP, MGNREGA etc. A watershed is the area/region of land where all of the water that falls in it and drains off goes into the common outlet. Thandarampet Block watershed map is illustrated in Figure 3.7. Watershed is used for the interventions based on Ridge to Valley (R2V) concept and sequencing the plan accordingly. R2V approach intends to conserve each drop of rain water from ridge to a reasonable extent and it ensures the better surface water flow management also aids in strengthening the durability of land, soil and water conservation structures of the downstream.

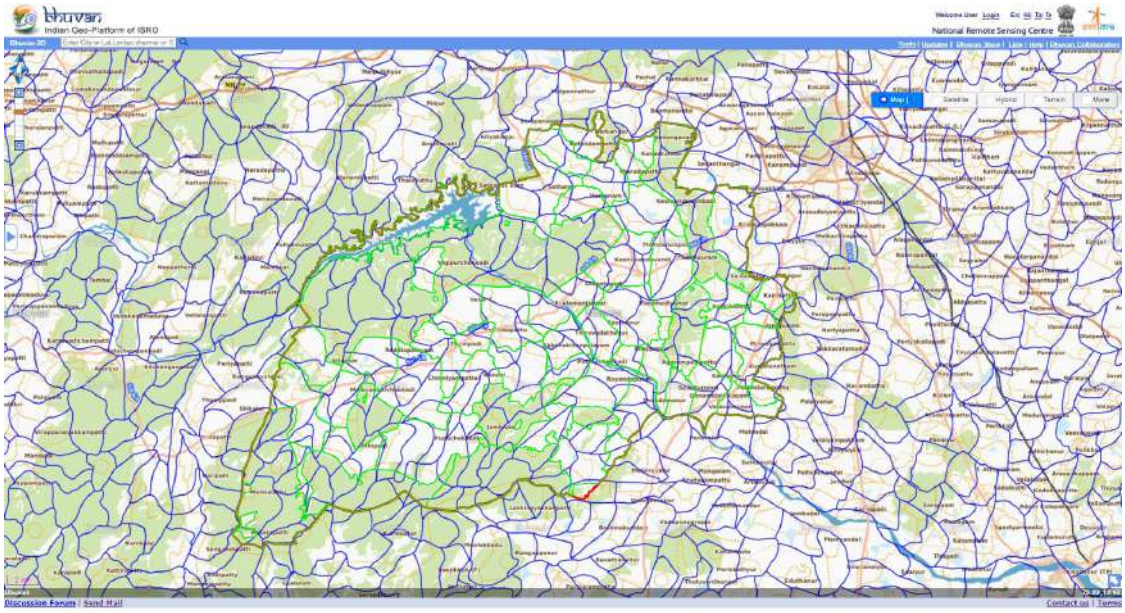


Figure 3.7. Watershed map

3.5.1.8 Ground water perspectives: Ground water is one of the important natural resources in semi-arid region like Thandarampet Block. The ground water perspectives map is the integration of lithology, geomorphology, geological structures, hydro geomorphic datasets, which provides the required information related to ground water exploration and the probable ground water prospects. This map will help in identification of tentative locations for construction of recharge structures. In the Block, some GPs area is witnessed the enrich yield of 800 LPM in above 80 m deep well, whereas most of GPs are with yield range between 50 to 100 LPM in above 80 m deep and some GPs area with now yield (Figure 3.8). The GPs wise detailed of Ground Water (GW) prosperity shown in below illustration. This specific information is will play crucial role in identifying sites for recharge structures in order to address water scarcity issues in the Block.

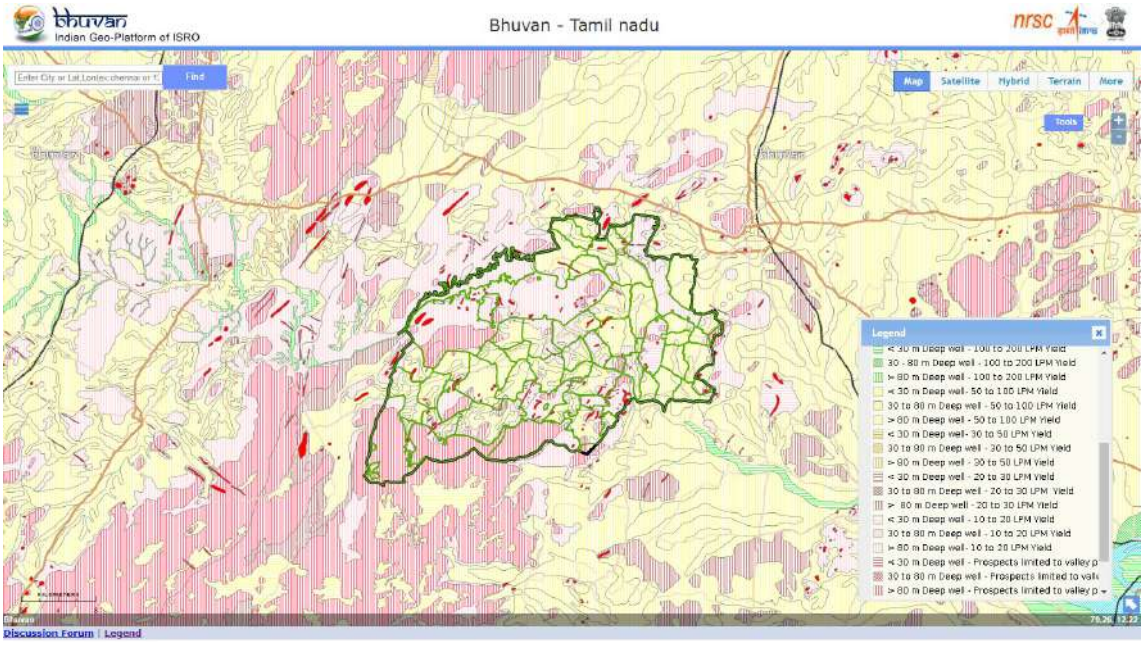
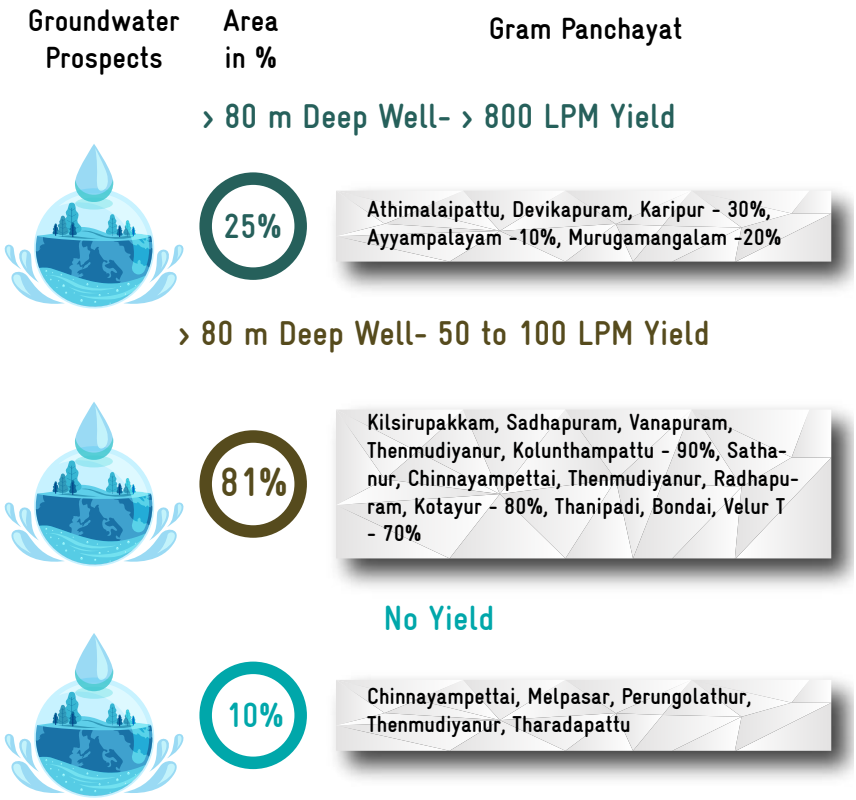


Figure 3.8. Ground water perspective map



3.5.2 NON SPATIAL DATA

Water resource based non-spatial secondary data related to irrigation facilities such as canal, traditional waterbodies, water quality, demand and supply were collected from Govt. sources (Table 6). GP wise current water resources state and its supply and demand side are shown in Annexure 3.6.

TABLE 6. CWRM PARAMETER BASED WATER RESOURCES STATUS IN THE BLOCK

Sl. No.	Canal Network	Extent
	Canal Network (m)	
1	Length of Main Canal (m)	43,555
2	Length of Minor Canal (m)	23,134
3	Length of Distributaries (m)	15,067
4	Water Courses (Field Channels) (m)	10,234
	Traditional Water bodies (No.)	
5	Number of Tanks (PWD & Union) (No.)	66
6	Number of Ooranis (No.)	157
7	Other surface water bodies	-
	Irrigation Facilities (ha)	
8	Tank Irrigation	859
9	Canal Irrigation	318
10	Open & Tube Well Irrigation	15,200
	Catchment Area wise Available Runoff (ha.m)	
11	Good Catchment Area	4,152
12	Average Catchment Area	380
13	Bad Catchment Area	5,761
	Watershed and Drainage Networks	
14	Length of Natural Drainage Lines (m)	5,57,946
15	Number of Natural Drainage Lines (No.)	664
16	Number of Microwatersheds (No.)	286
	Water Demand	
17	For Humans (ha.m)	489
18	For Livestock (ha.m)	193
19	For Agriculture (ha.m)	17,181
20	% GW utilization for Drinking (%)	13
21	% GW utilization for Livestock (%)	83
22	% GW utilization for Agriculture. (%)	96
23	% SW utilization for Drinking (%)	87
24	% SW utilization for Livestock (%)	17
25	% SW utilization for Agriculture (%)	4

3.5.2.1 Existing Water Structures

The Block has structured traditional water storage units such as tanks and ooranis waterbodies which are the life line of local communities for their lives and livelihoods. It is noticed that the ooranis are more (157) than tanks (66) (Figure 3.9).

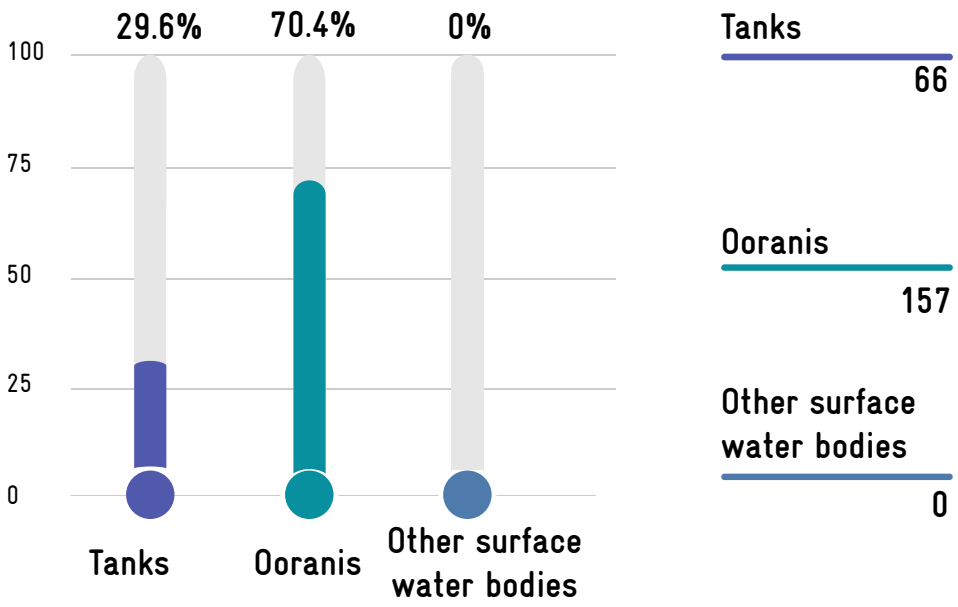


Figure 3.9. Traditional Waterbodies

3.5.2.2 Sources of Irrigation

The total area under irrigation in the Block is 16,377 ha, of which 93 % (15,200 ha) is irrigated through ground water stored in open/tube wells followed by 5.24 % (859 ha) is through tanks and the remaining 2 % (318 ha) area is through canals based irrigation (Figure 3.10).

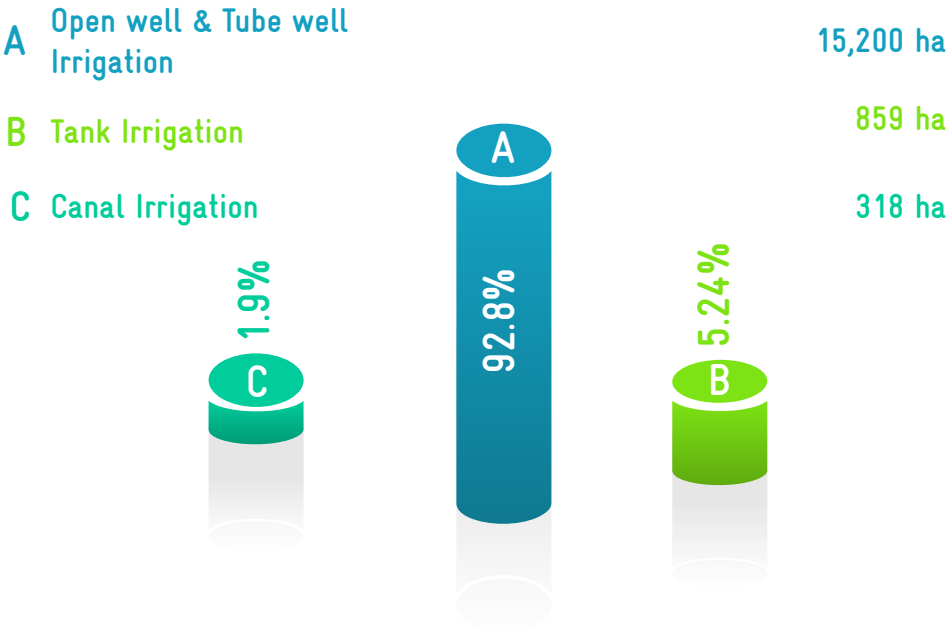


Figure 3.10. Irrigation sources

3.5.2.3 Available Run off

The total available runoff in the catchment area is 10,293 ha.m and in that 56 % is bad catchment area followed by 40.3 % is good and remaining 3.7 % is average catchment area (Figure 3.11).

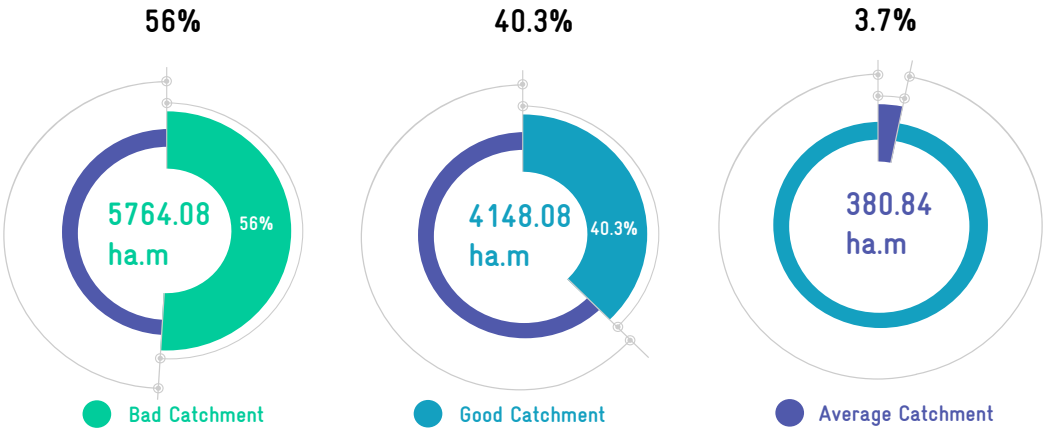
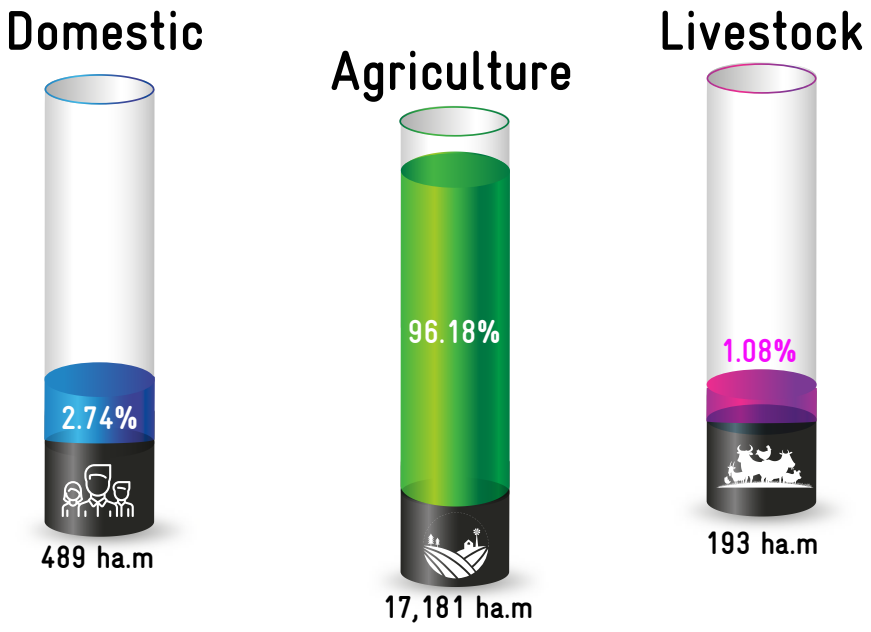


Figure 3.11. Runoff from catchments

3.5.2.4 Water Demand

The total demand for water including domestic, agriculture and livestock purpose is 17,863 ha.m. The highest demand is from the agriculture sector of 17,181ha.m (96 %) followed by domestic use demand of 489 ha.m (2.7 %) and rest is from livestock.



87 % of the domestic purpose usage is met through surface water while the remaining 13 % from ground water resources. Utilization of 96 % for agriculture and 83 % for livestock is met by ground water (Figure 3.12).

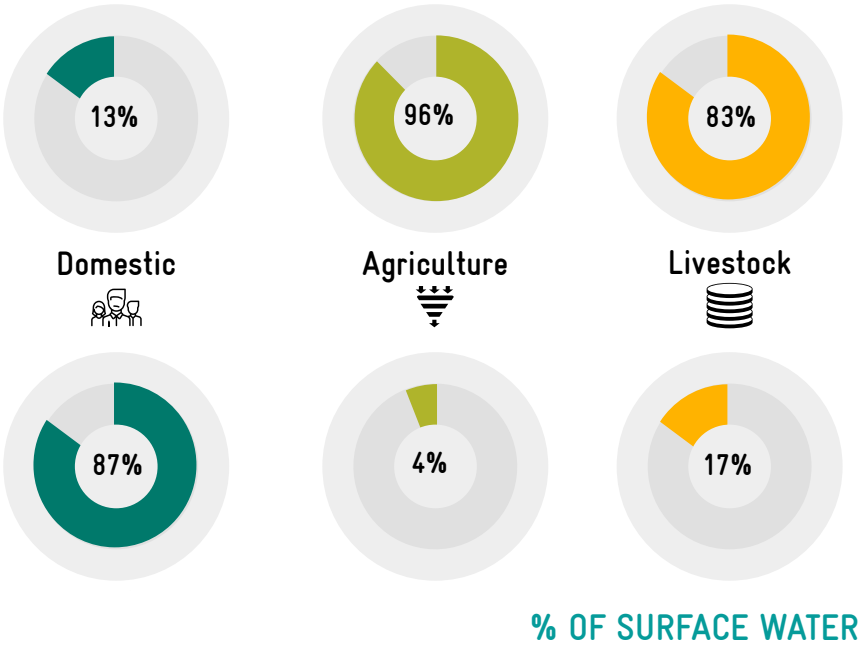


Figure 3.12. Sector-wise water utilization

3.6 CWRM PLANNING ANALYSIS-AGRICULTURE

Agriculture is the primary livelihood of the households in Thandarampet 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

Bhuvan based spatial data for LULC, waste land, salt affected land, soil erosion and soil texture were taken into consideration to understand Thandarampet Block's problems in order to draft scientific key water actions.

3.6.1.1 Soil texture: The soil consistency of particle size is distinguished through soil texture types, especially it is determined by amount of sand, silt or clay. The Block has diverse soil types and predominant in vertisol and alfisol, with reference to soil texture, the proportion of Clay skeletal, fine and clay texture type is dominated across the Block (Figure 3.13). Soil texture devise the details about the soil properties such as water holding capacity, permeability, soil workability also the ability of plant to grow and this will help in proposing the relevant conservation measures for natural resources.

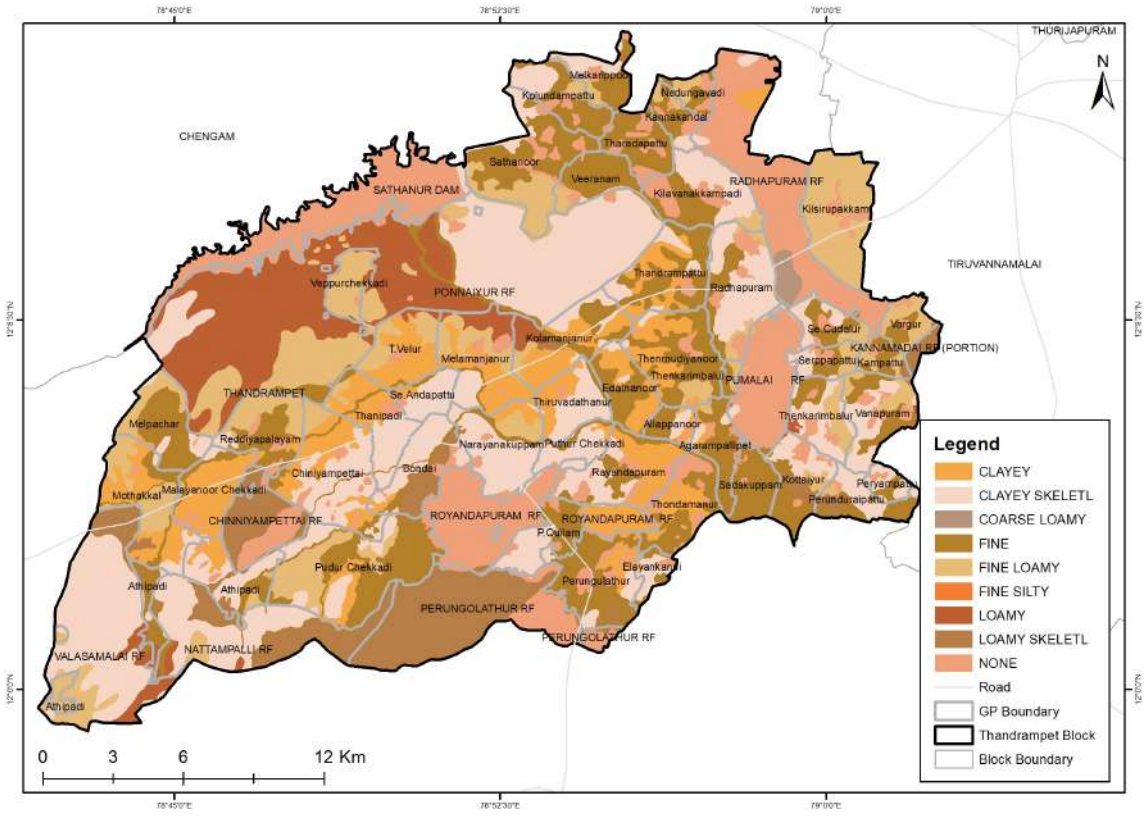


Figure 3.13. Soil texture

3.6.1.2 Soil erosion: Soil erosion is a natural process of displacement of upper layer of soil caused by dynamic erosion agents i.e. water, air, plants and humans. Sheet erosion and saline moderate type soil erosion found in the Block (Figure 3.14) and below illustration gives GPs and area wise details. Soil eroded sites will act as direct input in preparation of plan, to suggest soil conservation and watershed management activities.

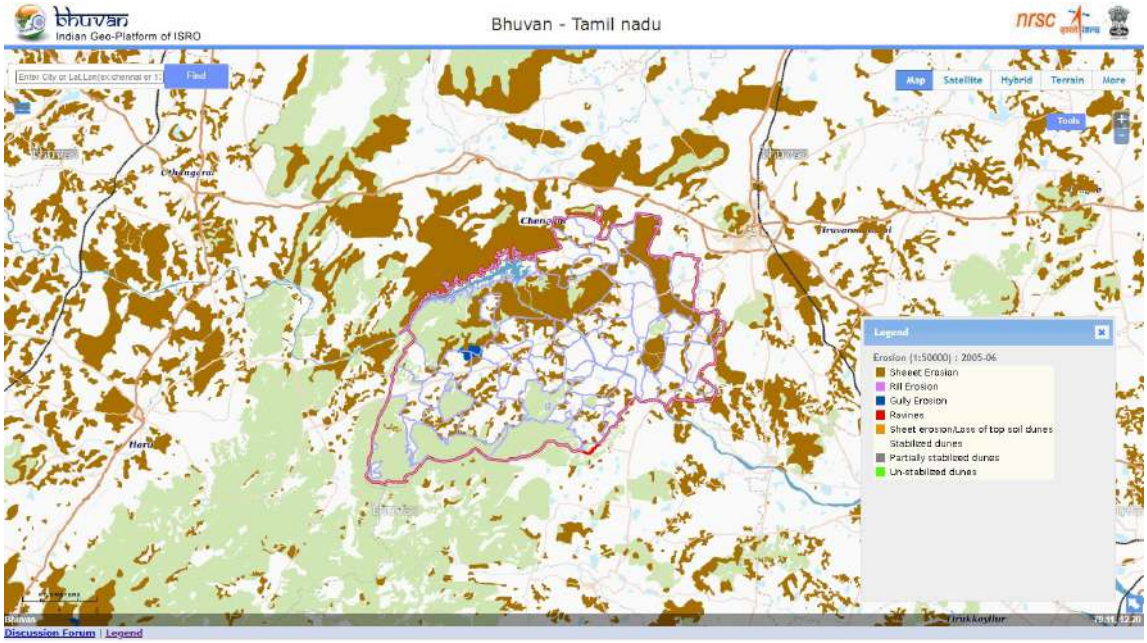


Figure 3.14. Soil Erosion map

Erosion type	Area in %	Gram Panchayat
Sheet Erosion		
	42%	Athipadi, Kolamanjanoor - 60%, Melmanjanoor, Chinnayampettai, Thandrampet - 50%, Puthuchek-kadi, Keelvanakambadi - 40%, Sathanur - 30%, Thenkarimbalur, Perungolathur - 20%
Saline - Moderate		
	10%	Edathanur, Sadakuppam

3.6.1.3 Land Use & Land Cover (LULC): LULC are two separate terminologies which are often used interchangeably. In general, land cover is defined as 'the observed biophysical cover on the Earth's surface'. It includes vegetation and man-made features as well as bare rock, bare soil, and inland water surfaces; while land use refers to 'the way in which land has been used by humans and their habitat, usually with the accent on the functional role of land for economic activities'. LULC has become increasingly important which, in turn, underlines many environment-development policies. Thandarampet Block is majorly covered by the agricultural crop followed barren land (Figure 3.15). The GP wise LULC tabulated in the Table 7. LULC map helps the decision makers and planners to focus on the fallow land development activities.

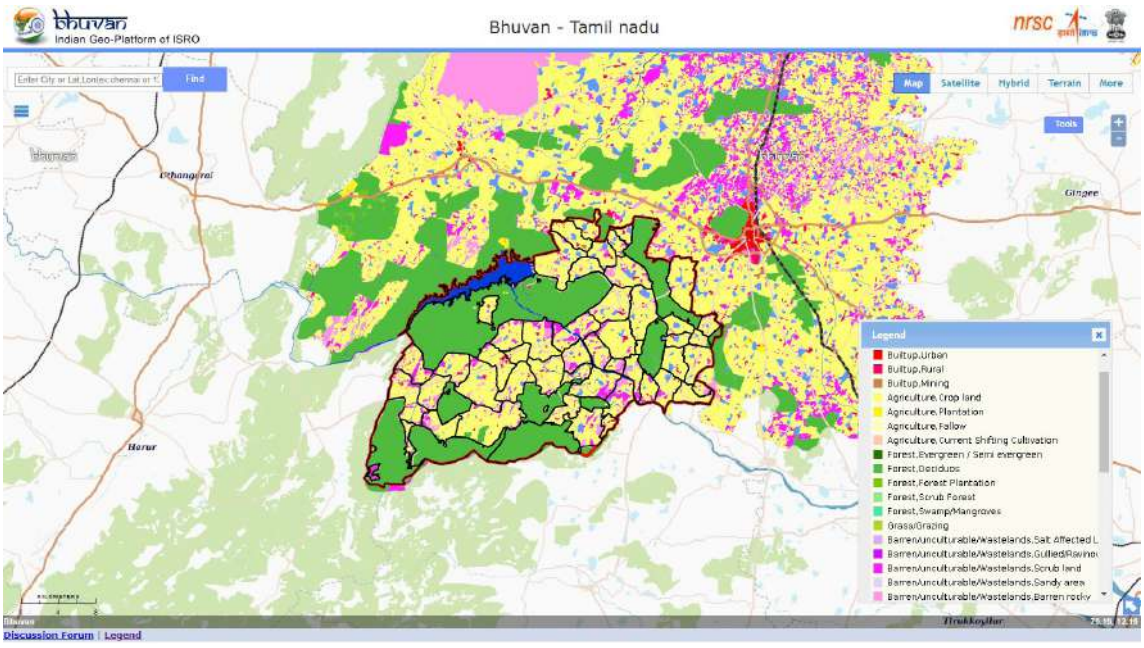


Figure 3.15. Land Use Land Cover map

Land Use	Area coverage in %	Gram Panchayat
Barren Lands	30%	Allapanur, Edathanur, Kolamanjanoor - 50%, Melmanjanoor, Thondamanur - 30%, Royan-dapuram - 25%, Keelvanakampadi, Melpasar, Chinnayampettai - 20%, Thiruvadathanur - 10%
Agriculture crop land and Plantation	90%	All GPs

3.6.1.4 Waste land: A Parcel of land that is not suitable for any agriculture activity and mostly covered with dense or open scrub is called as wasteland. The extent of wasteland will act as a direct input for preparation of plans for land development activities or greenery. Barren rock, and scrub land type of wasteland is noticed in Thandarampet Block (Figure 3.16). GP wise details is shown in below illustration. During planning for the GPs, plantation measures have been taken up in the identified portions to convert the wasteland into productive land.

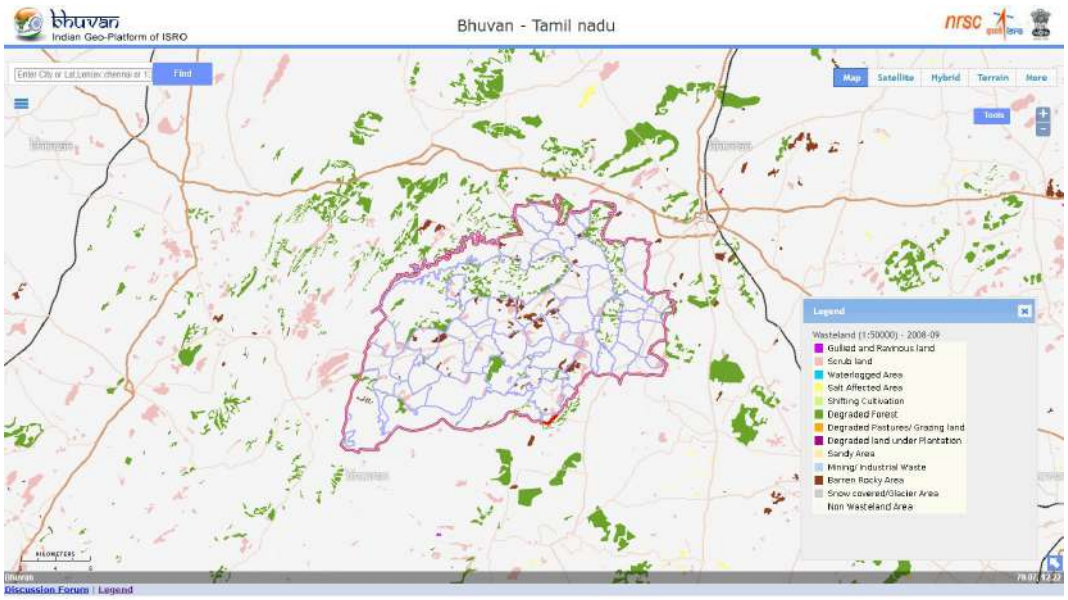


Figure 3.16. Wasteland map

Wasteland type	Area in %	Gram Panchayat
Barren rocks	28%	Thondamanur - 60%, Thiruvadathanur - 40%, Edathanur, Kolamanjanoor, Thondamanur - 20%, Chinnayampettai - 10%
Scrub Land	25%	Allapanur - 50%, Athipadi - 30%, Veppurchek-kadi - 20%, Royandapuram, Velur T - 10%

3.6.1.5 Salt affected area: About five percent area of saline affected area were noticed in the Edathanur and Sadakuppam (Figure 3.17). These parcels will act as a direct input while planning process to propose soil conservation measures, mainly activities to reduce salinization and suggestions for alternative cropping.

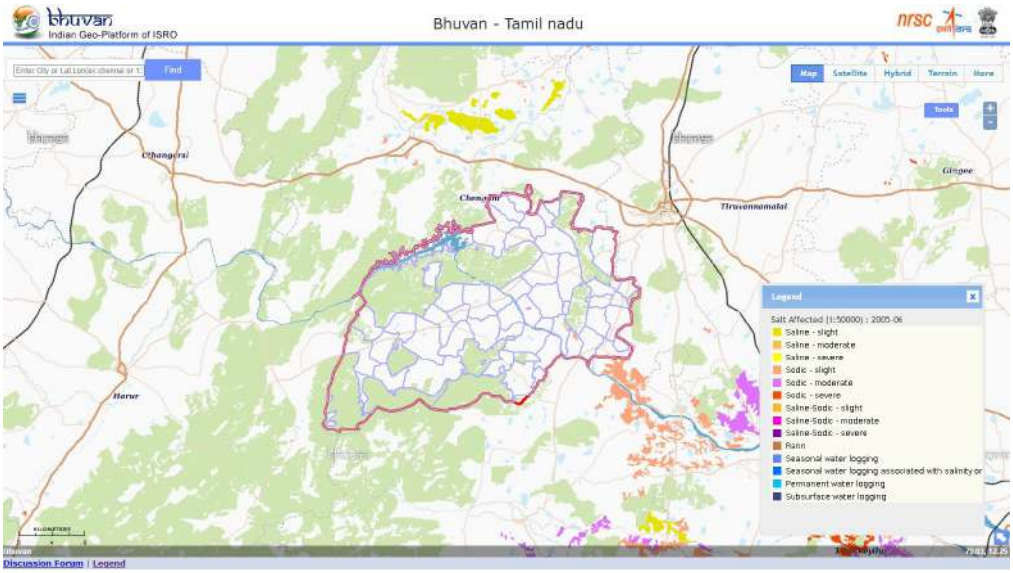


Figure 3.17. Salt affected area map

Thematic unit	Area in %	Gram Panchayat
Saline - Moderate	10%	Edathanur, Sadakuppam

3.6.2 NON SPATIAL DATA

Agriculture based non-spatial secondary data related to land resources, catchment, crop type, soil micro-macro nutrient, moisture, ET and livestock data were collected from govt. sources (Table 7.) The key CWRM parameters of agriculture area for all GPs are tabulated in Annexure 3.7.

TABLE 7. CWRM PARAMETER-BASED AGRICULTURE RESOURCES STATUS IN THE BLOCK

Sl. No.	Key parameter	Extent
	Area under Land Resources (ha.)	
1	Area Irrigated by Source	19,142
2	Non-Agricultural Uses	6,725
3	Fallows Land other than Current Fallows	6,351
4	Barren & Un-cultivable Land	4,250
5	Current Fallow land	3,521
6	Unirrigated Land	1,959
7	Cultivable Waste Land	914
8	Permanent Pastures and Other Grazing Land	403
9	Forest land	292
10	Land Under Miscellaneous Tree Crops etc.	39
	Land under Catchment Area (ha)	
11	Good Catchment	11,267
12	Average Catchment	1,355
13	Bad Catchment	30,973
	Crop Details	
14	Irrigated Area (ha)	13,617
15	Rainfed area (ha)	999
16	Paddy Cultivation (ha)	6,397
17	Crop Water Requirement - Irrigated condition (ha.m)	16,846
18	Crop Water Requirement - Rainfed condition (ha.m)	335
	Soil Resources: Status of Available Nitrogen (%)	
19	Very Low	14.98
20	Low	84.60
21	Medium	0.43
	Status of Organic Carbon (%)	
22	Very Low	21.59
23	Low	77.88
24	Medium	0.51
25	High	0.02
	Status of Soil Micro Nutrients (%)	
26	Sufficient	59.62
27	Deficient	40.38
	Status of Physical condition of the soil (%)	
28	Acidic Sulphate	0.03
29	Moderately Acidic	2.47

30	Slightly Acidic	8.68
31	Neutral	1.97
32	Moderately Alkaline	86.85
	Soil Texture (%)	
33	Clay Soil	34.05
34	Fine Soil	50.66
35	Coarse loamy	0.42
36	Soil Water Permeability (Low, Moderate, high)	Moder-ate
	Soil moisture and ET	
37	Volumetric Soil Moisture (%)	23
38	Estimated Soil Moisture (ha.m)	8,480
39	ET Losses (ha.m)	17,152
	Means of Water Extraction (%)	
40	Gravity	4
41	Lifting	96
	Irrigation Methods (%)	
42	Wild Flooding	8
43	Control Flooding	91
	Livestock (No.)	
44	Cattle population	48,890
45	Sheep population	14,594
46	Goat population	22,975

3.6.2.1 Land utilization

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 distribution across the geographical boundary of the Block is necessary to take decisions. Of the total land area of 43,595 ha, the highest of 44 % land is used for irrigation, followed by 15 % land is non-agriculture and fellow land, while less than 5 % of land is unirrigated, cultivable wasteland, permanent pastures and other grazing land, forest land, and land under miscellaneous tree crop etc., (Figure 3.18).

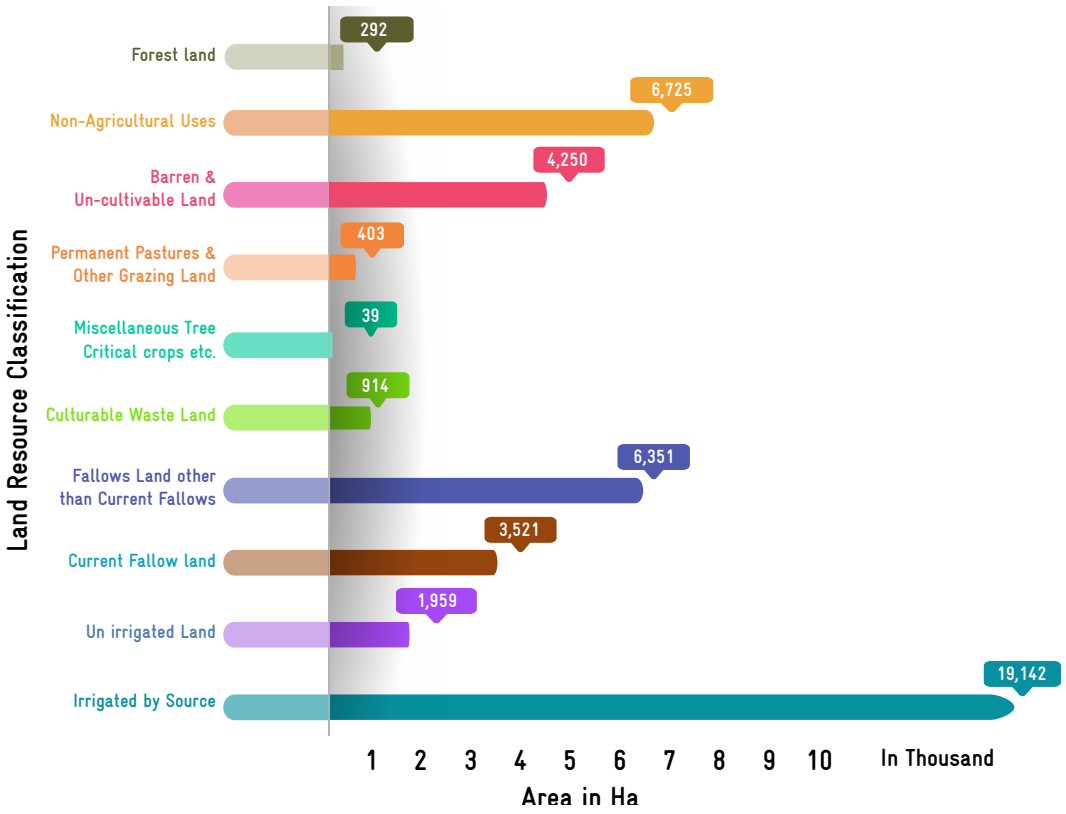


Figure 3.18. Land utilization

3.6.2.2 Catchment Area

The land use types in each of the GPs are categorized into three different types of runoff; good, average and bad catchment area. Out of total catchment area of 43,945 ha, of the Block, the highest of about 70 % is bad catchment area followed by 26 % if good and remaining is under average catchment area. This analysis helps to focus on prioritizing the works in the land use systems under the good and bad catchment areas (Figure 3.19).

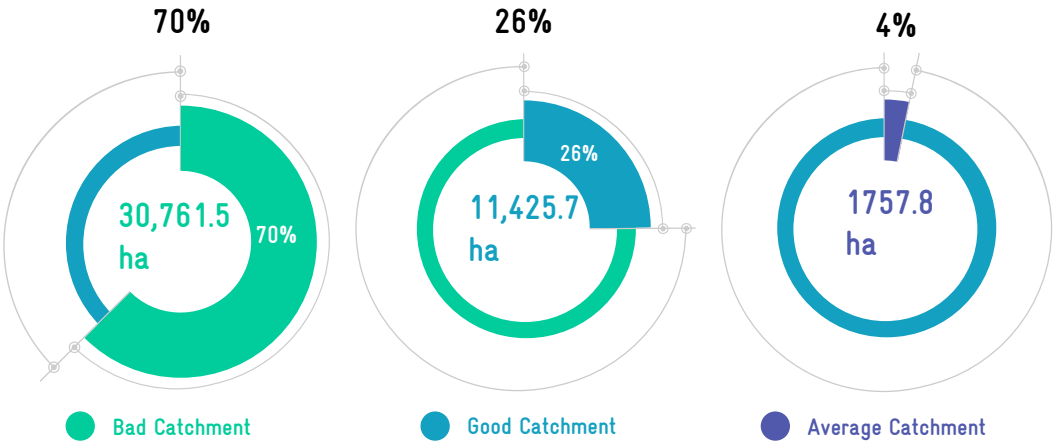


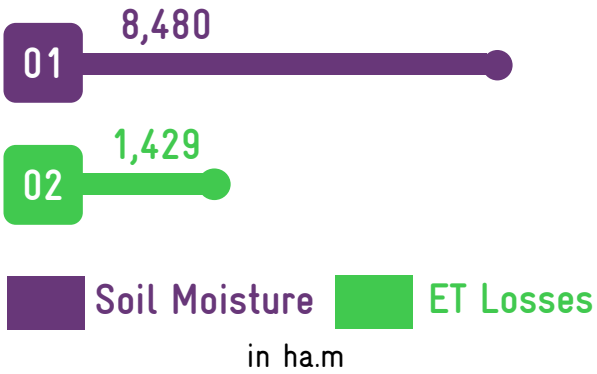
Figure 3.19. Catchment area

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 (23%), is taken for estimating the amount of water stored as soil moisture which accounts to 8,480 ha.m.

3.6.2.4 ET losses

The loss of water through ET is important in water budgeting. The annual total ET loss during 2018-19 was 17,152 ha.m with monthly average of 1,429 ha.m.



3.6.2.5 Macro-nutrients
Nitrogen

The macro soil nutrients such as nitrogen and organic carbon falls under very low to moderate category in all the soil samples tested. The available nitrogen is very low in 15 % of the samples tested while it was 84.5 % under low category and remaining is moderate Nitrogen (Figure 3.20). According to soil resource map, this Block is identified as one of the nitrogen deficient Block (Tiruvannamalai district profile 2020).

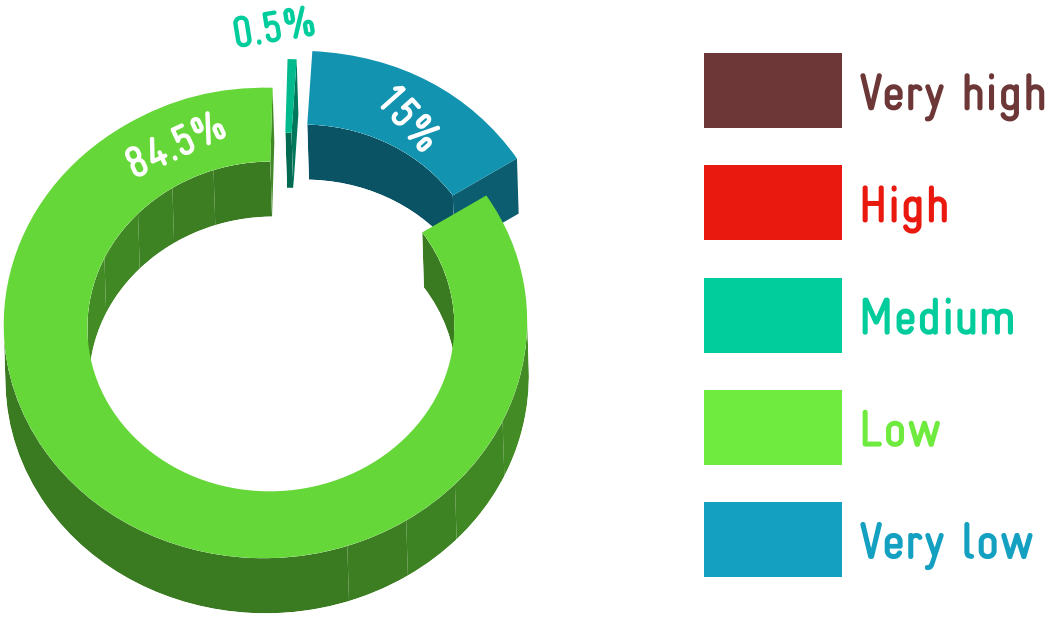


Figure 3.20. Status of available Nitrogen

Organic Carbon Status

A similar trend was recorded for soil organic carbon. Soil organic carbon is also ranges between very low and high in the Block. Nearly 77.9 % of the soil samples tested fall under low category followed by 26.65 % are falls under very low very low category while less than 1 % under medium and high (Figure 3.21). This indicates that the soil fertility is very poor and further intensive practices will make the soil more vulnerable to degradation over a period of time.

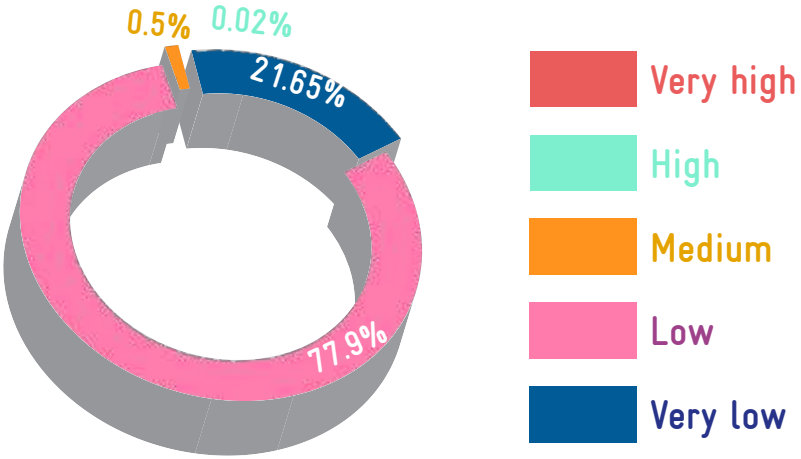


Figure 3.21. Status of soil Organic Carbon

3.6.2.6 Status of the soil micro-nutrients

This Block is one of the Nitrogen, zinc and ferrous deficient Block of Tiruvannamalai district. The micro-nutrient status of the soil with specific reference to Manganese, Boron and Zinc, Ferrous, Copper, and Sulphate are deficient in 40.4 % and 59.6 % sufficient in the soils tested. (Figure 3.22)

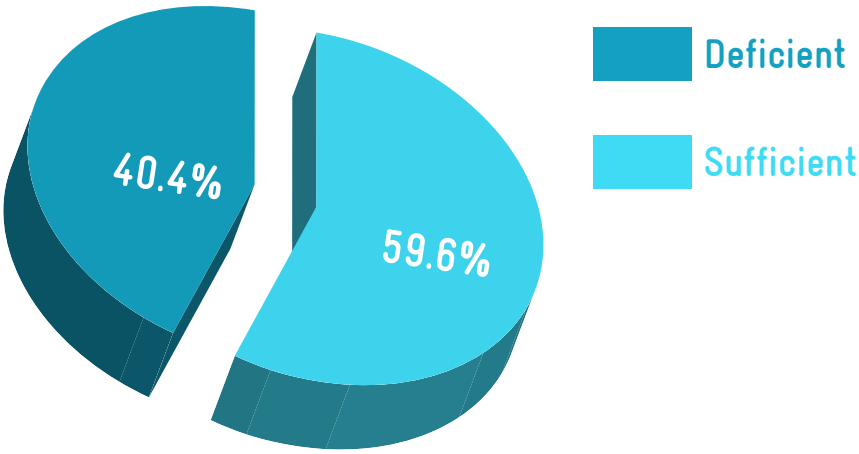


Figure 3.22. Status of soil micro-nutrients

3.6.2.7 Physical parameters – pH status

With reference to the physical parameters, 86.85 % of the soil is moderately alkaline in nature followed by 8.68 % is slightly acidic, 2.47 % is moderately acidic, 1.97 % is neutral in nature and very minute in acidic sulphate (Figure 3.23).

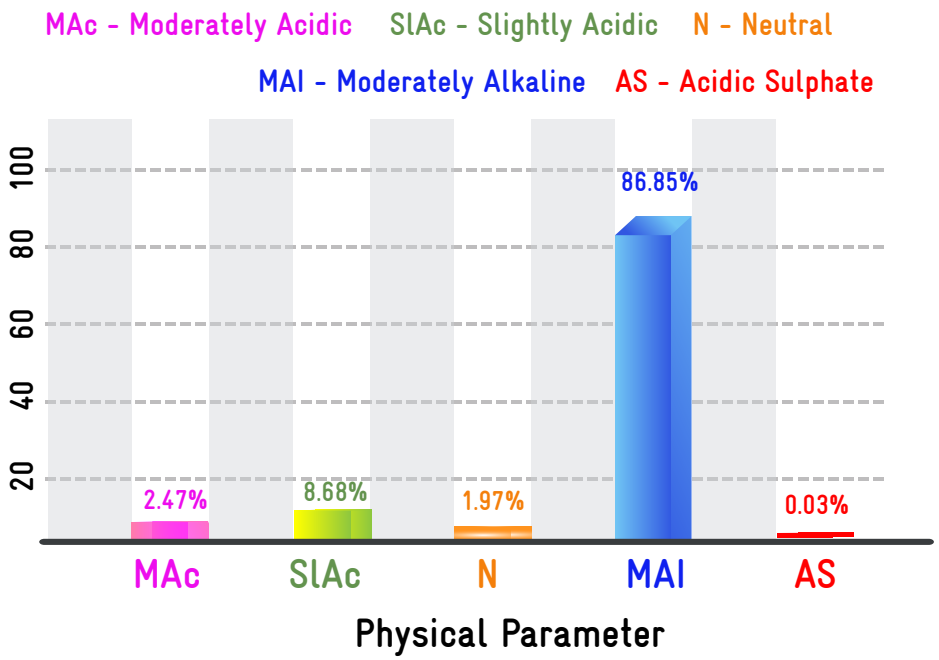


Figure 3.23. Status of pH of soil

3.6.2.8 Cropping pattern and the irrigation

A total of 20,000 ha area s used for cop cultivation in which irrigation shares the highest area of 85 % rest is rain-fed irrigation. About 17,000 ha is irrigated area crop paddy cultured as major crop (32 %) followed by groundnut (24 %) while, vegetables are less in area. Groundnut is predominated crop in the rain fed cultivation of 78 % of area followed by pulses of 20 % (Figure 3.24). While sugar cane, red gram, ragi, dry chilli, brinjal, water melon, ladies finger, gourds, flower crops, banana, guava, medicinal plants, lemon, mango, tomato, coconut are cultivated in less than one percent of the area.

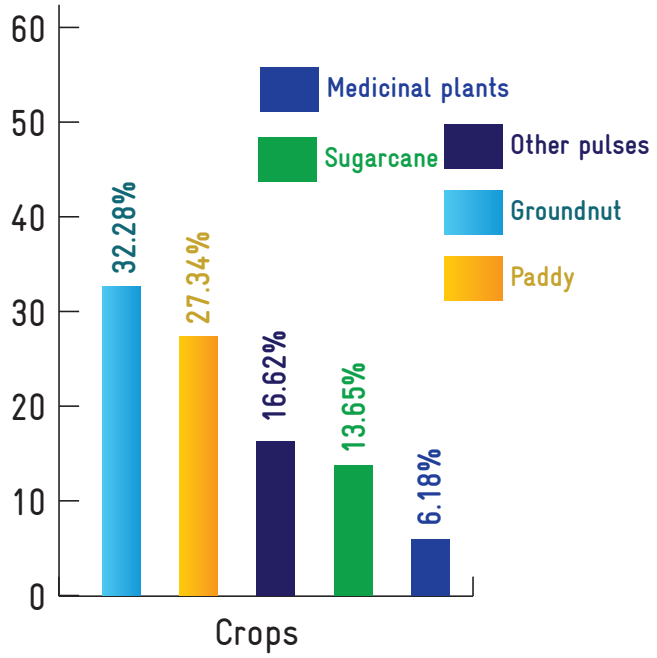


Figure 3.24. Crop patterns Irrigation methods

3.6.2.9 Irrigation methods

In case of the surface water resources, wild flooding is the primary method of irrigation. But in case of ground water resources, the predominant type of irrigation is control flooding. In the Block, 92 % of the irrigation is done by control flooding and only 8% of the irrigation is done by wild flooding (Figure 3.25).

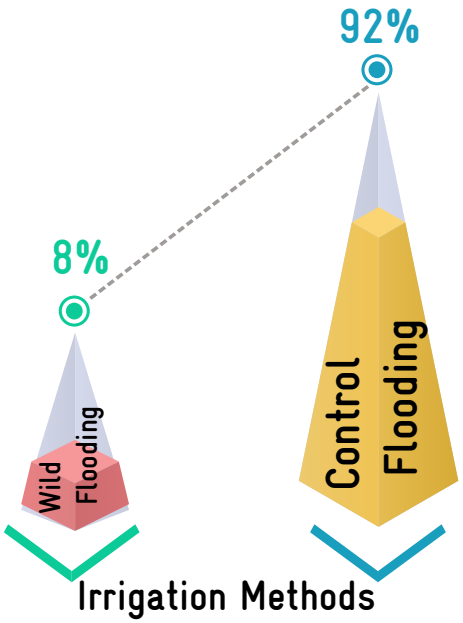


Figure 3.25. Irrigation methods

3.6.2.10 Means of water extraction

Water is extracted in two ways, one by gravity and another is by lifting. 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 is more, 96 % of the water extraction methods are under lifting means of extraction and only 4 % comes under gravity means of water extraction (Figure 3.26).

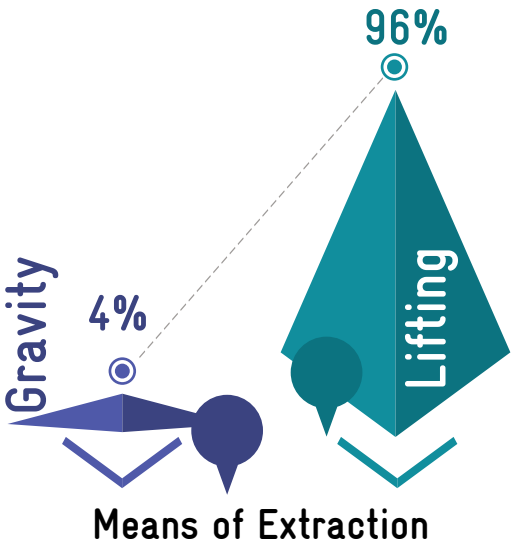


Figure 3.26. Means of water extraction

3.6.2.11 Livestock details

This Block has considerable proportion of livestock resources of which small ruminants such as sheep and goat constitute 17 % (14,594) and 27 % (22,975) of the total livestock. While cattle population is higher in this Block 57 % (48,890) (Figure 3.27). The total water requirement for livestock is 193 ha.m. Of the total water demand of 83 % is met through ground water and remaining is from surface water resources.

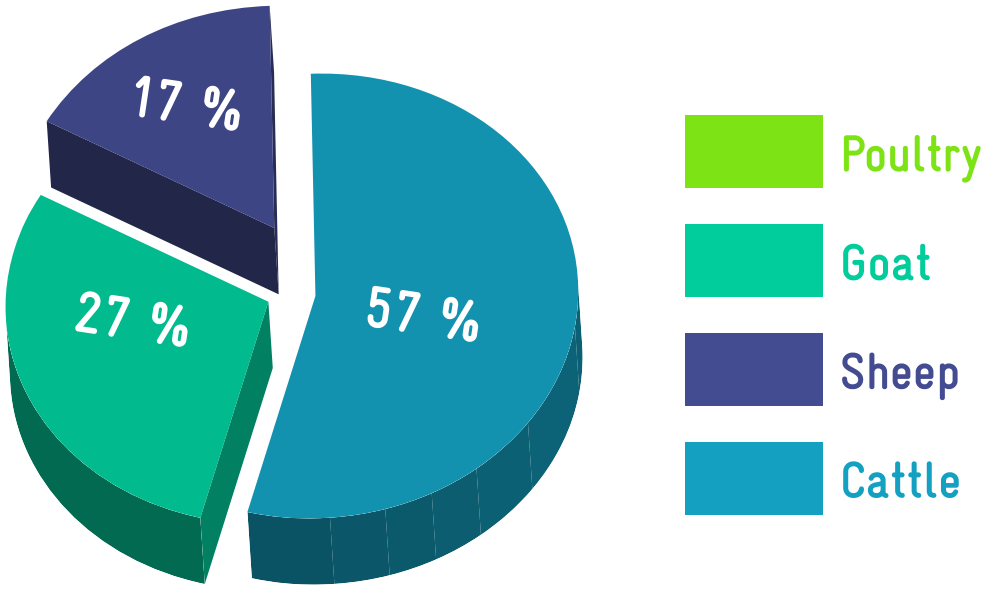


Figure 3.27. Livestock details

3.7 CWRM PLANNING ANALYSIS-SOCIO-ECONOMIC

The demographic details such as population, gender, vulnerable population/ households, drinking and grey water details are collected from authentic primary and secondary sources and analyzed. Data of MGNREGA job holders is also taken for the analysis. Table 8 lists the demographic and socio-economic status of Chengam Block. GP wise demographic and socio economic status are attached in Annexure 3.8.

TABLE 8. CWRM PARAMETER BASED SOCIO-ECONOMIC STATUS IN THE BLOCK

Sl.No.	Parameter	Total
1	Geographical Area (ha)	42,687
2	Male population (No.)	89,658
3	Female population (No.)	88,990
4	Total population (No.)	1,78,648
5	SC population (No.)	37,739
6	ST population (No.)	16,787
7	Vulnerable population (No.)	56,714
8	Households (HH's) (No.)	46,653
9	Only one room HH's (SECC) (No.)	6,700
10	Female Headed HH's (SECC) (No.)	2,532
11	Vulnerable Households (SECC) (No.)	5,346
12	% of Vulnerable Households	5.1

13	Registered MGNREGA Job cards (Persons)	65,834
14	Active person working in MGNREGA job Cards (Persons)	48,496
15	Drinking Water Sources (No.)	10,332
16	Ground Water - Drinking source (No.)	173
17	Surface water - Drinking source (No.)	36
18	sum of drinking water sources (No.)	209
19	HH's have tap water connection for drinking water (No.)	24,363
20	HH's dependent on other sources for drinking water (No.)	13,046
21	Annual Greywater Generation (ha - m)	326

3.7.1 Population:

The total population of this Block is 1.78 Lakhs of which the female proportion is slightly high then male population. 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 32 % of the total population are under vulnerable population (Figure 3.28).

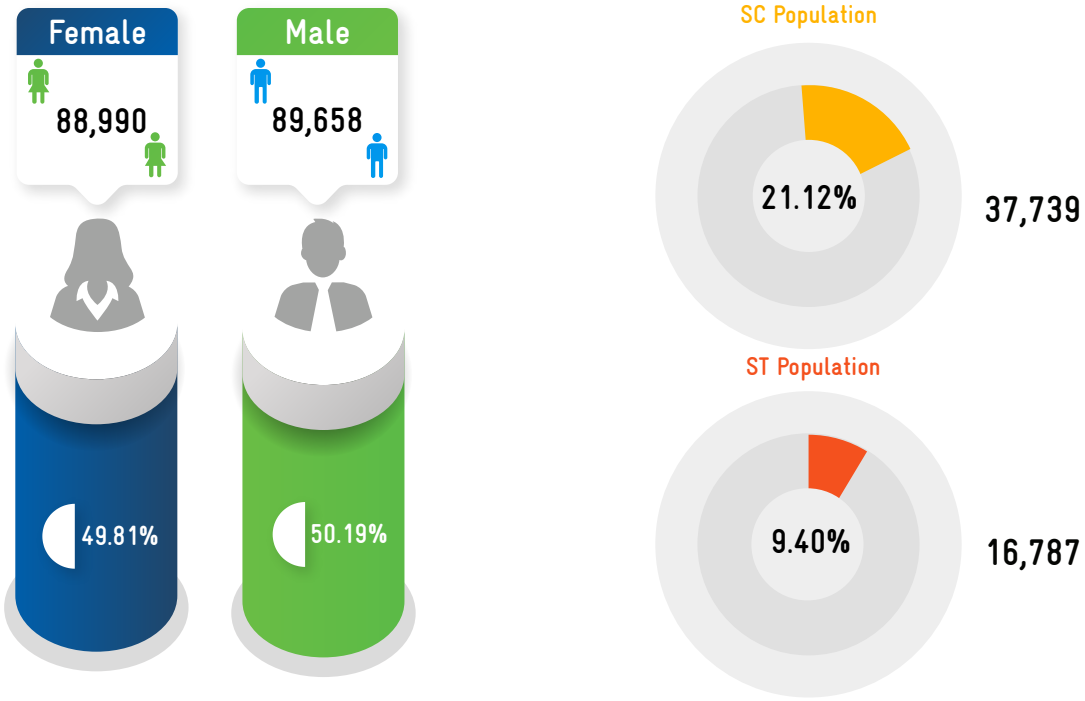


Figure 3.28. Population details

**population figure may differ from Census 2011 due to categorization of GPs based on revenue panchayat boundaries*

3.7.2 Details of households

There are a total of 46,653 households in which 14 % households have only one room, 5 % households are headed by women and 11 % are vulnerable households (Figure 3.29)

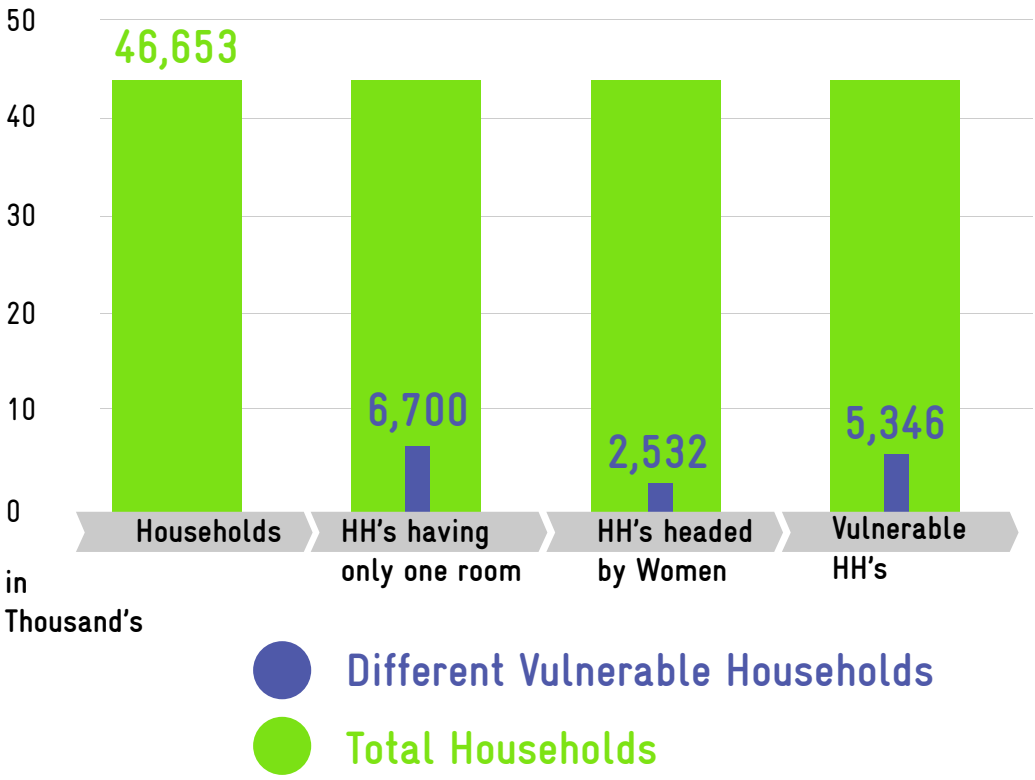


Figure 3.29. Details of Households

3.7.3 Status of Mahatma Gandhi NREGA - job card status

In the Block of the total population of 0.94 Lakhs, 33,776 are registered for job cards in Mahatma Gandhi NREGA scheme in which 72 % of the job cards are in active category (Figure 3.30).

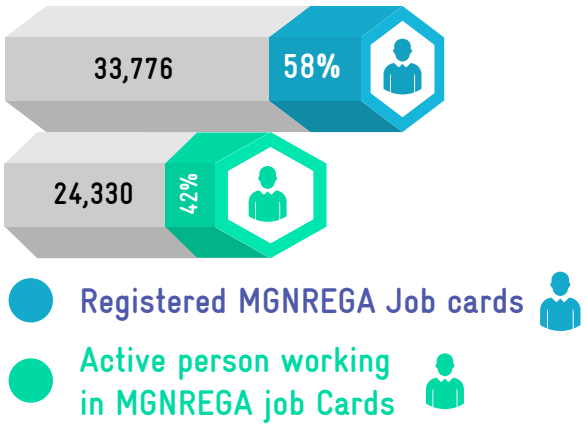


Figure 3.30. Status of MGNREGA job cards

3.7.4 Drinking Water Sources

Nearly 24,363 households have tap water connection and 13,046 households depend on other water sources for domestic use, where other sources included RTRWHS / Tanka (roof rain water harvesting systems, hand pump, open wells, bore wells, tank/ pond/ oorani, springs and river/ streams.

Tap water connection

24,363
Households

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

13,046
Households

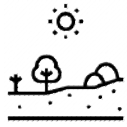
3.7.5 Annual Greywater Generation

The grey water generation estimated across this Block is 326 ha.m which is available for reuse or recycle.

SPATIAL DATA DERIVED AREA SCOPE FOR TREATMENT MEASURES IN GP'S

Morphology

Valasamala RF, Nattampalli RF, Chinnayampettai, Athipadi



Wasteland

Allapanur, Edathanur, Royandapura, Thondamanur, Thiruvadathanur, Allapanur

Soil erosion

Athipadi, Kolamanjanoor, Edathanur

Upland/Slope

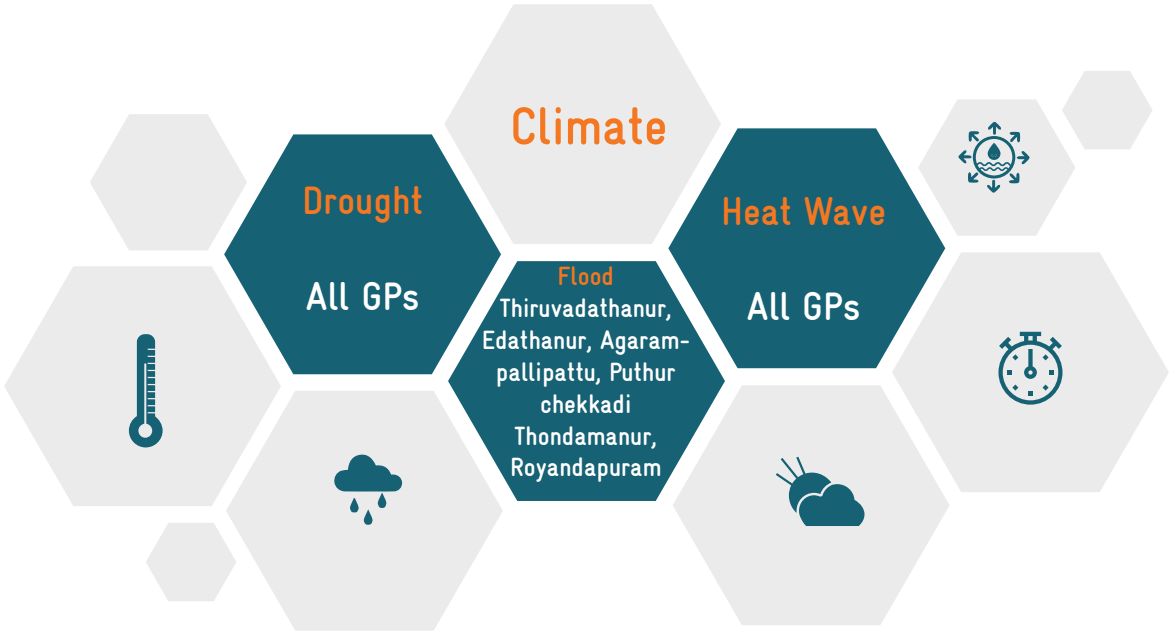
Elayankanni, Puduchekkadi, Chinnayampettai

Ground water prosperity

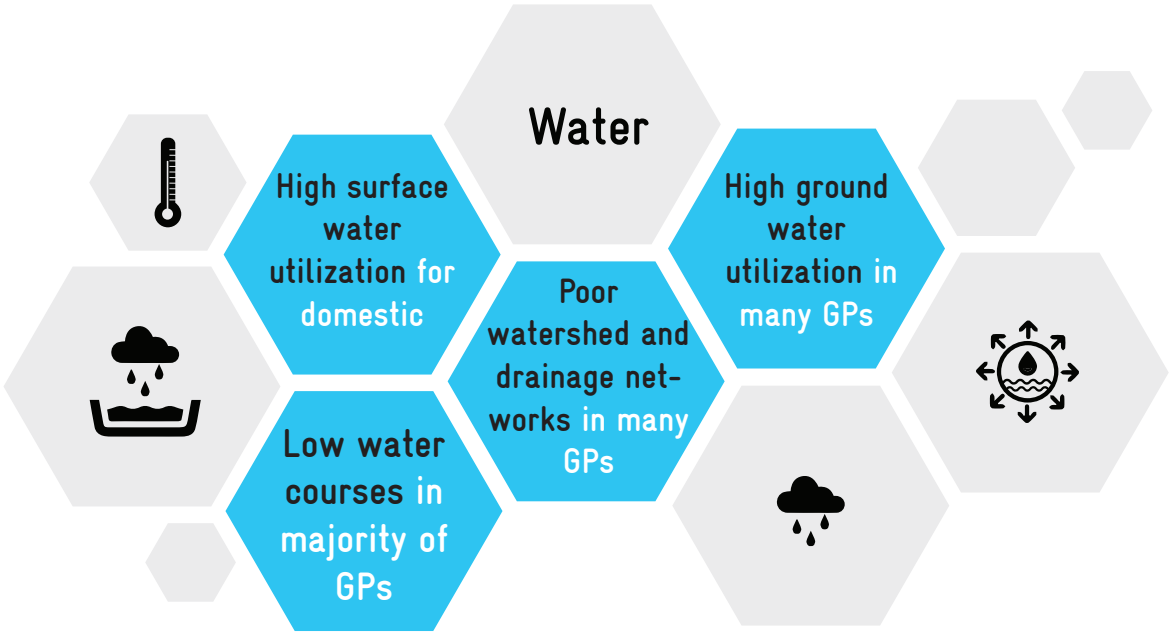
Chinnayampettai, Melpasar, Perungolathur, Thenmudiyanur, Tharadapattu

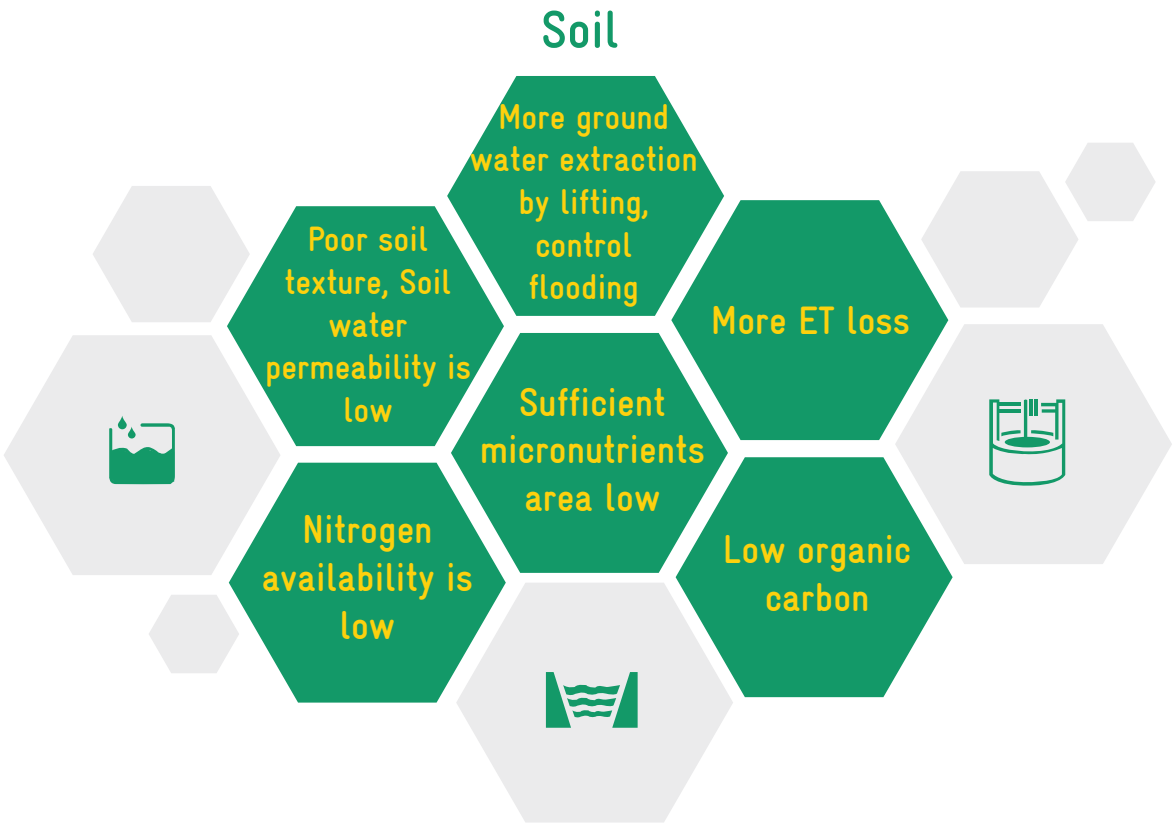
Salt affected area

Edathanur, Sadakuppam



Socio economic


Water
High surface water utilization for domestic
High ground water utilization in many GPs
Poor watershed and drainage net-works in many GPs
Low water courses in majority of GPs


Soil
More ground water extraction by lifting, control flooding
Poor soil texture, Soil water permeability is low
More ET loss
Sufficient micronutrients area low
Nitrogen availability is low
Low organic carbon

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).

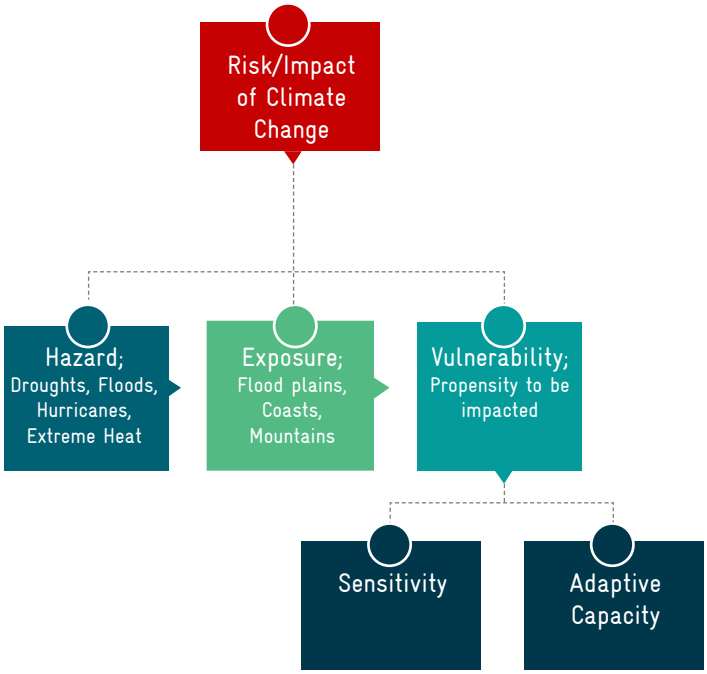


Figure 4.1. Vulnerability of the system as defined by IPCC

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 been explored through rigorous study were considered here to address the key water challenges at GP level. About 70 spatial and non-spatial parameters/ indicators under 4 dimensions via Climate (3), Water (25), Agriculture (31) and Sociodemographic (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.

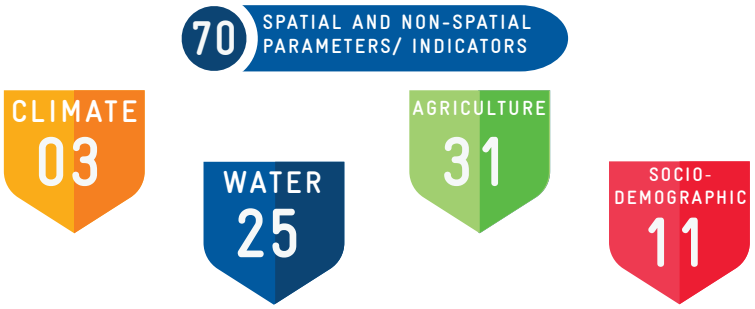


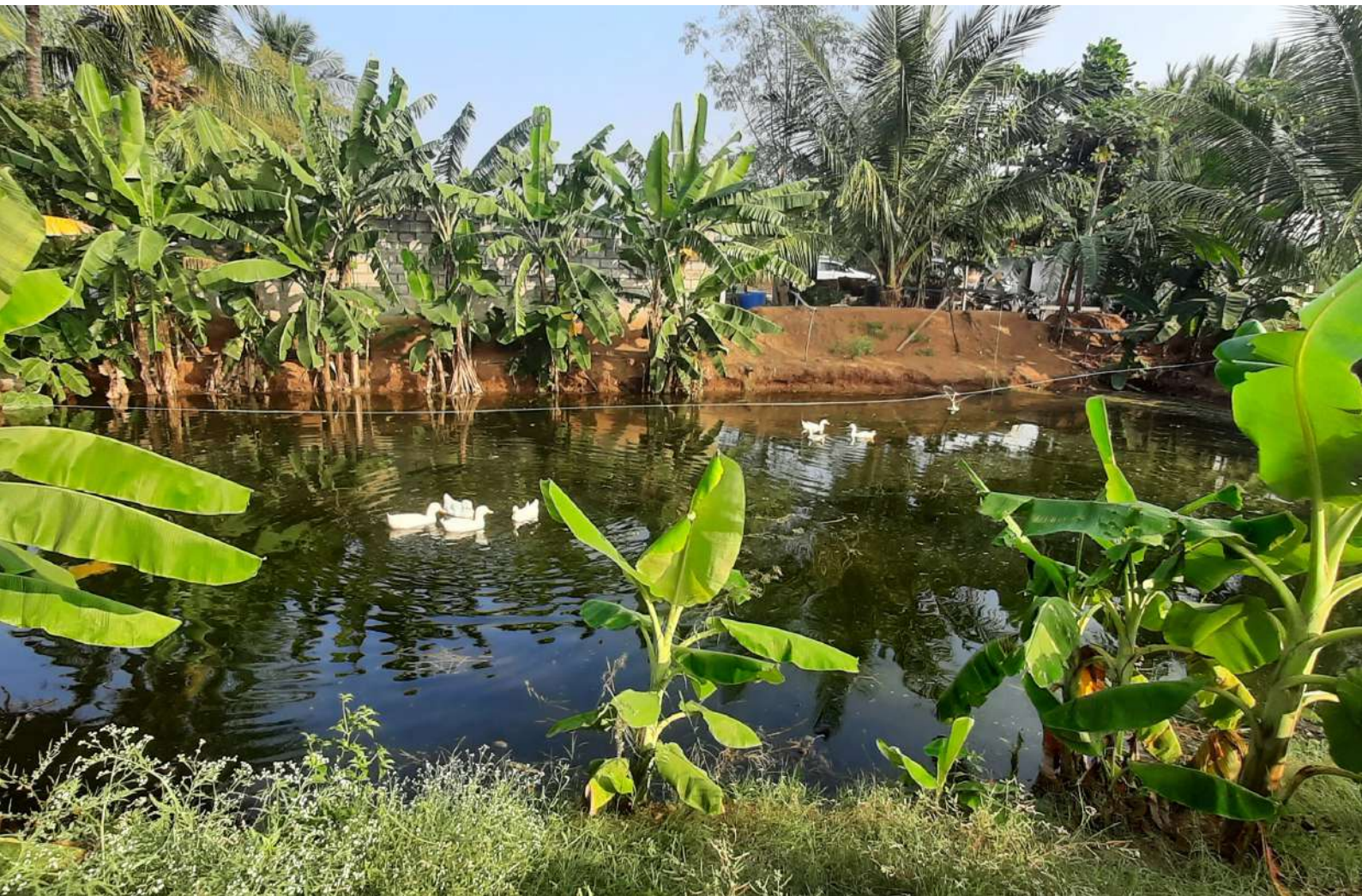
TABLE 9. CWRM PARAMETERS/INDICATORS SELECTED FOR BLOCK LEVEL VULNERABILITY

	Key CWRM Parameter	Vulnerability relationship
Climate	Drought	Climate risk/Sensitivity
	Flood locations	
	Heat Wave	
Water	**Canal Network (in m)**	
	Length of main canal	Adaptive capacity
	Length of minor canal	
	Length of distributaries	
	Water courses (Field channels)	
	Traditional water bodies (in No.)	
	No. of Tanks	Adaptive capacity
	No. of Ooranis	
	Other surface waterbodies	
	Irrigation Facilities (in ha)	
	Area under Tank irrigation	Sensitivity
	Area under canal irrigation	
	Area under open & tube well irrigation	
	Catchment Area wise Available Runoff (ha.m)	
	Good Catchment Area	Sensitivity
	Average Catchment Area	
	Bad Catchment Area	
	Watershed and Drainage Networks	
	Length of Natural Drainage Lines (m)	Adaptive capacity
	Number of Natural Drainage Lines	
	Number of Micro-watersheds	
	Water demand (ha.m)	
	For Humans	Sensitivity
	For Livestock	
	For Agriculture	
	% GW utilization for Drinking	
	% GW utilization for Livestock	
	% GW utilization for Agriculture.	
	% SW utilization for Drinking	
	% SW utilization for Livestock	
	% SW utilization for Agriculture	
Agriculture	**Area under land resources (in ha)**	
	Forest land	Adaptive capacity
	Non-Agricultural Uses	
	Barren & Un-cultivable Land	
	Permanent pastures and Other grazing land	
	Land under miscellaneous tree crops etc.	
	Cultivable wasteland	
	Fallows land other than current fallows	Sensitivity
	Current fallow land	
	Unirrigated land	
	Area irrigated by source	

Agriculture	**Land under catchment area (ha)**	
	Good Catchment	Adaptive capacity
	Average Catchment	
	Bad Catchment	Sensitivity
	Crop Area details (in ha)	
	Irrigated Area	Sensitivity
	Rainfed area	
	Soil Resources: Status of available Nitrogen (in %)	
	Very low to low	Sensitivity
	Status of Organic Carbon (in %)	
	Very low to low	Sensitivity
	Status of Soil Micro Nutrients (in %)	
	Deficient	Sensitivity
	Status of Physical condition of the soil (in %)	
	Highly acidic/alkaline	Sensitivity
	Slightly acidic	Adaptive capacity
	Neutral	
	Moderately alkaline	
	Soil Texture (in %)	
	Clay	Sensitivity
	Fine	Adaptive capacity
	Coarse loamy	
	Soil Water Permeability (Low, Moderate, high)	
	Soil moisture and ET (in ha.m)	
	Estimated soil moisture	Adaptive capacity
	ET losses	Sensitivity
	Means of Water Extraction (in %)	
	Lifting	Sensitivity
	Irrigation Methods (in %)	
	Wild flooding	Sensitivity
	Livestock (in No.)	
	Livestock density (cattle, sheep, Goat, poultry)	Sensitivity
Socio economic	Population density (persons per ha)	Sensitivity
	Demographic (in %)	
	Female Proportion	Sensitivity
	Vulnerable population Proportion	
	Economic (In %)	
	Only one room HH's	Sensitivity
	Female headed HH's	
	Vulnerable households	
	MGNREGA (in %)	
	Registered MGNREGA Job cards	Adaptive capacity
	Active person working in MGNREGA job Cards	
	Water accessibility (in %)	
	HH's have tap water connection for drinking water	Adaptive capacity
	HH's dependent on other sources for drinking water	Sensitivity
	Annual Greywater Generation (in ha.m)	

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 levels very high, high, medium, low and very low category. The methodology vulnerability assessment is given in Annexure 4.. The GPs are categorized based on vulnerability scores shown in Figure 4.2. Athipadi, Keelvanakkambadi, Thandarampet, Perunduraipattu, Thanipadi, Narayankuppam, Thenmudiyanur, Mothakkal, Velur T GPs have very high rural water security vulnerability to climate risks. P Quilam, Perayampattu, Nedungavadi, Kambattu, Varagur, Veppurchekkadi, Kanakkandal, Allappanur GPs have very low vulnerability.

Upto	Category	Color range
0.577	Very High	
0.541	High	
0.505	Medium	
0.469	Low	
0.433	Very low	



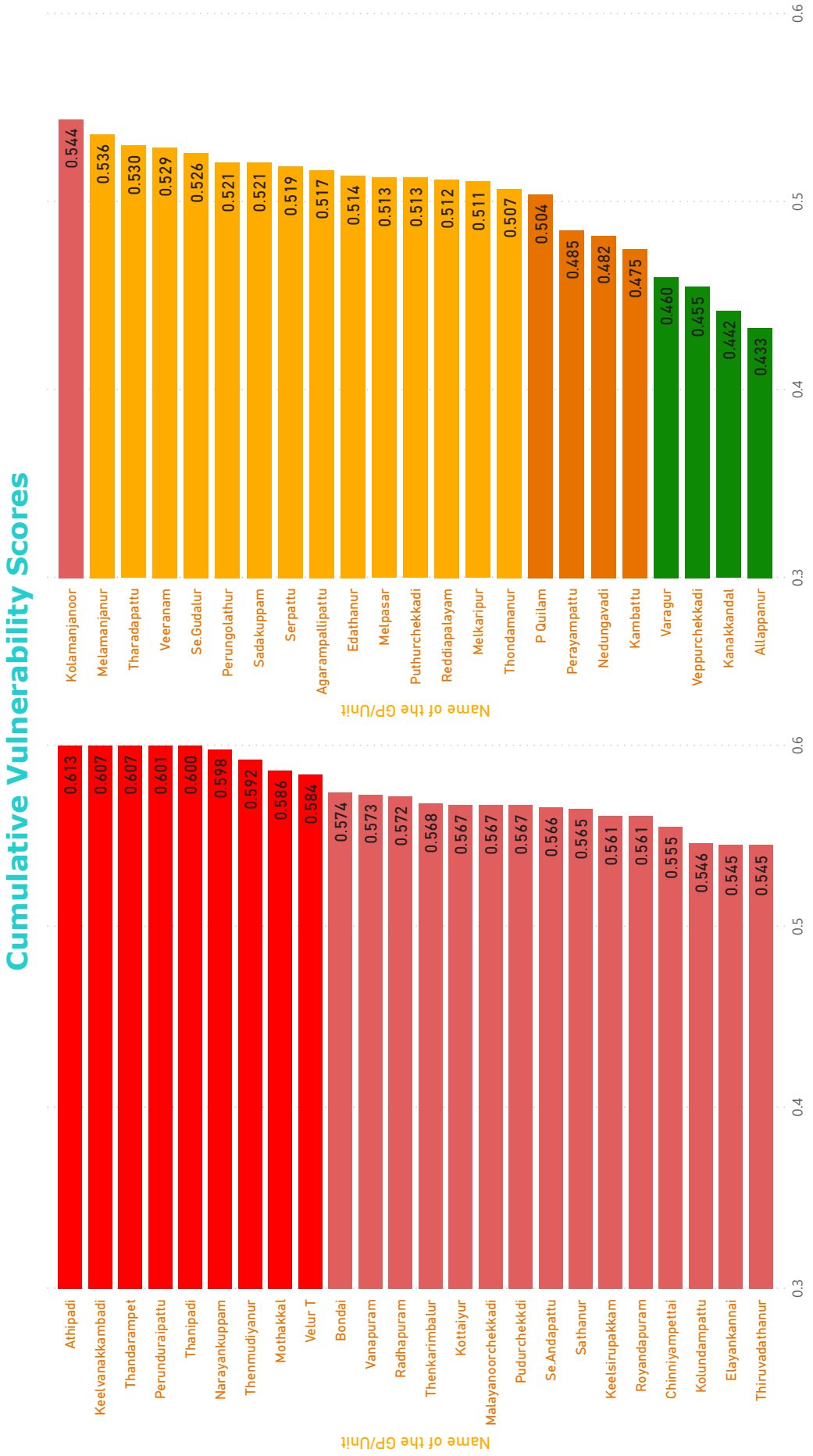


Figure 4.2. Final cumulative vulnerability scores

Sectoral vulnerability

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

Climate risks vulnerability

The climate risk vulnerability index shows that all villages in this Block are affected with droughts and heat waves in last decades Agarampallipattu, Edathanur, Puthurchekkadi, Royandapuram, Thiruvadathanur, Thondamanur GPs have moderate flood vulnerability

AGARAMPALLIPATTU, EDATHANUR, PUTHURCHEKKADI, ROYANDAPURAM, THIRUVADATHANUR, THONDAMANUR

Water resource vulnerability

The water resources vulnerability index shows that Pudurchekkdi, Thenmudiyanur, Athipadi, Mothakkal, Vanapuram GPs have high vulnerablity

PUDURCHEKKDI, THENMUDIYANUR, ATHIPADI, MOTHAKKAL, VANAPURAM

Agriculture resources vulnerability

In agriculture and allied sectors Se.Andapattu, Thanipadi, Keelvanakkambadi, Perunduraipattu, Velur T., Bondai, Narayankuppam, Malayanoorchekkadi GPs has highest vulnerable score

SE.ANDAPATTU, THANIPADI, KEELVANAKKAMBADI, PERUNDURAIPATTU, VELUR T., BONDAI, NARAYANKUPPAM, MALAYANOORCHEKKADI

Socio-economic vulnerability

Athipadi, Kottaiyur, Perungolathur, Velur T., Thanipadi, Thandarampet GPs have high socio economic vulnerability

ATHIPADI, KOTTAIYUR, PERUNGOLATHUR, VELUR T., THANIPADI, THANDARAMPET

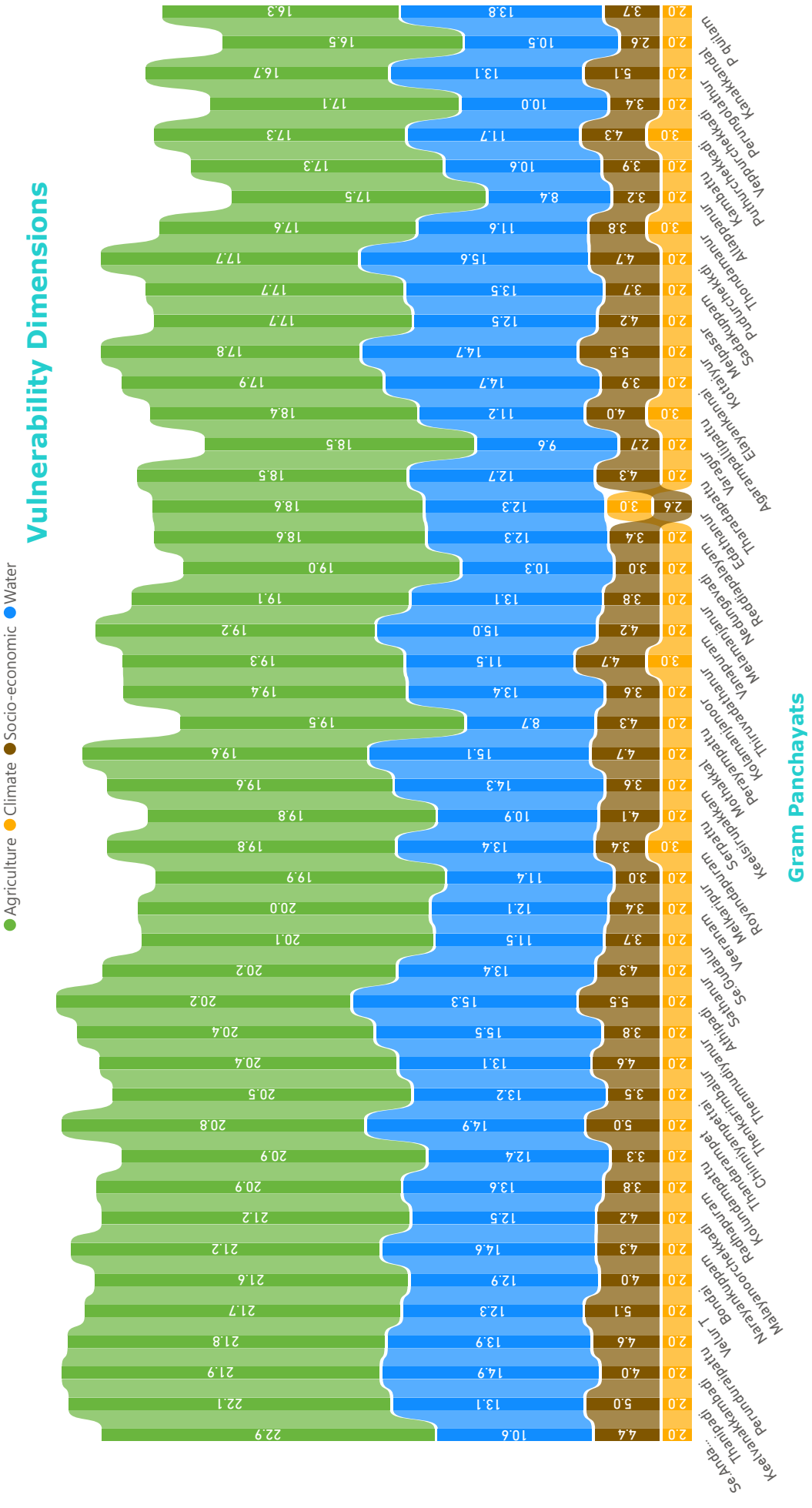
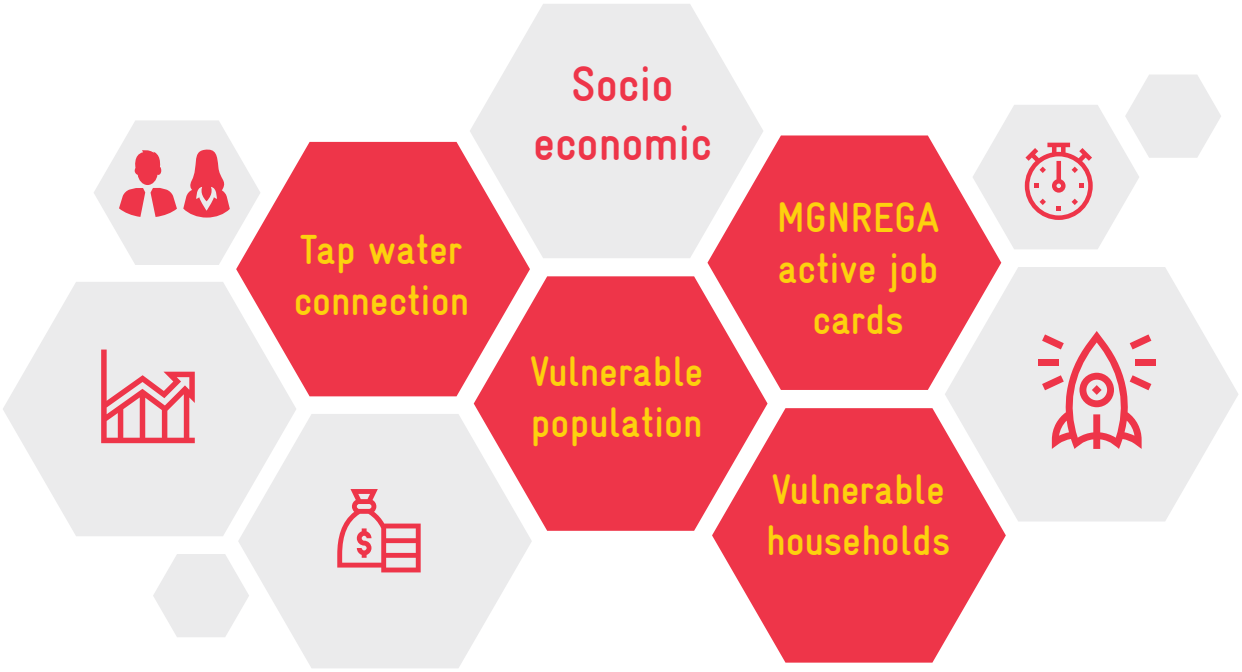
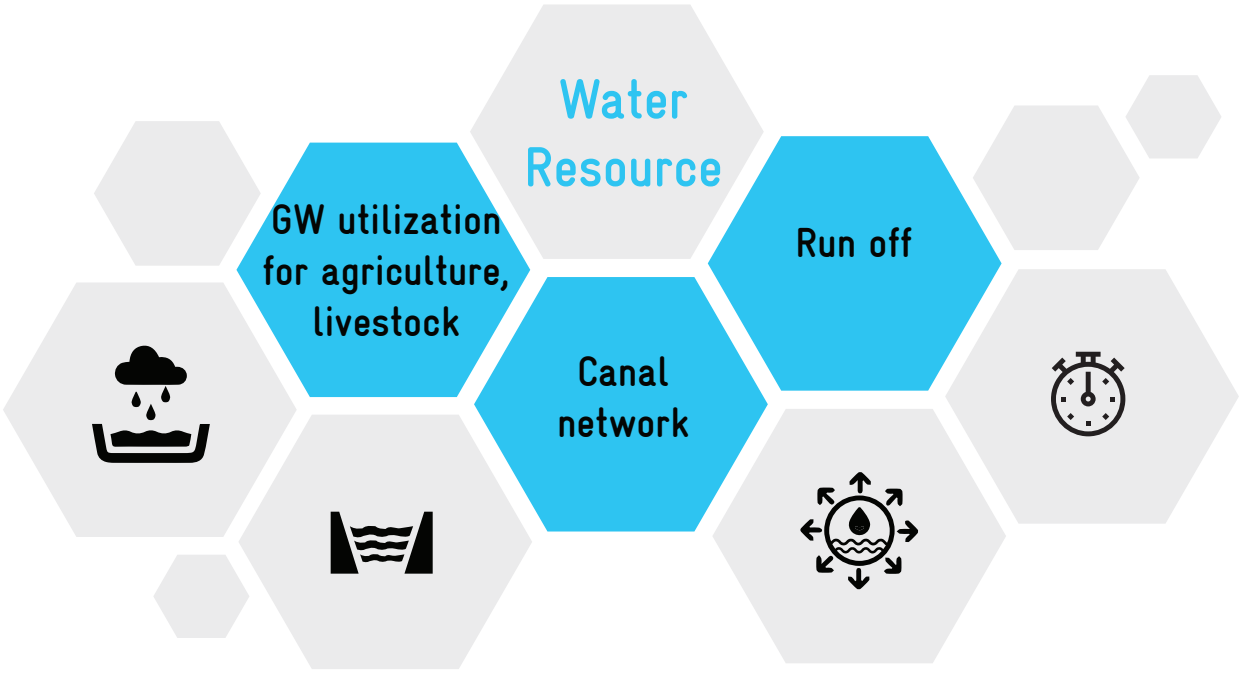
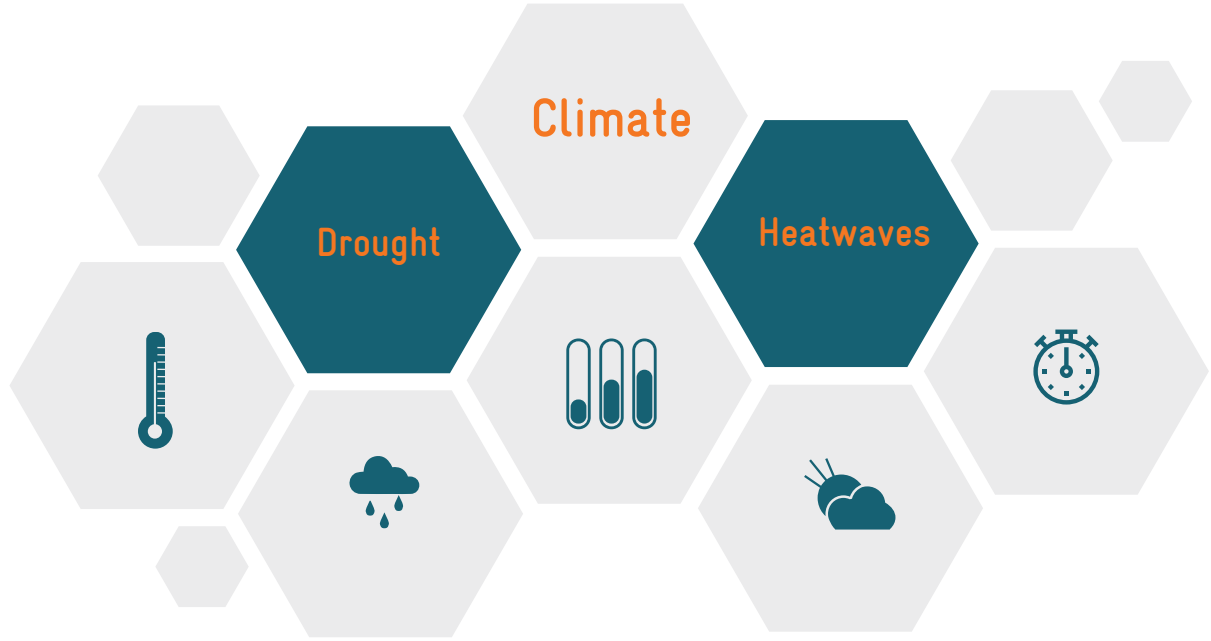


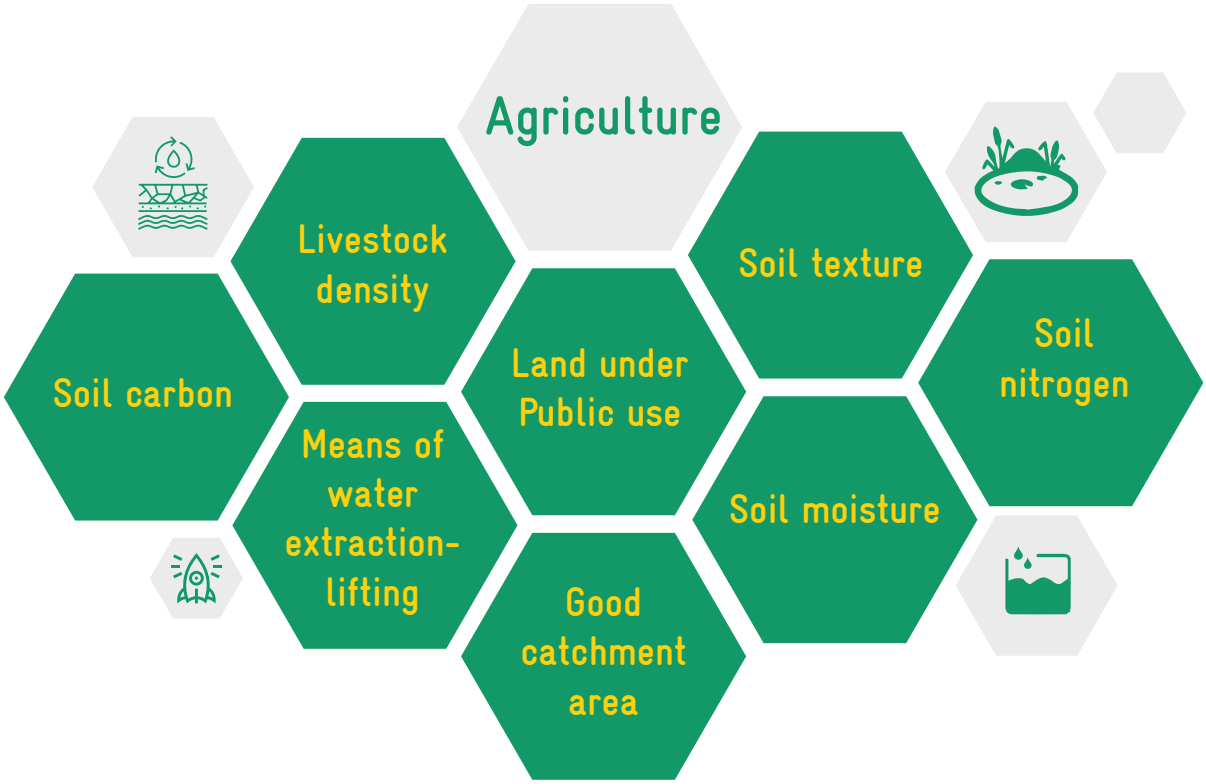
Figure 4.3. GP wise vulnerability dimensions

Contributing indicators to the total vulnerability









Based on the vulnerability assessment, high attention has been given 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

PROPOSED KEY WATER ACTIONS UNDER MAHATMA GANDHI NREGS CONVERGENCE

5 PROPOSED 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 were 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).

5.1 THE PROPOSED AREA UNDER WASCA TREATMENT

Out of 46,595 ha available land in Thandarampet Block, 9,332 ha (21.4 %) area is proposed for treatment under WASCA TN– CWRM planning. A major portion of key water actions is proposed in barre & uncultivable land i. e. 3,188 ha (34.2 %) followed by irrigation land in 1,914 ha (20.5 %) while less than five percent of permanent pastures and other grazing land, unirrigated land, forest land, miscellaneous tree crops etc. land area is proposed for water actions. The detailed land wise proposal for WASCA treatments is given in the Table 10 and Figure 5.1. GP wise proposed area for treatment is also attached in Annexure 5.1.

TABLE 10. THE PROPOSED AREA FOR WASCA TREATMENT

Land use	Total available land (ha)	WASCA proposed treatment area (ha)
Barren & un-cultivable land	4,250	3,188
Irrigated by source	19,142	1,914
Non-agricultural uses	6,725	1,760
Cultivable wasteland	914	685
Fallows land other than current fallows	6,351	654
Current fallow land	3,521	484
Permanent pastures and other grazing land	403	302
Unirrigated land	1,959	199
Forest land	292	117
Miscellaneous tree crops etc.	39	29

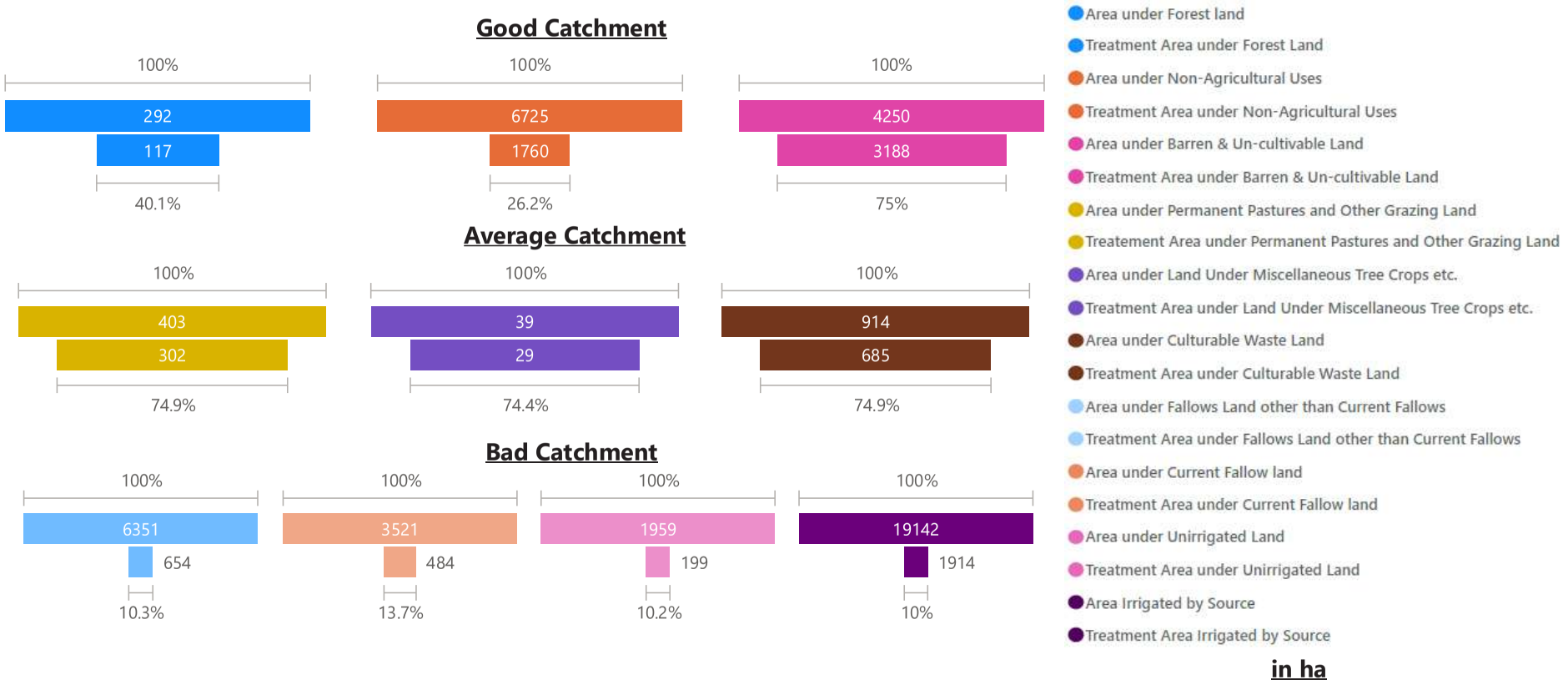


Figure 5.1. WASCA treatment area in percentage

Expected Runoff Conservation after WASCA treatment

The productive developmental activities that were taken up in the WASCA proposed areas are termed as key water actions. With the above proposed treatment area, the expected runoff harvested due to WASCA intervention would be around 3,333 ha.m which is 32 % of the total runoff. Of the expected runoff conservation, 73.8 % comes from good catchment area, 8.54 % comes under average catchment area and 18.08 % comes from bad catchment area (Figure 5.2).

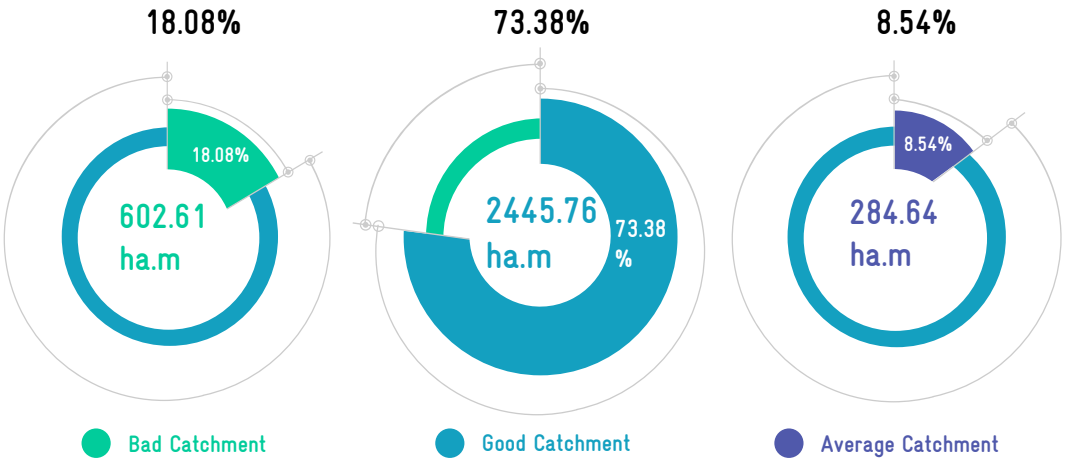


Figure 5.2. Expected conservation after WASCA treatment

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

All the works are proposed based on watershed and livelihood approach. GP wise works are annexed in annexed in Annexure 5.3.

Work (unit)	Abbreviation (unit)	No.	Extent (area in ha or length in m)
Azolla units - Individual (Number of units)	Az	1,292	
Cattle Shelters (Number of units)	CS	979	
Cattle Trough(Number of units)	CT	979	
Fodder development - Community & Individual	FD	-	
Goat Sheep Shelters (Number of units)	GSS	273	
Poultry Shed (Number of units)	PS	-	
Silvi-pasture Development(ha)	SPD	-	-
Soak Pits (Community) (Number of units)	SPC	69	
Soak Pits (Individual) (Number of units)	SPI	85	
Artificial Recharge Structure(Number of units)	ARS	-	4,344.50
Construction of Farm Ponds - Individual (Number of units)	FP	240	

Construction of new open wells & Recharge Shafts (Number of units)	COWRS	1,008	
Restotaration of water bodies:a.PWD and Tanks(Number)	RPWDT	66	
Restotaration of water bodies:b. Ooran-is(Number)	Ro	-	
Restotaration of water bodies:c. Ponds(Num-ber)	RP	157	
Roof Rain Water Harvesting (Number of units)	RRWH	94	
Water Course - Irrigation Channels - Desilt-ing (Mtrs)	WCICD	-	10,234
Afforestation in Public/common lands(ha)	Aff	1,210,283	1,515.38
Avenue plantation(km)	AVP	299	134,523.60
Block Plantation (Community)(ha)	BP	103,174	129.38
Canal Bund Plantation(ha)	CBP	1,501	7,504
Contour Continous Bunds (CCB) for Affor-estaion area(Mtrs)	CCBF	2,500	25
Drainage Line Treatment (DLT)(Mtrs)	DLT	9,686	48,429
Dry land Horticulture/Agro-forestry - Indi-vidual (ha)	DLHAI	3,82,848	1,914
Irrigation Channel Plantation (Mtrs)	ICP	2,047	10,234
Linear Plantation(km)	LP	22,288	1,10,080
Micro Irrigation(ha)	MI	-	-
Nursery Development(Number of units)	ND	4,114	823
Composting (Number of units)	Co	46	-
Farm Bunding with Boundary Trenches - Individual (ha)	FBBTI	90	226
Land development - Individual (ha)	LDI	168	424
NADEP Vermi compost (Number of units)	NADEP	902	


Proposed works are included the drought proofing, livelihood, land development and WCWH, measures
Land development works over 650 ha area
More than 17 Lakhs plants planting
1,565 sites for WCWH
3,600 livelihood works

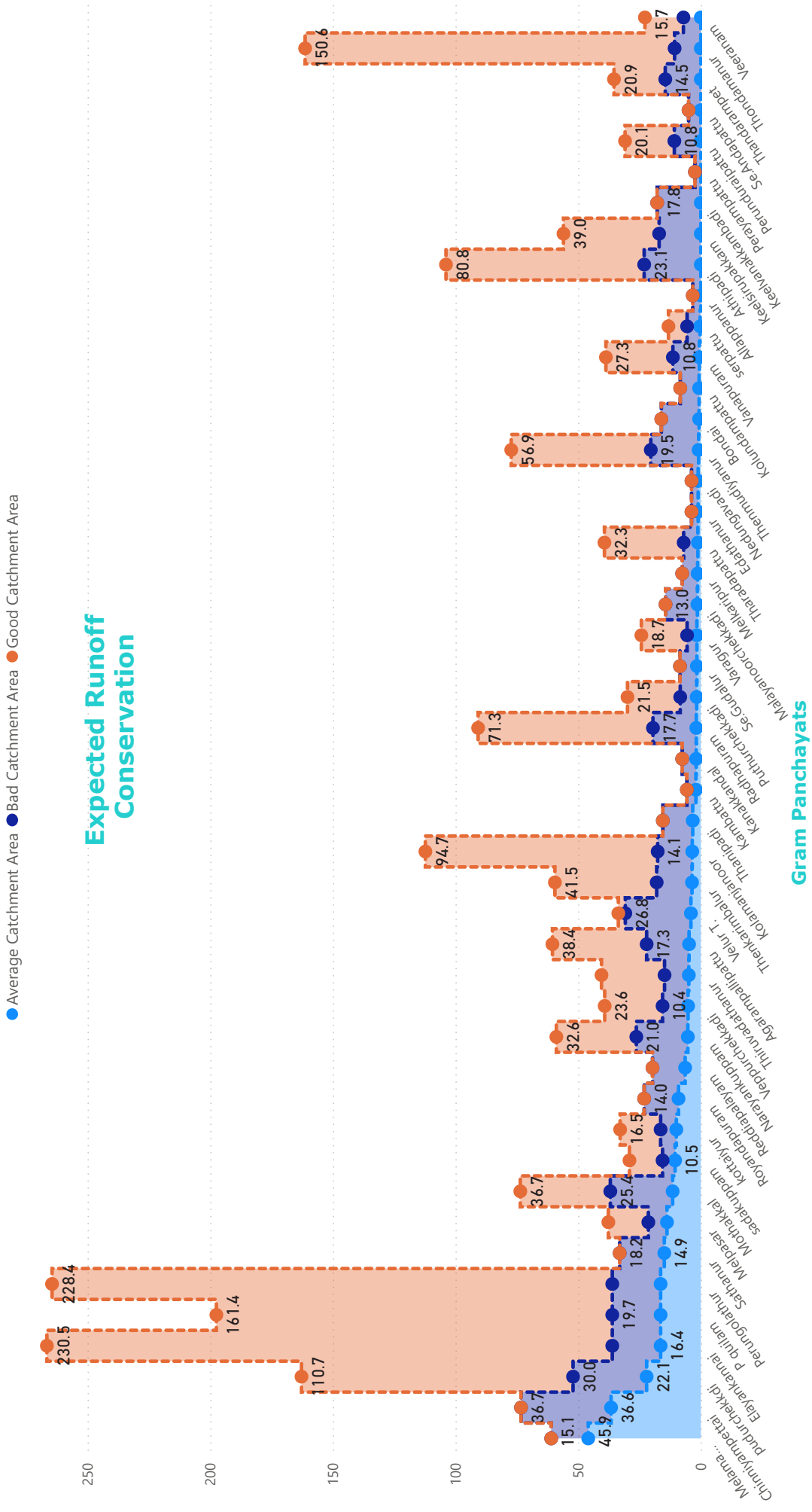


Figure 5.3. Expected GP wise runoff conservation after WASCA treatment

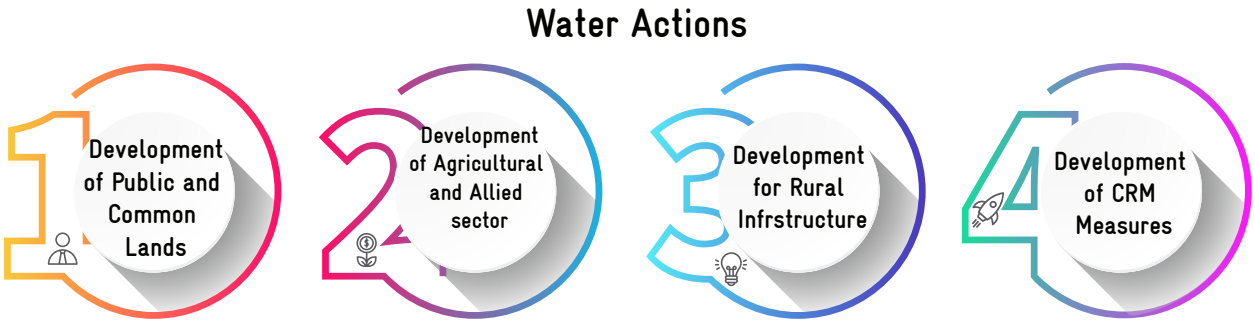
MAHATMA GANDHI NREGS Annual circular 2020-21 (Clause 6.3)

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



5.2 DEVELOPMENT OF PUBLIC & COMMON LANDS

The effective water augmentation measures are proposed in public and common lands via massive tree plantation, restoration of waterbodies etc., as listed in Table 11 and Figure 5.4.

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 CONTINOUS BUNDS (CCB) FOR AFFORESTATION AREA(m)	501	10	0.025	12.53	5,011
COMPOSTING (NUMBER OF UNITS)	3,615	15	0.17	614.55	54,225
AFFORESTATION IN PUBLIC/ COMMON LANDS (ha)	1,438	3,344	8.6	12,370.07	48,09,943
BLOCK PLANTATION (COMMUNITY) (ha)	129	4,320	11.1	5,58,922	5,58,922
SILVI-PASTURE DEVELOPMENT (ha)	88	6,664	17.1	1,504.80	5,86,432
LINEAR PLANTATION (km)	8	703	1.8	14.04	5,483
CANAL BUND PLANTATION (ha)	557	2,930	7.5	3,113	11,76,880
IRRIGATION CHANNEL PLANTATION (m)	27	6	0.015	0.4	159
AVENUE PLANTATION(km)	5	703	1.8	9.03	3,527
NURSERY DEVELOPMENT (NUMBER OF UNITS)	2	2,344	15	27	4,219
RESTOTARATION OF WATER BODIES: A) PWD AND TANKS (NUMBER)	93	800	5	465	74,400
RESTORATION OF WATER BODIES: B.OORANIS (NUMBER)	0	200	2	0	0
RESTORATION OF WATER BODIES: C.PONDS (NUMBER)	144	200	1	288	28,800
ARTIFICIAL RECHARGE STRUCTURE (NUMBER OF UNITS)	293	391	2.5	732.50	1,14,563
WATER COURSE - IRRIGATION CHANNELS - DESILTING (M)	27	3	0.0075	0.2	80
DRAINAGE LINE TREATMENT (m)	561	5	0.03	16.84	2,806

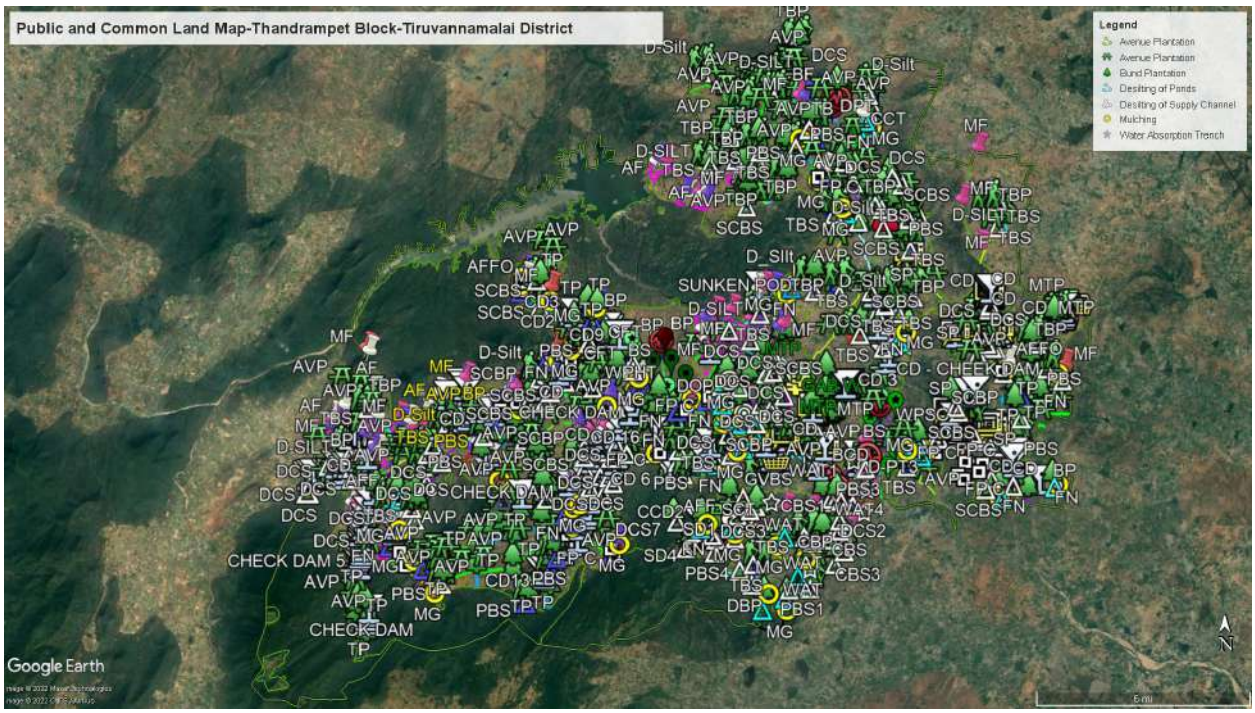


Figure 5.4. Map of Proposed development activities in public and common land

5.3 DEVELOPMENT OF AGRICULTURE AND ALLIED SECTOR

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 12 & Figure 5.5).

DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

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

	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)	225.93	586	1.5	338.895	1,32,395
MICRO IRRIGATION (ha)	0	-	1	35	0
CONSTRUCTION OF FARM PONDS - INDIVIDUAL (NUMBER OF UNITS)	840	781	2	1,680	6,56,040
LAND DEVELOPMENT - INDIVIDUAL (ha)	424	3,906	10	4,237.1	16,55,011
DRY LAND HORTICULTURE/AGRO-FORESTRY - INDIVIDUAL (ha)	786	3,321	8.5	6,681	26,10,306
AZOLLA UNITS - INDIVIDUAL (NUMBER OF UNITS)	567	23	0.15	85.05	13,041
NADEP VERMI-COMPOST (NUMBER OF UNITS)	1,170	27	0.18	210.6	31,590
FODDER DEVELOPMENT - COMMUNITY & INDIVIDUAL	567	2,344	1.48	839.16	13,29,048
CATTLE SHELTERS (NUMBER OF UNITS)	177	331	2.12	375.24	58,587
GOAT SHEEP SHELTERS (NUMBER OF UNITS)	145	355	2.27	329.15	51,475
CATTLE TROUGH (NUMBER OF UNITS)	254	6	0.05	12.7	21,524
POULTRY SHED (NUMBER OF UNITS)	211	10	0.09	18.99	2,110
CONSTRUCTION OF NEW OPEN WELLS & RECHARGE SHAFTS (NUMBER OF UNITS)	346	926	5	1,730	3,20,396

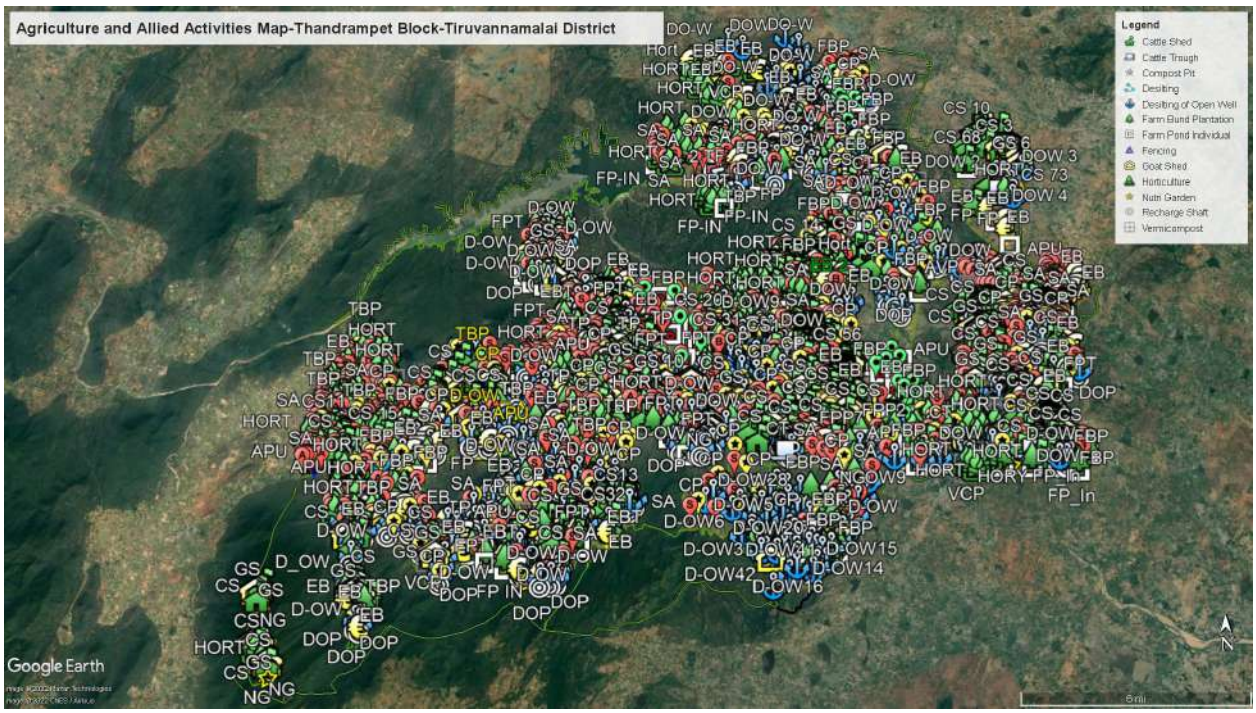


Figure 5.5. Map of Proposed development activities in Agriculture and allied Sectors

5.4 DEVELOPMENT OF RURAL INFRASTRUCTURE

The prominent works on constructing structures for water harvesting and grey water management are proposed as in Table 13 and Figure 5.6.

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	ESTIMATED COST IN INR (LAKHS)	ESTIMATED PERSON DAYS
SOAK PITS (COMMUNITY) (NUMBER OF UNITS)	87	20	0.13	11.31	1,740
SOAK PITS (INDIVIDUAL) (NUMBER OF UNITS)	850	16	0.1	85	13,600
ROOF RAIN WATER HARVESTING (NUMBER OF UNITS)	94	625	4	376	58,750

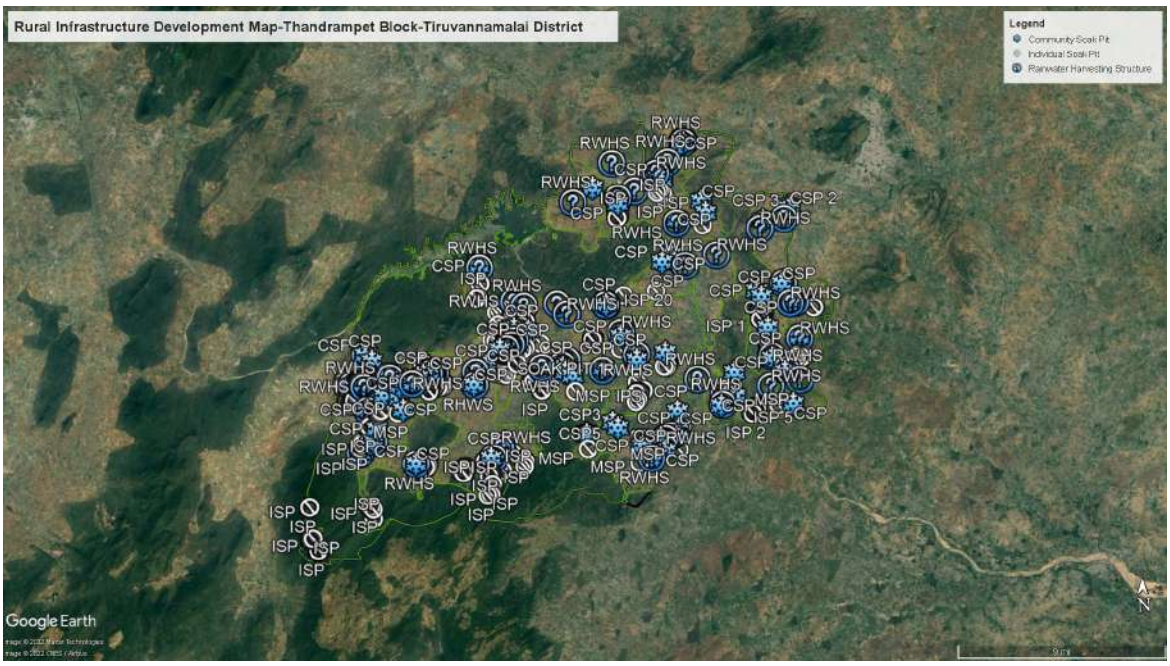


Figure 5.6. Map of Proposed rural infrastructure activities

5.5 PROPOSED CLIMATE RESILIENCE MEASURES

Climate resilient measures are proposed to enable the system to cope up with future climate risks such as droughts, heatwaves and floods (Figure 5.7). As Thandarampet Block is a drought prone area and frequently exposed to severe droughts, more measures are proposed to manage droughts and its subsequent impacts (Table 14). CRM such as farm ponds (Table 15), Silvi-pasture (Table 16), Cascade of Tanks (Table 17), Mini forest (Table 18) and Greening of Hills (Table 19) are proposed in this Block in saturation mode.

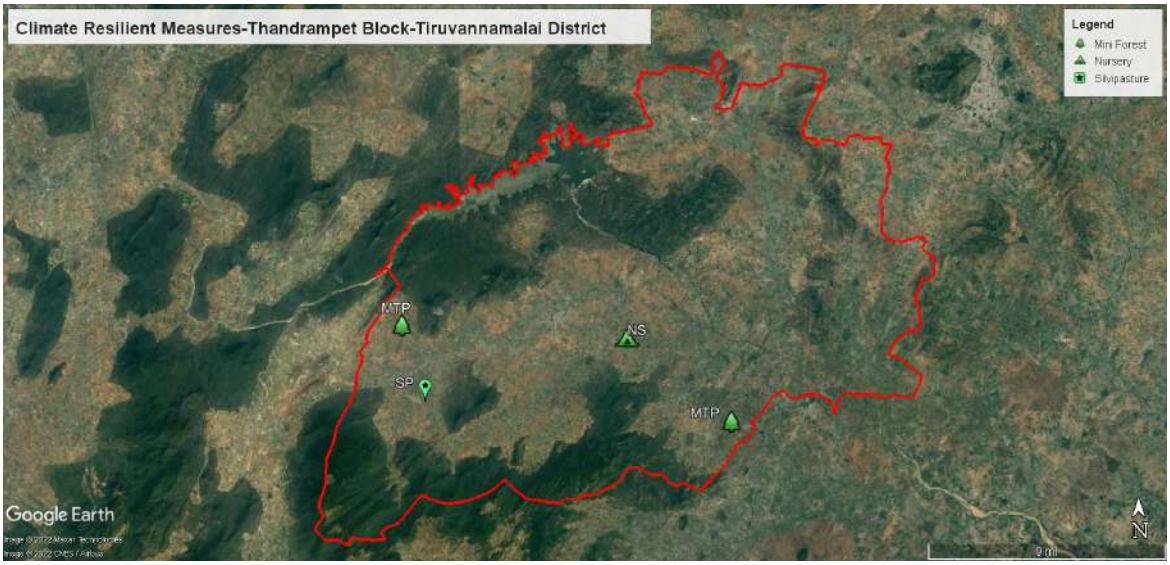


Figure 5.7. Map of proposed climate resilient measures

TABLE 14. GP WISE PROPOSED CRM

GP	Agriculture and allied activities	Public and common land
Agarampallipattu	Farm pond	
Allapanur	Farm pond	
Chinniyampettai	Farm pond	
Elaiyankanni	Farm pond	Greening of Hillocks
Kampattu		Silvi-pasture Development
Kannakandhal	Farm pond	
Kelsirupakkam		Cascade of Tanks
Kolamanjanur	Farm pond	
Kolundhampattu	Farm pond	
Malamanjanur	Farm pond	
Malayanur Chekkadi	Farm pond	Miniforest
Melkaripur	Farm pond	
Melpachar	Farm pond	Greening of Hillocks
Mothakkal	Farm pond	
Narayanakuppam	Farm pond	
Nedungavadi	Farm pond	
P.Quilam	Farm pond	
Perungulathur	Farm pond	
Pudur Chekkadi	Farm pond	Silvi-pasture Development
Puthur Chekkadi	Farm pond	
Rayandapuram	Farm pond	
Reddiyapalayam	Farm pond	
Sathanur	Farm pond	Silvi-pasture Development
T.Velur	Farm pond	
Thandarampet	Farm pond	
Thanipadi	Farm pond	
Tharadapattu	Farm pond	
Thenmudiyanur	Farm pond	Greening of Hillocks
Thiruvadathanur	Farm pond	
Veppurchekkadi	Farm pond	

TABLE 15. DETAILS OF PROPOSED FARM PONDS ACTIVITIES UNDER CRM

GP	Habitation	No. of Farm pond
Allapanur	Allapanur	1
Elaiyankanni	Elaiyankanni	2
Kolamanjanur	Kolamanjanur	1
Kolundhampattu	Kolundhampattu	2
Rayandapuram	Rayandapuram	1
Melpachar	Melpachar	3
Mothakkal	Mothakkal	2
Narayanakuppam	Narayanakuppam	1
Nedungavadi	Nedungavadi	1
Malayanur Chekkadi	Malayanur Chekkadi	3

P.Quilam	P.Quilam	4
Puthur Chekkadi	Puthur Chekkadi	3
Rayandapuram	Rayandapuram	1
Malayanur Chekkadi	Malayanur Chekkadi	1
Reddiyapalayam	Reddiyapalayam	1
Sathanur	Sathanur	3
Thandarampet	Thandarampet	5
Tharadapattu	Tharadapattu	1
Thenmudiyanur	Thenmudiyanur	1
Thiruvadathanur	Thiruvadathanur	1
Veppurchekkadi	Veppurchekkadi	3
Agarampallipattu	Agarampallipattu	2
Chinniyampettai	Chinniyampettai	10
Kannakandhal	Kannakandhal	2
Kolamanjanur	Kolamanjanur	1
Malamanjanur	Malamanjanur	1
Melkaripur	Melkaripur	2
Melpachar	Melpachar	2
Mothakkal	Mothakkal	1
Narayanakuppam	Narayanakuppam	1
Nedungavadi	Nedungavadi	1
Melpachar	Melpachar	1
P.Quilam	P.Quilam	4
Perungulathur	Perungulathur	1
Rayandapuram	Rayandapuram	4
T.Velur	T.Velur	2
Thandarampet	Thandarampet	2
Thenmudiyanur	Thenmudiyanur	2
Veppurchekkadi	Veppurchekkadi	3

TABLE 16. DETAILS OF PROPOSED SILVI-PASTURE ACTIVITY UNDER CRM

Sl.No	GP	Area for Plantation in ha	Total Number of Plants
1	**Kampattu**	2.54	5,000
2	**Pudhur Chekkadi**	3.005	5,800
3	**Sathanoor**	0.925	1,750

TABLE 17. DETAILS OF PROPOSED CASCADE OF TANKS ACTIVITY UNDER CRM

GP	Local Name of the tank
Keelsirupakkam	Keelsirupakkam Eri

TABLE 18. DETAILS OF PROPOSED MINI FOREST ACTIVITY UNDER CRM

Name of the Panchayat	Area for Plantation (in ha)	Total No. of Plants (1 ha - 10000 saplings)	Classification of land
Malayanurchekkadi	10.67	106700	**Kallanguthu**
	9.33	93300	

TABLE 19. DETAILS OF PROPOSED GREENING OF HILLOCKS ACTIVITY UNDER CRM

GP	Area in ha	Classification of land
Melpasar (Kilpasar GLR)	10.98	Kallanguthu
Edathanur	0.43	Others
Thenmudiyanur	49.96	(Malai)

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 PLANNING

6 PROJECTED OUTCOMES OF PLANNING

In view of Mahatma Gandhi NRGES 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	9,332 ha (21.4 %) of the total area treated under WASCA
2	Percentage reduction of run off	3,333 ha.m i.e 32 % of the total runoff harvested due to WASCA interventions
3	No. of waterbodies restored	237 waterbodies (tanks/pond and ooranis) restored
4	Area under afforestation	1,438.38 ha area under afforestation
5	Area under silvi-pasture development	88 ha under Silvi-pasture plantation
6	Length of drainage line treated	4,554 m length of drainage line treated
7	Canal Bund Plantation	6,693 number of plants through 557 works
8	Nursery development	360 units

9,332 ha AREA TREATED

3,333 ha.m TOTAL RUNOFF HARVESTED

237 WATER BODIES RESTORED

1,438.38 ha AREA AFFORESTATION

88 ha SILVI-PASTURE PLANTATION

4,554 m DRAINAGE LINE TREATED

6,693 PLANTS

360 UNITS NURSERY DEVELOPMENT

6.2 OUTCOMES OF DEVELOPMENT OF AGRICULTURE AND ALLIED SECTOR

OUTCOMES OF DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

	INDICATOR	OUTCOMES/ IMPACT
1	Assessment of sources of water for live-stock and agriculture demand No of structures established for on-farm (in-situ) water harvesting in dry lands	840 farm ponds established which target the harvest of 148 ha.m of water which has the potential to irrigate 294 ha area in both kharif and rabi seasons
2	Improvement in soil health	1,170 vermi compost units for soil health improvement
3	Dry land development with agro-forestry	225.93 m in 226 works
4	Households established fodder plots	2,120 ha under dry land horticulture
5		567 vulnerable households established fodder plots

840 FARM PONDS

1,170 COMPOST UNITS

567 FODDER PLOTS

2,120 ha DRY LAND HORTICULTURE

6.3 OUTCOMES OF RURAL INFRASTRUCTURE DEVELOPMENT

OUTCOMES OF RURAL INFRASTRUCTURE DEVELOPMENT

	INDICATOR	OUTCOMES/ IMPACT
1	No. of villages having liquid waste management systems	850 individual and 87 community level soak pits established for recycle of grey water benefiting 46,653 HHs
2	Roof rain water harvesting measures	94 common roof rainwater harvesting and storage structures with a target to harvest and store 0.11 ha.m of rainwater for use
3	Nutri-garden	46,653 HHs established nutri-gardens in homesteads and planted 2,33,265 saplings

87 COMMON & **850** INDIVIDUAL SOAK PITS

94 COMMON ROOF RAINWATER HARVESTING

46,653 NUTRI-GARDENS

2,33,265 SAPLINGS

6.4 OUTCOMES OF CLIMATE RESILIENCE MEASURES

OUTCOMES OF CLIMATE RESILIENCE MEASURES

	INDICATOR	OUTCOMES/ IMPACT
1	Climate resilient measures are identified for climate risks	5 models are identified via., Farm ponds, Silvi pasture, Cascade of Tanks, Mini forest, and Greening of Hills 82 farm ponds in 28 GPs 6.47 ha under silvi-pasture with 12,550 plants Cascade of Keelsirupakkam Eri tank Mini forest with 2 Lakhs plants in 20 ha area Greening of hillocks in 82 ha area

82 FARM PONDS

6.47 ha SILVI PASTURE

12,550 PLANTS

82 ha GREENING OF HILLOCKS

20 HA MINI FOREST

Estimated person days

The total estimated person days required for the above propose activities are 1,43,81,062 as specified below Figure 6.1.

Estimated Cost

The total estimated cost budgeted for the above propose activities is Rs 37,613.96 Lakhs as specified below Figure 6.2.

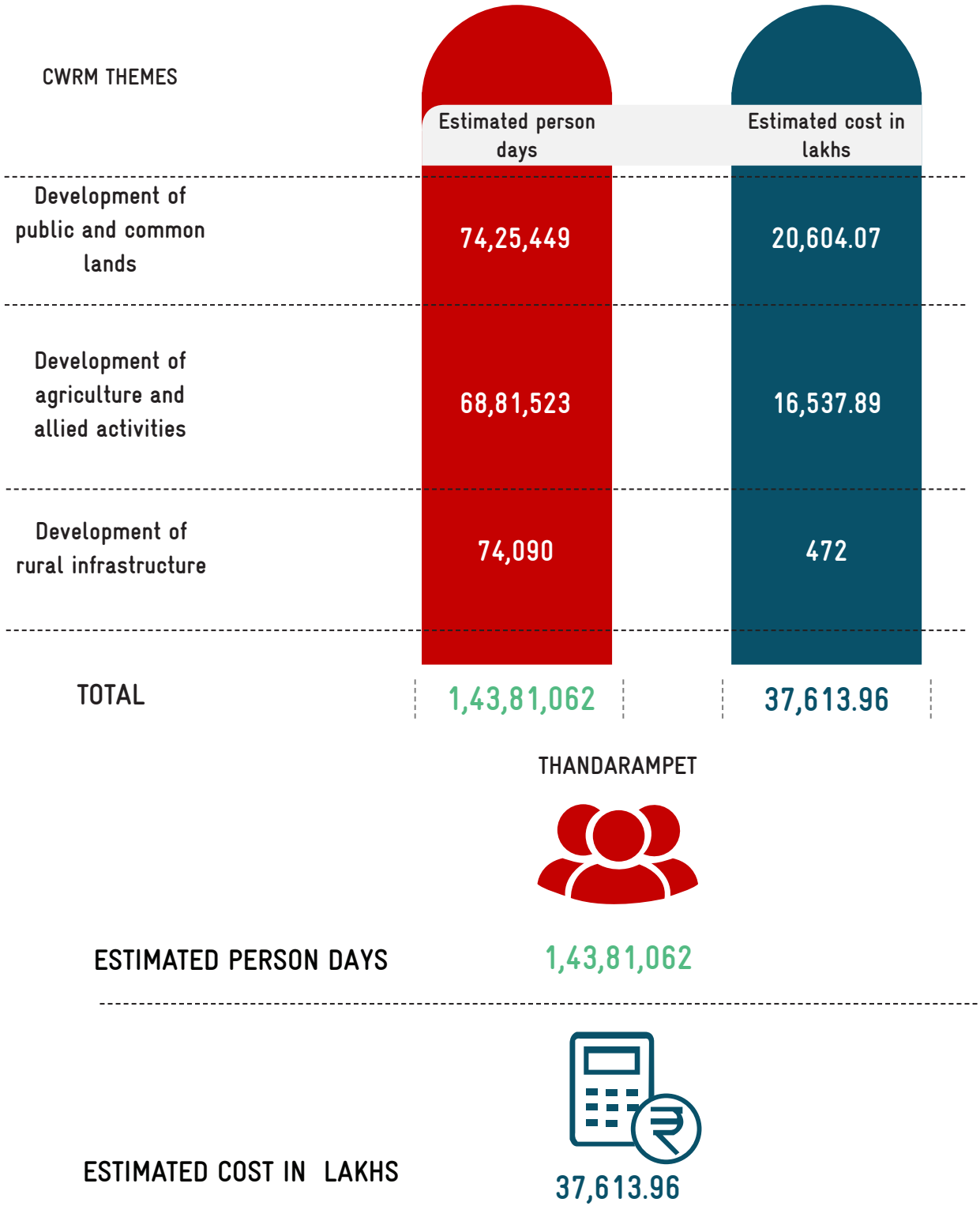


Figure 6.1 & 6.2. Estimated person days & cost for all water actions

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 Contributions (NDC) 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 is indispensable.

6.5.1 NATIONALLY DETERMINED CONTRIBUTION GOALS AND WASCA TN 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 oC 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.

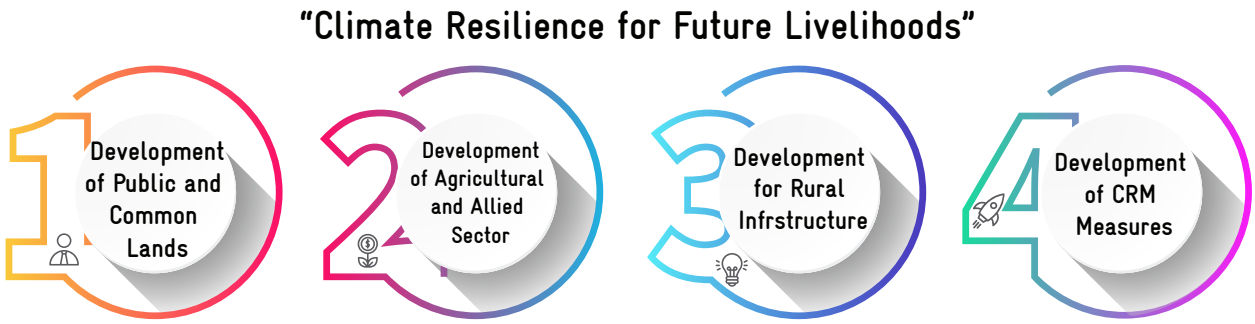
Internationally, the recent process on NDC Enhancement (2020) significantly acknowledge the climate change vulnerability on national sectors including agriculture, energy, and urban areas, especially through impacts on water resources. The role that water and water-related activities play in national 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.



TN WASCA will achieve the above actions working closely with Mahatma Gandhi NREGA programme of Ministry of Rural Development and National Water Mission programme of (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 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	Implement integrated water resources management at all levels (6.5.1)
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 considered for district and Block level vulnerability assessment of WASCA TN which is also used in SDG India 2020-21 report (Table 20)

TABLE 20. COMMON VULNERABILITY INDICATORS USED IN WASCA TN & SDG INDIA 2020-21

Head count ratio as per the multidimensional poverty index (%)	
	Persons provided employment as a percentage of persons who demanded employment under 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 for district level vulnerability assessment along with its linked SDGs are already tabulated in (Table 2). The detailed proposed water actions in CWRM which was assessed based on the vulnerability dimensions are linked with climate vulnerability index and SGDs are tabulated in Table 21 to 23.

TABLE 21. WATER ACTIONS ON DEVELOPMENT OF PUBLIC & COMMON LANDS & ITS LINKED SDG

Name of the work	No. of CWRM works	Climate Vulnerability Index Impacting (WASCA TN)	Linked SDG Goal
Contour Continuous Bunds for Afforestation area (m)	501	W3	SDG 1,2, 6,13&15
Composting (No. of units)	3615	W1	SDG1& 6
Afforestation in Public/common lands (ha)	1438	C1,C2,C3, W3,	SDG 1, 2,6,13&15
Block Plantation (Community) (ha)	129	C1,C2,C3,W3,S2	SDG 1,2, 6 &13, 15
Silvi-pasture Development (ha)	88	C1,C2,C3,W3	SGG 12 &15
Linear Plantation (km)	8	C1,C2,C3,W3,S2	SDG 1,2,6,12&13, 15
Canal Bund Plantation (ha)	557	C1,C2,C3,W3,S2	SDG 1, 6&13, 15
Irrigation Channel Plantation (m)	27	W4,W5,S2	SDG 1,2& 6, 15
Avenue plantation (km)	5	C1,C2,C3,W3,S2	SDG 1, 6&13

Nursery Development (No. of units)	2	C1,S2,S4	SDG 1,2 &6
Restoration of waterbodies :PWD and Union Tanks (No.)	93	S2, S1	SDG 6, 1, 13
Restoration of water bodies : Ooranis (No.)	0	S2, S1	SDG 6, 1, 13
Restoration of waterbodies :Ponds (No.)	144	S2, S1	SDG 6,1, 13
Artificial Recharge Structure (No. of units)	293	W3	SDG 1, 2, & 6
Water Course - Irrigation Channels - Desilting (m)	27	C1,C2,C3,W3,S2	SDG 1, 6&13
Drainage Line Treatment (m)	561	W1,W3,W4	SDG1 & 6

TABLE 22. WATER ACTIONS ON DEVELOPMENT OF AGRICULTURAL AND ALLIED SECTOR & ITS LINKED SDG

Name of the Work	No. of CWRM works	CVI	SDG
Farm Bunding with Boundary Trenches - Individual (ha)	225.93	A1,A3,W1,W3	SDG 1,2&6
Micro Irrigation(ha)	0	A1,A3,A5,W5	SDG 1, 2&6
Construction of Farm Ponds - Individual (No. of units)	840	A1,A3,W5,W1, W3	SDG 2& 6
Land development - Individual (ha)	424	W1,W5,A1,A3,S2,S4	SDG 2, 6& 15
Dry land Horticulture/Agro-forestry - Individual (ha)	786	A1,A3,A4,W1,S4,S2,C1	SDG 1& 2,15
Azolla units - Individual (No. of units)	567	A3,A4,S4	SDG 1& 2
NADEP Vermi compost (No. of units)	1,170	A3, W1, S4	SDG 1& 2,6
Fodder development - Community & Individual	567	A3, S4	SDG 1& 2, 15
Cattle shelters (No. of units)	177	S4	SDG 1& 2
Goat/sheep shelters (No. of units)	145	S4	SDG 1& 2
Cattle trough (No. of units)	254	W5,S4	SDG 1& 2
Poultry Shed (No. of units)	211	S2,S4	SDG 1& 2
Construction of new open wells & Recharge Shafts (No. of units)	346	S3,W5,W1	SDG 1,2 & 6

TABLE 23. WATER ACTIONS ON RURAL WATER MANAGEMENT & IT'S LINKED SDG

Name of the work	No. of CWRM works	CVI	Linking SDG
Soak Pits (Community) (No. of units)	87	W3,S2	SDG 1& 6
Soak Pits (Individual) (No. of units)	850	W3,S2	SDG 1& 6
Roof Rain Water Harvesting (No. of units)	94	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

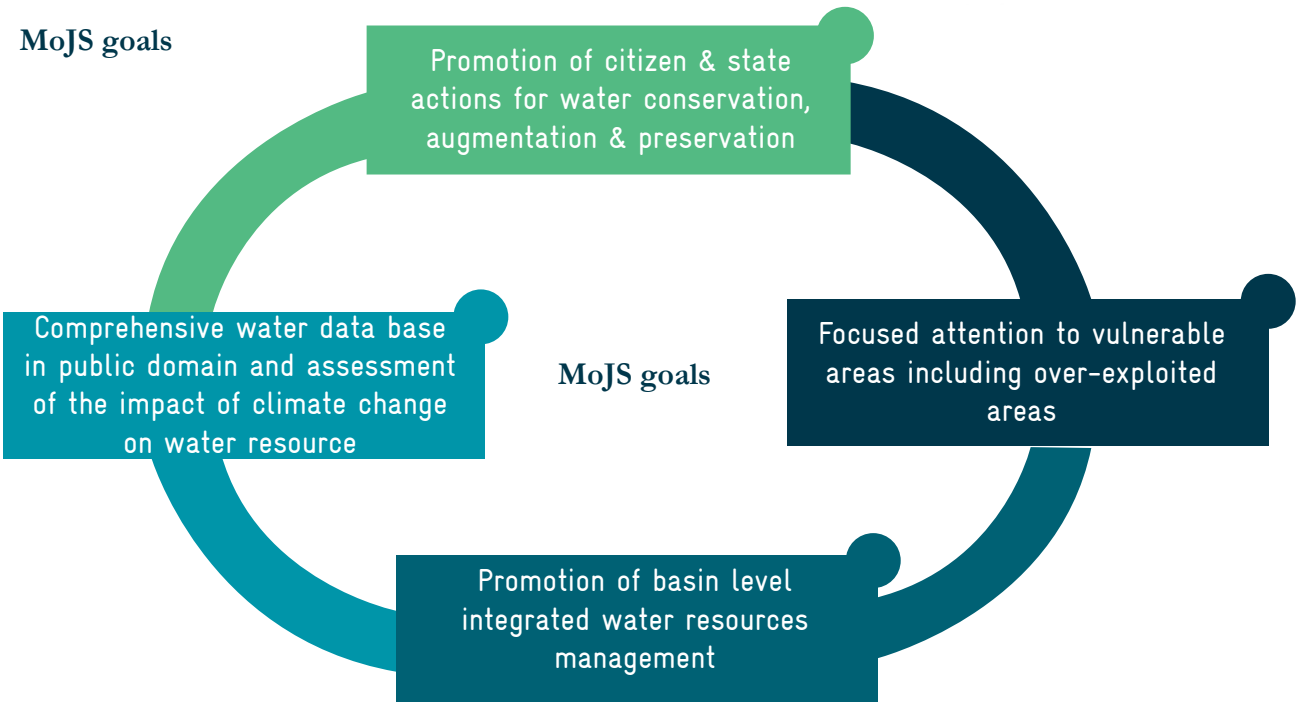
7 IMPLEMENTATION OF GP PLANS

Execution of GP plans includes integrating all verified, approved works in MORD's web enabled ap-plication 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 esti-mation 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, both NRM and Non NRM activities into Mahatma Gandhi NREGS portal. The performance and implementation of GP plans of Thandarampet Bock is listed in Table 24 and the details of work progress, expenditure during the past 3 financial years are shown in Figure 7.1 and 7.2. The Total No. of works, ongoing and completed GIS works are shown in Figure 7.3. The GP wise recommendations and works uploaded are given in Annexure 7.1.

TABLE 24. GIS PLAN IMPLEMENTATION- KEY PARAMETERS PERFORMANCE IN THANDARAMPET BLOCK



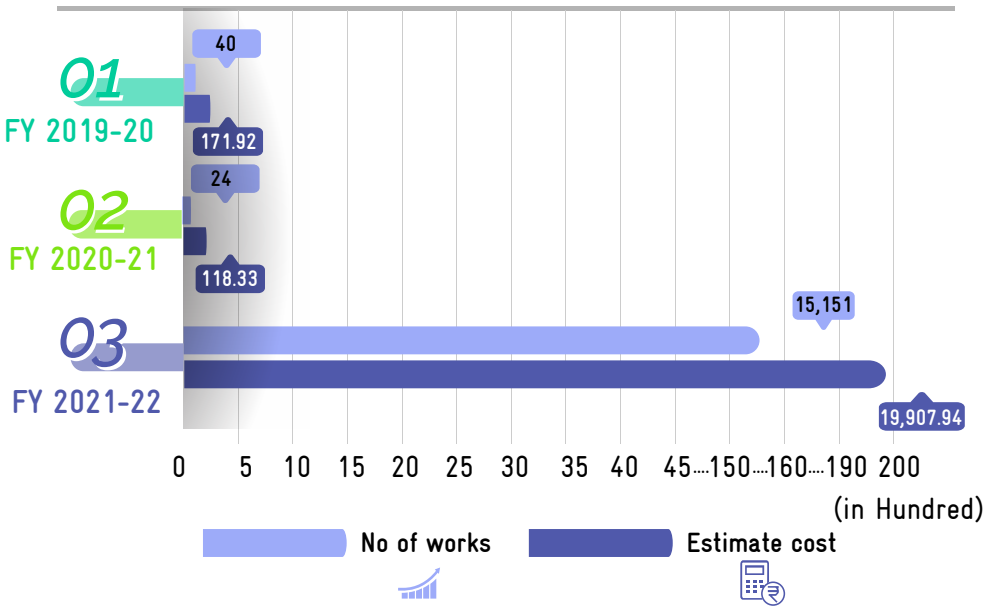


Figure 7.1. Work progress in last three years

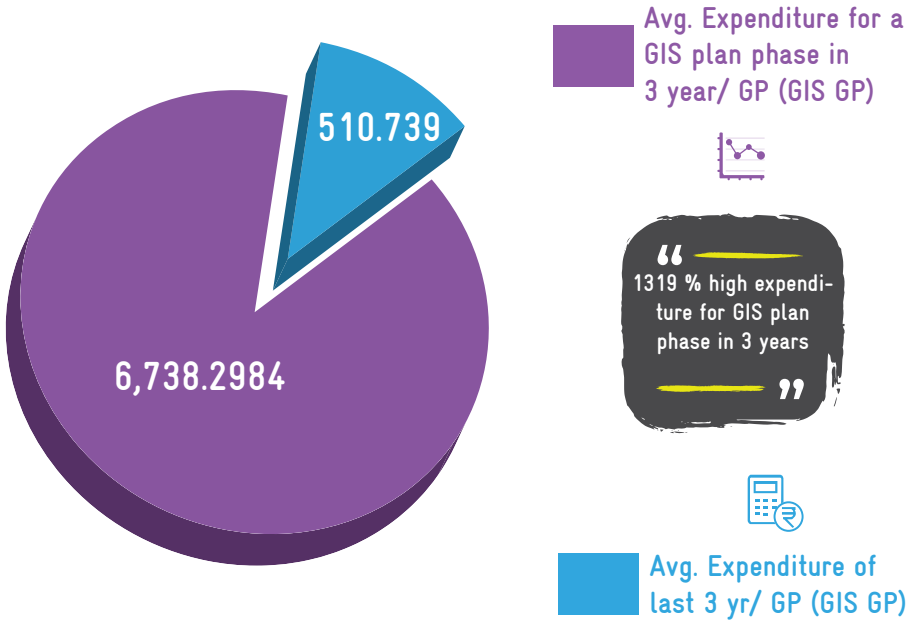
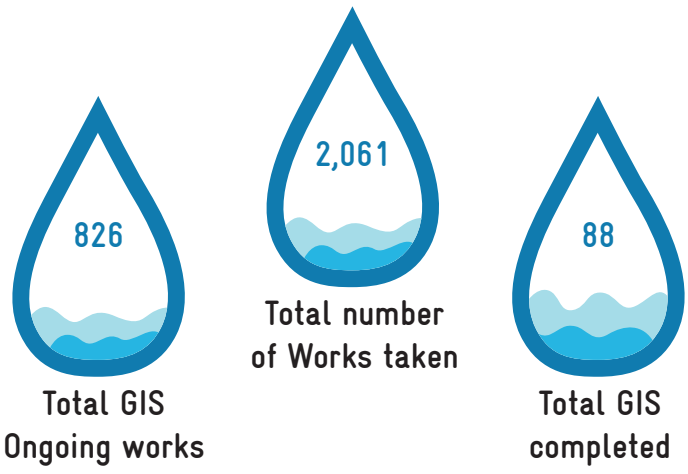


Figure 7.2. Average Expenditure for GIS plan in last 3 years



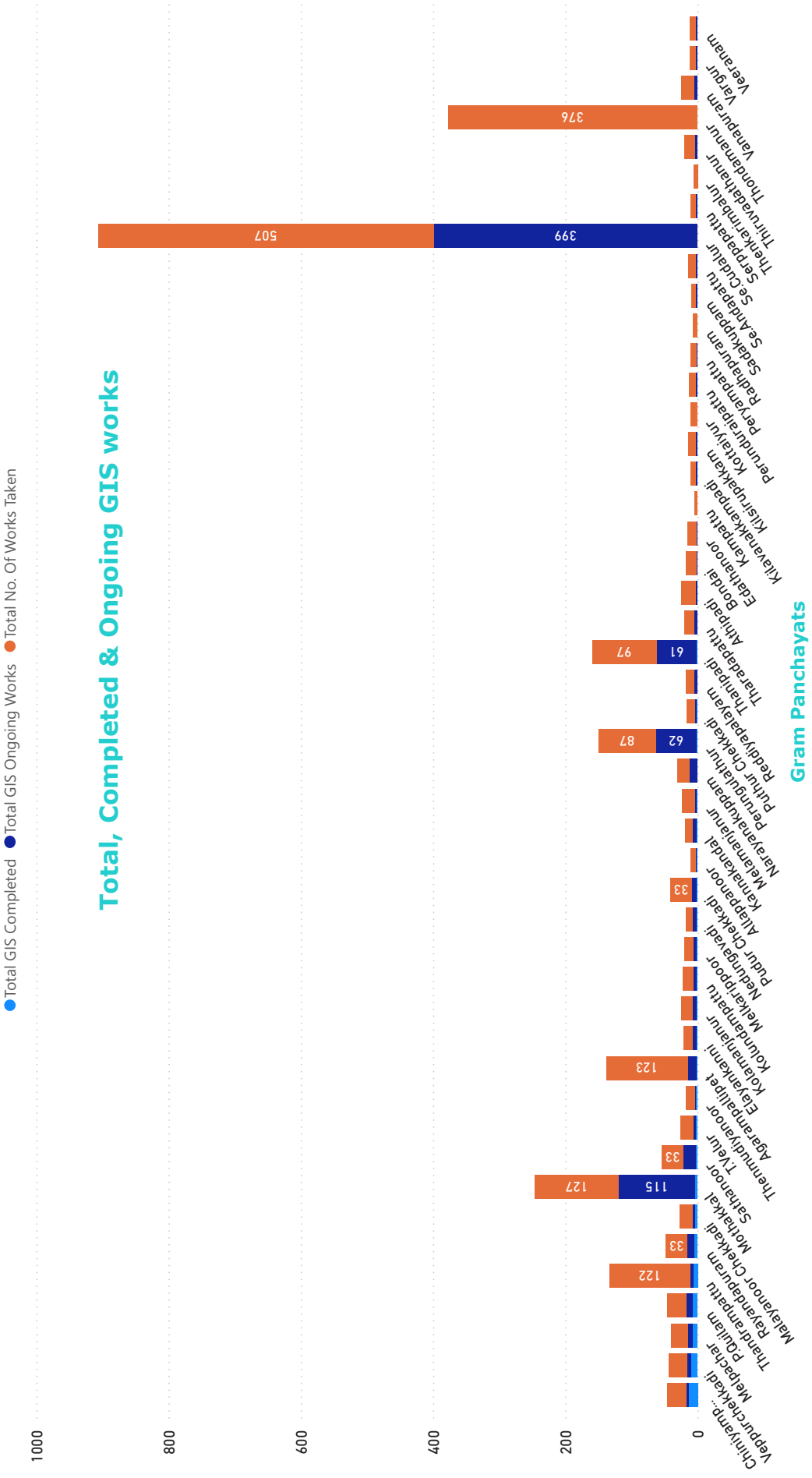
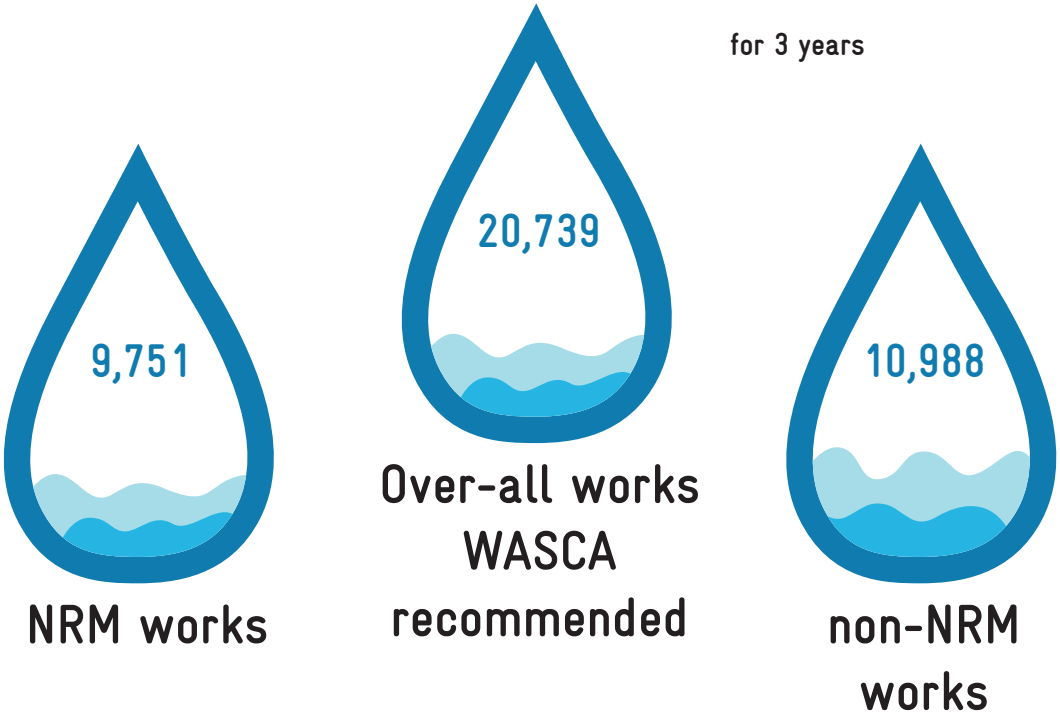


Figure 7.3. GP wise total, completed and ongoing GIS works

7.2 WASCA RECOMMENDED NRM AND NON-NRM WORKS

WASCA recommended 20,739 works for a period of 3 years, out of which 9,751 are NRM works and 10,988 are non NRM works (Figure 7.4). A total of 14,105 works has been uploaded so far for the financial year 2021-22 as on 02/02/2021.



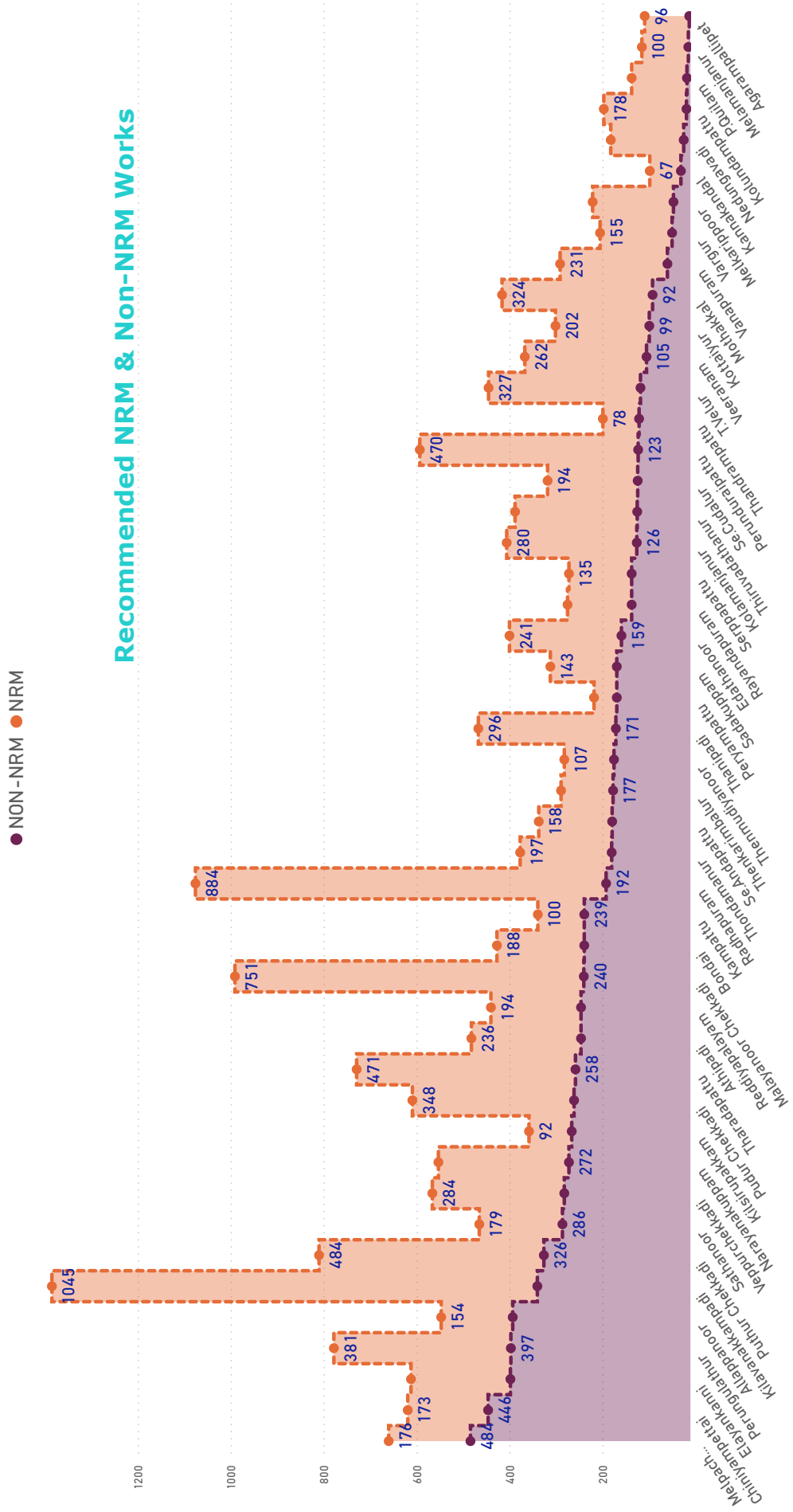


Figure 7.4. GP wise recommended NRM and non-NRM works

7.3 ONGOING WORKS

The ongoing works in Thandarampet Block includes Anganwadi/Other Rural Infrastructure, Drought Proofing, Rural Connectivity, Rural Sanitation, WCWH, Works on Individuals Land (Category IV). A total of 177 works are ongoing in the Block, in which individual benificary orientated works are more (47 %) followed by WCWH (37 %) while drought proofing and Anganawadi/other rural infrastructure works are less in number (< 3 %) (Figure 7.5), GP and work category wise ongoing works are tabulated in Annexure 7.2.

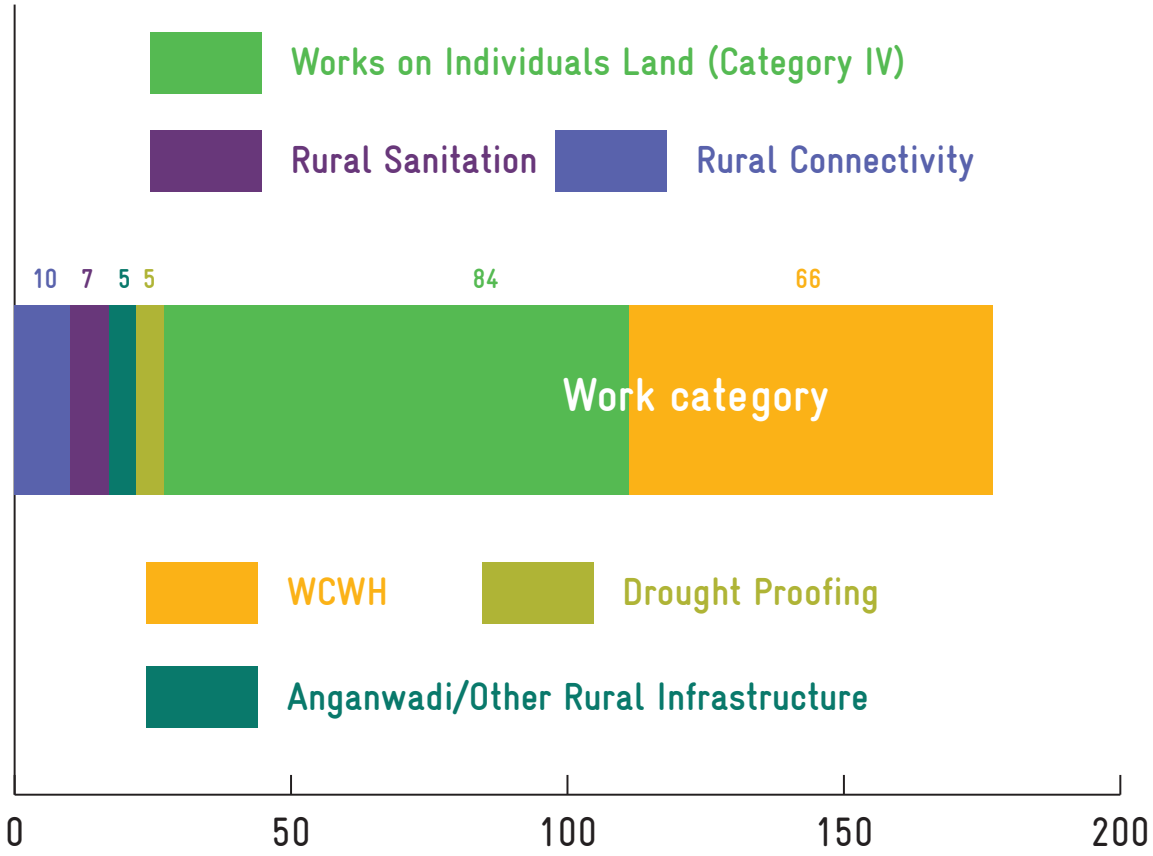


Figure 7.5. Work category-wise ongoing works in Thandrampet Block

7.4 CATCH THE RAIN

The NWM's campaign "Catch The Rain" with the tagline "Catch the rain, where it falls, when it falls" is to nudge the states and stakeholders to create appropriate 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. The expenditure towards progressive works on Catch the rain campaign of Thandarampet Block is shown in Figure 7.6. The expenditure is high for watershed development followed by rain water conservation while less for afforestation activities.

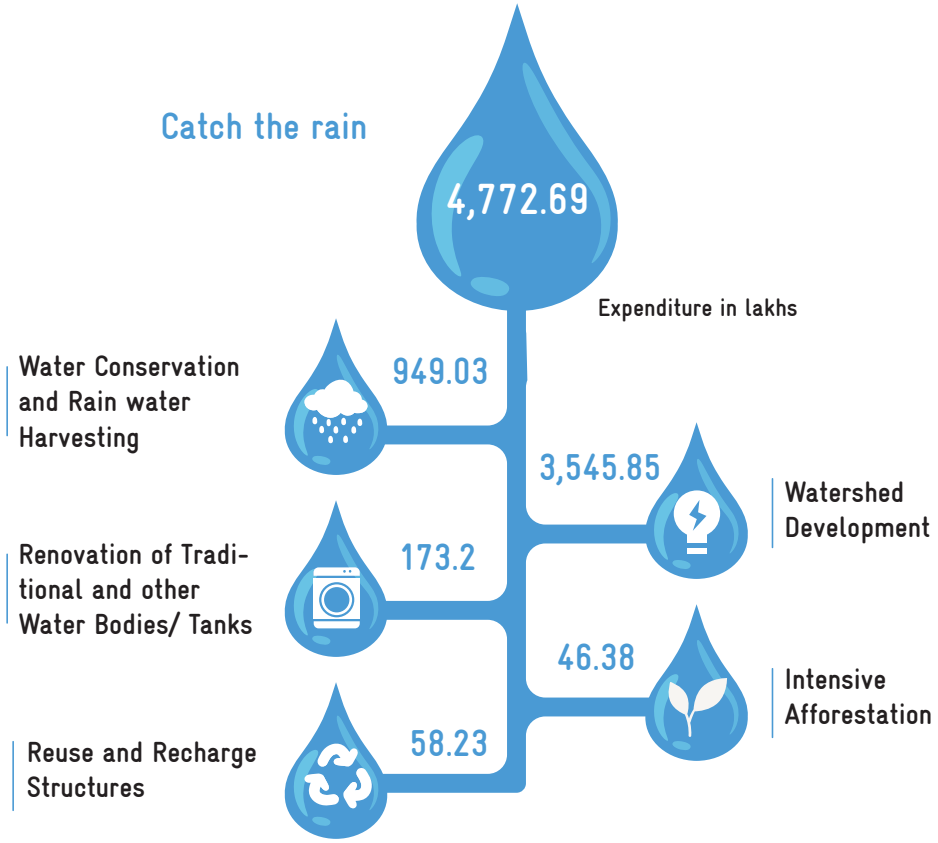
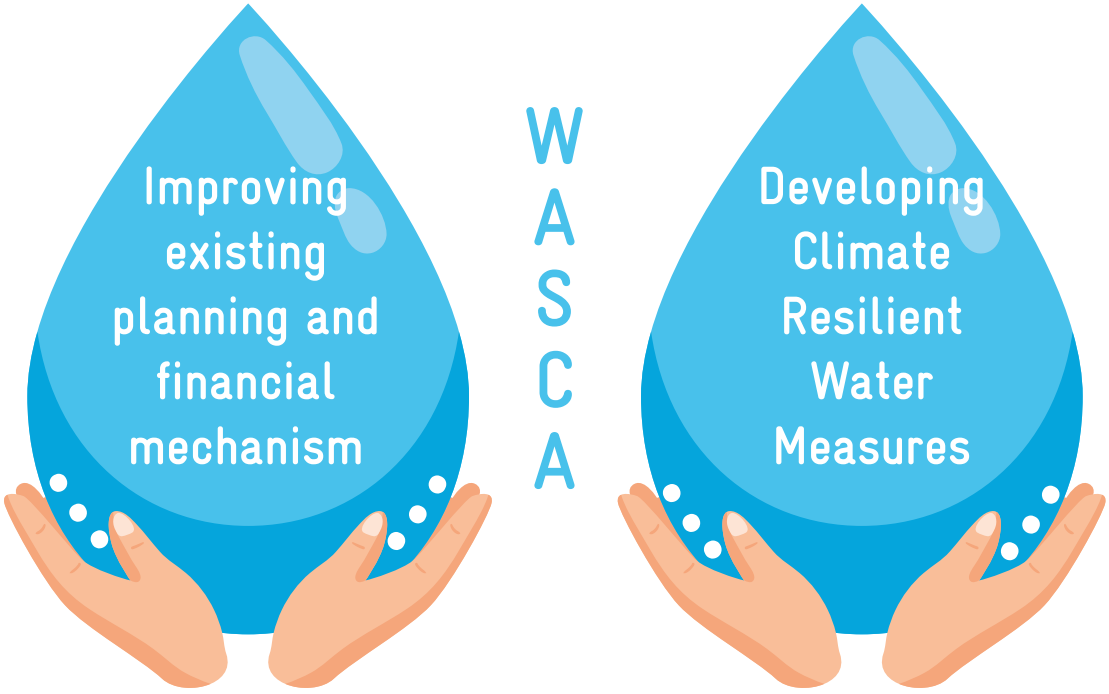


Figure 7.6. Catch the rain campaign in Thandarampet Block



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 STUDIES

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

8.1 MACRO-WATERSHEDS IN THANDRAMPET BLOCK

Thandrampet Block covered under three sub-basins namely Thurinjalar, Pamban and Kallar watersheds (Figure 8.1). The Thurinjalar watershed (4C1B3) consist of 11 micro-watersheds covering an area of 7,019.97 ha. Whereas Pamban watershed (4C1B5) consist of 127 micro-watersheds covering an area of 67,931.75 ha and Kallar watershed (4C1C1) consist 18 micro-watersheds covering an area of 1,079.77 ha (Table 25). Out of 47 GPs of the Block, 44 GPs falls under Pamban (4C1B5) watershed while three GPs covered in both watersheds namely Thurinjalar and Pamban (Table 26). Figure 8.2 shows the GP of this Block in Macro-watershed.

TABLE 25. GENERAL DESCRIPTION OF MACRO-WATERSHEDS COVERING THANDRAMPET BLOCK

Macro-watershed	Area in ha	No. of micro-watersheds
Thurinjalar	7,019.97	11
Pamban	67,931.75	127
Kallar	1,079.77	18

TABLE 26. NUMBER OF GPs COVERED UNDER MACRO-WATERSHEDS IN THANDRAMPET BLOCK

Macro-watershed	No. of GPs
Thurinjalar & Pamban	3
Pamban	44

Understanding the Block area respect to its terrain nature aid in treating area with appropriate measurement at right place also ensures the well management of the watershed (micro or macro). Ridge-based Block area is mapped (zoning) by referring the spatial thematic datasets and showcased with macro-watershed and GPs boundaries. Figure 8.3 and Figure 8.4 show the ridges in macro-watershed and GPs. Based on ridge range types such as high, median, lower and inter variations Block area is distinguished into 4 kind of ridge zones.

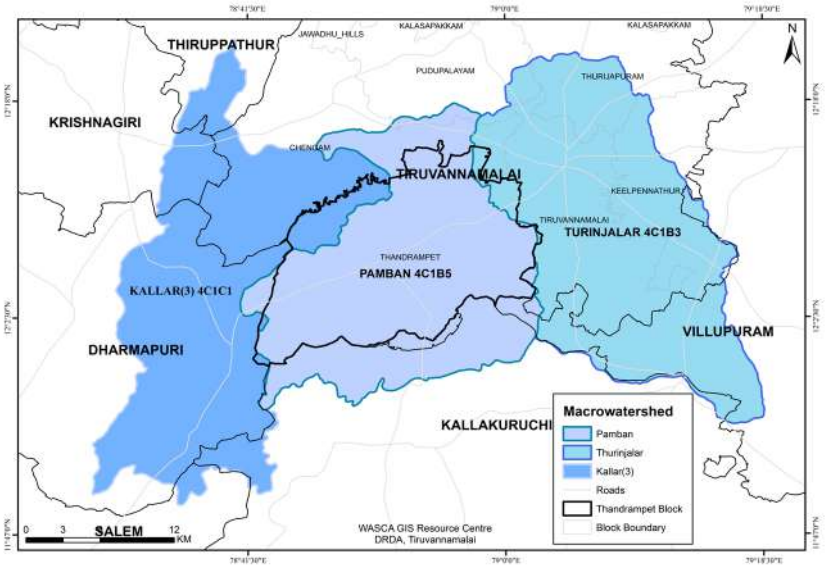


Figure 8.1. Macro-watershed map- Thandrampet Block

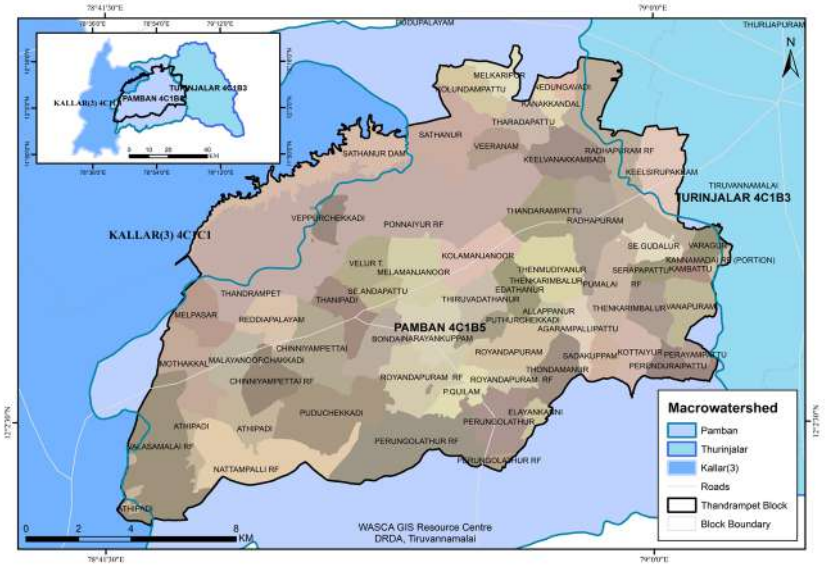


Figure 8.2. Map of Macro-watershed with GPs-Thandrampet Block

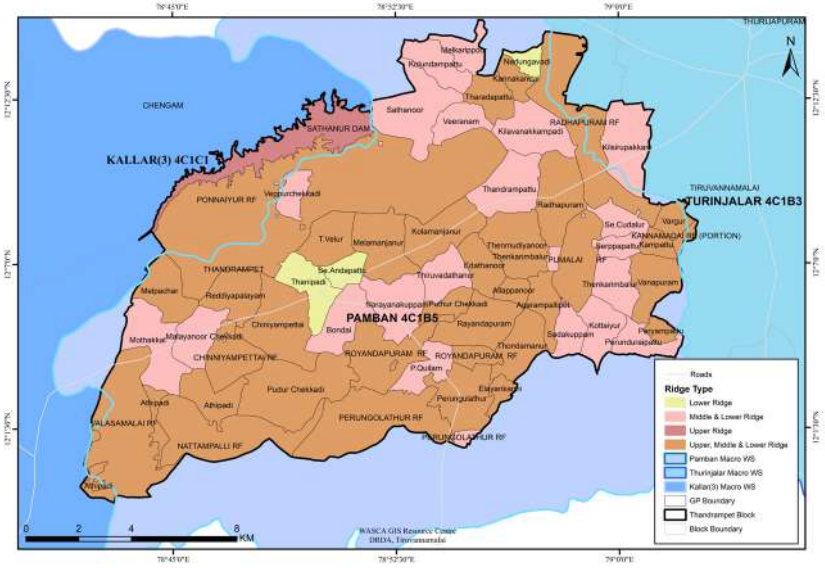


Figure 8.3. Map of Macro-watershed and ridge -Thandrampet Block

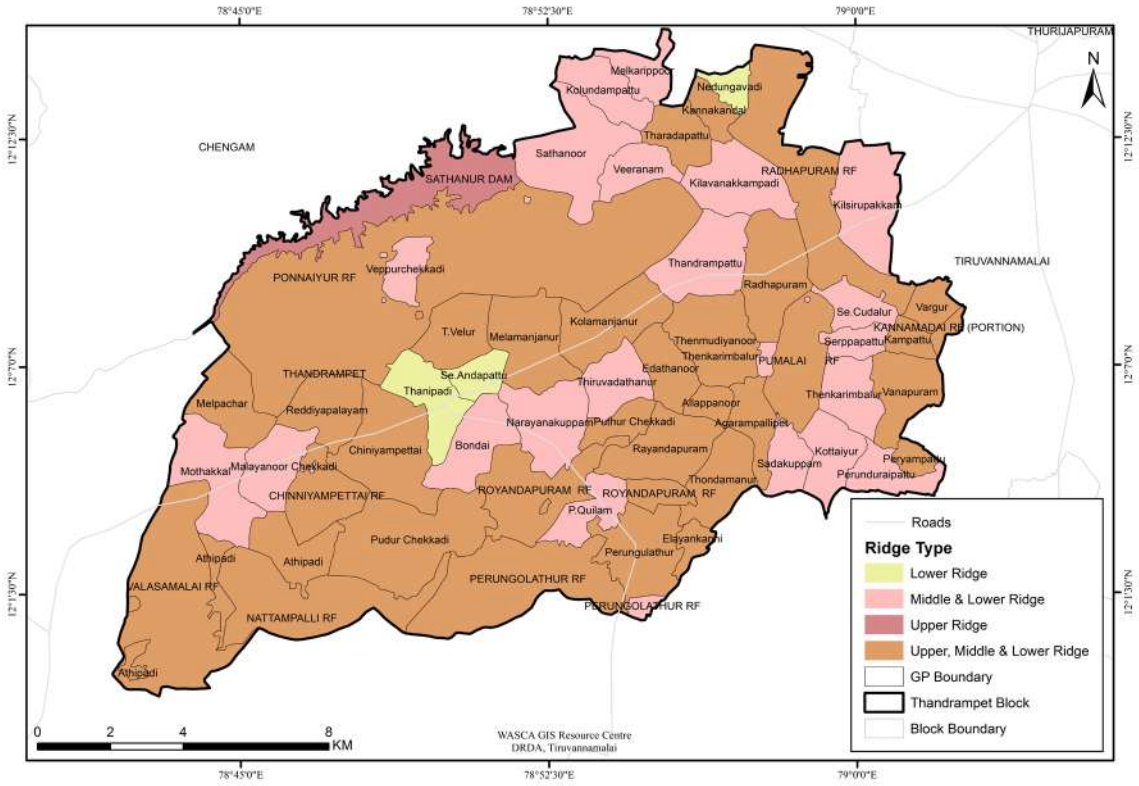


Figure 8.4. GP level ridge map- Thandrampet Block

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 Thandrampet Block are listed in Table 27 to 33.

TABLE 27. MICRO-WATERSHED IN THANDRAMPET BLOCK FALLING UNDER PAMBAN MACRO-WATERSHED

Sl.No	Micro-watershed Code	Micro-watershed Area in ha	Ridge Type
1	4C1B5d10a	957.91	Upper, Middle & Lower
2	4C1B5d07a	691.25	
3	4C1B5d07c	308.65	
4	4C1B5d05a	610.39	
5	4C1B5d06b	571.98	
6	4C1B5d09c	622.17	
7	4C1B5d09b	713.00	
8	4C1B5d03b	735.42	
9	4C1B5d04b	354.60	
10	4C1B5d03c	537.36	
11	4C1B5d04c	560.84	
12	4C1B5c07c	548.29	
13	4C1B5c08a	552.28	
14	4C1B5c06c	650.73	
15	4C1B5c08b	846.67	
16	4C1B5d01b	545.07	

17	4C1B5c10c	993.24	
18	4C1B5d01c	504.26	
19	4C1B5c07a	504.65	
20	4C1B5a10c	787.58	
21	4C1B5c07b	667.06	
22	4C1B5c09c	513.29	
23	4C1B5a10a	864.57	
24	4C1B5c04c	543.81	
25	4C1B5c04d	265.46	
26	4C1B5c04b	644.80	
27	4C1B5a04a	736.39	
28	4C1B5c06b	517.06	
29	4C1B5c10b	348.42	
30	4C1B5c09b	667.79	
31	4C1B5c05b	606.64	
32	4C1B5a10b	422.29	
33	4C1B5a12a	481.50	
34	4C1B5a12b	808.15	
35	4C1B5c05c	309.63	
36	4C1B5c03c	950.17	
37	4C1B5c05a	499.92	
38	4C1B5a14c	718.47	
39	4C1B5a01a	879.08	Upper, Middle & Lower
40	4C1B5a02a	553.46	
41	4C1B5c04a	630.96	
42	4C1B5c01c	308.74	
43	4C1B5a14b	596.81	
44	4C1B5a12c	261.60	
45	4C1B5a15b	1079.99	
46	4C1B5a14a	441.40	
47	4C1B5b03a	415.18	
48	4C1B5a02b	436.89	
49	4C1B5a11b	511.66	
50	4C1B5a05c	696.72	
51	4C1B5a13a	249.33	
52	4C1B5c01b	550.65	
53	4C1B5b03c	951.20	
54	4C1B5a18d	538.12	
55	4C1B5a05d	295.64	
56	4C1B5b03b	270.13	
57	4C1B5a11c	456.78	
58	4C1B5a03a	478.58	
59	4C1B5b09a	768.60	
60	4C1B5a15a	383.92	
61	4C1B5a18a	347.49	
62	4C1B5a07b	647.94	

63	4C1B5a13b	591.59	
64	4C1B5b02a	691.83	
65	4C1B5b02b	452.68	
66	4C1B5a03b	438.30	
67	4C1B5b09b	641.85	
68	4C1B5b02c	515.65	
69	4C1B5a18b	216.24	
70	4C1B5a07a	724.09	
71	4C1B5a08a	590.08	
72	4C1B5a06a	627.64	
73	4C1B5a15c	329.83	
74	4C1B5a08b	865.25	
75	4C1B5a03c	446.60	
76	4C1B5b10a	486.58	
77	4C1B5a13c	389.32	
78	4C1B5a16a	244.21	
79	4C1B5b07a	952.30	
80	4C1B5b09c	309.75	
81	4C1B5a16b	458.14	
82	4C1B5a16c	270.54	
83	4C1B5b07c	656.64	Upper, Middle & Lower
84	4C1B5a08c	398.47	
85	4C1B5b10c	379.34	
86	4C1B5a06b	488.60	
87	4C1B5b10b	333.54	
88	4C1B5a17a	315.36	
89	4C1B5a17c	814.13	
90	4C1B5a09a	456.43	
91	4C1B5b13c	293.33	
92	4C1B5a17b	523.55	
93	4C1B5b11c	457.20	
94	4C1B5b13b	503.09	
95	4C1B5b14a	374.19	
96	4C1B5b14b	614.24	
97	4C1B5b13a	382.87	
98	4C1B5a06c	469.83	
99	4C1B5b08c	325.61	
100	4C1B5a19a	243.94	
101	4C1B5a09c	728.29	
102	4C1B5a19b	232.96	
103	4C1B5a19c	540.47	
104	4C1B5d05b	447.44	
105	4C1B5d06a	351.16	
106	4C1B5d04a	537.83	Middle & Lower
107	4C1B5d03a	536.96	
108	4C1B5c08c	385.78	

109	4C1B5d02a	581.68	Middle & Lower
110	4C1B5c06a	682.40	
111	4C1B5a01c	377.51	
112	4C1B5c09a	509.32	
113	4C1B5c03a	779.59	
114	4C1B5c02a	425.79	
115	4C1B5d06c	358.34	Lower Ridge
116	4C1B5d09a	490.57	
117	4C1B5d02c	625.54	
118	4C1B5d01a	251.96	
119	4C1B5d02b	475.58	
120	4C1B5c10a	618.87	
121	4C1B5a04b	1001.36	
122	4C1B5a11a	375.13	
123	4C1B5c03b	609.52	
124	4C1B5c02c	370.89	
125	4C1B5a05a	157.93	
126	4C1B5c02b	934.14	
127	4C1B5a05b	359.24	

TABLE 28. LIST OF GPs WITH TYPE OF RIDGE FALLING UNDER PAMBAN MACRO-WATERSHED IN THANDRAMPET BLOCK

Sl.No	Name of the GP	Ridge Type
1	Chinniyampettai	Upper, Middle & Lower
2	Kanakkandal	
3	Melpasar	
4	Agarampallipattu	
5	Allappanur	
6	Puduchekkadi	
7	Athipadi	
8	Royandapuram	
9	Puthurchekkadi	
10	Thondamanur	
11	Vanapuram	
12	Reddiapalayam	
13	Edathanur	
14	Melamanjanoor	
15	Perungolathur	
16	Velur t.	
17	Thenmudiyanur	
18	Kolamanjanoor	
19	Kambattu	
20	Elayankanni	
21	Tharadapattu	
22	Radhapuram	

23	Perunduraipattu	Middle & Lower
24	Thiruvadathanur	
25	Bondai	
26	Mothakkal	
27	Kottaiyur	
28	Thandarampattu	
29	Thenkarimbalur	
30	Veeranam	
31	Sadakuppam	
32	Narayankuppam	
33	Kolundampattu	
34	Malayanoorchakkadi	
35	Sathanur	
36	Melkaripur	
37	P.Quilam	
38	Keelvanakkambadi	
39	Serapapattu	
40	Se.gudalur	
41	Veppurchekkadi	
42	Nedungavadi	Lower
43	Se.andapattu	
44	Thanipadi	

TABLE 29. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER PAMBAN MACRO-WATERSHED

Sl.No	Proposed Work	Ridge Type	Extent
1	Afforestation in Public/common lands (ha)	Upper	1,438
2	Drainage Line Treatment (m)		5,611
3	CC Check dams (No.)	Middle	4
4	Block Plantation (Community) (ha)		129
5	Avenue plantation (m)		2,401
6	Agro Forestry (ha)		0
7	Composting (No.)	Lower	46
8	Canal Bund Plantation (m)		758
9	Restoration of water bodies: Tanks and Ooranis (No.)		2
10	Artificial Recharge Structure (No.)		293
11	Farm Bunding with Boundary Trenches - Individual (ha)		225
12	Construction of Farm Ponds - Individual (No.)		159
13	Land development - Individual (ha)		423
14	Azolla units - Individual (No.)		1,292
15	NADEP Vermi compost (No.)		902
16	Cattle Shelters (No.)		979
17	Goat Sheep Shelters (No.)		238
18	Cattle Trough (No.)		979
19	Construction of new open wells & Recharge Shafts (No.)		648
20	Soak Pits (Community) (No.)		357

21	Soak Pits (Individual) (No.)	Lower	85
22	Roof Rain Water Harvesting (No.)		13
23	Nutri Garden (No.)		918
24	Silt application		74

TABLE 30. MICRO-WATERSHED IN THANDRAMPET BLOCK FALLING UNDER THURINJALAR MACRO-WATERSHED

Sl.No	Micro-watershed Code	Micro-watershed Area in ha	Ridge Type
1	4C1B3c08c	582.53	Upper, Middle & Lower
2	4C1B3c08a	917.10	
3	4C1B3a09c	606.51	
4	4C1B3e17a	763.05	Middle & Lower
5	4C1B3e12c	372.93	
6	4C1B3e12b	714.97	
7	4C1B3c11a	767.38	
8	4C1B3e12a	784.12	Lower
9	4C1B3c10c	408.43	
10	4C1B3c11c	727.99	
11	4C1B3c11b	374.92	

TABLE 31. MICRO-WATERSHED IN THANDRAMPET BLOCK FALLING UNDER KALLAR MACRO-WATERSHED

Sl.No	Micro-watershed Code	Micro-watershed Area in ha	Ridge Type
1	4C1C1f01a	735.76	Upper, Middle & Lower
2	4C1C1f02a	519.47	
3	4C1C1f02b	246.08	
4	4C1C1f02c	267.87	
5	4C1C1f03a	407.40	
6	4C1C1f06a	310.84	
7	4C1C1f03c	658.54	
8	4C1C1f06b	378.86	
9	4C1C1f07a	280.39	
10	4C1C1f06c	413.89	
11	4C1C1f07b	541.23	
12	4C1C1f07c	716.16	
13	4C1C1f07d	543.65	
14	4C1C1f08c	775.99	
15	4C1C1b01d	325.25	
16	4C1C1b04a	517.53	
17	4C1C1b04b	823.28	
18	4C1C10000	2337.58	Lower

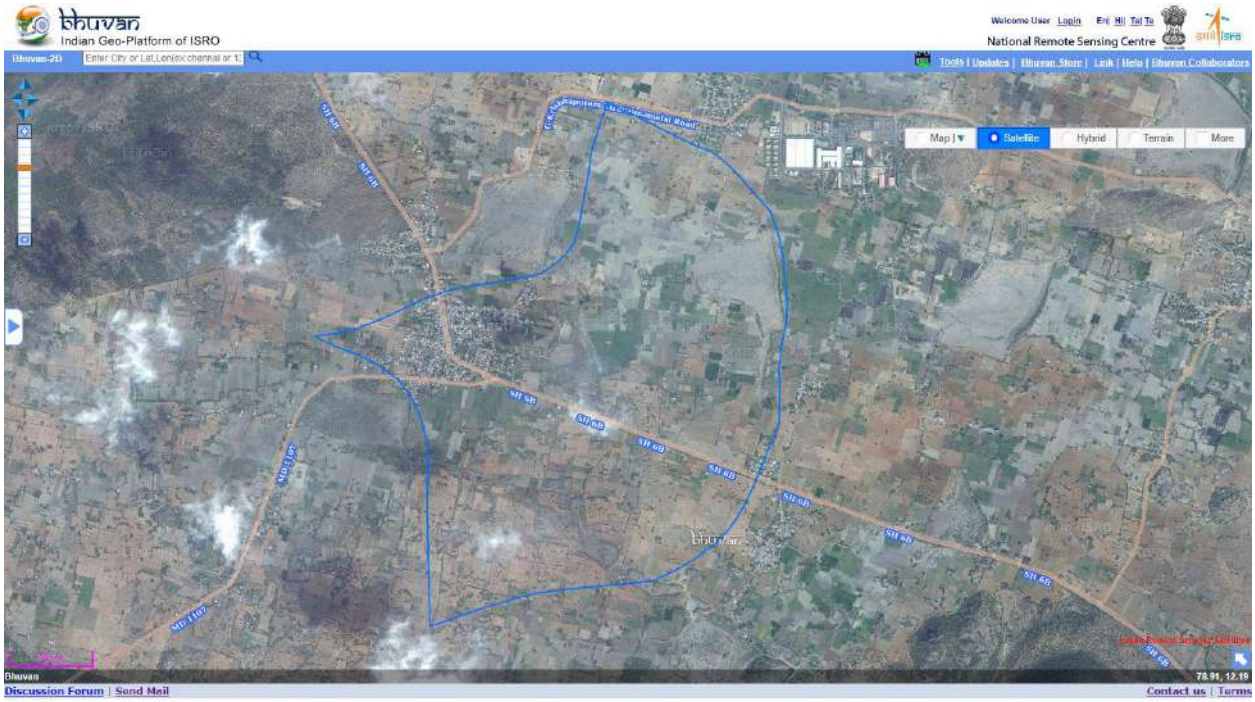
TABLE 32. LIST OF GPS WITH TYPE OF RIDGE FALLING UNDER THURINJALAR & PAMBAN MACRO-WATERSHED

Sl.No	Name of the GP	Ridge Type
1	Varagur	Upper, Middle & Lower
2	Perayampattu	
3	Keelsirupakkam	Middle & Lower

TABLE 33. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER THURINJALAR & PAMBAN MACRO-WATERSHED IN THANDRAMPET BLOCK

Sl.No	Proposed Work	Ridge Type	Extent
1	Afforestation in Public/common lands (ha)	Upper	43
2	Drainage Line Treatment (m)		168
3	CC Check dams (No.)	Middle	8
4	Block Plantation (Community) (ha)		3.87
5	Silvi-pasture Development (ha)		2
6	Avenue plantation (m)		3,249
7	Mini Forest (ha)		2
8	Agro Forestry (ha)		1
9	Composting (No.)	Lower	2
10	Canal Bund Plantation (m)		22
11	Restoration of water bodies: Tanks and Ooranis (No.)		4
12	Artificial Recharge Structure (No.)		9
13	Farm Bunding with Boundary Trenches - Individual (ha)		7
14	Construction of Farm Ponds - Individual (No.)		4
15	Land development - Individual (ha)		12
16	Azolla units - Individual (No.)		25
17	NADEP Vermi compost (No.)		25
18	Cattle Shelters (No.)		204
19	Goat Sheep Shelters (No.)		17
20	Cattle Trough (No.)		3
21	Construction of new open wells & Recharge Shafts (No.)		2
22	Soak Pits (Community) (No.)		6
23	Soak Pits (Individual) (No.)		88
24	Roof Rain Water Harvesting (No.)		4
25	Nutri Garden (No.)		15
26	Silt application (No.)		16

8.2 MODEL MICRO-WATERSHED: SATHANOOR



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 for holistic development and management to ensure sustainable long-term benefits. The micro-watershed plan has been 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 water 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.

SATHANOOR MICRO-WATERSHED

Sathanoor micro-watershed falls under Sathanoor and Veeranam GPs, Thandrampet Block in Tiruvannamalai District. This Micro-watershed is a part of Pamban macro-watershed in Aliyar sub-basin (Figure 8.5). The general information, geology, hydrogeology, natural drainage line, catchment area, ground water status, water budget of Sathanoor 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 34 to 45). Proposed activities shown in Figure 8.6 & 8.7. The key CWRM parameters for the GPs falling in this micro-watershed is Annexed in 8.

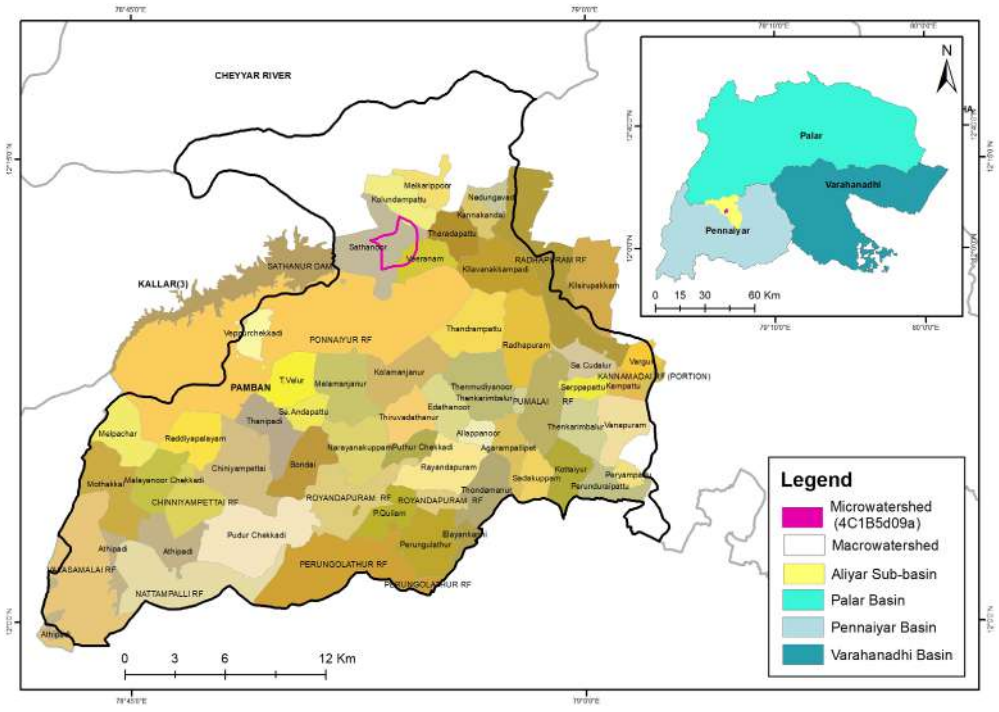


Figure 8.5. Sathanoor micro-watershed location map

TABLE 34. GENERAL INFORMATION OF THE MICRO-WATERSHED

Description	Name/ Number/ Quantity/ Status
Micro-watershed	**Sathanoor**
Micro-watershed number	**4C1B5d09a**
Basin	Pennaiyar
subbasin	Aliyar
Macro-watershed	Pamban
No. of GPs covered under the Micro-watershed	2
GPs	Sathanoor &
	Veeranam
Latitude of Micro-watershed (From To)	12°11'24.07"N to 12°13'6.64"N
Longitude of Micro-watershed (From To)	78°52'54.47"E to 78°54'25.84"E
Total area of the Micro-watershed in ha	491
% of micro-watershed area in Sathanoor GP	78
% of micro-watershed area in Veeranam GP	22
Area of micro-watershed falling in Sathanoor GP (ha)	381
Area of micro-watershed falling in Veeranam GP (ha)	110
Total population of Sathanoor GP	8,749
Total population of Veeranam GP	2,432
Annual Average Rainfall (mm)	1,047
Annual maximum Temperature	33
Annual Minimum Temperature	22.8
Evapo-Transporation Losses of Sathanoor GP (ha.m)	60.76
Evapo-Transporation Losses of Veeranam GP (ha.m)	19.35
Volumetric soil moisture availability (%)	23

Climate Risk	Drought and heat waves
CVI Index Value for Sathanoor GP (Based on WASCA Climate study)	0.565
CVI Index Value for Veeranam GP (Based on WASCA Climate study)	0.529
Agro-Climatic Zone	North eastern zone (TN-1)
Agro Ecological Sub-Region (ICAR)	Eastern Ghats
Status of Ground water in Sathanoor GP	Over Exploited
Status of Ground water in Veeranam GP	Over Exploited

TABLE 35. GEOLOGY, HYDROGEOLOGY OTHER CHARACTERISTICS IN MICRO-WATERSHED

Geology occurrence in % (Hard rock)	100
Geology Quality	Moderate
Depth of weathered zone and/or maximum depth of fractures in Hard Rock area (m)	30 to 60
Bottom of the unconfined aquifer in soft rock areas (m)	20 to 40
No. of lineaments passing through the micro-watershed	Two
Type of lineaments passing through the micro-watershed	Both lineaments in Lower ridge, First one is Structural lineaments, Joint/Fracture and another one is Structural lineaments, Dyke
Sheet Erosion (ha)	125 (middle and lower ridge)

TABLE 36. NATURAL DRAINAGE LINES IN SATHANOOR MICRO-WATERSHED

No. of 1st Order drains	1
Total length of natural drainage line (m)	1,116
Drainage density (ha.m)	2.27

TABLE 37. MICRO-WATERSHED'S CATCHMENT AREA (STRANGE METHODOLOGY- CGWB)

Catchment Area (in ha)	Sathanoor	Veeranam
Good catchment area	228.06	71.71
Average catchment area	70.76	0
Bad catchment area	1331.12	517.79

TABLE 38. GROUND WATER STATUS OF MICRO-WATERSHED

Firka Assessment Unit for Sathanoor and Veeranam GP in ha.m	
Name of the Firka (Assesment Unit) falling under Micro-watershed	Thandarampat
Net Annual Ground Water Availability	2,330.66
Existing Gross Ground Water Draft for Irrigation	2,748.2
Existing Gross Ground Water Draft for domestic and industrial water supply	74.47
Existing Gross Ground Water Draft for All uses	2,822.67
Provision for domestic and industrial requirement supply to 2025	84.65
Net Ground Water Availability for future irrigation development	-502.19

TABLE 39. GP WISE WATER BUDGET OF MICRO -WATERSHED- SATHANOOR & VEERANAM

Water Budget in ha.m	Sathanoor	Veeranam
Water for Human (ha.m)	23.95	6.66
Water for Agriculture (ha.m)	344	217
Water for Animal (ha.m)	6.62	3.45
Village wise water required (ha.m)	374.6	227.11
Available run-off from rain water (derived from strange method) (ha.m)	354.3	123.7
Harvested Runoff from Water Harvesting Activities (ha.m)	2.6	2.1
Potential Harvesting from proposed Interventions (ha.m)	23.6	25.9
Total Water harvested (ha.m)	26.2	28
Water demand and Supply Difference (ha.m)	-348.3	-199.11
Water Demand Supply Gap Status	Deficient	Deficient
Per capita Water Availability (Cum)	404.96	508.63
International Standard per capita water Availability (Cum)	1700	1700
Water Availability Gap (Cum)	-1,295.04	-1,191.37
Water security status	Water Stress	Water Stress

TABLE 40. GP WISE PROPOSED MICRO-WATERSHED WORKS - SATHANOOR & VEERANAM

Proposed works in Ridge	Sathanoor	Veeranam
Upper	-	-
Middle	12	5
Lower	166	50
Total	178	55

TABLE 41. RIDGE WISE TREATMENT AREA, ESTIMATED COST AND PERSON DAYS REQUIRED

Ridge Type	Sathanoor GP	Veeranam GP
Middle Ridge		
Estimated cost for Middle Ridge area (in INR Lakhs)	60	28.5
Total area in ha of Middle Ridge	80	10
Treatment cost of Middle Ridge per ha	**0.75 lakhs/ha**	**2.85 lakhs/ha**
Estimated Person days generated for Treatment of Middle Ridge	**23,442**	**11,135**
Lower Ridge		
Estimated cost for Lower Ridge area (in INR Lakhs)	179.28	54.38
Total area in ha of Lower Ridge (ha)	301	100
Estimated Person days generated for Treatment of Lower Ridge	**72,739**	**18,498**
Treatment cost of Lower Ridge per ha (INR in Lakhs)	**0.59**	**0.54**

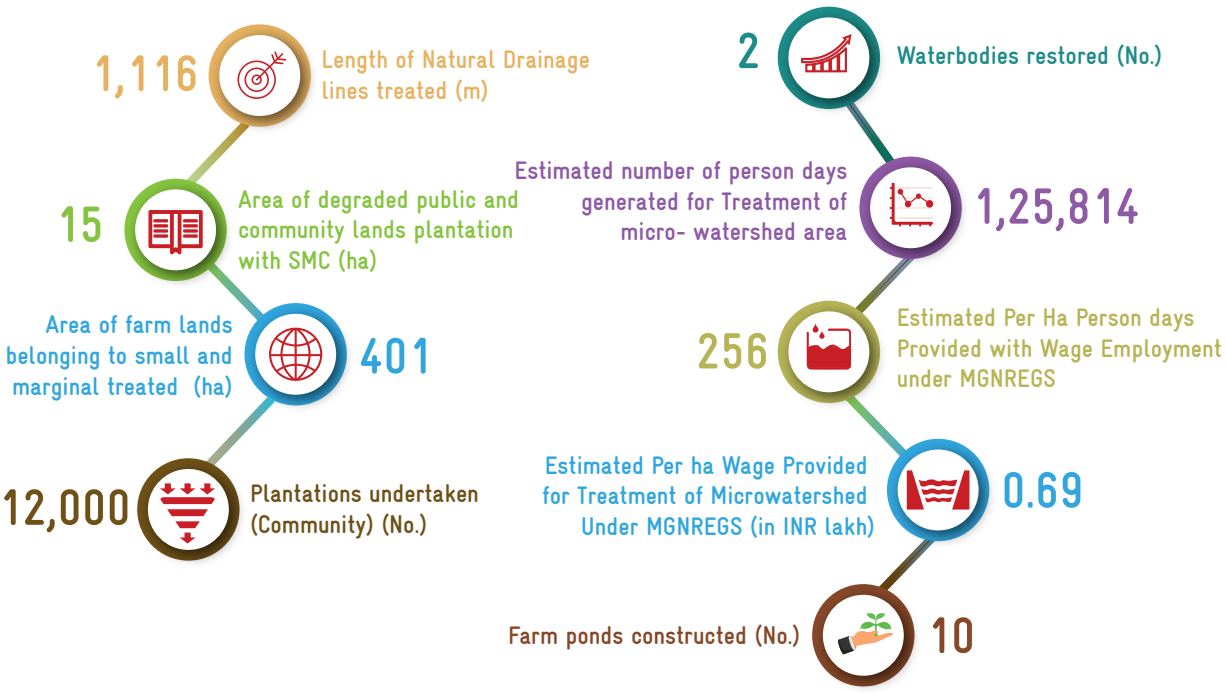
Sathanoor GP	Treatment cost (INR in lakhs)	Estimated person days
Upper Ridge	NA	NA
Middle Ridge	0.75 lakh/ha	23,442
Lower Ridge	0.59 lakh/ha	72,739
	1.34 lakh/ha	96,181

Veeranam GP	Treatment cost (INR in lakhs)	Estimated person days
Upper Ridge	NA	NA
Middle Ridge	2.85 lakh/ha	11,135
Lower Ridge	0.54 lakh/ha	18,498
	3.39 lakh/ha	29,633

TABLE 42. NATURE AND NO. OF WORKS IN MICRO-WATERSHED

Description	Number
Total No. of works in micro-watershed area (Arable, Non arable & DLT)	133
Total No. of works in micro-watershed including livelihood Activities	60
Total No. of works in micro-watershed including rural greywater management activities	40

TABLE 43. KEY OUTCOMES OF INTERVENTION



Expenditure for FY 2020-21 (in INR lakh)

Sathanoor GP	85.7 lakh
Veeranam GP	31.64 lakh

TABLE 44. ESTIMATES OF MICRO-WATERSHED IN SATHANOOR GP

Proposed Work	Ridge Type	Status of Work	Quantity (Area or No.)	No. of works as per KML	Estimate cost (INR in Lakhs)	Person days
NRM works in Public and Community Lands						
Mini Forest (ha)	Lower	Not commenced	1.79	1	11.1	4,320
Afforestation (ha)			1.62	1	13.9	5,417
Tank bund Plantation (No.)			2	2	3.6	1,406
Avenue plantation (km)			2.81	2	5.04	1,968
Compost Pit (No.)			11	11	1.87	165
Restoration of Traditional water bodies: (Union Tank) (No.)			2	2	10	1,600
Sub total				**19**	**45.51**	**14,876**
Works in Individual Farmer lands (Agriculture and Allied Activities)						
Artificial Recharge Structure for borewell farmers (No.)	Lower	Not commenced	7	7	17.5	2,737
Silt application (No.)			4	4		
Fodder development - Individual (No.)			16	16	23.68	37,504
Construction of Farm Ponds - Individual (No.)		Ongoing	7	7	14	5,467
Azolla Production units - Individual (No.)		Commenced	17	17	2.55	391
NADEP Vermi compost (No.)			16	16	2.88	432
Farm Bunding with Boundary Trenches - Individual (ha) (No.)	Middle	Not commenced	15	6	9	3,516
			6			
Dryland Horticulture (ha) (No.)			17	6	51	19,926
			6			
Sub total				**79**	**120.61**	**69,973**
Total				**98**	**166.12**	**84,849**
Livelihood enhancement activities for Individual Farmers (dryland)						
Cattle Shelters (No.)	Lower	Commenced	16	16	33.92	5,296
Goat Sheep Shelters (No.)			16	16	36.82	5,680
Cattle Trough (No.)		Not commenced	16	16	0.8	96
Sub total				**38**	**50.71**	**7,895**
Rural Greywater and Rooftop Rainwater Management						
Soak Pits (Individual) (No.)	Lower	Ongoing	16	16	1.6	256
Nutri Garden (No.)		Not commenced	16	16	0.02	4
Sub total				**32**	**1.62**	**260**
Total				**178**	**239.28**	**96,181**

TOTAL ESTIMATES OF MICRO-WATERSHED IN SATHANOOR GP

	No. of works as per KML	Estimate cost in INR (Lakhs)	Person days
			
Sathanoor GP	178	239.28	96,181

TABLE 45. ESTIMATES OF MICRO-WATERSHED IN VEERANAM GP

Proposed Work	Ridge Type	Status of Work	Quantity (Area or No.)	No. of works as per KML	Estimate cost (INR in Lakhs)	Person days
NRM works in Public and Community Lands						
Loose boulder check dam (No.)	Lower	Not commenced	1	1	0.85	42
Sunken Pit in 1st order drain (No.)			1	1	1.54	383
Gabion Check Dam (No.)			1	1	1.6	160
Afforestation (ha)			1.62	1	8.6	3,344
Avenue plantation (km)			0.739	1	1.341	524
Compost Pit (No.)			5	5	0.85	75
Sub total				**10**	**14.78**	**4,528**
Works in Individual Farmer lands (Agriculture and Allied Activities)						
Azolla Production units - Individual (No.)	Lower	Commenced	3	3	0.45	69
NADEP Vermi compost (No.)			3	3	0.54	81
Artificial Recharge Structure for borewell farmers (No.)		Not commenced	5	5	10	1,564
Silt application (No.)			3	3		
Fodder development - Individual (No.)			3	3	4.44	7,032
Construction of Farm Ponds - Individual (No.)		Ongoing	3	3	6	2,343
Farm Bunding with Boundary Trenches - Individual (ha) (No.)	Middle	Not commenced	5	2	3	1,172
			2			
Dryland Horticulture (ha) (No.)			7	3	25.5	9,963
			3			
Sub total				**25**	**49.93**	**22,224**
Total				**35**	**64.71**	**26,752**

Livelihood enhancement activities for Individual Farmers (dryland)						
Cattle Shelters (No.)	Lower	Commenced	4	4	8.48	1,324
Goat Sheep Shelters (No.)			4	4	9.08	1,420
Cattle Trough (No.)		Not commenced	4	4	0.2	24
Sub total				**12**	**17.76**	**2,768**
Rural Greywater and Rooftop Rainwater Management						
Soak Pits (Individual) (No.)	Lower	Commenced	4	4	0.4	64
Nutri Garden (No.)		Not commenced	4	4	0.01	2
Sub total				**8**	**0.41**	**113**
Grand Total				**55**	**82.88**	**29,633**

TOTAL ESTIMATES OF MICRO-WATERSHED IN VEERANAM GP

	No. of works as per KML	Estimate cost in INR (Lakhs)	Person days
Veeranam GP	55	82.88	29,633

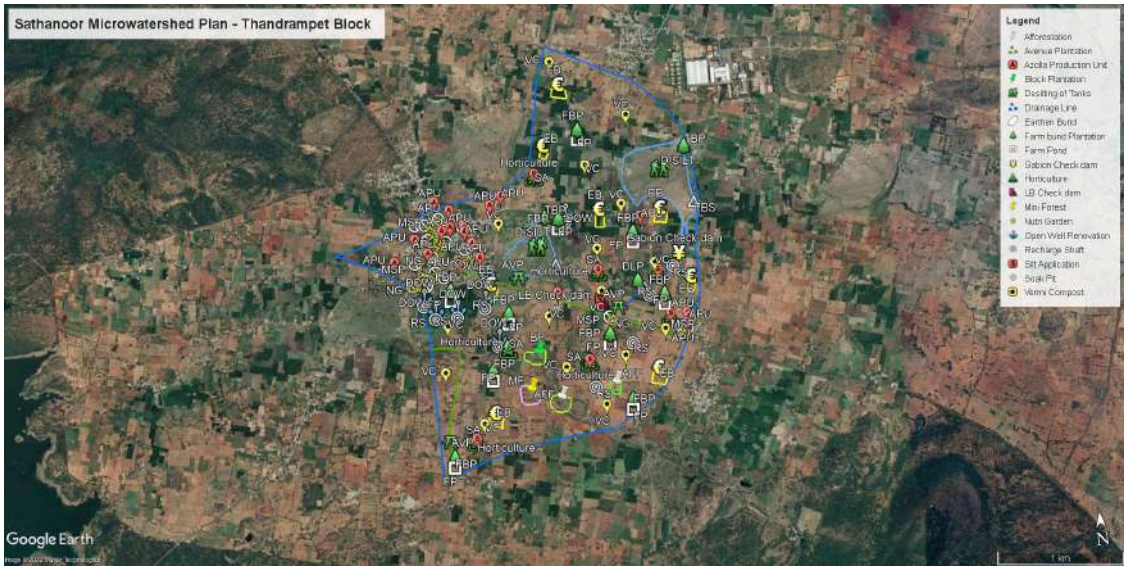


Figure 8.6. Map of proposed activities in Sathanoor micro-watershed


Proposed NRM activities for community
Write a description for your map.
Legend
AFF
AVP
AVP
BP
DL
D-SILT
Gabion Check dam
LB Check dam
MF
Tank
TBP
TBS
TBP
D-SILT
TBS
TBP
D-SILT
TBS
AVP
DLP
SP
AVP
LB Check dam
Gabion Check dam
BP
MF
AFF
AFF
AVP
Google Earth
1 km
N

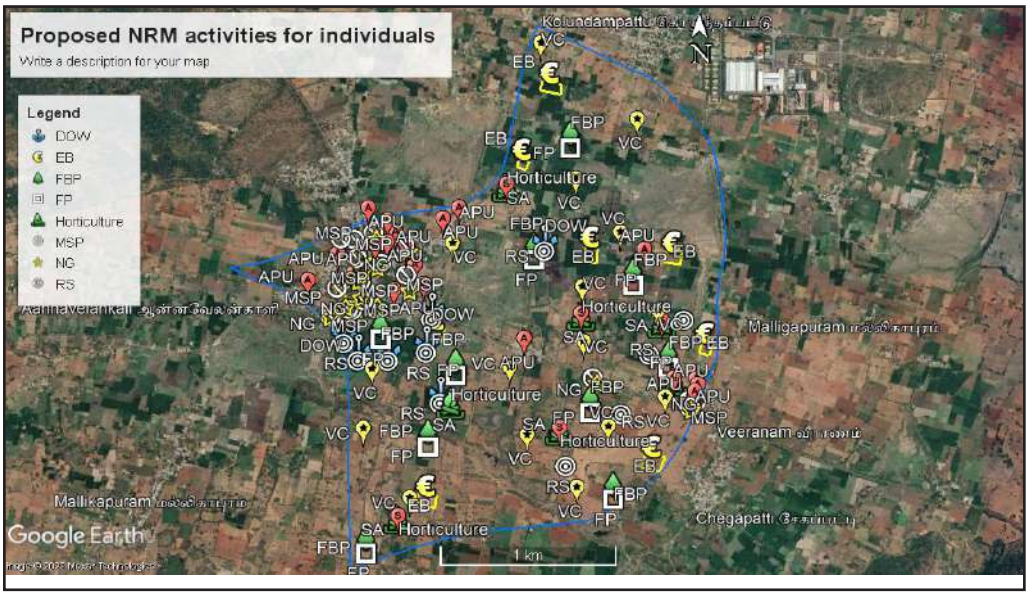

Proposed NRM activities for individuals
Write a description for your map
Legend
DOW
EB
FBP
FP
Horticulture
MSP
NG
RS
Kolundampatti
Aathaveerankal
Malligapuram
Veeranam
Mallikapuram
Chegapatti
Google Earth
1 km
N

Figure 8.7. Map of proposed activities in Sathanoor micro-watershed. A.NRM activities. B. NRM activities for individuals. C. Non-NRM activities for Individuals. D. Non-NRM activities for community

(APU: Azolla Production unit, AVP: Avenue Plantations, CP: Compost pit, CS: Cattle Shed, D-silt: Desilting, D-OW: Desilting open well, CT: Cattle through, EB: Farm Bunding with Boundary Trenches - Individual, FBP: Farm Bund Plantations, FDC: Fodder Development, FP_in: Farm Pond for Individuals, FN: Fencing, GS: Goat shed, Horti: Horticulture, LBS: Loose Boulder Structure, MSP: Soak pits for Individual, NG: Nutrition garden, RS: Artificial Recharge Structure, RWHS: Rain Water Harvesting Structure, SA: Silt Application, VCP: Vermi compost pit)

8.3 MODEL GP - MALAYANOORCHEKADI

8.3.1 ABOUT MALAYANOORCHEKADI GP

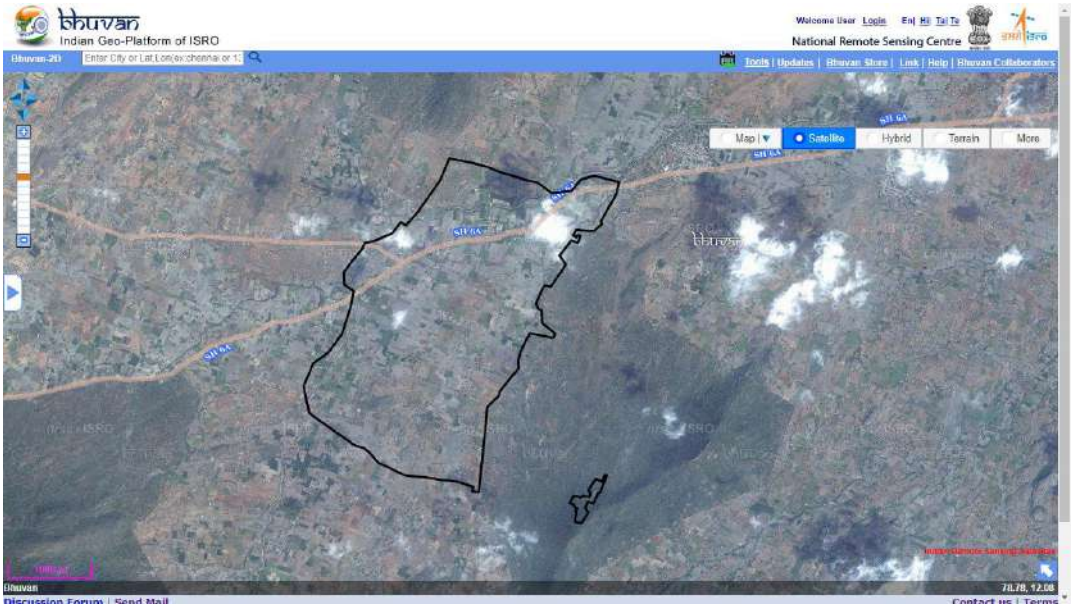
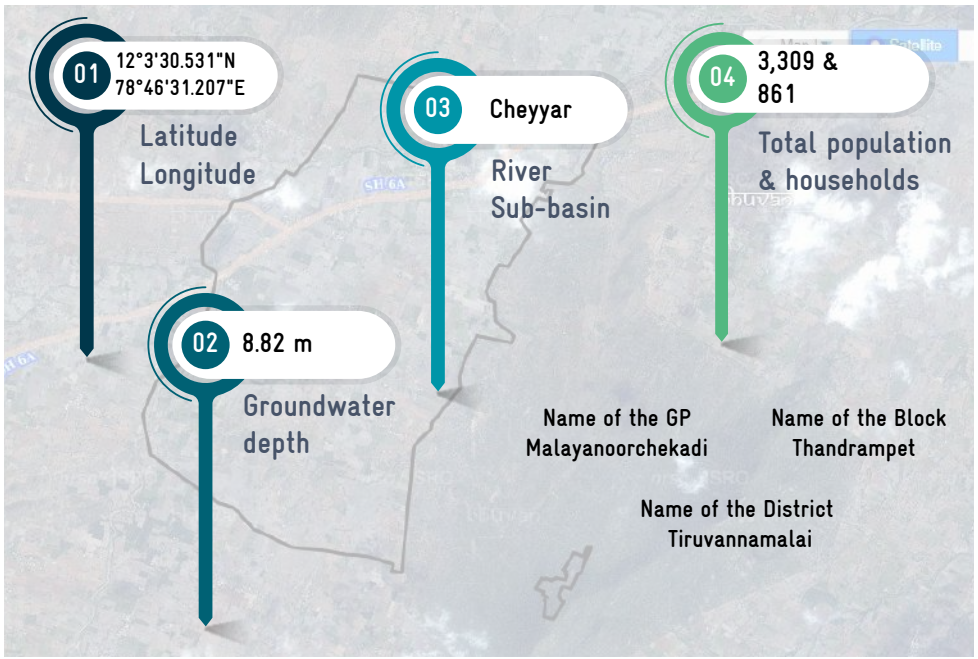


Figure 8.8. Malayanoorchekadi GP over satellite image

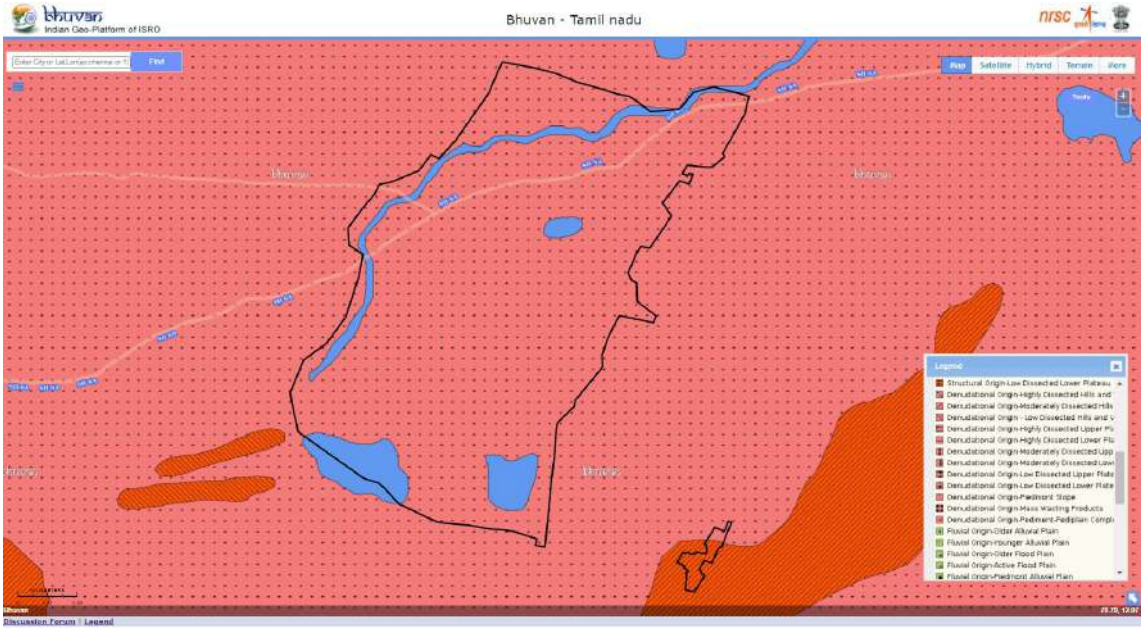
Malayanoorchekadi GP is situated between located 12°3'30.531"N to 12°5'36.501"N and 78°45'7.17"E to 78°46'31.207"E (Figure 8.8) and belongs to Block administrative unit Thandrampet of Tiruvannamalai District. The total population is 3,309 of which 1,690 are males while 1,690 are females as per population Census 2011. The total number of households is 861. The ST population is 1,056 and SC population is 777 in the Malayanoorchekadi village. The general description of this GP is given in Table 46. The detailed spatial and non-spatial data considered in the process of identifying key water challenges and preparation of climate resilient plans under CWRM for Malayanoorchekadi GP.

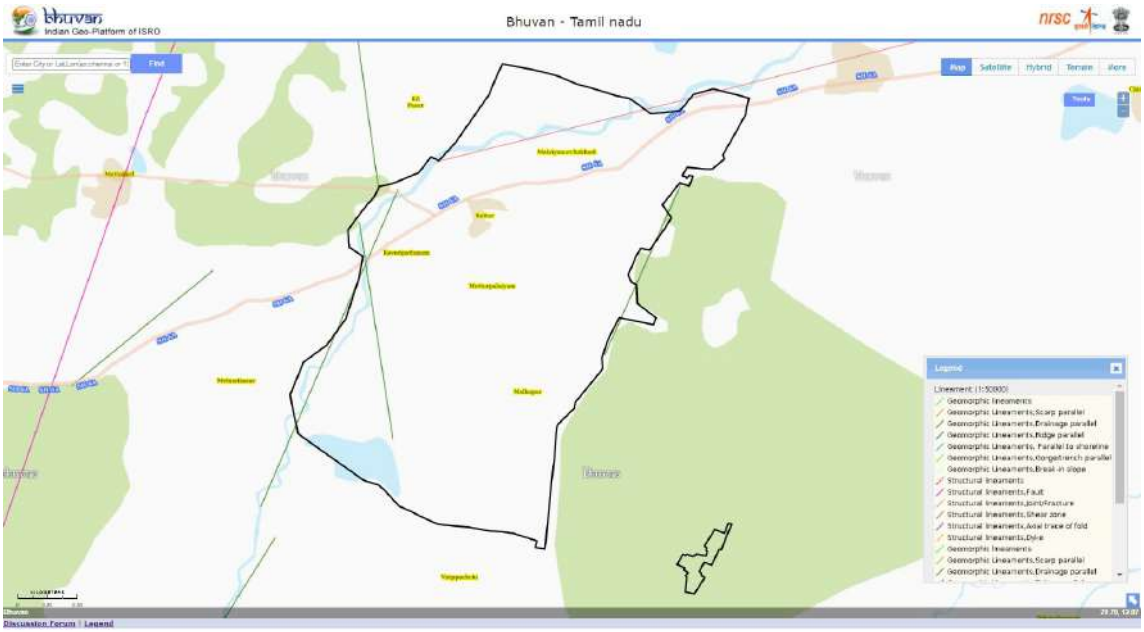
TABLE 46. GENERAL DESCRIPTION OF MALAYANOORCHEKADI GP

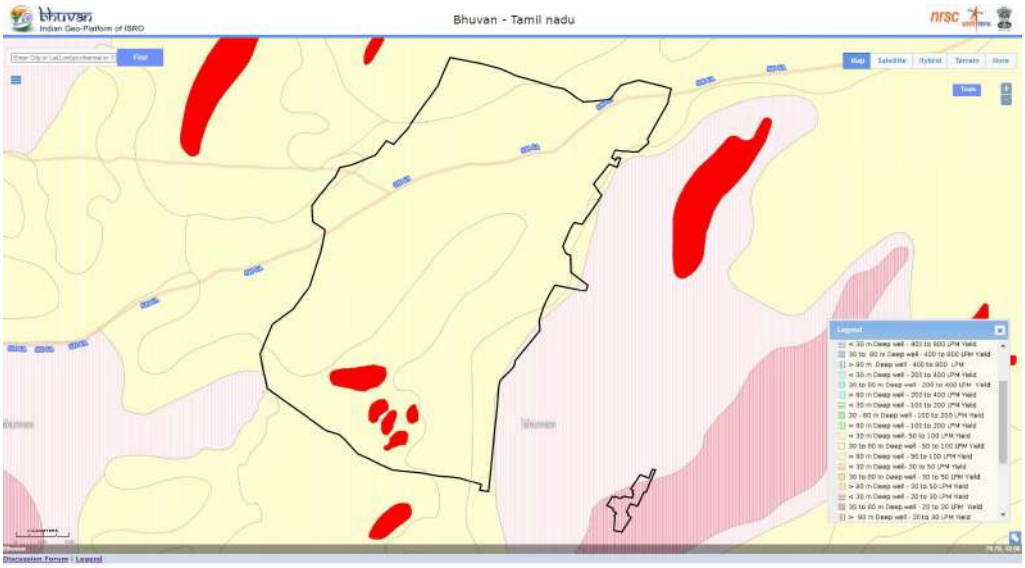


8.3.2 CWRM PLANNING - SPATIAL DATA

CWRM adapted the geospatial technologies in its process of plan preparation towards climate-resilient infrastructure, Water Conservation Water Harvesting etc. at cadastral levels. Geospatial datasets allow players to understand the study area in terms of geomorphology, lineaments, salt-affected area, erosion, watershed, LULC, and wasteland. In some cases, spatial data will serve as a direct input for a particular activity to be implement towards conservation of resources. Various thematic datasets for Malayanoorchekadi GP showen in Figure 8.9 and discussed below,



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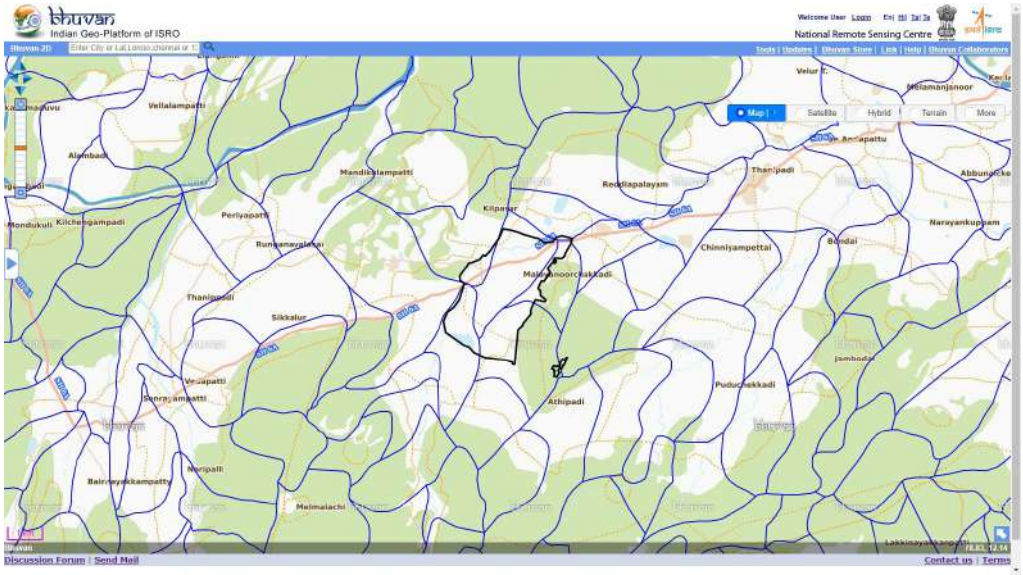
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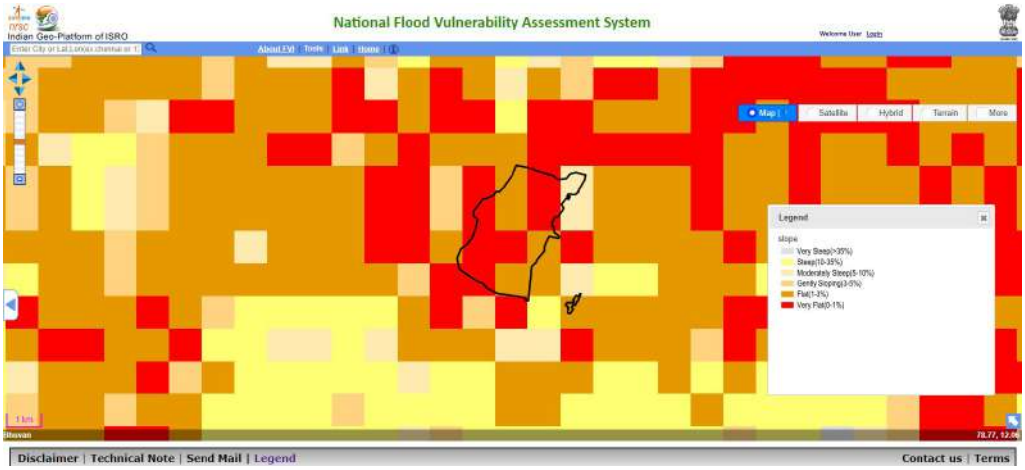
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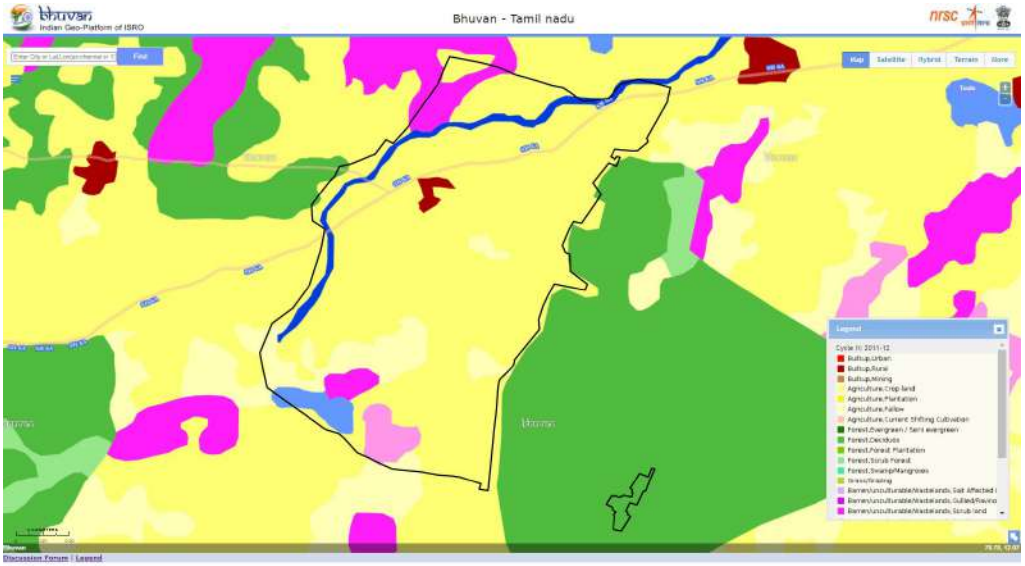
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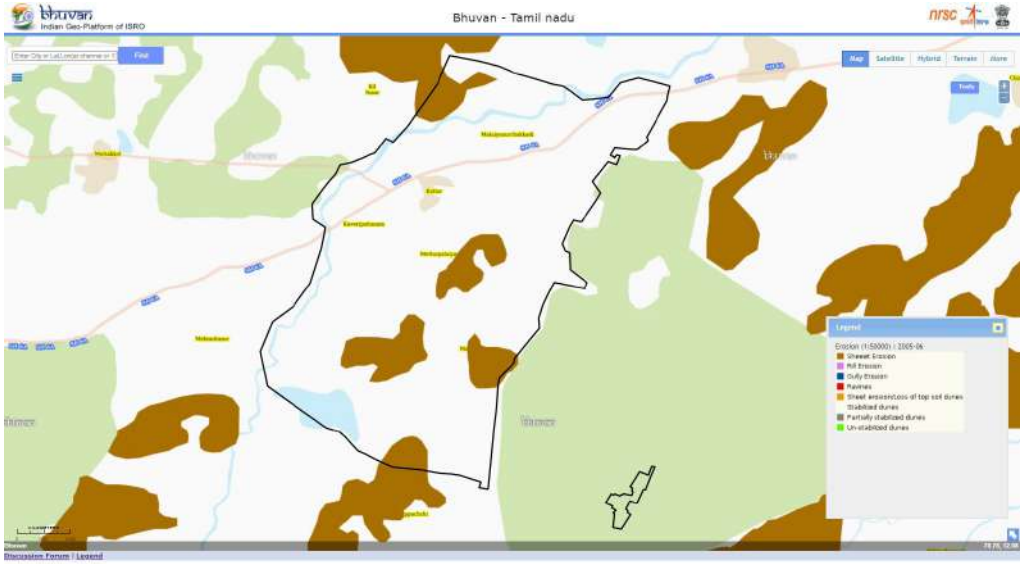
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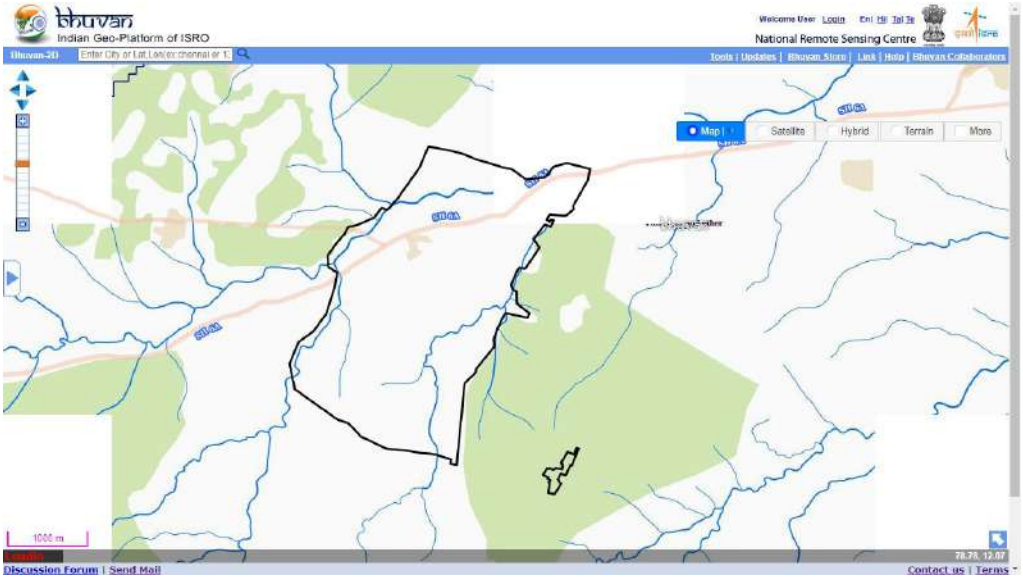
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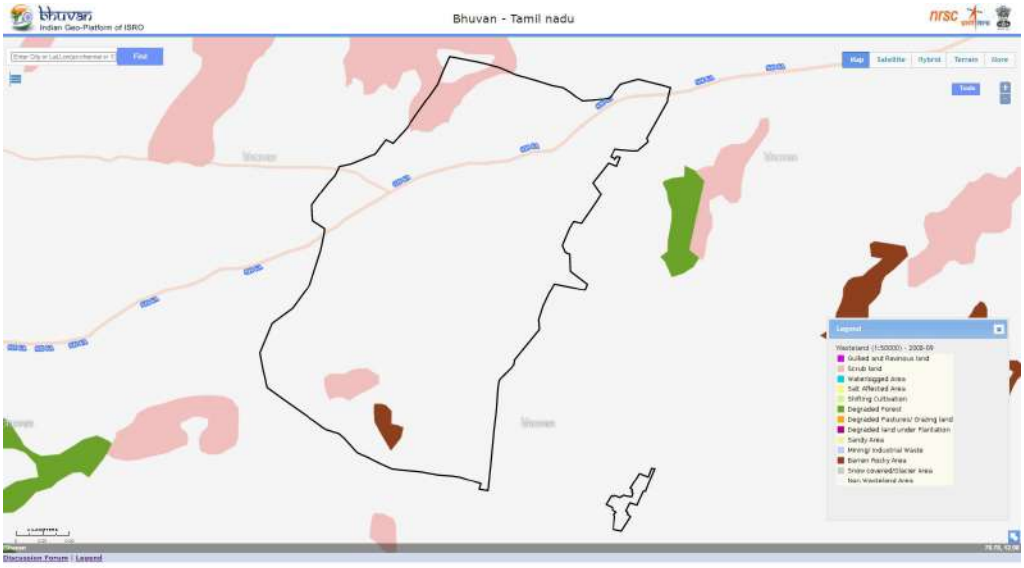


Figure 8.9. Spatial thematic maps of Malayanoorchekadi GP. A. Geomorphology, B. Lineament, C. GE prosperity, D. Watershed, E. Slope, F. LULC, G. Soil erosion, H. Drainage network, I. Salt affected

Malayanoorchekadi GP engrossed with denudation origin – pediment complex (A) landform unit where as a two geomorphic lineament are intersects (like scissor cross) is witnessed in the south western region (B). It is observed that the groundwater prosperity is less than 30 m deep well with 50 to 100 LPM capacity (C). GP area is falls under four micro-watershed units (D). Flat to very flat range slope is witnessed in GP (E). Most of land used for crop cultivation whereas two parcels of wasteland is covered in South region of GP (F & I). Sheet erosion type of soil degradation in approximate about 40 acres is noticed in GP area (G). The lower order stream which is flowing towards North-East direction from South-West, it is noticed that the stream indicating the boundary list of GP. Two moderate size waterbodies in south region and small waterbody in central location of GP (H).

8.3.3 CWRM PLANNING - NON-SPATIAL DATA

The non-spatial datasets covers four major themes related to the 116 parameters – socio economic, climate, water and agriculture (Table 47). This data will be used for analysis along with the spatial data in identifying the key water challenges, by estimating the water budgeting and for proposing water actions at the most suitable sites in the GP. The non-spatial data analysis started with mapping of the administrative, agro-ecological and hydrological units considering GP as the lowest administrative unit of action plan and implementation of proposed developmental activities.

TABLE 47. NON-SPATIAL DATA- MALAYANOORCHEKADI GP

Key CWRM Parameter	Details
Climate Vulnerability Area (CVA) 1: Socio-Economic	
Geographical Area (ha)	792
Male population (No.)	1,690
Female population (No.)	1,619

Total population (No.)	3,309
SC population (No.)	777
ST population (No.)	1,056
Vulnerable population (No.)	1,833
Households (HH's) (No.)	861
Only one room HH's (SECC) (No.)	167
Female-Headed HH's (SECC) (No.)	36
Vulnerable Households (SECC) (No.)	128
Vulnerable Households (%)	15
Registered MGNREGA Job cards (No.)	1,476
Active person working in job Cards (No.)	911
Drinking-Water Sources (No.)	78
Groundwater sources - Drinking water (No)	938
Surface water sources - Drinking water (No)	86
Annual Grey water Generation (ha.m)	6.04
Climate Vulnerability Area (CVA) 2: Climate	
Average Annual Rainfall (mm)	1,047
Average Annual Temperature (°C)	27.9 °C
Ground Water (G.W) Status	Over -Exploited
Climate Vulnerability Area (CVA) 3: Water Resources	
Canal Network (m)	
Length of Main Canal	900
Length of Minor Canal	600
Length of Distributaries	375
Water Courses (Field Channels)	330
Number of Tanks (PWD & Union)	3
Number of Ooranis	3
Irrigation Facilities (ha)	
Area under Open & Tube Well Irrigation	455.66
Catchment Area wise Available Runoff (ha.m)	
Good Catchment Area	63.9
Average Catchment Area	1.8
Bad Catchment Area	115.1
Watershed and Drainage Networks	
Length of Natural Drainage Lines (m)	10,237
Number of Natural Drainage Lines (No)	11
Number of micro-watersheds (No)	8
Water Demand (ha.m)	
Water Demand for Humans	9.06

Water Demand for Livestock	3.87
Water Demand for Agriculture	202
GW Utilization for Drinking	18%
GW Utilization for Livestock	93%
GW Utilization for Agriculture.	100%
SW Utilization for Drinking	82%
SW Utilization for Livestock	7%
Climate Vulnerability Area 4: Agriculture	
Area Under Land Resources (ha)	
Non-Agricultural Uses	117.76
Barren & Un-cultivable Land	52.65
Cultivable Waste Land	6.45
Fallows Land other than Current Fallows	134.29
Current Fallow land	25.46
Area Irrigated by Source	455.66
Catchment Area (ha)	
Good Catchment	170.41
Average Catchment	6.45
Bad Catchment	615.41
Crop Details (ha)	
Irrigated Area	194.55
The area under Paddy Cultivation	81.99
Crop Water Requirement - The irrigated condition (ha.m)	201.96
Soil Resources: Status of Available Nitrogen (%)	
Very Low	4%
Low	95%
Medium	1%
Status of Organic Carbon (%)	
Very Low	27%
Low	73%
Status of Soil Micro Nutrients (%)	
Sufficient	65%
Deficient	35%
Status of Physical condition of the soil (%)	
Acidic Sulphate	1%
Moderately Acidic	5%
Slightly Acidic	5%
Moderately Alkaline	88%
Soil Texture	
% of Clay Soil	80

% of Fine Soil	14
Soil Water Permeability	Low
Soil moisture and ET	
Volumetric Soil Moisture (%)	23
Estimated Soil Moisture	155.14
ET Losses	366.35
Means of Water Extraction (%)	
Gravity	2
Lifting	98
Irrigation Methods (%)	
Control Flooding	100
Livestock (No)	
Cattle population	953
Sheep population	82
Goat population	580

8.3.4 KEY WATER CHALLENGES

Socio-Economic

1. 15 % of the households are vulnerable in the GP
2. 167 one room households, and 36 female headed households.
3. 55% SC/ST population
4. Access to drinking water through tap water connections inadequate
5. Grey water generation is 6.04 ha.m and needs attention

Water

1. Ground water status – over exploited
2. Six traditional waterbodies in the GP
3. Irrigation depends 100 % on open and tube well
4. 93% livestock need met through ground-water, 82% drinking water met through surface water, 100% ground water for agriculture
5. 115.1 ha.m of water is available runoff, from bad catchment area

Agriculture and Allied Sector

1. 22 % of the land covers the common area
2. 78% of the land covers an individual land area
3. Main crop in the GP is paddy which is cultivated about 81.99 ha of land
4. Crop water requirement for irrigated condition is more (201.96 ha.m)
5. 98% of the water is given to paddy fields by lifting methods of irrigation
6. Remaining water is extracted by gravity method of irrigation.
7. Soil Nitrogen, organic carbon is low
8. Predominant Clay soil in GP
9. Very high ET loss 366.35 ha.m

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 21.77% of the total land area is taken for WASCA treatment activities like plantation and conservation works. The total proposed area for treatment is 172.48 ha. More attention is given to non-agricultural land followed by area irrigated by source, barren and uncultivable land. (Figure 8.10). Through the proposed conservation activities, 65.6 ha.m run off would be harvested in which 77.9% of the run off is from good catchment, 19.8% of the run off is from average catchment and the rest 2.13 run off is from bad catchment (Figure 8.11).

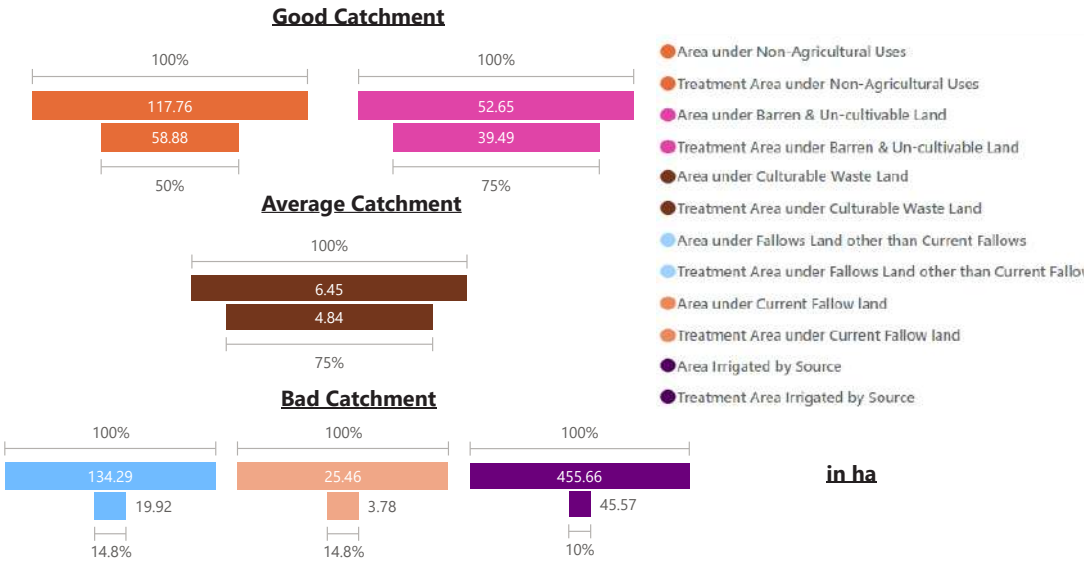


Figure 8.10. Proposed land resource treatment area in Malayanoorchekadi GP

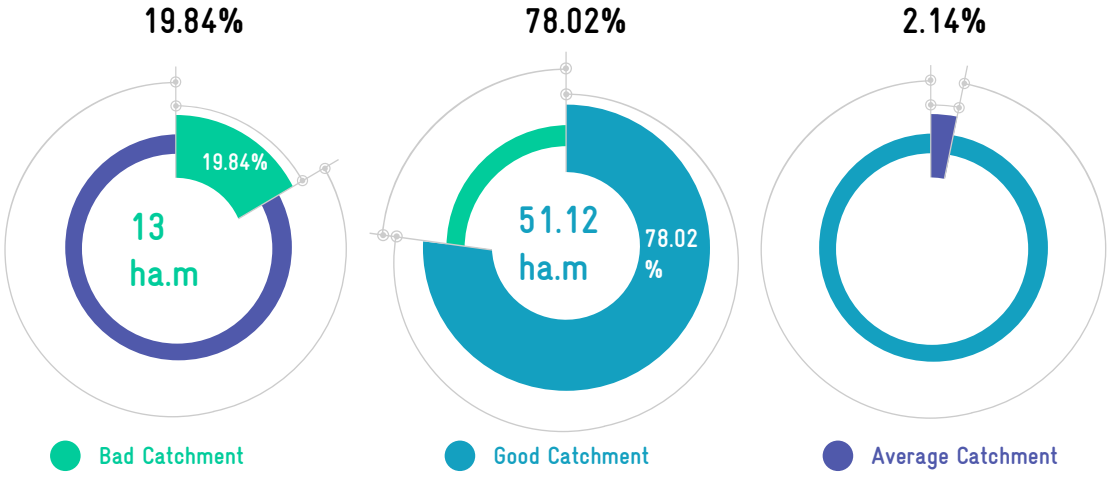


Figure 8.11. Expected run off conservation after treatment

The detailed proposed activities along with silent parameters are showed in the Table 48 for 2021-2024. More attention towards common and public land developments are given with appropriate works to improve the resilience of the GP.

TABLE 48. PERSPECTIVE PLAN OF MALAYANOORCHEKADI GP - FY (2021-2024)

CWRM Water Action 1: Improvement of Public & Common Lands Development				
CWRM Water Action 1: Works in Upper& Middle Ridge				
Name of the Work	**Ridge Type**	**No of Works**	**Estimated cost (INR in Lakhs)**	**Estimated Person Days**
Contour Continuous Bunds for Afforestation area (m)	Upper	2	0.05	20
Composting (No. of units)	Lower	16	2.72	240
Block Plantation (Community) (ha)	Middle	2	22.2	8,640
Linear Plantation (km)		4	7.2	2,812
Canal Bund Plantation (km)	Lower	2	15	5,860
Avenue plantation (km)	Middle	3	5.4	2,109
Restoration of water bodies:PWD and Union Tanks (No.)	Lower	3	15	2,400
Restoration of water bodies:Ooranis (No.)		1	1	200
Artificial Recharge Structure (No. of units)		182	455	71,162
Drainage Line Treatment (DLT) (m)	Upper	1	0.03	5
Sub Total Water Action -1		**217**	**523.6**	**93,448**
CWRM Water Action 2: Agricultural and allied Sector development				
CWRM Water Action 2: Works in Lower Ridge				
Farm Bunding with Boundary Trenches - Individual (ha)	Lower	8	12	4,688
Micro Irrigation (ha)		46	46	0
Construction of Farm Ponds - Individual (No.of units)		8	16	6,248
Land development - Individual (ha)		2	20	7,812
Dryland Horticulture/Agroforestry - Individual (ha)		3	25.5	9,963
Azolla units - Individual (No. of units)		128	19.2	2,944
NADEP Vermi compost (No. of units)		128	23.04	3,456
Fodder development - Community & Individual		128	189.44	3,00,032
Cattle Shelters (No. of units)		128	271.36	42,368
Goat Sheep Shelters (No.of units)		62	140.74	22,010
Cattle Trough (No. of units)		128	6.4	768
Construction of new open wells & Recharge Shafts (No.of units)		182	910	1,68,532
Sub Total Water Action -2		**951**	**1,680**	**5,68,821**

CWRM Water Action 3: Rural Water Management				
CWRM Water Action 3: Works in Lower Ridge				
Soak Pits (Community) (No. of units)	Lower	9	1.17	180
Soak Pits (Individual) (No. of units)		86	8.6	1,376
Roof Rain Water Harvesting (No. of units)		2	8	1,250
Sub Total Water Action -3		**97**	**18**	**2,806**
GP- Total		**1,265**	**2221.6**	**6,65,075**

Regarding CWRM themes of the total number of projects identified, 75 % works are in agriculture and allied sector while 17 % works are in public and common land, and 8% works are in rural infrastructure respectively. Table 49 provides the estimates of the work budget, and personal days for three years from 2021-2024 in Malayanoorchekadi GP.

TABLE 49. SUMMARY OF WORKS IDENTIFIED AND ESTIMATED PERSON-DAYS FOR 2021-2024

CWRM themes	No of works	Estimated budget (INR in lakhs)	Estimated person days
Public and common land development	217	523.6	93,448
Agriculture and Allied sector development	951	1,680	5,68,821
Rural water management	97	18	2,806
TOTAL	1,265	2,221.6	6,65,075

8.3.6 IMPACTS

The proposed water actions based on the above key water challenges cover a period of three years from 2021- 2022 to 2023-2024. At the end of the implementation period i.e. in the year 2024, the following impacts are envisaged (Table 50). It is expected that these impacts will potentially reduce the vulnerability and improve the resilience of the system to the projected climatic change events and ensured water security.

TABLE 50. WASCA- WATER ACTIONS AND INDICATORS

WASCA CWRM ACTION PLAN

DEVELOPMENT OF PUBLIC AND COMMON LAND

	INDICATOR		OUTCOMES/ IMPACT
1	No. of water bodies restored in the village	1	Four traditional water bodies restored
2	Area under Block plantation	2	44 ha under afforestation
3	Percentage reduction in the annual surface runoff	3	48.61 ha.m surface runoff harvested and stored
4	The proportion of land treated under WASCA	4	25% of the total geographical area of the village treated under WASCA in three years
5	Drainage line treatment	5	10.2 km length of drainage lines treated

4 TRADITIONAL WATER BODIES RESTORED

44 ha BLOCK PLANTATION

48.61 ha.m RUNOFF HARVESTED

25 % AREA OF THE VILLAGE TREATED

10.2 km DRAINAGE LINES TREATED

WASCA CWRM ACTION PLAN

DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

	INDICATOR		OUTCOMES/ IMPACT
1	No of structures were established for on-farm (in-situ) water harvesting in drylands	1	17 farm ponds established
2	The reducing area under fallow lands	2	39.94 ha under fallow land restored for cultivation
3	Improvement in soil health	3	128 units of vermicompost established
4	No of artificial recharge structures proposed	4	182 artificial recharge structures were established to replenish groundwater flow

17 FARM PONDS

128 VERMI COMPOST

182 ARTIFICIAL RECHARGE STRUCTURES

39.94 ha FALLOW LAND RESTORED

WASCA CWRM ACTION PLAN

DEVELOPMENT OF RURAL INFRASTRUCTURE

INDICATOR	
1.	No. of villages having complete solid and liquid waste management systems
2.	Roof rainwater harvesting measures
3.	Nutri-gardens

OUTCOMES/ IMPACT	
1.	Nine community level and 86 individual level soak pits were constructed for grey water management to maintain hygiene in the village
2.	Two units of roof rainwater harvesting and storing established
3.	861 households established Nutri-gardens in homesteads

9 COMMUNITY & **86** INDIVIDUAL SOAK PITS

2 COMMON ROOF RAINWATER HARVESTING

861 NUTRI-GARDENS

The following table provides both the perspective plan for three years period and the annual plan for one year period from 2021-2022 on the shelf of projects/number of works and number of person-days (Table 51).

TABLE 51. PROPOSALS FOR THE MGNREGS, MALAYANOORCHEKADI GP, TIRUVANNAMALAI DISTRICT

	No of works	No of person days
Perspective plan	1,265	6,65,075
Annual plan	507	2,71,887

8.3.7 PROPOSED ACTIVITY MAP

The proposed activity map for, Malayanoorchekadi GP, Thandrampet Block shows a shelf of projects for all three year works from 2021-2024 (Figures 8.12 to 8.15).

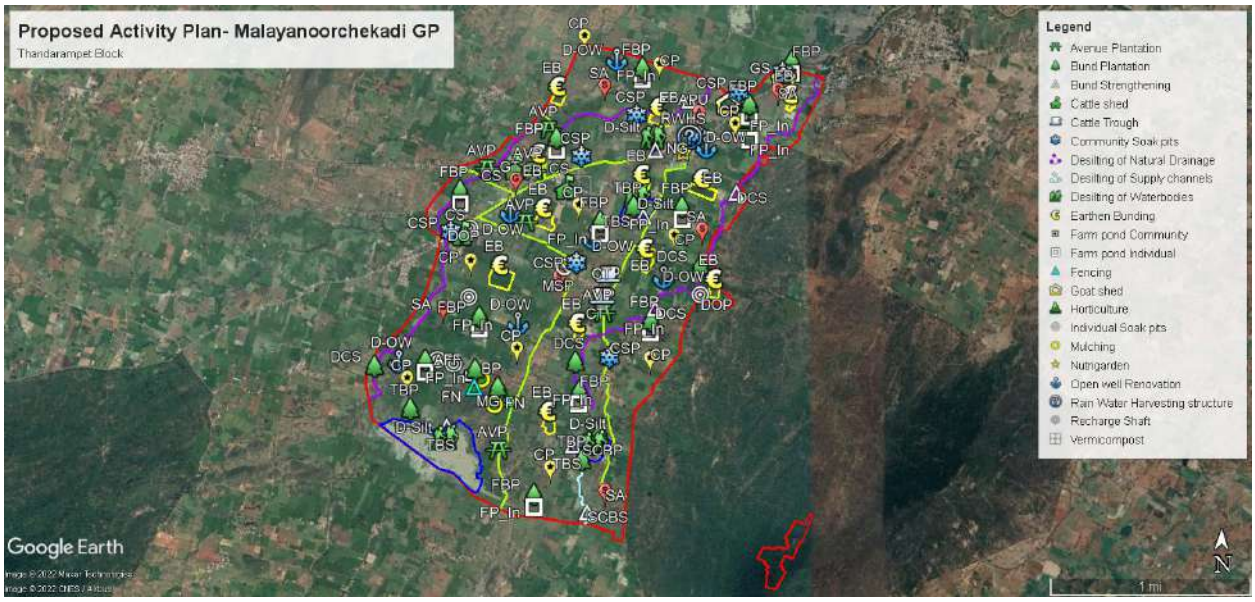


Figure 8.12. Action plan map of Malayanoorchekadi GP

Figure 8.13. Map of Works on upper ridge of Malayanoorchekadi GP

Figure 8.14. Map of Works on middle ridge of Malayanoorchekadi GP

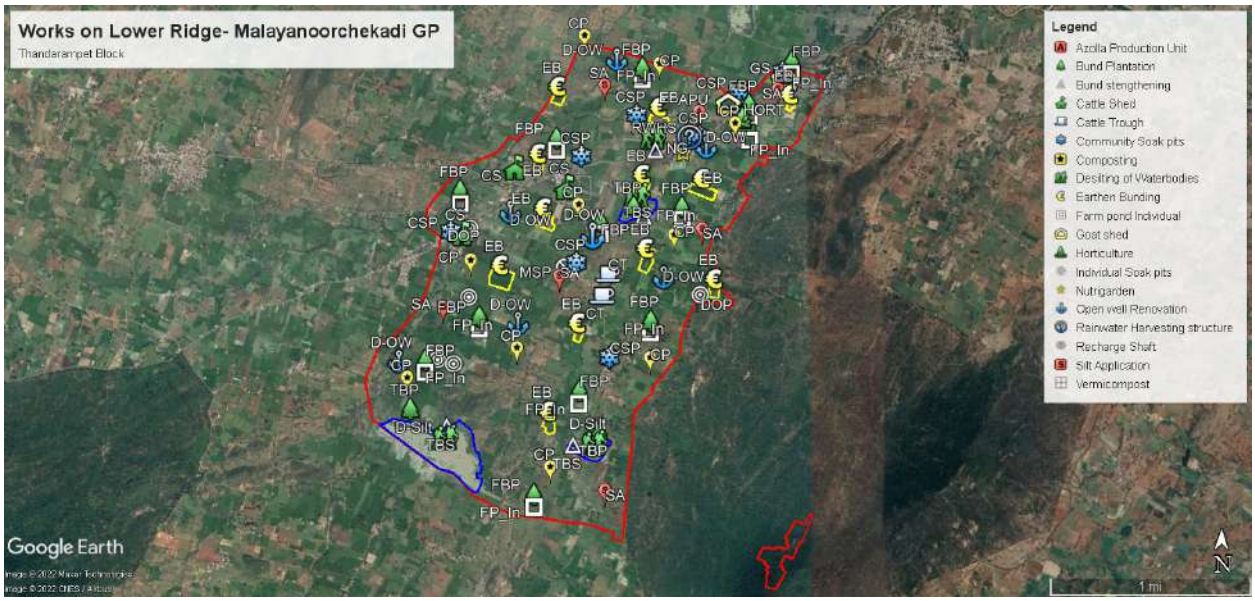
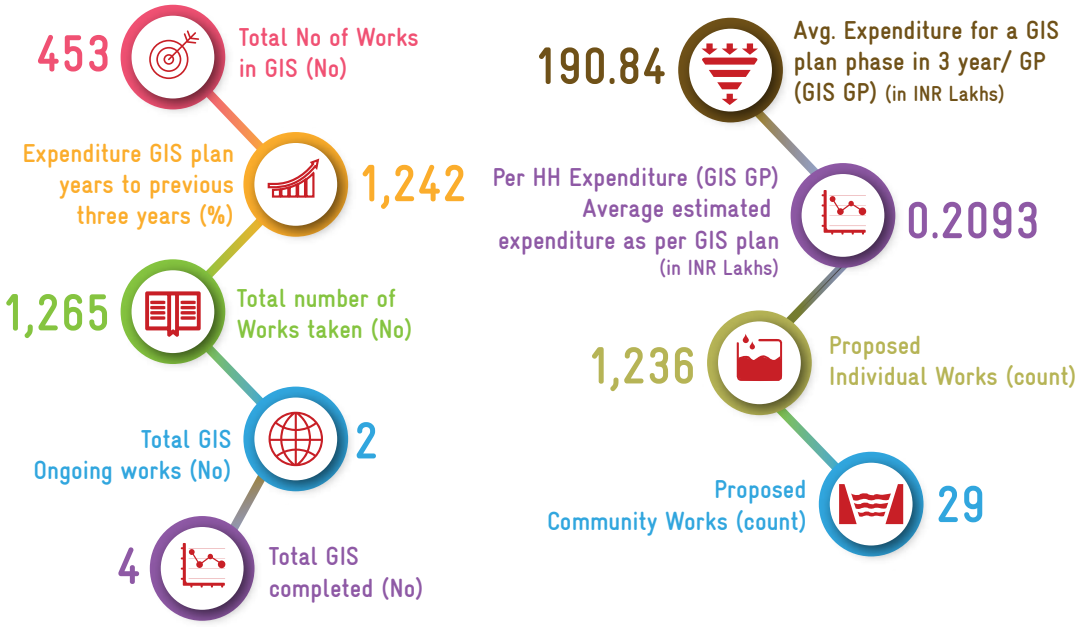


Figure 8.15. Map of Works on lower ridge of Malayanoorchekadi GP

8.3.8 GIS PLAN IMPLEMENTATION, KEY PARAMETERS

The GIS plan implementation and performance in Thandrampet Block is represented in Table 52.

TABLE 52. GIS PLAN IMPLEMENTATION, KEY PARAMETERS PERFORMANCE OF MALAYANOORCHEKADI GP



நீர்இன்று அமையாது உலகெனின் யார்யார்க்கும்
வான்இன்று அமையாது ஒழுக்கு

குறள் - 20

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

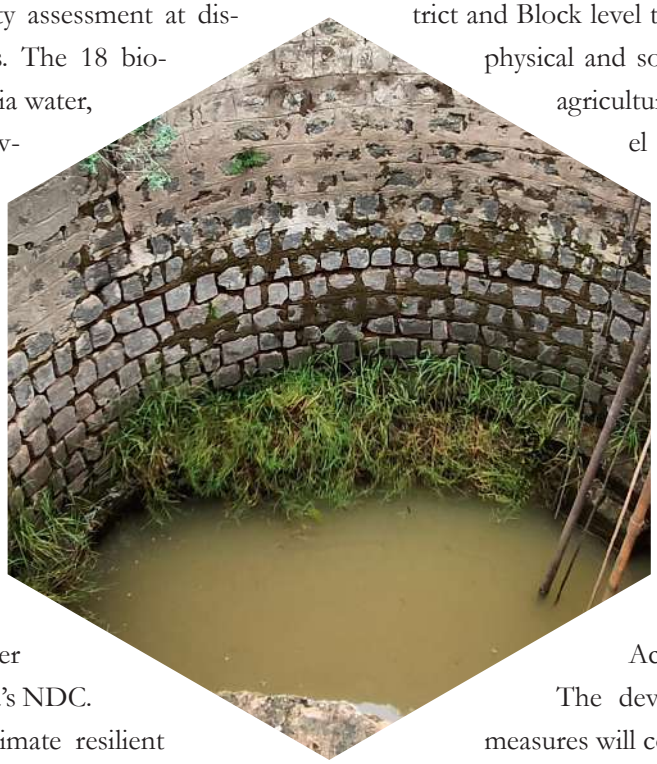
Thirukkural - 20

CHAPTER 9

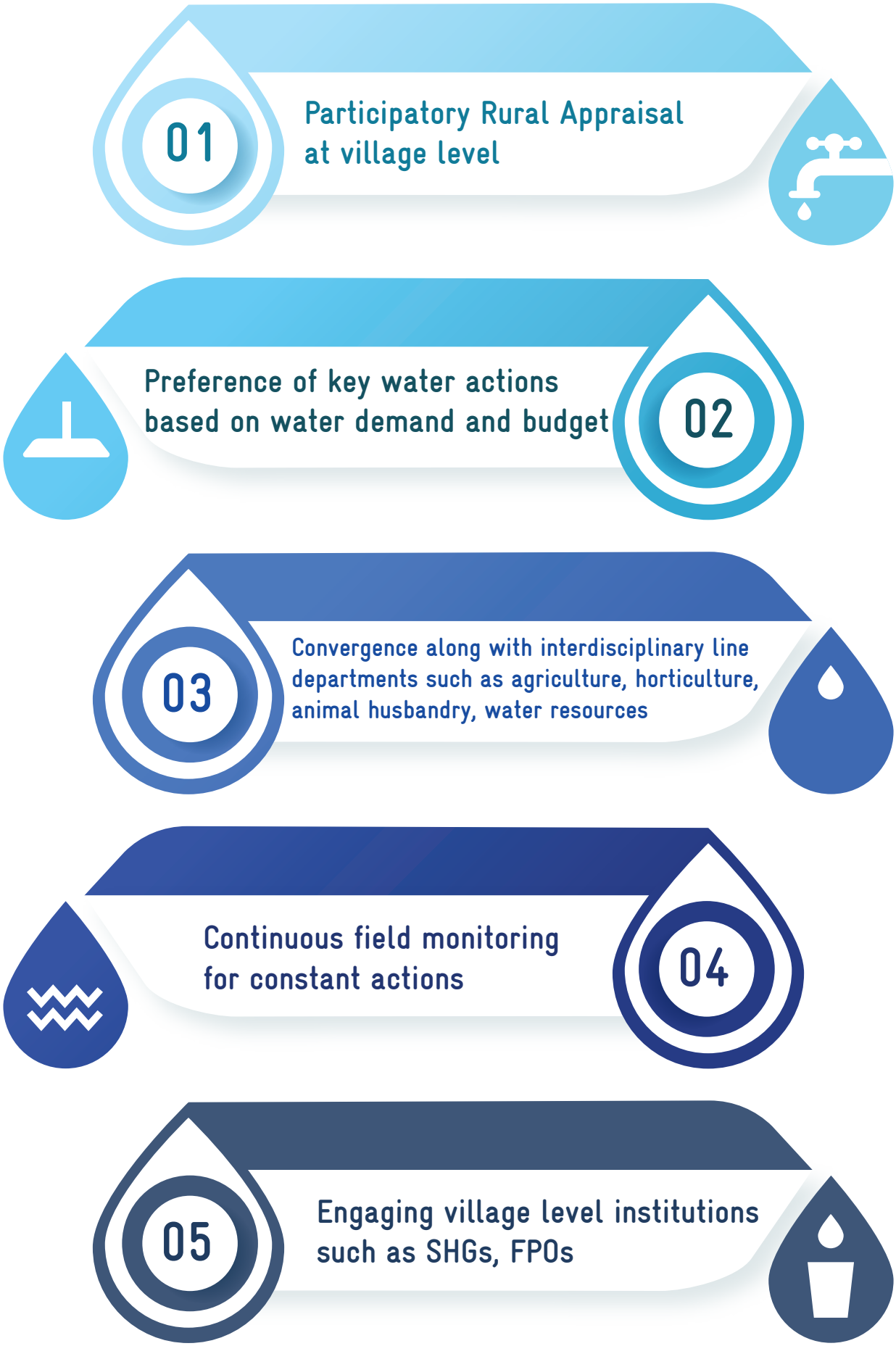
CONCLUSION

"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 demand for water is increasing at a fast rate due to rapid increase in population, industrial and economic growth. The evident changes in climate 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 which resulted in lowering of ground water levels and even drying up of wells. WASCA TN took an initiative 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 bio-physical and socio-economic indicators 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 the above mentioned four 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 drawn up 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 based planning and integration at the Block level based on macro and micro-watershed enables to adopt an ecosystem approach in promoting nature-based solutions. The productive impacts are visualized through a 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 MGNREGA 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 MGNREGA 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	*https://censusindia.gov.in/2011census/dchb/DCHB.html*
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	

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.	
% SW Utilization for Drinking	
% SW Utilization for Livestock	
% SW 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

ANNEXURE 3.4

STANDARD NORMS FOR CALCULATING WATER DEMAND

	Water Users	Total Annual Requirement (ha.m)
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 ha.m	**Annual Grey water in Cum/10000**

ANNEXURE 3.6

GP WISE STATUS OF WATER RESOURCE AND ITS SUPPLY AND DEMAND

Gram Panchayat	Canal Irrigation				Tradational Water bodies		
	Length of Main Canal (m)	Length of Minor Canal (m)	Length of Distributaries (m)	Water Courses (Field Channels) (m)	Number of Tanks (PWD & Union) (No.)	Number of Ooranis (No.)	Other Surface Water Bodies (No.)
Agarampallipattu	900	300	195	370	1	7	-
Chinniyampettai	1,300	950	650	325	1	4	-
Allappanur	1,200	750	450	275	1	4	-
Bondai	1,100	850	500	295	1	5	-
Edathanur	950	650	420	310	1	3	-
Kambattu	900	600	400	300	1	3	-
Kanakkandal	950	650	420	310	2	4	-
Keelvanakkambadi	1,100	750	520	360	2	3	-
Malayanoorchekkadi	900	600	375	330	3	3	-
Kolundampattu	1,100	750	380	330	2	2	-
Melamanjanur	950	650	420	310	1	4	-
Melkaripur	1,110	755	475	275	2	4	-
Nedungavadi	925	525	370	250	1	5	-
Perayampattu	1,050	752	435	350	1	4	-
Puthurchekkadi	950	650	420	310	1	3	-
Radhapuram	1,100	750	523	375	4	5	-
Reddiapalayam	1,050	562	357	362	2	6	-
Royandapuram	1,025	756	456	345	2	3	-
Sathanur	1,250	850	570	410	4	6	-
Se.Andapattu	800	575	400	275	-	4	-
Se.Gudalur	995	675	468	386	1	6	-
Thanipadi	1,350	850	635	489	1	5	-
Tharadapattu	875	600	385	275	2	3	-

Gram Panchayat	Canal Irrigation				Tradational Water bodies		
	Length of Main Canal (m)	Length of Minor Canal (m)	Length of Distributaries (m)	Water Courses (Field Channels) (m)	Number of Tanks (PWD & Union) (No.)	Number of Ooranis (No.)	Other Surface Water Bodies (No.)
Thenkarimbalur	680	450	310	260	2	3	-
Thenmudiyanur	875	625	400	300	1	4	-
Thiruvadathanur	830	580	375	286	1	10	-
Thondamanur	925	625	400	280	3	3	-
Varagur	1,100	900	480	460	1	5	-
Veeranam	950	650	420	310	2	3	-
Veppurchekkadi	1,115	752	479	356	1	6	-
Velur T.	1,050	752	479	365	1	5	-
Perungolathur	4,000	-	-	-	2	5	-
Elayankannai	4,000	-	-	-	-	1	-
P Quilam	-	-	-	-	-	4	-
Athipadi	-	-	-	-	-	-	-
Keelsirupakkam	3,000	500	1,500	-	2	5	-
Kolamanjanoor	-	-	-	-	1	-	-
Kottaiyur	-	-	-	-	1	-	-
Melpasar	-	-	-	-	2	-	-
Mothakkal	-	-	-	-	1	-	-
Narayankuppam	-	-	-	-	1	-	-
Pudurchekkdi	-	-	-	-	-	-	-
Sadakuppam	-	-	-	-	1	-	-
Serpattu	1,200	1,500	-	-	2	7	-
Thandarampet	-	-	-	-	2	-	-
Vanapuram	-	-	-	-	2	-	-
Perunduraipattu	-	-	-	-	-	-	-

Gram Panchayat	Irrigation Facilities (ha)			Water Quality (No.)		Catchment Area wise Available Runoff (ha.m)			Watershed and Drainage Networks		
	Tank Irrigation	Canal Irrigation	Open & Tube Well Irrigation	Chemical Contaminants	Bacterial and Other Contaminants	Good Catchment Area	Average Catchment Area	Bad Catchment Area	Length of Natural Drainage Lines (m)	Number of Natural Drainage Lines (No.)	Number of Micro Watersheds (No.)
Agarampallipattu	-	-	83.20	-	-	43.70	6.40	86.00	8431	12	5
Chinniyampettai	-	-	830.27	-	-	56.10	48.80	239.90	30432	28	6
Allappanur	25.47	-	32.50	-	-	59.80	-	24.00	4622	11	6
Bondai	-	-	533.00	-	-	75.20	1.00	136.90	16685	21	8
Edathanur	-	24.51	189.19	-	-	27.50	1.50	38.20	12905	12	5
Kambattu	9.45	-	159.55	-	-	24.20	2.70	37.10	3720	5	3
Kanakkandal	-	-	158.05	-	-	26.40	2.50	51.80	7108	8	3
Keelvanakkambadi	103.72	-	590.45	-	-	76.00	-	171.00	12124	13	1
Malayanoorchekkadi	-	-	455.66	-	-	63.90	1.80	115.10	10237	11	8
Kolundampattu	-	-	242.30	-	-	39.30	0.90	126.70	13343	13	7
Melamanjanur	38.70	-	630.21	-	-	64.00	61.20	162.60	13541	16	9
Melkaripur	-	-	265.16	-	-	41.30	1.80	81.80	6557	11	8
Nedungavadi	-	-	106.76	-	-	27.50	1.50	38.20	3013	6	2
Perayampattu	-	-	92.87	-	-	34.00	-	24.30	4564	5	2
Puthurchekkadi	-	23.00	201.03	-	-	37.90	2.30	56.40	5472	5	6
Radhapuram	-	0.40	696.01	-	-	115.50	2.30	185.40	13424	11	6
Reddiapalayam	-	-	457.52	-	-	65.10	8.50	136.00	18144	19	7
Royandapuram	147.76	-	219.55	-	-	151.60	12.20	132.20	10466	11	7
Sathanur	-	-	522.83	-	-	85.50	19.90	248.90	21363	22	6
Se.Andapattu	-	-	158.76	-	-	14.50	-	66.90	7016	10	8
Se.Gudalur	25.94	-	227.70	-	-	37.30	2.10	73.80	7992	11	3
Thanipadi	-	-	471.26	-	-	43.10	4.40	144.40	18243	21	5
Tharadapattu	-	-	194.46	-	-	70.40	1.60	81.30	4963	4	4

Gram Panchayat	Irrigation Facilities (ha)			Water Quality (No.)		Catchment Area wise Available Runoff (ha.m)			Watershed and Drainage Networks		
	Tank Irrigation	Canal Irrigation	Open & Tube Well Irrigation	Chemical Contaminants	Bacterial and Other Contaminants	Good Catchment Area	Average Catchment Area	Bad Catchment Area	Length of Natural Drainage Lines (m)	Number of Natural Drainage Lines (No.)	Number of Micro Watersheds (No.)
Thenkarimbalur	59.48	-	289.94	-	-	53.10	4.80	121.40	13543	12	6
Thenmudiyanur	99.75	170.00	174.72	-	-	63.70	1.20	205.60	17463	15	8
Thiruvadathanur	169.66	-	108.23	-	-	73.50	6.50	87.90	11491	17	9
Thondamanur	60.06	-	142.68	-	-	175.10	-	69.20	11111	14	5
Varagur	14.30	-	165.82	-	-	29.60	2.10	48.00	4404	7	7
Veeranam	-	-	170.91	-	-	26.90	-	96.80	8421	12	1
Veppurchekkadi	-	-	156.10	-	-	35.60	7.00	62.70	8286	13	8
Velur T.	-	-	395.45	-	-	22.20	5.40	151.40	19193	20	3
Perungolathur	-	-	400.00	-	-	401.80	21.90	189.60	15423	23	5
Elayankannai	-	-	83.65	-	-	401.80	21.90	189.60	3278	6	3
P Quilam	-	-	-	-	-	401.80	21.90	189.60	16254	26	9
Athipadi	-	-	442.43	-	-	154.50	-	153.30	-	-	16
Keelsirupakkam	18.48	50.00	611.59	-	-	58.90	-	214.30	15683	22	7
Kolamanjanoor	-	-	543.68	-	-	171.50	4.60	128.40	22857	28	8
Kottaiyur	-	-	346.25	-	-	72.00	13.40	98.60	12271	11	5
Melpasar	-	-	-	-	-	32.40	18.30	135.00	17110	27	5
Mothakkal	-	-	801.72	-	-	83.70	15.30	214.40	22777	21	11
Narayankuppam	-	-	546.77	-	-	75.90	7.10	174.50	16736	22	7
Pudurchekkdi	-	-	639.60	-	-	210.90	29.40	294.10	-	-	11
Sadakuppam	-	-	245.83	-	-	47.60	14.10	56.50	7243	11	3
Serpattu	43.09	-	180.02	-	-	29.90	0.40	48.40	7142	12	4
Thandarampet	-	-	525.37	-	-	108.10	-	173.00	23292	28	8
Vanapuram	43.54	50.01	414.03	-	-	104.70	0.80	117.30	19255	19	7
Perunduraipattu	-	-	296.92	-	-	36.80	-	82.90	10346	12	5

Gram Panchayat	Water Demand								
	For Humans (ha.m)	For Livestock (ha.m)	For Agriculture (ha.m)	% GW Utilization for Drinking (%)	% GW Utilization for Livestock (%)	% GW Utilization for Agriculture. (%)	% SW Utilization for Drinking (%)	% SW Utilization for Livestock (%)	% SW Utilization for Agriculture (%)
Agarampallipattu	6.32	2.36	175	-	-	100.0	100.0	100.0	-
Chinniyampettai	15.58	4.50	262	-	-	98.0	100.0	100.0	2.0
Allappanur	3.82	1.74	122	14.0	90.0	96.0	86.0	10.0	4.0
Bondai	9.16	4.45	469	1.0	95.0	99.0	99.0	5.0	1.0
Edathanur	7.72	4.18		-	-	-	100.0	100.0	100.0
Kambattu	4.31	2.34	136	5.0	92.0	98.0	95.0	8.0	2.0
Kanakkandal	4.19	4.43	196	44.0	99.0	95.0	56.0	1.0	5.0
Keelvanakkambadi	12.37	6.06	608	2.0	92.0	98.0	98.0	8.0	2.0
Malayanoorchekkadi	9.06	3.87	202	18.0	93.0	100.0	82.0	7.0	-
Kolundampattu	8.70	3.33	402	6.0	92.0	94.0	94.0	8.0	6.0
Melamanjanur	12.95	4.38	318	3.0	90.0	99.0	97.0	10.0	1.0
Melkaripur	6.79	2.39	258	9.0	97.0	99.0	91.0	3.0	1.0
Nedungavadi	2.49	1.22	136	17.0	78.0	99.0	83.0	22.0	1.0
Perayampattu	5.38	3.22	128	6.0	98.0	100.0	94.0	2.0	-
Puthurchekkadi	4.55	3.86	88	10.0	94.0	88.0	90.0	6.0	12.0
Radhapuram	14.31	6.33	394	70.0	96.0	100.0	30.0	4.0	-
Reddiapalayam	15.14	3.49	252	-	26.0	99.0	100.0	74.0	1.0
Royandapuram	10.67	4.34	504	5.0	93.0	97.0	95.0	7.0	3.0
Sathanur	23.95	6.62	344	1.0	94.0	69.0	99.0	6.0	31.0
Se.Andapattu	9.25	0.93	129	14.0	86.0	100.0	86.0	14.0	-
Se.Gudalur	6.33	2.01	291	5.0	92.0	100.0	95.0	8.0	-
Thanipadi	28.18	5.11	164	3.0	92.0	100.0	97.0	8.0	-
Tharadapattu	11.19	3.59	182	1.0	89.0	100.0	99.0	11.0	-
Thenkarimbalur	7.32	3.65	516	6.0	98.0	99.0	94.0	2.0	1.0
Thenmudiyanur	15.01	7.10	588	5.0	94.0	99.0	95.0	6.0	1.0
Thiruvadathanur	6.31	2.17	232	78.0	91.0	100.0	22.0	9.0	-

Gram Panchayat	Water Demand								
	For Humans (ha.m)	For Livestock (ha.m)	For Agriculture (ha.m)	% GW Utilization for Drinking (%)	% GW Utilization for Livestock (%)	% GW Utilization for Agriculture. (%)	% SW Utilization for Drinking (%)	% SW Utilization for Livestock (%)	% SW Utilization for Agriculture (%)
Thondamanur	4.82	2.04	305	23.0	96.0	99.0	77.0	4.0	1.0
Varagur	4.99	1.76	166	-	92.0	99.0	100.0	8.0	1.0
Veeranam	6.66	3.45	217	12.0	92.0	99.0	88.0	8.0	1.0
Veppurchekkadi	6.05	4.12	129	10.0	88.0	100.0	90.0	12.0	-
Velur T.	10.54	3.18	116	6.0	88.0	100.0	94.0	12.0	-
Perungolathur	17.39	5.64	1061	85.0	94.0	99.0	15.0	6.0	1.0
Elayankannai	12.54	5.64	1061	86.0	94.0	99.0	14.0	6.0	1.0
P Quilam	5.98	5.64	1061	76.0	-	99.0	24.0	100.0	1.0
Athipadi	9.29	6.12	328	-	84.0	95.0	100.0	16.0	5.0
Keelsirupakkam	14.33	8.54	588	3.0	89.0	95.0	97.0	11.0	5.0
Kolamanjanoor	8.48	3.16	335	-	84.0	97.0	100.0	16.0	3.0
Kottaiyur	13.14	5.83	698	-	96.0	100.0	100.0	4.0	-
Melpasar	8.19	4.14	293	-	97.0	100.0	100.0	3.0	-
Mothakkal	17.79	5.41	427	-	92.0	100.0	100.0	8.0	-
Narayankuppam	10.77	4.97	388	-	91.0	97.0	100.0	9.0	3.0
Pudurchekkdi	12.29	5.25	423	-	94.0	99.0	100.0	6.0	1.0
Sadakuppam	7.75	1.97	377	-	92.0	98.0	100.0	8.0	2.0
Serpattu	6.21	5.08	226	3.0	96.0	100.0	97.0	4.0	-
Thandarampet	25.45	3.82	912	-	93.0	100.0	100.0	7.0	-
Vanapuram	18.11	8.08	433	-	95.0	99.0	100.0	5.0	1.0
Perunduraipattu	7.24	1.43	537	-	90.0	100.0	100.0	10.0	-

ANNEXURE 3.7

GP WISE STATUS OF AGRICULTURE RESOURCE

Gram Panchayat	Land Resources (ha)									
	Forest land	Non-Agricultural Uses	Barren & Un-cultivable Land	Permanent Pastures and Other Grazing Land	Land Under Miscellaneous Tree Criticalops etc.	Culturable Waste Land	Fallows Land other than Current Fallows	Current Fallow land	Unirrigated Land	Area Irrigated by Source
Agarampallipattu	-	72	45	-	-	23	159	97	53	151
Chinniyampettai	-	-	150	174	-	-	45	394	14	830
Allappanur	-	59	100	-	-	-	61	-	9	58
Bondai	-	195	6	-	-	4	195	-	4	533
Edathanur	-	92	177	-	-	10	130	27		214
Kambattu	-	35	30	3	-	7	-	21	8	169
Kanakkandal	-	64	6	-	-	9	33	51	34	158
Keelvanakkambadi	-	203	-	-	-	-	-	188	32	694
Malayanoorchekkadi	-	118	53	-	-	6	134	25	-	456
Kolundampattu	-	71	34	-	-	3	321	-	114	242
Melamanjanur	-	-	171	218	-	-	8	170	22	669
Melkaripur	-	105	5	-	-	6	54	43	75	265
Nedungavadi	-	58	15	-	-	5	-	86	12	107
Perayampattu	-	30	61	-	-	-	-	30	7	93
Puthurchekkadi	-	73	28	-	-	8	-	69	9	224
Radhapuram	-	223	85	-	-	8	-	171	124	696
Reddiapalayam	-	108	65	-	-	30	264	-	6	458
Royandapuram	-	185	219	-	-	43	338	-	2	367
Sathanur	-	219	9	-	-	71	71	353	384	523
Se.Andapattu	-	39	-	-	-	-	178	-	21	159
Se.Gudalur	-	80	20	2	-	5	-	120	21	254
Thanipadi	-	115	-	-	-	16	291	-	10	471

Gram Panchayat	Land Resources (ha)									
	Forest land	Non-Agricultural Uses	Barren & Un-cultivable Land	Permanent Pastures and Other Grazing Land	Land Under Miscellaneous Tree Criticalops etc.	Culturable Waste Land	Fallows Land other than Current Fallows	Current Fallow land	Unirrigated Land	Area Irrigated by Source
Tharadapattu	-	153	35	-	-	6	133	-	107	194
Thenkarimbalur	-	141		-	-	17	-	291	9	349
Thenmudiyanur	-	144	26	4	-	-	609	-	45	445
Thiruvadathanur	-	107	89	-	1	23	136	55	1	278
Thondamanur	-	89	378	-	-	-	-	132	35	203
Varagur	-	40	39	-	-	7	60	-	16	180
Veeranam	-	66	5	-	-	-	229	-	118	171
Veppurchekkadi	-	32	63	-	-	25	25	134	20	156
Velur T.	-	57	2	-	-	19	-	365	49	395
Perungolathur	97	628	346	-	12	65	-	-	65	949
Elayankannai	97	628	346	-	12	65	-	-	65	949
P quilam	97	628	346	-	12	65	-	-	65	949
Athipadi	-	167	245	-	-	-	183	100	95	442
Keelsirupakkam	-	153	4	-	-	-	189	346	-	612
Kolamanjanoor	-	139	318	-	-	17	119	-	24	544
Kottaiyur	-	176	16	-	0	47	13	151	20	343
Melpasar	-	34	52	-	-	65	305	3	8	406
Mothakkal	-	114	109	-	-	54	342	-	3	802
Narayankuppam	-	108	95	-	-	25	358	-	28	547
Pudurchekkdi	-	199	363	-	1	104	846	38	49	640
Sadakuppam	-	102	25	2	-	48	4	6	46	246
Serpattu	-	72	8	-	-	2	-	1	34	223
Thandarampet	-	279	10	-	-	-	355	1	44	525
Vanapuram	-	239	41	-	-	3	68	26	26	508
Perunduraipattu	-	88	10	-	-	-	96	26	24	297

Gram Panchayat	Land under Catchment Area (ha)			Crop Details				
	Good Catchment	Average Catchment	Bad Catchment	Irrigated Area (ha)	Rainfed area (ha)	Paddy Cultivation (ha)	Crop Water Requirement - Irrigated condition (ha.m)	Crop Water Requirement - Rainfed condition (ha.m)
Agarampallipattu	117	23	460	111	-	63	175	-
Chinniyampettai	150	174	1,283	269	11	85	258	4
Allappanur	159	-	128	84	15	54	117	5
Bondai	201	4	732	389	10	240	466	3
Edathanur	268	10	370	231	93	116	-	-
Kambattu	65	10	198	102	7	49	133	3
Kanakkandal	70	9	277	122	24	116	187	9
Keelvanakkambadi	203	-	914	435	38	336	595	13
Malayanoorchekkadi	170	6	615	195	-	82	202	-
Kolundampattu	105	3	678	256	70	207	378	25
Melamanjanur	171	218	869	322	10	119	315	4
Melkaripur	110	6	437	224	4	140	256	2
Nedungavadi	73	5	205	140	5	65	134	2
Perayampattu	91	-	130	91	-	14	128	-
Puthurchekkadi	101	8	301	73	30	16	78	10
Radhapuram	308	8	991	334	-	158	394	-
Reddiapalayam	174	30	727	214	5	124	251	2
Royandapuram	404	43	707	298	29	185	488	17
Sathanur	228	71	1,331	214	304	69	238	106
Se.Andapattu	39	-	358	91	-	76	129	-
Se.Gudalur	100	7	394	230	2	150	291	1
Thanipadi	115	16	772	180	-	66	164	-
Tharadapattu	188	6	435	121	-	121	182	-
Thenkarimbalur	141	17	649	303	16	84	510	6
Thenmudiyanur	170	4	1,099	394	24	253	580	8

Gram Panchayat	Land under Catchment Area (ha)			Crop Details				
	Good Catchment	Average Catchment	Bad Catchment	Irrigated Area (ha)	Rainfed area (ha)	Paddy Cultivation (ha)	Crop Water Requirement - Irrigated condition (ha.m)	Crop Water Requirement - Rainfed condition (ha.m)
Thiruvadathanur	196	23	470	231	-	96	232	-
Thondamanur	467	-	370	221	11	110	301	4
Varagur	79	7	257	128	6	66	164	2
Veeranam	72	-	518	191	3	88	216	1
Veppurchekkadi	95	25	335	141	-	22	129	-
Velur T.	59	19	810	99	-	23	116	-
Perungolathur	1,072	78	1,014	881	20	486	1,054	7
Elayankannai	1,072	78	1,014	881	20	486	1,054	7
P quilam	1,072	78	1,014	881	20	486	1,054	7
Athipadi	412	-	820	374	49	109	310	17
Keelsirupakkam	157	-	1,146	533	78	170	556	32
Kolamanjanoor	457	17	687	257	26	102	326	9
Kottaiyur	192	48	527	401	-	41	698	-
Melpasar	86	65	722	318	-	108	293	-
Mothakkal	223	54	1,147	380	-	188	427	-
Narayankuppam	202	25	933	305	21	138	376	11
Pudurchekkdi	562	105	1,573	294	7	275	421	2
Sadakuppam	127	50	302	247	19	45	371	7
Serpattu	80	2	259	198	3	64	225	1
Thandarampet	288	-	925	597	9	178	909	3
Vanapuram	279	3	627	333	8	115	430	3
Perunduraipattu	98	-	443	304	1	15	537	0

Gram Panchayat	Soil Resources: Status of Available Nitrogen (%)					Status of Organic Carbon					Status of Soil Micro Nutrients	
	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High	Suffi-cient	Defi-cient
Agarampallipattu	75%	25%	-	-	-	40%	58%	2%	-	-	67%	33%
Chinniyampettai	74%	26%	-	-	-	43%	57%	0%	-	-	61%	39%
Allappanur	83%	17%	-	-	-	43%	57%	-	-	-	65%	35%
Bondai	72%	28%	-	-	-	40%	60%	-	-	-	66%	34%
Edathanur	67%	33%	-	-	-	48%	51%	-	1%	-	66%	34%
Kambattu	31%	69%	-	-	-	31%	65%	3%	-	-	61%	39%
Kanakkandal	6%	82%	12%	-	-	18%	64%	18%	-	-	79%	21%
Keelvanakkambadi	61%	39%	-	-	-	42%	58%	-	-	-	62%	38%
Malayanoorchekkadi	4%	95%	1%	-	-	27%	73%	-	-	-	65%	35%
Kolundampattu	1%	99%	-	-	-	34%	66%	-	-	-	58%	42%
Melamanjanur	7%	93%	-	-	-	45%	55%	-	-	-	62%	38%
Melkaripur	-	100%	-	-	-	7%	93%	-	-	-	61%	39%
Nedungavadi	-	100%	-	-	-	23%	77%	-	-	-	60%	40%
Perayampattu	-	100%	-	-	-	28%	72%	-	-	-	60%	40%
Puthurchekkadi	3%	97%	-	-	-	13%	87%	-	-	-	60%	40%
Radhapuram	-	100%	0%	-	-	7%	93%	-	-	-	73%	27%
Reddiapalayam	1%	99%	-	-	-	3%	97%	-	-	-	60%	40%
Royandapuram	-	100%	-	-	-	3%	97%	-	-	-	59%	41%
Sathanur	0%	100%	-	-	-	3%	97%	-	-	-	63%	37%
Se.Andapattu	-	100%	-	-	-	-	100%	-	-	-	57%	43%
Se.Gudalur	81%	18%	1%	-	-	45%	55%	-	-	-	57%	43%
Thanipadi	-	100%	-	-	-	-	100%	-	-	-	35%	65%
Tharadapattu	1%	99%	-	-	-	-	100%	-	-	-	49%	51%
Thenkarimbalur	-	100%	-	-	-	1%	99%	-	-	-	57%	43%
Thenmudiyanur	-	100%	-	-	-	2%	98%	-	-	-	55%	45%

Gram Panchayat	Soil Resources: Status of Available Nitrogen (%)					Status of Organic Carbon					Status of Soil Micro Nutrients	
	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High	Suffi-cient	Defi-cient
Thiruvadathanur	-	100%	-	-	-	30%	70%	-	-	-	60%	40%
Thondamanur	-	100%	-	-	-	33%	67%	-	-	-	58%	42%
Varagur	32%	68%	-	-	-	41%	59%	-	-	-	62%	38%
Veeranam	-	100%	-	-	-	36%	64%	-	-	-	60%	40%
Veppurchekkadi	3%	92%	4%	-	-	26%	74%	-	-	-	54%	46%
Velur T.	1%	99%	-	-	-	33%	67%	-	-	-	61%	39%
Perungolathur	1%	99%	-	-	-	8%	92%	-	-	-	60%	40%
Elayankannai	1%	99%	-	-	-	8%	92%	-	-	-	60%	40%
P quilam	1%	99%	-	-	-	8%	92%	-	-	-	60%	40%
Athipadi	2%	98%	-	-	-	37%	63%	-	-	-	58%	42%
Keelsirupakkam	-	100%	-	-	-	2%	98%	-	-	-	62%	38%
Kolamanjanoor	5%	93%	1%	-	-	30%	70%	-	-	-	64%	36%
Kottaiyur	-	100%	-	-	-	5%	95%	-	-	-	81%	19%
Melpasar	-	100%	-	-	-	6%	94%	-	-	-	55%	45%
Mothakkal	-	100%	-	-	-	14%	86%	-	-	-	61%	39%
Narayankuppam	10%	90%	-	-	-	37%	63%	-	-	-	61%	39%
Pudurchekkdi	3%	97%	-	-	-	13%	87%	-	-	-	61%	39%
Sadakuppam	-	100%	-	-	-	37%	63%	-	-	-	39%	61%
Serpattu	-	100%	-	-	-	4%	96%	-	-	-	51%	49%
Thandarampet	-	100%	-	-	-	-	100%	-	-	-	38%	62%
Vanapuram	-	100%	-	-	-	4%	96%	-	-	-	53%	47%
Perunduraipattu	76%	24%	-	-	-	54%	46%	-	-	-	65%	35%

Gram Panchayat	Status of Physical condition of the soil (%)							
	Acidic Sul-phate	Strongly Acidic	Highly Acidic	Moderately Acidic	Slighly Acidic	Neutral	Moderately Alkaline	Strongly Alka-line
Agarampallipattu	-	-	-	-	4%	2%	94%	-
Chinniyampettai	-	-	-	1%	45%	15%	39%	-
Allappanur	-	-	-	-	-	-	100%	-
Bondai	-	-	-	-	-	-	100%	-
Edathanur	-	-	-	-	-	-	100%	-
Kambattu	-	-	-	-	17%	33%	50%	-
Kanakkandal	-	-	-	-	-	-	100%	-
Keelvanakkambadi	-	-	-	-	1%	-	99%	-
Malayanoorchekkadi	1%	-	-	5%	5%	-	88%	-
Kolundampattu	-	-	-	-	-	1%	99%	-
Melamanjanur	-	-	-	-	-	12%	88%	-
Melkaripur	-	-	-	12%	53%	-	35%	-
Nedungavadi	-	-	-	-	-	-	100%	-
Perayampattu	-	-	-	-	-	-	100%	-
Puthurchekkadi	-	-	-	1%	4%	-	94%	-
Radhapuram	-	-	-	12%	2%	-	86%	-
Reddiapalayam	-	-	-	3%	1%	-	96%	-
Royandapuram	-	-	-	20%	18%	-	61%	-
Sathanur	-	-	-	5%	20%	1%	74%	-
Se.Andapattu	-	-	-	-	-	-	100%	-
Se.Gudalur	-	-	-	-	-	-	100%	-
Thanipadi	-	-	-	-	-	7%	93%	-
Tharadapattu	-	-	-	-	-	-	100%	-
Thenkarimbalur	-	-	-	-	1%	-	99%	-
Thenmudiyanur	-	-	-	-	-	-	100%	-
Thiruvadathanur	-	-	-	-	-	-	100%	-

Gram Panchayat	Status of Physical condition of the soil (%)							
	Acidic Sulphate	Strongly Acidic	Highly Acidic	Moderately Acidic	Slighly Acidic	Neutral	Moderately Alkaline	Strongly Alkaline
Thondamanur	-	-	-	-	-	-	100%	-
Varagur	-	-	-	-	-	5%	95%	-
Veeranam	-	-	-	-	-	-	100%	-
Veppurchekkadi	-	-	-	1%	13%	3%	82%	-
Velur T.	-	-	-	-	-	-	100%	-
Perungolathur	-	-	-	1%	58%	0%	41%	-
Elayankannai	-	-	-	1%	58%	0%	41%	-
P quilam	-	-	-	1%	58%	0%	41%	-
Athipadi	-	-	-	-	-	-	100%	-
Keelsirupakkam	-	-	-	-	-	-	100%	-
Kolamanjanoor	-	-	-	-	-	-	100%	-
Kottaiyur	-	-	-	51%	20%	-	28%	-
Melpasar	-	-	-	-	-	-	100%	-
Mothakkal	-	-	-	-	6%	-	94%	-
Narayankuppam	-	-	-	-	-	8%	92%	-
Pudurchekkdi	-	-	-	1%	4%	-	94%	-
Sadakuppam	-	-	-	-	-	-	100%	-
Serpattu	-	-	-	-	2%	-	98%	-
Thandarampet	-	-	-	-	-	-	100%	-
Vanapuram	-	-	-	-	16%	3%	82%	-
Perunduraipattu	-	-	-	-	-	-	100%	-

Gram Panchayat	Soil Texture				Soil moisture and ET			Means of Water Extraction (%)	
	% of Clay Soil	% of Fine Soil	% of Coarse loamy	Soil Water Permeability (Low, Moderate, high)	Volumetric Soil Moisture (%)	Estimated Soil Moisture (ha.m)	ET Losses (ha.m)	Gravity	Lifting
Agarampallipattu	16%	75%	-	Moderate	0	121	106	3%	97%
Chinniyampettai	80%	15%	-	Low	0	369	818	0%	100%
Allappanur	37%	54%	-	Moderate	0	52	54	7%	93%
Bondai	51%	10%	-	Low	0	171	432	0%	100%
Edathanur	49%	50%	-	Moderate	0	128	172	1%	99%
Kambattu	-	80%	-	Moderate	0	55	144	2%	98%
Kanakkandal	13%	63%	-	Moderate	0	67	155	3%	97%
Keelvanakkambadi	42%	34%	-	Low	0	210	584	1%	99%
Malayanoorchekkadi	80%	14%	-	Low	0	155	366	2%	98%
Kolundampattu	30%	60%	-	Moderate	0	164	287	2%	98%
Melamanjanur	47%	28%	-	Low	0	289	731	0%	100%
Melkaripur	29%	59%	-	Moderate	0	103	274	2%	98%
Nedungavadi	-	72%	-	Moderate	0	52	62	2%	98%
Perayampattu	63%	26%	1%	Low	0	44	80	3%	97%
Puthurchekkadi	-	78%	16%	Moderate	0	78	187	1%	99%
Radhapuram	58%	26%	1%	Low	0	249	660	1%	99%
Reddiapalayam	11%	79%	-	Moderate	0	189	373	1%	99%
Royandapuram	60%	21%	-	Low	0	223	297	2%	98%
Sathanur	12%	77%	-	Moderate	0	325	729	2%	98%
Se.Andapattu	89%	7%	-	Low	0	82	144	0%	100%
Se.Gudalur	33%	52%	1%	Moderate	0	97	222	1%	99%
Thanipadi	79%	15%	-	Low	0	181	387	1%	99%
Tharadapattu	0%	72%	-	Moderate	0	109	242	3%	97%
Thenkarimbalur	40%	47%	-	Moderate	0	153	288	2%	98%
Thenmudiyanur	35%	60%	-	Moderate	0	260	258	1%	99%

Gram Panchayat	Soil Texture				Soil moisture and ET			Means of Water Extraction (%)	
	% of Clay Soil	% of Fine Soil	% of Coarse loamy	Soil Water Permeability (Low, Moderate, high)	Volumetric Soil Moisture (%)	Estimated Soil Moisture (ha.m)	ET Losses (ha.m)	Gravity	Lifting
Thiruvadathanur	0%	7%	-	Moderate	0	134	225	2%	98%
Thondamanur	31%	48%	-	Moderate	0	172	191	5%	95%
Varagur	-	87%	-	Moderate	0	70	158	1%	99%
Veeranam	3%	88%	-	Moderate	0	120	232	3%	97%
Veppurchekkadi	-	85%	-	Moderate	0	97	142	2%	98%
Velur T.	55%	35%	-	Low	0	191	357	1%	99%
Perungolathur	25%	54%	-	Moderate	0	353	903	1%	99%
Elayankannai	60%	29%	-	Low	0	353	903	0%	100%
P quilam	25%	54%	-	Moderate	0	353	903	0%	100%
Athipadi	44%	40%	-	Low	0	245	432	0%	100%
Keelsirupakkam	-	91%	-	Moderate	0	264	319	1%	99%
Kolamanjanoor	58%	28%	-	Low	0	235	457	0%	100%
Kottaiyur	30%	45%	-	Moderate	0	136	292	1%	99%
Melpasar	14%	84%	-	Moderate	0	193	333	100%	0%
Mothakkal	47%	48%	-	Moderate	0	301	647	0%	100%
Narayankuppam	71%	21%	-	Low	0	242	462	0%	100%
Pudurchekkdi	26%	70%	-	Moderate	0	469	554	0%	100%
Sadakuppam	-	93%	-	Moderate	0	87	236	1%	99%
Serpattu	29%	57%	-	Moderate	0	62	207	3%	97%
Thandarampet	47%	50%	-	Moderate	0	215	458	1%	99%
Vanapuram	37%	50%	0%	Moderate	0	154	429	1%	99%
Perunduraipattu	43%	41%	-	Low	0	104	258	0%	100%

Gram Panchayat	Irrigation Methods (%)		Livestock (No.)			
	Wild Flooding	Control Flooding	Cattle Population	Sheep Population	Goat Population	Poultry
Agarampallipattu	8%	92%	604	122	294	-
Chinniyampettai	0%	100%	1,113	124	1,074	-
Allappanur	44%	56%	429	204	260	-
Bondai	0%	100%	1,158	122	496	-
Edathanur	0%	100%	1,092	123	402	-
Kambattu	6%	94%	588	273	258	-
Kanakkandal	0%	100%	1,112	361	646	-
Keelvanakkambadi	15%	85%	1,532	346	872	-
Malayanoorchekkadi	0%	100%	953	82	580	-
Kolundampattu	0%	100%	836	393	376	-
Melamanjanur	6%	94%	1,082	684	452	-
Melkaripur	0%	100%	633	123	82	-
Nedungavadi	0%	100%	316	77	98	-
Perayampattu	0%	100%	866	81	66	-
Puthurchekkadi	0%	90%	995	248	364	-
Radhapuram	0%	100%	1,661	188	517	-
Reddiapalayam	0%	100%	880	289	473	-
Royandapuram	40%	60%	1,103	390	449	-
Sathanur	0%	100%	1,714	339	632	-
Se.Andapattu	0%	100%	220	26	316	-
Se.Gudalur	10%	90%	509	101	291	-
Thanipadi	0%	100%	1,286	501	601	-
Tharadapattu	0%	100%	870	687	375	-
Thenkarimbalur	17%	83%	978	67	150	-
Thenmudiyanur	22%	78%	1,839	635	430	-
Thiruvadathanur	61%	39%	539	155	384	-

Gram Panchayat	Irrigation Methods (%)		Livestock (No.)			
	Wild Flooding	Control Flooding	Cattle Population	Sheep Population	Goat Population	Poultry
Thondamanur	30%	70%	535	136	90	-
Varagur	8%	92%	443	173	223	-
Veeranam	0%	100%	868	419	337	-
Veppurchekkadi	0%	100%	1,000	434	822	-
Velur T.	0%	100%	768	690	356	-
Perungolathur	100%	0%	1,449	244	675	-
Elayankannai	0%	100%	1,449	244	675	-
P quilam	0%	100%	1,449	244	675	-
Athipadi	0%	100%	1,376	535	1,916	-
Keelsirupakkam	3%	90%	2,065	1,485	1,036	-
Kolamanjanoor	0%	100%	730	580	777	-
Kottaiyur	0%	100%	1,538	380	214	-
Melpasar	0%	100%	1,099	110	193	-
Mothakkal	0%	100%	1,362	180	870	-
Narayankuppam	0%	100%	1,241	435	745	-
Pudurchekkdi	0%	100%	1,352	268	567	-
Sadakuppam	0%	100%	494	162	282	-
Serpattu	19%	81%	1,333	87	504	-
Thandarampet	0%	100%	968	294	428	-
Vanapuram	9%	82%	2,109	438	578	-
Perunduraipattu	0%	100%	354	315	74	-

ANNEXURE 3.8

GP WISE DEMOGRAPHIC AND SOCIO ECONOMIC STATUS

Gram Panchayat	Geo-graphical Area (ha)	Male Popula-tion (No.)	Female Popula-tion (No.)	Total Popula-tion (No.)	SC Pop-ulation (No.)	ST Pop-ulation (No.)	Vulnera-ble pop-upation (No.)	House-holds (HH's) (No.)	Only one room HH's (SECC) (No.)	Female Headed HH's (SECC) (No.)	Vul-nerable House-holds (SECC) (No.)
Agarampallipattu	599	1,147	1,160	2,307	802	-	802	548	109	19	82
Chinniyampettai	1,606	2,831	2,861	5,692	834	-	834	1,214	161	45	126
Allappanur	287	729	666	1,395	643	21	664	312	19	11	17
Bondai	936	1,672	1,675	3,347	415	19	434	767	127	80	113
Edathanur	649	1,398	1,421	2,819	204	-	-	737	100	35	81
Kambattu	272	780	793	1,573	422	-	422	383	47	19	39
Kanakkandal	356	792	737	1,529	129	226	355	402	61	21	49
Keelvanakkambadi	1,117	2,287	2,231	4,518	1,649	694	2,343	1,030	146	58	120
Malayanoorchekkadi	792	1,690	1,619	3,309	777	1,056	1,833	861	167	36	128
Kolundampattu	788	1,574	1,603	3,177	1,237	158	1,395	852	32	36	33
Melamanjanur	1,258	2,383	2,349	4,732	861	54	915	1,098	86	50	75
Melkaripur	554	1,267	1,212	2,479	887	-	887	667	24	37	28
Nedungavadi	283	447	461	908	266	-	266	309	13	18	15
Perayampattu	220	982	984	1,966	719	-	719	417	43	24	37
Puthurchekkadi	411	819	844	1,663	518	-	518	1,020	269	41	201
Radhapuram	1,308	2,582	2,647	5,229	1,013	86	1,099	1,206	98	53	85
Reddiapalayam	931	2,806	2,725	5,531	1,100	74	1,174	1,229	140	60	116
Royandapuram	1,154	1,958	1,941	3,899	858	649	1,507	887	129	31	100
Sathanur	1,630	4,422	4,327	8,749	2,036	446	2,482	2,160	127	104	120
Se.Andapattu	396	1,689	1,689	3,378	2,192	9	2,201	702	44	23	38
Se.Gudalur	501	1,164	1,147	2,311	1,171	115	1,286	546	47	40	45
Thanipadi	903	5,158	5,136	10,294	748	68	816	2,242	155	95	137

Gram Panchayat	Geo-graphical Area (ha)	Male Popula-tion (No.)	Female Popula-tion (No.)	Total Popula-tion (No.)	SC Pop-ulation (No.)	ST Pop-ulation (No.)	Vulnera-ble pop-upation (No.)	House-holds (HH's) (No.)	Only one room HH's (SECC) (No.)	Female Headed HH's (SECC) (No.)	Vul-nerable House-holds (SECC) (No.)
Tharadapattu	628	2,028	2,058	4,086	1,708	874	2,582	944	48	38	45
Thenkarimbalur	808	1,311	1,362	2,673	1,242	27	1,269	735	132	35	103
Thenmudiyanur	1,273	2,786	2,698	5,484	1,197	48	1,245	1,257	143	48	115
Thiruvadathanur	689	1,087	1,219	2,306	507	106	613	587	99	26	77
Thondamanur	837	896	865	1,761	447	25	472	419	125	19	93
Varagur	343	918	904	1,822	632	8	640	438	15	32	20
Veeranam	589	1,220	1,212	2,432	1,143	25	1,168	529	40	12	32
Veppurchekkadi	455	1,148	1,062	2,210	258	35	293	562	163	38	126
Velur T.	888	1,927	1,923	3,850	798	-	798	905	211	51	163
Perungolathur	1,257	3,118	3,235	6,353	1,370	428	1,798	3,105	645	191	509
Elayankannai	2,163	2,333	2,249	4,582	245	153	398	3,105	645	191	509
P Quilam	2,163	1,101	1,083	2,184	371	521	892	3,105	645	191	509
Athipadi	1,232	1,722	1,673	3,395	32	2,401	2,433	846	233	47	177
Keelsirupakkam	1,303	2,666	2,567	5,233	-	-	2,392	1,165	74	42	64
Kolamanjanoor	1,160	1,542	1,557	3,099	776	96	872	730	132	51	108
Kottaiyur	767	2,392	2,409	4,801	868	277	1,145	77	59	72	-
Melpasar	874	1,554	1,436	2,990	60	953	1,013	114	28	88	-
Mothakkal	1,424	3,364	3,133	6,497	293	2,049	2,342	1,608	339	71	259
Narayankuppam	1,160	1,965	1,970	3,935	437	201	638	896	167	58	134
Pudurchekkdi	2,240	2,250	2,238	4,488	8	3,372	3,380	426	51	28	44
Sadakuppam	479	1,374	1,457	2,831	327	-	327	631	33	33	33
Serpattu	340	1,184	1,086	2,270	243	6	249	506	112	32	88
Thandarampet	1,214	4,602	4,696	9,298	3,033	1,046	4,079	2,054	136	109	128
Vanapuram	909	3,285	3,332	6,617	1,206	454	1,660	1,633	111	53	94
Perunduraipattu	541	1,308	1,338	2,646	1,057	7	1,064	687	170	40	131

Gram Panchayat	% of Vulnerable House-holds (%)	Registered MGN-REGA Job cards (Persons)	Active person working in MGN-REGA job Cards (Persons)	Drinking Water Sources (No.)	Ground Water - Drinking source (No.)	Surface water - Drinking source (No.)	Sum of drinking water sources (No.)	HH's have tap water connection for drink-ing water (No.)	HH's dependent on other sources for drink-ing water (No.)	Annual Greywater Generation (ha - m)
Agarampallipattu	0.15	1,145	867	10	1	-	1	-	187	4
Chinniyampettai	0.10	2,018	1,702	98	5	1	6	1,282	215	10
Allappanur	0.05	607	377	50	5	1	6	425	115	3
Bondai	0.15	1,368	1,064	540	5	1	6	75	651	6
Edathanur	0.11	1,400	1,205	114	5	1	6	1,282	232	5
Kambattu	0.10	813	481	168	5	1	6	465	306	3
Kanakkandal	0.12	895	490	32	5	1	6	1,282	150	3
Keelvanakkambadi	0.12	1,574	1,288	535	5	1	6	1,282	654	8
Malayanoorchekkadi	0.15	1,476	911	78	5	1	6	938	86	6
Kolundampattu	0.04	1,697	1,137	181	5	1	6	1,237	303	6
Melamanjanur	0.07	1,797	1,309	560	5	1	6	180	678	9
Melkaripur	0.04	1,346	802	110	5	1	6	1,021	233	5
Nedungavadi	0.05	367	261	41	5	1	6	460	54	2
Perayampattu	0.09	1,109	573	164	5	1	6	491	287	4
Puthurchekkadi	0.20	629	514	218	5	1	6	-	-	3
Radhapuram	0.07	2,086	1,488	448	5	1	6	1,278	560	10
Reddiapalayam	0.09	2,722	2,214	372	5	1	6	1,120	383	10
Royandapuram	0.11	1,945	1,520	256	5	1	6	1,282	374	7
Sathanur	0.06	2,109	1,726	984	5	1	6	1,166	1,085	16
Se.Andapattu	0.05	796	639	70	5	1	6	703	180	6
Se.Gudalur	0.08	888	731	232	5	1	6	503	317	4
Thanipadi	0.06	2,711	1,959	458	5	1	6	1,166	607	19
Tharadapattu	0.05	1,201	972	627	5	1	6	936	698	7
Thenkarimbalur	0.14	1,140	673	127	5	1	6	536	153	5

Gram Panchayat	% of Vulnerable House-holds (%)	Registered MGN-REGA Job cards (Persons)	Active person working in MGN-REGA job Cards (Persons)	Drinking Water Sources (No.)	Ground Water - Drinking source (No.)	Surface water - Drinking source (No.)	Sum of drinking water sources (No.)	HH's have tap water connection for drink-ing water (No.)	HH's dependent on other sources for drink-ing water (No.)	Annual Greywater Generation (ha - m)
Thenmudiyanur	0.09	2,402	1,648	156	5	1	6	606	275	10
Thiruvadathanur	0.13	456	365	476	5	1	6	-	-	4
Thondamanur	0.22	669	535	35	5	1	6	360	86	3
Varagur	0.05	603	501	186	5	1	6	1,282	304	3
Veeranam	0.06	1,122	814	75	5	1	6	506	144	4
Veppurchekkadi	0.22	1,392	1,007	111	5	1	6	515	174	4
Velur T.	0.18	1,666	1,174	249	5	1	6	834	3,555	7
Perungolathur	0.16	1,956	1,438	416	5	1	6	-	-	12
Elayankannai	0.16	1,271	1,006	325	5	1	6	-	-	8
P Quilam	0.16	1,265	848	25	4	1	5	-	-	4
Athipadi	0.21	1,038	602	-	-	-	-	-	-	6
Keelsirupakkam	0.06	1,764	1,322	1,193	4	1	5	1,150	-	10
Kolamanjanoor	0.15	1,405	1,208	-	-	-	-	-	-	6
Kottaiyur	-	2,132	1,584	-	-	-	-	-	-	9
Melpasar	-	1,236	821	-	-	-	-	-	-	5
Mothakkal	0.16	1,747	1,333	-	-	-	-	-	-	12
Narayankuppam	0.15	1,272	920	-	-	-	-	-	-	7
Pudurchekkdi	0.10	2,348	1,217	-	-	-	-	-	-	8
Sadakuppam	0.05	1,119	856	-	-	-	-	-	-	5
Serpattu	0.17	818	566	612	4	2	6	-	-	4
Thandarampet	0.06	1,745	1,547	-	-	-	-	-	-	17
Vanapuram	0.06	1,735	1,548	-	-	-	-	-	-	12
Perunduraipattu	0.19	834	733	-	-	-	-	-	-	5

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

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

Aggregation and categorization of Indicators

The normalized values of indicator sets are aggregated to obtain the vulnerability index and categorized in to high, medium and low vulnerability classes.

$$VI = \frac{\sum_{i}^{N} K_i S_i}{K_i}$$

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

Gram Panchayat	Forest Land	Non-Agricultural Uses	Barren & Un-cultivable Land	Treatement Area under Permanent Pastures and Other Grazing Land	Land Under Miscellaneous Tree Criticalops etc.	Culturable Waste Land	Fallows Land other than Current Fallows	Current Fallow land	Unirrigated Land	Treatment Area Irrigated by Source
Agarampallipattu	-	3	34	-	-	17	40	24	13	15
Chinniyampettai	-	-	112	130	-	-	11	98	3	83
Allappanur	-	45	75	-	-	-	10	-	2	6
Bondai	-	9	5	-	-	3	29	-	1	53
Edathanur	-	69	132	-	-	8	22	5	-	21
Kambattu	-	2	22	2	-	5	-	2	1	17
Kanakkandal	-	48	5	-	-	7	4	6	4	16
Keelvanakkambadi	-	101	-	-	-	-	-	22	4	69
Malayanoorchekkadi	-	59	39	-	-	5	20	4	-	46
Kolundampattu	-	3	26	-	-	2	13	-	4	24
Melamanjanur	-	-	128	163	-	-	1	12	2	67
Melkaripur	-	5	4	-	-	5	2	2	3	27
Nedungavadi	-	29	12	-	-	4	-	3	0	11
Perayampattu	-	1	45	-	-	-	-	3	1	9
Puthurchekkadi	-	36	21	-	-	6	-	12	2	22
Radhapuram	-	111	64	-	-	6	-	12	9	70
Reddiapalayam	-	5	49	-	-	23	25	-	1	46
Royandapuram	-	9	164	-	-	32	38	-	0	37
Sathanur	-	10	7	-	-	53	4	20	21	52
Se.Andapattu	-	2	-	-	-	-	10	-	1	16
Se.Gudalur	-	4	15	2	-	4	-	10	2	25
Thanipadi	-	5	-	-	-	12	18	-	1	47
Tharadapattu	-	7	26	-	-	4	6	-	5	19
Thenkarimbalur	-	7	-	-	-	13	-	41	1	35

Gram Panchayat	Forest Land	Non-Agricultural Uses	Barren & Un-cultivable Land	Treatement Area under Permanent Pastures and Other Grazing Land	Land Under Miscellaneous Tree Criticalops etc.	Culturable Waste Land	Fallows Land other than Current Fallows	Current Fallow land	Unirrigated Land	Treatment Area Irrigated by Source
Thenmudiyanur	-	7	20	3	-	-	55	-	4	45
Thiruvadathanur	-	5	67	-	0	17	18	7	0	28
Thondamanur	-	4	284	-	-	-	-	29	8	20
Varagur	-	2	29	-	-	6	3	-	1	18
Veeranam	-	3	4	-	-	-	14	-	7	17
Veppurchekkadi	-	2	47	-	-	19	6	30	4	16
Velur T.	-	3	2	-	-	14	-	91	12	40
Perungolathur	39	339	260	-	9	49	-	-	11	95
Elayankannai	39	339	260	-	9	49	-	-	11	95
P Quilam	39	115	260	-	9	49	-	-	11	95
Athipadi	-	31	184	-	-	-	38	21	20	44
Keelsirupakkam	-	28	3	-	-	-	10	19	-	61
Kolamanjanoor	-	26	239	-	-	12	18	-	4	54
Kottaiyur	-	32	12	-	0	36	-	-	-	34
Melpasar	-	6	39	-	-	49	-	-	-	41
Mothakkal	-	21	81	-	-	41	55	-	0	80
Narayankuppam	-	20	71	-	-	19	54	-	4	55
Pudurchekkdi	-	37	272	-	0	78	88	4	5	64
Sadakuppam	-	19	19	2	-	36	0	0	2	25
Serpattu	-	13	6	-	-	1	-	0	6	22
Thandarampet	-	51	7	-	-	-	22	0	3	53
Vanapuram	-	44	30	-	-	2	4	1	2	51
Perunduraipattu	-	44	8	-	-	-	18	5	5	30

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

Key CWRM Parameter	Good Catchment Area	Average Catchment Area	Bad Catchment Area
Agarampallipattu	38.40	4.80	17.30
Chinniyampettai	44.88	36.60	36.70
Allappanur	47.84	-	3.30
Bondai	60.16	0.70	15.40
Edathanur	22.00	1.10	2.70
Kambattu	19.36	2.00	3.70
Kanakkandal	21.12	1.90	5.70
Keelvanakkambadi	60.80	-	17.80
Malayanoorchekkadi	51.12	1.40	13.00
Kolundampattu	31.44	0.70	7.70
Melamanjanur	51.20	45.90	15.10
Melkaripur	33.04	1.30	6.30
Nedungavadi	22.00	1.10	2.70
Perayampattu	27.20	-	2.40
Puthurchekkadi	21.50	1.70	6.70
Radhapuram	71.28	1.84	17.68
Reddiapalayam	52.08	6.40	13.30
Royandapuram	121.28	9.10	14.00
Sathanur	68.40	14.90	18.20
Se.Andapattu	11.60	-	5.00
Se.Gudalur	29.84	1.60	6.90
Thanipadi	34.48	3.30	12.20
Tharadapattu	32.30	1.20	5.80
Thenkarimbalur	41.50	3.60	14.40
Thenmudiyanur	56.90	0.90	19.50
Thiruvadathanur	25.70	4.90	9.90
Thondamanur	150.63	-	10.70
Varagur	18.65	1.60	4.00
Veeranam	15.70	-	7.10
Veppurchekkadi	23.60	5.20	10.40
Velur T.	2.85	4.04	26.75
Perungolathur	228.40	16.40	19.70
Elayankannai	230.50	16.40	19.70
P Quilam	161.40	16.40	19.70
Athipadi	80.80	-	23.10
Keelsirupakkam	39.00	-	17.00
Kolamanjanoor	94.70	3.50	14.10
Kottaiyur	16.50	10.00	6.40
Melpasar	16.30	13.80	7.60
Mothakkal	36.70	11.50	25.40

Key CWRM Parameter	Good Catchment Area	Average Catchment Area	Bad Catchment Area
Narayankuppam	32.60	5.30	21.00
Pudurchekkdi	110.70	22.10	30.00
Sadakuppam	13.50	10.50	5.10
Serpattu	7.60	0.30	5.30
Thandarampet	20.90	-	14.50
Vanapuram	27.30	0.60	10.80
Perunduraipattu	20.10	-	10.80

ANNEXURE 5.3

GP WISE PROPOSED WORKS BASED ON WATERSHED AND LIVELIHOOD APPROACH (AREA IN ha / LENGTH IN m / PLANTS IN No.)

Gram Panchayat	Aff		ARS	AVP		Az	BP		CBP		CS
	No.	Area	No.	No.	Length	No.	No.	Area	No.	Length	No.
Agarampallipattu	60,000	75	-	-	1,913	60	-	-	642	3,208	60
Allappanur	-	-	-	-	3,701		-	-	153	765	
Athipadi	-	-	-	-	5,467		-	-	448	2,241	
Bondai	-	-	-	-	1,035		-	-	-	-	
Chinniyampettai	-	-	-	-	3,093		-	-	-	-	
Edathanur	1,600	2	-	-	2,924		-	-	-	-	
Elayankannai	41,600	52	-	-	318	509	-	-	-	-	119
Kambattu	-	-	-	-	3,675		-	-	-	-	
Kanakkandal	-	-	-	-	1,820		-	-	-	-	
Keelsirupakkam	-	-	-	-	3,675		-	-	-	-	
Keelvanakkambadi	-	-	-	-	1,218		-	-	-	-	
Kolamanjanoor	200,800	251	-	-	1	73	-	-	-	-	73
Kolundampattu	-	-	-	-	3,038		-	-	-	-	
Kottaiyur	-	-	-	-	5,581		-	-	-	-	
Malayanoorchekkadi	-	-	-	-	5,293		-	-	-	-	
Melamanjanur	-	-	-	-	769		-	-	-	-	
Melkaripur	-	-	-	-	975		-	-	-	-	
Melpasar	-	-	-	-	2,660		-	-	-	-	
Mothakkal	-	-	-	-	4,237		-	-	-	-	
Narayankuppam	-	-	-	-	2,946		-	-	-	-	
Nedungavadi	-	-	-	-	318		-	-	-	-	
P Quilam											
Perayampattu	-	-	-	-	135		-	-	-	-	
Perunduraipattu	-	-	-	-	1807		-	-	-	-	
Perungolathur	246990	309			5439	145	-	-	-	-	145

Gram Panchayat	Aff		ARS	AVP		Az	BP		CBP		CS
	No.	Area	No.	No.	Length	No.	No.	Area	No.	Length	No.
Pudurchekkadi	-	-	-	-	4506		-	-	-	-	
Puthurchekkadi	21810	27	-	-	2903	100	-	-	-	-	100
Radhapuram	56010	70	-	-	3079	58	66870	84	258	1290	58
Reddiapalayam	-	-	-	-	2471		-	-	-	-	
Royandapuram	-	-	-	-	4171		-	-	-	-	
Sadakuppam	44000	55	-	-	0.35	50	-	-	-	-	50
Sathanur	-	-	-	-	8487		-	-	-	-	
Se.Andapattu	-	-	-	299	1495		-	-	-	-	
Se.Gudalur	-	-	-	-	7265		-	-	-	-	
Serapattu	-	-	-	-	688		-	-	-	-	
Thandarampet	-	-	-	-	6976		-	-	-	-	
Thanipadi	-	-	-	-	0.52		-	-	-	-	
Tharadapattu	-	-	-	-	0.25		-	-	-	-	
Thenkarimbalur	10272	13	-	-	0.58	98	-	-	-	-	98
Thenmudiyanur	-	-	-	-	7110		-	-	-	-	
Thiruvadathanur	52800	66	-	-	5677		34400	43	-	-	
Thondamanur	227200	284	-	-	1795	54	-	-	-	-	54
Vanapuram	-	-	-	-	3234		-	-	-	-	
Varagur	-	-	-	-	0.32		-	-	-	-	
Veeranam	-	-	-	-	1526		-	-	-	-	
Velur T	1	2.38	-	-	4192		1904	2.38	-	-	77
Veppurchekkadi	-	-	-	-	3262		-	-	-	-	

Gram Panchayat	CT	Co		FP	COWRS	CCBF		DLT		DLHAI		FBBTI	
	No.	No.	Area	No.	No.	No.	Area	Plants	Length	No.	Area	No.	Area
Agarampallipattu	60	10	-	20	10	2,500	25	-	-	3,016	15	-	-
Allappanur		-	-	-	-	-	-	-	-	1,160	6	-	-
Athipadi		-	-	-	-	-	-	-	-	8,848	44	-	-
Bondai		-	-	-	-	-	-	-	-	10,660	53	-	-
Chinniyampettai		-	-	-	-	-	-	-	-	16,606	83	-	-
Edathanur		-	-	-	-	-	-	-	-	4,274	21	-	-
Elayankannai	119	5	-	7	15	-	-	300	1,500	18,980	95	-	-
Kambattu		-	-	-	-	-	-	-	-	3,380	17	-	-
Kanakkandal		-	-	-	-	-	-	-	-	3,162	16	-	-
Keelsirupakkam		-	-	-	-	-	-	-	-	12,232	61	-	-
Keelvanakkambadi		-	-	-	-	-	-	-	-	13,884	69	-	-
Kolamanjanoor	73	-	-	11	217	-	-	-	-	10,874	54	13	33
Kolundampattu		-	-	-	-	-	-	-	-	4,846	24	-	-
Kottaiyur		-	-	-	-	-	-	-	-	6,854	34	-	-
Malayanoorchekkadi		-	-	-	-	-	-	-	-	9,114	46	-	-
Melamanjanur		-	-	-	-	-	-	-	-	13,378	67	-	-
Melkaripur		-	-	-	-	-	-	-	-	5,304	27	-	-
Melpasar		-	-	-	-	-	-	-	-	8,112	41	-	-
Mothakkal		-	-	-	-	-	-	-	-	16,034	80	-	-
Narayankuppam		-	-	-	-	-	-	-	-	10,936	55	-	-
Nedungavadi		-	-	-	-	-	-	-	-	2,136	11	-	-
P Quilam										18980	94.9		
Perayampattu		-	-	-	-	-	-	-	-	1858	9.29	-	-
Perunduraipattu		-	-	-	-	-	-	-	-	5938	29.69	-	-
Perungolathur	145	-	-	5	-	-	-	3085	15423	18980	94.9	7	17
Pudurchekkadi		-	-	-	-	-	-	-	-	12792	63.96	-	-
Puthurchekkadi	100	-	-	40	200	-	-	1094	5472	4470	22.35	7	18
Radhapuram	58	18	-	49	278	-	-	276	1380	13928	69.64	13	16.59

Gram Panchayat	CT	Co		FP	COWRS	CCBF		DLT		DLHAI		FBBTI	
	No.	No.	Area	No.	No.	No.	Area	Plants	Length	No.	Area	No.	Area
Reddiapalayam		-	-	-	-	-	-	-	-	9150	45.75	-	-
Royandapuram		-	-	-	-	-	-	-	-	7346	36.73	-	-
Sadakuppam	50	-	-	50	200	-	-	-	-	4916	24.58	6	15
Sathanur		-	-	-	-	-	-	-	-	10456	52.28	-	-
Se.Andapattu		-	-	-	-	-	-	-	-	3176	15.88	-	-
Se.Gudalur		-	-	-	-	-	-	-	-	5072	25.36	-	-
Serapattu		-	-	-	-	-	-	-	-	4468	22.34	-	-
Thandarampet		-	-	-	-	-	-	-	-	10508	52.54	-	-
Thanipadi		-	-	-	-	-	-	-	-	9426	47.13	-	-
Tharadapattu		-	-	-	-	-	-	-	-	3890	19.45	-	-
Thenkarimbalur	98	-	-	15	25	-	-	2709	13543.36	6988	34.94	7	18
Thenmudiyanur		-	-	-	-	-	-	-	-	8900	44.5	-	-
Thiruvadathanur		13	-	20	43	-	-	-	-	5558	27.79	-	-
Thondamanur	54	-	-	10	10	-	-	2222	11111	4054	20.27	15	38
Vanapuram		-	-	-	-	-	-	-	-	10152	50.76	-	-
Varagur		-	-	-	-	-	-	-	-	3602	18.01	-	-
Veeranam		-	-	-	-	-	-	-	-	3418	17.09	-	-
Velur T	77	-	-	8	10	-	-	-	-	7910	39.55	2	20.34
Veppurchekkadi		-	-	-	-	-	-	-	-	3122	15.61	-	-

Gram Panchayat	GSS	ICP		LDI		LP		MI		NADEP
	No.	Plants	Length	No.	Area	Plants	Length	No.	Area	No.
Agarampallipattu	15	74	370	-	-	846	4,230	-	-	60
Allappanur		55	275	-	-	330	3,540	-	-	
Athipadi		-	-	-	-	-	-	-	-	
Bondai		59	295	-	-	380	1,882	-	-	
Chinniyampettai		65	325	-	-	596	2,976	-	-	
Edathanur		62	310	-	-	306	1,531	-	-	
Elayankannai	38	-	-	-	-	1,616	8,080	-	-	119
Kambattu		60	300	-	-	265	1,327	-	-	
Kanakkandal		62	310	-	-	-	-	-	-	
Keelsirupakkam		-	-	-	-	595	2,975	-	-	
Keelvanakkambadi		72	360	-	-	1,029	5,145	-	-	
Kolamanjanoor	39			13	33	1,273	6,365	-	-	73
Kolundampattu		66	330	-	-	1,009	5,045	-	-	
Kottaiyur		-	-	-	-	413	2,065	-	-	
Malayanoorchekkadi		66	330	-	-	289	1,443	-	-	
Melamanjanur		62	310	-	-	322	1,612	-	-	
Melkaripur		55	275	-	-	547	2,737	-	-	
Melpasar				-	-	307	1,536	-	-	
Mothakkal		-	-	-	-	405	2,025	-	-	
Narayankuppam		-	-	-	-	160	800	-	-	
Nedungavadi		50	250	-	-	79	395	-	-	
P Quilam		-	-							
Perayampattu		70	350	-	-	430	2146	-	-	
Perunduraipattu		-	-	-	-	79	2322	-	-	
Perungolathur	34			3	8	345	1725	-	-	145
Pudurchekkadi				-	-	-	-	-	-	
Puthurchekkadi	18	62	310	7	18	403	2015	-	-	100
Radhapuram	16	75	375	69	172	436	2179	-	-	58

Gram Panchayat	GSS	ICP		LDI		LP		MI		NADEP
	No.	Plants	Length	No.	Area	Plants	Length	No.	Area	No.
Reddiapalayam		72.4	362	-	-	729	3644	-	-	
Royandapuram		69	345	-	-	543	2713	-	-	
Sadakuppam	14	-	-	3	8	659	3296	-	-	50
Sathanur		82	410	-	-	551	2755	-	-	
Se.Andapattu		55	275	-	-	373	1864	-	-	
Se.Gudalur		77.2	386	-	-	-	-	-	-	
Serapattu				-	-	79	395	-	-	
Thandarampet				-	-	428	2142	-	-	
Thanipadi		97.8	489	-	-	231	1153	-	-	
Tharadapattu		55	275	-	-	1371	6857	-	-	
Thenkarimbalur	7	52	260	7	18	348	1741	-	-	98
Thenmudiyanur		60	300	-	-	375	1877	-	-	
Thiruvadathanur		57.2	286	44	110	360	1798	-	-	
Thondamanur	5	56	280	15	38	741	3703	-	-	54
Vanapuram		-	-	-	-	225	1126	-	-	
Varagur		92	460	-	-	938	3348	-	-	
Veeranam		62	310	-	-	762	0.38	-	-	
Velur T	53	73	365	1	2.71	591	2955	-	-	-
Veppurchekkadi		71.2	356	-	-	524	2618	-	-	

Gram Panchayat	ND		PS	RPWDT	RP	RRWH	SPD		SPC	SPI	WCICD
	Plants	HH	No.	No.	No.	No.	No.	Area	No.	No.	Length
Agarampallipattu	295	59	-	1	7	2	-	-	3		370
Allappanur			-	1	4	2	-	-	-		275
Athipadi			-	-	-	2	-	-	-		-
Bondai			-	1	5	2	-	-	-		295
Chinniyampettai			-	1	4	2	-	-	-		325
Edathanur			-	1	3	2	-	-	16		310
Elayankannai	119	24	-	-	1	2	-	-	3		-
Kambattu			-	1	3	2	-	-	-		300
Kanakkandal			-	2	4	2	-	-	-		310
Keelsirupakkam			-	2	5	2	-	-	-		-
Keelvanakkambadi			-	2	3	2	-	-	-		360
Kolamanjanoor	357	71	-	1		2	-	-	-		
Kolundampattu			-	2	2	2	-	-	15		330
Kottaiyur			-	1	-	2	-	-	-		-
Malayanoorchekkadi			-	3	3	2	-	-	-		330
Melamanjanur			-	1	4	2	-	-	-		310
Melkaripur			-	2	4	2	-	-	-		275
Melpasar			-	2		2	-	-	-		
Mothakkal			-	1	-	2	-	-	-		-
Narayankuppam			-	1	-	2	-	-	-		-
Nedungavadi			-	1	5	2	-	-	-		250
P Quilam				-	4						-
Perayampattu			-	1	4	2	-	-	-		350
Perunduraipattu			-	-	-	2	-	-	-		-
Perungolathur	734	147	-	2	5	2	-	-	-		
Pudurchekkadi			-			2	-	-	-		
Puthurchekkadi	200	40	-	1	3	2	-	-	-		310
Radhapuram	1206	241	-	4	5	2	-	-	12	85	375

Gram Panchayat	ND		PS	RPWDT	RP	RRWH	SPD		SPC	SPI	WCICD
	Plants	HH	No.	No.	No.	No.	No.	Area	No.	No.	Length
Reddiapalayam			-	2	6	2	-	-	-		362
Royandapuram			-	2	3	2	-	-	-		345
Sadakuppam	238	48	-	1	-	2	-	-	-		-
Sathanur			-	4	6	2	-	-	-		410
Se.Andapattu			-	-	4	2	-	-	-		275
Se.Gudalur			-	1	6	2	-	-	-		386
Serapattu			-	2	7	2	-	-	-		
Thandarampet			-	2		2	-	-	-		
Thanipadi			-	1	5	2	-	-	-		489
Tharadapattu			-	2	3	2	-	-	-		275
Thenkarimbalur	405	81	-	2	3	2	-	-	-		260
Thenmudiyanur			-	1	4	2	-	-	-		300
Thiruvadathanur			-	1	10	2	-	-	20		286
Thondamanur	199	40	-	3	3	2	-	-	-		280
Vanapuram			-	2	-	2	-	-	-		-
Varagur			-	1	5	2	-	-	-		460
Veeranam			-	2	3	2	-	-	-		310
Velur T	-	-	-	1	5	2	-	-	-		365
Veppurchekkadi			-	1	6	2	-	-	-		356

ANNEXURE 7.1

GP WISE WASCA RECOMMENDATION AND WORKS UPLOADED

S. No	GP	WASCA Recommendation for 3 Years	Works uploaded for FY-2021-22 as on 02/02/2022
1	Agarampallipet	109	398
2	Allappanoor	547	320
3	Athipadi	482	171
4	Bondai	427	163
5	Chiniyampettai	619	418
6	Edathanoor	400	290
7	Elayankanni	612	365
8	Kampattu	339	82
9	Kannakandal	98	286
10	Kilavanakkampadi	1385	434
11	Kilsirupakkam	358	277
12	Kolamanjanur	406	241
13	Kolundampattu	197	271
14	Kottaiyur	301	389
15	Malayanoor Chekkadi	991	453
16	Melamanjanur	115	341
17	Melkarippoor	221	216
18	Melpachar	660	226
19	Mothakkal	416	543
20	Narayanakuppam	553	117
21	Nedungavadi	182	258
22	P.Quilam	137	295
23	Perunduraipattu	593	512
24	Perungulathur	778	453
25	Peryampattu	218	309
26	Pudur Chekkadi	609	296
27	Puthur Chekkadi	810	301
28	Radhapuram	1076	392
29	Rayandapuram	275	491
30	Reddiyapalayam	440	133
31	Sadakuppam	312	230
32	Sathanoor	465	134
33	Se.Andapattu	337	74
34	Se.Cudalur	318	1017
35	Serppapattu	272	235
36	T.Velur	445	156
37	Thandrampattu	199	541
38	Thanipadi	467	616
39	Tharadapattu	729	297
40	Thenkarimbalur	289	378
41	Thenmudiyanoor	282	356

S. No	GP	WASCA Recommendation for 3 Years	Works uploaded for FY-2021-22 as on 02/02/2022
42	Thiruvadathanur	388	409
43	Thondamanur	377	166
44	Vanapuram	291	203
45	Vargur	205	48
46	Veeranam	367	168
47	Veppurchekkadi	566	192

ANNEXURE 7.2

GP AND WORK CATEGORY-WISE ONGOING WORKS IN THANDARANPET BLOCK

GP	Work Category	No of ongoin works
Agarampallipet	WCWH	1
	Works on Individuals Land (Category IV)	1
Allappanoor	WCWH	1
Athipadi	WCWH	3
Bondai	WCWH	2
	Works on Individuals Land (Category IV)	1
Chiniyampettai	WCWH	2
	Works on Individuals Land (Category IV)	1
Edathanoor	WCWH	1
Elayankanni	Rural Connectivity	1
	WCWH	1
Kampattu	Works on Individuals Land (Category IV)	6
Kannakandal	Rural Connectivity	1
	WCWH	2
Kilavanakkampadi	WCWH	2
	Works on Individuals Land (Category IV)	1
Kilsirupakkam	WCWH	2
	Works on Individuals Land (Category IV)	1
Kolamanjanur	Anganwadi/Other Rural Infrastructure	1
	Rural Connectivity	1
	WCWH	2
	Works on Individuals Land (Category IV)	1
Kolundampattu	WCWH	1
	Works on Individuals Land (Category IV)	3
Kottaiyur	WCWH	2
Melamanjanur	Rural Connectivity	1
	Rural Sanitation	1
	WCWH	1
	Works on Individuals Land (Category IV)	1
Melkarippoor	WCWH	1
Melpachar	WCWH	1
	Works on Individuals Land (Category IV)	10
Mothakkal	Anganwadi/Other Rural Infrastructure	1
	WCWH	4
	Works on Individuals Land (Category IV)	3
Narayanakuppam	Drought Proofing	1
	Rural Connectivity	1
	WCWH	3
Nedungavadi	Rural Sanitation	1
	WCWH	1
	Works on Individuals Land (Category IV)	2

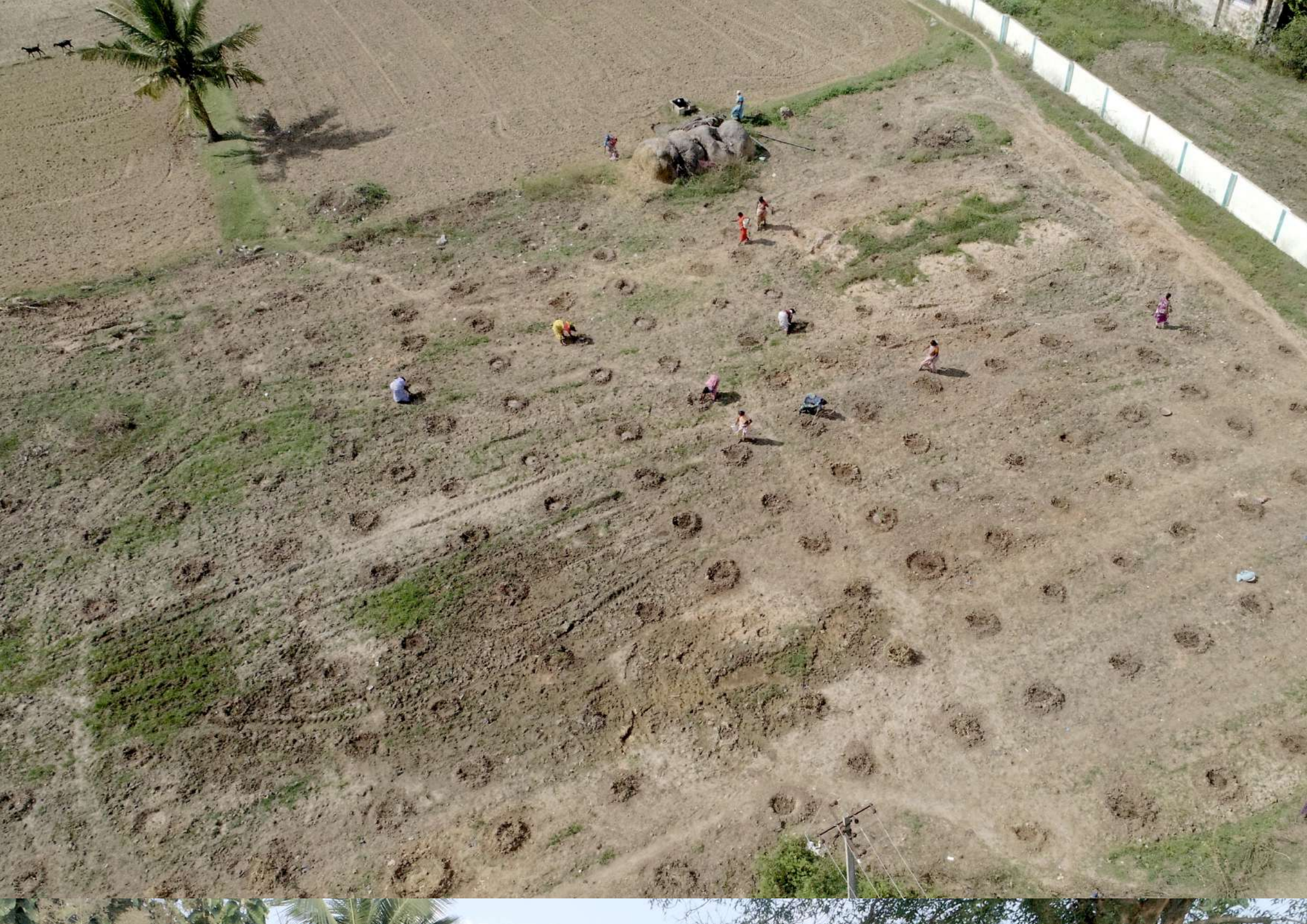
GP	Work Category	No of ongoin works
P.Quilam	Anganwadi/Other Rural Infrastructure	2
	Rural Connectivity	1
	Rural Sanitation	2
	WCWH	3
	Works on Individuals Land (Category IV)	4
Perunduraipattu	Rural Sanitation	1
	WCWH	1
Perungulathur	Rural Connectivity	1
	WCWH	1
	Works on Individuals Land (Category IV)	6
Peryampattu	Rural Sanitation	1
	WCWH	1
Pudur Chekkadi	Works on Individuals Land (Category IV)	4
Puthur Chekkadi	WCWH	1
Radhapuram	Rural Connectivity	2
Rayandapuram	WCWH	1
	Works on Individuals Land (Category IV)	6
Reddiyapalayam	WCWH	2
Sadakuppam	Drought Proofing	1
	WCWH	1
Sathanoor	WCWH	1
Se.Andapattu	WCWH	1
Se.Cudalur	Anganwadi/Other Rural Infrastructure	1
	WCWH	1
Serppapattu	WCWH	1
	Works on Individuals Land (Category IV)	7
T.Velur	WCWH	1
	Works on Individuals Land (Category IV)	9
Thandrampattu	Drought Proofing	1
	Rural Sanitation	1
	WCWH	2
Thanipadi	WCWH	2
	Works on Individuals Land (Category IV)	5
Tharadapattu	WCWH	2
Thenkarimbalur	WCWH	1
Thenmudiyanoor	WCWH	2
	Works on Individuals Land (Category IV)	6
Thiruvadathanur	WCWH	2
	Works on Individuals Land (Category IV)	2
Thondamanur	WCWH	1
Vanapuram	Drought Proofing	1
	WCWH	2
	Works on Individuals Land (Category IV)	1

GP	Work Category	No of ongoin works
Vargur	Rural Connectivity	1
	WCWH	1
Veeranam	WCWH	1
	Works on Individuals Land (Category IV)	1
Veppurchekkadi	Drought Proofing	1
	WCWH	1
	Works on Individuals Land (Category IV)	2

ANNEXURE 8

CWRM KEY INDICATORS FOR GPs IN VARAGUR, PERAYAMPATTU, & KEELSIRUPAKKAM IN SATHANOOR MICRO-WATERSHED

CWRM Parameter	Keelsirupakkam	Perunduraipattu	Varagur
Soil Resources: Status of Available Nitrogen (%)			
Very Low	0%	76%	32%
Low	100%	24%	68%
Medium	0%	0%	
Status of Organic Carbon (%)			
Very Low	2%	54%	41%
Low	98%	46%	59%
Status of Soil Micro Nutrients (%)			
Sufficient	62%	65%	62%
Deficient	38%	35%	38%
Status of Physical condition of the soil (%)			
Neutral	0%	0%	5%
Moderately Alkaline	100%	100%	95%
Soil Texture (%)			
% of Clay Soil	0%	43%	0%
% of Fine Soil	91%	41%	87%
Means of Water Extraction (%)			
Gravity	0%	0%	1%
Lifting	100%	100%	99%
Irrigation Methods (%)			
Wild Flooding	3%	0%	8%
Control Flooding	97%	100%	92%
Livestock (No.)			
Cattle Population	2065	354	443
Sheep Population	1485	315	173
Goat Population	1036	74	223
Land Resources (ha)			
Non-Agricultural Uses	153.44	88.00	
Barren & Un-cultivable Land	3.65	10.00	39.92
Culturable Waste Land	0.00	0.00	39.05
Fallows Land other than Current Fallows	188.78	95.89	7.38
Current Fallow land	345.62	26.20	60.02
Unirrigated Land	0.00	24.04	0.00
Area Irrigated by Source	611.59	296.92	16.44

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Department of Rural Development & Panchayat Raj,
Government of Tamil Nadu
Panagal Building, 4th and 5th floor
Jeenis Road, Saidapet, Chennai-600015
T : +91 44-24336105/24337436/24337440/24336102
E: drd@tn.nic.in; I: https://tnrd.gov.in/

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
A2/18, Safdarjung Enclave
New Delhi-110029, India
T : +91 11-49495353
E : info@giz.de; I: www.giz.de