Ministry of Rural Development Ministry of Jal Shakthi

# 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

**Published by:**
Department of Rural Development & Panchayat Raj,
Government of Tamil Nadu, Chennai

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

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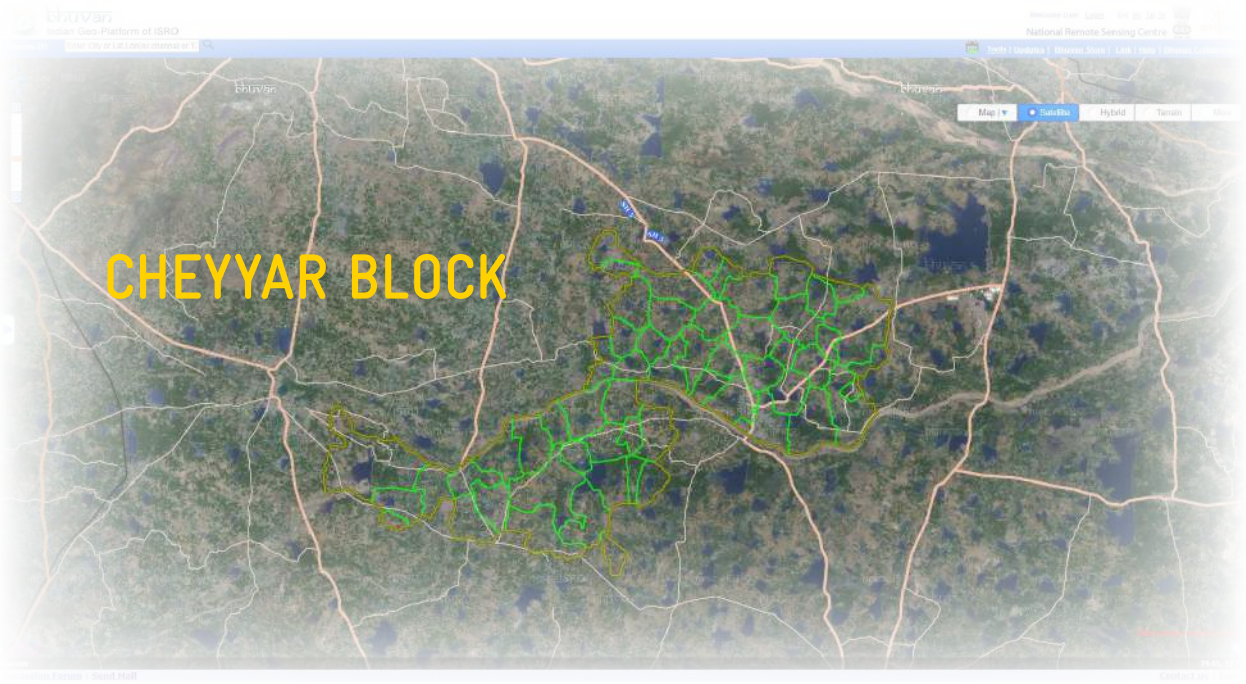
**Image Credits:** RD & PR, DRDA and GIZ India

**On behalf of**
German Federal Ministry for Economic Cooperation and Development (BMZ)
GIZ is responsible for the content of this publication.
**New Delhi, India,** Jan 2022

# 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).

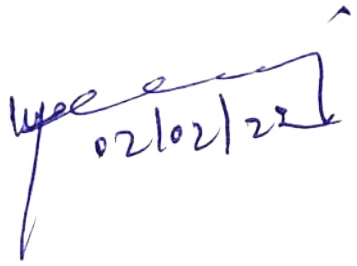
Through GIS based planning in 860 GPs, works identified under CWRM are verified, approved at Gram Sabha. These works would potentially reduce 38% surface runoff to be harvested or recharged by various interventions through ridge to valley watershed approach.

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

**EC**
End Century

**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

## I - M

**ha**
Hectare

**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

**Km**
Kilometer

**KML**
Keyhole Markup Language

**LULC**
Land use and land cover

**LPM**
Liters per minute

## 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

## N - S

**NAPCC**
National Action on Climate Change

**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

## S - U

**Rabi crop**
Sown in winter and harvested in monsoon

**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

## S - W

**SHG**
Self Help Group

**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

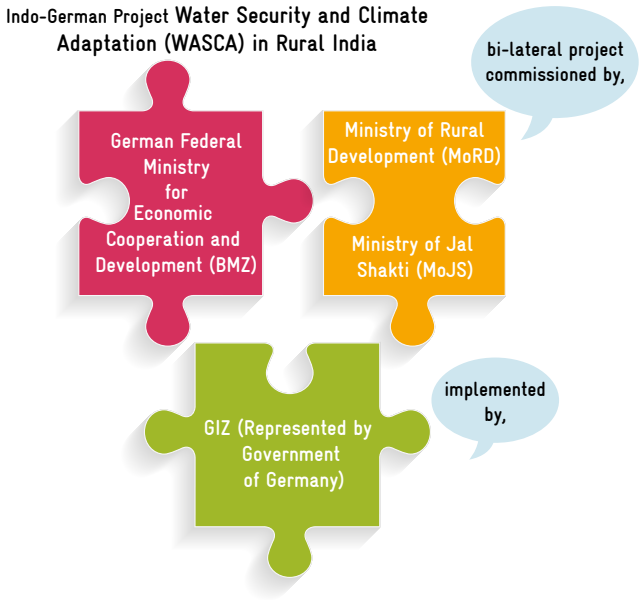
Thirukkural - 11

# EXECUTIVE SUMMARY

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

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

The Indo-German Project "Water Security and Climate Adaptation in Rural India", is a bi-lateral project commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) in partnership with the Ministry of Rural Development (MoRD) and Ministry of Jal Shakti (MoJS) and implemented by GIZ (Represented by Government of Germany). This project aims to improve water resource management with respect to water security and climate adaptation and to establish a framework for integrating water perspectives into planning and implementing adaptation actions that promotes climate resilience. It is implemented under technical cooperation from BMZ-GIZ with implementation under Mahatma Gandhi National Rural Employment Guarantee Act (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, New Delhi.



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 (implementers?) 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 concerned line departments.

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

This report has been structured under 9 complete 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 degree of vulnerability through sensitivity and adaptive capacity in 4 areas of CWRM

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

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

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

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

Cheyyar Block of Thiruvannmalai District lies between 12°34'29.951"N to 12°45'20.99"N and 79°19'28.981"E to 79°36'42.569"E. The Block is surrounded by Anakkavur, Vembakkam, West Arani, and Pernamallur Blocks (Figure 1.1). The total geographical area of the Block is 26,164 ha (261.64 Km2). Administratively, this Block comes under Cheyyar Taluk and comprised 53 GPs and 245 habitations.

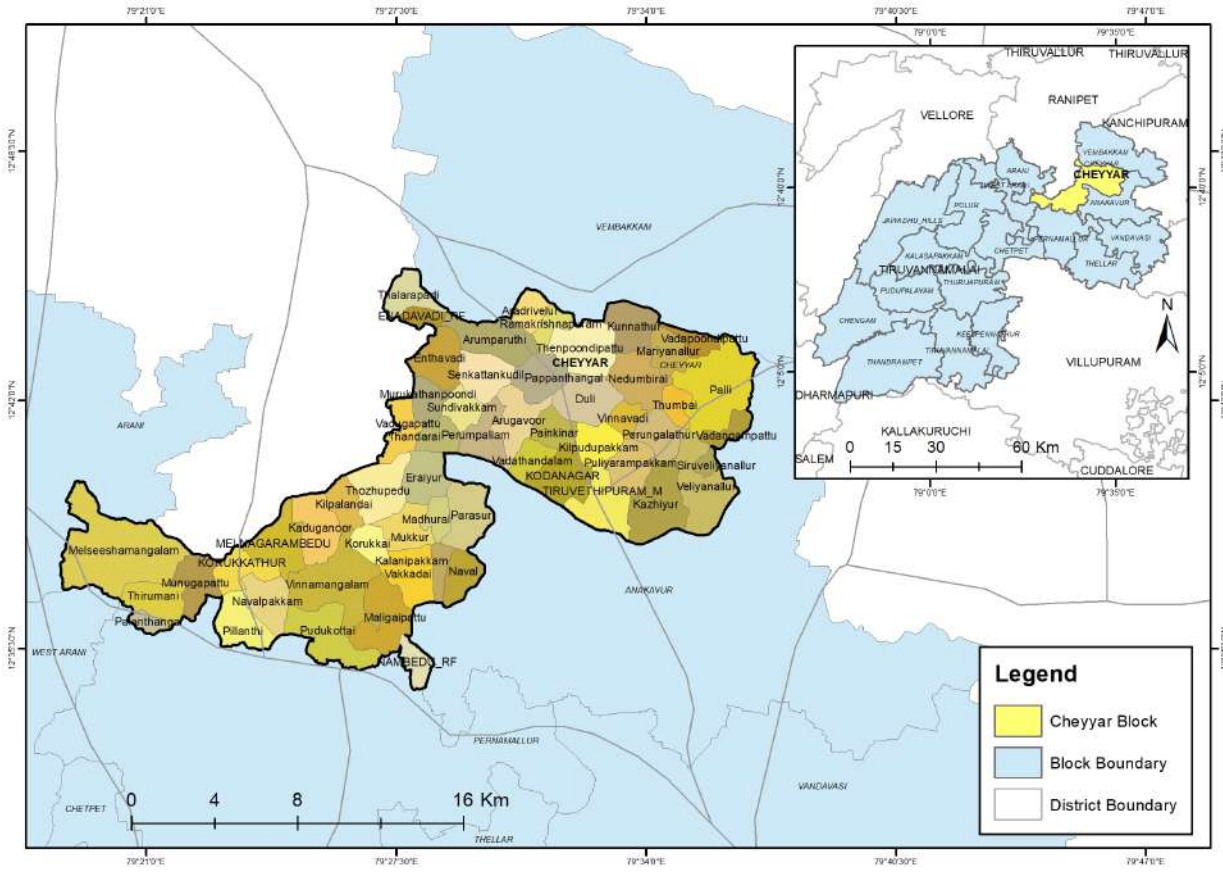



*Figure 1.1 Cheyyar Block and it's environ*

According to Census 2011, the population of Cheyyar Block is 1,30,907. The population density of the Block is 358 per sq. km which is much lower than the district population density (473 per sq. km) and State's density (555 per sq.km). There is 6.26% increase in the population observed since 2001 in this densely populated rural Block. The percentage of Male population is slightly lower (49.97 %) than the female population (50%). The proportion of sex ratio is 996 females per 1000 males, which is slightly higher compared to the district average sex-ratio (994 females per 1,000 males). The literacy rate of female population is lower (43.73%) than male literacy (56.27%). The average literacy rate of the Block is much lower than national average (72.98%). Scheduled Castes and Scheduled Tribes accounted for 20% of the total population (Thiruvannamalai district profile 2020).

Economically, Cheyyar is 5th top revenue earning Blocks of the Tiruvannamalai district. The chief occupation of the people is agriculture and hand looming. Rice mills are very popular in Cheyyar. Paddy tops as the predominant crop, with 58.36% of the irrigated area, followed by ground nut and other pulses. The other major crops grown in the

> The proportion of sex ratio is 996 females per 1000 males, which is slightly higher compared to the district average sex-ratio (994 females per 1,000 males)

> average literacy rate of the Block is much lower than national average (72.98%)

Block area are red gram, sugar cane, banana, dry chilli, maize and ragi cultivation. Groundnut and pulses are cultivated both under irrigated and rain-fed conditions. A small patch of sericulture (16.55 acres) is practiced. This Block has highest number of handlooms in the district, nearly 585 families are involved in handlooms. A livestock counts of 1,58,669 was recorded during 2019-20. The Block has 18 milk societies with 21,451 litres of milk being produced. One of the largest sugar mills in the country and one of the important sugarcane processing industries in the state of Tamil Nadu, 'Cheyyar Co-operative Sugars' is situated in this Block.

> Paddy tops as the predominant crop, with 58.36% of the irrigated area

Hydrologically, Cheyyar Block comes under Cheyyar Sub basin of Palar basin. The seasonal Cheyyar river flows through the Block. Three macro watersheds Cheyyar, Cheyyar rivers and Naganathi covers the Block and it has 69 of micro watersheds (Figure 1.2).

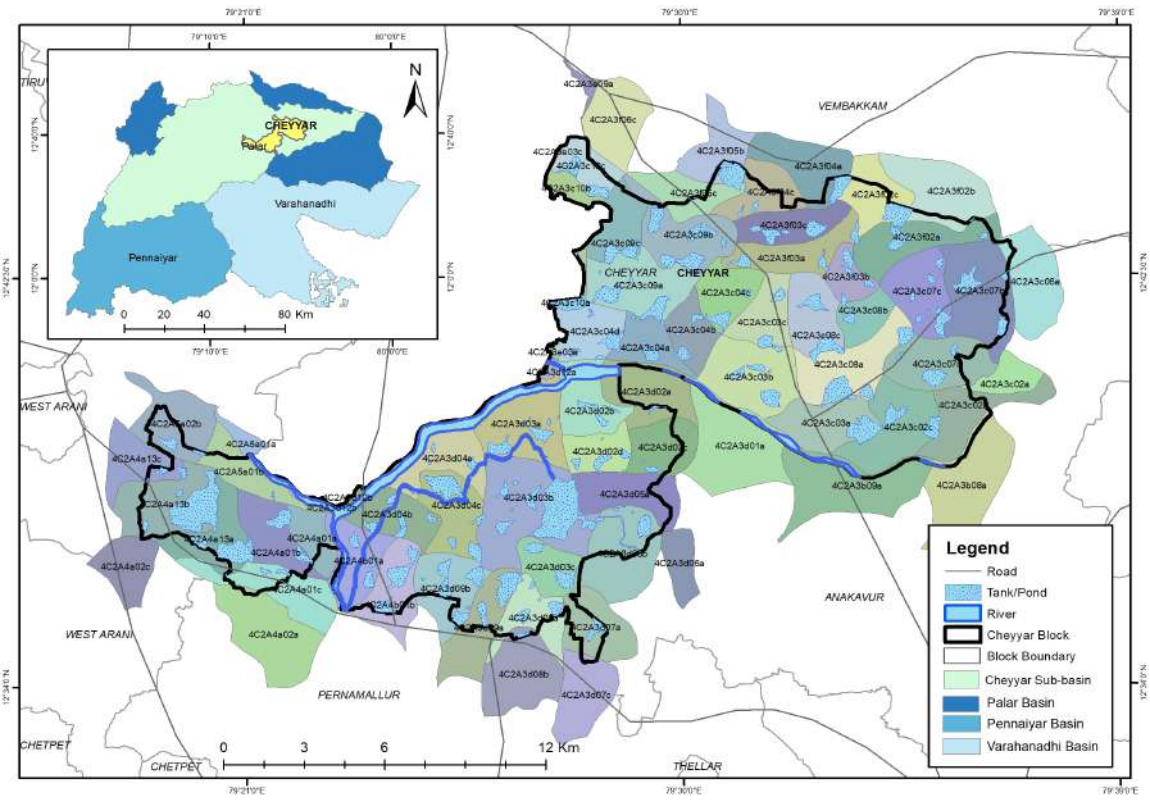



*Figure 1.2. Watersheds- Cheyyar Block*

There are 61 tanks in the Block with the largest tank being the Vakkadai Mukkur Hissa tank with an area of 471 ha. Other important tanks are Melseshamangalam tank (264 ha), Kazhiyur big tank (214.48 ha), Kaduganur Big Tank (186 ha) and Vinnamangalam Tank (145.65 ha). Figure 1.3 represents the spatial distribution of waterbodies in the Block. Vadathandalam firka covers the Block and ground water development in this Block is in critical stage.

## GROUND WATER LEVEL OF THIS BLOCK

| | |
|---|---|
| CRITICAL- › 90% & ‹=100% | Vadathandalam |

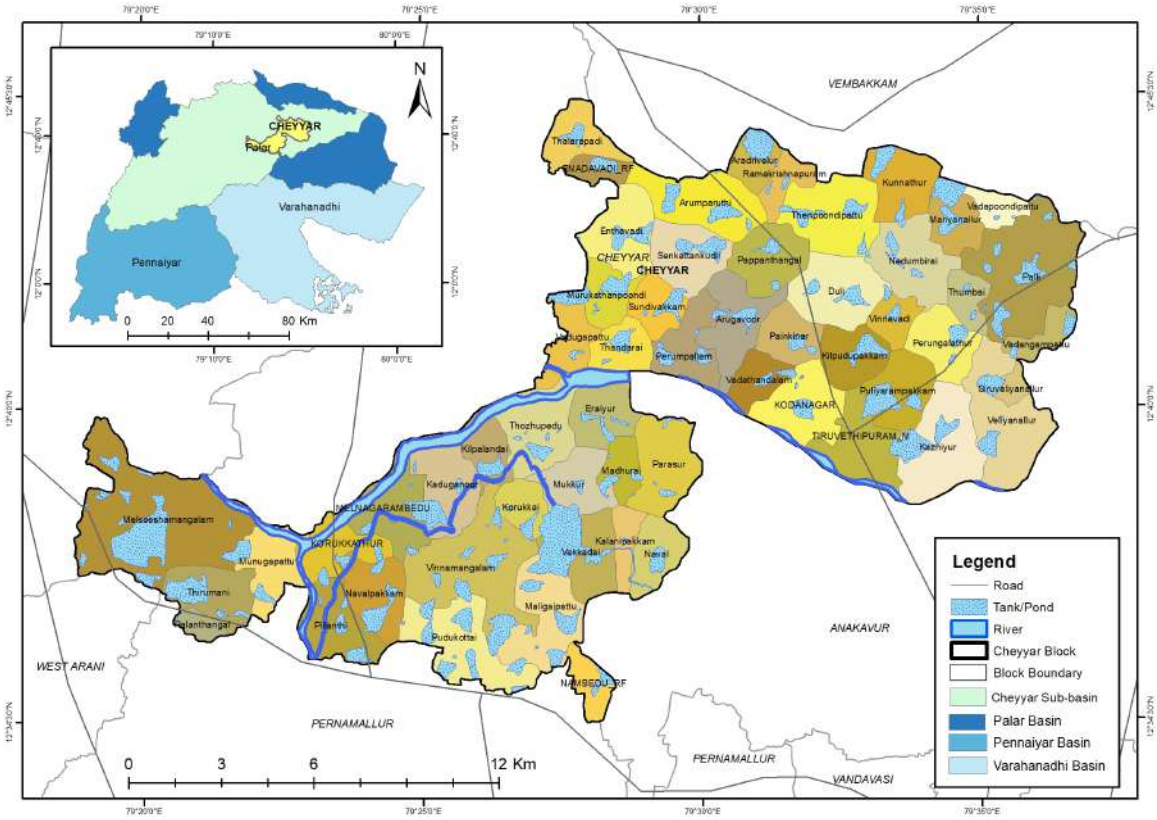
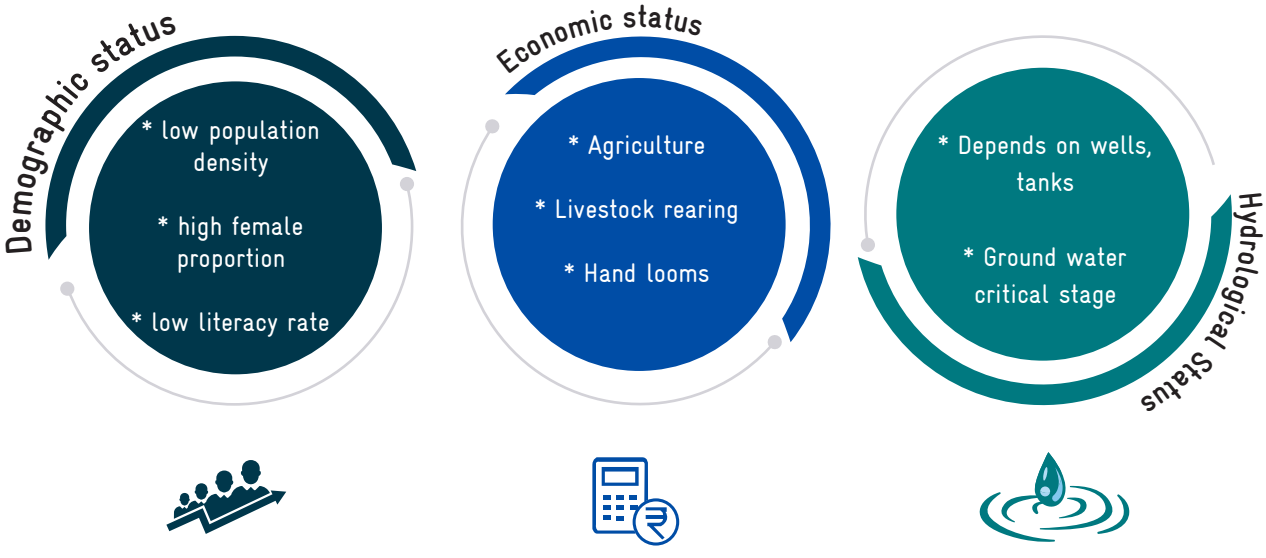



*Figure 1.3. Spatial distribution of waterbodies*



விண்இன்று பொய்ப்பின் விரிநீர் வியனுலகத்து
உள்நின்று உடற்றும் பசி

குறள் - 13

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

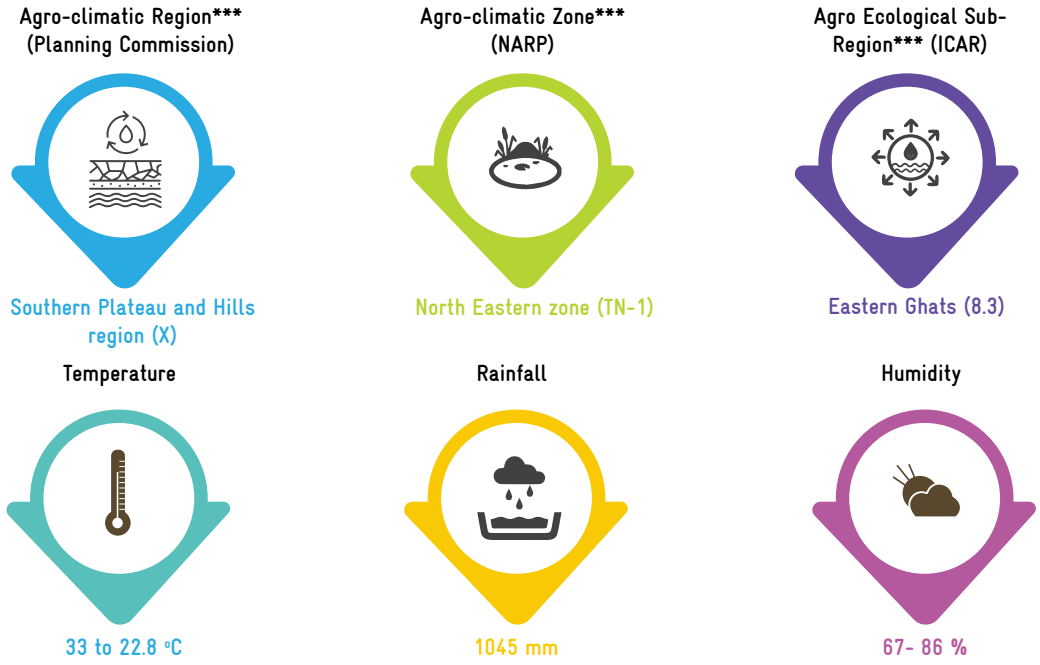
Thirukkural - 13

# CHAPTER 2

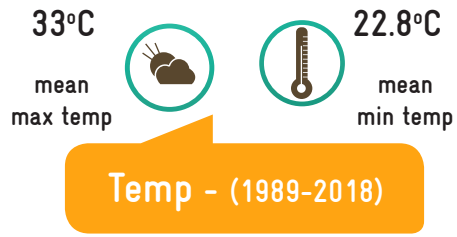
# 2 CLIMATE AND WATER SECURITY

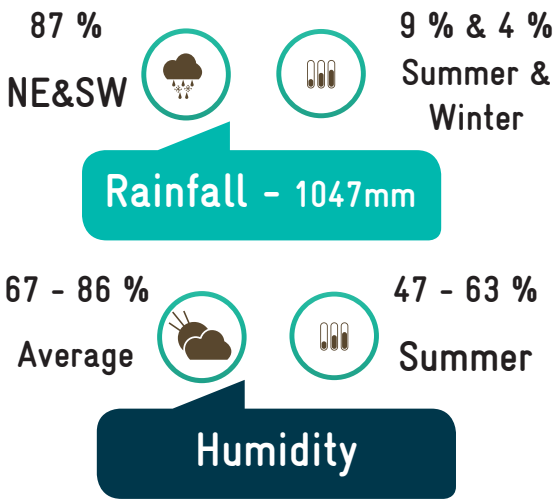
This region has typical tropical climate, located in the North-Eastern agro-climatic zone of State and Southern Plateau and hills region according to the agro climatic regional classification of planning commission. The general climate description of this region is given below (Table 1).

TABLE 1. GENERAL CLIMATE DESCRIPTION




In general, this semi-arid region has dry and hot weather. The mean maximum temperature is 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




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 %.

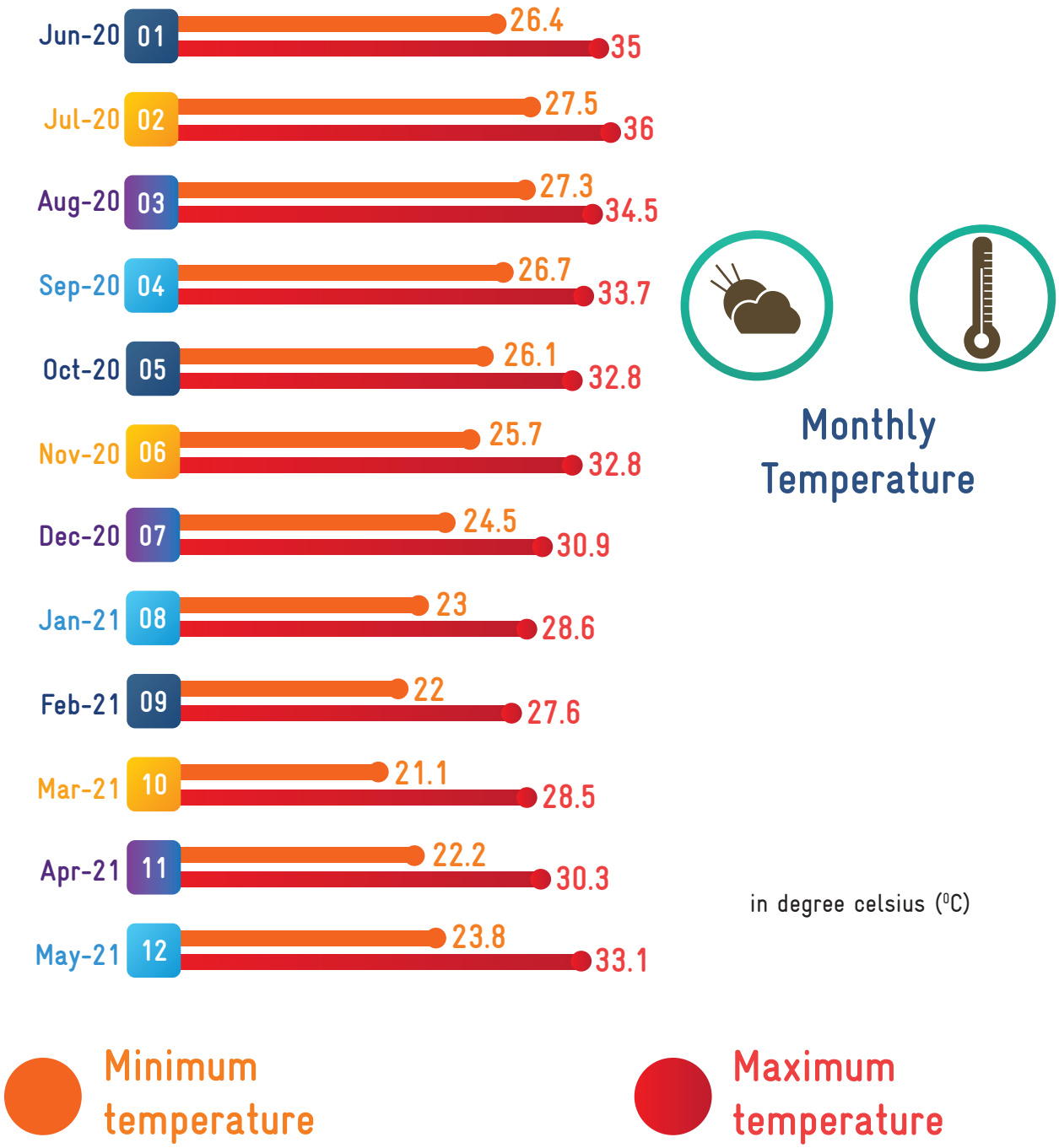



*Figure 2.1. Average monthly temperature*

The average annual rainfall days are 172 days in which 72 days are from North East Monsoon (NEM) and 82 days are from South West Monsoon (SWM) months. Onset of SW Monsoon 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.

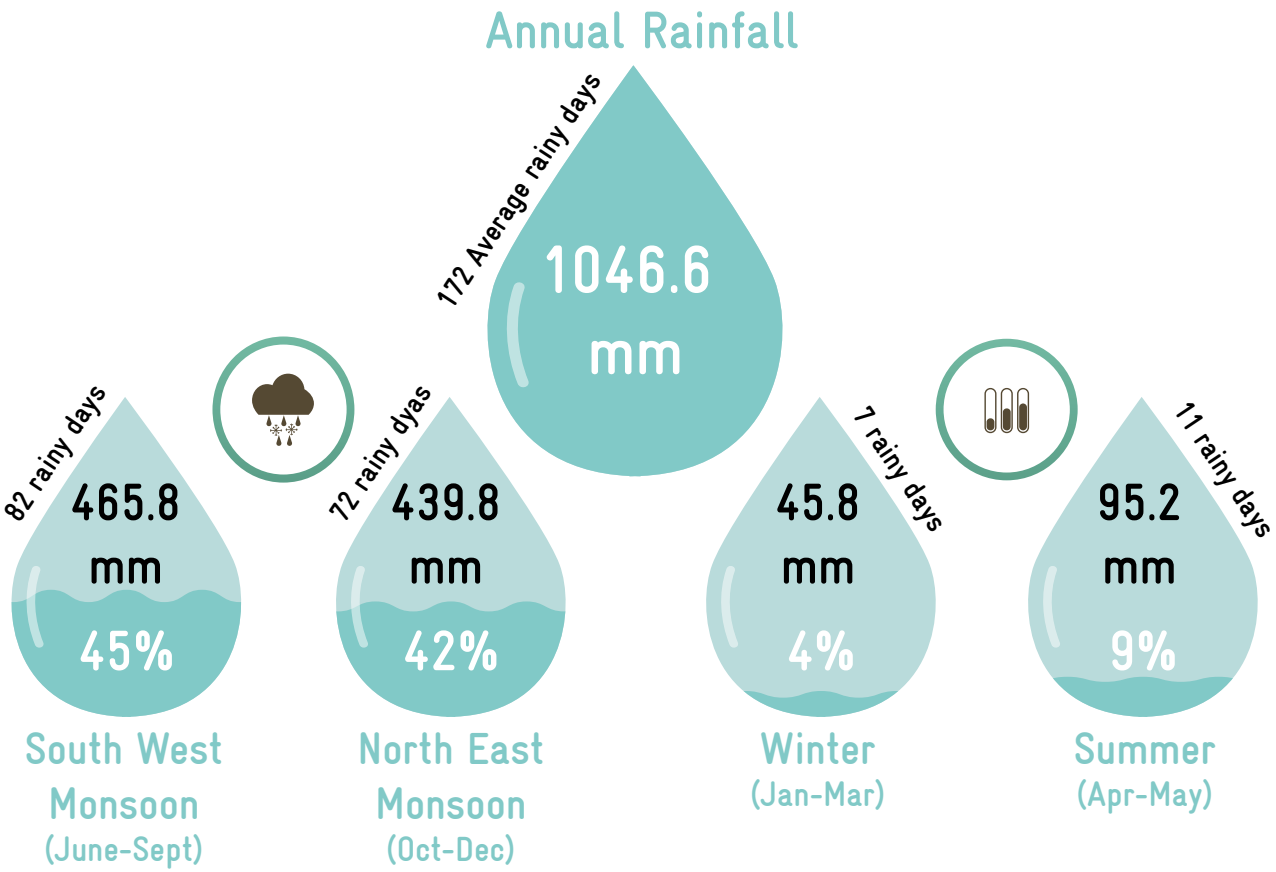


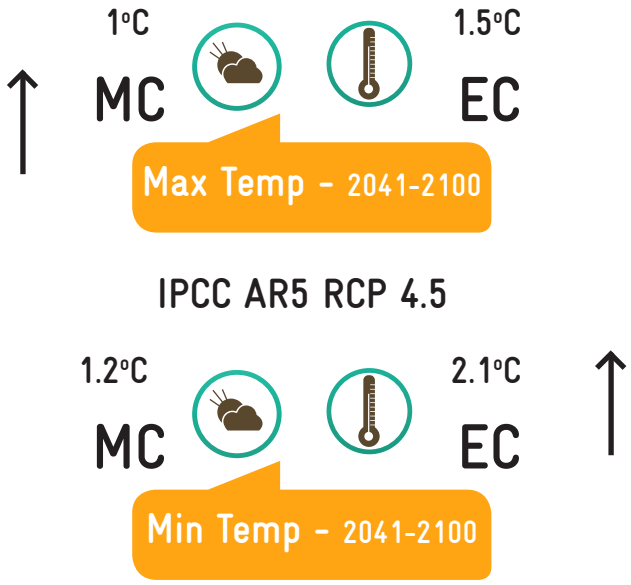

*Figure 2.2. Season-wise distribution of annual rainfall*

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°C and 0.5°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 lead 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.

**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.**

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,




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. In Cheyyar Block, 5 locations are moderately vulnerable to floods.

**Drought**

Low rainfall coupled with the erratic behaviour 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 Cheyyar 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 Cheyyar 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 | Goal 13 |
| | Changes in rainfall (%) | C3 | Goal 13 |
| | Excess rainfall years | C4 | Goal 13 |
| | Deficient rainfall years | C5 | Goal 13 |
| Water | Ground water extraction (%) | W1 | Goal 6 |
| | Ground water Recharge (m3) | W2 | Goal 6 |
| | Surface water availability (mm) | W3 | Goal 6 |
| | Water gap (mcm) | W4 | Goal 6 |
| | % of contamination | W5 | Goal 6 |
| Agriculture | Rainfed area (%) | A1 | Goal 15 |
| | Cropping intensity (%) | A2 | Goal 2 |
| | Soil moisture (Kg/m2) | A3 | Goal 15 |
| | Evapotranspiration (Kg/m2) | A4 | Goal 15 |
| 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 water bodies, canal networks, irrigation facilities, catchments area wise available runoff, ground water and surface water utilization, ground water status, ground water availability, evapotranspiration losses, and water demand for drinking, agriculture and livestock | 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

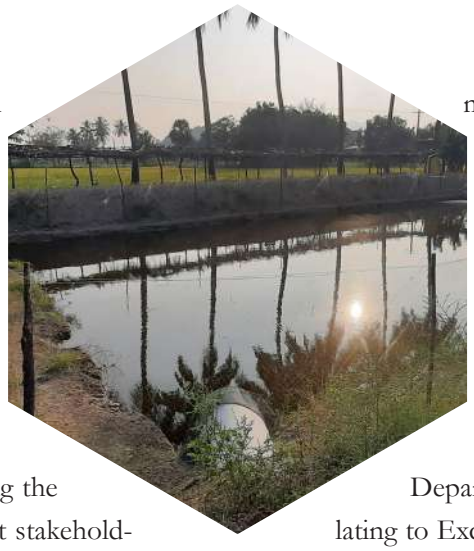
Unless the fruitful shower descend
The ploughman's sacred toil must end

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.

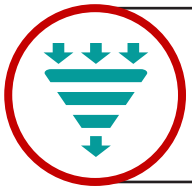
**262** Total Kinds of works in Schedule-I of Mahatma Gandhi NREGA

**182** Kinds of works relate to NRM alone

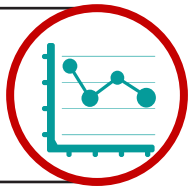
**164** Kinds of works related to Agriculture & allied works

**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 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**

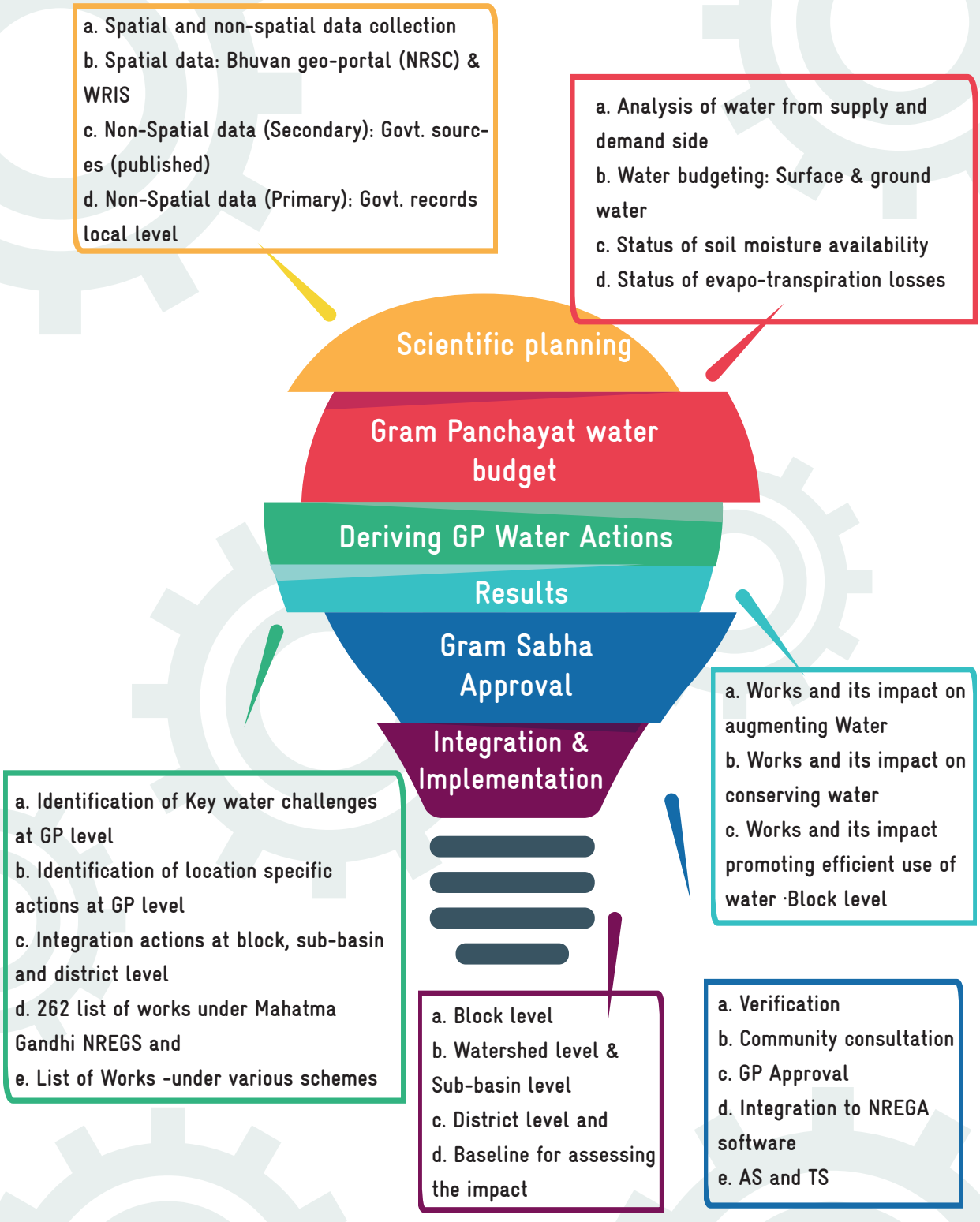


## 3.1 COMPOSITE WATER RESOURCE MANAGEMENT APPROACH FOR WASCA

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, evapotranspiration

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).

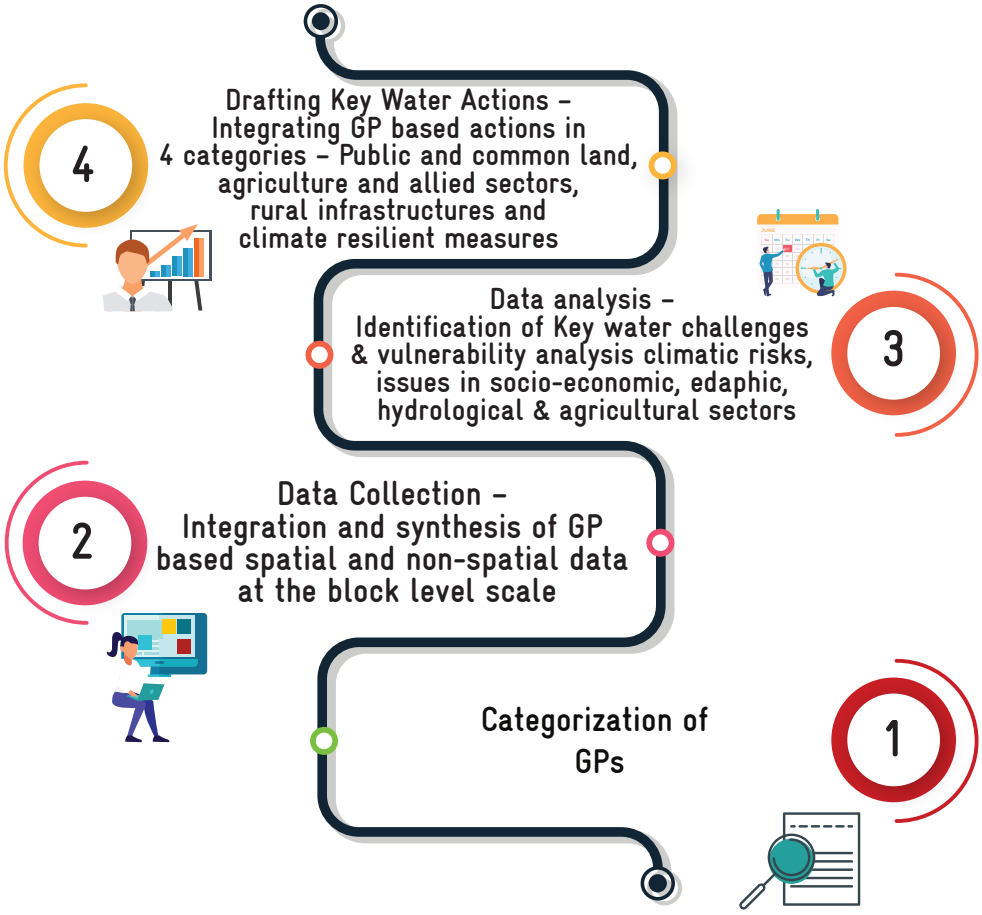
**BOX 1. MAJOR COMPONENTS INVOLVE IN CWRM PLANNING WORKOUTS**



Such a comprehensive analysis helps in preparing the water budget integrating ground water, surface water through runoff from rainfall, evapotranspiration 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. MAIN 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 SLSCas per DLSC and SLSC

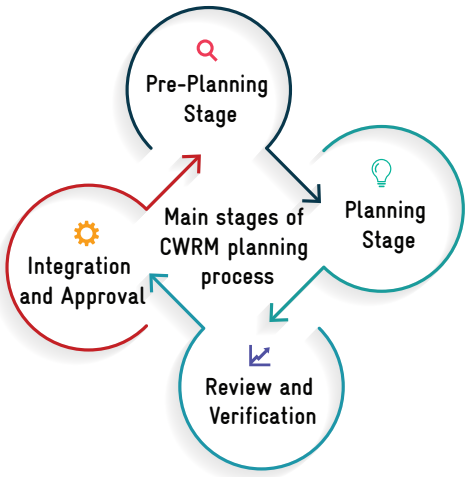
### PLANNING STAGE

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

### 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 Cheyyar Block is tabulated in Table 4.

TABLE 4. CATEGORIZATION OF CHEYYAR BLOCK GPS

| NUMBER OF GP | GP TYPE | NAME OF THE PANCHAYAT |
|---|---|---|
| 38 | GP and revenue village data and boundary match (Type-I) | Arathrivelur, Arugavoor, Enathavadi, Eraiyur, Kazhanipakkam, Kaduganur, Kizhapalanthai, Kazhiyur, Korukkai, Korukkathur, Madurai, Mariyanallur, Melnagarambedu, Mukkur, Murukathampoondi, Naval, Navalpakkam, Nedumpirai, Paingkinar, Pappanthangal, Parasur, Perumpallam, Perungalathur, Puliyarampakkam, Ramakrishnapuram, Sengattankundil, Siruveliyanallur, Sundivakkam, Thirumani, Vadangampattu, Thozhupedu, Thandarai, Thumbai, Vadapoondipattu, Vakkadai, Vadathandalam, Veliyanallur, Vinnavadi |
| 2 | Having more than one GPs in one Revenue Village (Type-II) | Melsheeshamangalam, Palauthangal |
| 13 | One GP is falling under more than Type 1 one Revenue Village (Type-III) | Arumparuthi, Duli, Kunnathur, Maligaipattu, Munugapattu, Palli, Pillandi, Pudukottai, Talarapadi, Thenpoondippattu, Vadugapattu, Vinnamangalam, Kilpudupakkam |

# 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 Land Use and Land Cover (LULC), waste land, salt and erosion affected lands, drainage lines, ground water potential, lineament, geomorphology, 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 and 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, No. 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

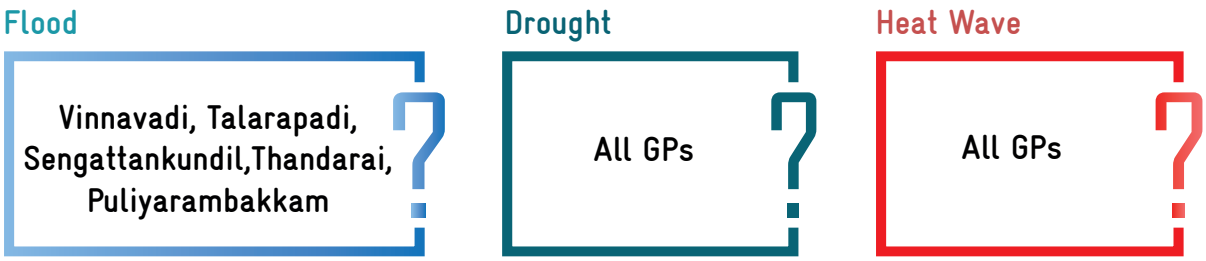
- Water budgeting at GP level to demonstrate the sector wise water demand and available water through the traditional water harvesting and storage bodies and the potential runoff that can be conserved through appropriate actions on the supply side. The difference between demand and supply at the GP level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




## 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, Cheyyar Block is engrossed with structural, denudational, and fluvial origin landform units (Figure 3.1). Most of Block area engrossed with denudational origin pediment or pediplain complex, whereas water flow influenced fluvial landform witnessed along the banks of stream and around waterbodies area. Fundamental information of landform by its units will act as critical input in the identification of suitable sites for NRM activities under CWRM plan preparation.

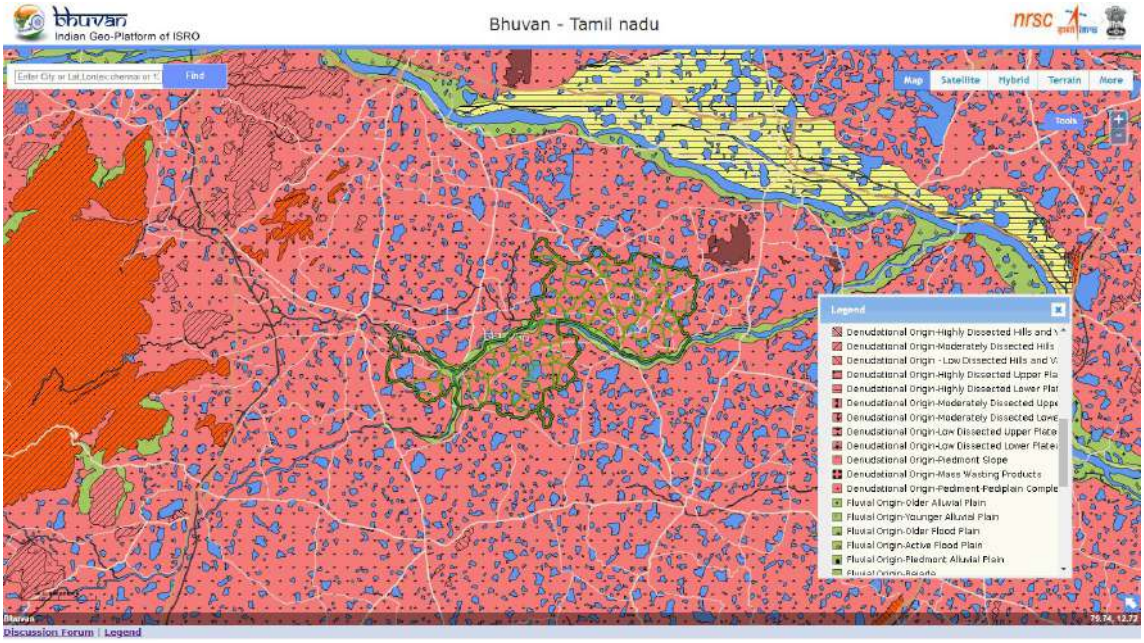



*Figure 3.1. Geomorphology map*

**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.

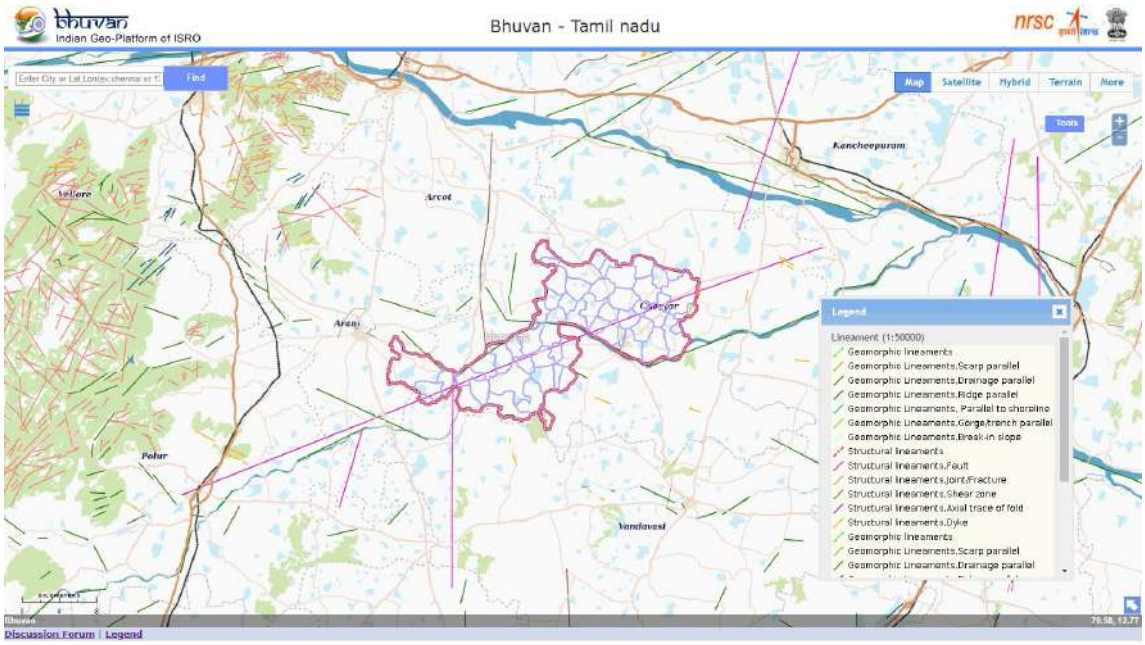



*Figure 3.2. Lineament map*

| Lineament type | Gram Panchayat |
|---|---|
| Structural lineaments, Fault | Kaduganoor, Kilpudupakkam, Korukkai, Madhurai, Melnagarambedu, Mukkur, Munugapattu, Palanthangal, Palli, Parasur, Perungalathur, Thirumani, Thumbai, Vadathandalam |
| Geomorphic lineaments, Drainage parallel | Melsheeshamangalam, Vadagapattu |

**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. Cheyyar 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).

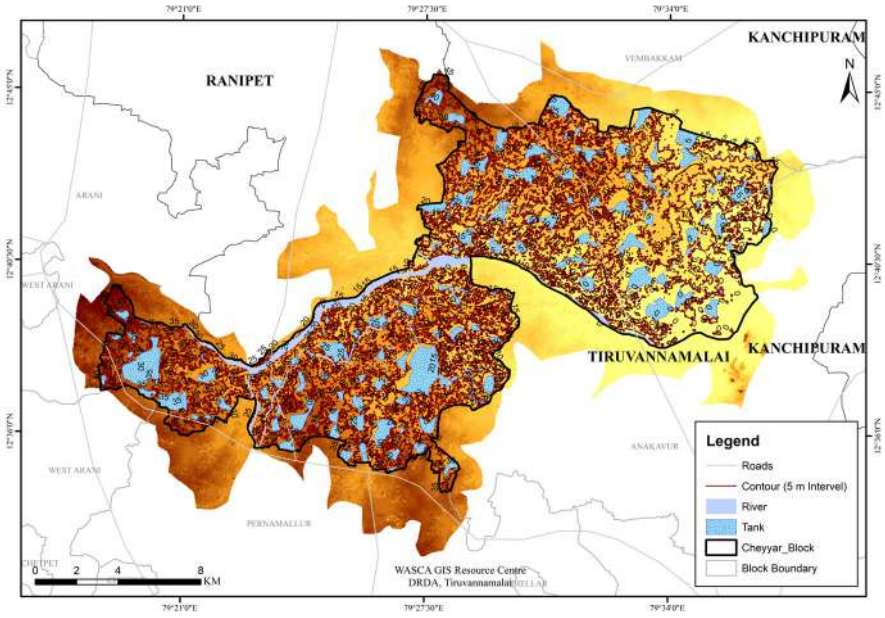



*Figure 3.4. Contour map*

**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 falt 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.

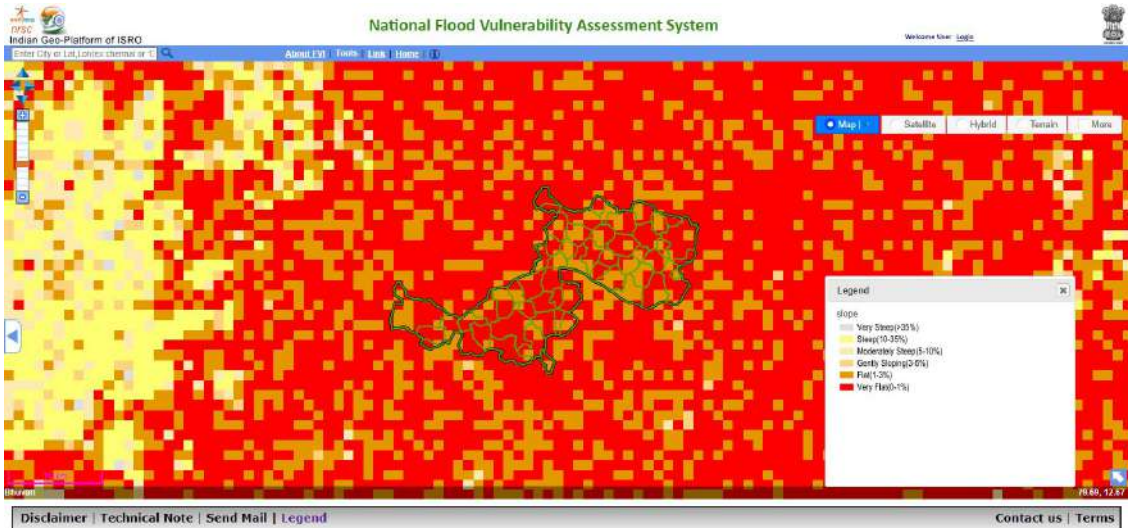



*Figure 3.5. Slope map*

| Slope range | Area in % | Gram Panchayat |
|---|---|---|
| Very flat (0-1%) | 90.5% | Eraiyur, Mukkur, Navalpakkam, Nedumpirai, Pillanthi, Pudukottai - 100%, Munugapattu, Murukkathampoondi, Palli, Thirumani, Thozhupedu, Vadathandalam, Vakkadai, Vinnamangalam - 90%, Kaliyur, Parasur, Velianallore - 80%, Melsheeshamangalam - 70% |
| Flat (1-3%) | 88% | Kilpudupakkam, Perumpallam, Sundivakkam, Puliyarambakkam - 90%, Thenpoondipattu - 80% |

**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 Cheyyar Block and due to its flat nature of the terrain and slope low to very low density of drainage network is noticed (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.

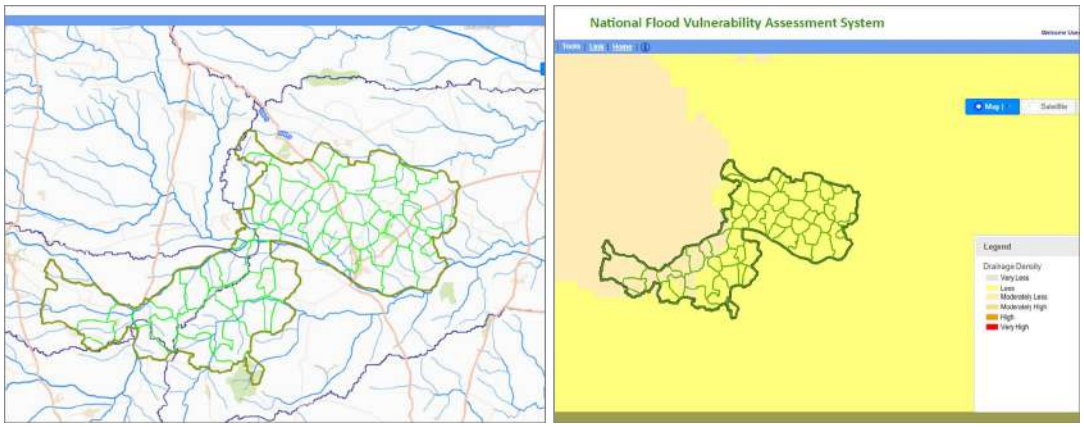



*Figure 3.6. Drainage network and density map*

**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. Cheyyar 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.

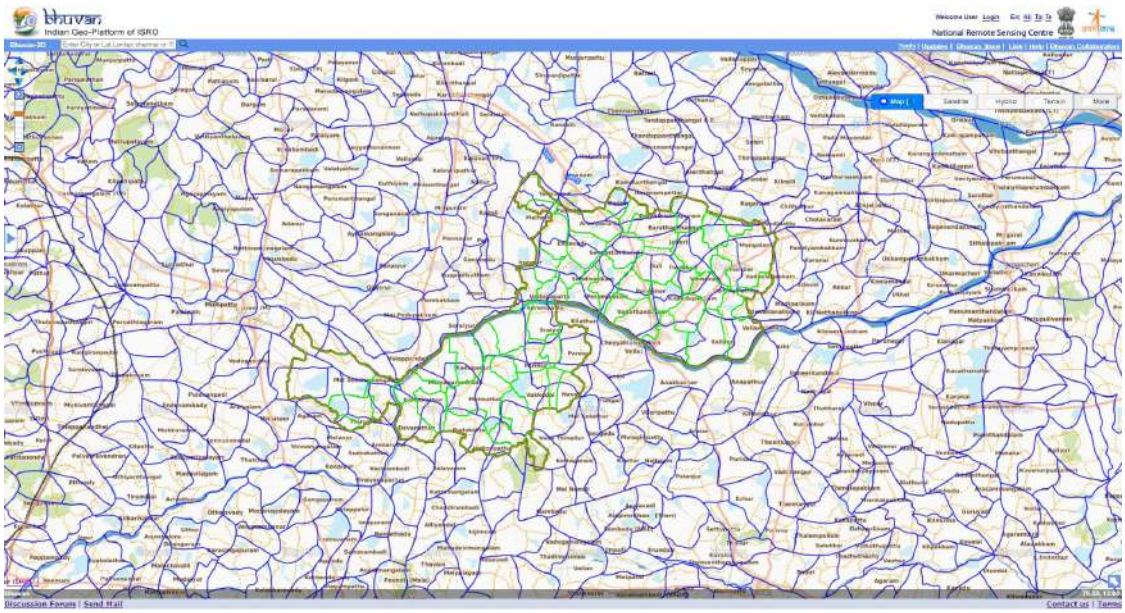



*Figure 3.7. Watershed map*

**3.5.1.8 Ground water perspectives:** Ground water is one of the important natural resources in semi-arid region like Cheyyar 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. Some GPs has witnessed the moderate yield of 400 to 800 LPM in above 80 m deep well in the Block. Whereas most of GPs are with yield range between 50 to 100 LPM in above 80 m deep (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.

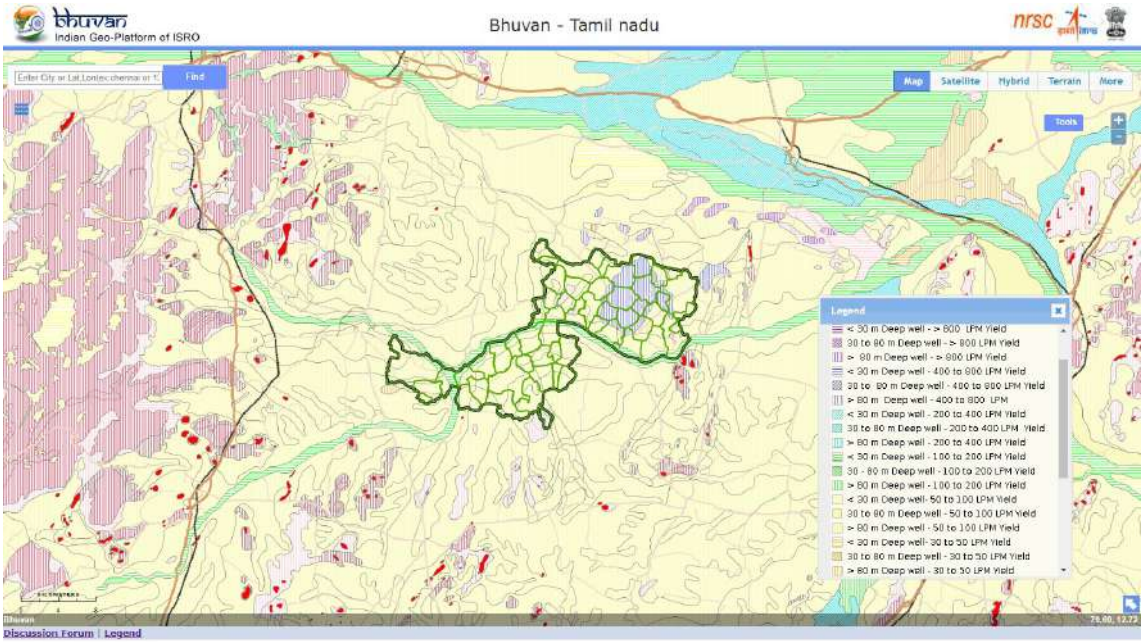



*Figure 3.8. Ground water perspective map*

| Groundwater Prospects | Area in % | Gram Panchayat |
|---|---|---|

## › 80 m deep Well- 400 to 800 LPM yield

81%

Duli, Kilpudupakkam, Nedumpirai, Thumbai, Vinnavadi - 100%, Kunnathur, Painkinar, Thenpoondipattu - 90%, Perungalathur, Puliyarambakkam - 20%

## › 80 m deep well- 50 to 100 LPM yield

99%

Aradrivelur, Arugavoor, Arumparuthi, Enthavadi, Eraiyur, Kaduganoor, Kalanipakkam, Kazhiyur, Kilpalandai, Korukkai, Korukkathur, Madhurai, Maligaipattu, Mariyanallur, Melnagarambedu, Melsheeshamangalam, Mukkur, Munugapattu, Murukathanpoondi, Naval, Navalpakkam, Palanthangal, Palli, Pappanthangal, Parasur, Perumpallam, Pillanthi, Pudukottai, Ramakrishnapuram, Senkattankudil, Siruveliyanallur, Sundivakkam, Thalarapadi, Thandarai, Thirumani, Thozhupedu, Vadangampattu, Vadapoondipattu, Vadathandalam, Vadugapattu, Vakkadai, Veliyanallur, Vinnamangalam - 100%, Perungalathur, Puliyarampakkam - 80%

### 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

| S No | Key CWRM Parameter | Total |
|---|---|---|
| | **Canal Network (in m)** | |
| 1 | Length of Main Canal (m) | 1,03,109 |
| 2 | Length of Minor Canal (m) | 1,18,987 |
| 3 | Length of Distributaries (m) | 17,960 |
| 4 | Water Courses (Field Channels) (m) | 10,290 |
| | **Traditional Waterbodies (in no.)** | |
| 5 | No. of Tanks (PWD & Union) (No.) | 138 |
| 6 | No. of Ooranis (No.) | 16 |
| 7 | Other Surface Water Bodies (No.) | 178 |
| | **Area under Irrigation facilities (ha.)** | |
| 8 | Tank Irrigation | 369 |
| 9 | Canal Irrigation | 79 |
| 10 | Open & Tube Well Irrigation | 4,762 |
| | **Catchment Area wise Available Runoff (in ha.m)** | |
| 11 | Good Catchment Area (ha.m) | 2,348 |
| 12 | Average Catchment Area (ha.m) | 271 |
| 13 | Bad Catchment Area (ha.m) | 3,475 |
| | **Watershed and Drainage Networks** | |
| 14 | Length of Natural Drainage Lines (m) | 1,48,152 |
| 15 | No. of Natural Drainage Lines (No.) | 197 |
| 16 | No. of Micro Watersheds (No.) | 210 |
| | **Water Demand (ha.m)** | |
| 17 | For Humans | 258 |
| 18 | For Livestock | 132 |
| 19 | For Agriculture (ha.m) | 9,633 |
| 20 | % GW utilization for Drinking (%) | 9 |
| 21 | % GW utilization for Livestock (%) | 97 |
| 22 | % GW utilization for Agriculture. (%) | 94 |
| 23 | % SW utilization for Drinking (%) | 91 |
| 24 | % SW utilization for Livestock (%) | 3 |
| 25 | % SW utilization for Agriculture (%) | 6 |

### 3.5.2.1 Existing Water Structures

The Block has structured traditional water storage units such as tanks, ooranis and surface waterbodies which are the life line of local communities for their lives and livelihoods. It is noticed that the surface waterbodies are more of 178 compare to tanks of 138 and 16 ooranis (Figure 3.9).

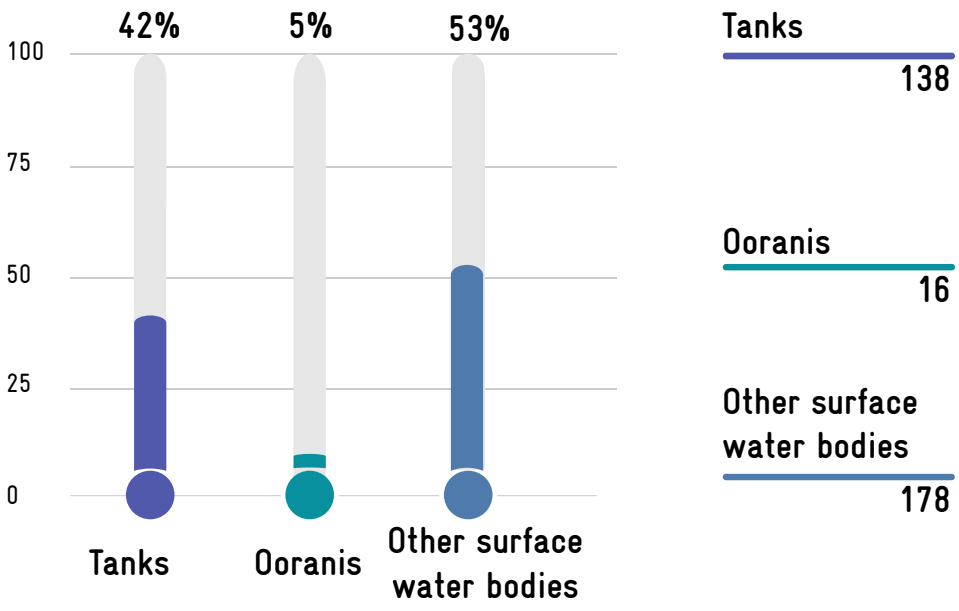



*Figure 3.9. Traditional waterbodies*

### 3.5.2.2 Sources of Irrigation

The total area under irrigation in the Block is 5,209 ha, of which 91.4 % (4,762 ha) is irrigated through ground water stored in open/tube wells, 7.08 % (369 ha) is through tanks and the remaining 1.5 % (79 ha) area is through canals based irrigation (Figure 3.10).

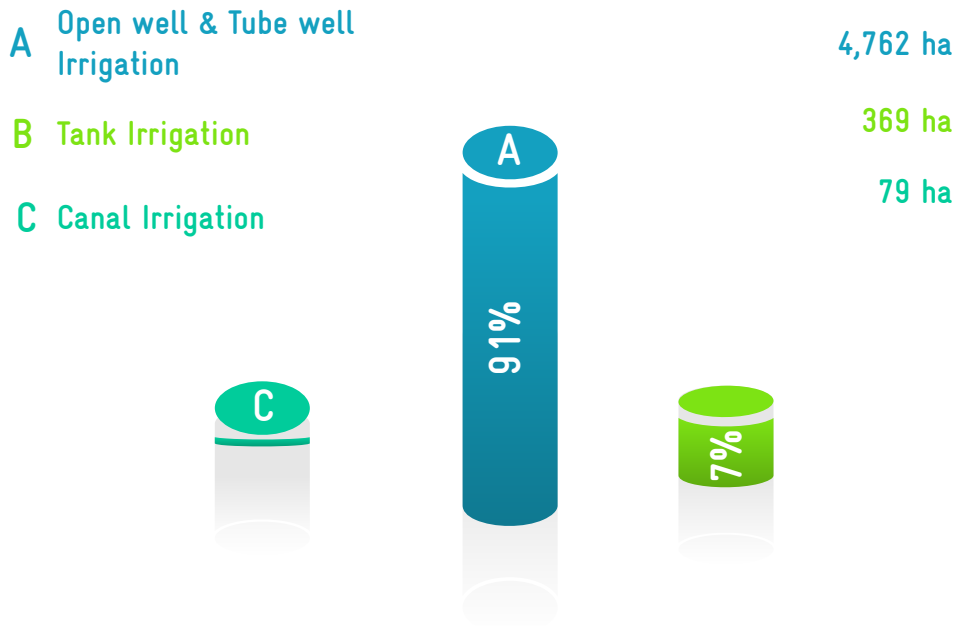



*Figure 3.10 Irrigation sources*

### 3.5.2.3 Available Run off

The total available runoff in the catchment area is 6,094 ha.m and in that 38.5 % (2,348 ha.m) comes under good catchment area, 4.5 % (271 ha.m) comes under average catchment area and 57% (3,475 ha.m) comes under bad catchment area. As the area has worse catchment area, the runoff generated is more. The amount of runoff generated in bad catchment area is 1.5 times higher than good catchment area and more than 13 times in average catchment areas (Figure 3.11).

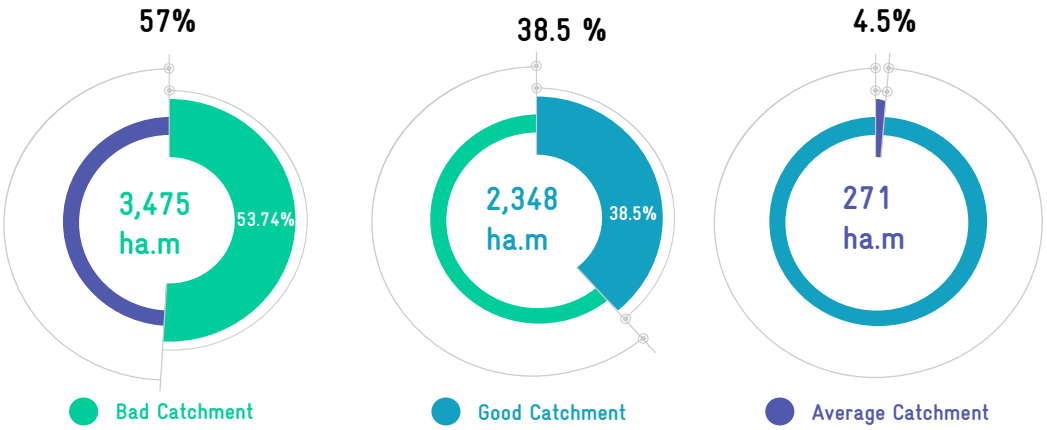
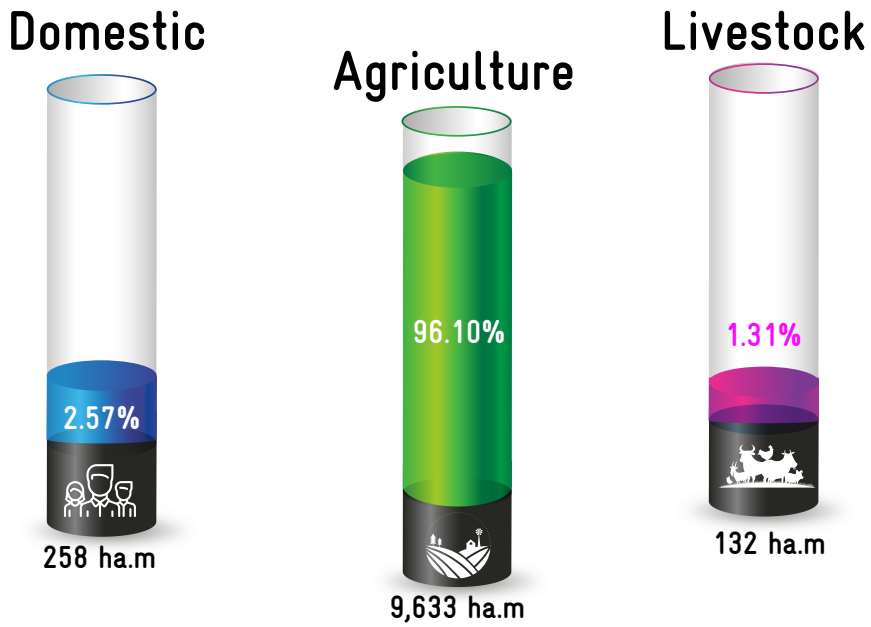



*Figure 3.11. Runoff from catchments*

### 3.5.2.4 Water Demand

The total demand for water including domestic, agriculture and livestock purpose is 10,023 ha.m. The highest demand is from the agriculture sector of 9,633 ha.m (96 %) followed by domestic use demand of 258 ha.m (2.56 %) and rest is from livestock.




Out of the total water demand, 91 % for domestic purpose usage is met through surface water while the remaining 9 % from ground water resources. While, more ground water is utilized for agriculture (94 %) and livestock (97 %) (Figure 3.12).

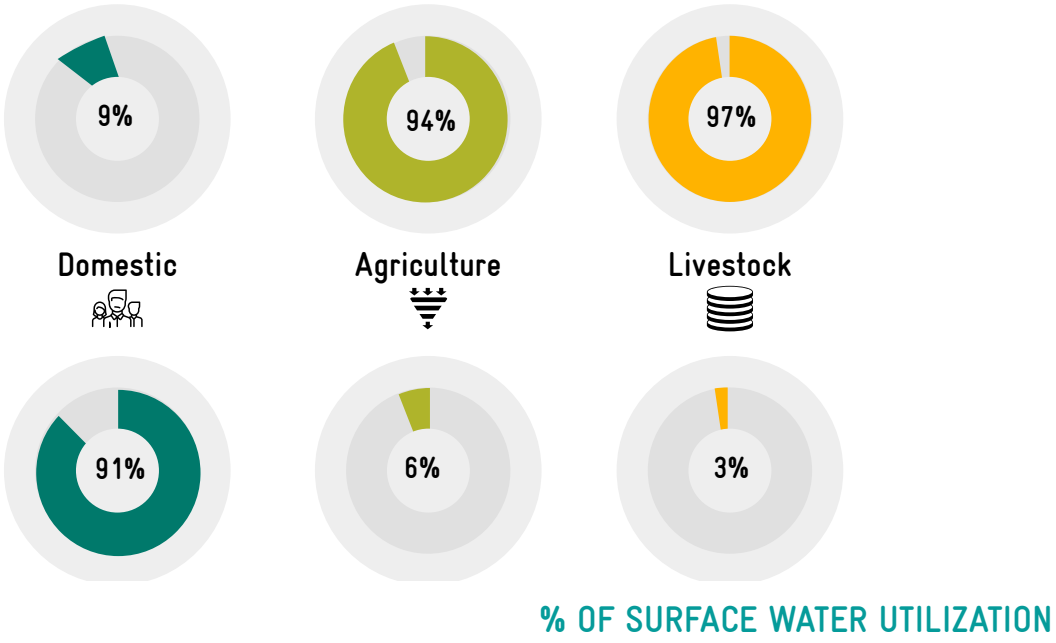



*Figure 3.12. Sector wise water utilization*

## 3.6 CWRM PLANNING ANALYSIS-AGRICULTURE

Agriculture is the primary livelihood of the households in Cheyyar 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 Cheyyar 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 fine loamy, fine texture type is dominated followed by course (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.

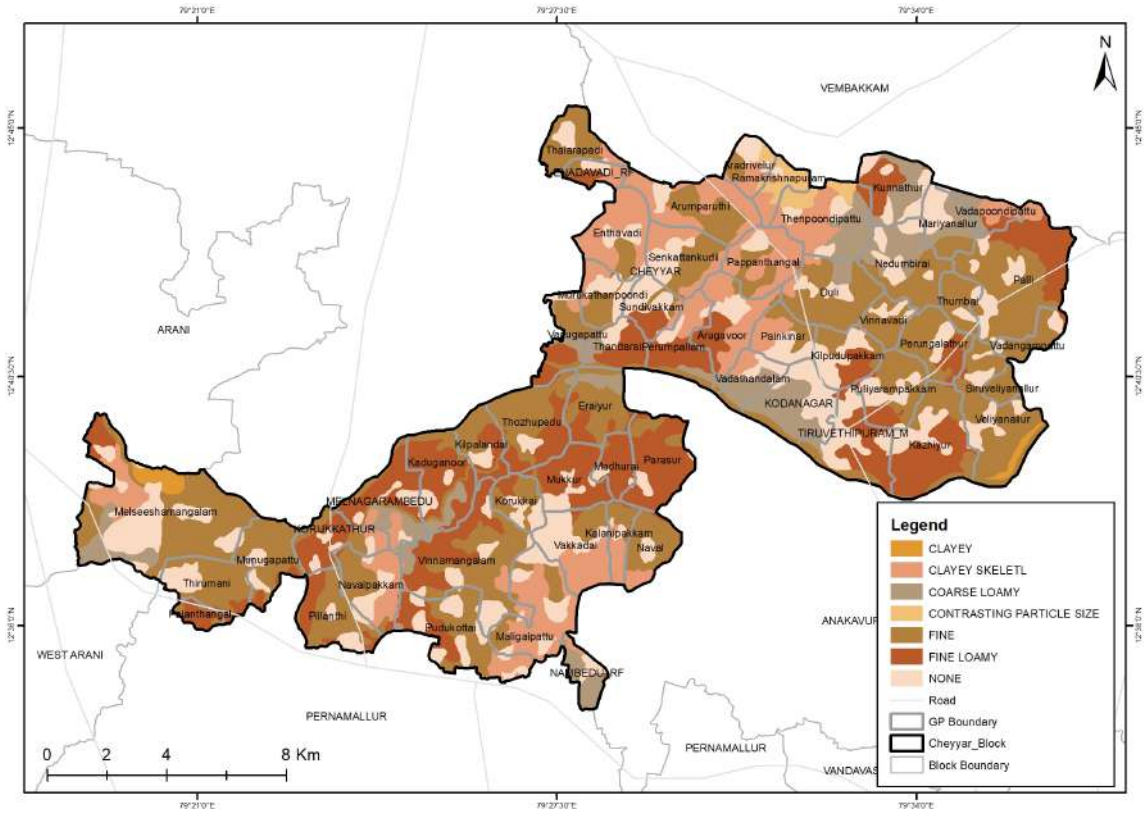



*Figure 3.13 Soil texture map*

**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 is observed in some parts of 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.

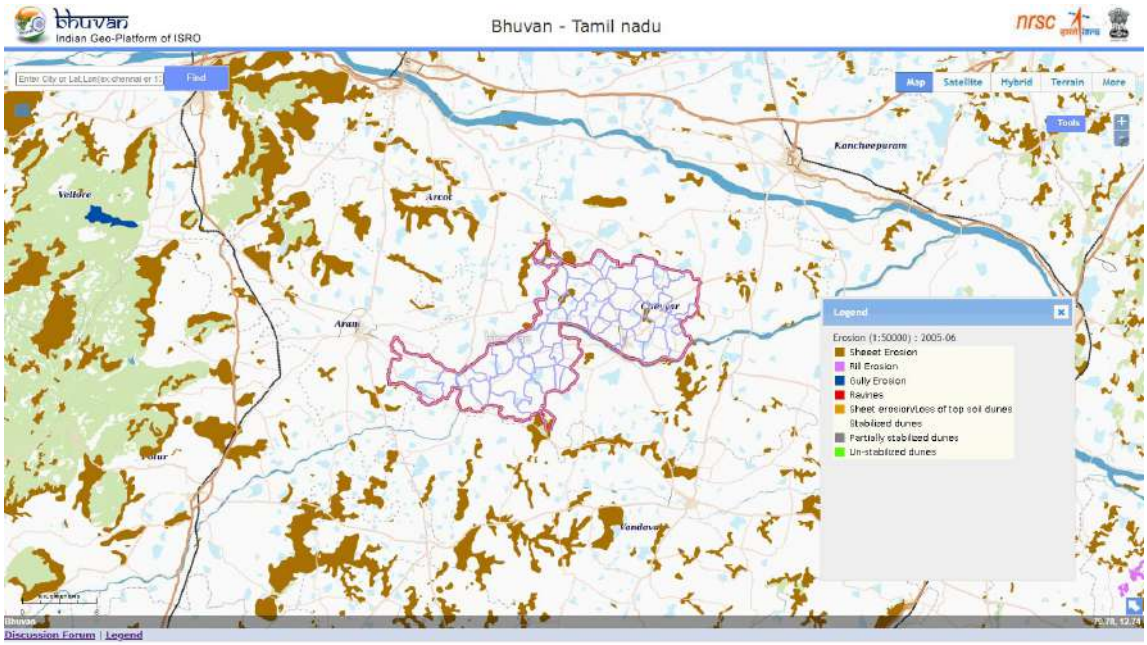
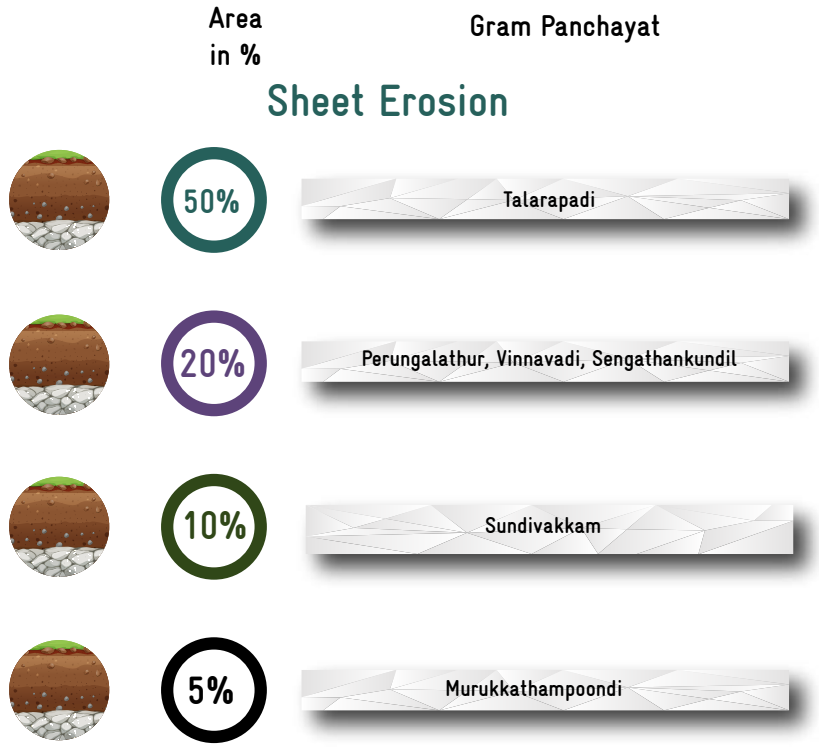



*Figure 3.14. Soil erosion map*




**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. Cheyyar Block is majorly covered by the agricultural crop and plantation followed by 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.

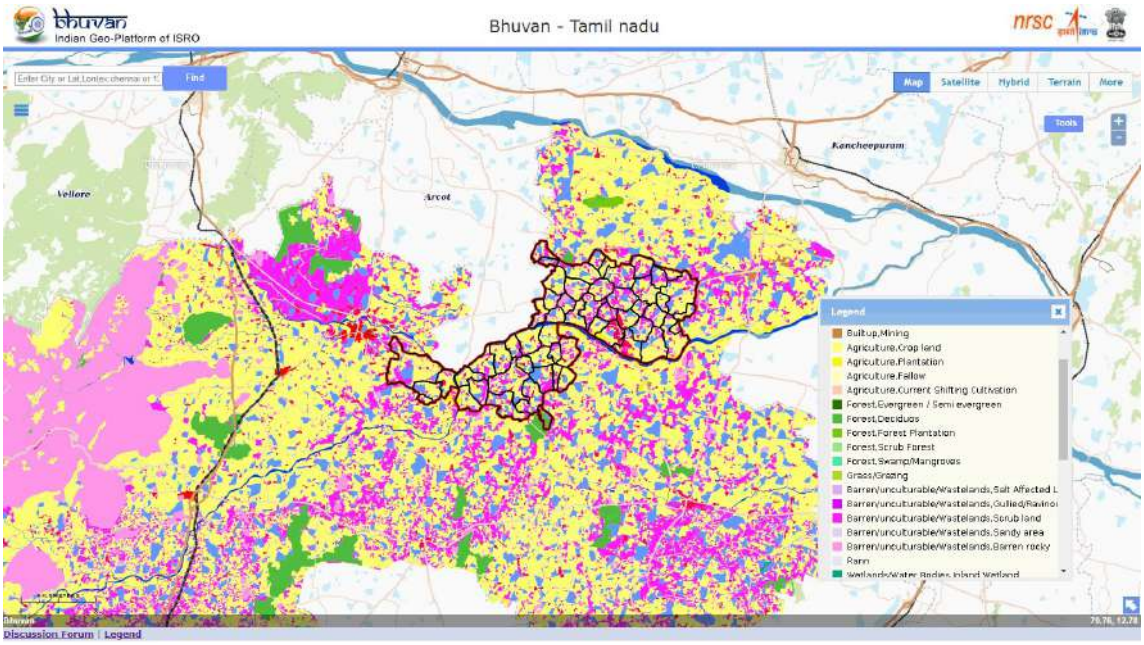



*Figure 3.15. Land use land cover map*

| Land Use | Area coverage in % | Gram Panchayat |
|---|---|---|
| Barren Lands | 59% | Arugavoor, Duli - 90%, Pappanthangal, Thenpoondipattu - 80%, Sengathankundil, Sundivakkam, Vakkaadai - 60%, Mariyanallur, Navalpakkam, Painkinar, Talarapadi, Vinnamangalam - 50%, Melsheeshamangalam, Puliyarambakkam - 30% |
| Agriculture crop lands and Plantation | 88% | Kaliyur - 100%, Endavadi, Eraiyur, Naval, Nedumparai, Perumpallam, Pillandi, Thandarai, Thozupedu, Tirumani, Vadathandalam, Velianallore - 90%, Kaduganur, Munugapattu, Munugapatu, Palli - 80% |

**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 Cheyyar 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.

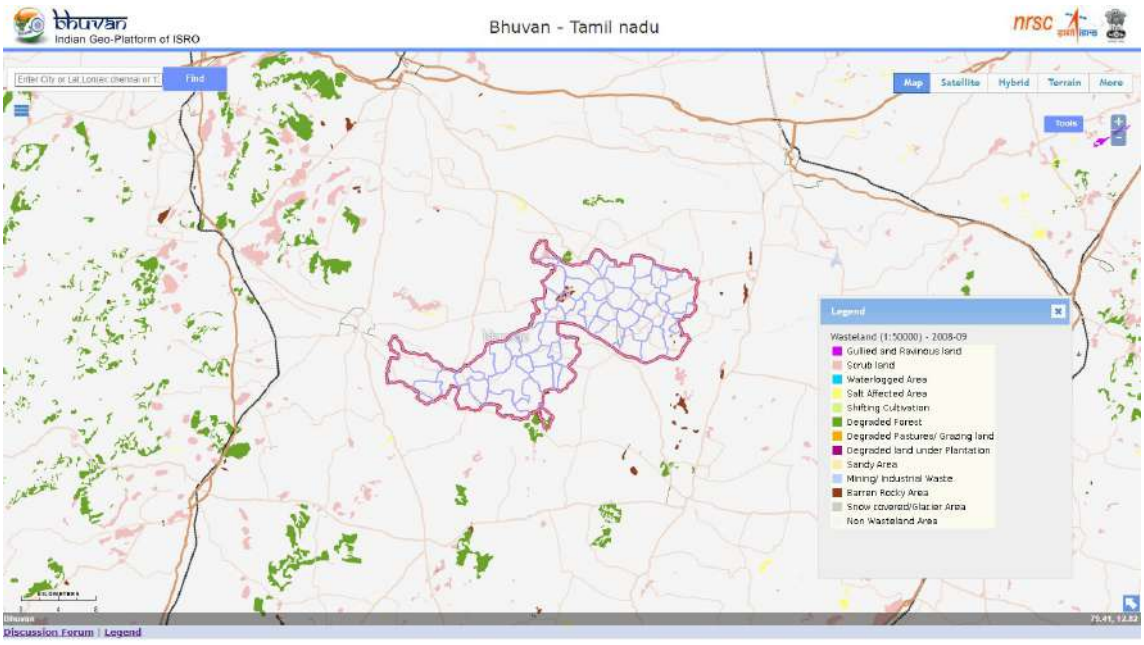



*Figure 3.16. Wasteland map*

| Wasteland type | Area in % | Gram Panchayat |
|---|---|---|
| Barren Rocks | 11% | Sundivakam - 20%, Sengathankundil, Murukkathampoondi - 10%, Velianallore - 5% |
| Scrub Land | 36% | Talarapadi - 50%, Sundivakam, Sengathankundil - 30% |

**3.6.1.5 Salt affected area:** About five percent area of saline affected area were noticed in the Kaliyur and Perungalathur (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.

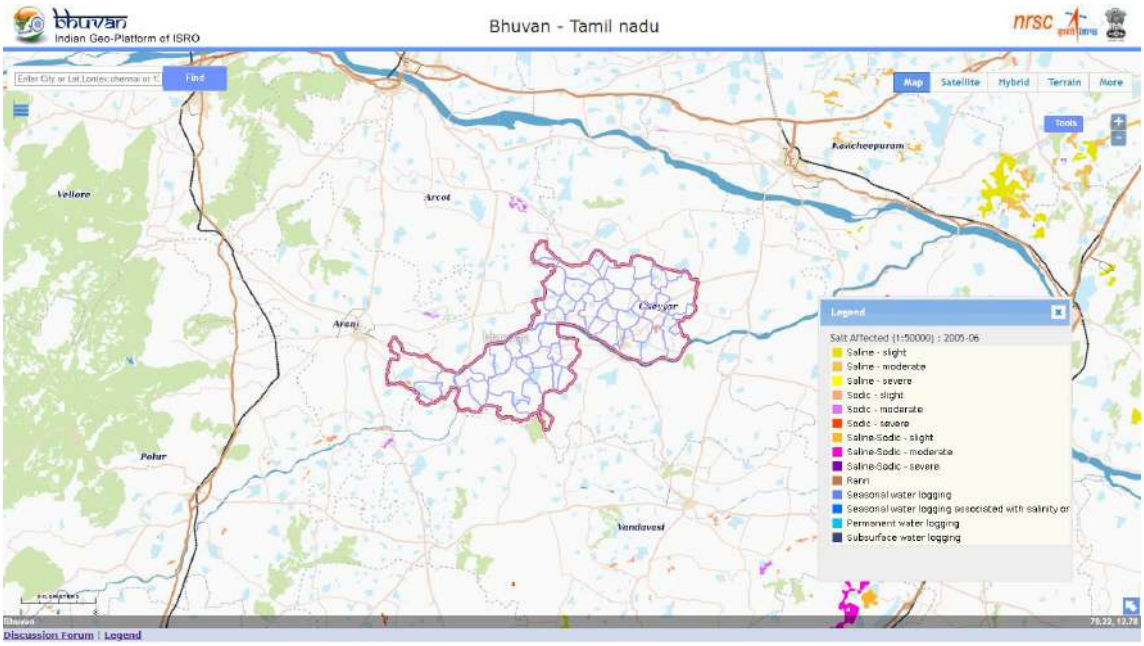



*Figure 3.17. Salt affected area map*

| Thematic unit | Area in % | Gram Panchayat |
|---|---|---|
| Saline- Moderate | 5% | Kaliyur, Perungalathur |

### 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

| S No | Key CWRM Parameter | Total |
|---|---|---|
| | **Area under land resources (in ha.)** | |
| 1 | Non-Agricultural Uses (ha) | 5,636 |
| 2 | Barren & Un-cultivable Land (ha) | 326 |
| 3 | Permanent Pastures and Other Grazing Land (ha) | 246 |
| 4 | Land Under Miscellaneous Tree Crops etc. (ha) | 419 |
| 5 | Cultivable Waste Land (ha) | 311 |
| 6 | Fallows Land other than Current Fallows (ha) | 1,839 |
| 7 | Current Fallow land (ha) | 7,574 |
| 8 | Unirrigated Land (ha) | 3,374 |
| 9 | Area Irrigated by Source (ha) | 4,683 |
| | **Catchment area (in ha.)** | |
| 10 | Good Catchment (ha) | 5,963 |
| 11 | Land under Average Catchment (ha) | 977 |
| 12 | Land under Bad Catchment (ha) | 17,470 |
| | **Crop details** | |
| 13 | Irrigated Area (ha) | 6,800 |
| 14 | Rainfed area (ha) | 725 |
| 15 | Area under Paddy Cultivation (ha) | 5,645 |
| 16 | Crop Water Requirement - Irrigated condition (Ha-m) | 9,330 |
| 17 | Crop Water Requirement - Rainfed condition (Ha-m) | 654 |
| | **Soil Resources: status of available Nitrogen (%)** | |
| 18 | Very Low | 6.45 |
| 19 | Low | 90.52 |
| 20 | Medium | 3.03 |
| | **Status of Organic Carbon (%)** | |
| 21 | Very Low | 18.67 |
| 22 | Low | 79.61 |
| 23 | Medium | 1.56 |
| 24 | High | 0.11 |
| 25 | Very High | 0.05 |
| | **Status of Soil micro-nutrients (%)** | |
| 26 | Sufficient | 55.6 |
| 27 | Deficient | 44.4 |
| | **Status of physical condition of the soil (%)** | |
| 28 | Moderately Acidic | 0.74 |
| 29 | Slightly Acidic | 4.15 |

| | | |
|---|---|---|
| 30 | Neutral | 0.54 |
| 31 | Moderately Alkaline | 94.56 |
| 32 | Strongly Alkaline | 0.01 |
| | **Soil Texture (%)** | |
| 33 | Clay Soil | 17 |
| 34 | Fine Soil | 63 |
| 35 | Coarse loamy | 6 |
| 36 | Soil Water Permeability (Low, Moderate, high) | Moderate |
| | **Soil moisture and ET** | |
| 37 | Volumetric Soil Moisture (%) | 23 |
| 38 | Estimated Soil Moisture (ha.m) | 4,318 |
| 39 | ET Losses (ha.m) | 6,909 |
| | **Means of water extraction (%)** | |
| 40 | Gravity | 8 |
| 41 | Lifting | 92 |
| | **Irrigation methods (%)** | |
| 42 | Wild Flooding | 15 |
| 43 | Control Flooding | 85 |
| | **Livestock (No.)** | |
| 44 | Cattle Population | 31,329 |
| 45 | Sheep Population | 16,195 |
| 46 | Goat Population | 14,534 |

### 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 24,409 ha, the highest of 31 % land is current fallow land, followed by 23 % of non-agriculture uses while barren and cultivable wasteland area of less than one percent is utilised (Figure 3.18).

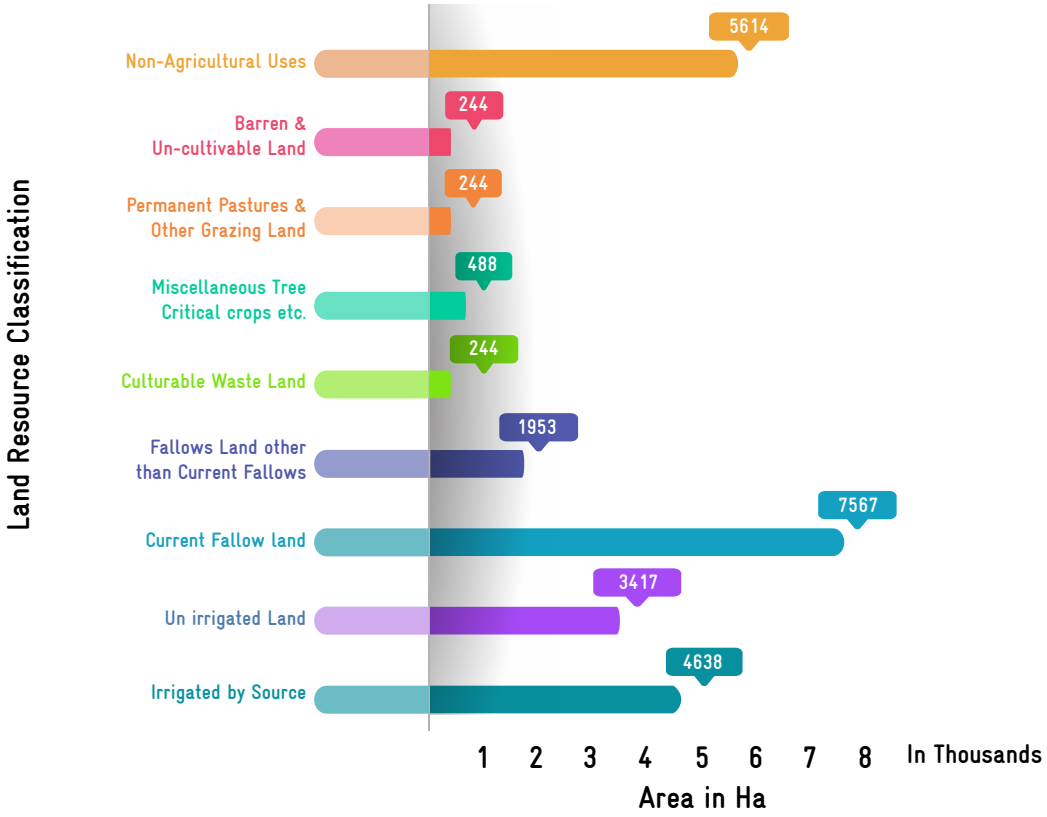



*Figure 3.18. Land utilization*

### 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 24,409 ha, of the Block, about 25 % is good catchment area, 73 % is bad catchment area and only 4% 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).

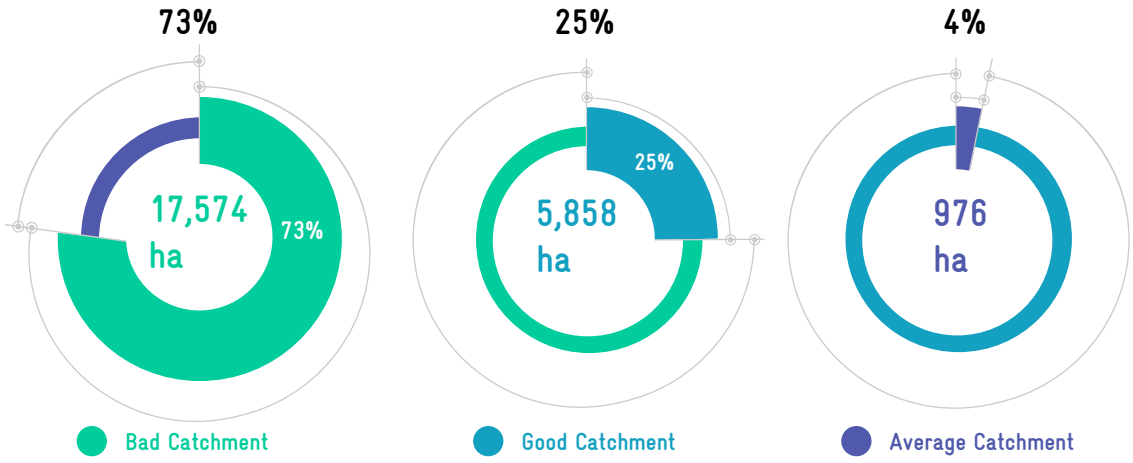


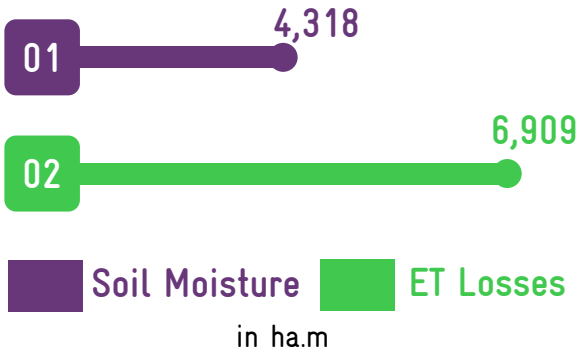

*Figure 3.19. Catchment area*

### 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 4,318 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 6,909 ha.m with monthly average of 575.76 ha.m.




### 3.6.2.5 Macro nutrients

The macro soil nutrients such as nitrogen and organic carbon falls under very low to low category in all the soil samples tested. The available nitrogen is very low in 6 % of the samples tested while it was 90.52 % under low category (Figure 3.20). According to soil resource map, this Block is identified as one of the nitrogen deficient Block (Tiruvannamalai district profile 2020).

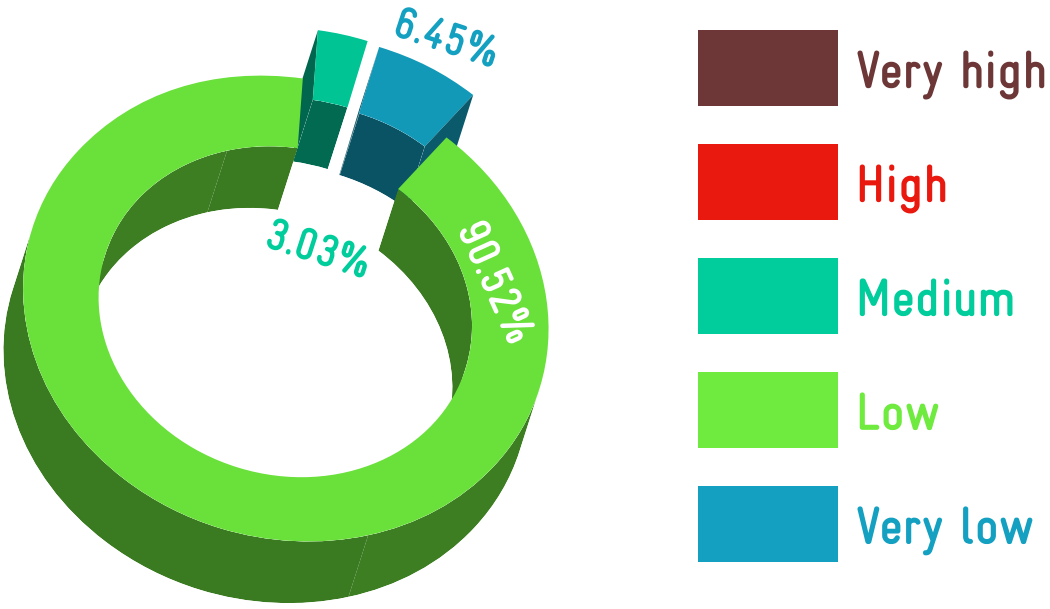



*Figure 3.20. Status of available Nitrogen*

## Organic carbon

A similar trend was recorded for soil organic carbon. Soil organic carbon is also ranges between low and very low in this Block. Nearly 79.61 % of the soil samples tested fall under low category and 18.62 % of the soil samples tested fall under very low category. (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.

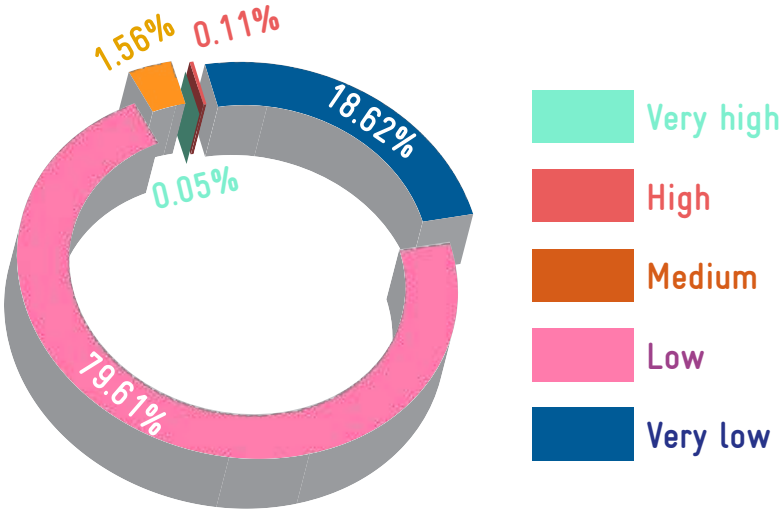



*Figure 3.21. Status of soil Organic Carbon*

### 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 44.4 % and 55.6 % sufficient in the soils tested. (Figure 3.22)

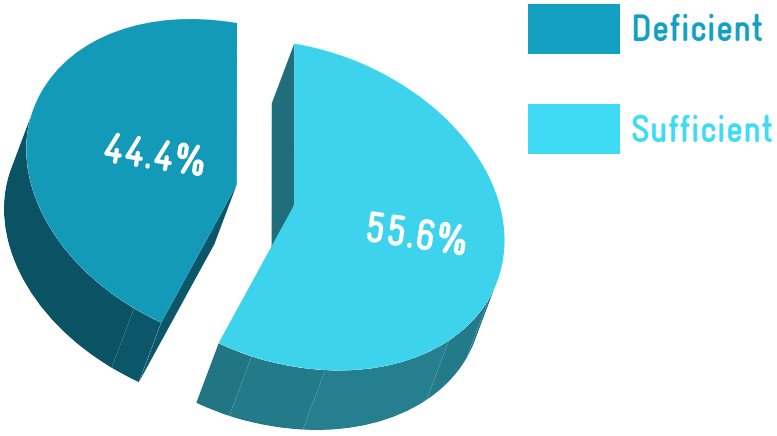



*Figure 3.22. Status of soil micro-nutrients*

### 3.6.2.7 Physical parameters – pH status

With reference to the physical parameters, 94.56 % of the soil is moderately alkaline in nature, 4.15% is slightly acidic, 0.74 % is moderately acidic, and 0.54 % is neutral in nature as shown in Figure 3.23.

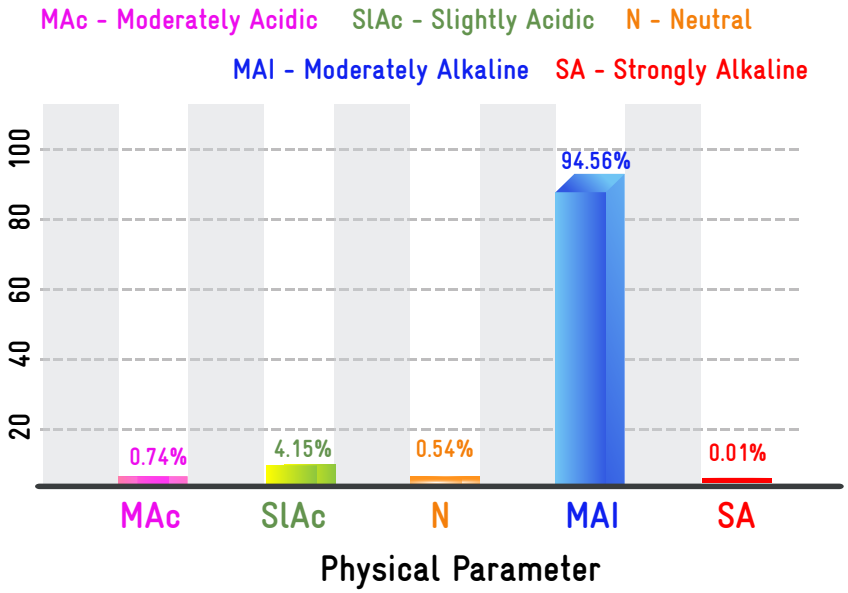



*Figure 3.23. Status of pH of soil*

### 3.6.2.8 Cropping pattern and the irrigation

Of the total area under cultivation, 90 % is under irrigation and the remaining 10 % is under rain-fed cultivation. Among the crops cultivated under irrigation, paddy is predominantly cultivated and accounts to about 58 % followed by ground nut of 22 % also groundnut is predominated crop in the rain fed cultivation of 61 % of area followed by pulses of 19 % (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.

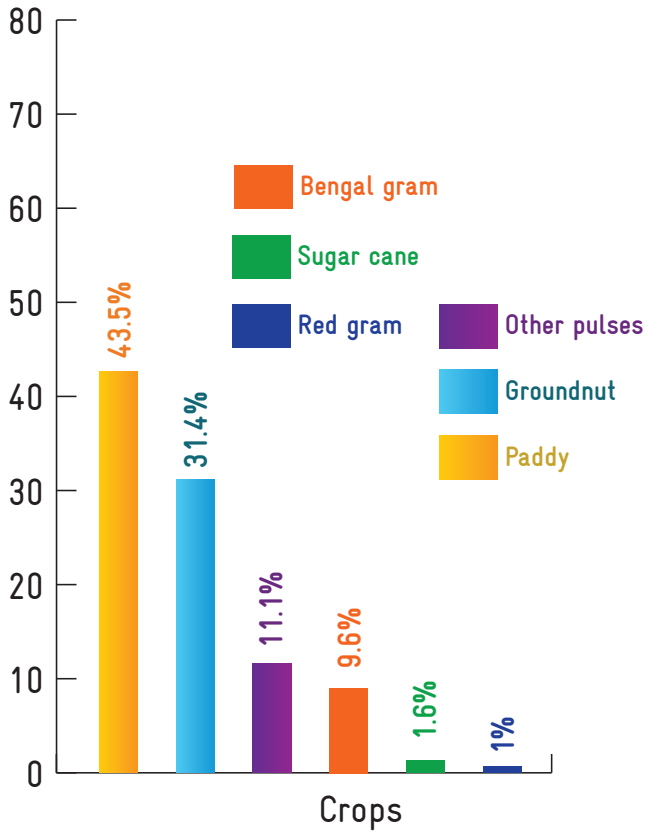



*Figure 3.24. Cropping pattern*

### 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 controlled flooding. In the Block, 85 % of the irrigation is done by control flooding and only 15% of the irrigation is done by wild flooding (Figure 3.25).

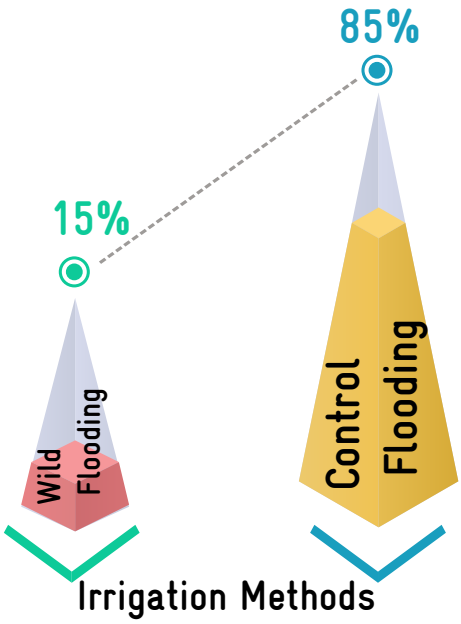



*Figure 3.25. Irrigation methods*

### 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, 92 % of the water extraction methods are under lifting means of extraction and only 8 % comes under gravity means of water extraction (Figure 3.26).

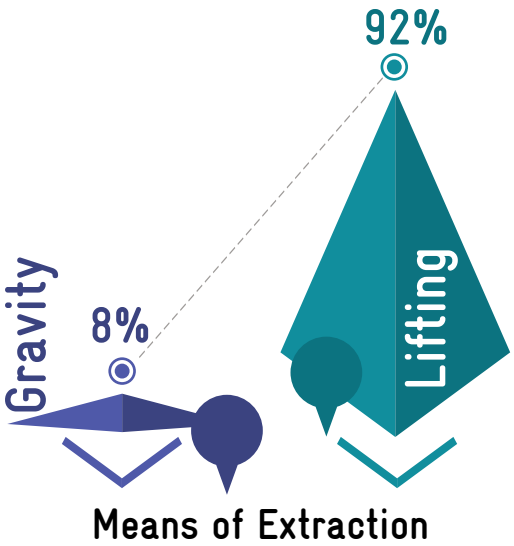



*Figure 3.26. Means of water extraction*

### 3.6.2.11 Livestock Details

This Block has considerable proportion of livestock resources of which small ruminants such as sheep and goat constitute 26 % and 24 % of the total livestock. While cattle population is higher in this Block 50 % (Figure 3.27). The total water requirement for livestock is 132 ha.m. Of the total water demand of 97 % is met through ground water and remaining 3% is from surface water resources.

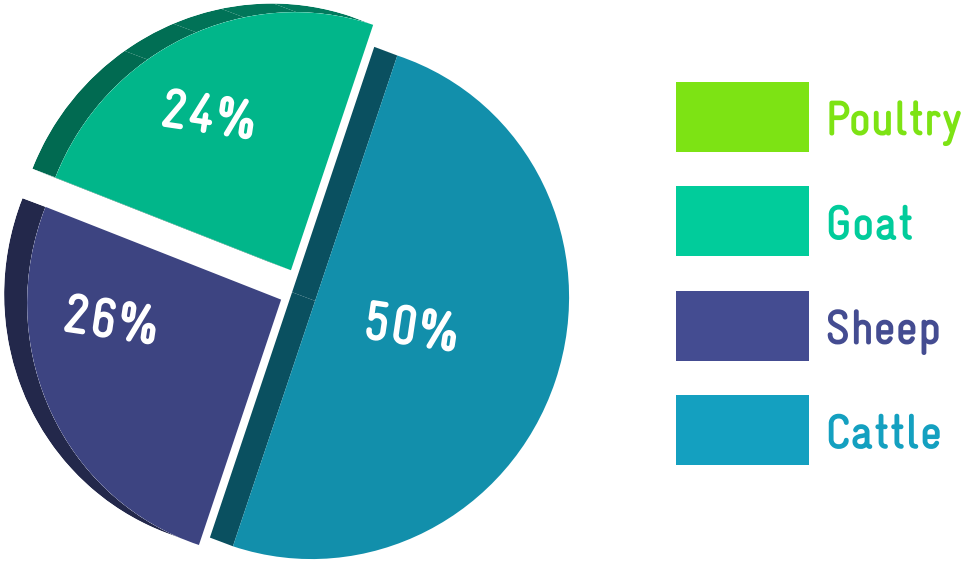



*Figure 3.27. Livestock details*

## 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 Cheyyar 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

| S No | Key CWRM Parameter | Total |
|---|---|---|
| 1 | Geographical Area (ha) | 26,164 |
| 2 | Male population (No.) | 47,251 |
| 3 | Female population (No.) | 47,008 |
| 4 | Total population (No.) | 94,259 |
| 5 | SC population (No.) | 20,809 |
| 6 | ST population (No.) | 1,069 |
| 7 | Vulnerable population (No.) | 21,878 |
| 8 | Households (HH's) (No.) | 23,471 |
| 9 | Only one room HH's (No.) | 3,158 |
| 10 | Female Headed HH's (No.) | 1,615 |
| 11 | Vulnerable Households (No.) | 2,698 |
| 12 | Vulnerable Households (%) | 13 |
| 13 | Registered MGNREGA Job cards (Persons) | 33,776 |

| | | |
|---|---|---|
| 14 | Active person working in MGNREGA job Cards (Persons) | 24,330 |
| 15 | Drinking Water Sources (No.) | 7,603 |
| 16 | Ground Water - Drinking source (No.) | 173 |
| 17 | Surface water - Drinking source (No.) | 46 |
| 18 | Sum of drinking water sources (No.) | 219 |
| 19 | HH's have tap water connection for drinking water (No.) | 7,158 |
| 20 | HH's dependent on other sources for drinking water (No.) | 46,009 |
| 21 | Annual Greywater Generation (ha.m) | 174 |

### 3.7.1 Population

The total population of this Block is 0.94 Lakhs of which the women proportion is almost equal to proportion of men. In the CWRM planning process due attention is given for the intersecting variables such as gender, class, caste and marital status and availability of safe drinking water resources. In the Block, about 23 % of the total population are under vulnerable population (Figure 3.28).

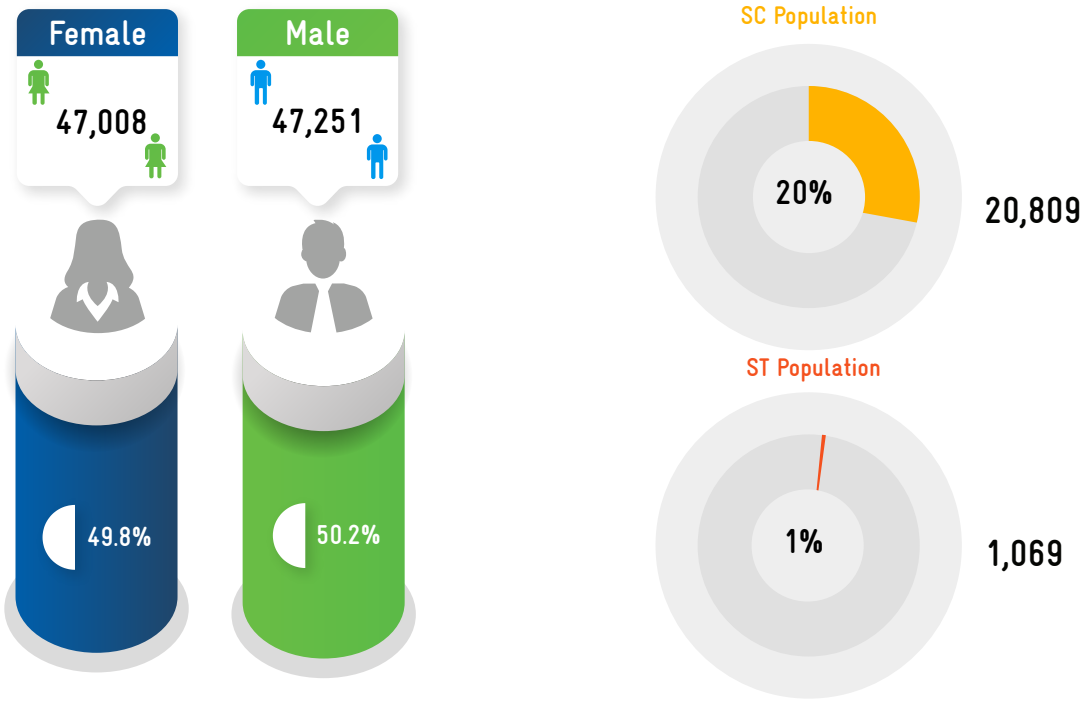



*Figure 3.28. Population details*

**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 23,417 households in which 13.45 % households have only one room, 6.8 % households are headed by women and 11.5 % are vulnerable households (Figure 3.29).

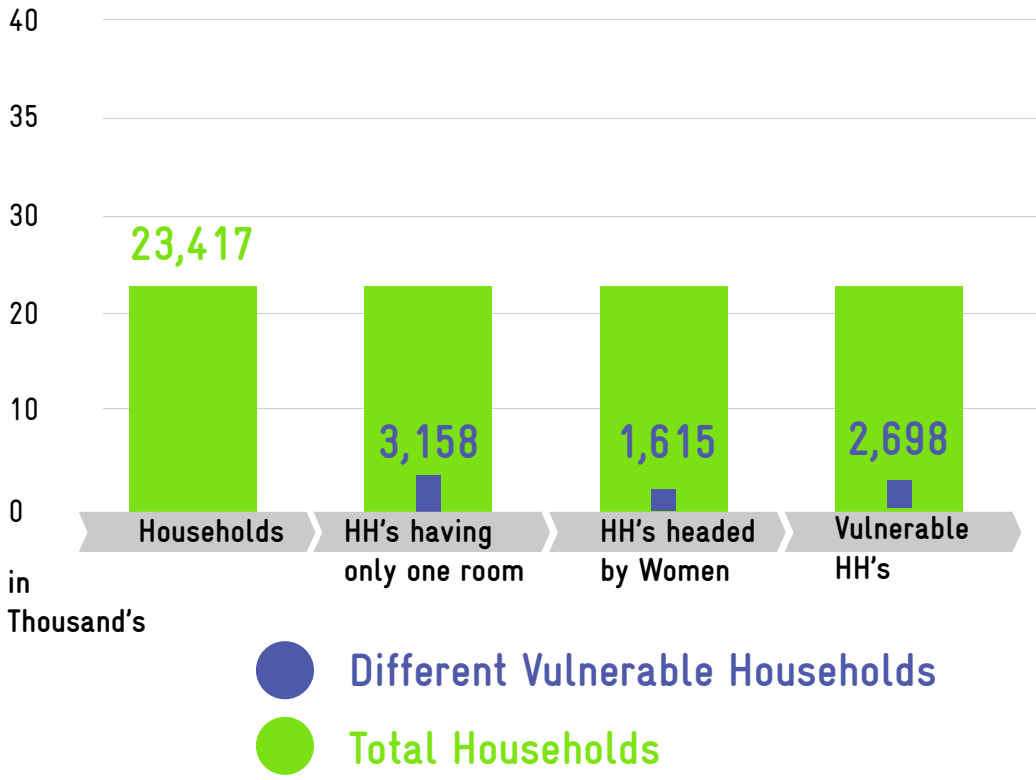



*Figure 3.29. Details of Households*

### 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).

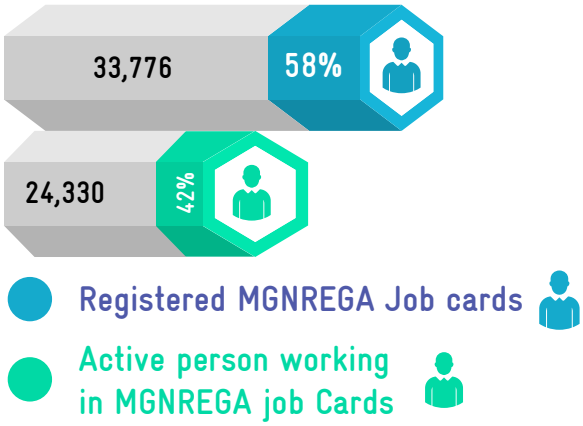



*Figure 3.30. Status of MGNREGA job cards*

### 3.7.4 Drinking Water Sources

Nearly 7,158 households have tap water connection and 46,009 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

**7,158 Households**

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

**46,009 Households**

### 3.7.5 Annual Greywater Generation

The grey water generation estimated across this Block is 174 ha.m which is available for reuse or recycle.

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

Morphology

Kaduganoor, Kilpudupakkam, Korukkai, Melsheeshamangalam

Wasteland

Talarapadi, Sundivakam, Sundivakam, Kaliyur

Soil erosion

Talarapadi, Perungalathur, Vinnavadi, Perungalathur

Upland/Slope

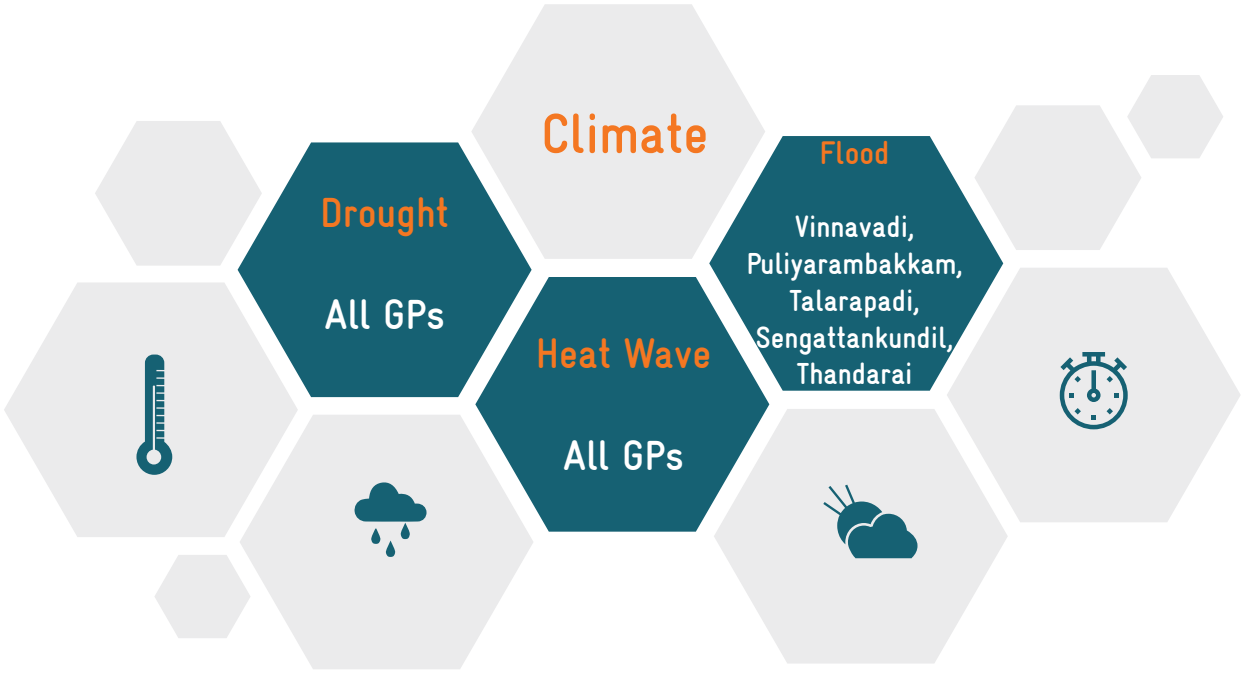
Eraiyur, Mukkur, Munugappattu, Kilpudupakkam

Ground water prosperity

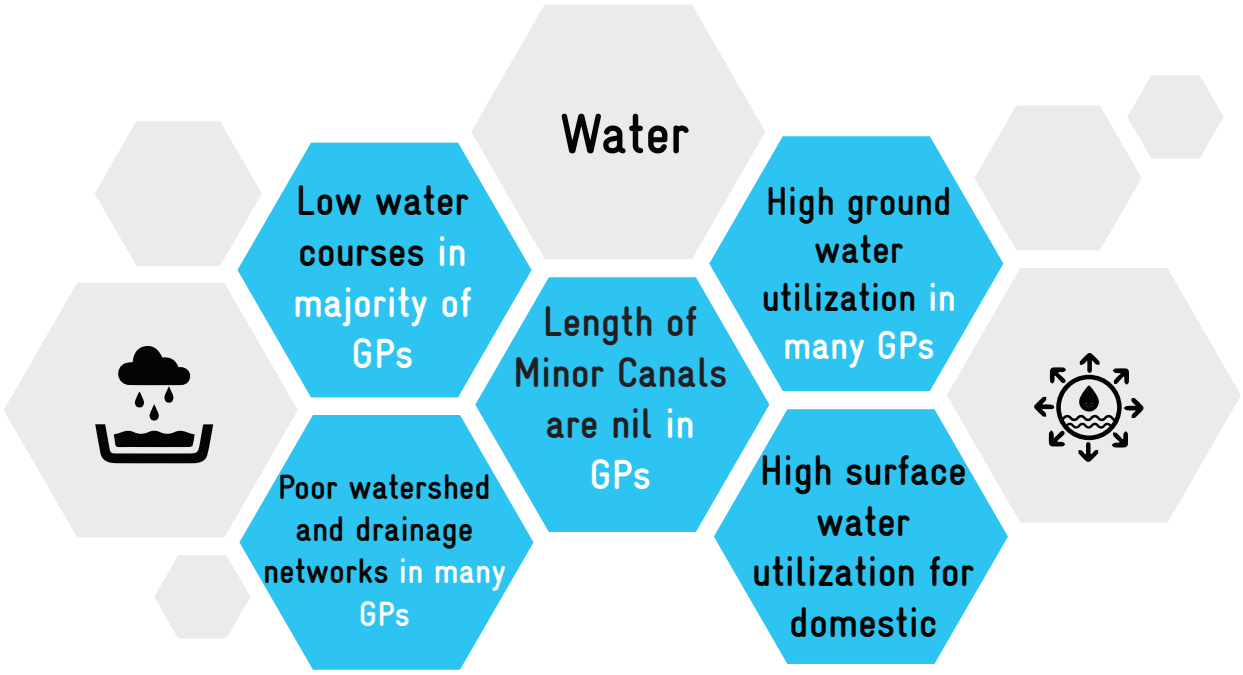
Vinnamangalam, Perungalathu Puliyarampakkam, Thenpoondi pattu

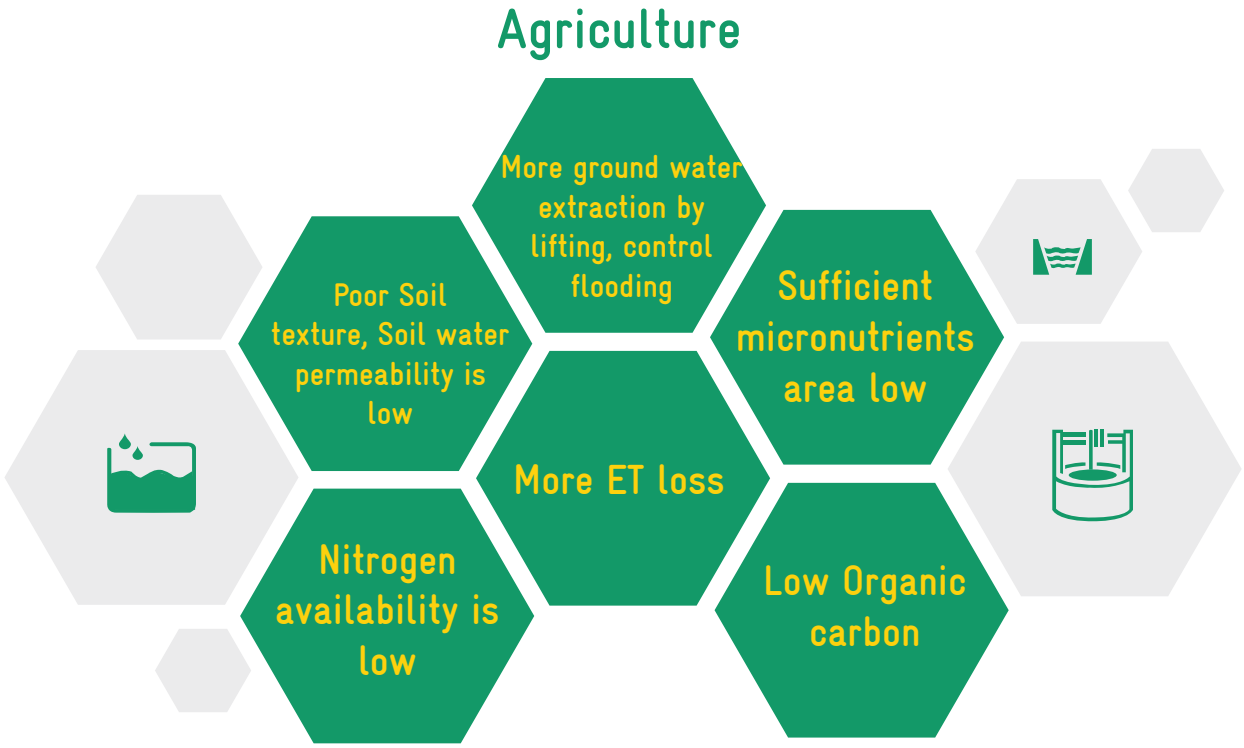

Salt affected area

Kaliyur, Perungalathur


Climate
Drought
All GPs
Flood
Vinnavadi, Puliyarambakkam, Talarapadi, Sengattankundil, Thandarai
Heat Wave
All GPs


Socio economic
Population density high in Kilpudupakkam, Siruveliyanallur, Paingkinar, Munugapattu
No. of households and female headed households high in Melsheeshamangalam, Palauthangal, Kilpudupakkam, Palli, Thirumani
Vulnerable population high in Vinnamangalam, Palli, Pudukottai, Paingkinar
Percentage of vulnerable households high in Siruveliyanallur, Veliyanallur, Vadangam-pattu low in Amarnathapudur Munnuramangalam, & Kottakulam
Total population, Female population high in Kizhapalanthai, Thandarai, Ramakr-ishnapuram, Madurai, Kaduganur, Kazhiyur
Grey water generation more in Kilpudupakkam, Melsheeshamangalam
Most of GP HH's have tap water connection for drinking water
Registered MGNERGA job cards and active persons working are low in Kazhanipakkam, Navalpakkam, Naval, Kazhiyur


Water
Low water courses in majority of GPs
High ground water utilization in many GPs
Length of Minor Canals are nil in GPs
Poor watershed and drainage networks in many GPs
High surface water utilization for domestic


Agriculture
More ground water extraction by lifting, control flooding
Poor Soil texture, Soil water permeability is low
Sufficient micronutrients area low
More ET loss
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).

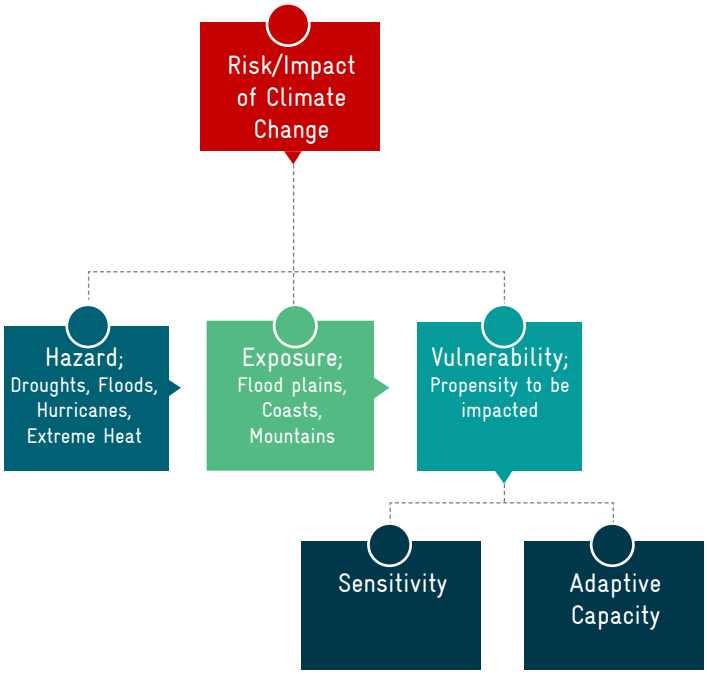



*Figure 4.1. Vulnerability of the system as defined by IPCC*

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.

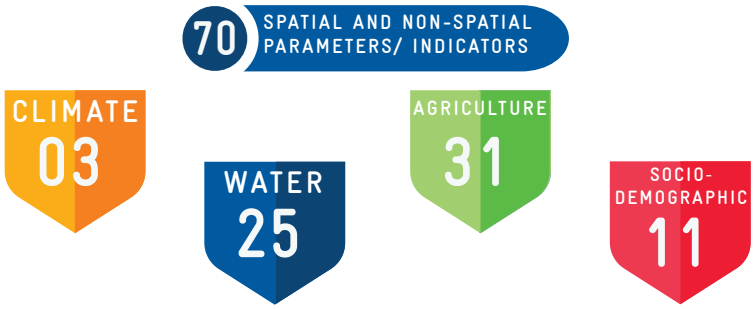


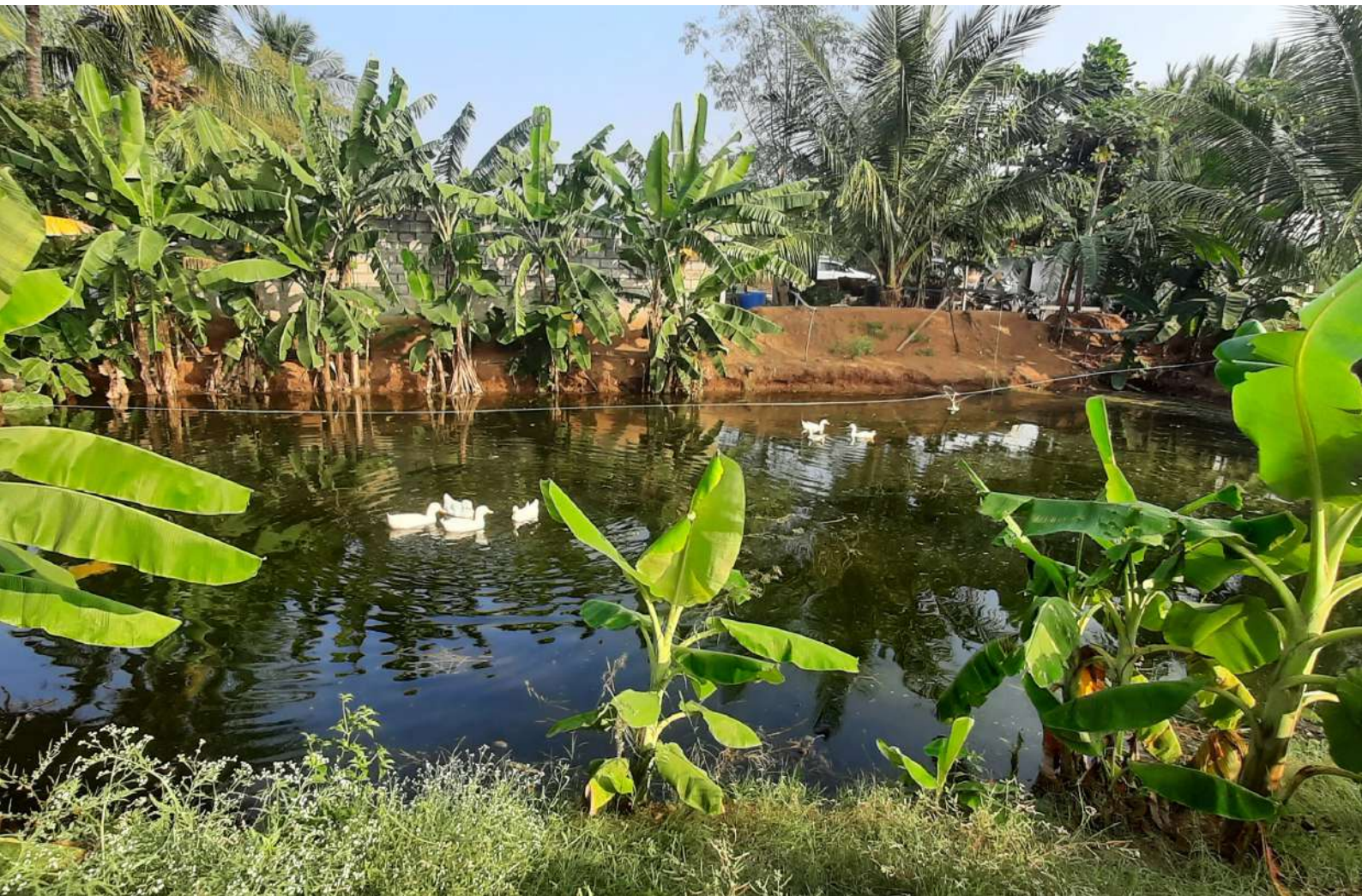
TABLE 9. CWRM PARAMETERS/INDICATORS SELECTED FOR BLOCK LEVEL VULNERABILITY

| | 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 Oranis | |
| | Other Surface Water Bodies | |
| | **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 | 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 vulnerability assessment methodology is given in Annexure 4. The GPs are categorized based on vulnerability scores as shown in Figure 4.2. Pappanthangal, Paingkinar, Sengattankundil, Palli, Korukkai, Palauthangal, Mukkur, Talarapadi, Duli and Melsheeshamangalam GPs have very high rural water security vulnerability to climate risks. Vadugapattu, Pillandi, and Munugapattu GPs have very low vulnerability.

| Range (upto) | Color code | Category |
|---|---|---|
| 0.576 | | very high |
| 0.553 | | high |
| 0.530 | | medium |
| 0.507 | | low |
| 0.484 | | very low |



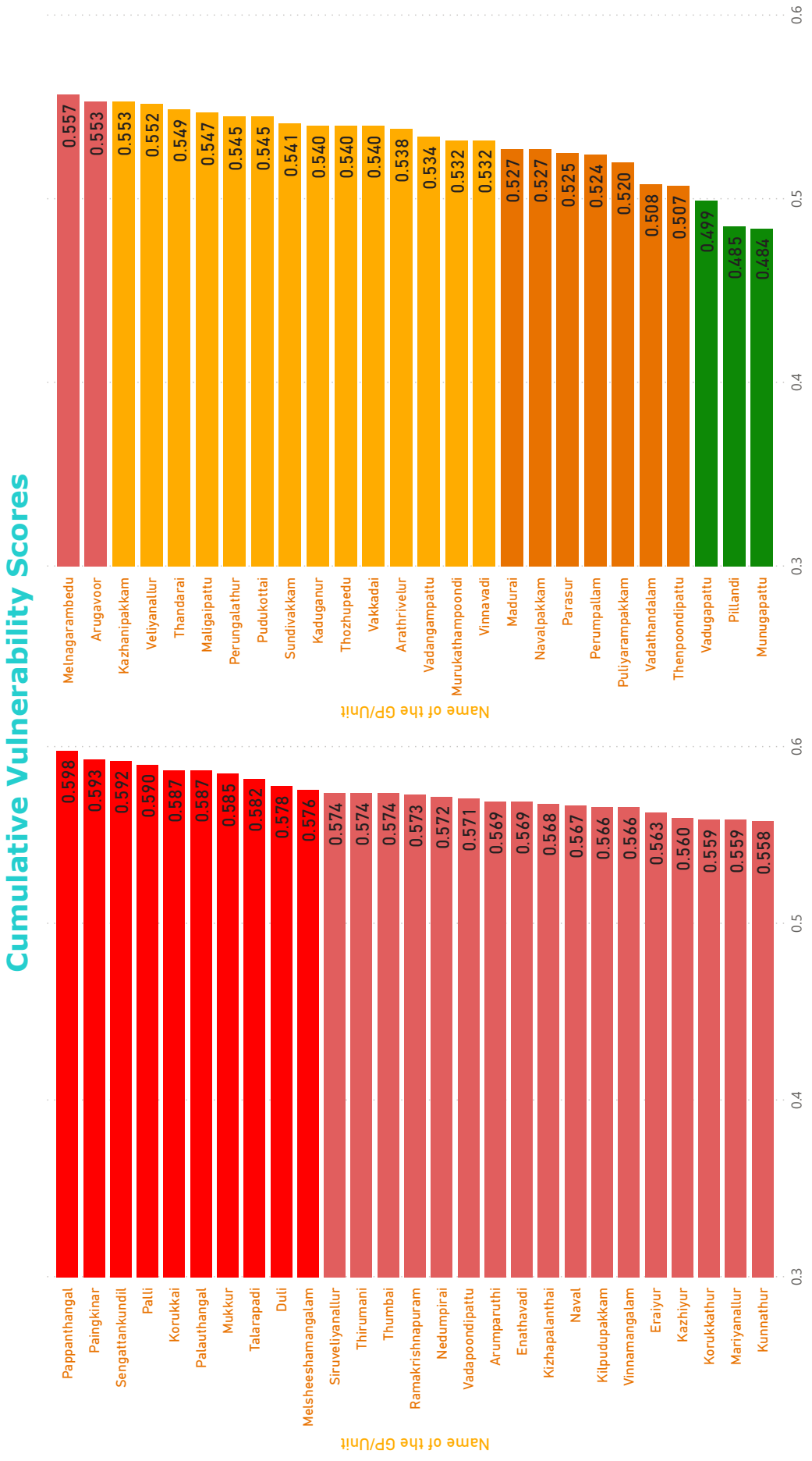



*Figure 4.2. Final cumulative vulnerability scores*

## 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. Vinnavadi, Puliyarambakkam, Talarapadi, Sengattankundil and Thandarai GPs have moderate flood vulnerability

**VINNAVADI, PULIYARAMBAKKAM, TALARAPADI, SENGATTANKUNDIL, THANDARAI**

**Water resource vulnerability**

The water resources vulnerability index shows that Palauthangal, Kilpudupakkam, Melsheeshamangalam, Melnagarambedu, Thirumani, Palli and Duli GPs have high vulnerability

**PALAUTHANGAL, KILPUDUPAKKAM, MELSHEESHAMANGALAM, MELNAGARAMBEDU, THIRUMANI, PALLI, DULI**

**Agriculture resources vulnerability**

In agriculture and allied sectors, Pappanthangal, Talarapadi, Korukkai, Kazhanipakkam, Enathavadi, Duli, Kunnathur, Mukkur and Paingkinar GP has highest vulnerable score

**PAPPANTHANGAL, TALARAPADI, KORUKKAI, KAZHANIPAKKAM, ENATHAVADI, DULI, KUNNATHUR, MUKKUR PAINGKINAR**

**Socio-economic vulnerability**

Paingkinar, Kizhapalanthai, Siruveliyanallur, Ramakrishnapuram, Kazhiyur and Palli GPs have high socio-economic vulnerability

**PAINGKINAR, KIZHAPALANTHAI, SIRUVELIYANALLUR, RAMAKRISHNAPURAM, KAZHIYUR, PALLI**

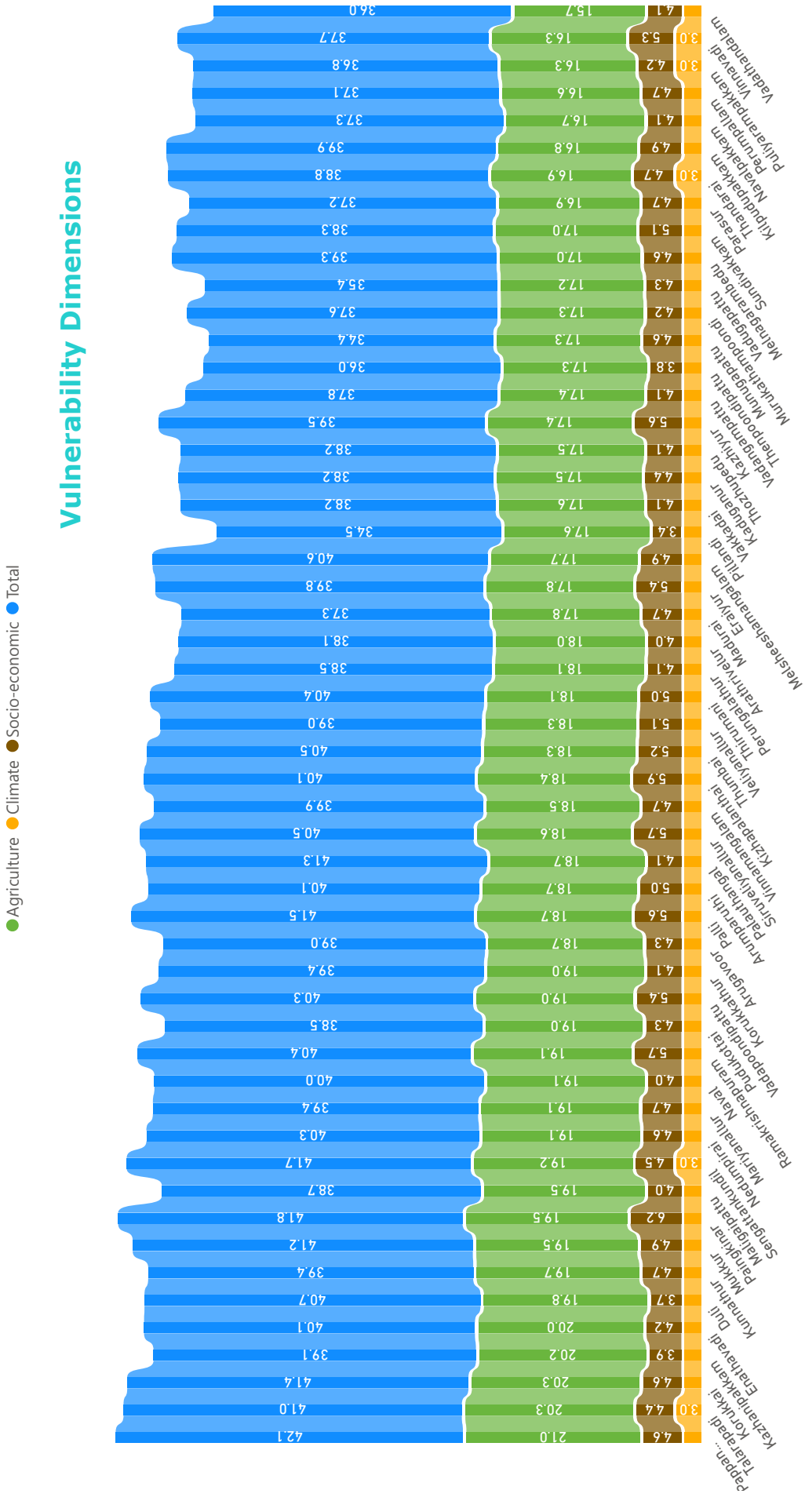
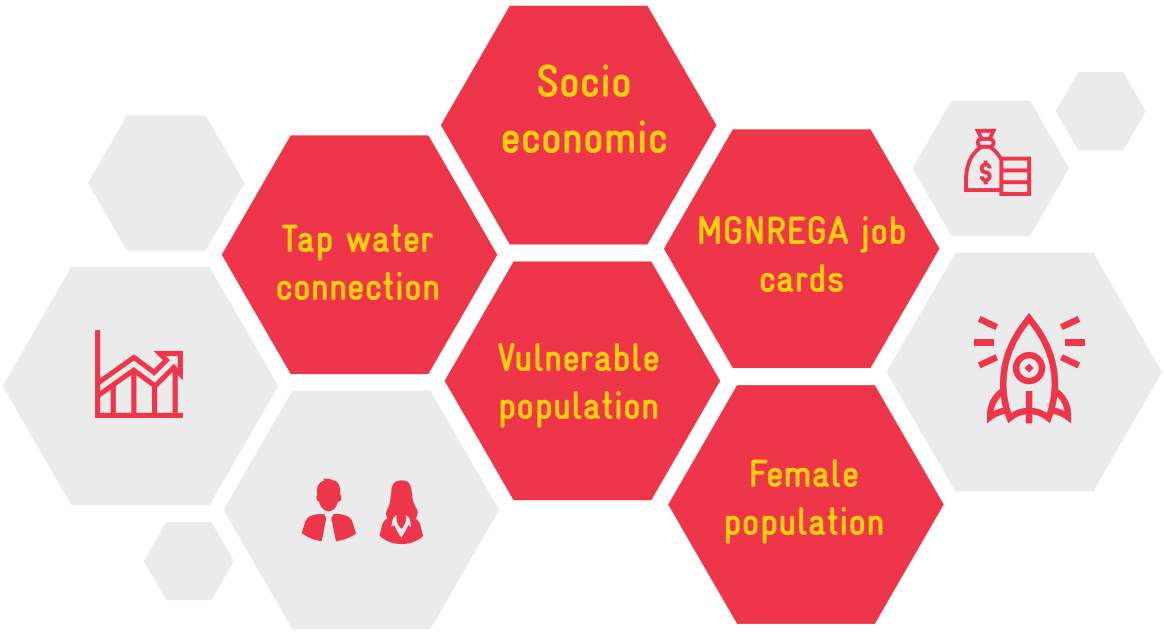
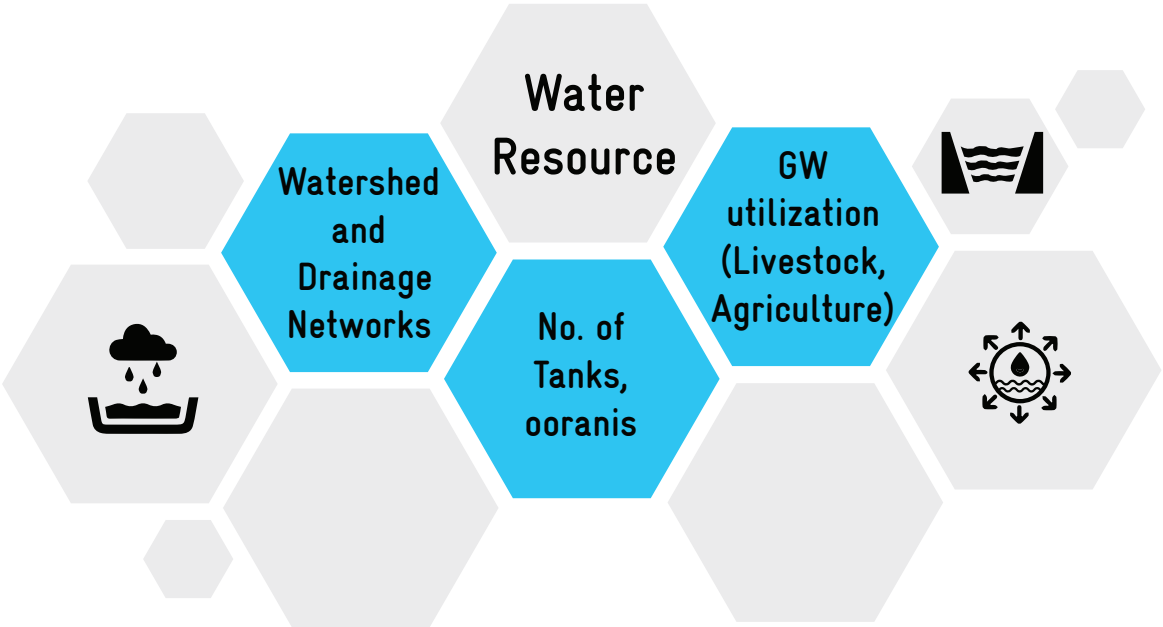
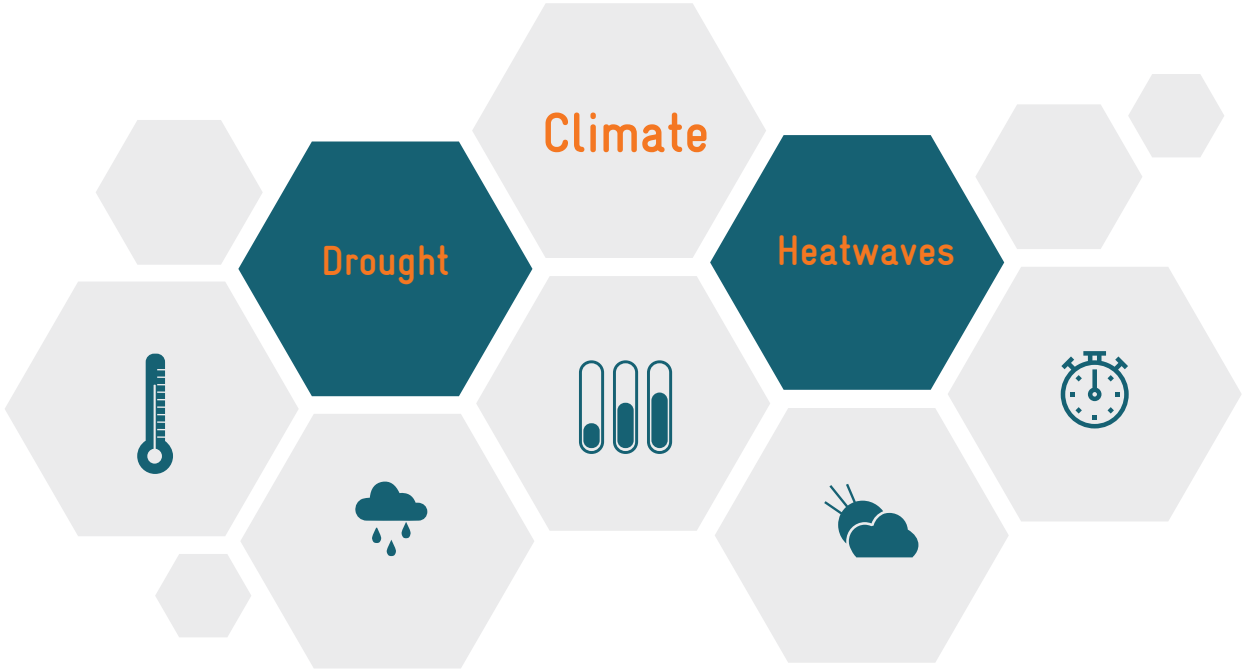


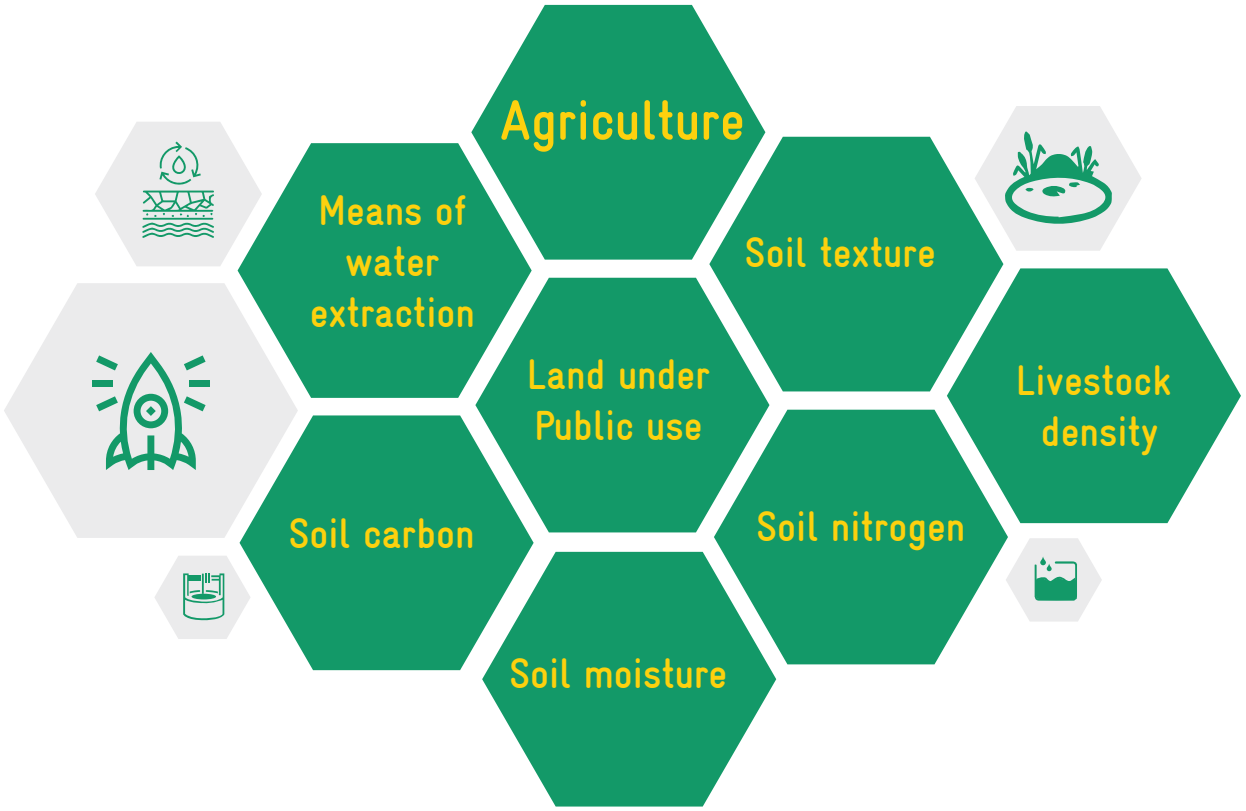

*Figure 4.3. GP wise vulnerability dimensions*

## 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 24,409 ha available land in Cheyyar Block, 3,804 ha (15.5 %) area is proposed for treatment under WASCA TN– CWRM planning. A major portion of key water actions is proposed in current fallow land in 1,029 ha (27 %) followed by non-agriculture land in 569 ha (15 %) while less than five percent land use grazing land (185 ha) of considered for treatment. 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) |
|---|---|---|
| Current Fallow land | 7,574 | 1,029 |
| Non-Agricultural Uses | 5,636 | 569 |
| Treatment Area Irrigated by Source | 4,683 | 500 |
| Unirrigated Land | 3,374 | 446 |
| Land Under Miscellaneous Tree crops etc. | 419 | 314 |
| Fallows Land other than Current Fallows | 1,839 | 284 |
| Barren & Un-cultivable Land | 326 | 245 |
| Cultivable Waste Land | 311 | 232 |
| Permanent Pastures and Other Grazing Land | 246 | 185 |
| **Total** | **24,409** | **3,804** |

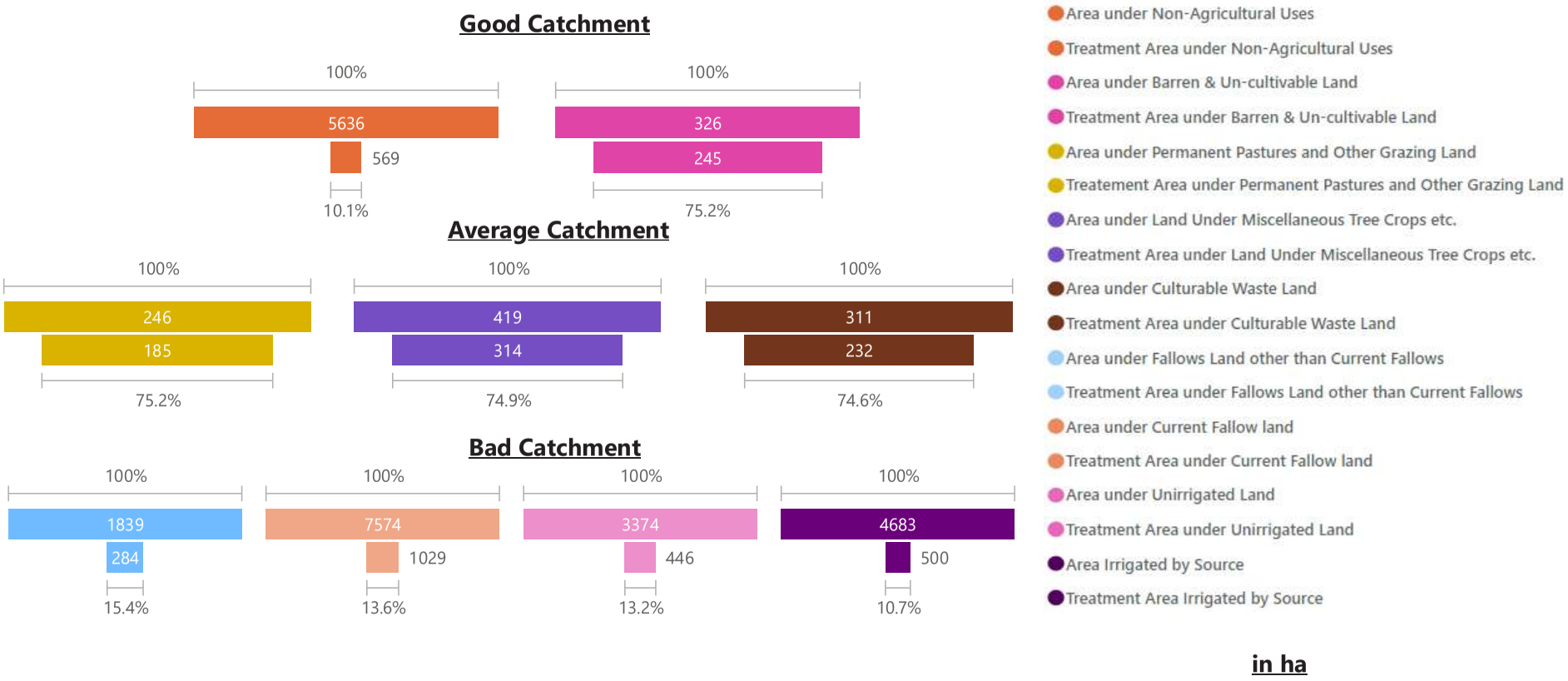



*Figure 5.1. WASCA treatment area in percentage*

## 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 1,088 ha.m which is 17.8 % of the total runoff. Of the expected runoff conservation, 40.9 % comes from good catchment area, 18.7 % comes under average catchment area and 48 % comes from bad catchment area (Figure 5.2).

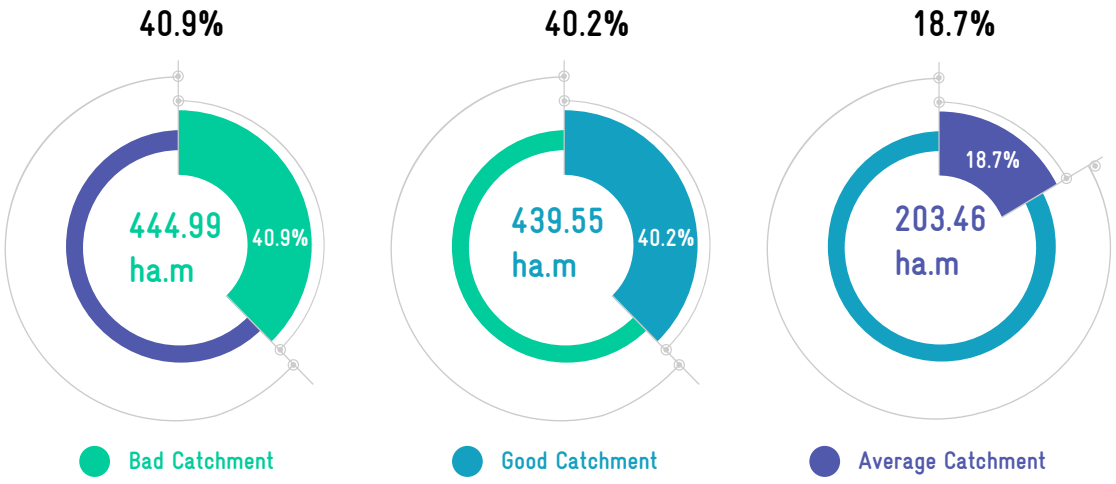



*Figure 5.2. Expected conservation after WASCA treatment*

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. The summary statistics of all proposed works are given below. The detailed list of works for all GP are attached in Annexure 5.3.

| Work (unit) | Abbreviation (unit) | No. | Extent (area in ha or length in m ) |
|---|---|---|---|
| Azolla units - Individual (Number of units) | Az | 1,735 | |
| Cattle Shelters (Number of units) | CS | 1,810 | |
| Cattle Trough(Number of units) | CT | 1,810 | |
| Fodder development - Community & Individual | FD | 112 | |
| Goat Sheep Shelters (Number of units) | GSS | 998 | |
| Poultry Shed (Number of units) | PS | 0 | |
| Silvi-pasture Development(Ha) | SPD | 1,13,201 | 144 |
| Soak Pits (Community) (Number of units) | SPC | 230 | |
| Soak Pits (Individual) (Number of units) | SPI | 2,484 | |
| Artificial Recharge Structure(Number of units) | ARS | 61 | 618 |

| | | | |
|---|---|---|---|
| Construction of Farm Ponds - Individual (Number of units) | FP | 575 | |
| Construction of new open wells & Recharge Shafts (Number of units) | COWRS | 1,497 | |
| Restotaration of water bodies:a.PWD and Tanks(Number) | RPWDT | 138 | |
| Restotaration of water bodies:b. Ooran-is(Number) | Ro | 16 | |
| Restotaration of water bodies:c. Ponds(Num-ber) | RP | 178 | |
| Roof Rain Water Harvesting (Number of units) | RRWH | 106 | |
| Water Course - Irrigation Channels - Desilt-ing (Mtrs) | WCICD | | 10,290 |
| Afforestation in Public/common lands(Ha) | Aff | 3,30,664 | 412 |
| Avenue plantation(Km) | AVP | 3,512 | 55,557 |
| Block Plantation (Community)(Ha) | BP | 2,50,059 | 313 |
| Canal Bund Plantation(Ha) | CBP | 14,513 | 62,288 |
| Contour Continous Bunds (CCB) for Affor-estaion area(Mtrs) | CCBF | 19,839 | 194 |
| Drainage Line Treatment (DLT)(Mtrs) | DLT | 17,984 | 89,925 |
| Dry land Horticulture/Agro-forestry - Indi-vidual (Ha) | DLHAI | 1,46,586 | 209 |
| Irrigation Channel Plantation (Mtrs) | ICP | 2,058 | 10,290 |
| Linear Plantation(Km) | LP | 30,214 | 1,09,848 |
| Micro Irrigation(Ha) | MI | 47 | 96 |
| Nursery Development(Number of units) | ND | 38,489 | 7,697 |
| Composting (Number of units) | Co | 422 | 161 |
| Farm Bunding with Boundary Trenches - Individual (Ha) | FBBTI | 398 | 533 |
| Land development - Individual (Ha) | LDI | 506 | 1,284 |
| NADEP Vermi compost (Number of units) | NADEP | 1,661 | |


Proposed works are included the drought proofing, livelihood, land development and WCWH, measures
Land development works over 800 ha area
More than 25 Lakhs plants planting
8,300 sites for WCWH
60,000 livelihood works

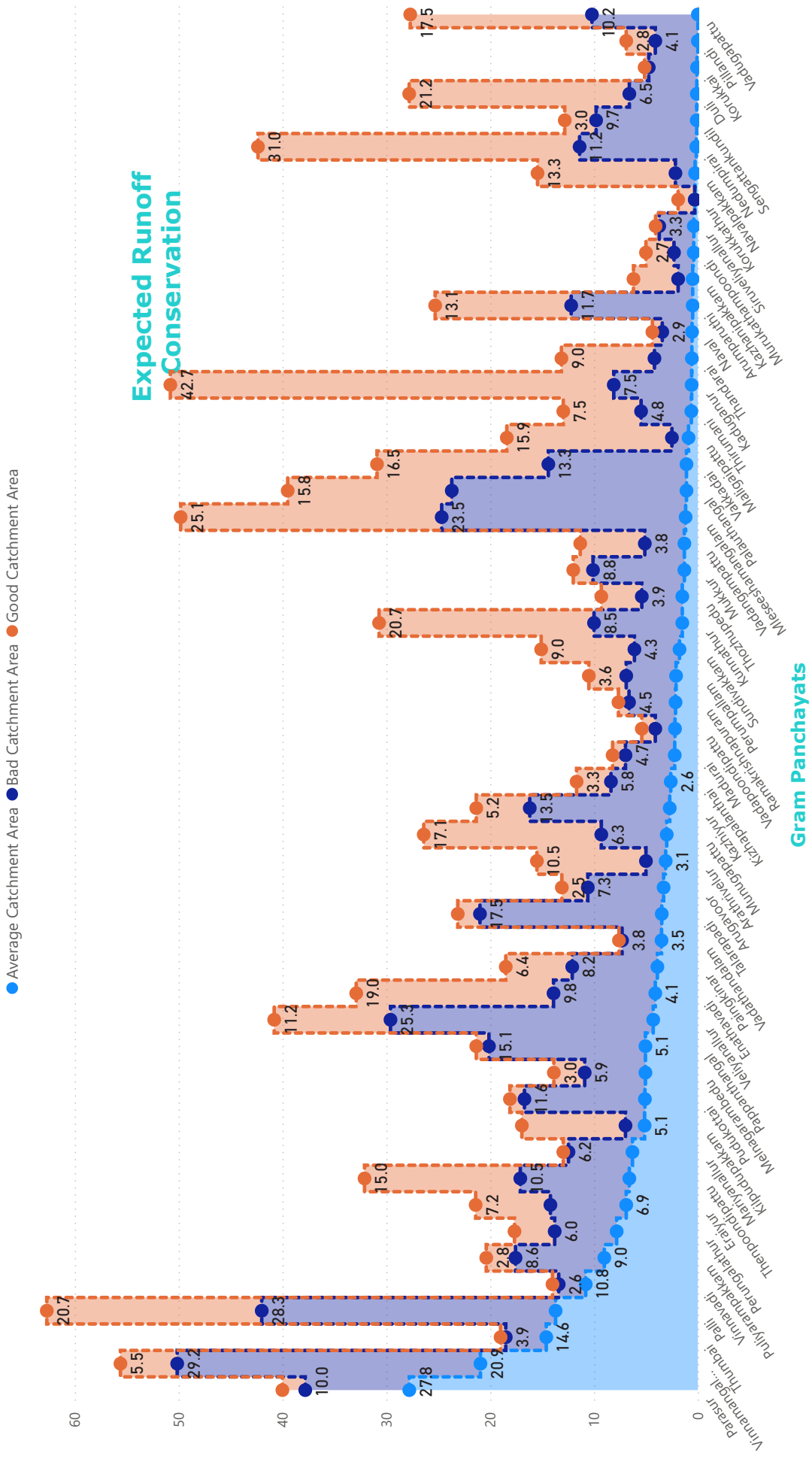



*Figure 5.3. Expected GP wise runoff conservation after WASCA treatment*

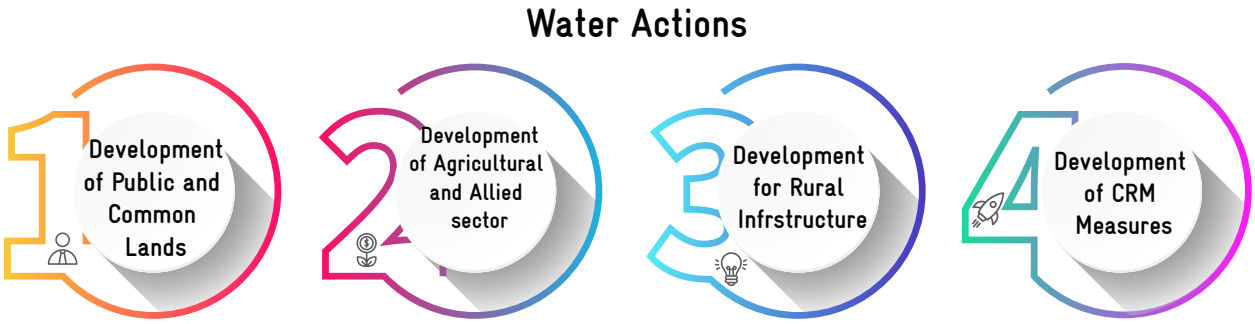
## Mahatma Gandhi NREGS Annual circular 2020-21 (Clause 6.3)

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 12. 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) | 341 | 10 | 0.025 | 8.53 | 3,411 |
| COMPOSTING(NUMBER OF UNITS) | 411 | 15 | 0.17 | 69.87 | 6,165 |
| AFFORESTATION IN PUBLIC/ COMMON LANDS(ha) | 412 | 3,344 | 8.6 | 3,547.16 | 13,79,266 |
| BLOCK PLANTATION (COMMUNITY)(ha) | 306 | 4,320 | 11.1 | 3,393.49 | 13,20,710 |
| SILVI-PASTURE DEVELOPMENT(ha) | 115 | 6,664 | 17.1 | 1,966.50 | 7,66,360 |
| LINEAR PLANTATION(km) | 8 | 703 | 1.8 | 13.93 | 5441 |
| CANAL BUND PLANTATION(ha) | 764 | 2,930 | 7.5 | 4,666.00 | 17,83,390 |
| IRRIGATION CHANNEL PLANTATION (m) | 72 | 6 | 0.015 | 1.08 | 434 |
| AVENUE PLANTATION(km) | 10 | 703 | 1.8 | 17.19 | 6,713 |
| NURSERY DEVELOPMENT (NUMBER OF UNITS) | 38 | 2,344 | 15 | 568.13 | 88,779 |
| RESTOTARATION OF WATER BODIES: A) PWD AND TANKS (NUMBER) | 121 | 800 | 5 | 605 | 96,800 |
| RESTORATION OF WATER BODIES: B.OORANIS (NUMBER) | 0 | 200 | 2 | 0 | 0 |
| RESTORATION OF WATER BODIES: C) PONDS (NUMBER) | 217 | 200 | 1 | 434 | 43,400 |
| ARTIFICIAL RECHARGE STRUCTURE (NUMBER OF UNITS) | 1,529 | 391 | 2.5 | 3,822.50 | 5,97,839 |
| WATER COURSE - IRRIGATION CHANNELS - DESILTING (m) | 72 | 3 | 0.0075 | 0.54 | 217 |
| DRAINAGE LINE TREATMENT (m) | 491 | 5 | 0.03 | 14.74 | 2,457 |

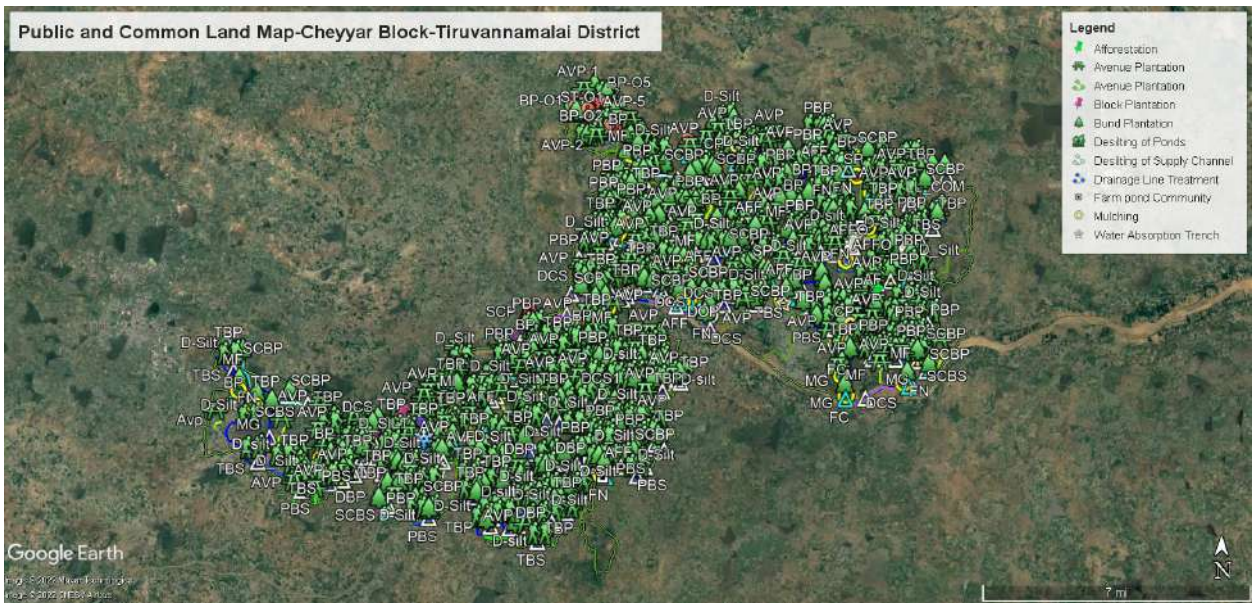



*Figure 5.4. Proposed development activities in public and common land*

# 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 13. 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) | 376 | 586 | 1.5 | 565 | 2,20,611 |
| MICRO IRRIGATION (ha) | 47 | 0 | 1 | 47 | 0 |
| CONSTRUCTION OF FARM PONDS - INDIVIDUAL (NUMBER OF UNITS) | 524 | 781 | 2 | 1,048 | 4,09,244 |
| LAND DEVELOPMENT - INDIVIDUAL (ha) | 1,271 | 3,906 | 10 | 12,715 | 49,66,323 |
| DRY LAND HORTICULTURE/AGRO-FORESTRY - INDIVIDUAL (ha) | 2,120 | 3,321 | 8.5 | 18,020 | 70,40,520 |
| AZOLLA UNITS - INDIVIDUAL (NUMBER OF UNITS) | 1,525 | 23 | 0.15 | 229 | 35,075 |
| NADEP VERMI-COMPOST (NUMBER OF UNITS) | 1,545 | 27 | 0.18 | 278 | 41,715 |
| FODDER DEVELOPMENT - COMMUNITY & INDIVIDUAL | 149 | 2,344 | 1.48 | 221 | 3,49,256 |
| CATTLE SHELTERS (NUMBER OF UNITS) | 1,698 | 331 | 2.12 | 3,600 | 5,62,038 |
| GOAT SHEEP SHELTERS (NUMBER OF UNITS) | 986 | 355 | 2.27 | 2,238 | 3,50,030 |
| CATTLE TROUGH (NUMBER OF UNITS) | 1,525 | 6 | 0.05 | 76 | 29,150 |
| POULTRY SHED (NUMBER OF UNITS) | 1,244 | 10 | 0.09 | 112 | 12,440 |
| CONSTRUCTION OF NEW OPEN WELLS & RECHARGE SHAFTS (NUMBER OF UNITS) | 1,497 | 926 | 5 | 7,485 | 13,86,222 |

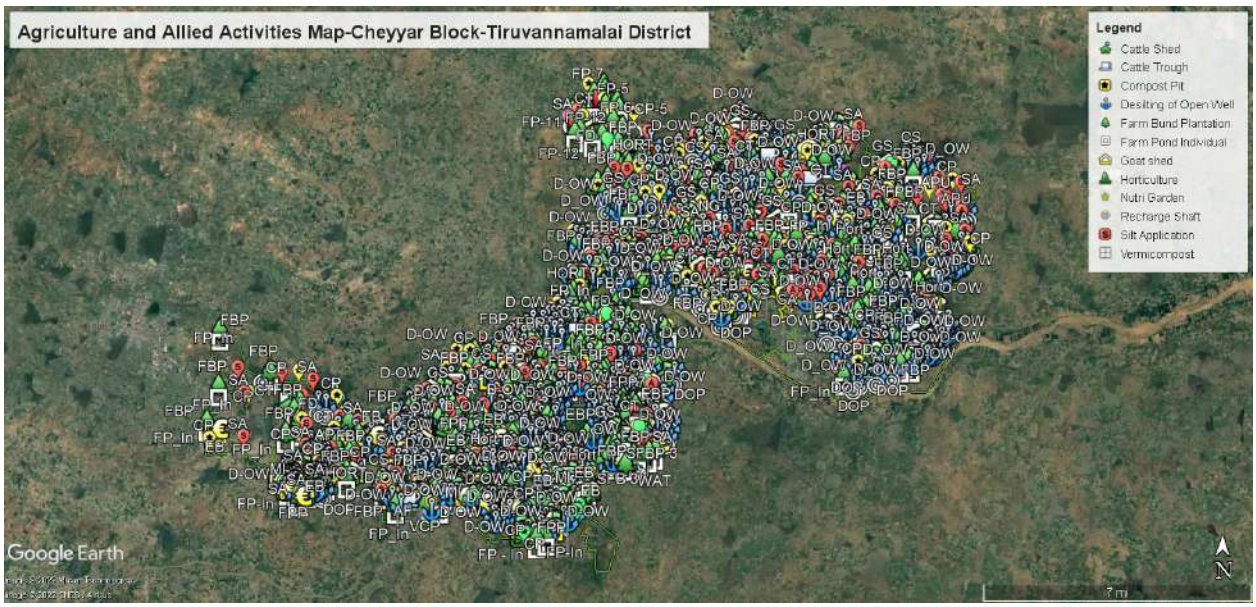



*Figure 5.5. Proposed development activities in Agriculture and allied Sectors*

## 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) | 150 | 20 | 0.13 | 19.50 | 3,000 |
| SOAK PITS (INDIVIDUAL) (NUMBER OF UNITS) | 2,866 | 16 | 0.1 | 286.60 | 45,856 |
| ROOF RAIN WATER HARVESTING (NUMBER OF UNITS) | 925 | 625 | 4 | 3,700 | 5,78,125 |

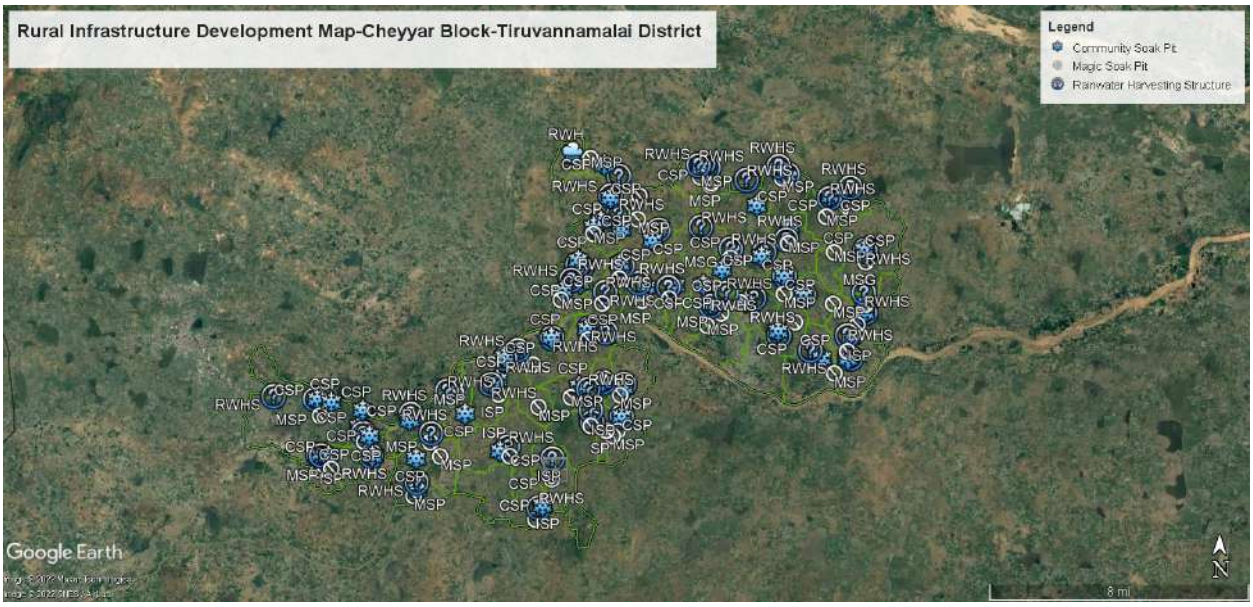



*Figure 5.6. Proposed rural infrastructure activities*

## 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 Cheyyar 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) and Bamboo plantation (Table 17) are proposed in this Block in saturation mode.

### TABLE 14. GP WISE PROPOSED CRM

| Name of the GPs | Agriculture and allied activities | Public and common land |
|---|---|---|
| Arathirivelur | Farm Pond | |
| Arumbaruthi | Farm Pond | |
| Duli | Farm Pond | |
| Eraiyur | Farm Pond | |
| Kazhiyur | Farm Pond | |
| Kilpudupakkam | Farm Pond | |
| Mariyanallur | Farm Pond | Silvi-pasture Development |
| Melnagarambedu | Farm Pond | |
| Melsheeshamangalam | Farm Pond | |
| Nedumbirai | Farm Pond | |
| Palli | Farm Pond | Bamboo Plantation |
| Puliyarampakkam | Farm Pond | |
| Ramakrishnapuram | Farm Pond | |

| | | |
|---|---|---|
| Siruveliyanallur | Farm Pond | |
| Thalarapadi | Farm Pond | |
| Thandarai | Farm Pond | |
| Thenpoondipattu | Farm Pond | |
| Thumbai | Farm Pond | |
| Vadugapattu | Farm Pond | |
| Veliyannalur | Farm Pond | |
| Vinnamanagalam | Farm Pond | |

TABLE 15. DETAILS OF PROPOSED FARM PONDS ACTIVITIES UNDER CRM

| Name of the Panchayat | Name of the Habitation | No. of Unit |
|---|---|---|
| Arathirivelur | Arathirivelur | 2 |
| Arumbaruthi | Arumbaruthi | 2 |
| Duli | Duli | 1 |
| Eraiyur | Eraiyur | 1 |
| Kazhiyur | Kazhiyur | 1 |
| Kilpudupakkam | Kilpudupakkam | 1 |
| Mariyanallur | Mariyanallur | 1 |
| Melnagarambedu | Melnagarambedu | 1 |
| Melsheeshamangalam | Melsheeshamangalam | 6 |
| Nedumbirai | Nedumbirai | 4 |
| Palli | Palli | 5 |
| Puliyarampakkam | Puliyarampakkam | 2 |
| Ramakrishnapuram | Ramakrishnapuram | 1 |
| Siruveliyanallur | Siruveliyanallur | 1 |
| Thalarapadi | Thalarapadi | 2 |
| Thandarai | Thandarai | 1 |
| Thenpoondipattu | Thenpoondipattu | 1 |
| Thumbai | Thumbai | 1 |
| Vadugapattu | Vadugapattu | 1 |
| Veliyannalur | Veliyannalur | 1 |
| Vinnamanagalam | Vinnamanagalam | 1 |

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

| GP | Survey No. | Area in ha | Total No. of Plants |
|---|---|---|---|
| **Mariyanallur** | 16 | 1.62 | 1,296 |

## TABLE 17. DETAILS OF PROPOSED BAMBOO PLANTATION ACTIVITY UNDER CRM

| GP | Area of plantation | Recommended Area in ha |
|---|---|---|
| (in ha) | Total No. of Plants | 19,250 |

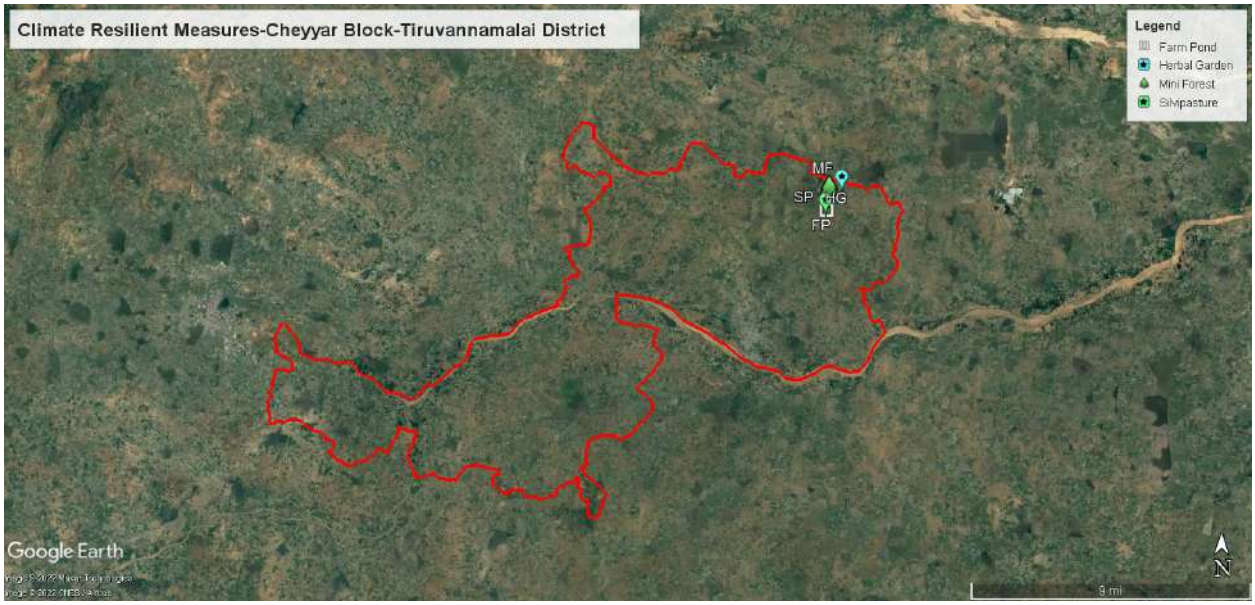



*Figure 5.7. Proposed climate resilient measures*

நெடுங்கடலும் தன்நீர்மை குன்றும் தடிந்தெழிலி
தான்நல்கா தாகி விடின்

குறள் - 17

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

Thirukkural - 17

# CHAPTER 6


# PROJECTED OUTCOMES OF 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 | 3,804 ha (15.6 %) of the total area treated under WASCA |
| 2 | Percentage reduction of run off | 1,088 ha.m i.e 17.8 % of the total runoff harvested due to WASCA interventions |
| 3 | No. of waterbodies restored | 338 waterbodies (tanks/pond and ooranis) restored |
| 4 | Area under afforestation | 412.46 ha area under afforestation |
| 5 | Area under Silvi-pasture development | 115 ha under Silvi-pasture plantation |
| 6 | Length of drainage line treated | 7,772 m length of drainage line treated |
| 7 | Canal Bund Plantation | 13,057 number of plants through 764 works |

**3,804 ha** AREA TREATED

**1,088 ha.m** TOTAL RUNOFF HARVESTED

**338** WATER BODIES RESTORED

**412.46 ha** AREA AFFORESTATION

**115 ha** SILVI-PASTURE PLANTATION

**7,772 m** DRAINAGE LINE TREATED

**13,057** NUMBER OF PLANTS

# 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<br>No of structures established for on-farm (in-situ) water harvesting in dry lands | 524 farm ponds established which target the harvest of 92.22 ha m of water which has the potential to irrigate 183 ha area in both kharif and rabi seasons |
| 2 | Improvement in soil health | 1,546 vermi compost units for soil health improvement |
| 3 | Changes in the irrigation practices | 51 ha farm bunding with trenches |
| 4 | Dry land development with Agro-forestry | 2,120 ha under dry land horticulture |
| 5 | Households established fodder plots | 149 vulnerable households established fodder plots |

**524** FARM PONDS

**1,546** COMPOST UNITS

**51 ha** FARM BUNDING

**2,120 ha** DRY LAND HORTICULTURE

**149** FODDER PLOTS

# 6.3 OUTCOMES OF RURAL INFRASTRUCTURE DEVELOPMENT

## OUTCOMES OF RURAL INFRASTRUCTURE DEVELOPMENT

| | INDICATOR | OUTCOMES/ IMPACT |
|---|---|---|
| 1 | No. of villages having liquid waste management systems | 2,866 individual and 150 community level soak pits established for recycle of grey water benefiting 23,471 HHs |
| 2 | Roof rain water harvesting measures | 925 common roof rainwater harvesting and storage structures with a target to harvest and store 2.31 ha.m of rainwater for use |
| 3 | Nutri-garden | 23,471 HHs established nutri-gardens in homesteads and planted 1,17,355 saplings |

**150** COMMON & **2,866** INDIVIDUAL SOAK PITS

**925** COMMON ROOF RAINWATER HARVESTING

**23,471** NUTRI-GARDENS

**1,17,355** 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 | 1 | 3 models are identified via., Farm ponds, Silvi pasture and Bamboo plantation<br>37 farm ponds in 21 GPs<br>1.62 ha under silvi pasture<br>7.70 ha under bamboo plantation |

**37**
FARM PONDS

**1.62 ha**
SILVI PASTURE

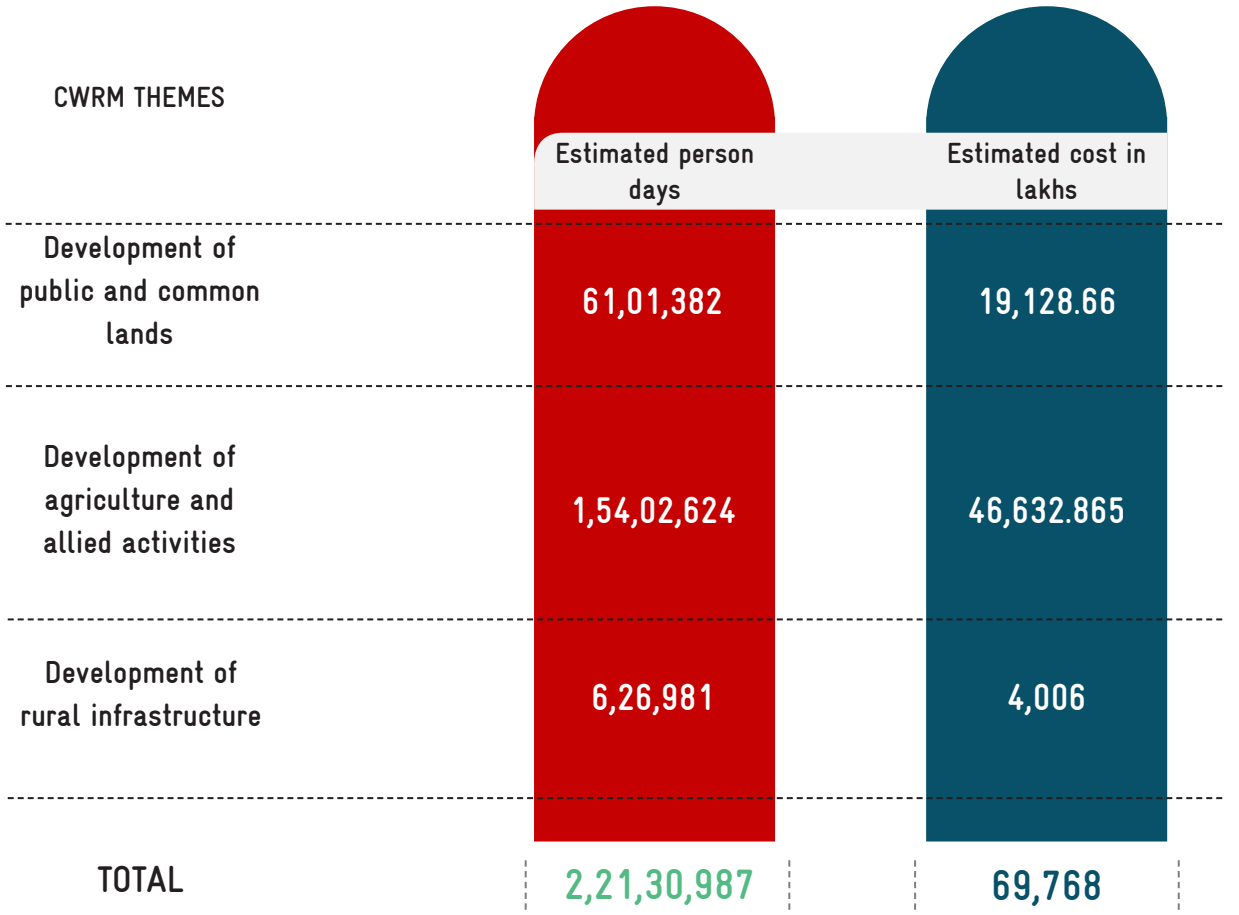
**7.70 ha**
BAMBOO PLANTATION

## Estimated person days

The total estimated person days required for the above propose activities are 2,21,30,987 as specified below

## Estimated Cost

The total estimated cost budgeted for the above propose activities is Rs 69,768 Lakhs as specified below



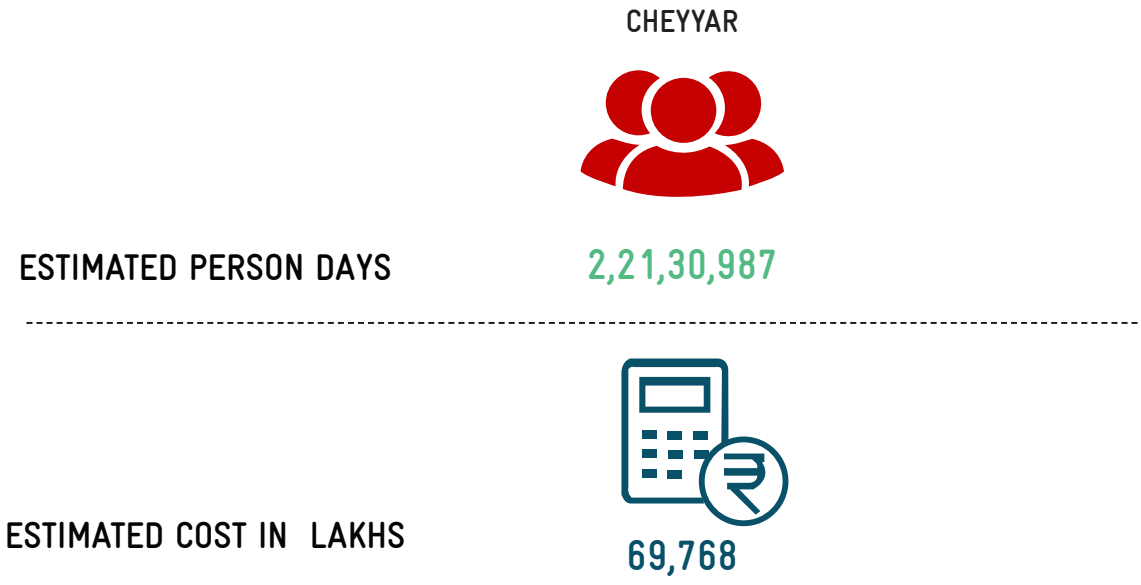




*Figure 6.1 & 6.2. Estimated person days & cost for all water actions*

# 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'S PROGRESS THROUGH NDC

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

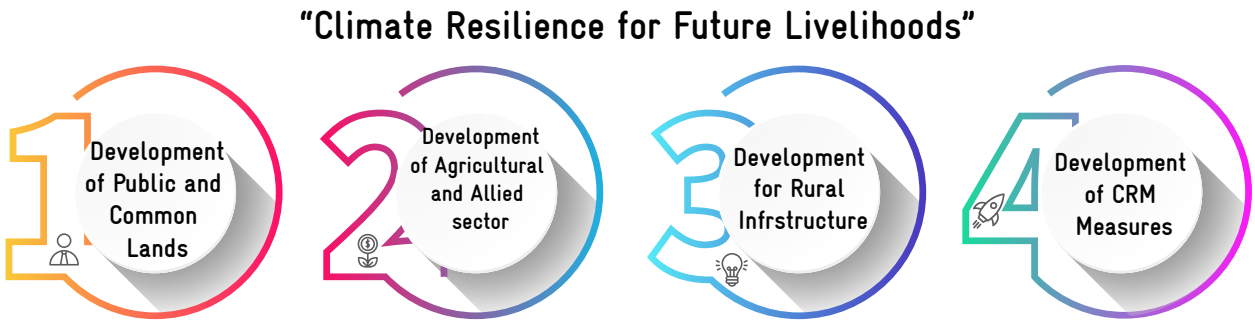
Internationally, the recent process on NDC Enhancement (2020) significantly acknowledge the climate change vulnerability on national sectors including agriculture, energy, and urban areas, especially through impacts on water resources. The role that water and water-related activities play in national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

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

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

### 6.5.2 WASCA TN SUPPORTS SDG

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




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.


# 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 18).

TABLE 18. 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 19 to 21.

TABLE 19. WATER ACTIONS ON DEVELOPMENT OF PUBLIC & COMMON LANDS & ITS LINKED SDG

| Name of the work | No. of CWRM works | CVI Impacting (WASCA TN) | Linked SDG Goal |
|---|---|---|---|
| Contour Continuous Bunds (CCB) for Afforestation area (m) | 341 | W3 | SDG 1,2, 6,13&15 |
| Composting (No. of units) | 411 | W1 | SDG1& 6 |
| Afforestation in Public/common lands (ha) | 412 | C1,C2,C3, W3, | SDG 1, 2,6,13&15 |
| Block Plantation (Community) (ha) | 306 | C1,C2,C3,W3,S2 | SDG 1,2, 6 &13, 15 |
| Silvi-pasture Development (ha) | 115 | 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) | 764 | C1,C2,C3,W3,S2 | SDG 1, 6&13, 15 |
| Irrigation Channel Plantation (m) | 72 | W4,W5,S2 | SDG 1,2& 6, 15 |
| Avenue plantation (Km) | 10 | C1,C2,C3,W3,S2 | SDG 1, 6&13 |
| Nursery Development (No. of units) | 38 | C1,S2,S4 | SDG 1,2 &6 |

| | | | |
|---|---|---|---|
| Restoration of water bodies: PWD and Tanks (No.) | 121 | S2, S1 | SDG 6, 1, 13 |
| Restoration of water bodies: Ponds (No.) | 0 | S2, S1 | SDG 6,1, 13 |
| Artificial Recharge Structure (No. of units) | 217 | W3 | SDG 1, 2, & 6 |
| Water Course - Irrigation Channels - Desilting (m) | 1,529 | C1,C2,C3,W3,S2 | SDG 1, 6&13 |
| Drainage Line Treatment (DLT) (m) | 72 | W1,W3,W4 | SDG1 & 6 |

TABLE 20. WATER ACTIONS ON DEVELOPMENT OF AGRICULTURAL AND ALLIED SECTOR & ITS LINKED SDG

| Name of the Work | Number of CWRM works | CVI | SDG |
|---|---|---|---|
| Farm Bunding with Boundary Trenches - Individual (ha) | 376 | A1,A3,W1,W3 | SDG 1,2&6 |
| Micro Irrigation(ha) | 47 | A1,A3,A5,W5 | SDG 1, 2&6 |
| Construction of Farm Ponds - Individual (No. of units) | 524 | A1,A3,W5,W1, W3 | SDG 2& 6 |
| Land development - Individual (ha) | 1,271 | W1,W5,A1,A3,S2,S4 | SDG 2, 6&15 |
| Dry land Horticulture/Agro-forestry - Individual (ha) | 2,120 | A1,A3,A4,W1,S4,S2,C1 | SDG 1& 2,15 |
| Azolla units - Individual (No. of units) | 1,525 | A3,A4,S4 | SDG 1& 2 |
| NADEP Vermi compost (No. of units) | 1,545 | A3, W1, S4 | SDG 1& 2,6 |
| Fodder development - Community & Individual | 149 | A3, S4 | SDG 1& 2, 15 |
| Cattle shelters (No. of units) | 1,698 | S4 | SDG 1& 2 |
| Goat/sheep shelters (No. of units) | 986 | S4 | SDG 1& 2 |
| Cattle trough(No. of units) | 1,525 | W5,S4 | SDG 1& 2 |
| Poultry Shed (No. of units) | 1,244 | S2,S4 | SDG 1& 2 |
| Construction of new open wells & Recharge Shafts (No. of units) | 1,497 | S3,W5,W1 | SDG 1,2 & 6 |

TABLE 21. 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) | 150 | W3,S2 | SDG 1& 6 |
| Soak Pits (Individual) (No. of units) | 2,866 | W3,S2 | SDG 1& 6 |
| Roof Rain Water Harvesting (No. of units) | 925 | 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

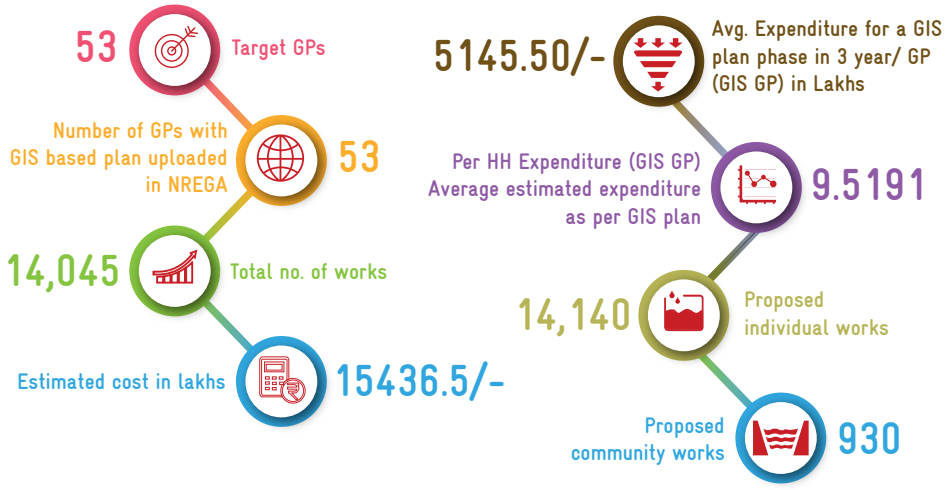
# 7 IMPLEMENTATION OF GP PLANS

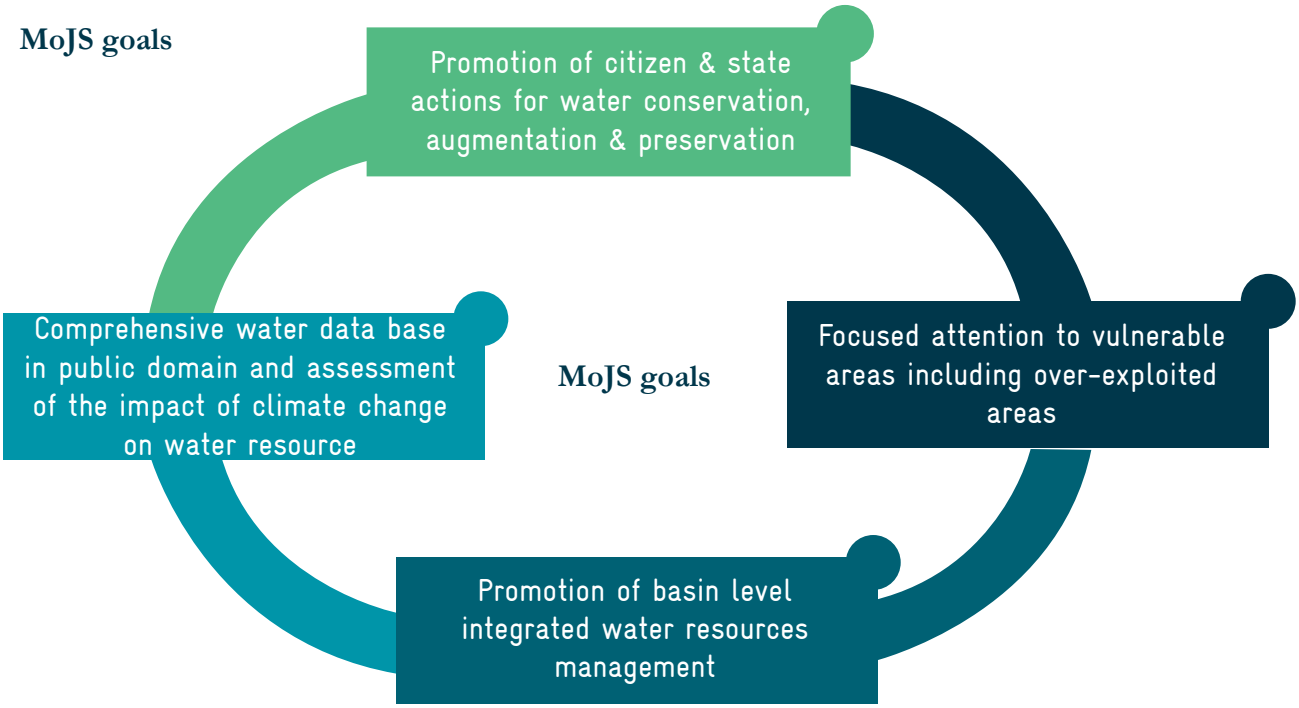
Execution of GP plans includes integrating all verified, approved works in MORD's web enabled ap-plication NREGA Soft (https://nrega.nic.in) for mainstreaming WASCA. The target GPs are identified first, the status of GIS based plans and total works along with its expenditure and category wise esti-mation 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 Cheyyar Bock is listed in Table 22 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 22. GIS PLAN IMPLEMENTATION- KEY PARAMETERS PERFORMANCE IN CHEYYAR BLOCK



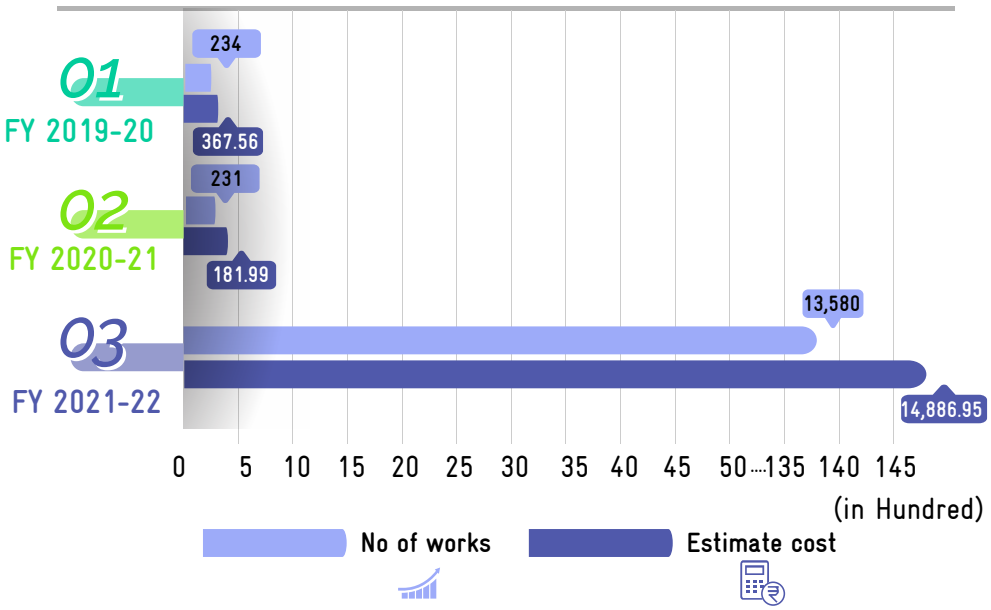



*Figure 7.1. Work progress in last 3 years*

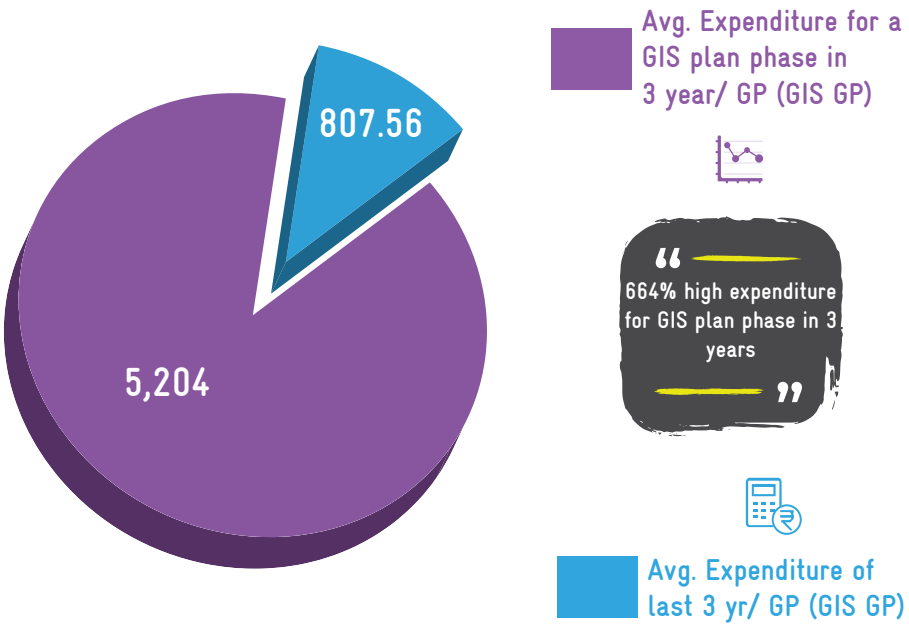
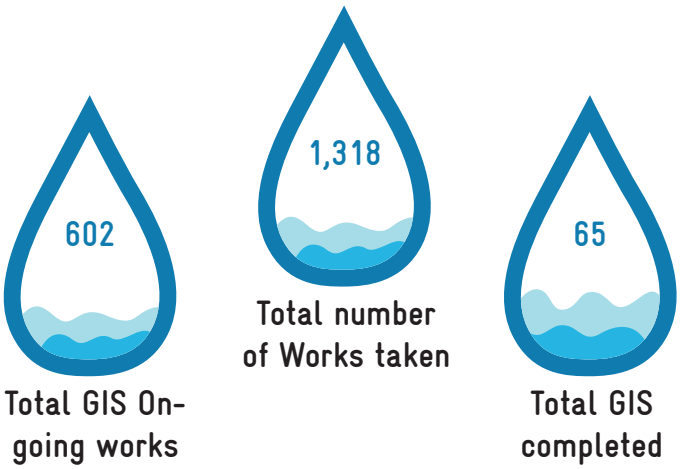



*Figure 7.2. Average Expenditure for GIS plan in last 3 years*



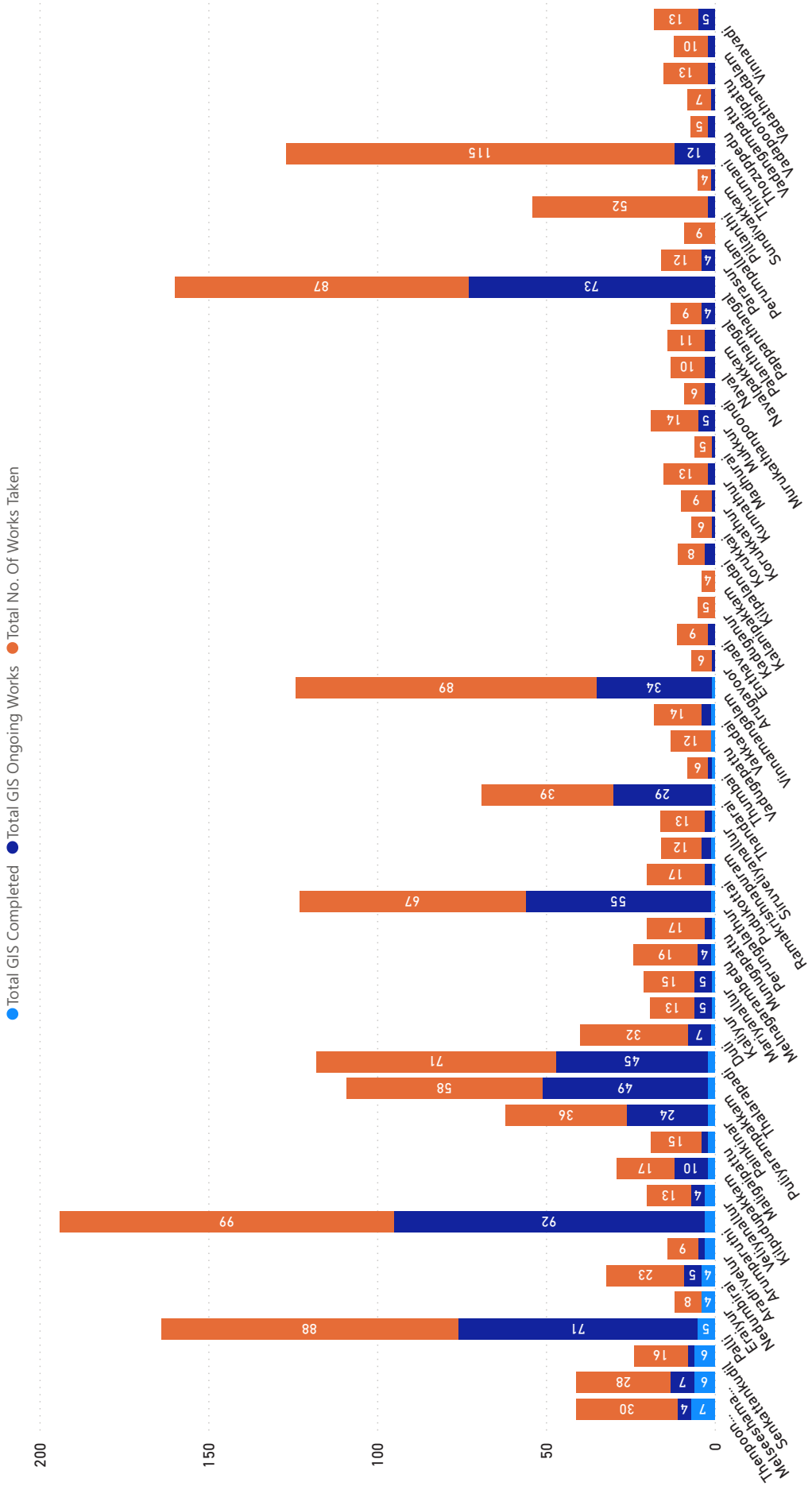
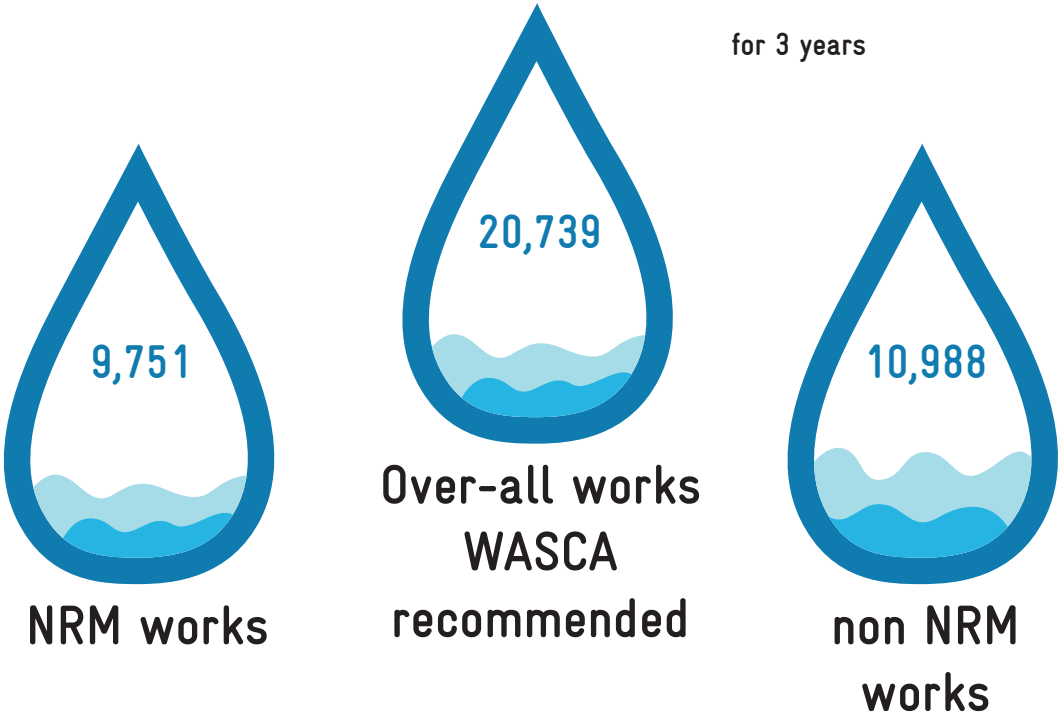



*Figure 7.3. GP wise total, completed and ongoing GIS works*

## 7.2 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.



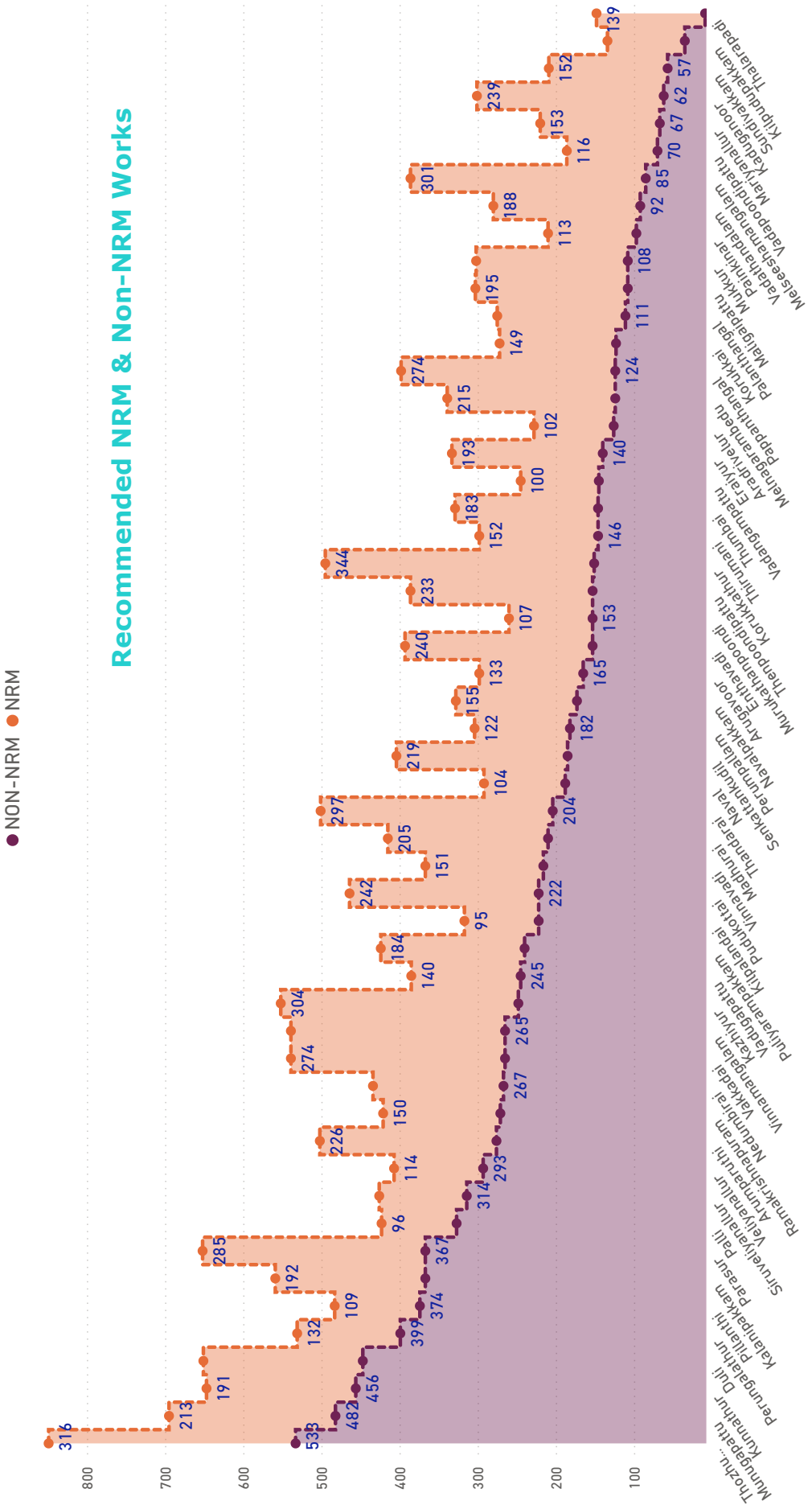




*Figure 7.4. GP wise recommended NRM and non-NRM works*

## 7.3 ONGOING WORKS

A total of 147 works are ongoing in the Block, include Anganwadi/Other Rural Infrastructure, Drought Proofing, Rural Connectivity, Rural Sanitation, WCWH, Works on Individuals Land (Category IV). Among ongoing works, WCWH shares the highest of 75 % followed by Individual beneficiary's category works of 15 % while rural sanitation is less in number ((Figure 7.5). The GPs and work category-wise details of works are tabulated in Annexure 7.2.

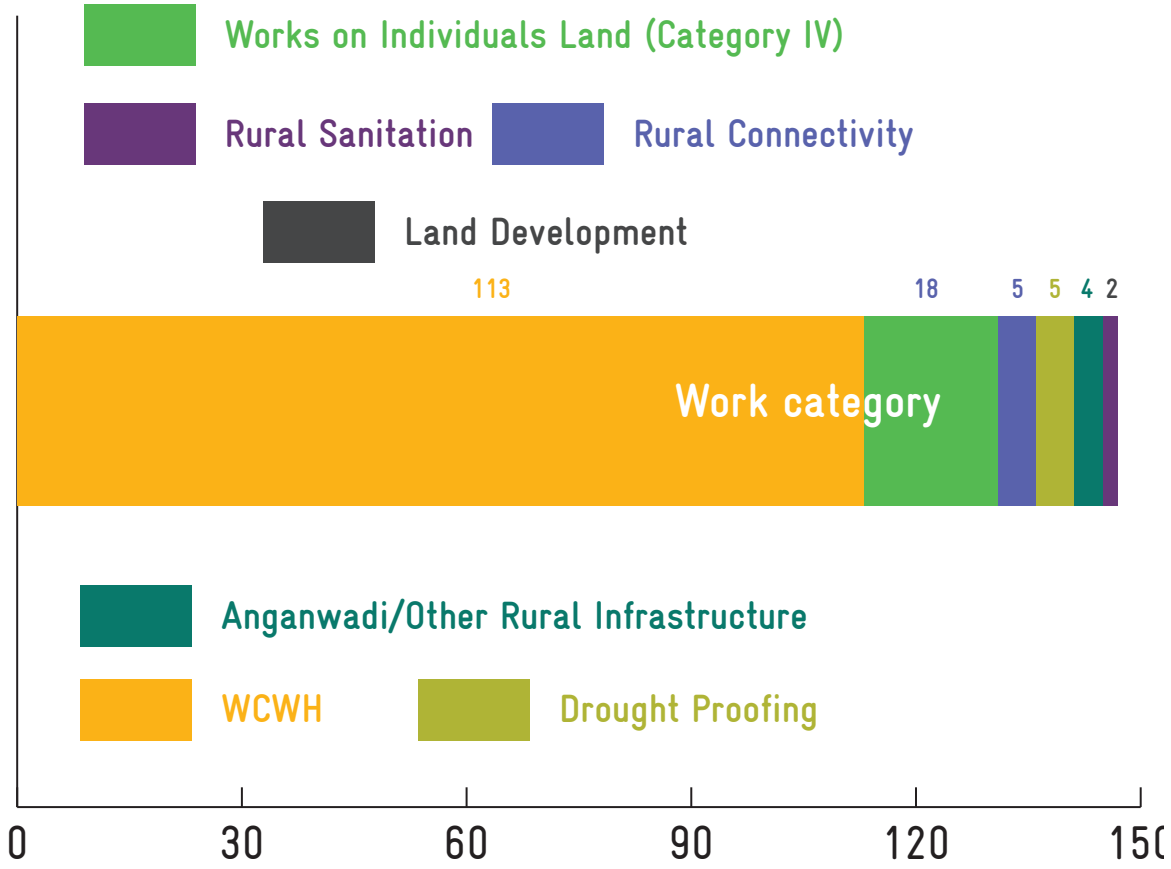



*Figure 7.5. Category-wise ongoing works in the Cheyyar Block*

## 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 Cheyyar Block is shown in Figure 7.6. Majority of expenditure is towards watershed development followed by water conservation and rain water harvesting.

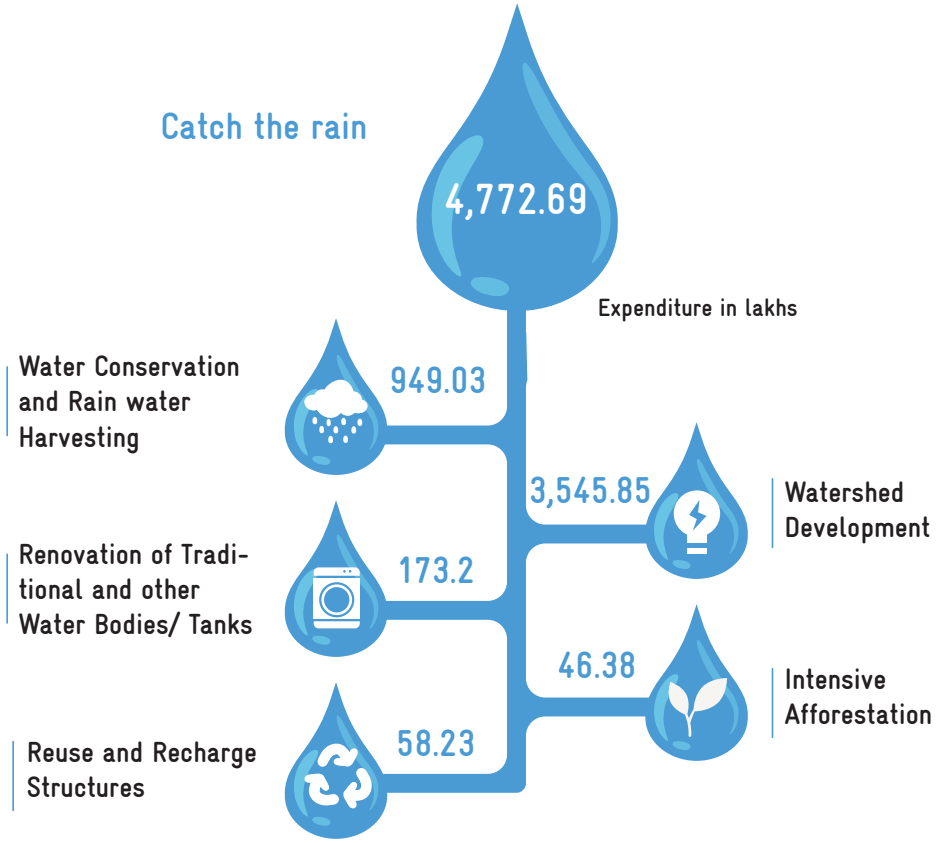
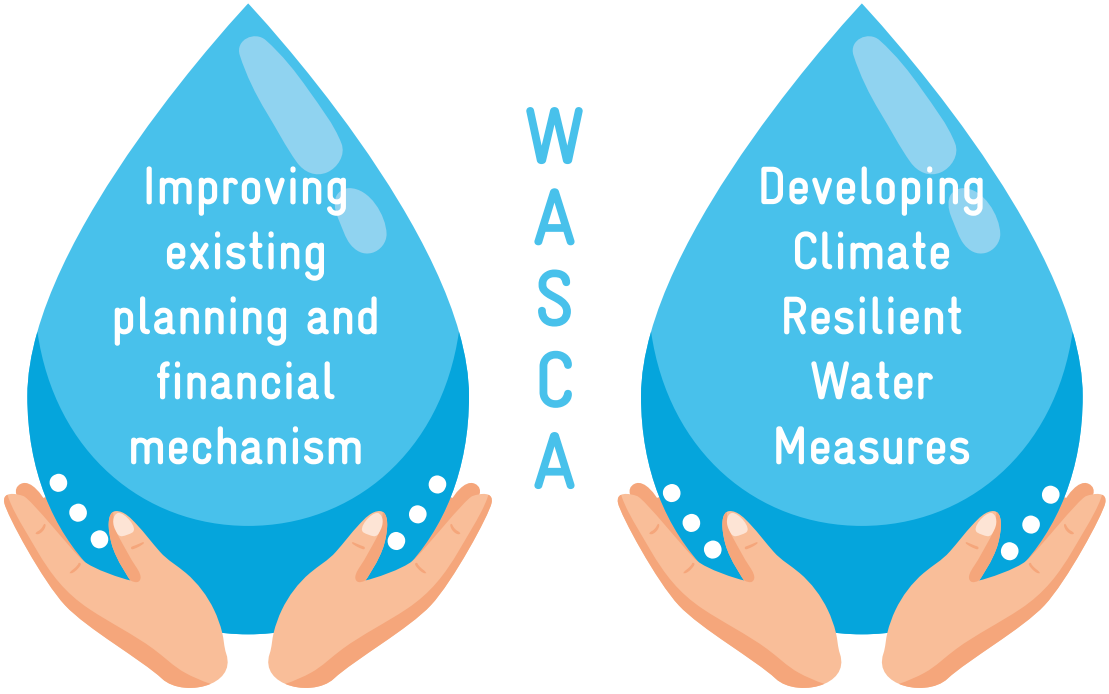



*Figure 7.6. Catch the rain campaign in Cheyyar Block*



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 STUDY

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 CHEYYAR BLOCK

Cheyyar Block covered under three sub-basins Cheyyar, Cheyyar River and Naganadi watersheds. The Cheyyar watershed (4C2A3) consists of 57 micro-watersheds covering an area of 35,376.37 ha. The Cheyyar River watershed (4C2A4) consists of nine micro-watersheds covering an area of 5,359.58 ha (Table 23). Naganadi watershed (4C2a5) consists of three micro-watersheds covering an area of 1,505 ha. Out of 53 GPs in the Block, 46 GPs fall under Cheyyar (4C2A3) watershed, three GPs under Cheyyar River (4C2A4) watershed. It is noticed that peripheral GPs area were covered in adjacent sub-basins, two GPs between Cheyyar River & Cheyyar, and two GPs between Cheyyar River & Naganadi watersheds (Table 24).

TABLE 23. GENERAL DESCRIPTION OF MACRO-WATERSHEDS COVERING CHEYYAR BLOCK

| Macro-watershed | Area in ha | No. of Micro-watershed |
|---|---|---|
| **Cheyyar** | 35,376.37 | 57 |
| **Cheyyar River** | 5,359.58 | 9 |
| **Naganadi** | 1505 | 3 |

TABLE 24. NO. OF GPS COVERED UNDER WATERSHEDS IN CHEYYAR BLOCK

| Watershed Name | No. of GPs |
|---|---|
| **Cheyyar** | 46 |
| **Cheyyar River** | 3 |
| **Cheyyar and Cheyyar River** | 2 |
| **Cheyyar River and Naganadi** | 2 |

The map below shows the boundary of Cheyyar, Cheyyar River and Naganadi boundaries on Cheyyar Block boundary (Figure 8.1 & 8.2). The micro-watershed-based works are identified using Basin, Sub-basin, and micro-watershed with GP administrative boundaries through composite water resources management plan approach.

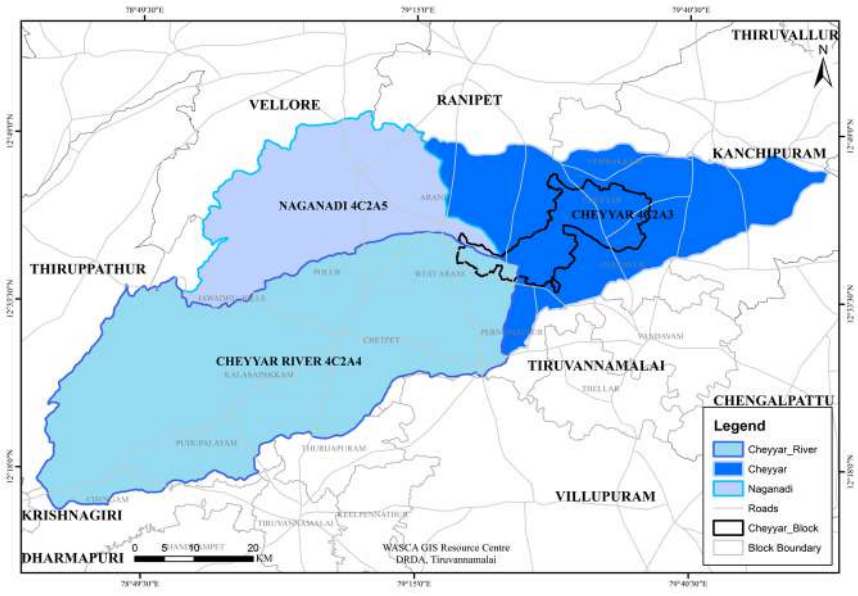



*Figure 8.1. Macro-watershed map- Cheyyar Block*

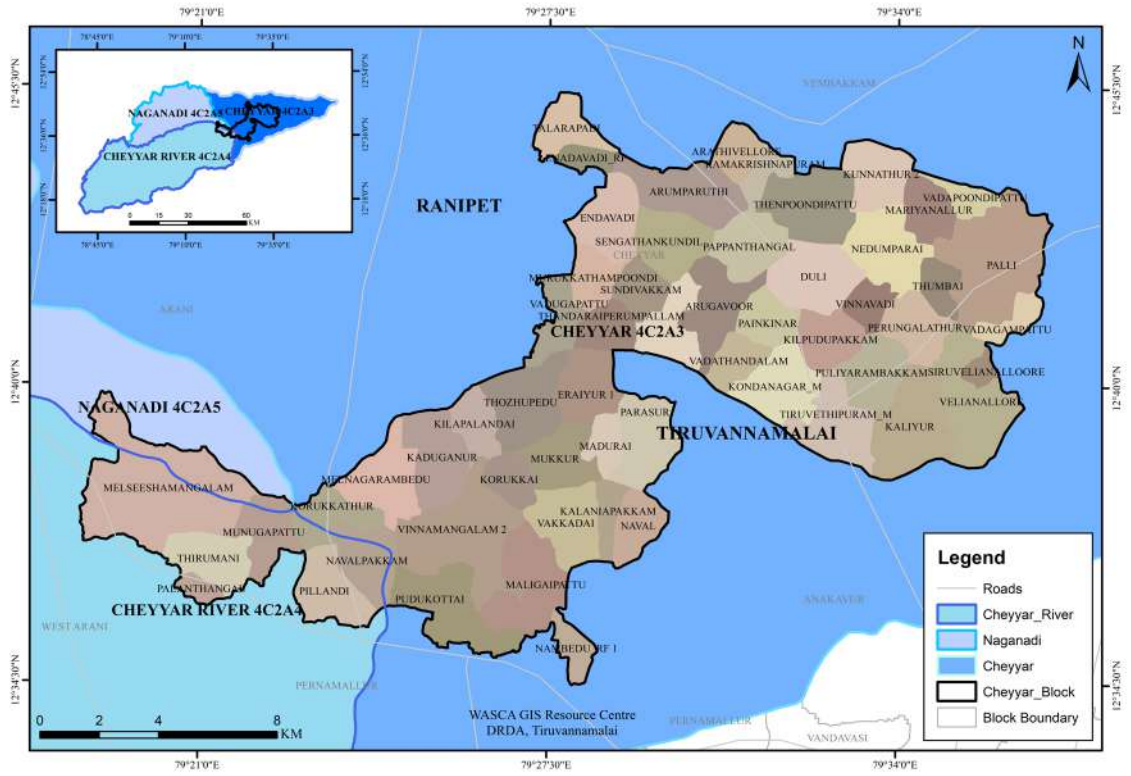



*Figure 8.2. Map of Macro-watershed with GPs-Cheyyar Block*

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 micro-watershed (Table 25 & Figure 8.3) and GPs boundaries (Table 26 & Figure 8.4). Based on ridge range types such as high, median, lower and inter variations Block area is distinguished into 4 kind of ridge zones.

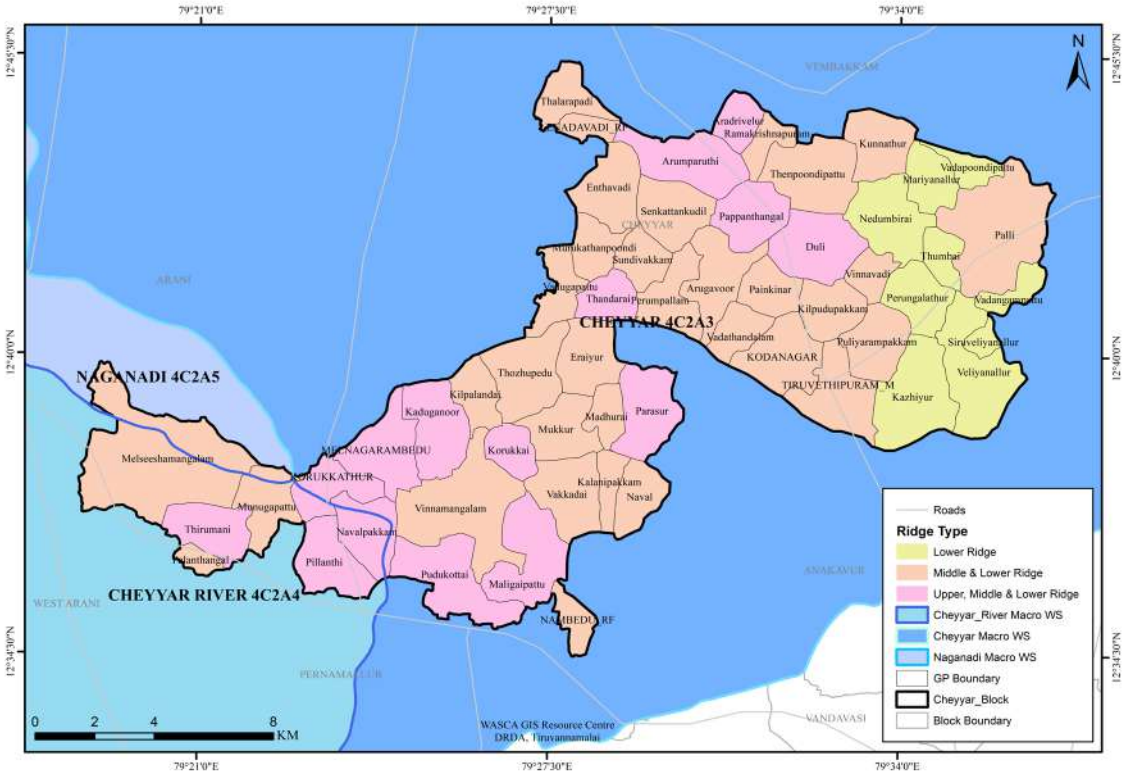



*Figure 8.3. Map of Macro-watershed and ridge-Cheyyar Block*

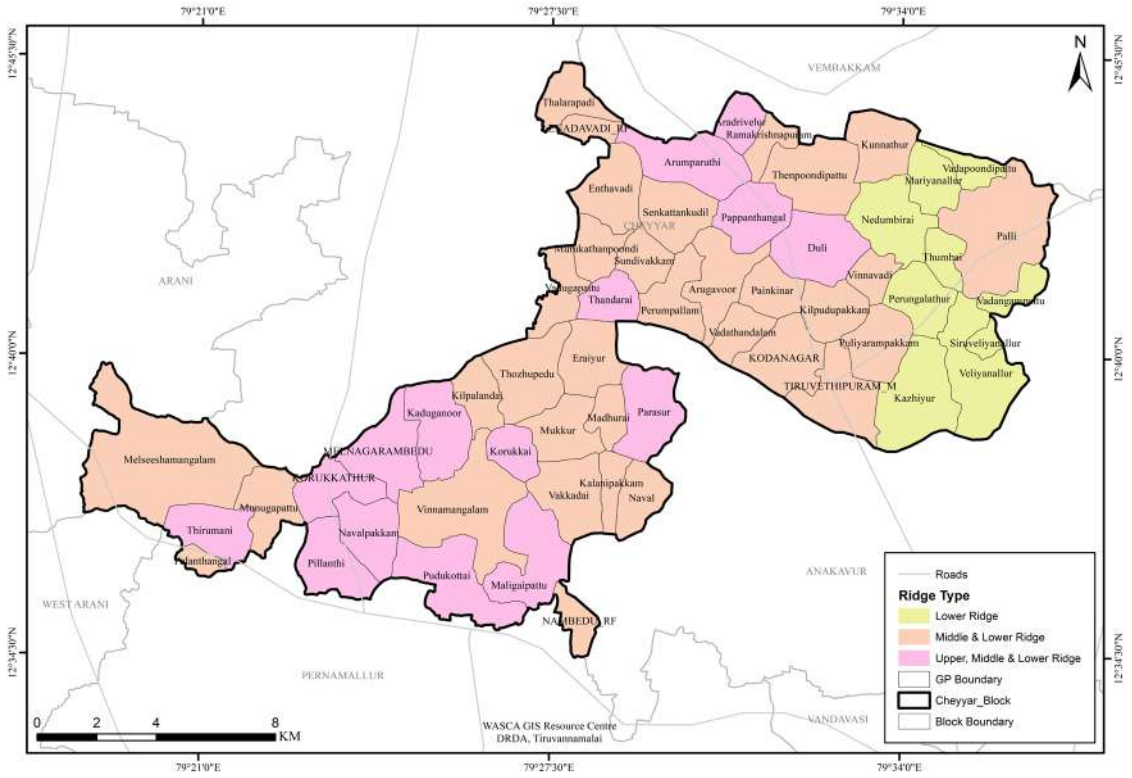



*Figure 8.4. GP level ridge map -Cheyyar Block*

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 retails of micro watersheds, list of GPs and details of proposed works in each macro watersheds of Cheyyar Block are listed in Table 27 to Table 35.

### TABLE 25. MICRO-WATERSHED IN CHEYYAR BLOCK FALLING UNDER CHEYYAR MACRO-WATERSHED

| Sl. No | Micro-watershed Code | Area in ha | Ridge type |
|---|---|---|---|
| 1 | 4C2A3f05b | 513.36 | Upper, Middle & Lower |
| 2 | 4C2A3d02d | 363.44 | |
| 3 | 4C2A3d05a | 602.36 | |
| 4 | 4C2A3d03c | 385.32 | |
| 5 | 4C2A3d09b | 613.87 | |
| 6 | 4C2A3d09a | 620.16 | |
| 7 | 4C2A3d08a | 462 | |
| 8 | 4C2A3f05b | 513.36 | Middle & Lower |
| 9 | 4C2A3e03c | 582.9 | |
| 10 | 4C2A3c10c | 339.37 | |
| 11 | 4C2A3f04a | 627.95 | |
| 12 | 4C2A3f02b | 776.89 | |
| 13 | 4C2A3f02c | 502.38 | |
| 14 | 4C2A3f04c | 455.02 | |
| 15 | 4C2A3c10b | 512.11 | |
| 16 | 4C2A3f05c | 432.85 | |
| 17 | 4C2A3c09b | 715.49 | |
| 18 | 4C2A3c09c | 471.29 | |

| | | | |
|---|---|---|---|
| 19 | 4C2A3f03c | 469.02 | Middle & Lower |
| 20 | 4C2A3c10a | 622.92 | |
| 21 | 4C2A3f03a | 533.04 | |
| 22 | 4C2A3f02a | 635.54 | |
| 23 | 4C2A3c06a | 684.31 | |
| 24 | 4C2A3c07b | 940.19 | |
| 25 | 4C2A3f03b | 267.51 | |
| 26 | 4C2A3c09a | 771.41 | |
| 27 | 4C2A3c07c | 604.49 | |
| 28 | 4C2A3c04c | 443.41 | |
| 29 | 4C2A3e03a | 408.36 | |
| 30 | 4C2A3c03c | 446.22 | |
| 31 | 4C2A3c08c | 530.99 | |
| 32 | 4C2A3c04b | 368.64 | |
| 33 | 4C2A3c08b | 302.64 | |
| 34 | 4C2A3c04d | 661.09 | |
| 35 | 4C2A3e01a | 907.11 | |
| 36 | 4C2A3c08a | 769.55 | |
| 37 | 4C2A3c04a | 376.9 | |
| 38 | 4C2A3c03b | 832.16 | |
| 39 | 4C2A3d02b | 541.84 | |
| 40 | 4C2A3d02a | 680.68 | |
| 41 | 4C2A3d12a | 332.06 | |
| 42 | 4C2A3d03a | 953.26 | |
| 43 | 4C2A3d01a | 1055.39 | |
| 44 | 4C2A3c03a | 607.37 | |
| 45 | 4C2A3d04a | 770.39 | |
| 46 | 4C2A3d03b | 1332.52 | |
| 47 | 4C2A3d04c | 588.27 | |
| 48 | 4C2A3d04b | 590.41 | |
| 49 | 4C2A3d06b | 850.13 | |
| 50 | 4C2A3d07a | 573.32 | |
| 51 | 4C2A3d08b | 738.78 | |
| 52 | 4C2A3d07c | 584.5 | |
| 53 | 4C2A3c07a | 692.46 | Lower |
| 54 | 4C2A3c02b | 584.79 | |
| 55 | 4C2A3c02c | 770.42 | |
| 56 | 4C2A3b08a | 1023.79 | |
| 57 | 4C2A3b09a | 1072.82 | |

TABLE 26. LIST OF GPS WITH TYPE OF RIDGE FALLING UNDER CHEYYAR MACRO-WATERSHED IN CHEYYAR BLOCK

| Sl.No | GP | Ridge type |
|---|---|---|
| 1 | Pappanthangal | Upper, Middle & Lower Ridge |
| 2 | Duli | |
| 3 | Thandarai | |
| 4 | Parasur | |
| 5 | Korukkai | |
| 6 | Arathivellore | |
| 7 | Kaduganur | |
| 8 | Maligaipattu | |
| 9 | Melnagarambedu | |
| 10 | Pudukottai | |
| 11 | Arumparuthi | |
| 12 | Kalaniapakkam | Middle & Lower Ridge |
| 13 | Ramakrishnapuram | |
| 14 | Vinnavadi | |
| 15 | Kilpudupakkam | |
| 16 | Vadathandalam | |
| 17 | Sengathankundil | |
| 18 | Sundivakkam | |
| 19 | Endavadi | |
| 20 | Painkinar | |
| 21 | Murukkathampoondi | |
| 22 | Perumpallam | |
| 23 | Thozhupedu | |
| 24 | Eraiyur | |
| 25 | Naval | |
| 26 | Mukkur | |
| 27 | Kilapalandai | |
| 28 | Vinnamangalam | |
| 29 | Palli | |
| 30 | Kunnathur | |
| 31 | Thenpoondipattu | |
| 32 | Puliyarambakkam | |
| 33 | Talarapadi | |
| 34 | Arugavoor | |
| 35 | Vadugapattu | |
| 36 | Madurai | |
| 37 | Vakkadai | |
| 38 | Vadagampattu | Lower Ridge |
| 39 | Siruvelianalloore | |
| 40 | Vadapoondipattu | |
| 41 | Mariyanallur | |
| 42 | Velianallore | |
| 43 | Nedumparai | |

| | | |
|---|---|---|
| 44 | Perungalathur | Lower Ridge |
| 45 | Kaliyur | |
| 46 | Thumbai | |

TABLE 27. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER CHEYYAR MACRO-WATERSHED IN CHEYYAR BLOCK

| Work wise Details of Cheyyar in Anakkavoor Block | | | |
|---|---|---|---|
| **Sl. No.** | **Proposed work** | **Ridge type** | **Extent** |
| 1 | Afforestation in Public/common lands (ha) | Upper | 367.14 |
| 2 | Drainage Line Treatment (m) | | 64,082 |
| 3 | CC Check dams (No.) | Middle | 35 |
| 4 | Block Plantation (Community) (ha) | | 231 |
| 5 | Silvi-pasture Development (ha) | | 115 |
| 6 | Avenue plantation (ha) | | 21,801.8 |
| 7 | Agro Forestry (ha) | | 7.01 |
| 8 | Mini Forest (ha) | | 228.83 |
| 9 | Composting (No.) | Lower | 350 |
| 10 | Canal Bund Plantation (m) | | 50,206 |
| 11 | Restoration of water bodies: Tanks and Ooranis (No.) | | 244 |
| 12 | Artificial Recharge Structure (No.) | | 1,190 |
| 13 | Farm Bunding with Boundary Trenches - Individual (ha) | | 297.8 |
| 14 | Construction of Farm Ponds - Individual (No.) | | 481 |
| 15 | Land development - Individual (ha) | | 1,073.7 |
| 16 | Azolla units - Individual (No.) | | 1,308 |
| 17 | NADEP Vermi compost (No.) | | 1,325 |
| 18 | Cattle Shelters (No.) | | 1,474 |
| 19 | Goat Sheep Shelters (No.) | | 912 |
| 20 | Cattle Trough (No.) | | 1,298 |
| 21 | Construction of new open wells & Recharge Shafts (No.) | | 1,117 |
| 22 | Soak Pits (Community) (No.) | | 154 |
| 23 | Soak Pits (Individual) (No.) | | 2,733 |
| 24 | Roof Rain Water Harvesting (No.) | | 81 |
| 25 | Nutri Garden (No.) | | 4,143 |
| 26 | Silt application (No.) | | 459 |

TABLE 28. MICRO-WATERSHED IN CHEYYAR BLOCK FALLING UNDER CHEYYAR RIVER MACRO-WATERSHED

| **Sl.No** | **Micro-watershed Code** | **Area in ha** | **Type of Ridge** |
|---|---|---|---|
| 1 | 4C2A4a13c | 464.4 | Upper, Middle,& Lower |
| 2 | 4C2A4a13b | 815.4 | |
| 3 | 4C2A4b01a | 562.34 | |
| 4 | 4C2A4a13a | 571.76 | Middle & Lower |
| 5 | 4C2A4a01b | 527.78 | |
| 6 | 4C2A4a01a | 305.19 | |
| 7 | 4C2A4b01b | 567.26 | |
| 8 | 4C2A4a01c | 653.67 | |
| 9 | 4C2A4a02a | 891.76 | |

TABLE 29. LIST OF GPS WITH TYPE OF RIDGE FALLING UNDER CHEYYAR RIVER MACRO-WATERSHED

| S No | GP Name | Ridge type |
|---|---|---|
| 1 | Thirumani | Upper, Middle & Lower |
| 2 | Pillandi | Upper, Middle & Lower |
| 3 | Palanthangal | Middle & Lower |

TABLE 30. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER CHEYYAR RIVER MACRO-WATERSHED IN POLUR BLOCK

| Sl. No. | Proposed work | Ridge type | Extent |
|---|---|---|---|
| 1 | Afforestation in Public/common lands (ha) | Upper | 2.24 |
| 2 | Drainage Line Treatment (m) | | 2,893.6 |
| 3 | CC Check dams (No.) | Middle | 1 |
| 4 | Block Plantation (Community) (ha) | | 50.76 |
| 5 | Avenue plantation (m) | | 318.17 |
| 6 | Composting (No.) | Lower | 33 |
| 7 | Canal Bund Plantation (m) | | 3928 |
| 8 | Restoration of water bodies: Tanks and Ooranis (No.) | | 7 |
| 9 | Artificial Recharge Structure (No.) | | 183 |
| 10 | Farm Bunding with Boundary Trenches – Individual (ha) | | 57.81 |
| 11 | Construction of Farm Ponds – Individual (No.) | | 39 |
| 12 | Land development – Individual (ha) | | 91 |
| 13 | Azolla units – Individual (No.) | | 144 |
| 14 | NADEP Vermi compost (No.) | | 144 |
| 15 | Cattle Shelters (No.) | | 144 |
| 16 | Goat Sheep Shelters (No.) | | 32 |
| 17 | Cattle Trough (No.) | | 144 |
| 18 | Construction of new open wells & Recharge Shafts (No.) | | 183 |
| 19 | Soak Pits (Community) (No.) | | 21 |
| 20 | Soak Pits (Individual) (No.) | | 228 |
| 21 | Roof Rain Water Harvesting (No.) | | 8 |
| 22 | Nutri Garden (No.) | | 545 |
| 23 | Silt application (No.) | | 36 |

TABLE 31. MICRO-WATERSHED IN CHEYYAR BLOCK FALLING UNDER NAGANADI MACRO-WATERSHED

| Sl.No | Micro-watershed Code | Micro-watershed area in ha | Ridge type |
|---|---|---|---|
| 1 | 4C2A5a02b | 661.89 | Upper, Middle & Lower |
| 2 | 4C2A5a01a | 398.30 | Middle & Lower |
| 3 | 4C2A5a01b | 444.81 | |

TABLE 32. LIST OF GPS WITH TYPE OF RIDGE FALLING UNDER CHEYYAR RIVER & NAGANADI MACRO-WATERSHED IN CHEYYAR BLOCK

| Sl. No | Name of the GP | Ridge type |
|---|---|---|
| 1 | Munugapattu | Middle & Lower |
| 2 | Melsheeshamangalam | |

TABLE 33. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER CHEYYAR RIVER & NAGANADI MACRO-WATERSHED

| Sl. No. | Proposed work | Ridge type | Extent |
|---|---|---|---|
| 1 | Afforestation in Public/common lands (ha) | Upper | 42.08 |
| 2 | Drainage Line Treatment (m) | | 9,816.49 |
| 3 | CC Check dams (No.) | Middle | 1 |
| 4 | Avenue plantation (m) | | 16,537 |
| 5 | Composting (No.) | Lower | 36 |
| 6 | Canal Bund Plantation (m) | | 2,053 |
| 7 | Restoration of water bodies: Tanks and Ooranis (No.) | | 16 |
| 8 | Artificial Recharge Structure (No.) | | 175 |
| 9 | Farm Bunding with Boundary Trenches - Individual (ha) | | 38.46 |
| 10 | Construction of Farm Ponds – Individual (No.) | | 45 |
| 11 | Land development – Individual (ha) | | 38.46 |
| 12 | Azolla units – Individual (No.) | | 267 |
| 13 | NADEP Vermi compost (No.) | | 176 |
| 14 | Cattle Shelters (No.) | | 176 |
| 15 | Goat Sheep Shelters (No.) | | 81 |
| 16 | Cattle Trough (No.) | | 176 |
| 17 | Construction of new open wells & Recharge Shafts (No.) | | 175 |
| 18 | Soak Pits (Community) (No.) | | 15 |
| 19 | Soak Pits (Individual) (No.) | | 527 |
| 20 | Roof Rain Water Harvesting (No.) | | 4 |
| 21 | Nutri Garden (No.) | | 1,633 |
| 22 | Silt application (No.) | | 19 |

TABLE 34. GPS WITH TYPE OF RIDGE FALLING UNDER CHEYYAR RIVER & CHEYYAR MACRO-WATERSHED IN CHEYYAR BLOCK

| Sl. No | Name of the GP | Ridge type |
|---|---|---|
| 1 | Navalpakkam | Upper, Middle & Lower |
| 2 | Korukkathur | |

TABLE 35. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER CHEYYAR RIVER & CHEYYAR MACRO-WATERSHED

| Sl. No. | Proposed work | Ridge type | Extent |
|---|---|---|---|
| 1 | Afforestation in Public/common lands (ha) | Upper | 1 |
| 2 | Drainage Line Treatment (m) | | 933 |
| 3 | CC Check dams (No.) | Middle | 2 |
| 4 | Block Plantation (Community) (ha) | | 27 |
| 5 | Avenue plantation (m) | | 2599 |
| 6 | Composting (No.) | Lower | 3 |
| 7 | Canal Bund Plantation (m) | | 877 |
| 8 | Restoration of water bodies: Tanks and Ooranis (No.) | | 4 |
| 9 | Artificial Recharge Structure (No.) | | 42 |
| 10 | Farm Bunding with Boundary Trenches - Individual (ha) | | 5 |
| 11 | Construction of Farm Ponds – Individual (No.) | | 10 |
| 12 | Land development – Individual (ha) | | 40 |
| 13 | Azolla units – Individual (No.) | | 16 |
| 14 | NADEP Vermi compost (No.) | | 16 |
| 15 | Cattle Shelters (No.) | | 16 |
| 16 | Goat Sheep Shelters (No.) | | 3 |
| 17 | Cattle Trough (No.) | | 16 |
| 18 | Construction of new open wells & Recharge Shafts (No.) | | 22 |
| 19 | Soak Pits (Community) (No.) | | 5 |
| 20 | Soak Pits (Individual) (No.) | | 63 |
| 21 | Roof Rain Water Harvesting (No.) | | 4 |
| 22 | Nutri Garden (No.) | | 1,005 |
| 23 | Silt application (No.) | | 16 |

# 8.2 MODEL MICRO-WATERSHED- PAPPANTHANGAL MICRO-WATERSHED

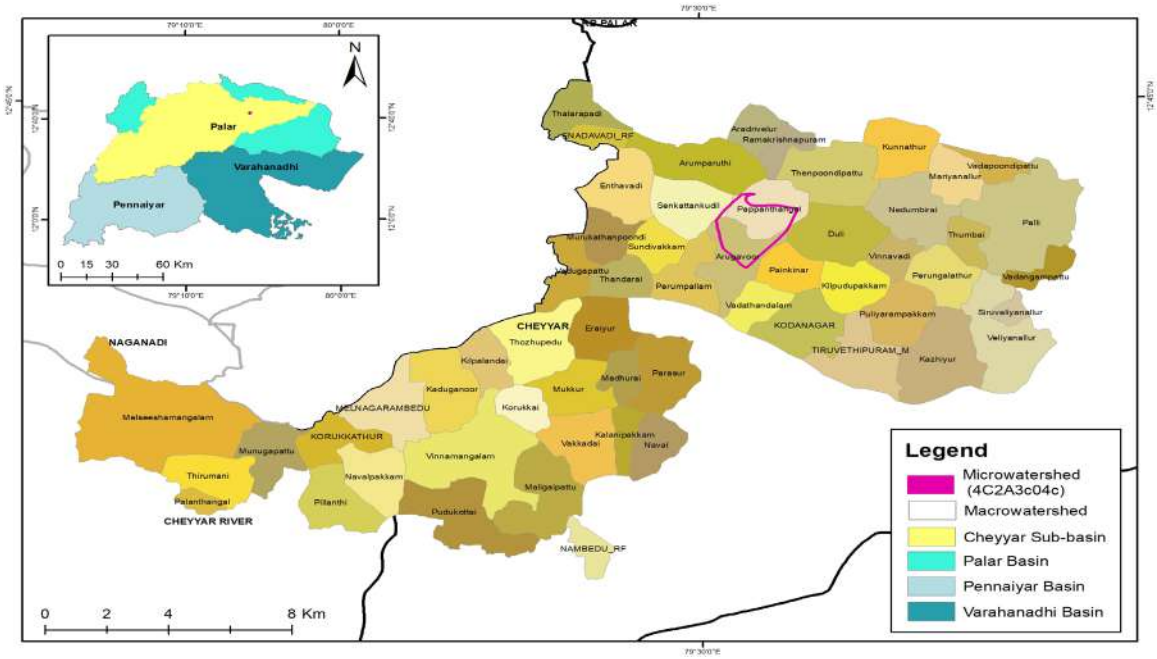



*Figure 8.5. Pappanthangal micro-watershed map*

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.

## PAPPANTHANGAL MICRO-WATERSHED

Pappanthangal micro-watershed falls under Pappanthangal and Arugavoor GPs, Cheyyar Block in Tiruvannamalai District (Figure 8.5). This micro-watershed is the part of Cheyyar macro-watershed in Cheyyar sub-basin. The general information, geology, hydrogeology, natural drainage line, catchment area, ground water status, water budget of Pappanthangal 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 36 to 46). The proposed NRM and Non-NRM activities in this micro-watershed are shown in Figure 8.6 and 8.7. The key CWRM parameters for the GPs falling in this micro-watershed is Annexed in 8.

TABLE 36. GENERAL INFORMATION OF THE MICRO-WATERSHED

| Description | Name/ No./ Quantity/ Status |
|---|---|
| Name of the micro-watershed | **Pappanthangal** |
| Micro-watershed No. | **4C2A3c04c** |
| Name of the Basin | Palar |
| Name of the subbasin | Cheyyar |
| Name of the macro-watershed | Cheyyar |
| No. of GPs covered under the micro-watershed | 2 |
| Name of the GPs | Pappanthangal & |
| Arugavoor | 12°44'42.17"N to 12°45'20.80"N |
| Latitude of micro-watershed (From To) | 12°41'17.40"N to 12°42'53.02"N |
| Longitude of micro-watershed (From To) | 79°30'16.91"E to 79°31'23.93"E |
| Total area of the micro-watershed (in ha) | 443 |
| Percentage of micro-watershed area in Pappanthangal GP | 53 |
| Percentage of micro-watershed area in Arugavoor GP | 47 |
| Area of micro-watershed falling in Pappanthangal GP (ha) | 235 |
| Area of micro-watershed falling in Arugavoor GP (ha) | 208 |
| Total Population of Pappanthangal GP | 1,948 |
| Total Population of Arugavoor GP | 1,547 |
| Annual Average Rainfall (mm) | 1047 |
| Annual maximum Temperature | 33°C |
| Annual Minimum Temperature | 22.8 °C |
| Evapo-Transporation Losses of Pappanthangal GP (ha.m) | 12.11 |
| Evapo-Transporation Losses of Arugavoor GP (ha.m) | 8.20 |
| Volumetric soil moisture availability | 23 |
| Climate Risk | Drought and heat waves |
| CVI Index Value for Pappanthangal GP (Based on WASCA Climate study) | 0.598 |
| CVI Index Value for Arugavoor GP (Based on WASCA Climate study) | 0.553 |
| Agro-Climatic Zone | North eastern zone (TN-1) |
| Agro Ecological Sub-Region (ICAR) | Eastern Ghats |
| Status of Ground water in Pappanthangal GP | Over Exploited |
| Status of Ground water in Arugavoor GP | Over Exploited |

TABLE 37. 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 (in m) | 30 to 60 |
| Bottom of the unconfined aquifer in soft rock areas (in m) | 20 to 40 |

### TABLE 38. MICRO-WATERSHED'S CATCHMENT AREA

| Catchment Area (in ha) | Pappanthangal | Arugavoor |
|---|---|---|
| Good catchment area | 81.33 | 121.46 |
| Average catchment area | 23.96 | 15.8 |
| Bad catchment area | 362.69 | 380.15 |

### TABLE 39. GROUND WATER STATUS OF MICRO-WATERSHED

| Name of the Firka (Assesment Unit) falling under micro-watershed (in ha.m) | Vadathandalam |
|---|---|
| Net Annual Ground Water Availability | 2,004.15 |
| Existing Gross Ground Water Draft for Irrigation | 2,303.00 |
| Existing Gross Ground Water Draft for domestic and industrial water supply | 50.22 |
| Existing Gross Ground Water Draft for All uses | 2,353.22 |
| Provision for domestic and industrial requirement supply to 2025 | 57.08 |
| Net Ground Water Availability for future irrigation development | -355.93 |

### TABLE 40. GP WISE WATER BUDGET OF MICRO –WATERSHED: PAPPANTHANGAL & ARUGAVOOR

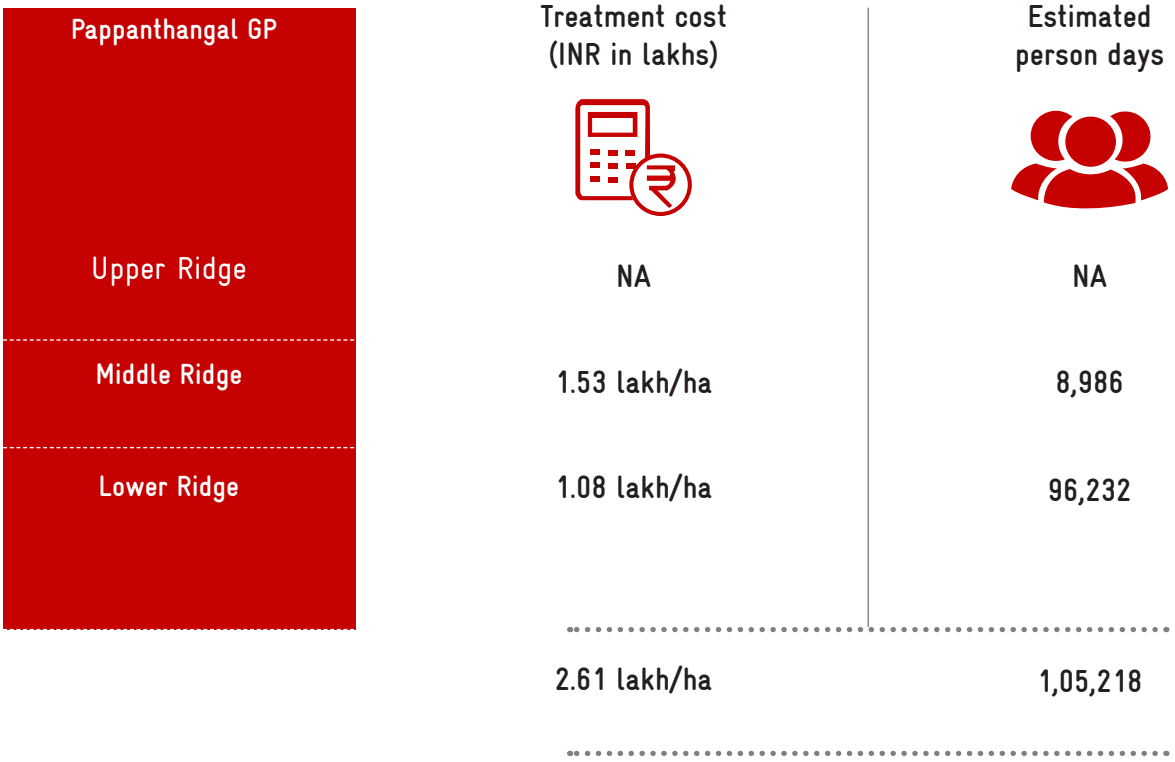
| Firka Assessment Unit (in ha.m) | Pappanthangal | Arugavoor |
|---|---|---|
| Water for Human | 5.33 | 4.23 |
| Water for Agriculture | 172.7 | 78.1 |
| Water for Animal | 2.98 | 1.99 |
| Village wise water required | 181 | 84.3 |
| Available run-off from rain water (derived from Strange method) | 105.1 | 121.1 |
| Harvested Runoff from Water Harvesting Activities | 3.1 | 3.5 |
| Potential Harvesting from proposed Interventions | 21.3 | 23.1 |
| Total Water harvested | 24.4 | 26.6 |
| Water demand and Supply Difference | -156.6 | -57.7 |
| Water Demand Supply Gap Status | Deficient | Deficient |
| Per capita Water Availability (in cum) | 539.52 | 782.80 |
| International Standard per capita water Availability (in cum) | 1700 | 1700 |
| Water Availability Gap | -1160.48 | -917.2 |
| Water security status | Water Stress | Water Stress |

TABLE 41. GP WISE PROPOSED MICRO-WATERSHED WORKS: PAPPANTHANGAL & ARUGAVOOR

| Proposed Works | Pappanthangal | Arugavoor |
|---|---|---|
| Proposed Total No. of works in Upper Ridge | No works falling Upper Ridge in GP | No works falling Upper Ridge in GP |
| Proposed Total No. of works in Middle Ridge (No.) | 6 | 2 |
| Proposed Total No. of works in Lower Ridge (No.) | 324 | 64 |
| Total No. of works in Pappanthangal & Arugavoor GPs (No.) | 330 | 66 |

TABLE 42. RIDGE WISE TREATMENT AREA, ESTIMATED COST AND PERSON DAYS REQUIRED

| | Pappanthangal | Arugavoor |
|---|---|---|
| **Middle Ridge** | | |
| Estimated cost for Middle ridge area (INR in Lakhs) | 23 | 3 |
| Total area in ha of Middle ridge | 15 | 10 |
| **Treatment cost of Middle ridge per ha (INR in Lakhs)** | **1.53** | **0.3** |
| **Estimated Person days generated for Treatment of Upper and Middle Ridge** | **8,986** | **1,172** |
| **Lower Ridge** | | |
| Estimated cost for Lower ridge area (in lakhs) | 238 | 79.79 |
| Total area in ha of Lower ridge | 219 | 198 |
| **Estimated Person days generated for Treatment of Lower Ridge** | **96,232** | **26,848** |
| **Treatment cost of Lower ridge per ha (INR in Lakhs)** | **1.08** | **0.4** |

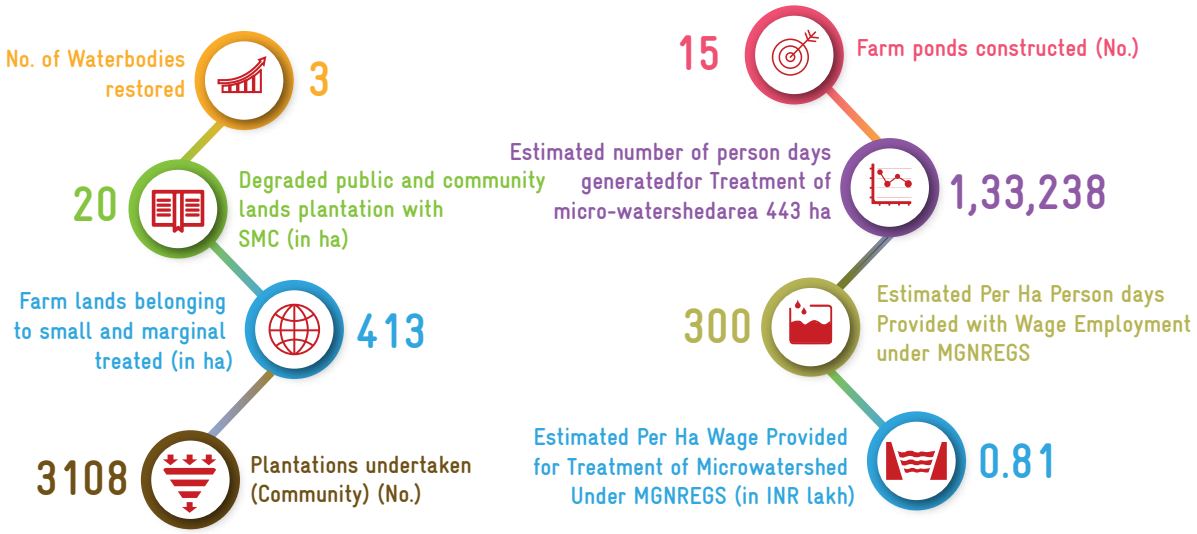


| Arugavoor GP | Treatment cost (INR in lakhs) | Estimated person days |
|---|---|---|
| Upper Ridge | NA | NA |
| Middle Ridge | 0.3 lakh/ha | 1,172 |
| Lower Ridge | 0.4 lakh/ha | 26,848 |
| | 0.7 lakh/ha | 28,020 |

TABLE 43. NATURE AND NO. OF WORKS IN MICRO-WATERSHED

| Description | No. |
|---|---|
| Total No. of works in Micro Watershed area (Arable, Non arable & DLT) | 181 |
| Total No. of works in Micro Watershed including livelihood Activities | 87 |
| Total No. of works in Micro Watershed including Rural Greywater Management Activities | 128 |

TABLE 44. KEY OUTCOMES OF INTERVENTION



**Expenditure for FY 2020-21 (in INR lakh)**

| | |
|---|---|
| Pappanthangal GP | 64.96 lakh |
| Arugavoor GP | 41.36 lakh |

TABLE 45. ESTIMATES OF MICRO-WATERSHED IN PAPPANTHANGAL GP

| Name of the Work Proposed | Type of ridge | Status of work | Quantity (Area or No.) | No. of works as per KML | Estimate cost in Lakhs | Person days |
|---|---|---|---|---|---|---|
| **NRM works in Public and Community Lands** | | | | | | |
| Tank bund Plantation (No.) | Lower | Not commenced | 1 | 1 | 1.8 | 703 |
| Avenue plantation (m) | | | 4,432 | 5 | 7.92 | 3,093 |
| Compost Pit (No.) | | | 25 | 25 | 4.25 | 375 |
| Restoration of Traditional water bodies: (Union Tank) (No.) | | | 1 | 1 | 5 | 800 |
| Restoration of Traditional water bodies: (Pond) (No.) | | | 1 | 1 | 1 | 200 |
| **Sub total** | | | | **33** | **19.97** | **5,171** |
| **Works in Individual Farmer lands (Agriculture and allied sector) (No.)** | | | | | | |
| Artificial Recharge Structure for borewell farmers (No.) | Lower | Not commenced | 12 | 12 | 30 | 4,692 |
| Farm Bunding with Boundary Trenches - Individual (No. & ha) | Middle and Lower | | 10 | 4 | 6 | 2,344 |
| | | | 4 | | | |
| Construction of Farm Ponds - Individual (No.) | Lower | Ongoing | 9 | 9 | 18 | 7,029 |
| Dryland Horticulture (ha & No.) | Middle | Not commenced | 5 | 2 | 17 | 6,642 |
| | | | 2 | | | |
| Silt application (No.) | Lower | Not commenced | 2 | 2 | | |
| Azolla Production units - Individual (No.) | | Commenced | 25 | 25 | 3.75 | 575 |
| NADEP Vermi compost (No.) | | Not commenced | 25 | 25 | 4.5 | 675 |
| Fodder development - Individual (No.) | | | 25 | 25 | 37 | 58,600 |
| **Sub total** | | | | **104** | **116.25** | **80,557** |
| **Total** | | | | **137** | **136.22** | **85,728** |
| **Livelihood enhancement activities for Individual farmers (dryland) (No.)** | | | | | | |
| Cattle Shelters (No.) | Lower | Commenced | 25 | 25 | 56.75 | 8,875 |
| Goat Sheep Shelters (No.) | Lower | | 25 | 25 | 1.25 | 150 |
| Cattle trough (No.) | Lower | Not commenced | 10 | 10 | 0.5 | 60 |
| **Sub total** | | | | **75** | **111** | **17,300** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Rural greywater management (No.)** | | | | | | |
| Rooftop Rainwater Harvesting System (No.) | Lower | Not commenced | 2 | 2 | 8 | 1,250 |
| Soak Pits (Individual) (No.) | | Ongoing | 58 | 58 | 5.8 | 928 |
| Nutri Garden (No.) | | Not commenced | 58 | 58 | 0.06 | 12 |
| **Sub total** | | | | **118** | **13.86** | **2,190** |
| **Grand Total** | | | | **330** | **261.08** | **1,05,218** |

TABLE 46. ESTIMATES OF MICRO-WATERSHED IN ARUGAVOOR GP

| Name of the Work Proposed | Type of ridge | Status of work | Quantity (Area or No.) | No. of works as per KML | Estimate cost in Lakhs | Person days |
|---|---|---|---|---|---|---|
| **NRM works in Public and Community Lands** | | | | | | |
| Avenue plantation (Km) | Lower | Not commenced | 2 | 1 | 2.7 | 1,054 |
| Tank bund Plantation (No.) | | | 1 | 1 | 1.8 | 703 |
| Restoration of traditional water bodies: (Union Tank) (No.) | | | 1 | 1 | 5 | 800 |
| Compost Pit (No.) | | | 5 | 5 | 0.85 | 75 |
| **Sub total** | | | | 8 | 10.35 | 2,632 |
| **Works in Individual Farmer lands (Agriculture and allied sector) (No.)** | | | | | | |
| Artificial Recharge Structure for borewell farmers (No.) | Lower | Not commenced | 13 | 13 | 32.5 | 5,083 |
| Farm Bunding with Boundary Trenches - Individual (ha & No.) | Middle | | 5 | | | |
| | | | 2 | 2 | 3 | 1,172 |
| Construction of Farm Ponds - Individual (No.) | Lower | Ongoing | 6 | 6 | 12 | 4,686 |
| Azolla Production units - Individual (No.) | Lower | Commenced | 5 | 5 | 0.75 | 115 |
| NADEP Vermi compost (No.) | | Not commenced | 5 | 5 | 0.9 | 135 |
| Fodder development - Individual (No.) | | | 5 | 5 | 7.4 | 11720 |
| **Sub total** | | | | **36** | **56.55** | **22,911** |
| **Total** | | | | **44** | **66.90** | **25,543** |
| **Livelihood enhancement activities for Individual farmers (dryland) (No.)** | | | | | | |
| Cattle Shelters (No.) | Lower | Commenced | 5 | 5 | 10.6 | 1,655 |
| Goat Sheep Shelters (No.) | | | 2 | 2 | 4.54 | 710 |
| Cattle Trough (No.) | | Not commenced | 5 | 5 | 0.25 | 30 |
| **Sub total** | | | | **12** | **15.39** | **2,395** |
| **Rural greywater management (No.)** | | | | | | |
| Soak Pits (Individual) (No.) | Lower | Commenced | 5 | 5 | 0.5 | 80 |
| Nutri Garden (No.) | | Not commenced | 5 | 5 | 0.001 | 2 |
| **Sub total** | | | | **10** | **0.501** | **82** |
| **Grand Total** | | | | **66** | **82.79** | **28,020** |

## TOTAL ESTIMATES OF MICRO-WATERSHED IN GP WISE

| | No. of works as per KML | Estimate cost in INR (Lakhs) | Person days |
|---|---|---|---|
| Pappanthangal GP | 330 | 261.08 | 1,05,218 |
| Arugavoor GP | 66 | 82.79 | 28,020 |

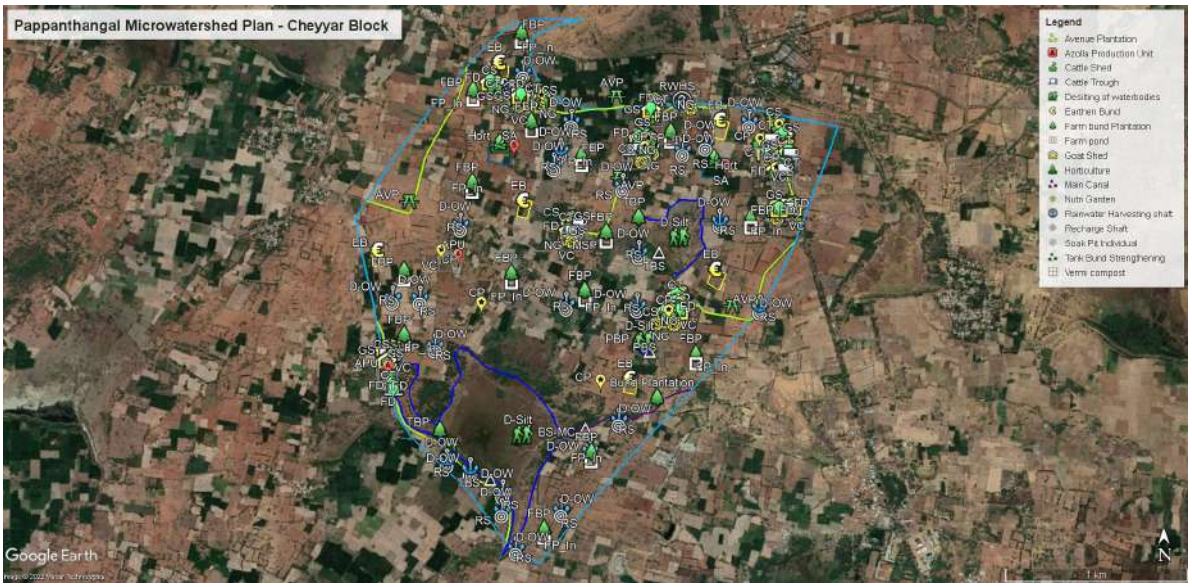



*Figure 8.6. Map of Proposed activities in Pappanthangal micro-watershed*

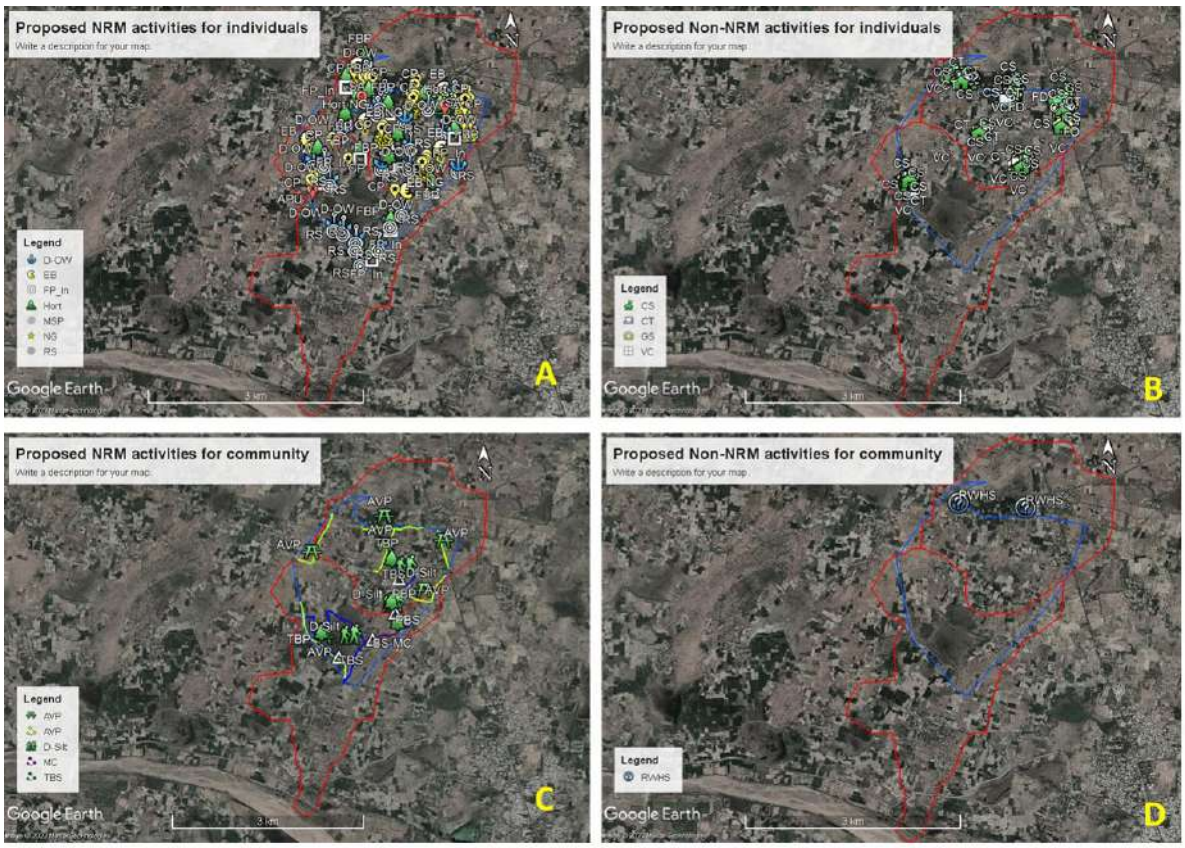
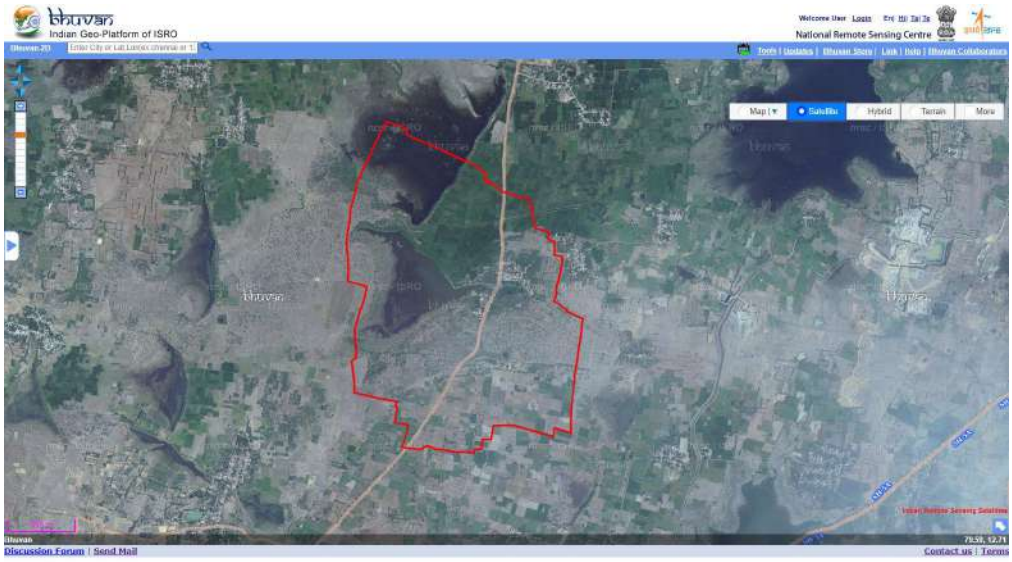



*Figure 8.7 Map of proposed activities in Pappanthangal micro-watershed. A.NRM activities.B. NRM activities for individuals. C. Non-NRM activities for Individuals. D. Non-NRM activities for community (APU: Azolla Production unit, AVP: Avenue Plantations, CP: Compost pit, CS: Cattle Shed, D-silt: Desilting, 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 PLAN

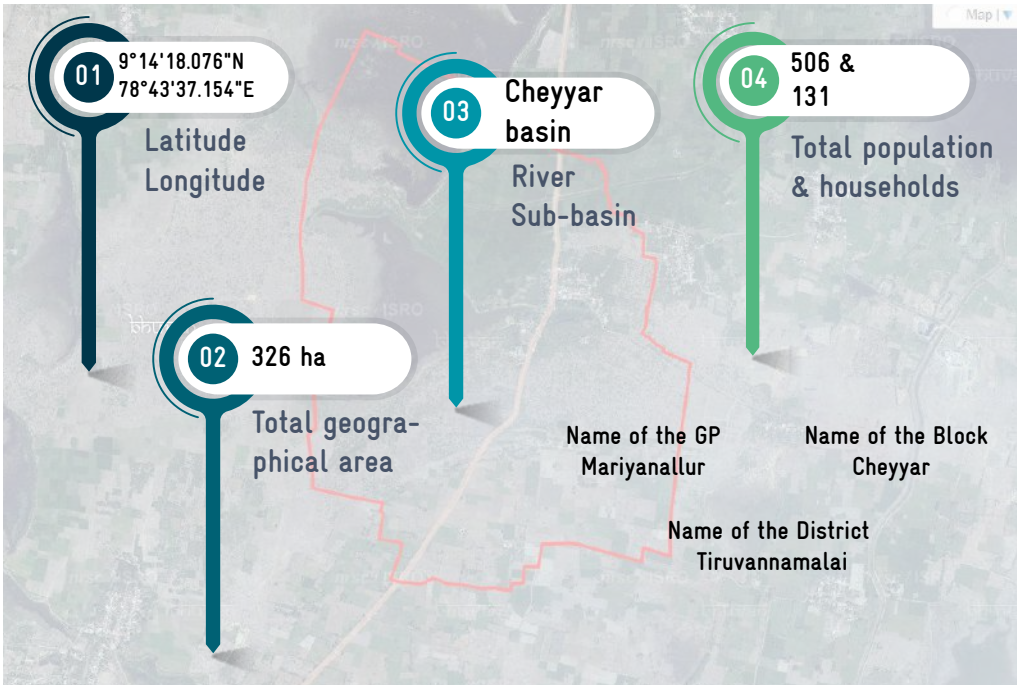
## MODEL GP-MARIYANALLUR GP

## 8.3.1 BACKGROUND OF – MARIYANALLUR GP



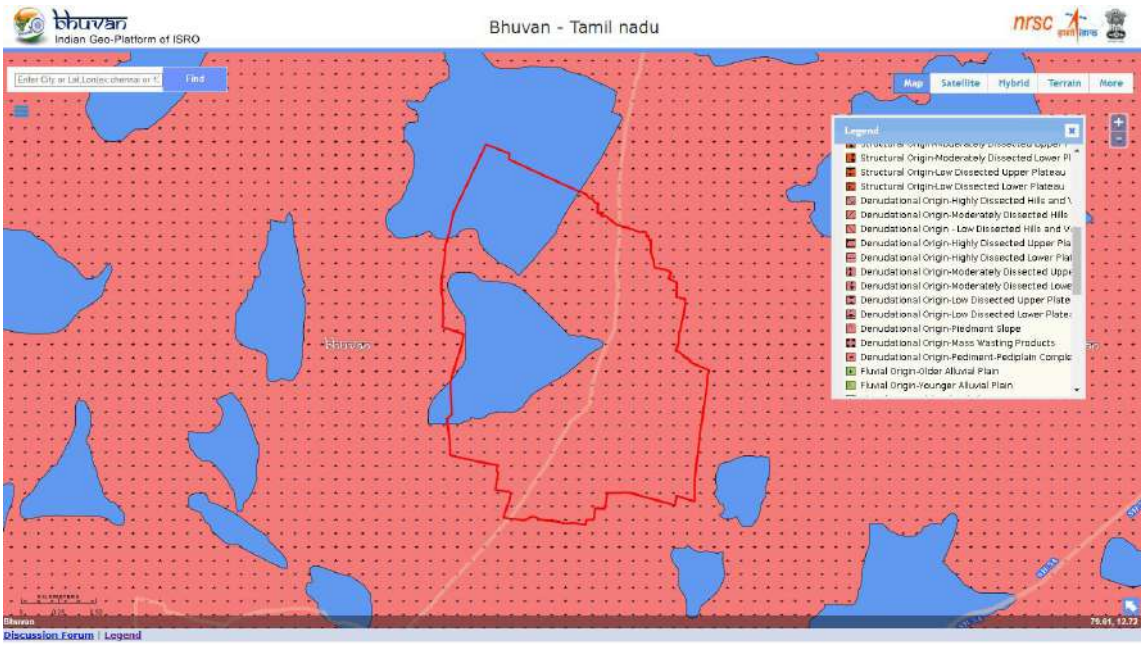

The Mariyanallur GP is located in Cheyyar Block of Tiruvannamalai district, Tamil Nadu GP is geographically situated between 12° 20' 43.3782" N & 78° 50' 59.1576" E . The total geographical area of GP is 326 ha. The total population is 506 of which 245 are males while 261 are females as per Population Census 2011. The total number of households is 131. The scheduled tribe constitutes 13 % of total population in Mariyanallur village. There is no Schedule Caste population in the village. The general description of this GP is given in Table 47.

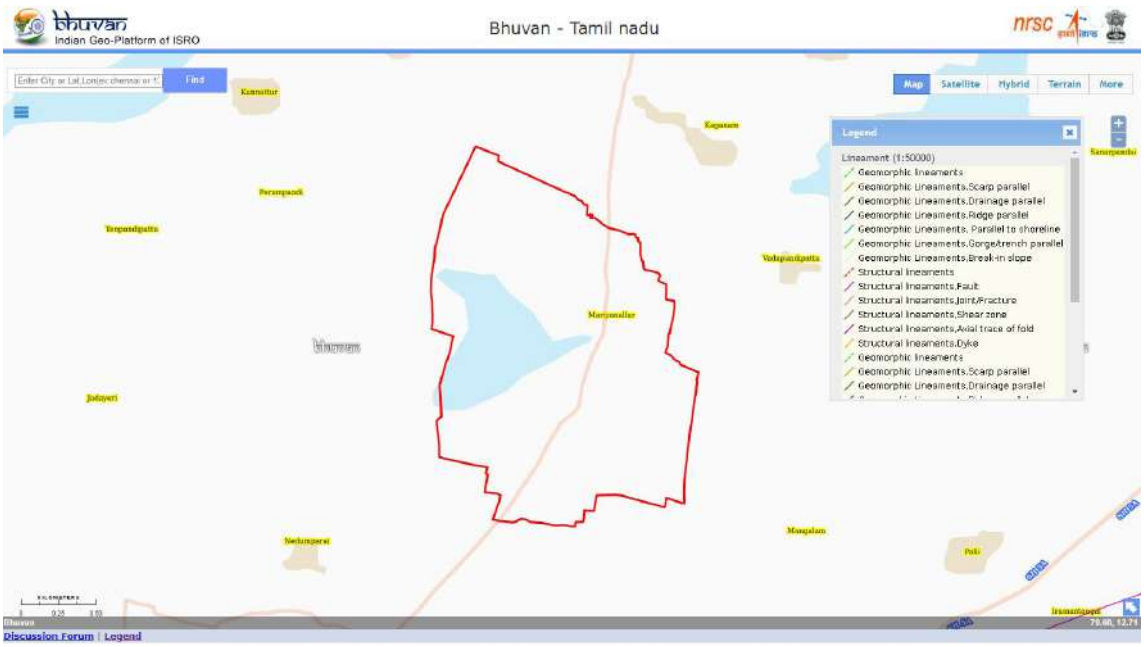
TABLE 47. GENERAL DESCRIPTION OF MARIYANALLUR GP

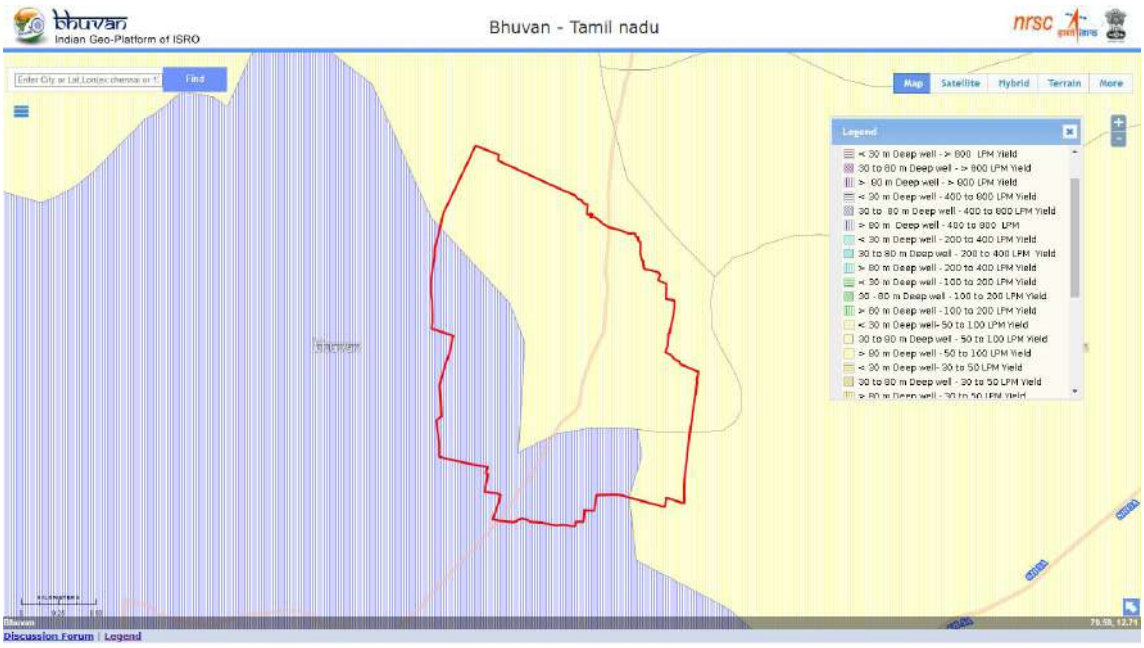


### 8.3.2 CWRM planning - Spatial Data:

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 Mariyanallur GP shown in Figure 8.8 and discussed below,




Bhuvan - Tamil nadu
Indian Geo-Platform of ISRO
nrsc
Find
Map
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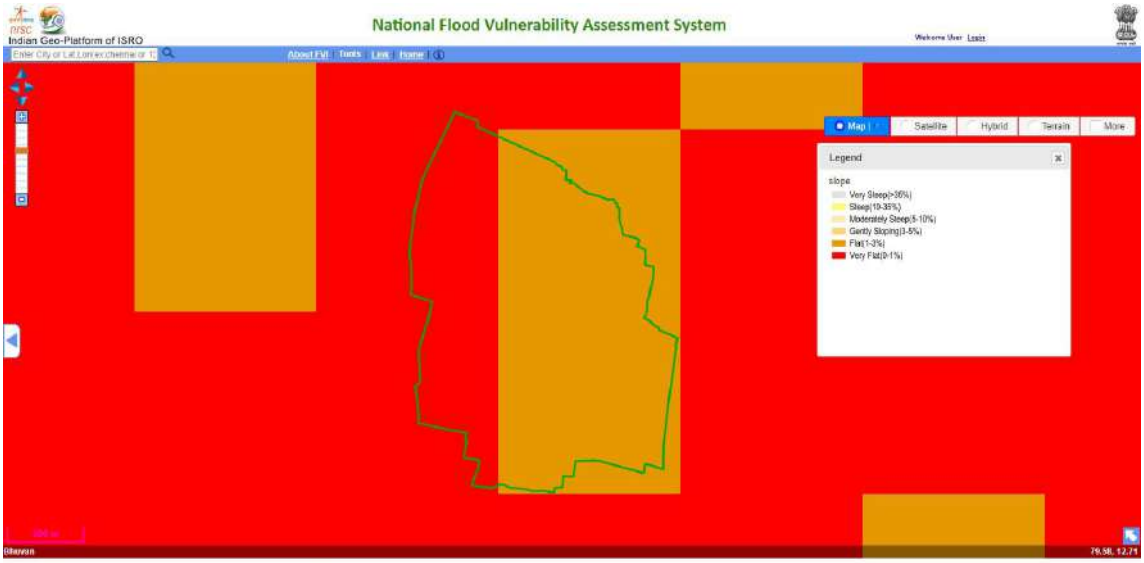
National Flood Vulnerability Assessment System
Indian Geo-Platform of ISRO
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Legend
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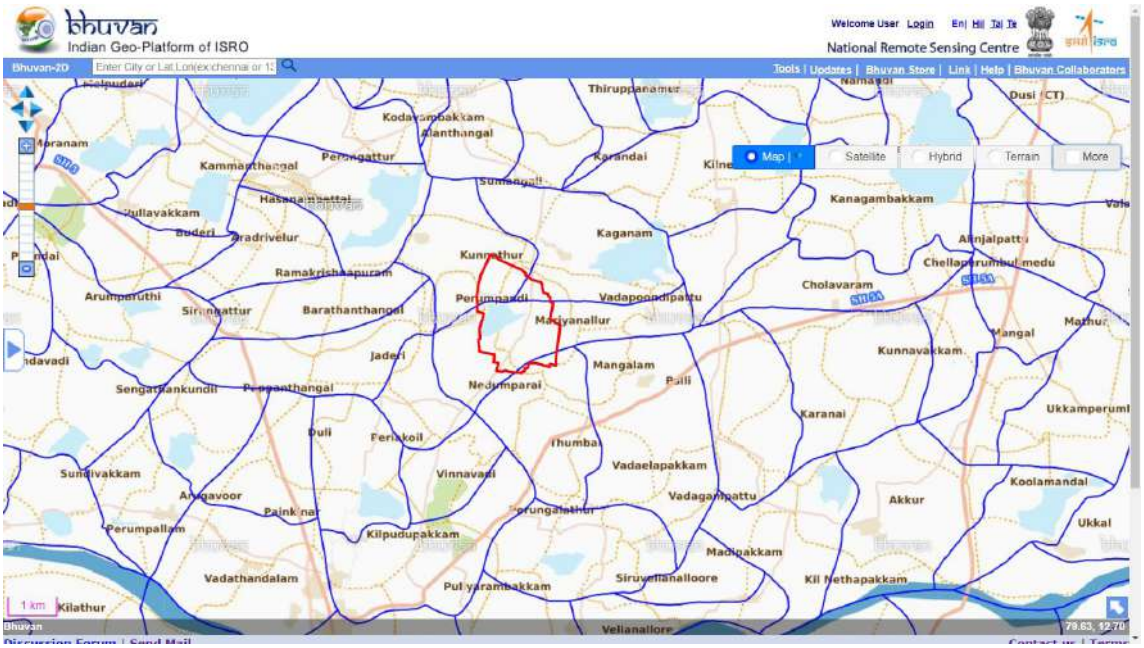

bhuvan
Indian Geo-Platform of ISRO
National Remote Sensing Centre
Welcome User Login
Bhuvan-2D
Tools | Updates | Bhuvan Store | Link | Help | Bhuvan Collaborators
Map
Satellite
Hybrid
Terrain
More
Thiruppanamur
Kodaikambakkam
Manthangal
Karandai
Kammanthangal
Perungattur
Kanagambakkam
Kaganam
Kunnathur
Ramakrishnapuram
Arumpuruthi
Barathanthangal
Perumpakkam
Vadapoondipattu
Cholavaram
Chellaperumbudu
Manjalpatti
Mangal
Mathur
Kunnavakkam
Jaderi
Mangalam
Nedumparai
Pulli
Karanai
Ukkamperumbakkam
Sengathankundil
Periakoil
Thumba
Vadaelapakkam
Sundivakkam
Vinnavadi
Koolamandal
Akkur
Ukkal
Perumpallam
Kilpudupakkam
Madipakkam
Vadathandalam
Pulivarambakkam
Siruvellanalloore
Kil Nethapakkam
Kilathur
Vellanallore
1 km

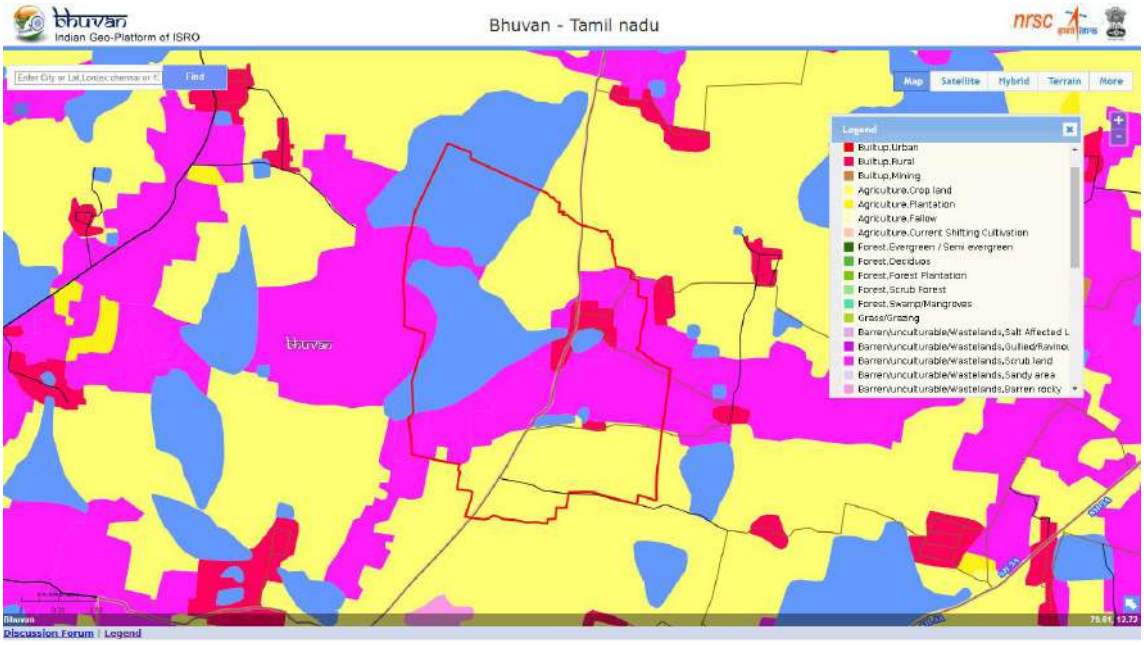



*Figure 8.8. Spatial maps of Mariyanallur GP - a. Geomorphology, b. Lineament, c. GW prospect, d. Slope, e. Watershed, f. LULC*

The Mariyanallur GP engrossed with denudation origin – pediment- pediplain complex landform unit whereas no lineaments were found at the available scale data. (Figure 8.8 A & B). It is noticed that the ground water prospectus is greater than 80m deep with 20 to 30 liter per minute capacity (c). A very flat slope of 0 to 1 % & flat slope range from 1 to 3% is noticed in the GP (d). GP area shares into four micro-watersheds (e) and the dominant land is used for agriculture purpose followed by fallow and barren land is noticed in the GP (f).

## 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 48). 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 48. NON-SPATIAL DATA- MARIYANALLUR GP

| Key CWRM Parameter | Details |
|---|---|
| **Climate Vulnerable Area – Socio economic** | |
| Geographical Area (ha) | 326 |
| Male Population (No.) | 245 |
| Female Population (No.) | 261 |
| Total Population (No.) | 506 |
| ST Population (No.) | 66 |
| Vulnerable population (No.) | 66 |
| Households (HH's) (No.) | 125 |
| Only one room HH's (SECC) (No.) | 15 |
| Female Headed HH's (SECC) (No.) | 13 |
| Vulnerable Households (SECC) (No.) | 14 |
| % of Vulnerable Households (%) | 12 |
| Registered MGNREGA Job cards (Persons) | 158 |
| Active person working in MGNREGA job Cards (Persons) | 128 |
| Drinking Water Sources (No.) | 81 |
| Ground Water - Drinking source (No.) | 3 |
| Surface water - Drinking source (No.) | 1 |
| sum of drinking water sources (No.) | 4 |
| HH's dependent on other sources for drinking water (No.) | 214 |
| Annual Greywater Generation (ha.m) | 0.92 |
| **CVA 2: Climate** | |
| Average Annual Rainfall (in mm) | 1,047 |
| Average Annual Temperature (°C) | 27.9 |
| Ground Water Status (OE, Critical, SC, Safe, Saline) | Over-Exploited |
| **CVA 3: Water Resources** | |
| **Canal Network** | |
| Length of Main Canal (m) | 2000 |
| Water Courses (Field Channels) (m) | 700 |
| No. of Tanks (PWD & Union) (No.) | 2 |
| Other Surface Water Bodies (No.) | 3 |
| **Irrigation Facilities (ha)** | |
| Area under Open & Tube Well Irrigation | 63.71 |
| **Runoff in ham** | |
| Good Catchment Area | 4.2 |
| Average Catchment Area | 8.4 |
| Bad Catchment Area | 53.3 |
| **Watershed and Drainage Networks** | |
| Length of Natural Drainage Lines (m) | 1150 |

| | |
|---|---|
| No. of Natural Drainage Lines (No.) | 3 |
| No. of Micro Watersheds (No.) | 4 |
| **Water Demand** | |
| For Humans (ha.m) | 1.39 |
| For Livestock (ha.m) | 0.92 |
| For Agriculture (ha.m) | 119.17 |
| % GW Utilization for Drinking | 92 |
| % GW Utilization for Livestock | 94 |
| % GW Utilization for Agriculture | 93 |
| % SW Utilization for Drinking | 8 |
| % SW Utilization for Livestock | 6 |
| % SW Utilization for Agriculture | 7 |
| **CVA 4 : Agriculture** | |
| **Area under Land Resources (ha)** | |
| Non-Agricultural Uses | 11.21 |
| Land Under Miscellaneous Tree Crops etc. | 0.43 |
| Cultivable Waste Land | 29.46 |
| Fallows Land other than Current Fallows | 62.09 |
| Current Fallow land | 124.24 |
| Unirrigated Land | 35.14 |
| Area Irrigated by Source | 63.71 |
| **Land under Catchment Area (ha)** | |
| Good Catchment | 11.21 |
| Average Catchment | 29.89 |
| Bad Catchment | 285.18 |
| **Crop Details** | |
| Irrigated Area (ha) | 84.62 |
| Rainfed area (ha) | 18.58 |
| Area under Paddy Cultivation (ha) | 70 |
| Crop Water Requirement - Irrigated condition (ha-m) | 111.09 |
| Crop Water Requirement - Rainfed condition (ha-m) | 8.08 |
| **Soil Resources: Status of Available Nitrogen** | |
| Very Low | 14 |
| Low | 81 |
| Medium | 5 |
| **Status of Organic Carbon (%)** | |
| Very Low | 21 |
| Low | 77 |
| Very High | 2 |

| | |
|---|---|
| **Status of Soil Micronutrients (%)** | |
| Sufficient | 66 |
| Deficient | 34 |
| **Status of Physical condition of the soil (%)** | |
| Moderately Alkaline | 100 |
| **Soil Texture** | |
| % of Fine Soil | 23 |
| % of Coarse loamy | 40 |
| Soil Water Permeability | High |
| **Soil moisture and ET** | |
| Volumetric Soil Moisture (%) | 23 |
| Estimated Soil Moisture (ha.m) | 72.47 |
| ET Losses (ha.m) | 79.82 |
| **Means of Water Extraction (%)** | |
| Gravity | 3 |
| Lifting | 97 |
| **Irrigation Methods (%)** | |
| Control Flooding | 100 |
| **Livestock (No.)** | |
| Cattle Population | 238 |
| Sheep Population | 20 |
| Goat Population | 121 |

# 8.3.4 KEY WATER CHALLENGES

## Socio-Economic

1. Male and female population is almost equal
2. 13 % of the population belongs to the ST category
3. 12% of the households are vulnerable
4. Access to drinking water through tap water connections is very low
5. Handling of grey water from the 88 households needs attention

## Water

1. Five traditional water bodies in the GP
2. Still agriculture, livestock, drinking depends on ground water
3. More Water demand for agriculture activities
4. Well irrigation and More ground water extraction
5. Less surface water utilization
6. 65.9 Ha-m of water is an available runoff

## Agriculture and Allied Sector

1. 13 % of the land covers the common area and 87% of the land covers an individual land area
2. Land under bad catchment is more
3. Main crop in the GP is paddy which is cultivated about 70 ha of land
4. The main source for paddy cultivation is groundwater
5. 97% of the water is given to paddy fields by lifting methods of irrigation
6. Remaining water is extracted by gravity method of irrigation
7. Coarse loamy soil is predominant in the GP

# 8.3.5 PERSPECTIVE PLAN- PROPOSED WORKS: 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 to reduce the vulnerability of the GP. About 49 ha (16.7 %) the total land area is taken for WASCA treatment activities like plantation and conservation works. The total proposed area for treatment is 39.16 ha, more attention is for non-agriculture land and non-agriculture land followed by miscellaneous Tree crop and irrigation area (Figure 8.9). Through the proposed conservation activities, 13 ha.m run off would be harvested in which, about 3.5 % of the runoff from the good catchment, 48 % of the runoff from the average catchment and 47.5 % of the conservation from the bad catchment area (Figure 8.10).

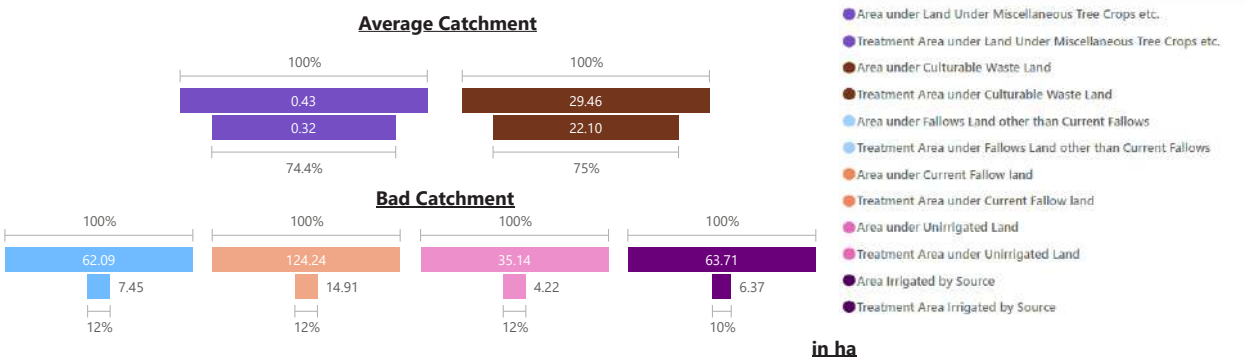



*Figure 8.9. Proposed land resource treatment area in Marianallur GP*

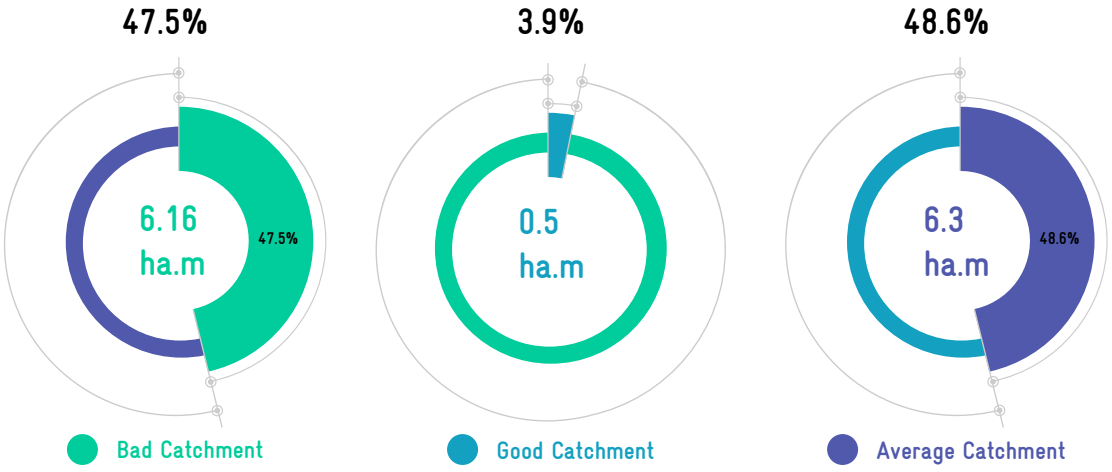



*Figure 8.10. Expected run off conservation after treatment*

The detailed proposed activities along with silent parameters are showed in the Table 49 for 2021-2024.

More attention towards common and public land developments are given with appropriate actions.

TABLE 49. PERSPECTIVE PLAN OF MARIYANALLUR GP - FY (2021-2024)

| Name of the work | Ridge type | No. of Works | Estimated cost (INR in Lakhs) | Estimated Person Days |
|---|---|---|---|---|
| **CWRM Water Action 1: Improvement of Public & Common Lands Development** | | | | |
| Contour Continuous Bunds for Afforestation area (m) | Upper | 1 | 0.025 | 10 |
| Composting (No. of units) | Lower | 12 | 2.04 | 180 |
| Afforestation in Public/common lands (ha) | Upper | 1 | 8.6 | 3,344 |
| Linear Plantation (Km) | Middle | 5 | 9 | 3,515 |
| Canal Bund Plantation (Km) | Lower | 1 | 7.5 | 2,930 |
| Avenue plantation (Km) | Middle | 6 | 10.8 | 4,218 |
| Restoration of water bodies: a.PWD and Tanks (Nos) | Lower | 2 | 10 | 1,600 |
| Restoration of water bodies: b. Ponds (Nos) | | 3 | 3 | 600 |
| Artificial Recharge Structure (No. of units) | | 25 | 37.5 | 5,865 |
| Drainage Line Treatment (m) | Upper | 1 | 0.03 | 5 |
| **Subtotal** | | **47** | **88.49** | **22267** |
| **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 | 18 | 27 | 10,548 |
| Construction of Farm Ponds - Individual (No .of units) | | 14 | 28 | 10,934 |
| Land development - Individual (Ha) | | 14 | 140 | 54,684 |
| Dry land Horticulture/Agro-forestry - Individual (ha) | | 2 | 17 | 6,642 |
| Azolla units - Individual (No. of units) | | 14 | 2.1 | 322 |
| NADEP Vermi compost (No. of units) | | 14 | 2.52 | 378 |
| Fodder development - Community & Individual (Nos) | | 14 | 20.72 | 32,816 |
| Cattle Shelters (No. of units) | | 14 | 29.68 | 4,634 |
| Goat Sheep Shelters (No. of units) | | 7 | 15.89 | 2,485 |
| Cattle Trough (No. of units) | | 14 | 0.7 | 84 |
| Construction of new open wells & Recharge Shafts (No. of units) | | 25 | 125 | 23,150 |
| **Sub Total Water Action -2** | | **150** | **408.61** | **1,46,677** |

| CWRM Water Action 3: Rural Water Management | | | | |
|---|---|---|---|---|
| **CWRM Water Action 3: Works in Lower Ridge** | | | | |
| Soak Pits (Community) (No. of units) | Lower | 2 | 0.26 | 40 |
| Soak Pits (Individual) (No. of units) | | 15 | 1.5 | 240 |
| Roof Rain Water Harvesting (No. of units) | | 2 | 8 | 1,250 |
| **Sub Total Water Action -3** | | **19** | **9.76** | **1,530** |
| **Gram Panchayat Total** | | **216** | **506.86** | **1,70,474** |

Regarding CWRM themes of the total number of projects identified, 69 % works are in agriculture and allied sector while 22 % works are in public and common land, and 9% works are in rural infrastructure respectively. Table 50 provides the estimates of the work budget, and personal days for three years from 2021-2024 in Mariyanallur GP.

TABLE 50. 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 | 47 | 88.49 | 22,267 |
| Agriculture and Allied sector development | 150 | 408.61 | 1,46,677 |
| Rural water management | 19 | 9.76 | 1,530 |
| TOTAL | 216 | 506.86 | 1,70,474 |

## 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 51). 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 51. 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 | Five traditional water bodies restored |
| 2 | Area under afforestation (ha) | 2 | 22 |
| 3 | % reduction in the annual surface runoff | 3 | 65.9 ha m surface runoff harvested and stored |
| 4 | The proportion of land treated under WASCA | 4 | 17% of the total geographical area of the village treated under WASCA in three years |
| 5 | Drainage line treatment (Km) | 5 | 1.15 |

**5** TRADITIONAL WATER BODIES RESTORED

**22 ha** AFFORESTATION

**65.9 ha.m** SURFACE RUNOFF HARVESTED

**17 %** AREA OF THE VILLAGE TREATED

**1.15 km** DRAINAGE LINES TREATED

## WASCA CWRM ACTION PLAN

### DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

| | INDICATOR | | OUTCOMES/ IMPACT |
|---|---|---|---|
| 1. | No of structures established for on-farm (in-situ) water harvesting in dry lands | 1. | 14 farm ponds established |
| 2. | The reducing area under fallow lands | 2. | 186.33 ha under fallow land restored for cultivation |
| 3. | Improvement in soil health | 3. | 14 units of vermi compost established |
| 4. | No of artificial recharge structures proposed | 4. | 15 artificial recharge structures were established to replenish groundwater flow |

**14** FARM PONDS

**186.33 ha** FALLOW LAND RESTORED

**14** VERMI COMPOST

**15** ARTIFICIAL RECHARGE STRUCTURES

## 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. | Two community level and 15 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. | 125 households established Nutri-gardens in homesteads |

**2** COMMUNITY & **15** INDIVIDUAL SOAK PITS

**2** COMMON ROOF RAINWATER HARVESTING

**125** 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 52).

TABLE 52. PROPOSALS FOR THE MGNREGS, MARIYANALLUR GP, TIRUVANNAMALAI DISTRICT

| | No of works | No of person days |
|---|---|---|
| Perspective plan | 216 | 1,70,474 |
| Annual plan | 86 | 68,189 |

## 8.3.7 PROPOSED ACTIVITY MAP

The proposed activity map for, Mariyanallur GP, Cheyyar Block shows a shelf of projects for all three year works from 2021-2024 (Figures 8.11 to 8.14).

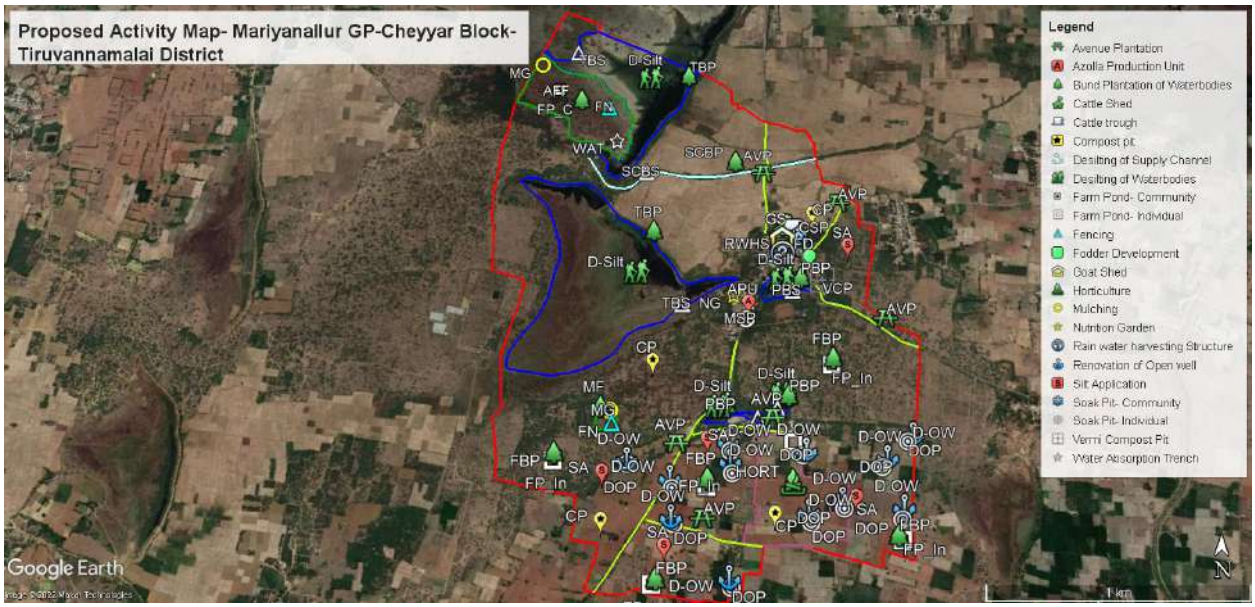



*Figure 8.11. Action plan map - Mariyanallur GP*

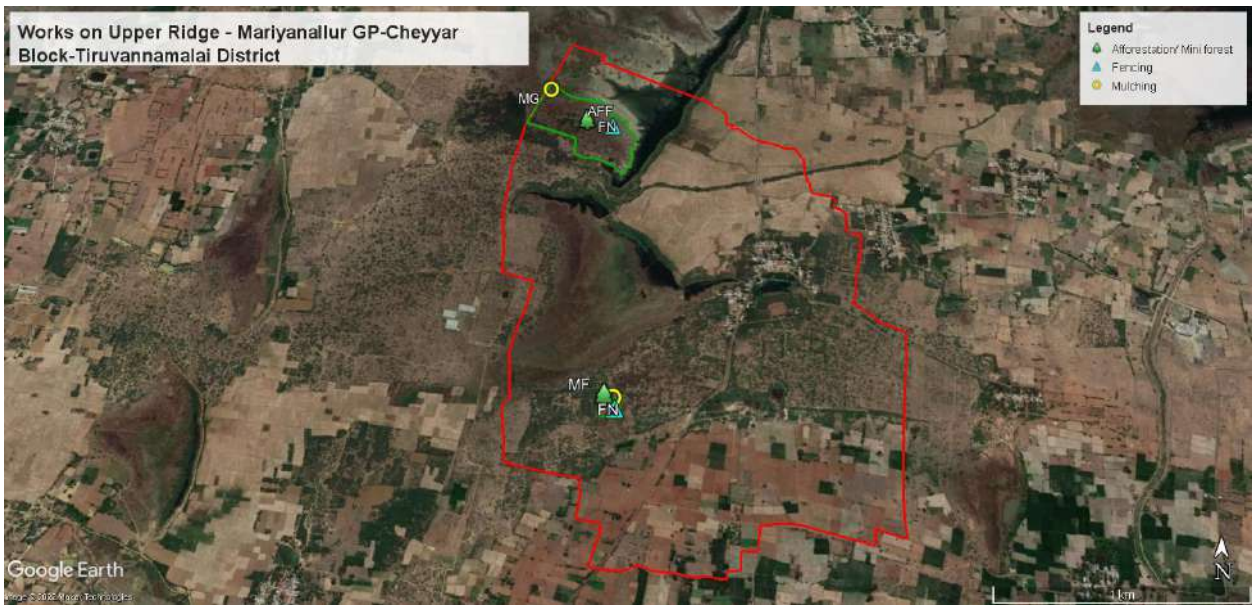



*Figure 8.12. Map of Works on Upper Ridge - Mariyanallur GP*

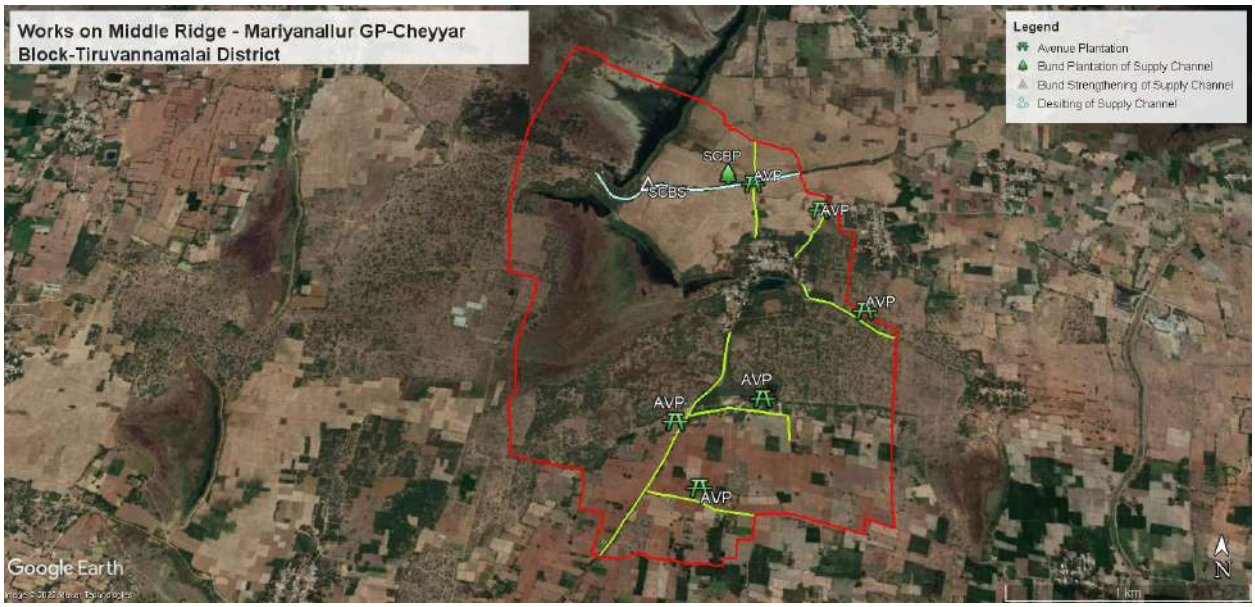



*Figure 8.13. Map of Works on Middle Ridge - Mariyanallur GP*

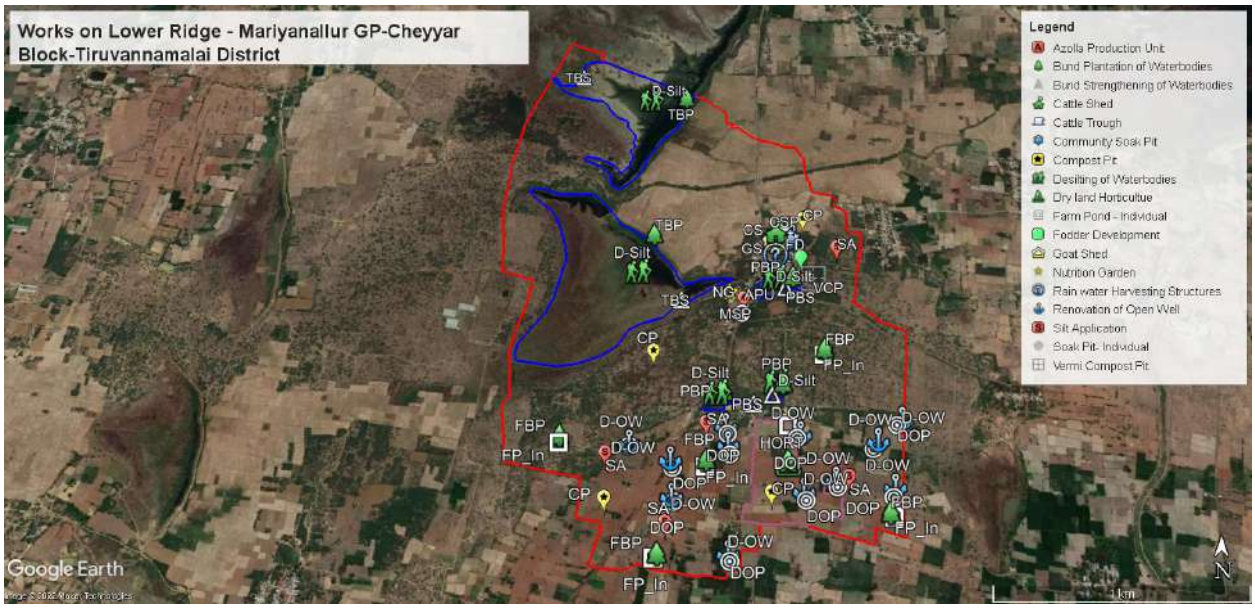
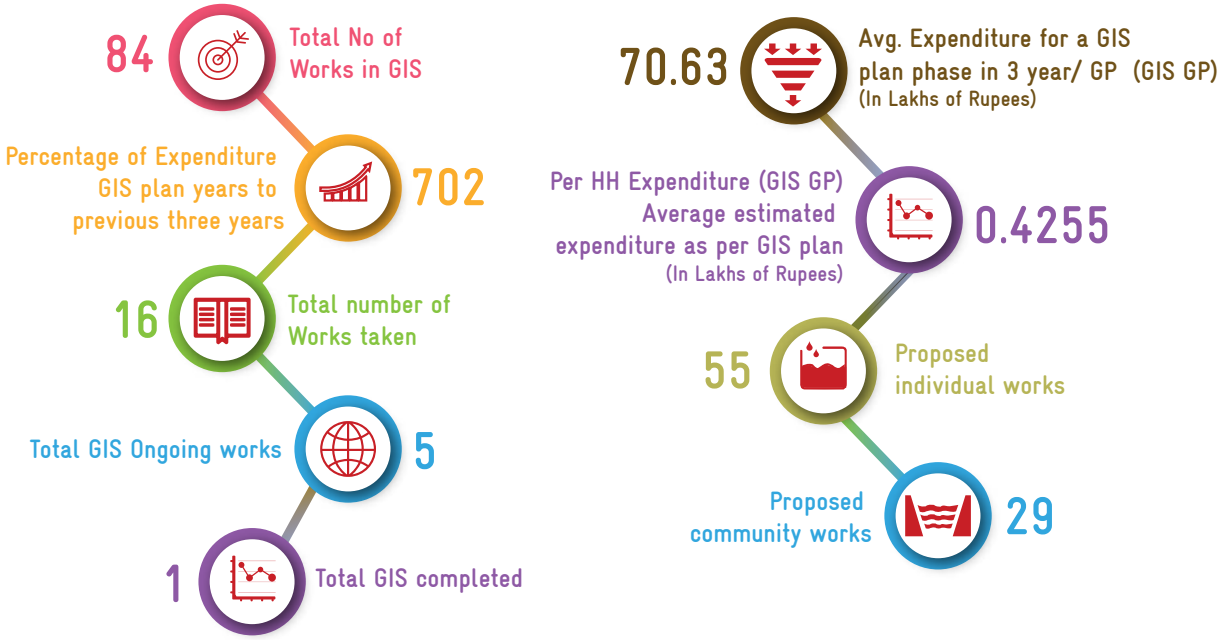



*Figure 8.14. Map of Works on Lower Ridge - Mariyanallur GP*

# 8.3.8 GIS PLAN IMPLEMENTATION AND KEY PARAMETERS

The GIS plan implementation and performance in Cheyyar Block is represented in Table 53.

TABLE 53. GIS PLAN IMPLEMENTATION, KEY PARAMETERS PERFORMANCE OF MARIYANALLUR 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

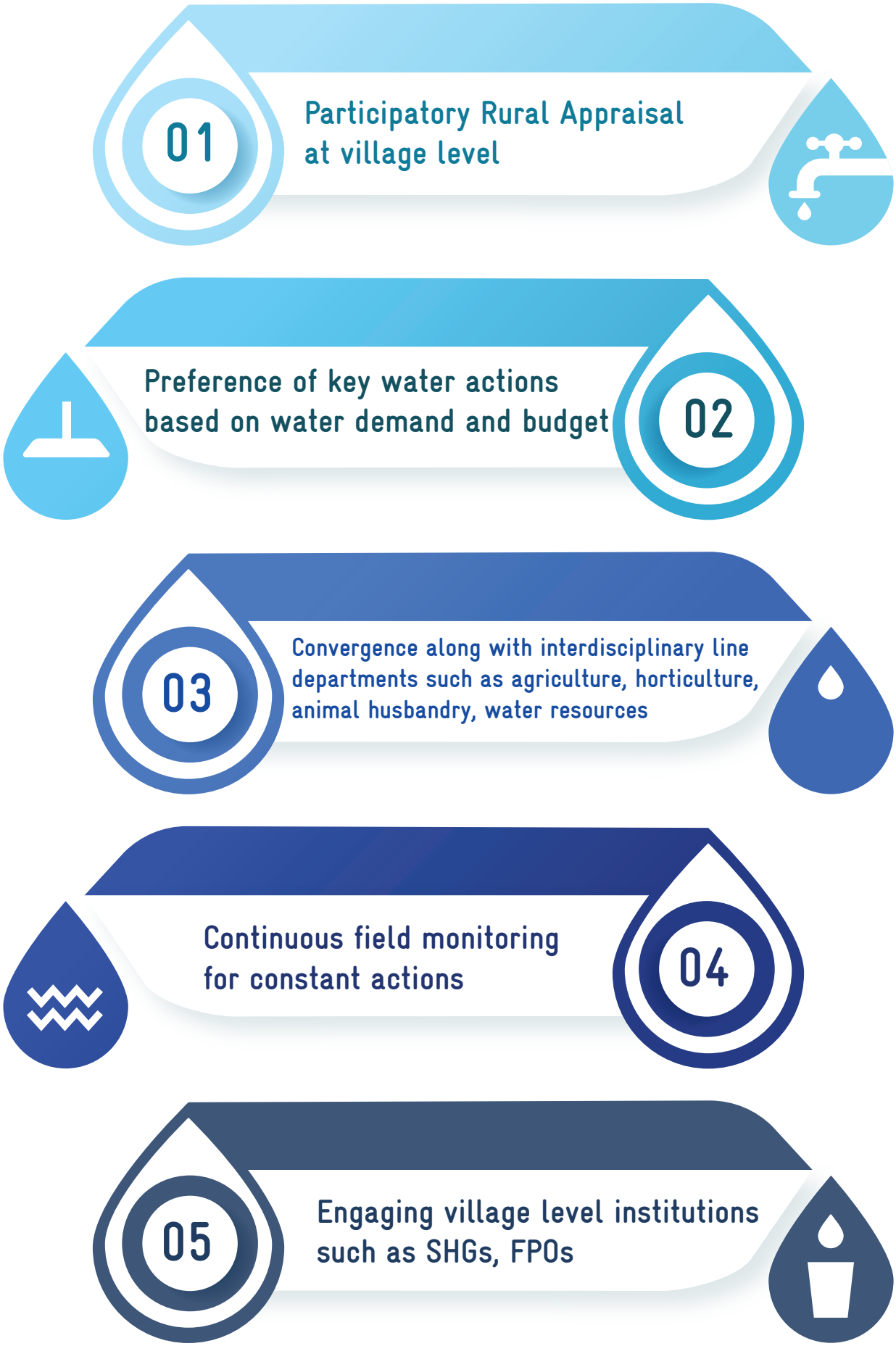
# CHAPTER 9

# 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 water demand is increasing at a fast rate due to rapid surge of population, industrial and economic growth. The evident changes in climate change and its extremities are bringing more threats to water security. Frequent monsoon failures lead to acute water scarcity and severe droughts. Thus, dependency on ground water has increased many folds during recent years that has resulted in lowering of ground water levels and even drying up of wells. WASCA TN took an initiate to address the problem holistically through comprehensive vulnerability assessment at District and Block level to identify the vulnerable area and its key problems. The 18 biophysical and socio-economic indicator of four interrelated areas via water, agriculture, socio-economic and climate used at District level are further expanded to 110 parameters at Block level. The spatial and non-spatial CWRM parameters for four 4 above mentioned interrelated areas are used to represent risk, sensitivity and adaptive capacity of the GPs, which eventually reflects rural water security. The key problems of the Blocks are identified and the best possible adaptation options 'key water actions' are intended under WASCA initiatives in public and common land, agriculture and allied sector, rural infrastructure areas. All the indicators/parameters and key water action are accompanied with 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 enables to adopt ecosystem approach in promoting nature based solutions. The productive impacts are visualized through convergence approach by mobilizing necessary finance, knowledge and technologies at the end of the three years of implementation. This integrated Block level approach will be more effective with Block level climate information which is not currently available.

Recommendations towards stable development and its progressive outcome are,


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

# ANNEXURES

# ANNEXURE 1

## TYPES OF GPS

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

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

# ANNEXURE 3.1

## KEY CWRM PARAMETER FROM SECONDARY SOURCES

| Key CWRM Parameter | Secondary Source |
|---|---|
| **Socio economic** | |
| Geographical Area | Census-2011, MoHA, GOI *https://censusindia.gov.in/2011census/dchb/DCHB.html* |
| Male Population | |
| Female Population | |
| Total Population | |
| SC Population | |
| ST Population | |
| Vulnerable population | |
| Households (HH's) | Socio-economic caste census (SECC) 2011 *https://secc.gov.in/homePageLgd.htm* |
| Only one room HH's | |
| Female Headed HH's | |
| Vulnerable Households | |
| % of Vulnerable Households | |
| Registered 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

| Key CWRM Parameter / Gram Panchayat | Canal Network | | | Tradational Water bodies | | | |
|---|---|---|---|---|---|---|---|
| | Length of Main Canal (m) | Length of Minor Canal (m) | Length of Dis-tributaries (m) | Water Courses (Field Channels) (m) | No. of Tanks (PWD & Union) (No.) | No. of Ooranis (No.) | Other Surface Water Bodies (No.) |
| Arathrivelur | 3,500.00 | - | - | - | 2.00 | - | 1.00 |
| Arugavoor | 1,800.00 | - | - | 950.00 | 2.00 | - | 1.00 |
| Enathavadi | 1,800.00 | - | - | 800.00 | 2.00 | - | 6.00 |
| Eraiyur | 2,900.00 | - | - | 900.00 | - | - | 3.00 |
| Kazhanipakkam | 3,900.00 | - | - | 1,100.00 | 4.00 | - | - |
| Kaduganur | 2,000.00 | - | - | 700.00 | 3.00 | - | 2.00 |
| Kizhapalanthai | 2,900.00 | - | - | 980.00 | 1.00 | - | 1.00 |
| Kazhiyur | 2,300.00 | 1.50 | - | 1,500.00 | 7.00 | - | - |
| Korukkai | - | - | - | 960.00 | 3.00 | - | - |
| Korukkathur | 2,920.00 | - | - | 800.00 | 2.00 | - | 1.00 |
| Madurai | 1,350.00 | - | - | 500.00 | 2.00 | - | 3.00 |
| Mariyanallur | 2,000.00 | - | - | 700.00 | 2.00 | - | 3.00 |
| Melnagarambedu | 860.00 | - | - | 400.00 | 3.00 | - | 2.00 |
| Mukkur | 3,700.00 | - | - | - | 2.00 | - | 4.00 |
| Murukathampoondi | - | - | - | - | 4.00 | - | - |
| Naval | 3,400.00 | 1,600.00 | - | - | 1.00 | - | 5.00 |
| Navalpakkam | 2,000.00 | - | - | - | 2.00 | - | 1.00 |
| Nedumpirai | - | 1,081.00 | - | - | 4.00 | - | 3.00 |
| Paingkinar | 1,550.00 | 700.00 | - | - | 1.00 | - | 2.00 |
| Pappanthangal | 5,560.00 | - | - | - | 3.00 | - | - |
| Parasur | 4,000.00 | - | - | - | 6.00 | - | - |
| Perumpallam | 1,200.00 | - | - | - | 3.00 | - | 1.00 |
| Perungalathur | 2,000.00 | 1,500.00 | - | - | 2.00 | - | 3.00 |
| Puliyarampakkam | - | 2,800.00 | - | - | 5.00 | - | - |
| Ramakrishnapuram | 9,750.00 | - | - | - | 4.00 | - | - |

| Key CWRM Parameter / Gram Panchayat | Canal Network | | | Tradational Water bodies | | | |
|---|---|---|---|---|---|---|---|
| | Length of Main Canal (m) | Length of Minor Canal (m) | Length of Dis-tributaries (m) | Water Courses (Field Channels) (m) | No. of Tanks (PWD & Union) (No.) | No. of Ooranis (No.) | Other Surface Water Bodies (No.) |
| Sengattankundil | 2,400.00 | - | - | - | 2.00 | - | 2.00 |
| Siruveliyanallur | - | - | - | - | - | - | 3.00 |
| Sundivakkam | 2,000.00 | - | - | - | 2.00 | - | - |
| Thirumani | 4,100.00 | - | - | - | 3.00 | - | - |
| Vadangampattu | 1,800.00 | - | - | - | 3.00 | - | - |
| Thozhupedu | 5,700.00 | - | - | - | 5.00 | - | 3.00 |
| Thandarai | 2,000.00 | - | - | - | 3.00 | - | 2.00 |
| Thumbai | - | 1,500.00 | - | - | 2.00 | - | 1.00 |
| Vadapoondipattu | - | 1,800.00 | - | - | - | - | 5.00 |
| Vakkadai | 3,000.00 | 1,800.00 | - | - | 2.00 | - | 5.00 |
| Vadathandalam | 1,005.00 | - | - | - | 4.00 | - | 3.00 |
| Veliyanallur | 3,300.00 | 3,200.00 | - | - | 3.00 | - | 11.00 |
| Vinnavadi | 1,200.00 | - | - | - | 1.00 | - | 8.00 |
| Mleseeshamangalam | 10,266.00 | - | - | - | 6.00 | - | 3.00 |
| Palauthangal | 1,094.00 | - | - | - | - | - | 4.00 |
| Arumparuthi | - | - | - | - | 2.00 | - | 9.00 |
| Duli | 2,142.00 | 984.00 | - | - | 3.00 | - | 4.00 |
| Kunnathur | 589.00 | 12,100.00 | - | - | 2.00 | - | 4.00 |
| Maligaipattu | - | 11,240.00 | 2,245.00 | - | 4.00 | - | 8.00 |
| Munugapattu | - | 11,240.00 | 2,245.00 | - | 2.00 | 8.00 | 8.00 |
| Palli | 1,123.00 | - | - | - | 4.00 | - | 16.00 |
| Pillandi | - | 11,240.00 | 2,245.00 | - | 3.00 | - | 4.00 |
| Pudukottai | - | 11,240.00 | 2,245.00 | - | - | 8.00 | 10.00 |
| Talarapadi | - | 11,240.00 | 2,245.00 | - | 4.00 | - | 2.00 |
| Thenpoondipattu | - | 11,240.00 | 2,245.00 | - | 5.00 | - | 5.00 |
| Vadugapattu | - | 11,240.00 | 2,245.00 | - | 1.00 | - | 6.00 |
| Vinnamangalam | - | 11,240.00 | 2,245.00 | - | 1.00 | - | 7.00 |
| Kilpudupakkam | - | - | - | - | 1.00 | - | 3.00 |

| Key CWRM Parameter / Gram Panchayat | Irrigation Facilities (ha) | | | Catchment Area wise Available Runoff | | | Run Off Conserved (Exisiting) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Area under Tank Irrigation | Area under Canal Irrigation | Area under Open & Tube Well Irrigation | Good Catchment Area (ha.m) | Average Catchment Area (ha.m) | Bad Catchment Area (ha.m) | Good Catchment Area (ha.m) | Average Catchment Area (ha.m) | Bad Catchment Area (ha.m) |
| Arathrivelur | - | - | 49.16 | 42.40 | 4.10 | 19.20 | 10.50 | 3.10 | 1.90 |
| Arugavoor | - | - | 50.39 | 45.50 | 4.40 | 71.10 | 2.50 | 3.30 | 7.30 |
| Enathavadi | - | - | 64.87 | 38.70 | 5.50 | 73.70 | 19.00 | 4.10 | 9.80 |
| Eraiyur | - | - | 137.08 | 37.00 | 9.20 | 59.40 | 7.20 | 6.90 | 7.30 |
| Kazhanipakkam | - | 0.39 | 58.97 | 17.50 | 0.70 | 25.60 | 4.30 | 0.50 | 1.40 |
| Kaduganur | - | 0.21 | 82.47 | 58.50 | 0.80 | 79.50 | 42.70 | 0.60 | 7.50 |
| Kizhapalanthai | - | 0.29 | 43.58 | 27.90 | 3.50 | 39.10 | 3.31 | 2.61 | 5.76 |
| Kazhiyur | - | - | 280.19 | 85.60 | 3.60 | 98.90 | 5.15 | 2.71 | 13.48 |
| Korukkai | - | - | 71.77 | 1.70 | 0.10 | 46.40 | 0.40 | 0.08 | 4.65 |
| Korukkathur | - | - | 48.76 | 2.50 | 1.50 | 55.30 | 1.60 | 0.30 | - |
| Madurai | - | - | 62.04 | 18.40 | 3.00 | 25.90 | 1.24 | 2.23 | 4.74 |
| Mariyanallur | - | - | 63.71 | 4.20 | 8.40 | 53.30 | 0.50 | 6.30 | 6.16 |
| Melnagarambedu | 106.49 | - | 30.81 | 4.20 | 6.70 | 70.90 | 2.97 | 5.05 | 5.85 |
| Mukkur | - | - | 134.83 | 37.40 | 1.70 | 57.90 | 1.90 | 1.30 | 8.80 |
| Murukathampoondi | - | - | 22.61 | 5.60 | 0.50 | 15.90 | 2.70 | 0.40 | 1.90 |
| Naval | - | - | 117.04 | 26.10 | 0.80 | 45.70 | 0.95 | 0.56 | 2.87 |
| Navalpakkam | - | - | 54.84 | 65.60 | 0.40 | 50.20 | 13.28 | 0.27 | 1.89 |
| Nedumpirai | - | - | 42.56 | 45.90 | 0.20 | 88.30 | 30.97 | 0.15 | 11.24 |
| Paingkinar | - | - | 33.04 | 18.90 | 5.20 | 49.10 | 6.40 | 3.90 | 8.20 |
| Pappanthangal | - | - | 67.21 | 30.50 | 6.70 | 67.80 | 1.22 | 5.05 | 15.07 |
| Parasur | - | - | 120.88 | 18.00 | 37.00 | 66.70 | 2.20 | 27.79 | 10.02 |
| Perumpallam | - | - | 23.31 | 47.30 | 2.80 | 47.70 | 3.60 | 2.10 | 4.80 |
| Perungalathur | - | - | 78.87 | 6.50 | 10.40 | 65.20 | 3.87 | 7.82 | 5.97 |
| Puliyarampakkam | - | - | 42.82 | 46.00 | 12.00 | 51.50 | 2.82 | 9.01 | 8.55 |
| Ramakrishnapuram | - | - | 61.12 | 15.70 | 2.90 | 26.50 | 1.02 | 2.15 | 4.48 |
| Sengattankundil | - | - | 102.95 | 45.20 | 0.20 | 70.10 | 3.02 | 0.11 | 9.69 |

| Key CWRM Parameter / Gram Panchayat | Irrigation Facilities (ha) | | | Catchment Area wise Available Runoff | | | Run Off Conserved (Exisiting) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Area under Tank Irrigation | Area under Canal Irrigation | Area under Open & Tube Well Irrigation | Good Catchment Area (ha.m) | Average Catchment Area (ha.m) | Bad Catchment Area (ha.m) | Good Catchment Area (ha.m) | Average Catchment Area (ha.m) | Bad Catchment Area (ha.m) |
| Siruveliyanallur | - | - | 22.61 | 5.60 | 0.50 | 15.90 | 0.35 | 0.39 | 3.33 |
| Sundivakkam | - | - | 52.76 | 42.80 | 2.40 | 28.70 | 8.98 | 1.77 | 4.34 |
| Thirumani | - | - | 70.68 | 63.20 | 0.80 | 66.50 | 7.49 | 0.63 | 4.84 |
| Vadangampattu | - | - | 46.19 | 28.30 | 1.70 | 21.50 | 6.22 | 1.30 | 3.81 |
| Thozhupedu | - | - | 72.19 | 58.40 | 2.00 | 88.90 | 3.90 | 1.50 | 3.90 |
| Thandarai | - | - | 35.51 | 41.00 | 0.80 | 31.30 | 8.96 | 0.58 | 3.60 |
| Thumbai | - | 6.83 | 70.67 | 1.00 | 19.50 | 28.10 | 0.50 | 14.60 | 3.90 |
| Vadapoondipattu | - | - | 65.23 | 10.50 | 3.00 | 23.30 | 1.30 | 2.20 | 1.90 |
| Vakkadai | - | 0.48 | 75.48 | 81.80 | 1.50 | 61.60 | 16.50 | 1.10 | 13.30 |
| Vadathandalam | - | - | 87.66 | 12.40 | 4.60 | 39.00 | 0.30 | 3.50 | 3.80 |
| Veliyanallur | - | 6.50 | 58.21 | 58.00 | 5.80 | 107.80 | 11.20 | 4.30 | 25.30 |
| Vinnavadi | - | - | 14.98 | 7.20 | 14.40 | 22.90 | 0.60 | 10.80 | 2.60 |
| Mleseeshamangalam | 116.26 | - | 321.38 | 183.90 | 1.50 | 228.10 | 25.14 | 1.18 | 23.49 |
| Palauthangal | 116.26 | - | 321.38 | 183.90 | 1.50 | 228.10 | 15.80 | 1.10 | 22.60 |
| Arumparuthi | - | - | 98.84 | 66.50 | 0.60 | 87.10 | 13.10 | 0.50 | 11.70 |
| Duli | - | 31.25 | 86.90 | 58.00 | 0.20 | 86.30 | 21.20 | 0.10 | 6.50 |
| Kunnathur | - | - | 95.45 | 37.50 | 2.00 | 62.80 | 20.70 | 1.50 | 8.50 |
| Maligaipattu | - | - | 87.04 | 90.20 | 1.20 | 79.70 | 15.90 | 0.90 | 1.60 |
| Munugapattu | - | - | 116.09 | 41.00 | 4.00 | 55.30 | 17.10 | 3.00 | 6.30 |
| Palli | 30.03 | - | 199.45 | 128.40 | 18.30 | 139.10 | 20.70 | 13.70 | 28.30 |
| Pillandi | - | - | 65.14 | 51.70 | - | 56.10 | 2.80 | - | 4.10 |
| Pudukottai | - | - | 187.99 | 72.70 | 6.80 | 77.60 | 1.40 | 5.10 | 11.60 |
| Talarapadi | - | - | 104.11 | 39.20 | 4.40 | 86.40 | 2.14 | 3.48 | 17.51 |
| Thenpoondipattu | - | - | 69.51 | 31.40 | 7.90 | 97.00 | 15.00 | 6.60 | 10.50 |
| Vadugapattu | - | - | 148.49 | 35.80 | - | 48.70 | 17.50 | - | 10.20 |
| Vinnamangalam | - | - | 187.99 | 78.20 | 26.70 | 146.80 | 5.47 | 20.94 | 29.20 |
| Kilpudupakkam | - | 32.70 | 53.73 | 46.30 | 6.80 | 39.60 | 9.98 | 5.13 | 1.84 |

| Key CWRM Parameter / Gram Panchayat | Watershed and Drainage Networks | | | Water Demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Length of Natural Drainage Lines (m) | No. of Natural Drainage Lines (No.) | No. of MiCriticalo Watersheds (No.) | For Humans (ha.m) | For Livestock (ha.m) | For Agriculture (ha.m) | % GWUtilization for Drinking (%) | % GWUtilization for Livestock (%) | % GWUtilization for Agriculture. (%) | % SW Utilization for Drinking (%) | % SW Utilization for Livestock (%) | % SW Utilization for Agriculture (%) |
| Arathrivelur | 1,241.00 | 1.00 | 3.00 | 2.03 | 2.40 | 86.39 | 9.00 | 97.00 | 94.00 | 91.00 | 3.00 | 6.00 |
| Arugavoor | 1,026.00 | 2.00 | 6.00 | 4.23 | 1.99 | 78.09 | 2.00 | 82.00 | 97.00 | 98.00 | 18.00 | 3.00 |
| Enathavadi | 4,766.00 | 5.00 | 5.00 | 5.03 | 2.89 | 195.01 | 19.00 | 85.00 | 97.00 | 81.00 | 15.00 | 3.00 |
| Eraiyur | 3,276.00 | 3.00 | 3.00 | 3.75 | 1.26 | 193.10 | 22.00 | 93.00 | 99.00 | 78.00 | 7.00 | 1.00 |
| Kazhanipakkam | 827.00 | 2.00 | 2.00 | 2.26 | 0.86 | 158.70 | 80.00 | 2,120.00 | 99.00 | 20.00 | -2,020.00 | 1.00 |
| Kaduganur | 3,290.00 | 3.00 | 4.00 | 3.51 | 1.80 | 163.49 | 6.00 | 89.00 | 98.00 | 94.00 | 11.00 | 2.00 |
| Kizhapalanthai | 1,776.00 | 2.00 | 3.00 | 4.44 | 1.72 | 146.41 | 41.00 | 84.00 | 98.00 | 59.00 | 16.00 | 2.00 |
| Kazhiyur | 5,666.00 | 5.00 | 5.00 | 4.69 | 1.98 | 343.33 | 8.00 | 93.00 | 98.00 | 92.00 | 7.00 | 2.00 |
| Korukkai | 988.00 | 2.00 | 2.00 | 2.69 | 1.86 | 136.72 | 21.00 | 88.00 | 97.00 | 79.00 | 12.00 | 3.00 |
| Korukkathur | 202.00 | 2.00 | 3.00 | 5.23 | 1.28 | 129.24 | 9.00 | 89.00 | 31.00 | 91.00 | 11.00 | 69.00 |
| Madurai | 2,185.00 | 5.00 | 4.00 | 2.24 | 1.37 | 118.60 | 88.00 | 98.00 | 98.00 | 12.00 | 2.00 | 2.00 |
| Mariyanallur | 1,150.00 | 3.00 | 4.00 | 1.39 | 0.92 | 119.17 | 92.00 | 94.00 | 93.00 | 8.00 | 6.00 | 7.00 |
| Melnagarambedu | 1,622.00 | 3.00 | 3.00 | 5.84 | 3.39 | 219.16 | 96.00 | 84.00 | 100.00 | 4.00 | 16.00 | 0.00 |
| Mukkur | 963.00 | 4.00 | 5.00 | 4.42 | 1.84 | 239.78 | 0.00 | 95.00 | 96.00 | 100.00 | 5.00 | 4.00 |
| Murukathampoondi | 288.00 | 1.00 | 3.00 | 2.23 | 1.44 | 99.16 | 10.00 | 90.00 | 99.00 | 90.00 | 10.00 | 1.00 |
| Naval | 298.00 | 2.00 | 3.00 | 3.54 | 1.10 | 223.07 | 82.00 | 80.00 | 100.00 | 18.00 | 20.00 | 0.00 |
| Navalpakkam | 731.00 | 2.00 | 5.00 | 5.92 | 2.89 | 73.34 | 18.00 | 97.00 | 96.00 | 82.00 | 3.00 | 4.00 |
| Nedumpirai | 1,654.00 | 3.00 | 4.00 | 3.88 | 3.28 | 233.00 | 100.00 | 92.00 | 92.00 | 0.00 | 8.00 | 8.00 |
| Paingkinar | 2,774.00 | 3.00 | 3.00 | 7.33 | 0.72 | 66.28 | 4.00 | 99.00 | 99.00 | 96.00 | 1.00 | 1.00 |
| Pappanthangal | 2,625.00 | 4.00 | 4.00 | 5.33 | 2.98 | 172.73 | 17.00 | 94.00 | 97.00 | 83.00 | 6.00 | 3.00 |
| Parasur | 5,361.00 | 5.00 | 5.00 | 6.30 | 2.51 | 264.35 | 100.00 | 89.00 | 98.00 | 0.00 | 11.00 | 2.00 |
| Perumpallam | 934.00 | 2.00 | 6.00 | 2.75 | 2.10 | 106.68 | 100.00 | 82.00 | 96.00 | 0.00 | 18.00 | 4.00 |
| Perungalathur | 1,746.00 | 3.00 | 4.00 | 4.86 | 1.76 | 134.10 | 57.00 | 88.00 | 98.00 | 43.00 | 12.00 | 2.00 |
| Puliyarampakkam | 2,513.00 | 2.00 | 5.00 | 4.58 | 1.47 | 68.01 | 17.00 | 90.00 | 100.00 | 83.00 | 10.00 | 0.00 |
| Ramakrishnapuram | 100.00 | 1.00 | 3.00 | 3.89 | 1.93 | 76.07 | 7.00 | 93.00 | 94.00 | 93.00 | 7.00 | 6.00 |
| Sengattankundil | 1,128.00 | 2.00 | 5.00 | 4.48 | 1.97 | 214.56 | 10.00 | 94.00 | 96.00 | 90.00 | 6.00 | 4.00 |

| Key CWRM Parameter / Gram Panchayat | Watershed and Drainage Networks | | | Water Demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Length of Natural Drainage Lines (m) | No. of Natural Drainage Lines (No.) | No. of MiCriticalo Watersheds (No.) | For Humans (ha.m) | For Livestock (ha.m) | For Agriculture (ha.m) | % GWUtilization for Drinking (%) | % GWUtilization for Livestock (%) | % GWUtilization for Agriculture. (%) | % SW Utilization for Drinking (%) | % SW Utilization for Livestock (%) | % SW Utilization for Agriculture (%) |
| Siruveliyanallur | - | 1.00 | 3.00 | 3.11 | 1.44 | 99.16 | 10.00 | 90.00 | 99.00 | 90.00 | 10.00 | 1.00 |
| Sundivakkam | - | 1.00 | 4.00 | 1.72 | 0.72 | 105.24 | 8.00 | 99.00 | 99.00 | 92.00 | 1.00 | 1.00 |
| Thirumani | - | 1.00 | - | 9.90 | 3.30 | 100.62 | 14.00 | 99.00 | 97.00 | 86.00 | 1.00 | 3.00 |
| Vadangampattu | - | 1.00 | 2.00 | 1.76 | 1.09 | 110.29 | 6.00 | 85.00 | 94.00 | 94.00 | 15.00 | 6.00 |
| Thozhupedu | - | 5.00 | 4.00 | 4.41 | 4.20 | 233.23 | 15.00 | 90.00 | 96.00 | 85.00 | 10.00 | 4.00 |
| Thandarai | - | 2.00 | 4.00 | 4.50 | 2.40 | 188.83 | 91.00 | 84.00 | 99.00 | 9.00 | 16.00 | 1.00 |
| Thumbai | - | 1.00 | - | 1.73 | 1.06 | 97.81 | 47.00 | 96.00 | 99.00 | 53.00 | 4.00 | 1.00 |
| Vadapoondipattu | - | 3.00 | 4.00 | 2.65 | 1.53 | 83.63 | 7.00 | 89.00 | 92.00 | 93.00 | 11.00 | 8.00 |
| Vakkadai | 81.00 | 1.00 | 4.00 | 3.85 | 1.68 | 273.28 | 31.00 | 99.00 | 99.00 | 69.00 | 1.00 | 1.00 |
| Vadathandalam | 2,998.00 | 3.00 | 2.00 | 3.67 | 2.47 | 62.18 | 11.00 | 89.00 | 99.00 | 89.00 | 11.00 | 1.00 |
| Veliyanallur | 6,144.00 | 6.00 | 7.00 | 4.21 | 2.39 | 244.16 | 28.00 | 93.00 | 94.00 | 72.00 | 7.00 | 6.00 |
| Vinnavadi | 557.00 | 2.00 | 4.00 | 3.38 | 1.20 | 165.10 | 28.00 | 0.00 | 98.00 | 72.00 | 100.00 | 2.00 |
| Mleseeshamangalam | 9,816.00 | 5.00 | 7.00 | 13.62 | 3.60 | 490.39 | 63.00 | 87.00 | 95.00 | 37.00 | 13.00 | 5.00 |
| Palauthangal | 954.62 | 2.00 | 3.00 | 3.41 | 3.60 | 490.39 | 2.00 | 91.00 | 95.00 | 98.00 | 9.00 | 5.00 |
| Arumparuthi | 3,861.69 | 6.00 | 4.00 | 6.38 | 2.84 | 177.30 | 0.00 | 93.00 | 92.00 | 100.00 | 7.00 | 8.00 |
| Duli | 3,125.63 | 6.00 | 4.00 | 4.75 | 3.85 | 232.34 | 16.00 | 93.00 | 94.00 | 84.00 | 7.00 | 6.00 |
| Kunnathur | 12,689.00 | 7.00 | 5.00 | 4.08 | 3.30 | 200.62 | 9.00 | 92.00 | 99.00 | 91.00 | 8.00 | 1.00 |
| Maligaipattu | 2,245.00 | - | 5.00 | 3.81 | 2.32 | 220.22 | 44.32 | 87.45 | 97.23 | 55.68 | 12.55 | 2.77 |
| Munugapattu | 16,207.00 | 9.00 | 6.00 | 10.24 | 1.86 | 143.19 | 39.00 | 86.00 | 98.00 | 61.00 | 14.00 | 2.00 |
| Palli | 1,123.00 | 6.00 | 6.00 | 8.71 | 7.35 | 623.81 | 0.00 | 0.00 | 96.00 | 100.00 | 100.00 | 4.00 |
| Pillandi | 16,207.00 | 9.00 | 2.00 | 4.04 | 3.03 | 101.07 | 48.00 | 97.00 | 98.00 | 52.00 | 3.00 | 2.00 |
| Pudukottai | 1,207.00 | 9.00 | 3.00 | 7.31 | 7.60 | 85.53 | 18.00 | 4.00 | 4.00 | 82.00 | 96.00 | 96.00 |
| Talarapadi | 2,701.00 | 9.00 | 3.00 | 3.84 | 2.86 | 218.77 | 0.00 | 0.00 | 92.00 | 100.00 | 100.00 | 8.00 |
| Thenpoondipattu | 13,485.00 | 9.00 | 4.00 | 4.30 | 5.82 | 225.92 | 18.00 | 4.00 | 4.00 | 82.00 | 96.00 | 96.00 |
| Vadugapattu | 2,093.00 | 9.00 | 6.00 | 3.34 | 0.82 | 113.77 | 61.00 | 99.00 | 98.00 | 39.00 | 1.00 | 2.00 |
| Vinnamangalam | 1,939.00 | 9.00 | 7.00 | 9.54 | 7.26 | 294.41 | 0.00 | 0.00 | 99.00 | 100.00 | 100.00 | 1.00 |
| Kilpudupakkam | 1,587.89 | 3.00 | 5.00 | 18.92 | 2.64 | 193.57 | 0.00 | 91.00 | 100.00 | 100.00 | 9.00 | 0.00 |

# ANNEXURE 3.7

## GP WISE STATUS OF AGRICULTURE RESOURCE

| Key CWRM Parameter / Gram Panchayat | Area under Land Resources | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Non-Agricultural Uses (ha) | Barren & Un-cultivable Land (ha) | Permanent Pastures and Other Grazing Land (ha) | Land Under Miscellaneous Tree Criticalops etc. (ha) | Culturable Waste Land (ha) | Fallows Land other than Current Fallows (ha) | Current Fallow land (ha) | Unirrigated Land (ha) | Area Irrigated by Source (ha) |
| Arathrivelur | 113 | - | - | 7 | 7 | 11 | 31 | 11 | 49 |
| Arugavoor | 121 | 1 | 15 | 0 | - | 19 | 254 | 56 | 50 |
| Enathavadi | 103 | - | - | 3 | 17 | 62 | 179 | 88 | 65 |
| Eraiyur | 99 | - | - | 20 | 12 | - | 157 | 23 | 137 |
| Kazhanipakkam | 42 | 4 | - | 3 | - | 1 | 13 | 64 | 59 |
| Kaduganur | - | 156 | 1 | 0 | 1 | 113 | 45 | 185 | 82 |
| Kizhapalanthai | 68 | 6 | - | 12 | - | 93 | 40 | 32 | 44 |
| Kazhiyur | 224 | 4 | 8 | 4 | - | 17 | 190 | 41 | 280 |
| Korukkai | 4 | - | - | - | 0 | 20 | 93 | 63 | 72 |
| Korukkathur | 60 | - | - | 12 | - | 72 | 78 | 77 | 49 |
| Madurai | 49 | - | - | - | 11 | - | 72 | 4 | 62 |
| Mariyanallur | 11 | - | - | 0 | 29 | 62 | 124 | 35 | 64 |
| Melnagarambedu | 119 | 5 | 15 | 7 | 1 | - | 192 | 50 | 137 |
| Mukkur | 100 | - | - | - | 6 | 20 | 79 | 76 | 135 |
| Murukathampoondi | 15 | - | - | - | 2 | - | 46 | 16 | 23 |
| Naval | 70 | - | - | - | 3 | 2 | 97 | 29 | 117 |
| Navalpakkam | 175 | - | - | - | 1 | - | 136 | 77 | 55 |
| Nedumpirai | 109 | 14 | - | - | 1 | 96 | 185 | 149 | 43 |
| Paingkinar | 37 | 14 | 11 | - | 8 | 100 | 69 | 60 | 33 |
| Pappanthangal | 81 | - | 4 | 20 | - | 24 | 182 | 90 | 67 |
| Parasur | 48 | 0 | 17 | 115 | 0 | 21 | 197 | 18 | 121 |
| Perumpallam | 119 | 7 | 3 | 3 | 4 | 23 | 204 | 5 | 23 |
| Perungalathur | 7 | 10 | 37 | - | - | 45 | 179 | 46 | 79 |
| Puliyarampakkam | 123 | - | - | 43 | - | 33 | 183 | 17 | 43 |
| Ramakrishnapuram | 42 | 0 | 10 | - | - | 6 | 55 | 20 | 61 |

| Key CWRM Parameter / Gram Panchayat | Area under Land Resources | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Non-Agricultural Uses (ha) | Barren & Un-cultivable Land (ha) | Permanent Pastures and Other Grazing Land (ha) | Land Under Miscellaneous Tree Criticalops etc. (ha) | Culturable Waste Land (ha) | Fallows Land other than Current Fallows (ha) | Current Fallow land (ha) | Unirrigated Land (ha) | Area Irrigated by Source (ha) |
| Sengattankundil | 117 | 4 | - | 1 | - | 51 | 190 | 30 | 103 |
| Siruveliyanallur | 15 | - | - | - | 2 | | 46 | 16 | 23 |
| Sundivakkam | 114 | - | 6 | 0 | 3 | 6 | 83 | 12 | 53 |
| Thirumani | 169 | - | - | - | 3 | 11 | 181 | 93 | 71 |
| Vadangampattu | 63 | 12 | 6 | - | - | - | 52 | 17 | 46 |
| Thozhupedu | 156 | - | 4 | - | 3 | 16 | 371 | 17 | 72 |
| Thandarai | 107 | 2 | 2 | 0 | 0 | 0 | 131 | 1 | 36 |
| Thumbai | 2 | 1 | 0 | - | 69 | 62 | 0 | 11 | 78 |
| Vadapoondipattu | 28 | - | - | 11 | - | - | 24 | 35 | 65 |
| Vakkadai | 213 | 5 | - | 4 | 1 | 76 | 43 | 135 | 75 |
| Vadathandalam | 33 | - | 12 | 0 | 5 | 44 | 29 | 48 | 88 |
| Veliyanallur | 131 | 23 | 18 | 3 | - | 202 | 251 | 66 | 58 |
| Vinnavadi | 19 | - | - | 51 | - | 21 | 78 | 9 | 15 |
| Mleseeshamangalam | 28 | - | - | 11 | - | - | 24 | 35 | 65 |
| Palauthangal | 490 | - | - | 5 | - | 63 | 606 | 113 | 438 |
| Arumparuthi | 177 | - | 2 | - | - | 4 | 277 | 86 | 99 |
| Duli | 143 | 12 | - | 1 | - | 1 | 240 | 133 | 87 |
| Kunnathur | 79 | 21 | 6 | 0 | - | 106 | 85 | 49 | 95 |
| Maligaipattu | 238 | 3 | - | 2 | 2 | 40 | 132 | 167 | 87 |
| Munugapattu | 103 | 7 | - | 14 | - | 12 | 80 | 87 | 116 |
| Palli | 337 | 5 | 11 | 41 | 13 | - | 401 | 113 | 229 |
| Pillandi | 138 | - | - | - | - | 1 | 122 | 113 | 65 |
| Pudukottai | 194 | - | 18 | 1 | 5 | 12 | 25 | 190 | 188 |
| Talarapadi | 105 | - | 15 | 1 | - | 27 | 186 | 144 | 104 |
| Thenpoondipattu | 76 | 8 | 4 | 18 | 6 | 93 | 238 | 114 | 73 |
| Vadugapattu | 95 | - | - | - | - | 63 | 103 | 25 | 70 |
| Vinnamangalam | 206 | 2 | 20 | 4 | 71 | 63 | 395 | 178 | 148 |
| Kilpudupakkam | 123 | - | - | - | 24 | 25 | 100 | - | 86 |

| Key CWRM Parameter / Gram Panchayat | Treatment Area under Land Resources - WASCA Treatement Proposed Area | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Non-Agricultural Uses (ha) | Barren & Un-cultivable Land (ha) | Treatement Area under Permanent Pastures and Other Grazing Land (ha) | Land Under Miscellaneous Tree Criticalops etc. (ha) | Culturable Waste Land (ha) | Fallows Land other than Current Fallows (ha) | Current Fallow land (ha) | Unirrigated Land (ha) | Treatment Area Irrigated by Source (ha) |
| Arathrivelur | 65 | - | - | 5 | 4 | 9 | 8 | 3 | 12 |
| Arugavoor | 4 | 0 | 12 | 0 | - | 2 | 26 | 6 | 5 |
| Enathavadi | 52 | - | - | 2 | 12 | 9 | 25 | 12 | 6 |
| Eraiyur | 18 | - | - | 15 | 9 | - | 22 | 3 | 14 |
| Kazhanipakkam | 8 | 3 | - | 2 | - | 0 | 0 | 1 | 6 |
| Kaduganur | - | 117 | 1 | 0 | 1 | 11 | 4 | 17 | 8 |
| Kizhapalanthai | 2 | 5 | - | 9 | - | 15 | 6 | 5 | 4 |
| Kazhiyur | 8 | 3 | 6 | 3 | - | 3 | 34 | 7 | 28 |
| Korukkai | 0 | - | - | - | 0 | 2 | 9 | 6 | 7 |
| Korukkathur | 2 | - | - | 9 | - | - | - | - | 5 |
| Madurai | 1 | - | - | - | 8 | - | 18 | 1 | 6 |
| Mariyanallur | - | - | - | 0 | 22 | 7 | 15 | 4 | 6 |
| Melnagarambedu | 2 | 3 | 11 | 6 | 1 | - | 14 | 4 | 14 |
| Mukkur | 3 | - | - | - | 4 | 4 | 15 | 14 | 13 |
| Murukathampoondi | 7 | - | - | - | 1 | - | 6 | 2 | 2 |
| Naval | 1 | - | - | - | 2 | 0 | 3 | 1 | 12 |
| Navalpakkam | 34 | - | - | - | 1 | - | 3 | 2 | 5 |
| Nedumpirai | 4 | 10 | - | - | 1 | 12 | 24 | 19 | 4 |
| Paingkinar | - | 10 | 8 | - | 6 | 18 | 12 | 11 | 3 |
| Pappanthangal | 1 | - | 3 | 15 | - | 6 | 45 | 22 | 7 |
| Parasur | 2 | 0 | 13 | 86 | 0 | 4 | 35 | 3 | 12 |
| Perumpallam | 4 | 5 | 3 | 2 | 3 | 2 | 21 | 0 | 2 |
| Perungalathur | - | 8 | 28 | - | - | 4 | 16 | 4 | 8 |
| Puliyarampakkam | 4 | - | - | 32 | - | 6 | 33 | 3 | 4 |
| Ramakrishnapuram | 1 | 0 | 8 | - | - | 1 | 12 | 4 | 6 |
| Sengattankundil | 4 | 3 | - | 0 | - | 8 | 29 | 5 | 10 |
| Siruveliyanallur | - | - | - | - | 1 | - | 12 | 4 | 2 |

| Key CWRM Parameter / Gram Panchayat | Treatment Area under Land Resources - WASCA Treatement Proposed Area | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Non-Agricultural Uses (ha) | Barren & Un-cultivable Land (ha) | Treatement Area under Permanent Pastures and Other Grazing Land (ha) | Land Under Miscellaneous Tree Criticalops etc. (ha) | Culturable Waste Land (ha) | Fallows Land other than Current Fallows (ha) | Current Fallow land (ha) | Unirrigated Land (ha) | Treatment Area Irrigated by Source (ha) |
| Sundivakkam | 24 | - | 4 | 0 | 2 | 1 | 15 | 2 | 5 |
| Thirumani | 20 | - | - | - | 2 | 1 | 12 | 6 | 7 |
| Vadangampattu | 8 | 9 | 5 | - | - | - | 12 | 4 | 5 |
| Thozhupedu | 7 | - | 3 | - | 2 | 1 | 13 | 1 | 7 |
| Thandarai | 20 | 2 | 2 | 0 | 0 | 0 | 16 | 0 | 4 |
| Thumbai | - | 1 | 0 | - | 52 | 11 | 0 | 2 | 8 |
| Vadapoondipattu | 1 | - | - | 8 | - | - | 1 | 2 | 7 |
| Vakkadai | 39 | 4 | - | 3 | 1 | 19 | 11 | 34 | 8 |
| Vadathandalam | - | - | 9 | 0 | 3 | 4 | 3 | 5 | 9 |
| Veliyanallur | 11 | 17 | 13 | 2 | - | 50 | 63 | 16 | 6 |
| Vinnavadi | - | - | - | 38 | - | 2 | 9 | 1 | 2 |
| Mleseeshamangalam | 1 | - | - | 8 | - | - | 1 | 2 | 7 |
| Palauthangal | 42 | - | - | 4 | - | 6 | 60 | 11 | 44 |
| Arumparuthi | 33 | - | 2 | - | - | 1 | 40 | 12 | 10 |
| Duli | 5 | 9 | - | 1 | - | 0 | 17 | 9 | 9 |
| Kunnathur | 39 | 16 | 5 | 0 | - | 16 | 13 | 7 | 10 |
| Maligaipattu | 10 | 2 | - | 2 | 2 | - | - | - | 9 |
| Munugapattu | 5 | 5 | - | 11 | - | 1 | 10 | 11 | 12 |
| Palli | - | 4 | 9 | 31 | 9 | - | 100 | 28 | 23 |
| Pillandi | 5 | - | - | - | - | 0 | 8 | 7 | 7 |
| Pudukottai | 3 | - | 13 | 1 | 4 | 2 | 4 | 28 | 28 |
| Talarapadi | - | - | 11 | 1 | - | 7 | 47 | 36 | 10 |
| Thenpoondipattu | 1 | 6 | 3 | 14 | 5 | 11 | 29 | 14 | 9 |
| Vadugapattu | 48 | - | - | - | - | 16 | 26 | 6 | 7 |
| Vinnamangalam | 2 | 2 | 15 | 3 | 53 | 12 | 75 | 34 | 28 |
| Kilpudupakkam | 17 | - | - | - | 18 | 0 | 1 | - | 9 |

| Key CWRM Parameter / Gram Panchayat | Land under Catchment Area | | | Crop Details | | | | |
|---|---|---|---|---|---|---|---|---|
| | Good Catchment (ha) | Land under Average Catchment (ha) | Land under Bad Catchment (ha) | Irrigated Area (ha) | Rainfed area (ha) | Area under Paddy Cultivation (ha) | Crop Water Requirement - Irrigated condition (Ha-m) | Crop Water Requirement - Rainfed condition (Ha-m) |
| Arathrivelur | 15 | 102 | 102 | 56 | 13 | 45 | 81 | 5 |
| Arugavoor | 16 | 380 | 380 | 51 | 5 | 48 | 75 | 3 |
| Enathavadi | 19 | 394 | 394 | 131 | 13 | 99 | 189 | 6 |
| Eraiyur | 33 | 317 | 317 | 136 | 3 | 125 | 192 | 1 |
| Kazhanipakkam | 3 | 137 | 137 | 108 | 3 | 104 | 158 | 1 |
| Kaduganur | 3 | 425 | 425 | 113 | 10 | 104 | 160 | 4 |
| Kizhapalanthai | 12 | 209 | 209 | 101 | 9 | 93 | 143 | 4 |
| Kazhiyur | 13 | 529 | 529 | 228 | 20 | 199 | 336 | 8 |
| Korukkai | 0 | 248 | 248 | 92 | 9 | 84 | 132 | 4 |
| Korukkathur | 12 | 276 | 276 | 87 | 4 | 86 | 129 | 40 |
| Madurai | 11 | 139 | 139 | 77 | 4 | 77 | 116 | 119 |
| Mariyanallur | 30 | 285 | 285 | 85 | 19 | 70 | 111 | 8 |
| Melnagarambedu | 24 | 379 | 379 | 152 | 2 | 143 | 219 | 1 |
| Mukkur | 6 | 310 | 310 | 167 | 19 | 147 | 231 | 9 |
| Murukathampoondi | 2 | 85 | 85 | 73 | 2 | 57 | 98 | 1 |
| Naval | 3 | 245 | 245 | 148 | 1 | 146 | 223 | 0 |
| Navalpakkam | 1 | 268 | 268 | 48 | 7 | 46 | 71 | 3 |
| Nedumpirai | 1 | 472 | 472 | 220 | 37 | 91 | 214 | 214 |
| Paingkinar | 19 | 262 | 262 | 46 | 2 | 43 | 66 | 1 |
| Pappanthangal | 24 | 363 | 363 | 136 | 13 | 95 | 168 | 5 |
| Parasur | 132 | 357 | 357 | 169 | 11 | 155 | 258 | 6 |
| Perumpallam | 10 | 255 | 255 | 72 | 12 | 67 | 103 | 4 |
| Perungalathur | 37 | 349 | 349 | 98 | 5 | 83 | 132 | 2 |
| Puliyarampakkam | 43 | 276 | 276 | 44 | 0 | 37 | 68 | 0 |
| Ramakrishnapuram | 10 | 142 | 142 | 55 | 13 | 44 | 71 | 5 |
| Sengattankundil | 1 | 375 | 375 | 139 | 16 | 129 | 207 | 8 |
| Siruveliyanallur | 2 | 85 | 85 | 73 | 2 | 57 | 98 | 1 |

| Key CWRM Parameter / Gram Panchayat | Land under Catchment Area | | | Crop Details | | | | |
|---|---|---|---|---|---|---|---|---|
| | Good Catchment (ha) | Land under Average Catchment (ha) | Land under Bad Catchment (ha) | Irrigated Area (ha) | Rainfed area (ha) | Area under Paddy Cultivation (ha) | Crop Water Requirement - Irrigated condition (Ha-m) | Crop Water Requirement - Rainfed condition (Ha-m) |
| Sundivakkam | 8 | 153 | 153 | 70 | 2 | 63 | 104 | 1 |
| Thirumani | 3 | 356 | 356 | 67 | 9 | 64 | 97 | 3 |
| Vadangampattu | 6 | 115 | 115 | 68 | 14 | 62 | 104 | 6 |
| Thozhupedu | 7 | 476 | 476 | 171 | 16 | 139 | 224 | 9 |
| Thandarai | 3 | 167 | 167 | 129 | 6 | 123 | 187 | 2 |
| Thumbai | 69 | 150 | 150 | 75 | 4 | 58 | 96 | 1 |
| Vadapoondipattu | 11 | 125 | 125 | 59 | 14 | 49 | 77 | 6 |
| Vakkadai | 5 | 329 | 329 | 187 | 4 | 179 | 272 | 1 |
| Vadathandalam | 16 | 209 | 209 | 43 | 1 | 41 | 62 | 0 |
| Veliyanallur | 21 | 577 | 577 | 168 | 36 | 136 | 230 | 14 |
| Vinnavadi | 51 | 123 | 123 | 111 | 11 | 106 | 161 | 4 |
| Mleseeshamangalam | 11 | 125 | 125 | 326 | 57 | 264 | 468 | 22 |
| Palauthangal | 5 | 1220 | 1220 | 326 | 57 | 264 | 468 | 22 |
| Arumparuthi | 2 | 466 | 466 | 116 | 31 | 92 | 164 | 14 |
| Duli | 1 | 461 | 461 | 245 | 32 | 107 | 219 | 13 |
| Kunnathur | 7 | 336 | 336 | 137 | 7 | 131 | 198 | 2 |
| Maligaipattu | 4 | 426 | 426 | 154 | 14 | 137 | 214 | 6 |
| Munugapattu | 14 | 296 | 296 | 93 | 10 | 93 | 140 | 3 |
| Palli | 65 | 744 | 744 | 479 | 69 | 361 | 600 | 24 |
| Pillandi | - | 300 | 300 | 67 | 7 | 65 | 99 | 2 |
| Pudukottai | 24 | 415 | 415 | 61 | 4 | 53 | 84 | 1 |
| Talarapadi | 16 | 462 | 462 | 131 | 30 | 121 | 201 | 18 |
| Thenpoondipattu | 28 | 519 | 519 | 193 | 20 | 99 | 219 | 7 |
| Vadugapattu | - | 261 | 261 | 74 | 5 | 68 | 111 | 3 |
| Vinnamangalam | 95 | 785 | 785 | 219 | 11 | 175 | 290 | 4 |
| Kilpudupakkam | 24 | 212 | 212 | 127 | - | 123 | 194 | - |

| Key CWRM Parameter / Gram Panchayat | Soil Resources: Status of Available Nitrogen (%) | | | Status of Organic Carbon (%) | | | | | Status of Soil Micro Nutrients | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Very Low | Low | Medium | Very Low | Low | Medium | High | Very High | Sufficient (%) | Deficient (%) |
| Arathrivelur | - | 100.0 | - | 21.2 | 78.8 | - | - | - | 21.0 | 79.0 |
| Arugavoor | - | 100.0 | - | 14.9 | 85.1 | - | - | - | 35.0 | 65.0 |
| Enathavadi | 8.4 | 91.6 | - | 13.7 | 86.3 | - | - | - | 65.0 | 35.0 |
| Eraiyur | - | 100.0 | - | 18.9 | 81.1 | - | - | - | 61.0 | 39.0 |
| Kazhanipakkam | 4.5 | 95.5 | - | 38.6 | 61.4 | - | - | - | 38.0 | 62.0 |
| Kaduganur | 3.4 | 92.4 | 4.2 | 26.1 | 72.3 | 1.7 | - | - | 42.0 | 58.0 |
| Kizhapalanthai | 1.5 | 98.5 | - | 7.5 | 92.5 | - | - | - | 50.0 | 50.0 |
| Kazhiyur | 13.0 | 87.0 | - | 44.2 | 55.8 | - | - | - | 80.0 | 20.0 |
| Korukkai | - | 100.0 | - | 13.5 | 86.5 | - | - | - | 58.0 | 42.0 |
| Korukkathur | 1.5 | 98.5 | - | 14.9 | 85.1 | - | - | - | 57.0 | 43.0 |
| Madurai | - | 100.0 | - | 9.1 | 90.9 | - | - | - | 70.0 | 30.0 |
| Mariyanallur | 14.0 | 81.4 | 4.7 | 20.9 | 76.7 | - | - | 2.3 | 66.0 | 34.0 |
| Melnagarambedu | - | 100.0 | - | 19.1 | 80.9 | - | - | - | 41.0 | 59.0 |
| Mukkur | - | 100.0 | - | 10.8 | 89.2 | - | - | - | 35.0 | 65.0 |
| Murukathampoondi | - | 100.0 | - | 15.8 | 84.2 | - | - | - | 51.0 | 49.0 |
| Naval | - | 100.0 | - | - | 100.0 | - | - | - | 55.0 | 45.0 |
| Navalpakkam | - | 100.0 | - | 11.1 | 88.9 | - | - | - | 65.0 | 35.0 |
| Nedumpirai | 73.1 | 26.9 | - | 34.4 | 65.6 | - | - | - | 27.0 | 73.0 |
| Paingkinar | - | 100.0 | - | 18.8 | 81.3 | - | - | - | 65.0 | 35.0 |
| Pappanthangal | 1.4 | 98.6 | - | 20.3 | 79.7 | - | - | - | 53.0 | 47.0 |
| Parasur | 5.0 | 95.0 | - | 15.0 | 85.0 | - | - | - | 60.0 | 40.0 |
| Perumpallam | - | 100.0 | - | 19.7 | 80.3 | - | - | - | 49.0 | 51.0 |
| Perungalathur | 3.0 | 97.0 | - | 32.8 | 67.2 | - | - | - | 54.0 | 46.0 |
| Puliyarampakkam | - | 100.0 | - | 13.3 | 86.7 | - | - | - | 63.0 | 37.0 |
| Ramakrishnapuram | 9.5 | 61.9 | 28.6 | 21.4 | 66.7 | 11.9 | - | - | 47.0 | 53.0 |
| Sengattankundil | - | 100.0 | - | 12.1 | 87.9 | - | - | - | 67.0 | 33.0 |
| Siruveliyanallur | - | 100.0 | - | 15.8 | 84.2 | - | - | - | 51.0 | 49.0 |
| Sundivakkam | - | 100.0 | - | 20.0 | 80.0 | - | - | - | 57.0 | 43.0 |

| Key CWRM Parameter / Gram Panchayat | Soil Resources: Status of Available Nitrogen (%) | | | Status of Organic Carbon (%) | | | | | Status of Soil Micro Nutrients | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Very Low | Low | Medium | Very Low | Low | Medium | High | Very High | Sufficient (%) | Deficient (%) |
| Thirumani | 1.2 | 98.8 | - | - | 100.0 | - | - | - | 58.0 | 42.0 |
| Vadangampattu | - | 100.0 | - | 8.8 | 91.2 | - | - | - | 48.0 | 52.0 |
| Thozhupedu | - | 100.0 | - | 7.3 | 92.7 | - | - | - | 62.0 | 38.0 |
| Thandarai | - | 100.0 | - | 3.8 | 96.2 | - | - | - | 43.0 | 57.0 |
| Thumbai | - | 100.0 | - | 14.3 | 85.7 | - | - | - | 67.0 | 33.0 |
| Vadapoondipattu | 3.6 | 96.4 | - | 37.9 | 62.1 | - | - | - | 83.0 | 17.0 |
| Vakkadai | 4.9 | 73.5 | 21.6 | 31.3 | 60.6 | 8.1 | - | - | 48.0 | 52.0 |
| Vadathandalam | 3.7 | 70.4 | 25.9 | 18.5 | 63.0 | 18.5 | - | - | 53.0 | 47.0 |
| Veliyanallur | - | 100.0 | - | 1.7 | 98.3 | - | - | - | 56.0 | 44.0 |
| Vinnavadi | - | 100.0 | - | - | 100.0 | - | - | - | 96.0 | 4.0 |
| Mleseeshamangalam | 3.6 | 93.6 | 2.8 | 27.4 | 72.2 | - | 0.4 | - | 56.0 | 44.0 |
| Palauthangal | 3.6 | 93.6 | 2.8 | 27.4 | 72.2 | - | 0.4 | - | 56.0 | 44.0 |
| Arumparuthi | - | 100.0 | - | 37.5 | 62.5 | - | - | - | 51.0 | 49.0 |
| Duli | - | 100.0 | - | 6.5 | 93.5 | - | - | - | 68.0 | 32.0 |
| Kunnathur | 19.6 | 80.4 | - | 39.1 | 60.9 | - | - | - | 64.0 | 36.0 |
| Maligaipattu | - | 100.0 | - | 3.7 | 96.3 | - | - | - | 63.0 | 37.0 |
| Munugapattu | 15.6 | 59.4 | 25.0 | 28.1 | 59.4 | 12.5 | - | - | 40.0 | 60.0 |
| Palli | 10.2 | 89.8 | - | 38.0 | 62.0 | - | - | - | 66.0 | 34.0 |
| Pillandi | - | 100.0 | - | - | 100.0 | - | - | - | 61.0 | 39.0 |
| Pudukottai | 1.7 | 98.3 | - | 8.3 | 91.7 | - | - | - | 54.0 | 46.0 |
| Talarapadi | 2.4 | 97.6 | - | 7.1 | 92.9 | - | - | - | 59.0 | 41.0 |
| Thenpoondipattu | 30.0 | 47.8 | 22.2 | 31.9 | 41.6 | 21.1 | 4.9 | 0.5 | 42.0 | 58.0 |
| Vadugapattu | 22.6 | 54.8 | 22.6 | 41.9 | 51.6 | 6.5 | - | - | 45.0 | 55.0 |
| Vinnamangalam | 0.6 | 99.4 | - | 2.9 | 94.9 | 2.3 | - | - | 68.0 | 32.0 |
| Kilpudupakkam | 80.6 | 19.4 | - | 41.9 | 58.1 | - | - | - | 59.0 | 41.0 |

| Key CWRM Parameter / Gram Panchayat | Status of Physical condition of the soil (%) | | | | | Soil Texture (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Moderately Acidic | Slighly Acidic | Neutral | Moderately Alkaline | Strongly Alkaline | % of Clay Soil | % of Fine Soil | % of Coarse loamy | Soil Water Permeability (Low, Moderate, high) |
| Arathrivelur | - | - | - | 100.0 | - | 33.0 | 20.0 | - | Low |
| Arugavoor | - | - | - | 100.0 | - | 51.0 | 30.0 | 3.0 | Low |
| Enathavadi | - | - | - | 100.0 | - | 68.0 | 14.0 | - | Low |
| Eraiyur | - | 1.4 | - | 98.7 | - | - | 61.0 | 15.0 | Moderate |
| Kazhanipakkam | - | - | - | 100.0 | - | 45.0 | 45.0 | - | Moderate |
| Kaduganur | - | 1.7 | 4.2 | 94.1 | - | - | 76.0 | 12.0 | Moderate |
| Kizhapalanthai | - | - | - | 100.0 | - | - | 100.0 | - | Moderate |
| Kazhiyur | 9.1 | 24.7 | - | 65.6 | 0.7 | - | 100.0 | - | Moderate |
| Korukkai | - | - | - | 100.0 | - | - | 100.0 | - | Moderate |
| Korukkathur | 3.0 | 17.9 | - | 79.1 | - | 13.5 | 73.0 | - | Moderate |
| Madurai | - | - | - | 100.0 | - | - | 100.0 | - | Moderate |
| Mariyanallur | - | - | - | 100.0 | - | - | 23.0 | 40.0 | High |
| Melnagarambedu | - | - | 3.5 | 96.5 | - | 12.0 | 70.0 | 18.0 | Moderate |
| Mukkur | - | 1.2 | - | 98.8 | - | - | 100.0 | - | Moderate |
| Murukathampoondi | - | - | - | 100.0 | - | - | 100.0 | - | Moderate |
| Naval | - | - | - | 100.0 | - | 15.0 | 72.0 | - | Moderate |
| Navalpakkam | 6.9 | 26.4 | 1.4 | 65.3 | - | 36.0 | 44.0 | - | Moderate |
| Nedumpirai | - | 8.6 | 2.2 | 89.3 | - | - | 43.0 | 31.0 | Moderate |
| Paingkinar | - | - | - | 100.0 | - | 32.0 | 31.0 | - | Low |
| Pappanthangal | - | - | - | 100.0 | - | 62.0 | 25.0 | - | Low |
| Parasur | - | - | - | 100.0 | - | - | 100.0 | - | Moderate |
| Perumpallam | - | - | - | 100.0 | - | 25.0 | 60.0 | 7.0 | Moderate |
| Perungalathur | - | - | - | 100.0 | - | - | 100.0 | - | Moderate |
| Puliyarampakkam | - | - | - | 100.0 | - | - | 100.0 | - | Moderate |
| Ramakrishnapuram | - | - | - | 100.0 | - | 100.0 | - | - | Low |
| Sengattankundil | 4.6 | 28.8 | - | 66.7 | - | 36.0 | 37.0 | - | Low |
| Siruveliyanallur | - | - | - | 100.0 | - | - | 100.0 | - | Moderate |
| Sundivakkam | - | - | - | 100.0 | - | 7.0 | 40.0 | - | Moderate |

| Key CWRM Parameter / Gram Panchayat | Status of Physical condition of the soil (%) | | | | | Soil Texture (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Moderately Acidic | Slighly Acidic | Neutral | Moderately Alkaline | Strongly Alkaline | % of Clay Soil | % of Fine Soil | % of Coarse loamy | Soil Water Permeability (Low, Moderate, high) |
| Thirumani | - | - | - | 100.0 | - | - | 90.0 | - | - |
| Vadangampattu | - | - | - | 100.0 | - | - | 100.0 | - | Moderate |
| Thozhupedu | - | 1.0 | - | 99.0 | - | - | 92.0 | 2.0 | Moderate |
| Thandarai | - | - | - | 100.0 | - | - | 68.0 | 14.0 | Moderate |
| Thumbai | - | - | - | 100.0 | - | - | 100.0 | - | - |
| Vadapoondipattu | 10.3 | 20.7 | - | 69.0 | - | 43.0 | 17.0 | 40.0 | Low |
| Vakkadai | - | - | 3.0 | 97.0 | - | 41.0 | 20.0 | - | Low |
| Vadathandalam | - | - | 3.7 | 96.3 | - | 19.0 | 7.0 | 54.0 | High |
| Veliyanallur | - | - | - | 100.0 | - | 7.0 | 75.0 | - | Moderate |
| Vinnavadi | - | 30.4 | - | 69.6 | - | - | 100.0 | - | Moderate |
| Mleseeshamangalam | 0.7 | 1.8 | 2.1 | 95.4 | - | 11.0 | 41.0 | 9.0 | Moderate |
| Palauthangal | 0.7 | 1.8 | 2.1 | 95.4 | - | 11.0 | 41.0 | 9.0 | Moderate |
| Arumparuthi | - | - | - | 100.0 | - | 40.0 | 50.0 | - | Moderate |
| Duli | - | 4.4 | - | 95.7 | - | 7.9 | 76.0 | 10.0 | Moderate |
| Kunnathur | - | - | - | 100.0 | - | 38.4 | 31.4 | 0.5 | Low |
| Maligaipattu | - | - | - | 100.0 | - | 55.5 | 20.5 | 0.2 | Low |
| Munugapattu | - | - | 6.3 | 93.8 | - | - | 100.0 | - | Moderate |
| Palli | 1.5 | 5.8 | - | 92.7 | - | 3.5 | 83.0 | 0.6 | Moderate |
| Pillandi | 2.5 | 17.5 | - | 80.0 | - | 0.9 | 86.0 | 0.5 | Moderate |
| Pudukottai | - | 5.0 | - | 95.0 | - | 13.9 | 60.0 | 1.1 | Moderate |
| Talarapadi | - | 4.8 | - | 95.2 | - | 11.0 | 72.0 | - | Moderate |
| Thenpoondipattu | - | - | - | 100.0 | - | 36.1 | 23.0 | 31.1 | Low |
| Vadugapattu | - | - | - | 100.0 | - | 5.0 | 71.0 | 17.2 | Moderate |
| Vinnamangalam | - | - | - | 100.0 | - | 6.0 | 73.0 | 5.0 | Moderate |
| Kilpudupakkam | - | 16.1 | - | 83.9 | - | - | 100.0 | - | Moderate |

| Key CWRM Parameter / Gram Panchayat | Soil moisture and ET | | | Means of Water Extraction | | Irrigation Methods (%) | | Livestock | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Volumetric Soil Moisture (%) | Estimated Soil Moisture (ha.m) | ET Losses (ha.m) | Gravity | Lifting | Wild Flooding | Control Flooding | Cattle Population (No.) | Sheep Population (No.) | Goat Population (No.) |
| Arathrivelur | 23 | 27 | 35 | 9.0 | 91.0 | - | 100.0 | 556 | 123 | 56 |
| Arugavoor | 23 | 91 | 98 | 13.0 | 87.0 | - | 100.0 | 429 | 517 | 461 |
| Enathavadi | 23 | 95 | 125 | 5.0 | 95.0 | - | 100.0 | 654 | 492 | 730 |
| Eraiyur | 23 | 81 | 145 | 9.0 | 91.0 | - | 100.0 | 317 | 12 | 238 |
| Kazhanipakkam | 23 | 33 | 101 | 8.0 | 92.0 | - | 100.0 | 212 | - | 182 |
| Kaduganur | 23 | 134 | 216 | 2.0 | 98.0 | - | 100.0 | 436 | 285 | 271 |
| Kizhapalanthai | 23 | 52 | 71 | 3.0 | 97.0 | 1.0 | 99.0 | 290 | 555 | 205 |
| Kazhiyur | 23 | 126 | 269 | 1.0 | 99.0 | - | 100.0 | 444 | 121 | 244 |
| Korukkai | 23 | 57 | 109 | 4.0 | 96.0 | - | 100.0 | 425 | 438 | 173 |
| Korukkathur | 23 | 66 | 111 | 2.0 | 98.0 | - | 100.0 | 312 | 151 | 157 |
| Madurai | 23 | 34 | 53 | 5.0 | 95.0 | - | 100.0 | 361 | - | 84 |
| Mariyanallur | 23 | 72 | 80 | 3.0 | 97.0 | - | 100.0 | 238 | 20 | 121 |
| Melnagarambedu | 23 | 94 | 110 | 5.0 | 95.0 | - | 100.0 | 714 | 913 | 591 |
| Mukkur | 23 | 73 | 170 | 4.0 | 96.0 | - | 100.0 | 475 | 80 | 170 |
| Murukathampoondi | 23 | 20 | 31 | 17.0 | 93.0 | - | 100.0 | 354 | 340 | 55 |
| Naval | 23 | 57 | 117 | 6.0 | 94.0 | - | 100.0 | 242 | 116 | 483 |
| Navalpakkam | 23 | 62 | 106 | 14.0 | 86.0 | - | 100.0 | 725 | 123 | 73 |
| Nedumpirai | 23 | 112 | 154 | 13.0 | 87.0 | - | 100.0 | 814 | 404 | 325 |
| Paingkinar | 23 | 68 | 83 | 6.0 | 94.0 | - | 100.0 | 196 | 12 | - |
| Pappanthangal | 23 | 89 | 145 | 9.0 | 91.0 | 100.0 | - | 696 | 284 | 180 |
| Parasur | 23 | 112 | 217 | 1.0 | 99.0 | - | 100.0 | 603 | 420 | 326 |
| Perumpallam | 23 | 63 | 27 | 29.0 | 71.0 | - | 100.0 | 454 | 525 | 508 |
| Perungalathur | 23 | 91 | 131 | 6.0 | 94.0 | - | 100.0 | 399 | 128 | 436 |
| Puliyarampakkam | 23 | 73 | 82 | 9.0 | 91.0 | - | 100.0 | 361 | 369 | 49 |
| Ramakrishnapuram | 23 | 35 | 48 | 5.0 | 95.0 | - | 100.0 | 418 | 52 | 328 |
| Sengattankundil | 23 | 87 | 108 | 8.0 | 92.0 | - | 100.0 | 450 | 152 | 180 |

| Key CWRM Parameter / Gram Panchayat | Soil moisture and ET | | | Means of Water Extraction | | Irrigation Methods (%) | | Livestock | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Volumetric Soil Moisture (%) | Estimated Soil Moisture (ha.m) | ET Losses (ha.m) | Gravity | Lifting | Wild Flooding | Control Flooding | Cattle Population (No.) | Sheep Population (No.) | Goat Population (No.) |
| Siruveliyanallur | 23 | 20 | 31 | 14.0 | 86.0 | - | 100.0 | 354 | 340 | 55 |
| Sundivakkam | 23 | 37 | 57 | 14.0 | 86.0 | - | 100.0 | 197 | 11 | - |
| Thirumani | 23 | 82 | 132 | 11.0 | 89.0 | - | 100.0 | 851 | - | 40 |
| Vadangampattu | 23 | 31 | 56 | 6.0 | 94.0 | - | 100.0 | 236 | 381 | 69 |
| Thozhupedu | 23 | 111 | 75 | 7.0 | 93.0 | - | 100.0 | 988 | 518 | 586 |
| Thandarai | 23 | 40 | 31 | 6.0 | 94.0 | - | 100.0 | 490 | 436 | 630 |
| Thumbai | 23 | 51 | 71 | 2.0 | 98.0 | 9.0 | 91.0 | 278 | 92 | 20 |
| Vadapoondipattu | 23 | 31 | 89 | 9.0 | 91.0 | - | 100.0 | 342 | 284 | 180 |
| Vakkadai | 23 | 78 | 172 | 15.0 | 85.0 | 1.0 | 99.0 | 454 | 19 | 43 |
| Vadathandalam | 23 | 52 | 119 | 6.0 | 94.0 | - | 100.0 | 440 | 388 | 335 |
| Veliyanallur | 23 | 143 | 116 | 20.0 | 80.0 | 1.0 | 99.0 | 560 | 330 | 142 |
| Vinnavadi | 23 | 40 | 60 | 24.0 | 76.0 | - | 100.0 | 315 | 21 | 129 |
| Mleseeshamangalam | 23 | 31 | 89 | 3.0 | 97.0 | 27.0 | 73.0 | 856 | 447 | 380 |
| Palauthangal | 23 | 282 | 447 | 3.0 | 97.0 | 27.0 | 73.0 | 856 | 447 | 380 |
| Arumparuthi | 23 | 108 | 151 | 19.0 | 81.0 | - | 100.0 | 663 | 228 | 344 |
| Duli | 23 | 109 | 178 | 3.0 | 97.0 | 97.0 | 3.0 | 892 | 280 | 429 |
| Kunnathur | 23 | 84 | 122 | - | 100.0 | - | 100.0 | 782 | 398 | 349 |
| Maligaipattu | 23 | 100 | 206 | - | 100.0 | - | 100.0 | 549 | 480 | 319 |
| Munugapattu | 23 | 73 | 175 | - | 100.0 | 100.0 | - | 439 | 537 | 118 |
| Palli | 23 | 187 | 318 | 9.0 | 91.0 | 100.0 | - | 1815 | 1356 | 621 |
| Pillandi | 23 | 69 | 143 | 6.0 | 94.0 | - | 100.0 | 741 | 75 | 145 |
| Pudukottai | 23 | 101 | 319 | - | 100.0 | 100.0 | - | 2025 | 124 | 440 |
| Talarapadi | 23 | 110 | 212 | - | 100.0 | 100.0 | - | 684 | 376 | 479 |
| Thenpoondipattu | 23 | 128 | 169 | 22.0 | 78.0 | - | 100.0 | 1388 | 475 | 699 |
| Vadugapattu | 23 | 60 | 76 | 12.0 | 88.0 | - | 100.0 | 221 | 24 | 5 |
| Vinnamangalam | 23 | 203 | 282 | - | 100.0 | 100.0 | - | 1777 | 1370 | 477 |
| Kilpudupakkam | 23 | 54 | 69 | 11.0 | 89.0 | 38.0 | 62.0 | 561 | 126 | 494 |

# ANNEXURE 3.8

## GP WISE DEMOGRAPHIC AND SOCIO ECONOMIC STATUS

| Key CWRM Parameter / Gram Panchayat | Geographical Area (ha) | Male Population (No.) | Female Population (No.) | Total Population (No.) | SC Population (No.) | ST Population (No.) | Vulnerable popupation (No.) | Households (HH's) (No.) | Only one room HH's (SECC) (No.) | Female Headed HH's (SECC) (No.) |
|---|---|---|---|---|---|---|---|---|---|---|
| Arathrivelur | 230 | 370 | 370 | 740 | 3 | - | 3 | 185 | 20 | 16 |
| Arugavoor | 518 | 773 | 774 | 1,547 | 1 | - | 1 | 390 | 46 | 26 |
| Enathavadi | 517 | 934 | 905 | 1,839 | - | - | - | 468 | 79 | 34 |
| Eraiyur | 449 | 674 | 695 | 1,369 | 538 | - | 538 | 358 | 58 | 32 |
| Kazhanipakkam | 186 | 411 | 414 | 825 | 295 | - | 295 | 237 | 1 | 14 |
| Kaduganur | 584 | 624 | 657 | 1,281 | 191 | - | 191 | 331 | 31 | 30 |
| Kizhapalanthai | 296 | 781 | 840 | 1,621 | 583 | 23 | 606 | 412 | 77 | 37 |
| Kazhiyur | 770 | 844 | 870 | 1,714 | 392 | 51 | 443 | 452 | 96 | 43 |
| Korukkai | 253 | 488 | 493 | 981 | - | - | - | 243 | 25 | 23 |
| Korukkathur | 349 | 967 | 942 | 1,909 | 458 | 13 | 471 | 389 | 72 | 20 |
| Madurai | 198 | 397 | 421 | 818 | 210 | - | 210 | 174 | 14 | 13 |
| Mariyanallur | 326 | 245 | 261 | 506 | - | 66 | 66 | 125 | 15 | 13 |
| Melnagarambedu | 526 | 1,085 | 1,048 | 2,133 | 562 | - | 562 | 350 | 20 | 38 |
| Mukkur | 415 | 824 | 792 | 1,616 | 441 | - | 441 | 450 | 110 | 29 |
| Murukathampoondi | 301 | 402 | 411 | 813 | 16 | 22 | 38 | 206 | 31 | 15 |
| Naval | 317 | 659 | 633 | 1,292 | 616 | 76 | 692 | 330 | 2 | 27 |
| Navalpakkam | 444 | 1,080 | 1,084 | 2,164 | 673 | 27 | 700 | 547 | 8 | 21 |
| Nedumpirai | 596 | 706 | 712 | 1,418 | 227 | 27 | 254 | 356 | 56 | 28 |
| Paingkinar | 331 | 1,363 | 1,315 | 2,678 | 978 | - | 978 | 225 | 48 | 21 |
| Pappanthangal | 468 | 991 | 957 | 1,948 | 387 | 46 | 433 | 501 | 48 | 36 |
| Parasur | 537 | 1,181 | 1,120 | 2,301 | 4 | - | 4 | 575 | 126 | 43 |
| Perumpallam | 391 | 494 | 510 | 1,004 | 119 | 77 | 196 | 297 | 31 | 28 |
| Perungalathur | 403 | 909 | 868 | 1,777 | 454 | 25 | 479 | 474 | 50 | 24 |
| Puliyarampakkam | 441 | 850 | 823 | 1,673 | - | - | - | 380 | 86 | 25 |
| Ramakrishnapuram | 194 | 694 | 728 | 1,422 | - | - | - | 362 | 101 | 31 |

| Key CWRM Parameter / Gram Panchayat | Geographical Area (ha) | Male Population (No.) | Female Population (No.) | Total Population (No.) | SC Population (No.) | ST Population (No.) | Vulnerable popupation (No.) | Households (HH's) (No.) | Only one room HH's (SECC) (No.) | Female Headed HH's (SECC) (No.) |
|---|---|---|---|---|---|---|---|---|---|---|
| Sengattankundil | 496 | 819 | 817 | 1,636 | 43 | - | 43 | 385 | 75 | 21 |
| Siruveliyanallur | 101 | 566 | 571 | 1,137 | - | 22 | 22 | 274 | 116 | 11 |
| Sundivakkam | 276 | 311 | 317 | 628 | 306 | 24 | 330 | 173 | 38 | 14 |
| Thirumani | 527 | 1,793 | 1,825 | 3,618 | 588 | 27 | 615 | 839 | 53 | 61 |
| Vadangampattu | 197 | 325 | 319 | 644 | - | 59 | 59 | 181 | 53 | 14 |
| Thozhupedu | 639 | 798 | 812 | 1,610 | 404 | 5 | 409 | 402 | 5 | 34 |
| Thandarai | 280 | 804 | 841 | 1,645 | 5 | - | 5 | 385 | 54 | 27 |
| Thumbai | 222 | 321 | 312 | 633 | 235 | - | 235 | 182 | 40 | 16 |
| Vadapoondipattu | 163 | 472 | 497 | 969 | 605 | - | 605 | 243 | 13 | 17 |
| Vakkadai | 553 | 712 | 694 | 1,406 | 260 | 3 | 263 | 358 | 35 | 31 |
| Vadathandalam | 258 | 670 | 672 | 1,342 | 67 | 7 | 74 | 351 | 37 | 26 |
| Veliyanallur | 752 | 791 | 747 | 1,538 | 407 | 3 | 410 | 379 | 144 | 18 |
| Vinnavadi | 194 | 601 | 634 | 1,235 | 38 | - | 38 | 316 | 39 | 30 |
| Mleseeshamangalam | 1,717 | 2,474 | 2,503 | 4,977 | 852 | 38 | 890 | 1,515 | 173 | 93 |
| Palauthangal | 1,715 | 615 | 632 | 1,247 | 111 | 37 | 148 | 1,515 | 173 | 93 |
| Arumparuthi | 645 | 1,176 | 1,155 | 2,331 | 906 | - | 906 | 510 | 97 | 19 |
| Duli | 617 | 876 | 860 | 1,736 | 296 | 24 | 320 | 444 | 37 | 19 |
| Kunnathur | 443 | 748 | 742 | 1,490 | 571 | 46 | 617 | 322 | 62 | 21 |
| Maligaipattu | 671 | 711 | 680 | 1,391 | 729 | 19 | 748 | 383 | 71 | 25 |
| Munugapattu | 419 | 1,883 | 1,858 | 3,741 | 669 | 76 | 745 | 948 | 137 | 73 |
| Palli | 1,151 | 1,578 | 1,602 | 3,180 | 1,252 | 47 | 1,299 | 808 | 121 | 100 |
| Pillandi | 438 | 730 | 747 | 1,477 | 178 |  | 178 | 371 | 21 | 32 |
| Pudukottai | 633 | 1,368 | 1,301 | 2,669 | 1,126 | 27 | 1,153 | 383 | 71 | 25 |
| Talarapadi | 582 | 723 | 679 | 1,402 | 797 | 34 | 831 | 362 | 89 | 17 |
| Thenpoondipattu | 631 | 794 | 776 | 1,570 | 310 | 69 | 379 | 413 | 57 | 33 |
| Vadugapattu | 356 | 619 | 602 | 1,221 | 506 | 10 | 516 | 290 | 24 | 16 |
| Vinnamangalam | 1,088 | 1,761 | 1,724 | 3,485 | 1,523 | 30 | 1,553 | 263 | 65 | 18 |
| Kilpudupakkam | 360 | 3,466 | 3,446 | 6,912 | 877 | 9 | 886 | 1,659 | 7 | 44 |

| Key CWRM Parameter / Gram Panchayat | Vulnerable House-holds (SECC) (No.) | % of Vulnerable House-holds (%) | Registered MGN-REGA Job cards (Persons) | Active person working in MGNREGA 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 drinking water (No.) | HH's dependent on other sources for drinking water (No.) | Annual Greywater Generation (ha.m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arathrivelur | 19 | 0.10 | 379 | 259 | 130 | 3 | 1 | 4 | - | 350 | 1 |
| Arugavoor | 40 | 0.10 | 454 | 308 | 289 | 2 | 1 | 3 | - | 500 | 3 |
| Enathavadi | 66 | 0.14 | 1,002 | 633 | 47 | 4 | - | 4 | - | 1,067 | 3 |
| Eraiyur | 50 | 0.14 | 474 | 336 | 58 | 3 | - | 3 | - | 643 | 2 |
| Kazhanipakkam | 5 | 0.02 | 440 | 308 | 20 | 3 | - | 3 | - | 522 | 2 |
| Kaduganur | 31 | 0.09 | 404 | 352 | 117 | 2 | 1 | 3 | - | 593 | 2 |
| Kizhapalanthai | 65 | 0.16 | 469 | 377 | 32 | 3 | 1 | 4 | - | 832 | 3 |
| Kazhiyur | 80 | 0.18 | 843 | 510 | 74 | 2 | 1 | 3 | - | 961 | 3 |
| Korukkai | 24 | 0.10 | 366 | 233 | 90 | 3 | 1 | 4 | - | 573 | 2 |
| Korukkathur | 56 | 0.15 | 649 | 593 | 327 | 3 | 1 | 4 | - | 910 | 3 |
| Madurai | 14 | 0.08 | 289 | 228 | 40 | 3 | 1 | 4 | - | 430 | 1 |
| Mariyanallur | 14 | 0.12 | 158 | 128 | 81 | 3 | 1 | 4 | - | 214 | 1 |
| Melnagarambedu | 25 | 0.07 | 830 | 618 | 174 | 3 | 1 | 4 | - | 914 | 4 |
| Mukkur | 86 | 0.19 | 745 | 478 | 67 | 3 | - | 3 | - | 849 | 3 |
| Murukathampoondi | 26 | 0.13 | 326 | 259 | 107 | 3 | - | 3 | - | 492 | 1 |
| Naval | 10 | 0.03 | 598 | 460 | 142 | 3 | 1 | 4 | - | 712 | 2 |
| Navalpakkam | 12 | 0.02 | 568 | 426 | 98 | 3 | 1 | 4 | - | 964 | 4 |
| Nedumpirai | 48 | 0.13 | 558 | 420 | 113 | 3 | - | 3 | - | 793 | 3 |
| Paingkinar | 40 | 0.18 | 437 | 335 | 561 | 3 | - | 3 | - | 1,135 | 5 |
| Pappanthangal | 44 | 0.09 | 559 | 364 | 53 | 4 | - | 4 | - | 954 | 4 |
| Parasur | 101 | 0.18 | 874 | 573 | 24 | 2 | - | 2 | - | 1,330 | 4 |
| Perumpallam | 30 | 0.10 | 529 | 342 | 176 | 3 | 1 | 4 | - | 482 | 2 |
| Perungalathur | 42 | 0.09 | 594 | 427 | 70 | 4 | - | 4 | - | 826 | 3 |
| Puliyarampakkam | 68 | 0.18 | 312 | 277 | 132 | 3 | 1 | 4 | - | 625 | 3 |
| Ramakrishnapuram | 80 | 0.22 | 661 | 420 | 152 | 3 | 1 | 4 | - | 580 | 3 |
| Sengattankundil | 59 | 0.15 | 670 | 443 | 188 | 4 | 1 | 5 | - | 796 | 3 |
| Siruveliyanallur | 85 | 0.31 | 605 | 368 | 111 | 3 | 1 | 4 | - | 492 | 2 |

| Key CWRM Parameter / Gram Panchayat | Vulnerable Households (SECC) (No.) | % of Vulnerable Households (%) | Registered MGNREGA Job cards (Persons) | Active person working in MGNREGA 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 drinking water (No.) | HH's dependent on other sources for drinking water (No.) | Annual Greywater Generation (ha.m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sundivakkam** | 31 | 0.18 | 243 | 207 | 113 | 3 | 1 | 4 | - | 309 | 1 |
| **Thirumani** | 55 | 0.07 | 1,292 | 881 | 208 | 3 | 1 | 4 | - | 1,768 | 7 |
| **Vadangampattu** | 41 | 0.23 | 451 | 351 | 186 | 3 | - | 3 | - | 255 | 1 |
| **Thozhupedu** | 14 | 0.03 | 758 | 556 | 112 | 3 | 1 | 4 | - | 958 | 3 |
| **Thandarai** | 46 | 0.12 | 559 | 411 | 69 | 4 | - | 4 | - | 733 | 3 |
| **Thumbai** | 33 | 0.18 | 282 | 186 | 36 | 3 | - | 3 | - | 461 | 1 |
| **Vadapoondipattu** | 14 | 0.06 | 312 | 211 | 184 | 3 | 1 | 4 | - | 329 | 2 |
| **Vakkadai** | 34 | 0.09 | 566 | 427 | 75 | 3 | 1 | 4 | - | 803 | 3 |
| **Vadathandalam** | 34 | 0.10 | 500 | 397 | 105 | 4 | 1 | 5 | - | 674 | 2 |
| **Veliyanallur** | 106 | 0.28 | 736 | 470 | 75 | 3 | 1 | 4 | - | 562 | 3 |
| **Vinnavadi** | 36 | 0.12 | 551 | 322 | 39 | 2 | 1 | 3 | - | 692 | 2 |
| **Mleseeshamangalam** | 149 | 0.10 | 1,797 | 1,263 | 123 | 4 | 1 | 5 | - | 2,363 | 9 |
| **Palauthangal** | 149 | 0.10 | 573 | 373 | 233 | 4 | 1 | 5 | - | 499 | 2 |
| **Arumparuthi** | 74 | 0.14 | 708 | 477 | 72 | 1 | - | 1 | - | 1,092 | 4 |
| **Duli** | 32 | 0.07 | 686 | 471 | 150 | 4 | 1 | 5 | 56 | 367 | 3 |
| **Kunnathur** | 50 | 0.15 | 488 | 393 | 127 | 5 | 1 | 6 | 30 | 285 | 3 |
| **Maligaipattu** | 57 | 0.15 | 524 | 397 | 185 | 6 | 1 | 7 | 808 | 773 | 3 |
| **Munugapattu** | 118 | 0.12 | 1,438 | 1,158 | 236 | 4 | 2 | 6 | 808 | 1,882 | 7 |
| **Palli** | 115 | 0.14 | 1,210 | 853 | 148 | 4 | 2 | 6 | 608 | 1,274 | 6 |
| **Pillandi** | 24 | 0.07 | 518 | 427 | 192 | 4 | 2 | 6 | 808 | 868 | 3 |
| **Pudukottai** | 57 | 0.15 | 1,030 | 789 | 107 | 4 | 2 | 6 | 808 | 1,307 | 5 |
| **Talarapadi** | 67 | 0.19 | 568 | 358 | 125 | 5 | 1 | 6 | 808 | 813 | 3 |
| **Thenpoondipattu** | 50 | 0.12 | 646 | 445 | 152 | 4 | 2 | 6 | 808 | 582 | 2 |
| **Vadugapattu** | 22 | 0.07 | 459 | 361 | 172 | 4 | 2 | 6 | 808 | 2,578 | 6 |
| **Vinnamangalam** | 51 | 0.19 | 1,277 | 973 | 107 | 4 | 2 | 6 | 808 | 1,307 | 5 |
| **Kilpudupakkam** | 18 | 0.01 | 811 | 698 | 799 | 1 | 1 | 2 | - | 2,936 | 13 |

# 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

| Key CWRM Parameter / Gram Panchayat | 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 |
|---|---|---|---|---|---|---|---|---|---|
| Arathrivelur | 65.00 | - | - | 5.30 | 4.20 | 8.60 | - | - | - |
| Arugavoor | 4.23 | 0.49 | 11.54 | 0.32 | - | 1.95 | 26.10 | 5.78 | 5.04 |
| Enathavadi | 51.56 | - | - | 2.10 | 12.45 | 8.66 | 25.10 | 12.31 | 6.49 |
| Eraiyur | 18.13 | - | - | 15.37 | 9.17 | - | 22.08 | 3.20 | 13.71 |
| Kazhanipakkam | 7.76 | 3.23 | - | 1.88 | - | 0.02 | 0.26 | 1.33 | 5.90 |
| Kaduganur | - | 117.08 | 0.80 | 0.25 | 1.04 | 10.52 | 4.13 | 17.13 | 8.25 |
| Kizhapalanthai | 2.12 | 4.68 | - | 9.29 | - | 14.88 | 6.42 | 5.13 | 4.36 |
| Kazhiyur | 7.84 | 3.15 | 6.27 | 3.37 | - | 3.05 | 33.69 | 7.32 | 28.02 |
| Korukkai | 0.16 | - | - | - | 0.29 | 2.05 | 9.30 | 6.35 | 7.18 |
| Korukkathur | 2.10 | - | - | 9.26 | - | - | - | - | 4.88 |
| Madurai | 0.74 | - | - | - | 7.93 | - | 18.11 | 1.01 | 6.20 |
| Mariyanallur | - | - | - | 0.32 | 22.10 | 7.45 | 14.91 | 4.22 | 6.37 |
| Melnagarambedu | 2.37 | 3.38 | 11.48 | 5.51 | 0.99 | - | 13.93 | 3.63 | 13.73 |
| Mukkur | 3.49 | - | - | - | 4.46 | 3.82 | 15.03 | 14.48 | 13.48 |
| Murukathampoondi | 7.40 | - | - | - | 1.37 | - | 5.86 | 2.06 | 2.26 |
| Naval | 0.70 | - | - | - | 2.00 | 0.07 | 2.78 | 0.83 | 11.70 |
| Navalpakkam | 33.82 | - | - | - | 0.98 | - | 2.96 | 1.68 | 5.48 |
| Nedumpirai | 3.53 | 10.37 | - | - | 0.54 | 12.45 | 24.03 | 19.38 | 4.26 |
| Paingkinar | - | 10.28 | 7.95 | - | 5.93 | 17.75 | 12.24 | 10.62 | 3.30 |
| Pappanthangal | 0.97 | - | 2.69 | 15.29 | - | 5.98 | 45.48 | 22.41 | 6.72 |
| Parasur | 1.66 | 0.30 | 12.77 | 85.88 | 0.23 | 3.62 | 34.72 | 3.15 | 12.09 |
| Perumpallam | 4.18 | 5.13 | 2.52 | 1.90 | 3.06 | 2.31 | 20.71 | 0.49 | 2.33 |
| Perungalathur | - | 7.69 | 27.84 | - | - | 3.97 | 15.94 | 4.14 | 7.89 |
| Puliyarampakkam | 4.30 | - | - | 32.06 | - | 5.94 | 32.54 | 2.98 | 4.28 |
| Ramakrishnapuram | 1.46 | 0.01 | 7.65 | - | - | 1.36 | 12.06 | 4.42 | 6.11 |
| Sengattankundil | 4.09 | 2.72 | - | 0.41 | - | 7.79 | 29.09 | 4.64 | 10.30 |

| Key CWRM Parameter / Gram Panchayat | 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 |
|---|---|---|---|---|---|---|---|---|---|
| Siruveliyanallur | - | - | - | - | 1.37 | - | 11.51 | 4.04 | 2.26 |
| Sundivakkam | 23.99 | - | 4.21 | 0.15 | 1.95 | 1.05 | 14.71 | 2.16 | 5.28 |
| Thirumani | 20.22 | - | - | - | 2.24 | 0.71 | 11.94 | 6.17 | 7.07 |
| Vadangampattu | 7.61 | 8.99 | 4.61 | - | - | - | 11.82 | 3.93 | 4.62 |
| Thozhupedu | 6.84 | - | 3.00 | - | 2.39 | 0.53 | 12.63 | 0.59 | 7.22 |
| Thandarai | 19.51 | 1.87 | 1.54 | 0.23 | 0.29 | 0.02 | 15.61 | 0.10 | 3.55 |
| Thumbai | - | 0.55 | 0.01 | - | 52.07 | 11.09 | 0.03 | 1.96 | 7.75 |
| Vadapoondipattu | 0.98 | - | - | 7.91 | - | - | 1.42 | 2.06 | 6.52 |
| Vakkadai | 39.40 | 3.86 | - | 3.21 | 0.71 | 19.03 | 10.77 | 33.70 | 7.55 |
| Vadathandalam | - | - | 8.76 | 0.09 | 3.45 | 4.25 | 2.74 | 4.64 | 8.77 |
| Veliyanallur | 11.44 | 17.34 | 13.35 | 2.03 | - | 50.47 | 62.70 | 16.42 | 5.82 |
| Vinnavadi | - | - | - | 38.48 | - | 2.36 | 8.98 | 1.01 | 1.50 |
| Mleseeshamangalam | 0.98 | - | - | 7.91 | - | - | 1.42 | 2.06 | 6.52 |
| Palauthangal | 42.17 | - | - | 4.01 | - | 6.17 | 59.59 | 11.16 | 43.76 |
| Arumparuthi | 32.58 | - | 1.65 | - | - | 0.51 | 39.95 | 12.47 | 9.88 |
| Duli | 4.57 | 8.84 | - | 0.53 | - | 0.07 | 16.82 | 9.33 | 8.69 |
| Kunnathur | 39.35 | 16.06 | 4.86 | 0.35 | - | 15.94 | 12.81 | 7.31 | 9.55 |
| Maligaipattu | 10.48 | 2.13 | - | 1.54 | 1.69 | - | - | - | 8.70 |
| Munugapattu | 4.52 | 5.19 | - | 10.66 | - | 1.45 | 9.99 | 10.85 | 11.61 |
| Palli | - | 3.89 | 8.59 | 30.72 | 9.48 | - | 100.25 | 28.34 | 22.95 |
| Pillandi | 4.82 | - | - | - | - | 0.06 | 7.97 | 7.37 | 6.51 |
| Pudukottai | 3.30 | - | 13.28 | 0.90 | 3.87 | 1.83 | 3.69 | 28.49 | 28.20 |
| Talarapadi | - | - | 11.19 | 0.63 | - | 6.84 | 46.50 | 36.09 | 10.41 |
| Thenpoondipattu | 1.29 | 6.01 | 2.99 | 13.58 | 4.62 | 11.16 | 28.57 | 13.71 | 8.79 |
| Vadugapattu | 47.68 | - | - | - | - | 15.64 | 25.79 | 6.36 | 6.95 |
| Vinnamangalam | 2.13 | 1.59 | 15.17 | 2.84 | 53.17 | 12.06 | 75.03 | 33.85 | 28.21 |
| Kilpudupakkam | 17.28 | - | - | - | 18.26 | 0.25 | 1.00 | - | 8.61 |

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

# ANNEXURE 5.2

## GP WISE EXPECTED RUNOFF CONSERVATION AFTER WASCA TREATMENT

| GP name | Good Catchment Area ha.m | Average Catchment Area ha.m | Bad Catchment Area ha.m |
|---|---|---|---|
| Arathrivelur | 10.50 | 3.10 | 1.90 |
| Arugavoor | 2.50 | 3.30 | 7.30 |
| Enathavadi | 19.00 | 4.10 | 9.80 |
| Eraiyur | 7.20 | 6.90 | 7.30 |
| Kazhanipakkam | 4.30 | 0.50 | 1.40 |
| Kaduganur | 42.70 | 0.60 | 7.50 |
| Kizhapalanthai | 3.31 | 2.61 | 5.76 |
| Kazhiyur | 5.15 | 2.71 | 13.48 |
| Korukkai | 0.40 | 0.08 | 4.65 |
| Korukkathur | 1.60 | 0.30 | 0.00 |
| Madurai | 1.24 | 2.23 | 4.74 |
| Mariyanallur | 0.50 | 6.30 | 6.16 |
| Melnagarambedu | 2.97 | 5.05 | 5.85 |
| Mukkur | 1.90 | 1.30 | 8.80 |
| Murukathampoondi | 2.70 | 0.40 | 1.90 |
| Naval | 0.95 | 0.56 | 2.87 |
| Navalpakkam | 13.28 | 0.27 | 1.89 |
| Nedumpirai | 30.97 | 0.15 | 11.24 |
| Paingkinar | 6.40 | 3.90 | 8.20 |
| Pappanthangal | 1.22 | 5.05 | 15.07 |
| Parasur | 2.20 | 27.79 | 10.02 |
| Perumpallam | 3.60 | 2.10 | 4.80 |
| Perungalathur | 3.87 | 7.82 | 5.97 |
| Puliyarampakkam | 2.82 | 9.01 | 8.55 |
| Ramakrishnapuram | 1.02 | 2.15 | 4.48 |
| Sengattankundil | 3.02 | 0.11 | 9.69 |
| Siruveliyanallur | 0.35 | 0.39 | 3.33 |
| Sundivakkam | 8.98 | 1.77 | 4.34 |
| Thirumani | 7.49 | 0.63 | 4.84 |
| Vadangampattu | 6.22 | 1.30 | 3.81 |
| Thozhupedu | 3.90 | 1.50 | 3.90 |
| Thandarai | 8.96 | 0.58 | 3.60 |
| Thumbai | 0.50 | 14.60 | 3.90 |
| Vadapoondipattu | 1.30 | 2.20 | 1.90 |
| Vakkadai | 16.50 | 1.10 | 13.30 |
| Vadathandalam | 0.30 | 3.50 | 3.80 |
| Veliyanallur | 11.20 | 4.30 | 25.30 |
| Vinnavadi | 0.60 | 10.80 | 2.60 |
| Mleseeshamangalam | 25.14 | 1.18 | 23.49 |
| Palauthangal | 15.80 | 1.10 | 22.60 |
| Arumparuthi | 13.10 | 0.50 | 11.70 |
| Duli | 21.20 | 0.10 | 6.50 |

| | | | |
|---|---|---|---|
| Kunnathur | 20.70 | 1.50 | 8.50 |
| Maligaipattu | 15.90 | 0.90 | 1.60 |
| Munugapattu | 17.10 | 3.00 | 6.30 |
| Palli | 20.70 | 13.70 | 28.30 |
| Pillandi | 2.80 | 0.00 | 4.10 |
| Pudukottai | 1.40 | 5.10 | 11.60 |
| Talarapadi | 2.14 | 3.48 | 17.51 |
| Thenpoondipattu | 15.00 | 6.60 | 10.50 |
| Vadugapattu | 17.50 | 0.00 | 10.20 |
| Vinnamangalam | 5.47 | 20.94 | 29.20 |
| Kilpudupakkam | 9.98 | 5.13 | 1.84 |
| **Total** | **446** | **204** | **438** |

# 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 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Area | No. | No. | Length | No. | Plants | Area | No. | Length |
| Arathrivelur | 4,320 | 5 | - | - | - | 31 | 16,964 | 21 | - | - |
| Arugavoor | 390 | 0 | - | - | - | 23 | 2,537 | 3 | 338 | 1,687 |
| Arumparuthi | - | - | - | - | - | 51 | 19,549 | 24 | 775 | 3,877 |
| Duli | 7,068 | 9 | - | 487 | 2,436 | 34 | 2,742 | 3 | - | - |
| Enathavadi | 9,960 | 12 | - | - | 3,905 | 46 | 30,936 | 39 | 393 | 1,964 |
| Eraiyur | 7,332 | 9 | - | - | - | 22 | 10,877 | 14 | - | - |
| Kaduganur | 94,494 | 118 | - | - | 1,730 | 20 | - | - | 393 | 1,964 |
| Kazhanipakkam | - | - | - | 643 | 3,215 | 21 | - | - | - | - |
| Kazhiyur | 2,520 | 3 | - | - | - | 39 | 4,706 | 6 | - | - |
| Kilpudupakkam | 14,610 | 18 | - | - | - | 3 | 10,367 | 13 | 490 | 2,450 |
| Kizhapalanthai | 3,744 | 5 | - | - | - | 31 | 1,270 | 2 | 241 | 1,205 |
| Korukkai | 228 | 0 | - | - | - | 21 | 94 | 0 | 176 | 880 |
| Korukkathur | - | - | - | 337 | 1,687 | 8 | 1,600 | 2 | 1,456 | 7,280 |
| Kunnathur | 12,800 | 16 | - | - | 2,440 | 50 | 24,000 | 30 | - | - |
| Madurai | - | - | - | - | 1,855 | 91 | - | - | - | - |
| Maligaipattu | - | - | - | - | - | - | - | - | - | - |
| Mariyanallur | 17,676 | 22 | - | - | - | 14 | - | - | 214 | 1,070 |
| Mel Seeshamangalam | 33,664 | 42 | - | - | - | 149 | - | - | 2,053 | - |
| Melnagarambedu | 3,498 | 4 | - | - | 8,655 | 26 | 1,423 | 2 | 393 | 1,964 |
| Mukkur | 3,564 | 4 | - | - | 2,145 | 45 | 2,092 | 3 | 393 | 1,964 |
| Munugapattu | - | - | - | - | 3,320 | 118 | - | - | - | - |
| Murukathampoondi | 1,098 | 1 | - | - | - | 23 | 1,631 | 2 | 393 | 1,964 |
| Naval | 1,602 | 2 | - | - | - | 3 | 418 | 1 | 511 | 2,557 |
| Navalpakkam | 780 | 1 | - | - | - | 8 | 20,291 | 25 | 175 | 874 |
| Nedumpirai | 8,724 | 11 | - | - | - | 55 | 2,119 | 3 | 267 | 1,336 |

| Gram Panchayat | Aff | | ARS | AVP | | Az | BP | | CBP | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Area | No. | No. | Length | No. | Plants | Area | No. | Length |
| Paingkinar | 12,960 | 16 | - | - | - | 17 | - | - | 340 | 1,697 |
| Palauthangal | - | - | - | 725 | 3,625 | 42 | 25,299 | 32 | - | - |
| Palli | - | - | - | - | - | | 1,685 | 2 | - | - |
| Pappanthangal | - | - | - | - | - | 31 | 774 | 1 | 373 | 1,865 |
| Parasur | 420 | 1 | - | - | - | 53 | 999 | 1 | - | - |
| Perumpallam | 6,552 | 8 | - | - | - | 23 | 2,505 | 3 | 441 | 2,204 |
| Perungalathur | 6,150 | 8 | - | - | - | 18 | - | - | 359 | 1,797 |
| Pillandi | - | - | - | - | - | 74 | 2,893 | 4 | 393 | 1,964 |
| Pudukottai | - | - | 50 | - | - | 51 | - | - | - | - |
| Puliyarampakkam | - | - | - | - | - | 32 | 2,577 | 3 | 483 | 2,416 |
| Ramakrishnapuram | 6 | 0 | - | - | - | 46 | 878 | 1 | - | - |
| Sengattankundil | 2,172 | 3 | - | - | 4,625 | 34 | 2,454 | 3 | 393 | 1,964 |
| Siruveliyanallur | 1,098 | 1 | - | - | - | 55 | - | - | - | - |
| Sundivakkam | 1,560 | 2 | - | 291 | 1,456 | 18 | 14,397 | 18 | 393 | 1,964 |
| Talarapadi | - | - | - | - | - | | 1,685 | 2 | - | - |
| Thandarai | 1,722 | 2 | - | - | - | 29 | 11,707 | 15 | 489 | 2,445 |
| Thenpoondipattu | - | - | 11 | 579 | 2,894 | 35 | - | - | - | - |
| Thirumani | 1,794 | 2 | - | - | 1,710 | 28 | 12,135 | 15 | 393 | 1,964 |
| Thozhupedu | 1,914 | 2 | - | - | - | 17 | 4,102 | 5 | 858 | 4,289 |
| Thumbai | 42,090 | 53 | - | - | - | 25 | - | - | 343 | 1,715 |
| Vadangampattu | 7,194 | 9 | - | 449 | 2,245 | 27 | 4,566 | 6 | 393 | 1,964 |
| Vadapoondipattu | - | - | - | - | - | 10 | 587 | 1 | 201 | 1,004 |
| Vadathandalam | - | - | - | - | 290 | 98 | - | - | - | - |
| Vadugapattu | - | - | - | - | 1,569 | 22 | 7,200 | 9 | - | - |
| Vakkadai | 3,088 | 4 | - | - | 590 | | - | - | - | - |
| Veliyanallur | 13,872 | 17 | - | - | 5,165 | | - | - | - | - |
| Vinnamangalam | - | - | - | - | - | | - | - | - | - |
| Vinnavadi | - | - | - | - | - | 18 | - | - | - | - |

| Gram Panchayat | CS | CT | Co | | FP | COWRS | CCBF | | DLT | | DLHAI | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | No. | No. | Area | No. | No. | No. | Area | Plants | Length | No. | Area |
| Arathrivelur | 31 | 31 | 2 | - | 6 | 20 | - | - | 248 | 1,241 | | |
| Arugavoor | 23 | 23 | 8 | - | 10 | 20 | - | - | 205 | 1,026 | | |
| Arumparuthi | 51 | 51 | 13 | - | 15 | 40 | - | - | 772 | 3,862 | | |
| Duli | 34 | 34 | 7 | - | 9 | 35 | - | - | 625 | 3,126 | | |
| Enathavadi | 46 | 46 | 11 | - | 17 | 26 | - | - | - | - | | |
| Eraiyur | 22 | 22 | 8 | - | 12 | 55 | - | - | 655 | 3,276 | | |
| Kaduganur | 20 | 20 | 8 | - | 20 | 33 | - | - | - | - | | |
| Kazhanipakkam | 21 | 21 | - | - | 12 | 10 | - | - | 165 | 827 | | |
| Kazhiyur | 39 | 39 | 14 | - | 18 | 112 | - | - | 1,133 | 5,666 | | |
| Kilpudupakkam | 3 | 3 | 2 | - | 6 | 21 | - | - | 318 | 1,588 | | |
| Kizhapalanthai | 31 | 31 | 7 | - | 9 | 17 | - | - | 355 | 1,776 | | |
| Korukkai | 21 | 21 | 5 | - | 5 | 29 | - | - | 198 | 988 | | |
| Korukkathur | 8 | 8 | 1 | 5 | 3 | - | - | - | 40 | 202 | 1,950 | 2 |
| Kunnathur | 78 | 78 | 3 | - | 3 | 35 | - | - | 740 | 3,700 | | |
| Madurai | 36 | 36 | 6 | 8 | 4 | 32 | - | - | - | - | | |
| Maligaipattu | - | - | 2 | 9 | 10 | - | - | - | 652 | 3,262 | 25,600 | 23 |
| Mariyanallur | 14 | 14 | 12 | - | 14 | 25 | - | - | 230 | 1,150 | | |
| Mel Seeshamangalam | 149 | 149 | 31 | - | 39 | 129 | 17,039 | 166 | 1,963 | 9,816 | 11,996 | 60 |
| Melnagarambedu | 26 | 26 | 6 | - | 11 | 12 | - | - | - | - | | |
| Mukkur | 45 | 45 | 9 | - | 11 | 54 | - | - | 320 | 1,600 | | |
| Munugapattu | 27 | 27 | 5 | - | 6 | 46 | - | - | 980 | 4,900 | | |
| Murukathampoondi | 23 | 23 | 2 | - | 6 | 9 | - | - | 58 | 288 | | |
| Naval | 3 | 3 | 3 | - | 4 | 47 | - | - | 60 | 298 | | |
| Navalpakkam | 8 | 8 | 2 | - | 7 | 22 | - | - | 146 | 731 | | |
| Nedumpirai | 55 | 55 | 12 | - | 13 | - | - | - | 331 | 1,654 | | |
| Paingkinar | 17 | 17 | 9 | - | 12 | 13 | - | - | 555 | 2,774 | | |
| Palauthangal | 42 | 42 | 24 | - | 27 | 129 | - | - | 191 | 955 | | |
| Palli | 45 | 45 | 15 | - | - | 1 | 1,400 | 14 | - | - | | |

| Gram Panchayat | CS | CT | Co | | FP | COWRS | CCBF | | DLT | | DLHAI | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | No. | No. | Area | No. | No. | No. | Area | Plants | Length | No. | Area |
| Pappanthangal | 31 | 31 | 45 | - | 27 | 27 | - | - | 525 | 2,625 | | |
| Parasur | 53 | 53 | 11 | - | 31 | 48 | - | - | 1,072 | 5,361 | | |
| Perumpallam | 23 | 23 | 5 | - | 8 | 9 | - | - | 187 | 934 | | |
| Perungalathur | 18 | 18 | 6 | - | 13 | 32 | - | - | 349 | 1,746 | | |
| Pillandi | 74 | 74 | 4 | - | 5 | 26 | - | - | 388 | 1,939 | | |
| Pudukottai | 51 | 51 | 14 | 62 | 15 | - | - | - | 742 | 3,711 | 24,800 | 29 |
| Puliyarampakkam | 32 | 32 | 9 | - | 16 | 17 | - | - | 503 | 2,513 | | |
| Ramakrishnapuram | 46 | 46 | 5 | - | 7 | 24 | - | - | 20 | 100 | | |
| Sengattankundil | 34 | 34 | 10 | - | 11 | 41 | - | - | - | - | | |
| Siruveliyanallur | 55 | 55 | 4 | - | 5 | 9 | - | - | 58 | 288 | | |
| Sundivakkam | 18 | 18 | 5 | - | 8 | 21 | - | - | - | - | | |
| Talarapadi | 45 | 45 | 15 | - | - | 1 | 1,400 | 14 | - | - | | |
| Thandarai | 29 | 29 | 4 | - | 8 | 14 | - | - | 310 | 1,552 | | |
| Thenpoondipattu | 35 | 35 | 11 | 62 | 11 | - | - | - | 309 | 1,545 | 30,400 | 31 |
| Thirumani | 28 | 28 | 5 | - | 7 | 28 | - | - | - | - | | |
| Thozhupedu | 17 | 17 | 4 | - | 6 | 29 | - | - | 846 | 4,229 | | |
| Thumbai | 25 | 25 | 4 | - | 15 | 28 | - | - | 40 | 200 | | |
| Vadangampattu | 27 | 27 | 4 | - | 6 | 18 | - | - | - | - | | |
| Vadapoondipattu | 10 | 10 | 2 | - | 4 | 26 | - | - | 424 | 2,118 | | |
| Vadathandalam | 55 | 55 | 5 | 15 | 7 | 21 | - | - | - | - | | |
| Vadugapattu | 22 | 22 | 5 | - | 3 | 28 | - | - | 400 | 2,000 | | |
| Vakkadai | 45 | 45 | - | - | 11 | 28 | - | - | - | - | | |
| Veliyanallur | 56 | 56 | - | - | 17 | 44 | - | - | - | - | 51,840 | 65 |
| Vinnamangalam | 45 | 45 | 15 | - | 15 | - | - | - | 760 | 3,801 | | |
| Vinnavadi | 18 | 18 | 3 | - | 10 | 6 | - | - | 111 | 557 | | |

| Gram Panchayat | FBBTI | | FD | GSS | ICP | | LDI | | LP | | MI | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Area | No. | No. | Plants | Length | No. | Area | Plants | Length | No. | Area |
| Arathrivelur | | | - | 5 | - | - | 14 | 34 | 321 | 1,605 | - | - |
| Arugavoor | | | - | 25 | 190 | 950 | 9 | 23 | 305 | 1,525 | - | - |
| Arumparuthi | | | - | 21 | - | - | 15 | 39 | 736 | 3,680 | - | - |
| Duli | | | - | 18 | - | - | 8 | 20 | 702 | 3,510 | - | - |
| Enathavadi | 15 | 35 | - | 60 | 160 | 800 | 25 | 64 | 592 | 2,959 | - | - |
| Eraiyur | - | - | - | 9 | 180 | 900 | 7 | 17 | 380 | 1,900 | - | - |
| Kaduganur | 126 | 17 | - | 20 | 140 | 700 | 51 | 127 | 438 | 2,190 | - | - |
| Kazhanipakkam | 1 | 13 | 21 | 9 | 220 | 1,100 | 5 | 13 | - | - | - | - |
| Kazhiyur | - | - | - | 22 | 300 | 1,500 | 13 | 33 | 1,628 | 8,140 | - | - |
| Kilpudupakkam | | | - | 2 | - | - | 13 | 33 | 424 | 2,120 | - | - |
| Kizhapalanthai | | | - | 30 | 196 | 980 | 9 | 23 | 172 | 860 | - | - |
| Korukkai | - | - | - | 26 | 192 | 960 | 2 | 5 | 598 | 2,992 | - | - |
| Korukkathur | 2 | 5 | - | 1 | 160 | 800 | 5 | 12 | 247 | 1,236 | 2 | 5 |
| Kunnathur | - | - | - | 37 | - | - | 1 | 16 | 1,184 | 1 | - | - |
| Madurai | 3 | 8 | 36 | 4 | 100 | 500 | - | - | 363 | 1,815 | - | - |
| Maligaipattu | 26 | 23 | - | - | - | - | 2 | 6 | 229 | 1,145 | 3 | 9 |
| Mariyanallur | | | - | 4 | 140 | 700 | 14 | 34 | 603 | 3,015 | - | - |
| Mel Seeshamangalam | 15 | 38 | - | | | | 15 | 38 | 2,408 | 12,038 | - | - |
| Melnagarambedu | 10 | 10 | - | 44 | 80 | 400 | 12 | 29 | 764 | 0 | - | - |
| Mukkur | 11 | 21 | - | 16 | - | - | 7 | 16 | 566 | 0 | - | - |
| Munugapattu | - | - | - | 21 | - | - | - | - | 1,757 | 1 | - | - |
| Murukathampoondi | 3 | 5 | - | 23 | - | - | 1 | 3 | 370 | 1,851 | - | - |
| Naval | 4 | 4 | - | 5 | - | - | 2 | 6 | 412 | 2,062 | - | - |
| Navalpakkam | - | - | - | 2 | - | - | 11 | 28 | 561 | 2,806 | - | - |
| Nedumpirai | | | - | 24 | - | - | 10 | 26 | 744 | 3,720 | - | - |
| Paingkinar | | | - | 1 | - | - | 13 | 33 | 297 | 1,485 | - | - |
| Palauthangal | 24 | 38 | - | 20 | - | - | 24 | 60 | - | - | - | - |
| Palli | - | - | - | 25 | - | - | - | - | 247 | 1,235 | 9 | |

| Gram Panchayat | FBBTI | | FD | GSS | ICP | | LDI | | LP | | MI | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Area | No. | No. | Plants | Length | No. | Area | Plants | Length | No. | Area |
| Pappanthangal | - | - | - | 4 | - | - | 15 | 36 | 320 | 1,599 | - | - |
| Parasur | - | - | - | 51 | - | - | 44 | 111 | 491 | 2,455 | - | - |
| Perumpallam | - | - | - | 39 | - | - | 8 | 21 | 562 | 2,812 | - | - |
| Perungalathur | - | - | - | 15 | - | - | 17 | 42 | 391 | 1,954 | - | - |
| Pillandi | 4 | 8 | - | 11 | - | - | 3 | 8 | 79 | 395 | - | - |
| Pudukottai | 25 | 62 | - | 10 | - | - | - | - | - | - | 11 | 28 |
| Puliyarampakkam | - | - | - | 35 | - | - | 18 | 44 | 513 | 2,567 | - | - |
| Ramakrishnapuram | - | - | - | 24 | - | - | 5 | 14 | 249 | 1,244 | - | - |
| Sengattankundil | 13 | 21 | - | 18 | - | - | 7 | 17 | 360 | 0 | - | - |
| Siruveliyanallur | | | - | 30 | - | - | 2 | 5 | 129 | 645 | - | - |
| Sundivakkam | 5 | 11 | - | 1 | - | - | 12 | 29 | 847 | 4,236 | - | - |
| Talarapadi | - | - | - | 25 | - | - | - | - | 730 | 3,651 | 9 | 23 |
| Thandarai | - | - | - | 45 | - | - | 9 | 22 | 744 | 3,722 | - | - |
| Thenpoondipattu | 38 | 62 | - | 31 | - | - | 11 | 27 | 487 | 2,436 | 4 | 9 |
| Thirumani | 6 | 12 | - | 1 | - | - | 9 | 23 | 508 | 0 | - | - |
| Thozhupedu | - | - | - | 14 | - | - | 6 | 15 | 493 | 2,465 | - | - |
| Thumbai | - | - | - | 9 | - | - | 23 | 57 | 322 | 1,609 | - | - |
| Vadangampattu | 13 | 8 | - | 47 | - | - | 9 | 23 | 314 | 1,568 | - | - |
| Vadapoondipattu | - | - | - | 11 | - | - | 4 | 11 | 423 | 2,116 | - | - |
| Vadathandalam | 2 | 5 | 55 | 29 | - | - | - | - | 970 | 0 | - | - |
| Vadugapattu | - | - | - | 1 | - | - | - | - | 1,142 | 1 | - | - |
| Vakkadai | 9 | 23 | - | 3 | - | - | - | - | 996 | 0 | - | - |
| Veliyanallur | - | - | - | 40 | - | - | - | - | 1,477 | 7,385 | - | - |
| Vinnamangalam | 40 | 99 | - | 25 | - | - | - | - | 518 | 2,589 | 9 | 23 |
| Vinnavadi | 3 | 6 | - | 5 | - | - | 16 | 41 | 101 | 507 | - | - |

| Gram Panchayat | NADEP | ND | | PS | RP-WDT | Roo | RP | RRWH | SPD | | SPC | SPI | WCICD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Plants | HH | No. | No. | No. | No. | No. | No. | Area | No. | No. | Length |
| Arathrivelur | 31 | 185 | 37 | - | 2 | - | 1 | 2 | - | - | 2 | 19 | - |
| Arugavoor | 23 | 390 | 78 | - | 2 | - | 1 | 2 | 9,600 | 12 | 4 | 40 | 950 |
| Arumparuthi | 51 | 510 | 102 | - | 2 | - | 9 | 2 | 1,600 | 2 | 5 | 74 | - |
| Duli | 34 | 444 | 89 | - | 3 | - | 4 | 2 | - | - | 4 | 32 | - |
| Enathavadi | 46 | 468 | 94 | - | 2 | - | 6 | 2 | - | - | | 66 | 800 |
| Eraiyur | 22 | 358 | 72 | - | - | - | 3 | 2 | - | - | 4 | 50 | 900 |
| Kaduganur | 20 | 331 | 66 | - | 3 | - | 2 | 2 | 800 | 1 | 3 | 31 | 700 |
| Kazhanipakkam | 21 | 535 | 107 | - | 4 | - | - | 2 | - | - | 1 | 210 | 1,100 |
| Kazhiyur | 39 | 452 | 90 | - | 7 | - | - | 2 | 4,800 | 6 | 5 | 80 | 1,500 |
| Kilpudupakkam | 3 | 1,659 | 332 | - | 1 | - | 3 | 2 | - | - | 17 | 18 | - |
| Kizhapalanthai | 31 | 412 | 82 | - | 1 | - | 1 | 2 | - | - | 4 | 65 | 980 |
| Korukkai | 21 | 243 | 49 | - | 3 | - | - | 2 | - | - | 2 | 24 | 960 |
| Korukkathur | 8 | 7,290 | 1,458 | - | 2 | - | 1 | 2 | - | - | 5 | 46 | 800 |
| Kunnathur | 50 | 250 | 50 | - | 2 | - | 4 | 2 | 1 | 4 | 2 | 209 | - |
| Madurai | 40 | 455 | 91 | - | 2 | - | 3 | 2 | - | - | 9 | | 500 |
| Maligaipattu | - | 1,364 | 273 | - | 4 | - | 8 | 2 | - | - | 3 | 34 | - |
| Mariyanallur | 14 | 125 | 25 | - | 2 | - | 3 | 2 | | - | 1 | 14 | 700 |
| Mel Seeshamangalam | 149 | 7,575 | 1,515 | - | 6 | | 3 | 2 | - | - | 15 | | |
| Melnagarambedu | 26 | 350 | 70 | - | 3 | - | 2 | 2 | 8,800 | 11 | 4 | 25 | 400 |
| Mukkur | 45 | 450 | 90 | - | 2 | - | 4 | 2 | - | - | 5 | 86 | - |
| Munugapattu | 27 | 540 | 108 | - | 2 | 8 | 8 | 2 | - | - | 4 | | - |
| Murukathampoondi | 23 | 206 | 41 | - | 4 | - | - | 2 | - | - | 2 | 26 | - |
| Naval | 3 | 330 | 66 | - | 1 | - | 5 | 2 | - | - | 3 | 10 | - |
| Navalpakkam | 8 | 547 | 109 | - | 2 | - | 1 | 2 | - | - | 5 | 12 | - |
| Nedumpirai | 55 | 356 | 71 | - | 4 | - | 3 | 2 | - | - | 4 | 48 | - |
| Paingkinar | 17 | 225 | 45 | - | 1 | - | 2 | 2 | 6,400 | 8 | 2 | 40 | - |
| Palauthangal | 42 | 1,515 | 303 | - | - | - | 4 | 2 | - | - | 15 | 149 | - |

| Gram Panchayat | NADEP | ND | | PS | RP-WDT | Roo | RP | RRWH | SPD | | SPC | SPI | WCICD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Plants | HH | No. | No. | No. | No. | No. | No. | Area | No. | No. | Length |
| Palli | | | | - | 4 | - | 16 | 2 | 10,000 | 1 | - | | - |
| Pappanthangal | 31 | 501 | 100 | - | 3 | - | - | 2 | 2,400 | 3 | 5 | 44 | - |
| Parasur | 53 | 575 | 115 | - | 6 | - | - | 2 | 10,400 | 13 | 6 | 101 | - |
| Perumpallam | 23 | 297 | 59 | - | 3 | - | 1 | 2 | 2,400 | 3 | 3 | 30 | - |
| Perungalathur | 18 | 474 | 95 | - | 2 | - | 3 | 2 | 22,400 | 28 | 5 | 42 | - |
| Pillandi | 74 | 371 | 74 | - | 3 | - | 4 | 2 | - | - | 4 | 24 | - |
| Pudukottai | 51 | 2,420 | 484 | - | - | 8 | 10 | 2 | - | - | 6 | 61 | - |
| Puliyarampakkam | 32 | 380 | 76 | - | 5 | - | - | 2 | - | - | 4 | 68 | - |
| Ramakrishnapuram | 46 | 362 | 72 | - | 4 | - | - | 2 | 6,400 | 8 | 4 | 80 | - |
| Sengattankundil | 34 | 385 | 77 | - | 2 | - | 2 | 2 | - | - | 4 | 59 | - |
| Siruveliyanallur | 55 | 274 | 55 | - | - | - | 3 | 2 | - | - | 3 | 85 | - |
| Sundivakkam | 18 | 173 | 35 | - | 2 | - | - | 2 | 3,200 | 4 | 2 | 31 | - |
| Talarapadi | | | | - | 4 | - | 2 | 2 | 24,000 | 30 | - | | - |
| Thandarai | 29 | 385 | 77 | - | 3 | - | 2 | 2 | - | 2 | 4 | 46 | - |
| Thenpoondipattu | 35 | 1,564 | 313 | - | 5 | - | 5 | 2 | - | - | 4 | 39 | - |
| Thirumani | 28 | 839 | 168 | - | 3 | - | - | 2 | - | - | 2 | 55 | - |
| Thozhupedu | 17 | 402 | 80 | - | 5 | - | 3 | 2 | - | 3 | 4 | 14 | - |
| Thumbai | 25 | 182 | 36 | - | 2 | - | 1 | 2 | - | - | 2 | 33 | - |
| Vadangampattu | 27 | 181 | 36 | - | 3 | - | - | 2 | - | 5 | 2 | 41 | - |
| Vadapoondipattu | 10 | 243 | 49 | - | - | - | 5 | 2 | - | - | 2 | 14 | - |
| Vadathandalam | 55 | 490 | 98 | - | 4 | - | 3 | 2 | - | - | 9 | | - |
| Vadugapattu | 33 | 110 | 22 | - | 1 | - | 6 | 2 | - | - | 4 | | - |
| Vakkadai | 40 | | | - | 2 | - | 5 | 2 | - | - | 13 | | - |
| Veliyanallur | 60 | | | - | 3 | - | 11 | 2 | - | - | 2 | 173 | - |
| Vinnamangalam | | | | - | 1 | - | 7 | 2 | - | - | 3 | | - |
| Vinnavadi | 18 | 316 | 63 | - | 1 | - | 8 | 2 | - | - | 3 | 36 | - |

# 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 16/11/21 |
|---|---|---|---|
| 1 | Aradrivelur | 228 | 146 |
| 2 | Arugavoor | 298 | 262 |
| 3 | Arumparuthi | 502 | 411 |
| 4 | Duli | 651 | 234 |
| 5 | Enthavadi | 393 | 288 |
| 6 | Eraiyur | 333 | 216 |
| 7 | Kaduganoor | 301 | 243 |
| 8 | Kalanipakkam | 559 | 207 |
| 9 | Kazhiyur | 552 | 291 |
| 10 | Kilpalandai | 317 | 571 |
| 11 | Kilpudupakkam | 134 | 225 |
| 12 | Korukkai | 272 | 215 |
| 13 | Korukkathur | 495 | 110 |
| 14 | Kunnathur | 647 | 135 |
| 15 | Madhurai | 415 | 328 |
| 16 | Maligaipattu | 303 | 603 |
| 17 | Mariyanallur | 220 | 84 |
| 18 | Melnagarambedu | 339 | 212 |
| 19 | Melseeshamangalam | 386 | 121 |
| 20 | Mukkur | 302 | 365 |
| 21 | Munugapattu | 695 | 462 |
| 22 | Murukathanpoondi | 260 | 115 |
| 23 | Naval | 292 | 702 |
| 24 | Navalpakkam | 328 | 313 |
| 25 | Nedumbirai | 434 | 201 |
| 26 | Painkinar | 210 | 145 |
| 27 | Palanthangal | 275 | 232 |
| 28 | Palli | 423 | 577 |
| 29 | Pappanthangal | 398 | 346 |
| 30 | Parasur | 652 | 263 |
| 31 | Perumpallam | 304 | 192 |
| 32 | Perungalathur | 531 | 243 |
| 33 | Pillanthi | 483 | 318 |
| 34 | Pudukottai | 464 | 151 |
| 35 | Puliyarampakkam | 424 | 472 |
| 36 | Ramakrishnapuram | 421 | 197 |
| 37 | Senkattankudil | 404 | 177 |
| 38 | Siruveliyanallur | 426 | 216 |
| 39 | Sundivakkam | 209 | 214 |
| 40 | Thalarapadi | 148 | 165 |
| 41 | Thandarai | 501 | 160 |
| 42 | Thenpoondipattu | 386 | 399 |

| S. No | GP | WASCA Recommendation for 3 Years | Works uploaded for FY-2021-22 as on 16/11/21 |
|---|---|---|---|
| 43 | Thirumani | 298 | 333 |
| 44 | Thozhupedu | 849 | 348 |
| 45 | Thumbai | 329 | 113 |
| 46 | Vadangampattu | 245 | 105 |
| 47 | Vadapoondipattu | 186 | 234 |
| 48 | Vadathandalam | 280 | 228 |
| 49 | Vadugapattu | 385 | 421 |
| 50 | Vakkadai | 539 | 108 |
| 51 | Veliyanallur | 407 | 115 |
| 52 | Vinnamangalam | 539 | 269 |
| 53 | Vinnavadi | 367 | 304 |
| | **Total** | **20739** | **14105** |

# ANNEXURE 7.2

## GPS AND WORK CATEGORY-WISE DETAILS OF WORKS

| Panchayat | Work Category | No. of work |
|---|---|---|
| Aradrivelur | WCWH | 3 |
| | Works on Individuals Land (Category IV) | 1 |
| Arugavoor | WCWH | 1 |
| Arumparuthi | WCWH | 2 |
| | Works on Individuals Land (Category IV) | 1 |
| Duli | WCWH | 2 |
| Enthavadi | WCWH | 3 |
| | Works on Individuals Land (Category IV) | 1 |
| Eraiyur | WCWH | 2 |
| | Works on Individuals Land (Category IV) | 1 |
| Kaduganur | WCWH | 2 |
| Kalanipakkam | WCWH | 2 |
| Kaliyur | Anganwadi/Other Rural Infrastructure | 1 |
| | Rural Connectivity | 1 |
| | WCWH | 3 |
| Kilpalandai | WCWH | 2 |
| Kilpudupakkam | Rural Sanitation | 3 |
| | WCWH | 2 |
| Korukkai | WCWH | 1 |
| Korukkathur | Rural Connectivity | 1 |
| | WCWH | 2 |
| | Works on Individuals Land (Category IV) | 1 |
| Kunnathur | WCWH | 2 |
| Madhurai | WCWH | 1 |
| Maligaipattu | WCWH | 2 |
| Mariyanallur | Drought Proofing | 1 |
| | WCWH | 1 |
| Melnagarambedu | WCWH | 3 |
| | Works on Individuals Land (Category IV) | 1 |
| Melseeshamangalam | WCWH | 5 |
| Mukkur | Rural Connectivity | 1 |
| | WCWH | 3 |
| | Works on Individuals Land (Category IV) | 1 |
| Munugapattu | WCWH | 4 |
| | Works on Individuals Land (Category IV) | 2 |
| Murukathanpoondi | Drought Proofing | 2 |
| Naval | WCWH | 2 |
| | Works on Individuals Land (Category IV) | 1 |
| Navalpakkam | WCWH | 3 |
| Nedumbirai | WCWH | 2 |
| Painkinar | Drought Proofing | 1 |
| | WCWH | 2 |

| | | |
|---|---|---|
| Palanthangal | WCWH | 3 |
| Palli | WCWH | 2 |
| Pappanthangal | Rural Connectivity | 1 |
| | WCWH | 2 |
| Parasur | WCWH | 3 |
| Perumpallam | WCWH | 2 |
| Perungalathur | WCWH | 2 |
| Pillanthi | WCWH | 2 |
| | Works on Individuals Land (Category IV) | 1 |
| Pudukottai | Anganwadi/Other Rural Infrastructure | 1 |
| | WCWH | 4 |
| Puliyarampakkam | WCWH | 2 |
| Ramakrishnapuram | WCWH | 2 |
| Senkattankudil | WCWH | 2 |
| | Works on Individuals Land (Category IV) | 1 |
| Siruveliyanallur | WCWH | 2 |
| Sundivakkam | WCWH | 1 |
| Thalarapadi | WCWH | 2 |
| Thandarai | WCWH | 2 |
| Thenpoondipattu | Drought Proofing | 1 |
| | WCWH | 1 |
| Thirumani | WCWH | 3 |
| Thozuppedu | WCWH | 2 |
| Thumbai | WCWH | 1 |
| Vadangampattu | WCWH | 1 |
| Vadapoondipattu | WCWH | 1 |
| Vadathandalam | WCWH | 2 |
| Vadugapattu | WCWH | 2 |
| Vakkadai | WCWH | 2 |
| | Works on Individuals Land (Category IV) | 1 |
| Veliyanallur | WCWH | 2 |
| Vinnamangalam | WCWH | 3 |
| | Works on Individuals Land (Category IV) | 4 |
| Vinnavadi | Rural Connectivity | 1 |
| | Rural Sanitation | 1 |
| | WCWH | 3 |
| | Works on Individuals Land (Category IV) | 1 |
| **Total** | | **147** |

# ANNEXURE 8

## CWRM KEY INDICATORS FOR GPS IN DEVANANDAL & ADAIYUR MICRO-WATERSHED

| Key CWRM Parameter | Pappanthangal | Arugavoor |
|---|---|---|
| **Section 1: Soil Profile** | | |
| **Soil Resources: Status of Available Nitrogen** | | |
| Very Low | 1% | 0% |
| Low | 99% | 100% |
| Medium | 0% | 0% |
| **Status of Organic Carbon** | | |
| Very Low | 20% | 15% |
| Low | 80% | 85% |
| **Status of Soil Micro Nutrients** | | |
| Sufficient | 53% | 35% |
| Deficient | 47% | 65% |
| **Status of Physical condition of the soil** | | |
| Moderately Alkaline (MAI) | 100% | 100% |
| **Soil Texture** | | |
| % of Clay Soil | 62% | 51% |
| % of Fine Soil | 25% | 30% |
| % of Coarse loamy | 0% | 3% |
| Soil Water Permeability | Low | Low |
| **Means of Water Extraction** | | |
| Gravity | 9% | 13% |
| Lifting | 91% | 87% |
| **Irrigation Methods** | | |
| Wild Flooding | 100% | 0% |
| Control Flooding | 0% | 100% |
| **Livestock** | | |
| Cattle Population | 696 | 429 |
| Sheep Population | 284 | 517 |
| Goat Population | 180 | 461 |
| **Land Resources (in ha)** | | |
| Non-Agricultural Uses | 0.97 | 4.23 |
| Barren & Un-cultivable Land | 0.00 | 0.49 |
| Treatement Area under Permanent Pastures and Other Grazing Land | 2.69 | 11.54 |
| Land Under Miscellaneous Tree Criticalops etc. | 15.29 | 0.32 |
| Culturable Waste Land | 0.00 | 0.00 |
| Fallows Land other than Current Fallows | 5.98 | 1.95 |
| Current Fallow land | 45.48 | 26.10 |
| Unirrigated Land | 22.41 | 5.78 |
| Treatment Area Irrigated by Source | 6.72 | 5.04 |

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