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

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## 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).

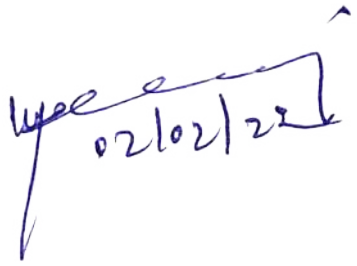
Through GIS based planning in 860 GPs, works identified under CWRM are verified, approved at Gram Sabha. These works would potentially reduce 38% surface runoff to be harvested or recharged by various interventions through ridge to valley watershed approach.

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—H

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

# MESSAGES

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

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

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

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

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

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

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

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

# MESSAGES

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

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

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

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

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

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

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# ABBREVIATIONS AND ACRONYMS

## A - D

**%**
Percentage

**$^{0}$C**
Degree Celsius

**AR**
Assessment Report

**CCB**
Contour Continuous Bunds

**CCCDM**
Centre for Climate Change and Disaster Management

**CRM**
Climate Resilient Measures

**CuM**
Cubic Meter

**CVI**
Climate Vulnerability Index

**CWRM**
Composite Water Resource Management

**CWRMP**
Composite Water Resource Management Plan

**DEM**
Digital Elevation Model

## D - H

**DLSC**
District Level Steering Committee

**DLT**
Drainage Line Treatment

**DRD&PR**
Department of Rural Development & Panchayat Raj

**ET**
Evapo-transpiration

**FPO**
Farmer Producer Organization

**FY**
Financial Year

**GIS**
Geographical Information System

**GIZ**
Deutsche Gesellschaft für Internationale

**Govt.**
Government

**GP**
Gram Panchayat

**GW**
Ground Water

**ha**
Hectare

## I - M

**ha.m**
Hectare Meter

**HH**
Households

**ICAR**
Indian Council for Agriculture Research

**IMD**
Indian Meteorological Department

**INR**
Indian Rupees

**IPCC**
Intergovernmental Panel on Climate Change

**IWRM**
Integrated Water Resources Management

**Kharif crop**
Sown in Monsoon and harvested close to Autumn

**km**
Kilometer

**KML**
Keyhole Markup Language

**LULC**
Land use and land cover

## M - N

**Max**
Maximum

**MCM**
Million Cubic Meter

**MC**
Mid Century

**Mahatma Gandhi NREGA**
Mahatma Gandhi Rural Employment Guarantee Act

**Mahatma Gandhi NRGES**
Mahatma Gandhi Rural Employment Guarantee Scheme

**Min**
Minimum

**mm**
Millimeter

**MoEFCC**
Ministry of Environment, Forest and Climate Change

**MoJS**
Ministry of Jal Shakti

**MoRD**
Ministry of Rural Development

**M**
Meters

**NAPCC**
National Action on Climate Change

## N - S

**NARP**
National Agricultural Research Project

**NADEP**
Nadepkaka

**NDC**
Nationally Determined Contributions

**NEM**
North-East monsoon

**NGO**
Non-Governmental Organization

**NITI**
National Institution for Transforming India

**No.**
Number

**NRM**
Natural Resource Management

**NRSC**
National Remote Sensing Centre

**NWC**
National Water Commission

**PWD**
Public Works Department

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

## S - U

**RDPR**
Rural Development & Panchayat Raj

**RF**
Reserve Forest

**RTRWHS**
Roof top rain water harvesting structures

**RWHS**
Rain Water Harvesting System

**SAPCC**
State Action Plan on Climate Change

**SC**
Scheduled Caste

**SDG**
Sustainable Development Goal

**SDMA**
State Disaster Management Authority

**SDMRI**
Suganthi Devadasan Marine Resources Institute

**SECC**
Socio Economic and Caste Census

**SHG**
Self Help Group

## S - W

**SLSC**
State Level Steering Committee

**ST**
Scheduled Tribe

**SWM**
South-West monsoon

**UN**
United Nations

**SW**
Surface Water

**TN**
Tamil Nadu

**WASCA**
Water Security and Climate Adaptation

**WCWH**
Water Conservation and Water Harvesting

வான்நின்று உலகம் வழங்கி வருதலால்
தான்அமிழ்தம் என்றுணரற் பாற்று

குறள் - 11

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

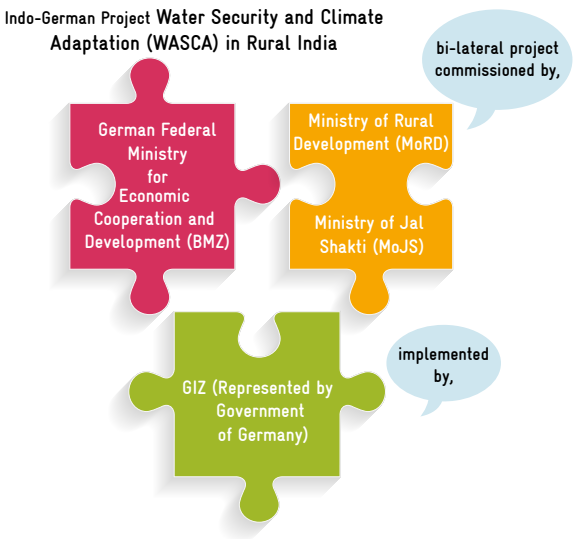
Thirukkural - 11

# EXECUTIVE SUMMARY

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

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

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



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

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

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

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

This report is structured with nine chapters

1

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

2

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

3

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

4

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

5

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

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

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

Chengam Block of Tiruvannamalai district lies between 12°6'10.85"N to 12°24'40.519"N latitude and 78°38'55.192"E to 78°59'52.782"E longitude. The Block is surrounded by Thandrampet, Thiruvannamalai, Thurinjapuram, Pudupalayam and Jawadhu Hills Blocks (Figure 1.1). The total geographical area of this Block is 59,853 ha (598.53 Sq.km). Administratively, this Block comes under Chengam taluk, with 44 Gram panchayats and 293 habitations in it.

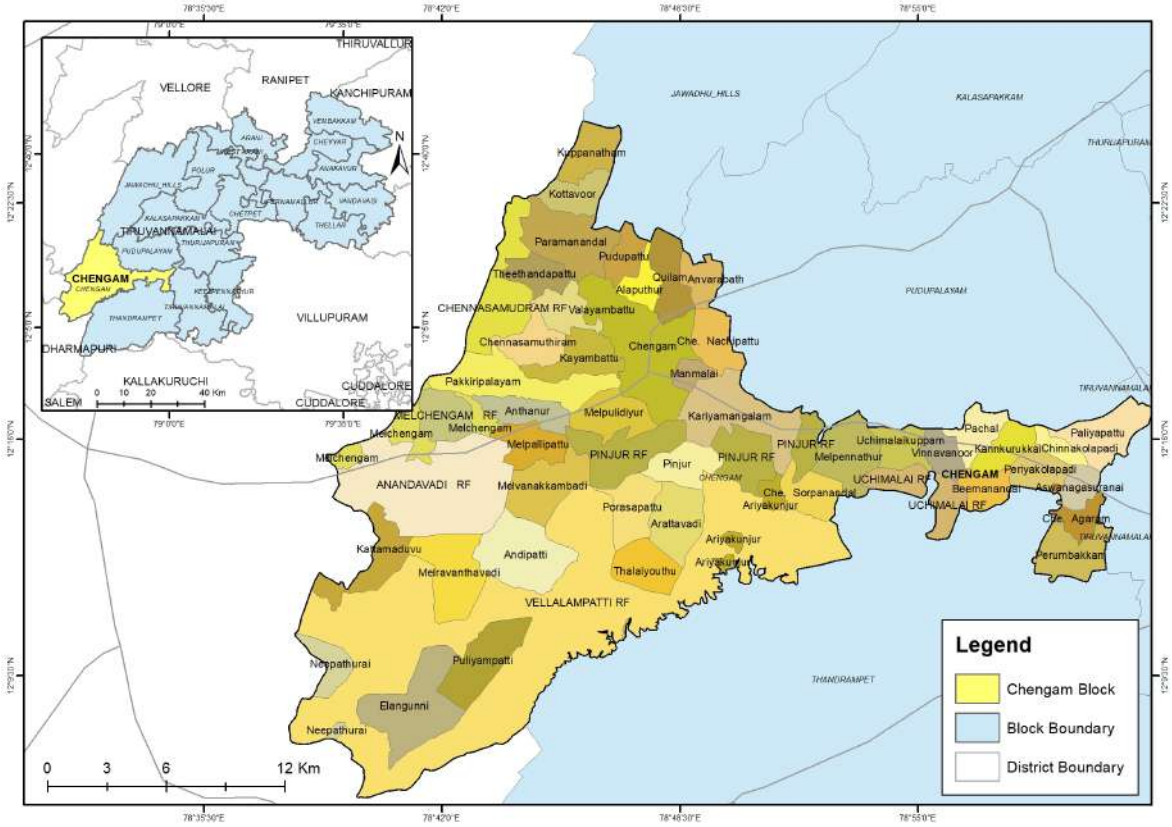



*Figure 1.1. Chengam Block and it's environ*

According to Census 2011, the population of Chengam Block is 1,69,129. The population density of the Block is 283 per Sq. km which is much lower than the district population density (473 per Sq. km) and the State's density (555 per Sq.km). There is -6.21% decrease in the population observed since 2001. The percentage of Male population is nearly equal to (50.57 %) female population (49.42%). The proportion of sex ratio is 977 females per 1000 males, which is slightly lower compared to the district average sex-ratio (994 females per 1,000 males). The literacy rate of female population is lower (43.90%) than male literacy (56.10%). At 69.79%, the average literacy rate of the Block is lower than the national average (72.98%). Scheduled Castes and Scheduled Tribes accounted for 30% of the total population (Thiruvannamalai district profile 2020).

Economically, Chengam is among the low revenue Blocks of the Tiruvannamalai district. Agriculture and allied activities, are the primary occupation. Paddy tops as the predominant crop, with 59.76 % of the irrigated area cultivated with paddy. The other major crops grown in the Block area are ground nut, flower crops, and sugarcane. Under rainfed crops other pulses, groundnut and red gram are mainly cultivated. Significant cultivated areas of banana, dry chilli, coconut and other fruits and vege-

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

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

tables can also be seen. Groundnut and pulses are cultivated both under irrigated and rainfed conditions. A huge livestock count of 1,51,015 was recorded during 2019-20. The cattle count is 78,098 and the Block has 36 milk societies with 31,816 litres of milk being produced per day.A noticable patch of sericuture (74.5 acres) is practiced in the Block. Chengam is the gateway to the Chengam pass in the Eastern ghats between Jawadhu hills to the north and Chennakesava hills to the south. The Aavin milk processing plant, Periya Kolappadi SIDCO estate and the Sathanur dam hydro-electric project, are situated in the Block making Chengam a centre for industrial activities.

> 59.76 % of the irrigated area cultivated with paddy.

Chengam Block comes under Aliyar, Matturar, Pambar to Thirukovilur,Thurinjalar, Vayalar Odai and Cheyyar sub-basin/Pennaiyar and Palar basins. River Cheyyar flows through the Block. Four macrosheds Cheyyar River, Kallar, Pamban and Thurinjalur macro watersheds covers the Block with 135 micro watersheds (Figure 1.2).

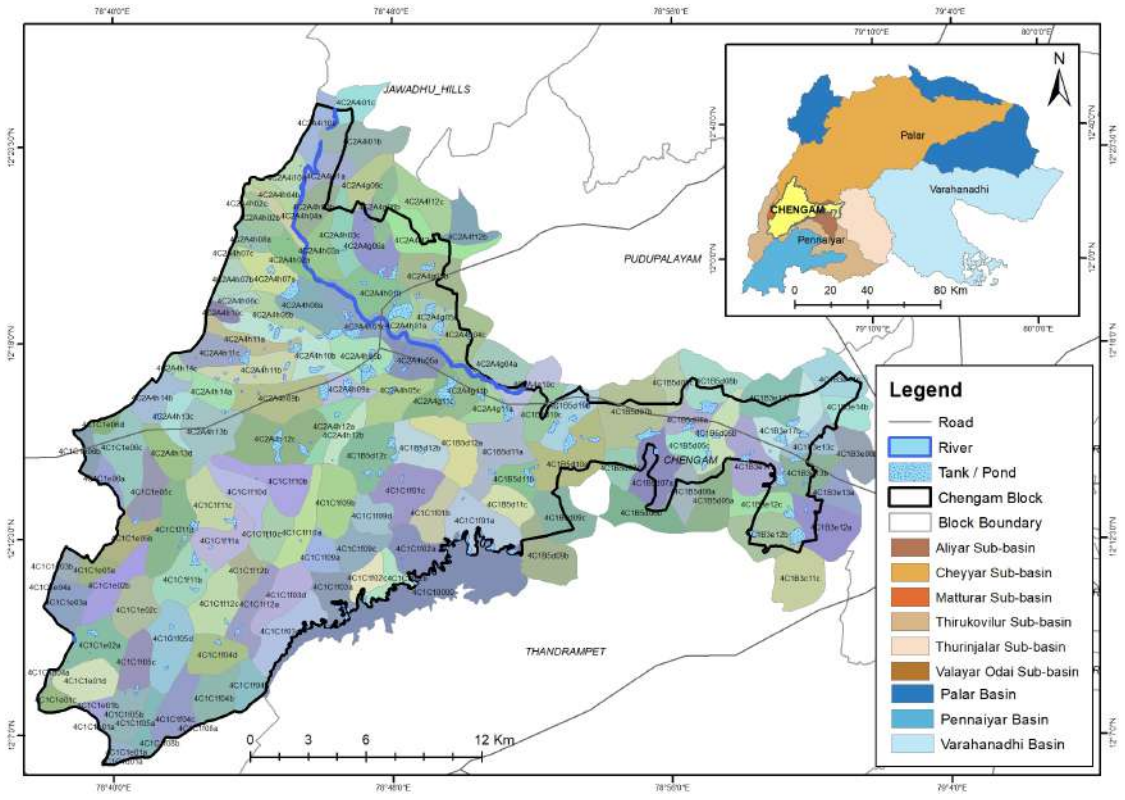



*Figure 1.2. Watersheds- Chengam Block*

There are 86 tanks in the Block with the largest tank being the Chengam Tank with an area of 216.31 ha. Other important tanks are Valayampattu tank, (178.54 ha), Thokkavadi tank (106.88 ha), Kariyamangalam big tank (96.35 ha) and Melvanakkampadi Tank (77.17 ha) (Figure 1.3). The ground water levels in Chengam Block are in an over exploited state of ground water development. Melpallipattu, Pachal and Chengam firkas cover the Block and all three firkas are in an over exploited stage.

## GROUND WATER LEVEL OF THIS BLOCK

| | |
|---|---|
| OVER EXPLOITED- › 100% | Melpallipattu, Pachal , Chengam |

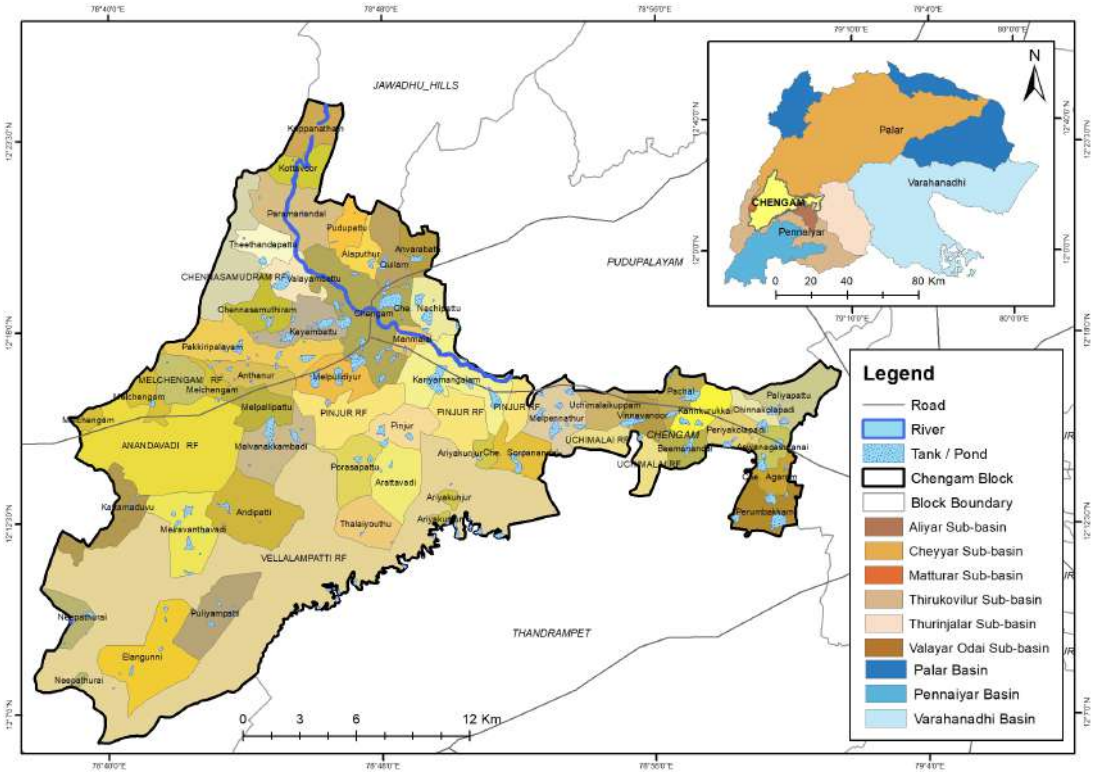
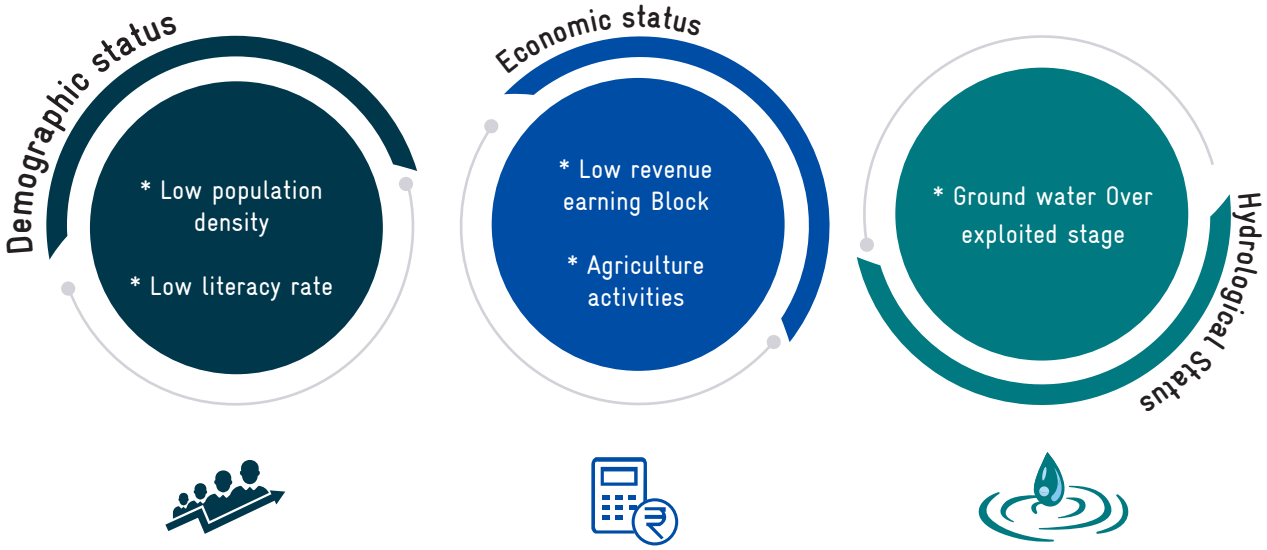



*Figure 1.3. Spatial distribution of waterbodies*



விண்இன்று பொய்ப்பின் விரிநீர் வியனுலகத்து
உள்நின்று உடற்றும் பசி

குறள் - 13

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

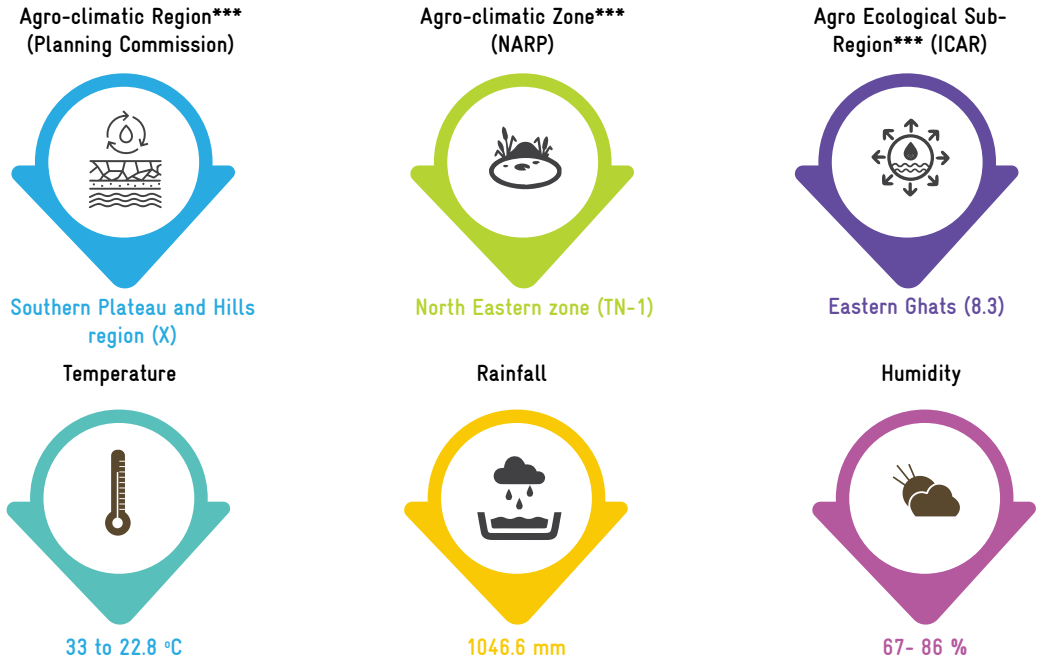
Thirukkural - 13

# CHAPTER 2

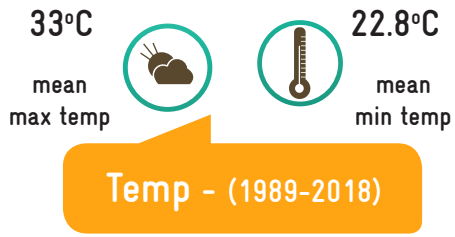
# 2 CLIMATE AND WATER SECURITY

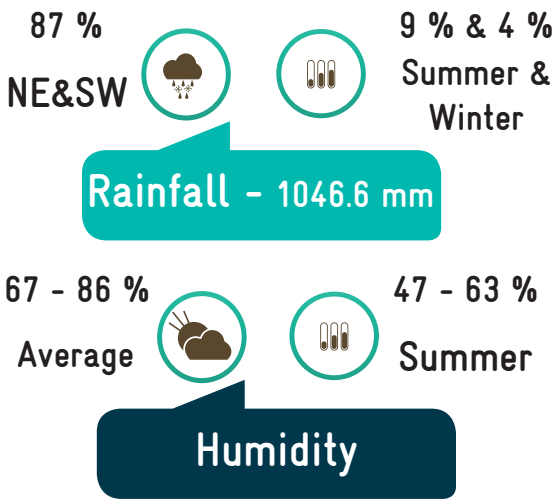
This region has typical tropical climate, located in the North Eastern agro-climatic zone of State and Southern Plateau and Hills region according to the agro climatic regional classification of the planning commission. The general climate description of this region is given below (Table 1).

TABLE 1. GENERAL CLIMATE DESCRIPTION




In general, this 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 few days. The average monthly temperature characteristic during 2020 is 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 1,046.6 mm (WRIS, GoI). Both North-East and South-West Monsoons contribute nearly 87 % of the annual rainfall in which SWM is slightly stronger. While summer (March to May) rainfall accounts 9 % of the total rainfall and winter (January, February) season has low contribution (4%) to the annual rainfall (Figure 2.2). The average relative humidity is 67- 86 % and during summer it ranges between 47-63 %.

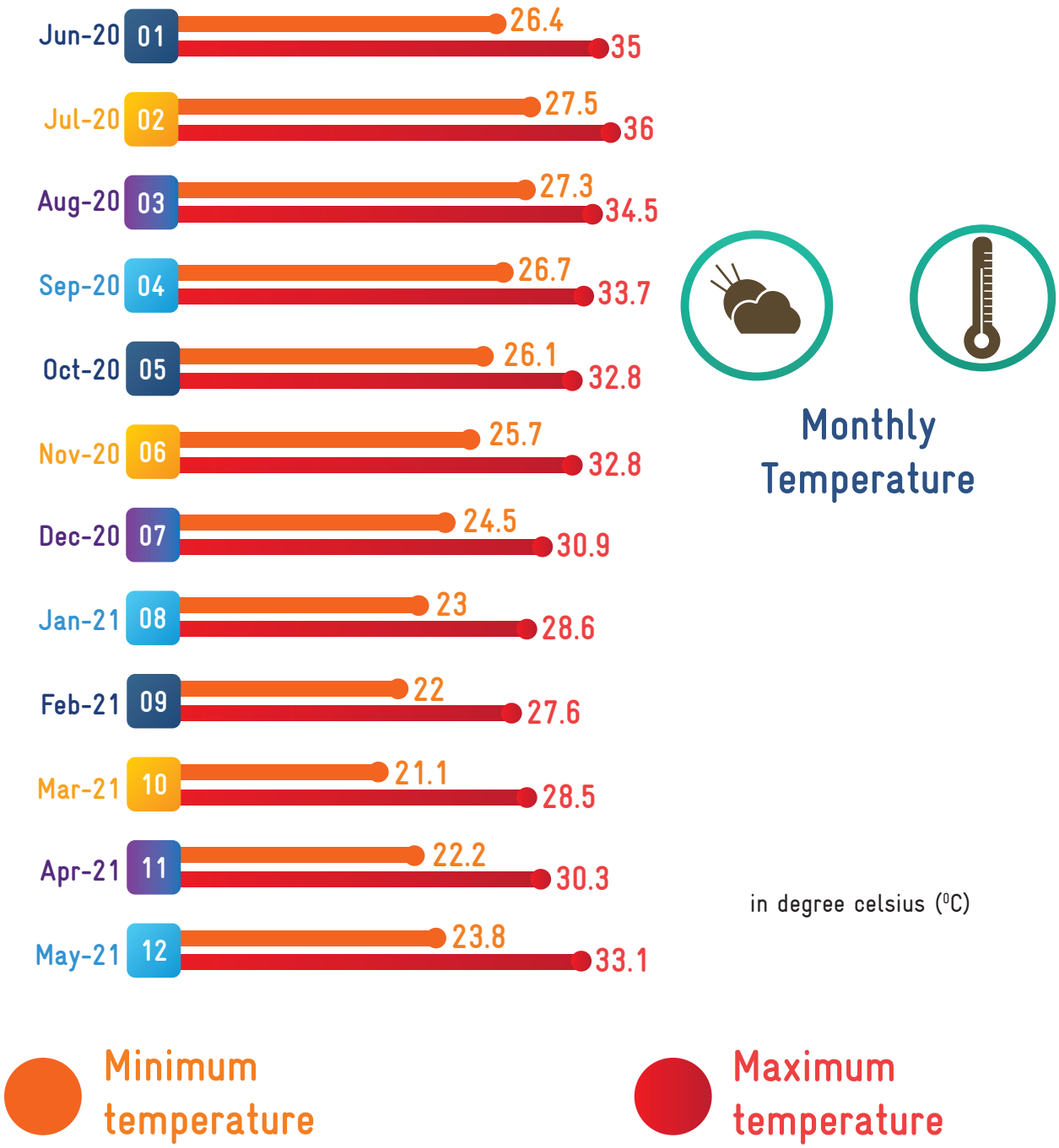



*Figure 2.1. Average monthly temperature*

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

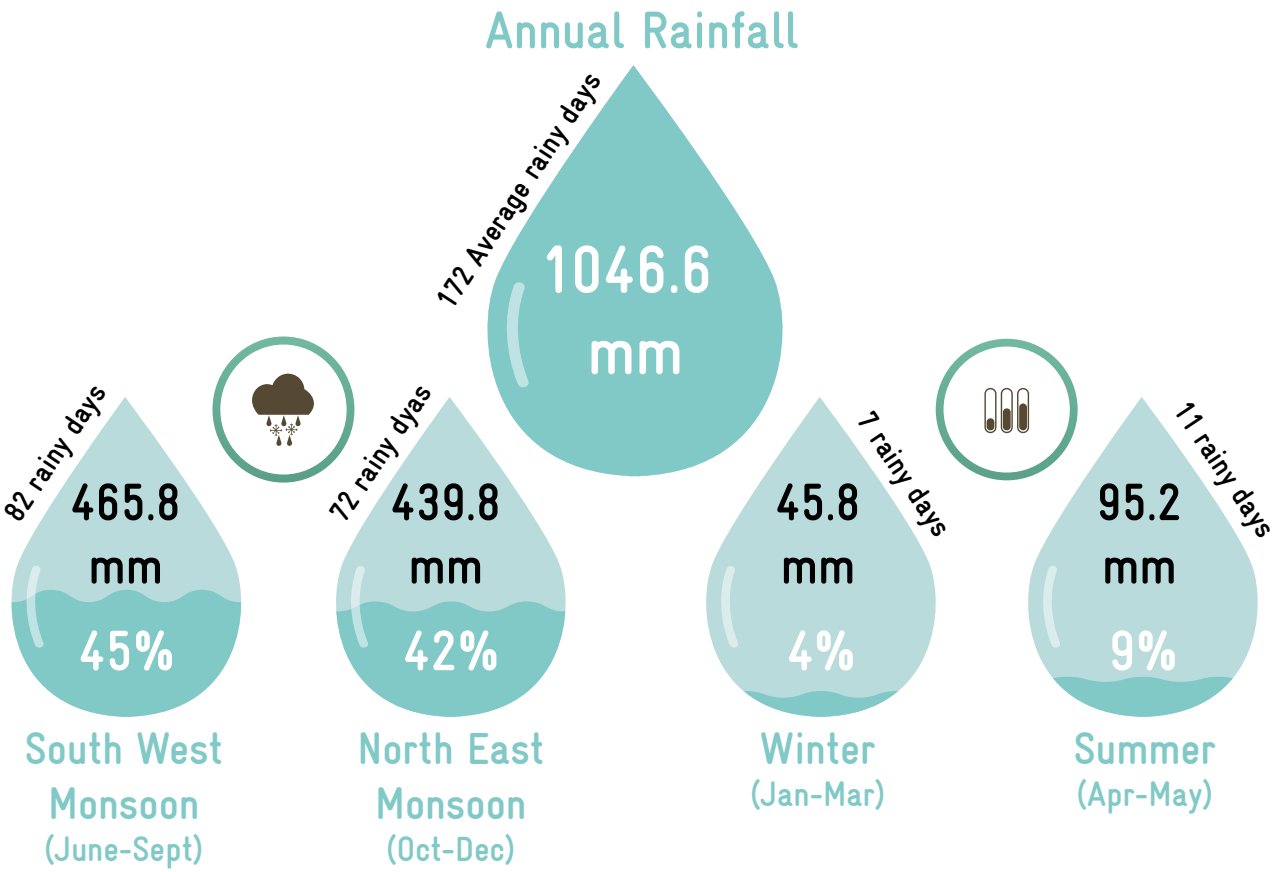


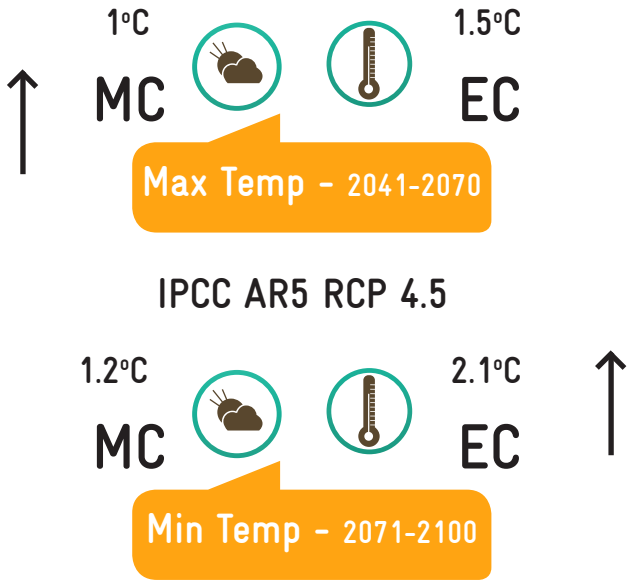

*Figure 2.2. Season-wise distribution of annual rainfall*

In recent decades, the world is witnessing significant changes in its climate. These changes include increase in average temperature, variations in the rainfall intensity and its frequency. This region is also no exception, and an increase in maximum and minimum temperature of 1.2°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.

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

Climate projection based on global climate models indicated that there would be 1°C increase in maximum temperature in mid-century (MC) period (2041-2070) and 1.50°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 1.20 °C and 2.10°C during MC and EC periods. Average annual rainfall for IPCC AR5 RCP4.5 scenario is projected to increase about 13 % towards MC and increase by about 21 % towards EC period.




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

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

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

As a result, these impacts pose severe risks to dependent sectors such as agriculture and allied activities, industry, and livelihoods of people, particularly the vulnerable sector.

## 2.1 CLIMATE RISKS

Increasing temperature, fluctuating rainfall patterns and its extremities create shorter rainy seasons and longer dry seasons making river basins more vulnerable. This District experiences climate hazards in the past such as floods, drought and heat waves.

* Flood
* Drought
* Heat waves

**Flood**

This region experiences heavy rain and flood during deep depressions/cyclones forms in the Bay of Bengal. In recent decades, some parts were 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. However , there is no flood vulnerable GPs in Chengam Block.

**Drought**

Low rainfall coupled with the erratic behaviour of the monsoon in the state makes Tamil Nadu the most vulnerable to drought. Thiruvannamalai District comes under drought vulnerable area as less than 40 % of normal rainfall was received and has experienced frequent droughts in the past, particularly in the years 2003 and 2009. The District also experienced severe drought during the year 2016- 2017. All parts of the District are affected by drought and its consequences are large areas of crop losses and drinking water scarcity. In Chengam 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 temperature 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 Chengam Block are prone to Heatwaves

## 2.2 WASCA CLIMATE VULNERABILITY INDICATORS

During 2019, WASCA TN conducted a preliminary State level scoping study on the State's rural water security through the climate lens and identified climate and water security hotspots/potential geographical areas for project demonstration through scientific criteria, jointly with the 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 viz., climate extremities, water resources, agriculture and socio-economic to assess climate-water vulnerability at the District level (Table 2).

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

| CWRM | Indicators of Rural water security vulnerability | Indicators label | Linked SDG |
|---|---|---|---|
| Climate | Changes in max temperature ($^{O}$C) | C1 | Goal 13 |
| | Changes in min temperature ($^{O}$C) | C2 | |
| | Changes in rainfall (%) | C3 | |
| | Excess rainfall years | C4 | |
| | Deficient rainfall years | C5 | |
| Water | Ground water extraction (%) | W1 | Goal 6 |
| | Ground water Recharge ($m^3$) | W2 | |
| | Surface water availability (mm) | W3 | |
| | Water gap (mcm) | W4 | |
| | % of contamination | W5 | |
| Agriculture | Rainfed area (%) | A1 | Goal 15 |
| | Cropping intensity (%) | A2 | Goal 2 |
| | Soil moisture ($Kg/m^2$) | A3 | Goal 15 |
| | Evapo-transpiration ($Kg/m^2$) | A4 | |
| Socio-economic | Rural proportion (%) | S1 | Goal 2 |
| | Multidimensional poverty index | S2 | Goal 1 |
| | Source of drinking water within premises in rural (%) | S3 | Goal 6 |
| | Marginal farmers land holdings (%) | S4 | Goal 1 |

Data from these 18 bio-physical and socio-economic indicators was collected at the 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 the GP level through Composite Water Resource Management (CWRM) approach by GIZ, Department of Rural Development (Mahatma Gandhi NREGS), National Water Mission, Tamil Nadu, along with technical partners of WASCA project Viz., 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. Data for the major parameters identified at Block level (Table 3) are collected both from primary and secondary sources and analyzed statistically and geospatially.

TABLE 3. MAJOR PARAMETERS IDENTIFIED FOR BLOCK LEVEL VULNERABILITY ASSESSMENT

| Climate | Water | Agriculture | Socio economic |
|---|---|---|---|
| Changes in temperature, rainfall and its extremities | Watershed, micro-watershed, and drainage network, traditional waterbodies, canal networks, irrigation facilities, catchments area wise available runoff, ground water and surface water utilization, ground water status, ground water availability, evapo-transpiration losses, and water demand for drinking, agriculture and livestock | Land resources, land use under different categories, catchment area, means of water extraction, irrigation methods, crop details, status of soil resources including macro and micro nutrients, soil physical condition, soil moisture, and livestock details | Area, population, gender, vulnerable population and household, details of MGNREGA job seekers, drinking water sources and grey water generation |

ஏரின் உழாஅர் உழவர் புயலென்னும்
வாரி வளங்குன்றிக் கால்

குறள் - 14

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

Thirukkural - 14

# CHAPTER 3


# CONVERGENCE OF WASCA AND MAHATMA GANDHI NREGA

# 3 CONVERGENCE OF WASCA AND MAHATMA GANDHI NREGA

GIZ has evolved a GP based CWRM planning approach for facilitating convergent planning under MGNREGA for water security and climate adaption. 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 a 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 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 Khet ko Pani and Per Drop More Crop are the four pillars of PMKSY. Technical inputs for planning are 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 comprising of 1-10 GPs, while deliberating and finalizing prioritization of shelf of projects.

Special focus has been 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 will take into consideration the automatically included and deprived households of SECC to ensure full coverage of poor and vulnerable households. Infrastructure built under the 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.

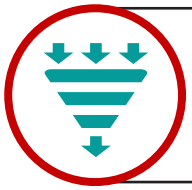
**262** Total Kinds of works in Schedule-I of Mahatma Gandhi NREGA

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

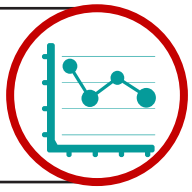
**164** Kinds of works related to Agriculture & allied works

**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 individuals, it 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 Geographical Information System (GIS) plans shall be comprehensive ones incorporating all eligible works under Mahatma Gandhi NREGS and the same shall be implemented in a phased manner. Section 22 of annual master circular provides the key steps for GIS based planning.



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

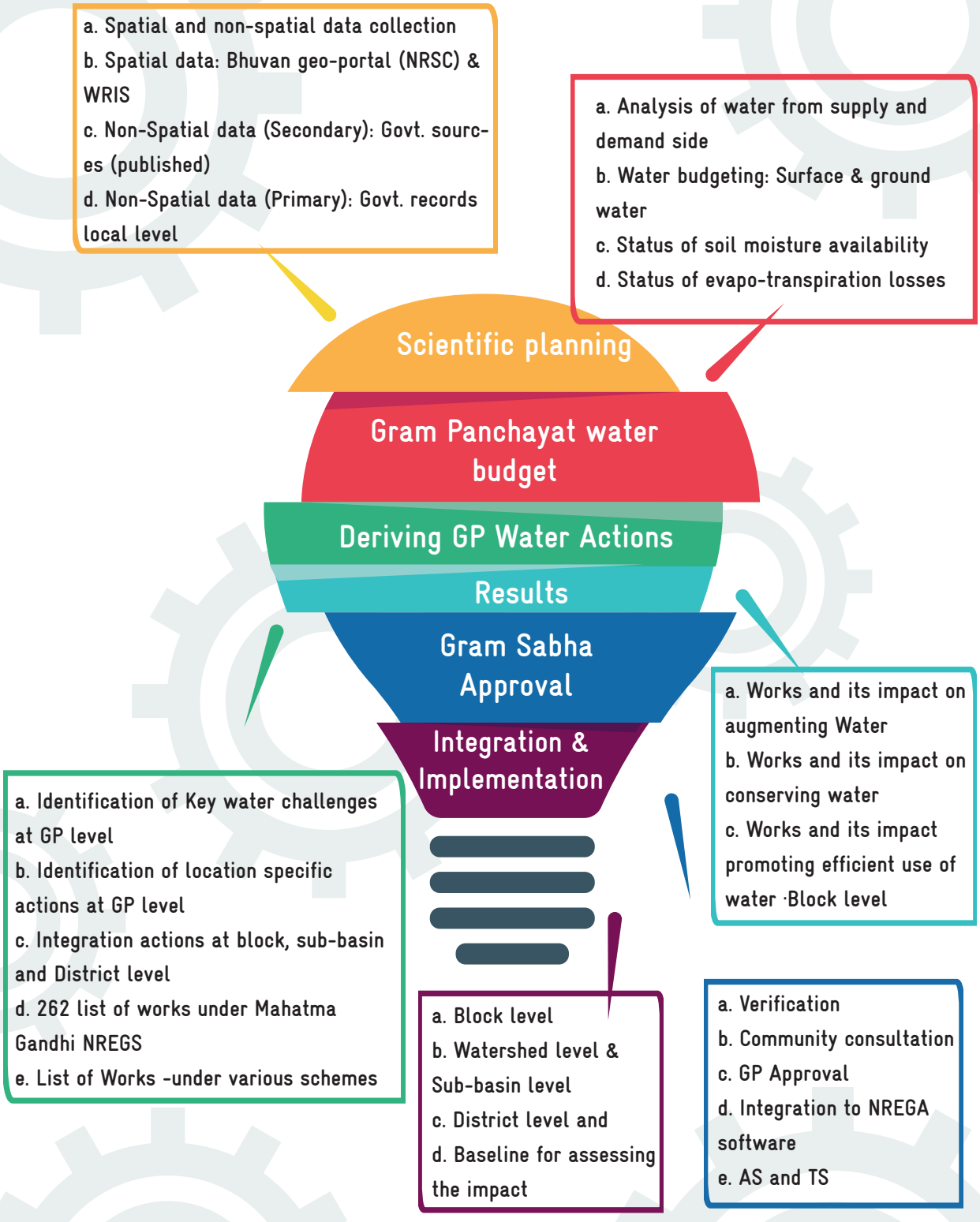


## 3.1 COMPOSITE WATER RESOURCE MANAGEMENT APPROACH

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 for planning and execution. Following this, a detailed socio-economic profile was mapped covering male/female population, proportion of SC and ST population, vulnerable households, access to employment in Mahatma Gandhi NREGS and proportion of works carried out in the village through amount of budget utilized as well as actual works completed. The climatic parameters including maximum and minimum temperature, season-wise rainfall and rainy days, evapo-transpiration

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

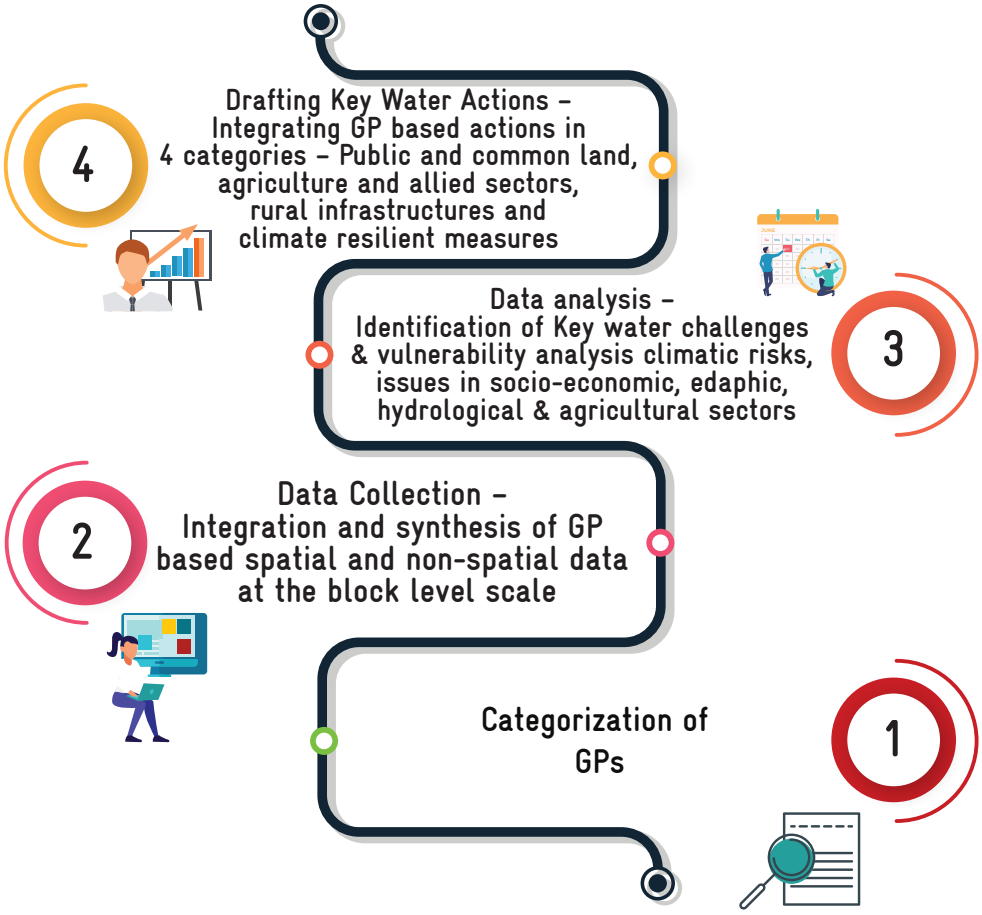
**BOX 1. MAJOR COMPONENTS INVOLVE IN CWRM PLANNING WORKOUTS**



Such a comprehensive analysis in preparing the water budget integrating ground water, surface water through runoff from rainfall, evapo-transpiration and soil moisture helps to identify potential areas of action to augment the water resources in public and common land, agriculture and allied sectors and rural infrastructure dimensions. The analysis also helps to understand the areas of interest and to take an appropriate and adaptive climate resilient 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 and serve as shelf of projects. This shelf of projects is again mapped to the available schemes and financial plans for execution, adopting convergence and inter-sectoral principles. In the execution process the District level technical and administrative teams are involved in planning, monitoring and evaluation in terms of outcome/impact mapping. In the execution stage, the approach of saturation of works, planning at watershed approach (Ridge to Valley), convergence is some of the key aspects that needs attention for a tangible outcome in both natural resource management 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 in to four stages – pre planning, planning, review and verification and integration and approval (Box 2).

STEPS INVOLVED IN BLOCK LEVEL ANALYSIS THROUGH CWRM APPROACH




This integrated approach has been accepted Nationally and by State and District level steering committees headed by additional Chief Secretary RD&PR and District collectors respectively in the project area of TN State government as a comprehensive and climate adapted planning approach for water security under Mahatma Gandhi NREGA and National Water Mission.

## BOX 2. STAGES OF CWRM PLANNING PROCESS

### PRE-PLANNING STAGE

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

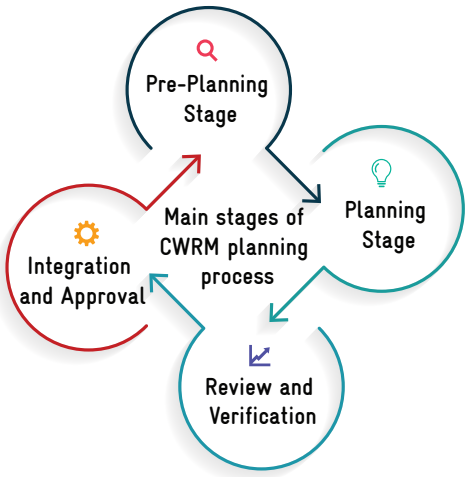
### PLANNING STAGE

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

FOUR LEVELS OF CWRM PLANNING UNDER WASCA

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

2. INTEGRATING GP LEVEL PLANS AT BLOCK LEVEL




FOUR LEVELS OF CWRM PLANNING UNDER WASCA

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

4. INTEGRATING GP PLANS TO DEVELOP WASCA DISTRICTS CWRM PLANS

### INTEGRATION AND APPROVAL

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

### REVIEW AND VERIFICATION

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

## 3.2 CATEGORIZATION OF GPs

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

TABLE 4. CATEGORISATION OF CHENGAM BLOCK GPs

| NUMBER OF GP | GP TYPE | NAME OF THE PANCHAYAT |
|---|---|---|
| 32 | GP and revenue village data and boundary match I | Agaram (Se), Alaputhur, Anwarabath, Arattavadi, Beemanandal, Aswanagasurunai, Chinnakolapadi, Ariyakunjur, Kannakurkkai, Kuppanatham, Kariyamangalam, Chennasamudram, Theethandapattu, Kayambattu, Manmalai, Melpallipattu, Melpennathur, Pakkiripalayam, Paliapattu, Periakolapadi, Porasapattu, Pinjur, Pudupattu,Quilam , Uchimalaikuppam, Se.Sorapanandal, Kattamaduvu, Se.Nachipattu, Thazhaiyuthu, Andanur, Valayambattu, Vinnavanur |
| 2 | Having more than one GP in one Revenue Village II | Paramanandal, Kottavoor |
| 10 | One GP is falling under more than Type 1 one Revenue Village III | Melpulidiyur, Andipatti, Elangunni, Melchengam, Melravanthavadi, Melvanakkambadi, Neepathurai, Pachal, Perumbakkam, Puliyampatti |

## 3.3 DATA COLLECTION

The CWRM planning framework has four vulnerability areas and integrated both non-spatial and spatial parameters with 18 indicators based on the IWRM and climate adaptation principles. The planning process 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 data is supportive evidence to understand the issues in the areas of Land Use and Land Cover (LULC), wastelands, salt and erosion affected lands, drainage lines, ground water potential, lineament, geomorphology and slope for science-based decision on water actions. The use of different spatial data to assess and confirm the key water challenges along with the non-spatial data given below.

## NON SPATIAL DATA

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

- Watershed based analysis is to understand the hydrological and administrative boundaries. This aids in understanding the profile and condition of the watershed at macro or micro level for planning relevant water actions

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

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

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

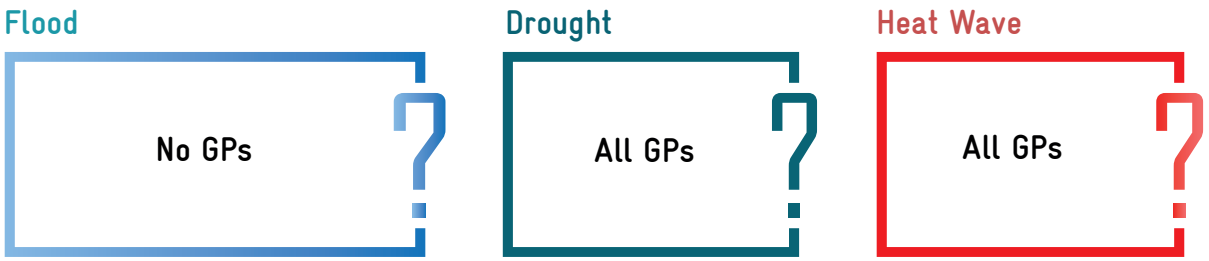
- Water budgeting at GP level to demonstrate the sector wise water demand and available water through the traditional water harvesting and storage bodies and the potential runoff that can be conserved through appropriate actions on the supply side. The difference between demand and supply at the GP level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

A total of 99 parameters of data were collected, in which 13 parameters are primary data and collected at the GP level by GP level officers. 65 parameters are secondary data collected from authentic Government sources and its websites; data for the remaining 21 requisite parameters for water budgeting and grey water is calculated using standard and suitable methods and formula. CWRM parameters and its sources are annexed as (Annexure 3.1, 3.2, 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 the Block level. On the other hand, all the climate change observations and projections are at the District or regional level and currently, data at the Block level is not available. Hence, the past hydro- meteorological disasters as recorded by State Disaster Management Agency (SDMA 2020) is considered to denote the Block's change in climate (temperature, rainfall) extremities and its risks (Table.5)

TABLE 5. CLIMATE RISKS AND VULNERABLE LOCATIONS




## 3.5 CWRM PLANNING ANALYSIS – WATER

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

### 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 is the study of Landforms and landform evaluation. It is the study of various features that are found on the Earth, such as mountains, hills, plains, rivers, moraines, cirques, sand dunes, beaches, spits, etc., that are created by various agents such as rivers, glaciers, wind, ocean, etc. Geomorphologically, Block majorly engrossed with denudation origin pediment, Pediplain complex structural landform in South-West region and fluvial landform units in North region (Figure 3.1). Pediment is the low relied or plain with gently slope area close to the mountains at their foot with or without debris whereas pediplain is relatively flat rock surface formed by joining of several pediments.

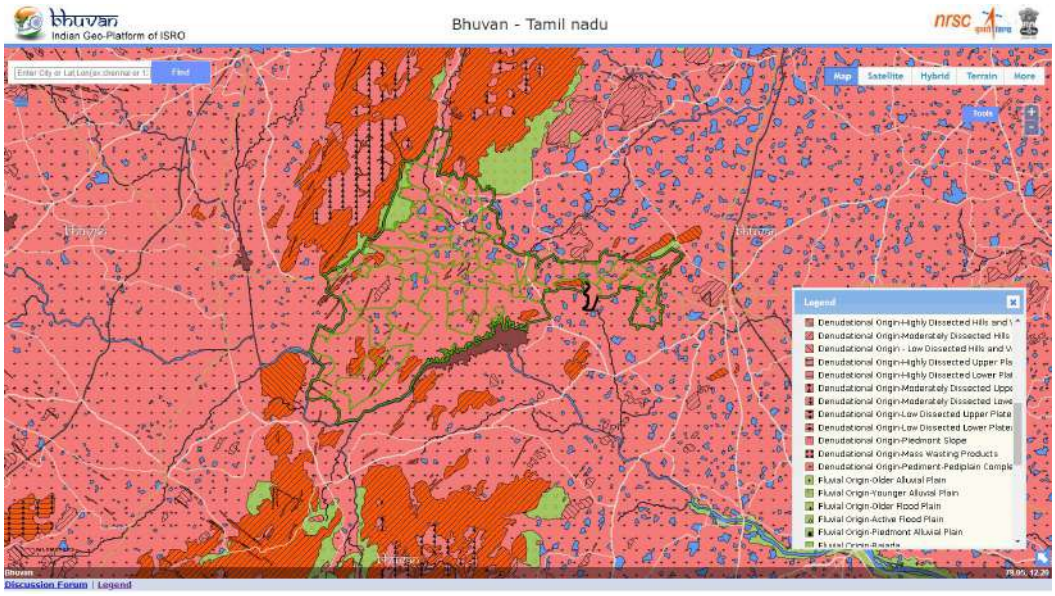
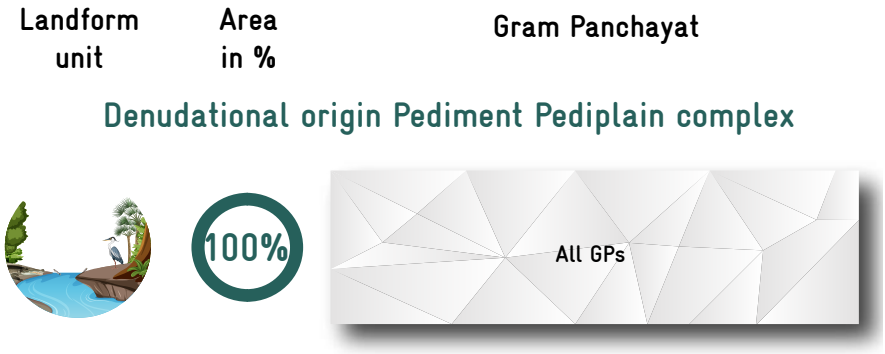



*Figure 3.1. Geomorphology map*




**3.5.1.2 Lineament:** The lineament is 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 features where two different landform converge or diverges. This site allows water to percolate at a high rate. The lineament details with respect to the GPs is illustrated in the table below. These observations are widely used to locate points of high-water flow especially in groundwater exploration.

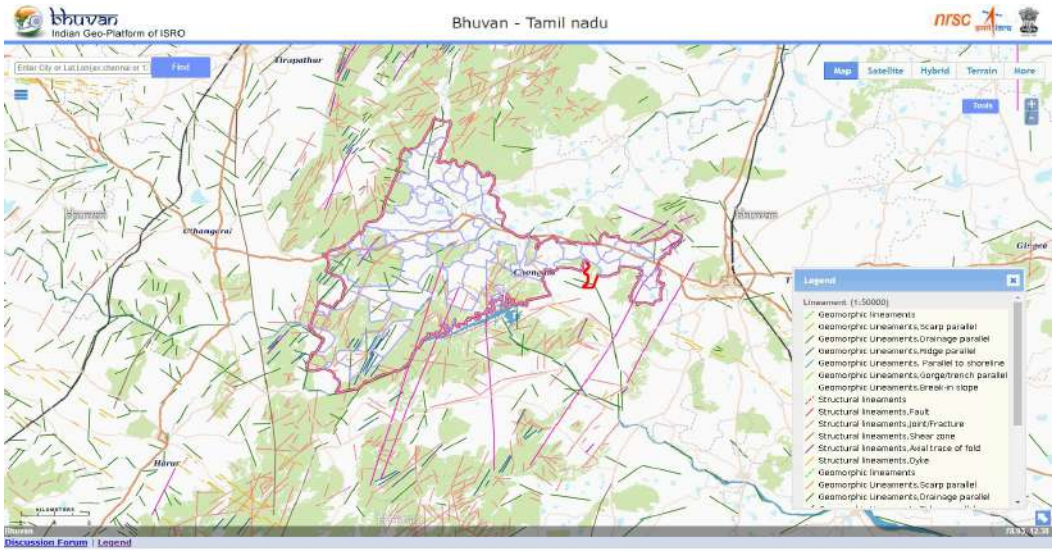
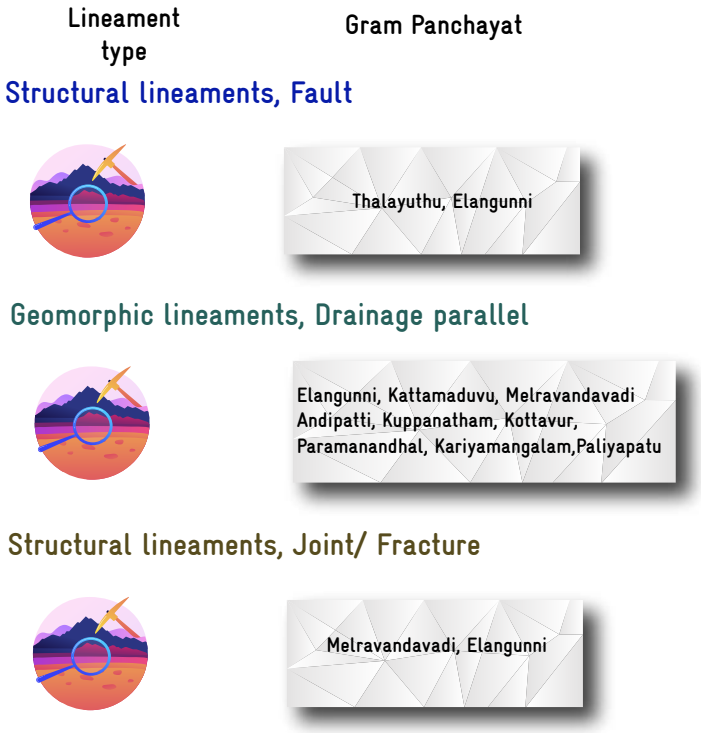



*Figure 3.2. Lineament map*




**3.5.1.3 Terrain:** Digital Elevation Model (DEM) is a representation of the topographic surface (bare ground) of the earth which excludes trees, buildings and any other surface object. Surface topography is a key factor in estimating catchment areas and surface water runoff. Therefore, DEM's are extensively used in watershed modelling and monitoring. The terrain map is a product of DEM, which gives information related to elevation from above sea level. This map will be useful in identification of better suitable sites for proposing the water and soil conservation related activities. The variations in terrain are observed in Chengam Block which gives the information regarding the slope and the direction of the waterflow is shown in Figure 3.3.

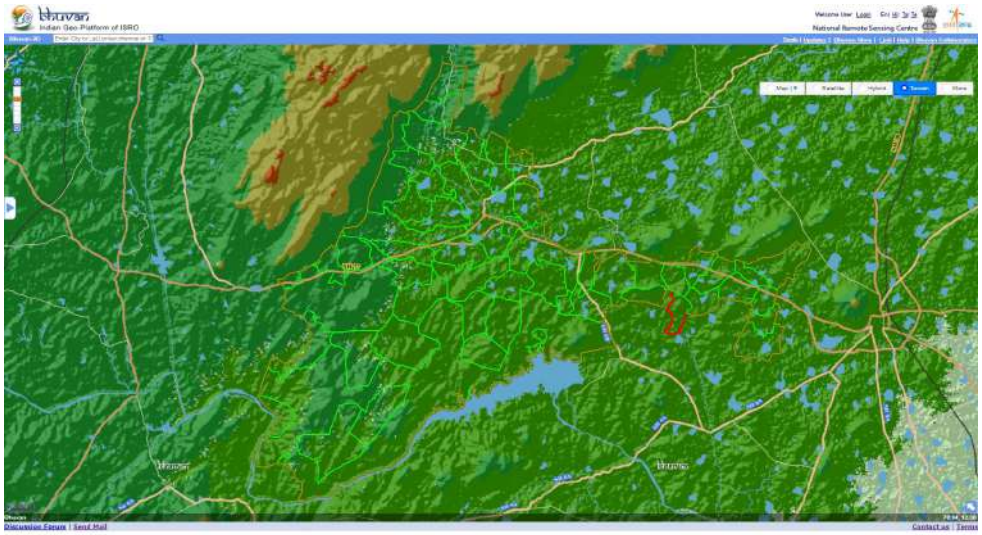


*Figure 3.3. Terrain map*

**3.5.1.4 Contour map:** The contour is the most important elements in the cartographic representation of the terrain and determines relief forms such as valleys and hills, and the steepness or gentleness of slopes in geometrically. A contour map is illustrated with a series of lines with equal points of elevation. Closely spaced contour lines indicate steep slope and the lines spaced far apart indicate a gentler slope. The contour map also plays a vital role in delineation of watershed area & its units, used in planning and identifying the recharge structures, farm ponds and construction of grey water drain network etc., (Figure 3.4).

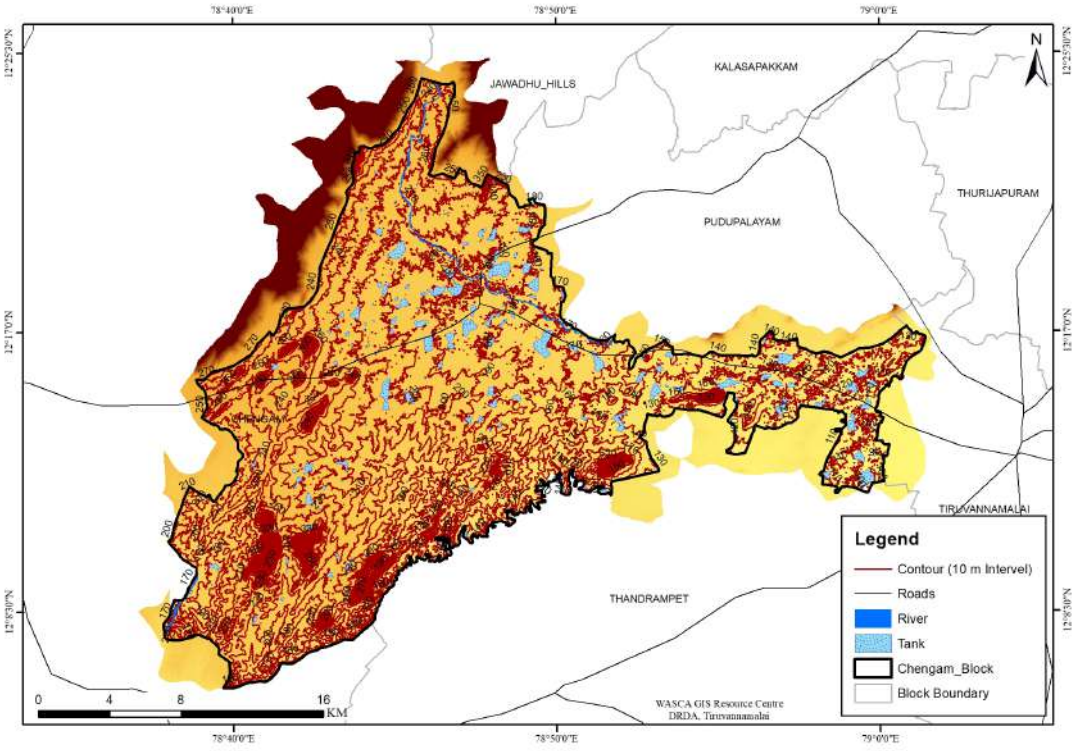



*Figure 3.4. Contour map*

**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. Very flat to flat and steep slope ranges is noticed in the Block (Figure 3.5). Slope information plays a significant role in identification of soil eroded sites, depth profiles, also used in analysing and further proposing the soil conservation measures such as check dam, bunds, farm ponds, land development activities etc.

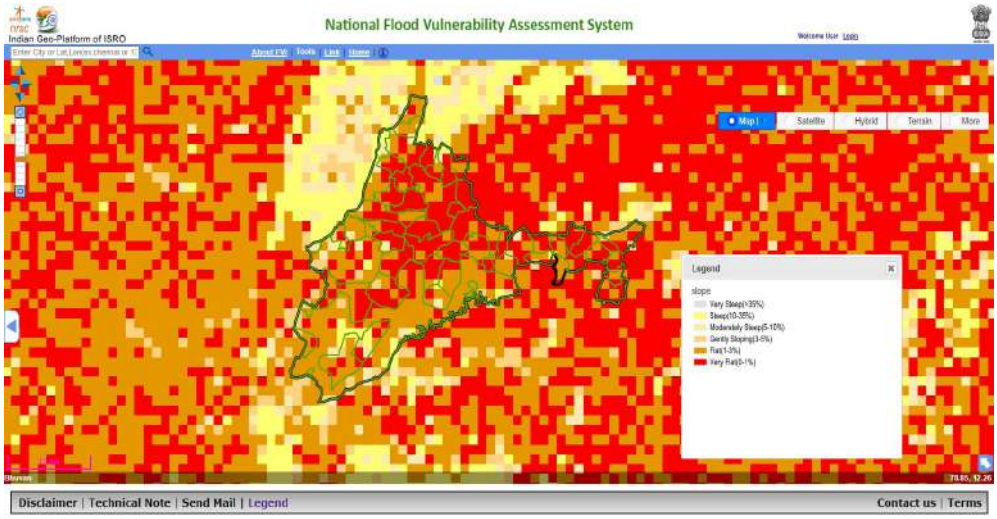
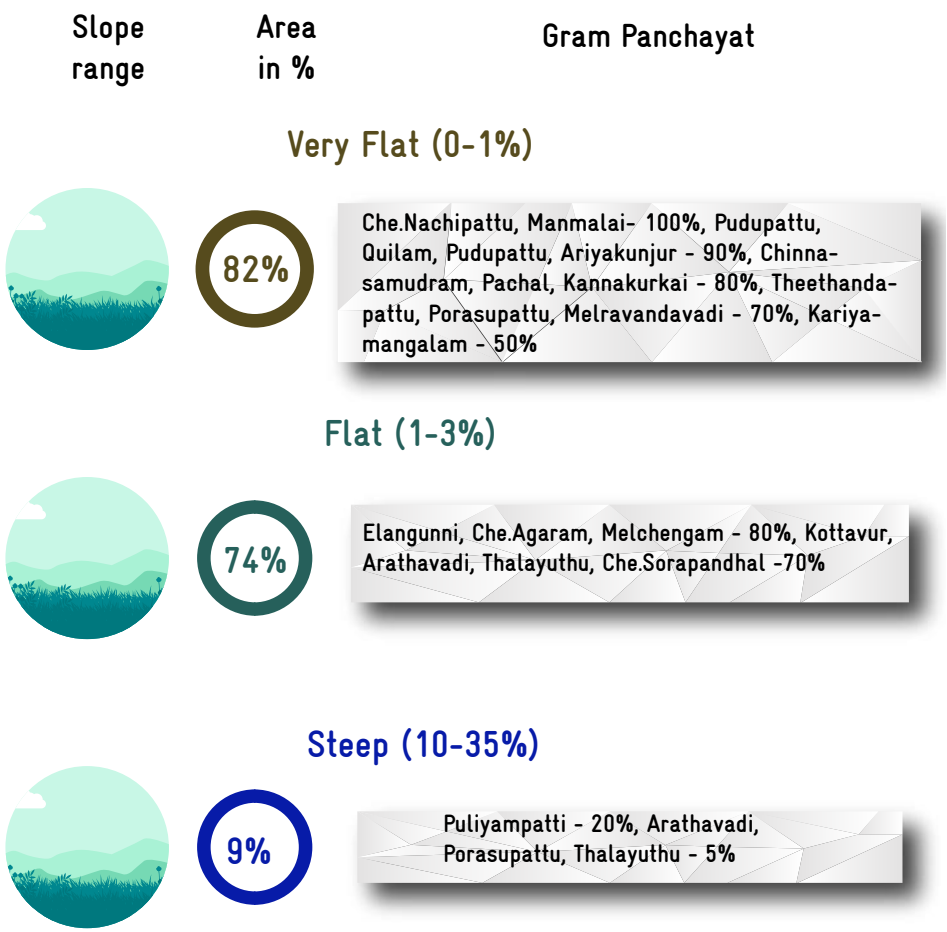



*Figure 3.5. Slope map*




**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 Chengam Block. Block area is drained with moderate high to high dense drainage network. High dense network in South-west area and moderate high in East & North area of Block witnessed (Figure 3.6). River Cheyyar flows through Chengam Block which is a major source of irrigation. Drainage network is referred to while identifying suitable sites for soil and water conservation measurements such as check dams, farm ponds, bunds, restoration of gullied region etc.

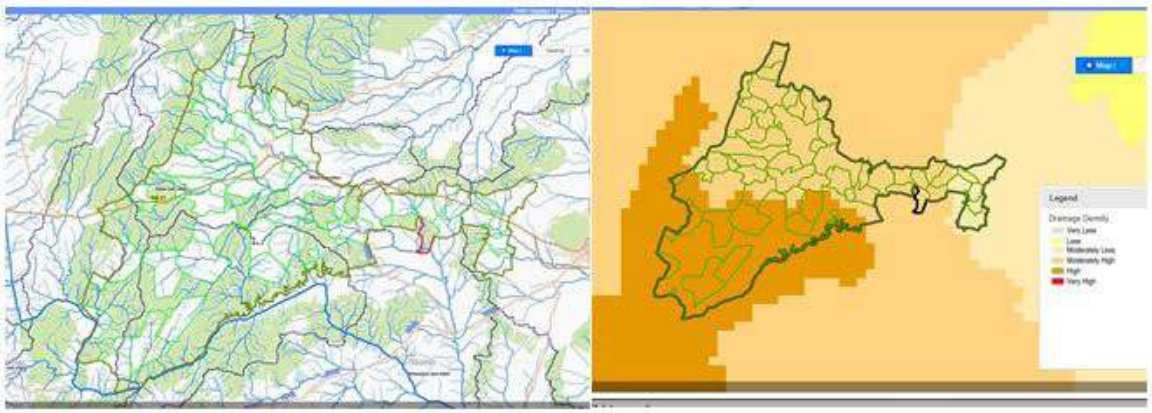


*Figure 3.6. Drainage network and density*

**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. Chengam 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 and also aids in strengthening the durability of land, soil and water conservation structures of the downstream.

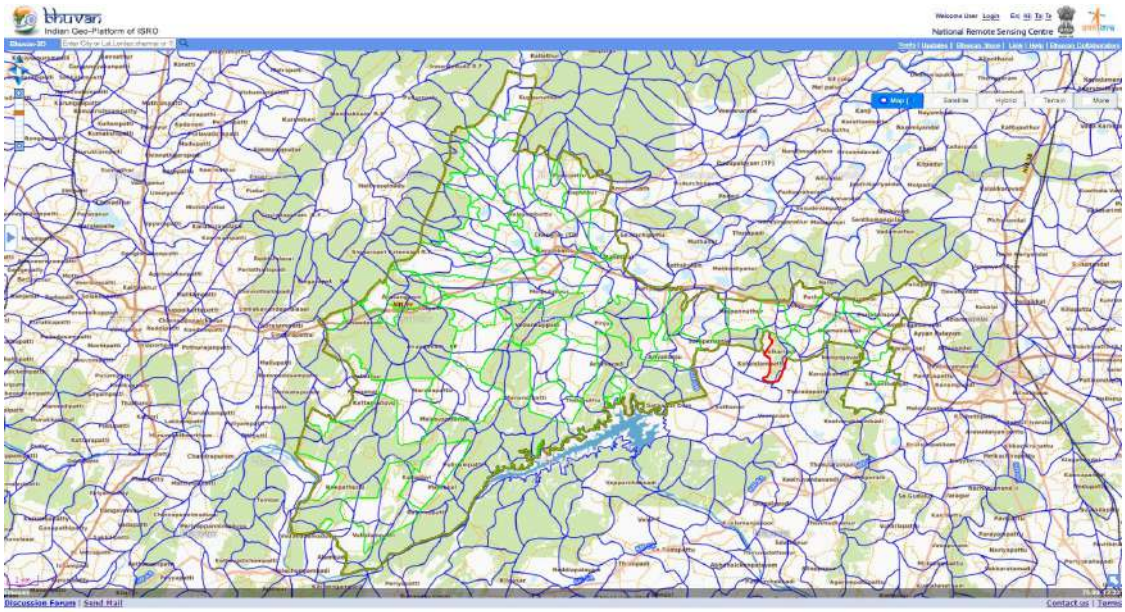



*Figure 3.7. Watershed map*

**3.5.1.8 Ground water perspectives:** Ground Water (GW) is one of the important natural resources in semi-arid region like Chengam Block. The ground water perspective map is the integration of lithology, geomorphology, geological structures, hydro geomorphic datasets, which provides the required information related to ground water exploration and the probable ground water prospects. This map will help in identification of tentative locations for construction of recharge structures. In the Block, most of GPs area witnessed the ground water above 80 m in deep wells with yield of 50 – 100 LPM, while some GPs are with no yield (Figure 3.8). The GPs wise detailed GW prosperity shown in below illustration. This specific information will play crucial role in identifying sites for recharge structures in order to address water scarcity issues in the Block.

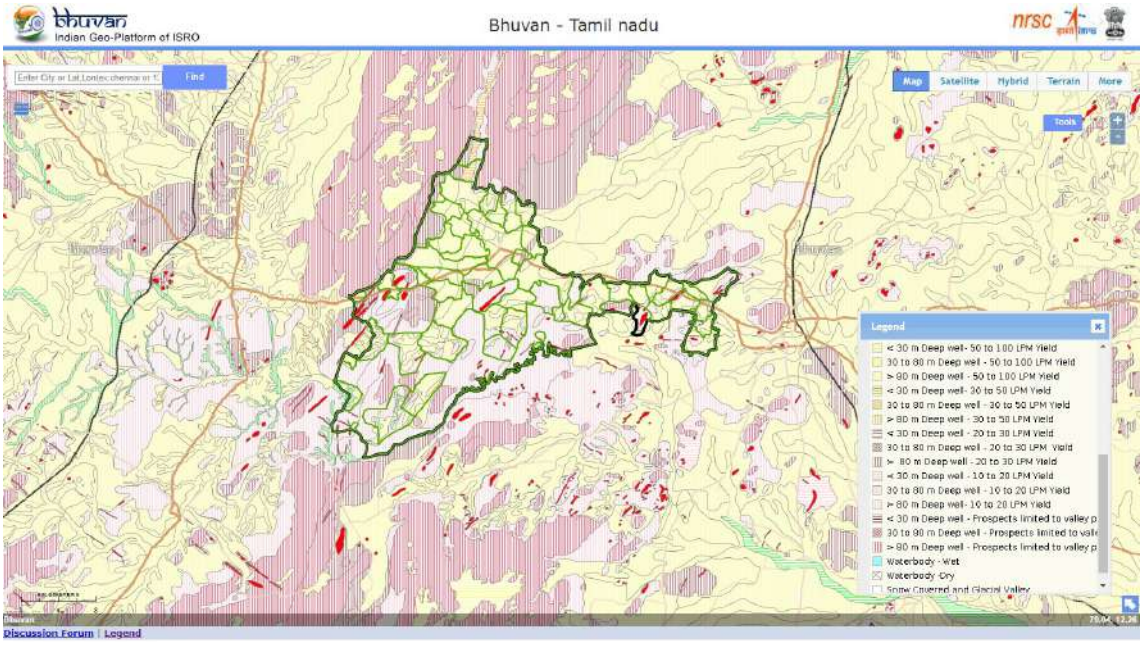



*Figure 3.8. Ground water perspective map*

| Groundwater Prospects | Area in % | Gram Panchayat |
|---|---|---|
| > 80 m Deep Well- 50 to 100 LPM Yield | 95% | Melravandavadi, Andipatti, Melvannakambadi, Melpallipatu, Andanur, Pakkiripalayam, Kayambattu, Chennasamudram, Valyambattu, Theethandapattu, Pramanandhal, Melpulidiyur, Quilam, Anwarabath, Pinjur, Porasupattu - 100%, Uchimalaikuppam, Chinnakolapadi, Paliyapatu, Arathavadi - 90%, Melpennathur, Vinnavanur, Che.Agaram - 80%, Pachal - 70% |
| No Yield | 5% | Perumbakkam, Paliyapatu, Periyakolapadi |

### 3.5.2 NON SPATIAL DATA

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

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

| Sl. No. | Canal Network | Extent |
|---|---|---|
| | **Canal Network (m)** | |
| 1 | Length of Main Canal | 43,919 |
| 2 | Length of Minor Canal | 7,600 |
| 3 | Length of Distributaries | 3,000 |
| 4 | Water Courses (Field Channels) | 2,000 |
| | **Traditional Water bodies (No.)** | |
| 5 | Number of Tanks (PWD & Union) | 85 |
| | **Irrigation Facilities (ha)** | |
| 6 | Tank Irrigation | 498 |
| 7 | Canal Irrigation | 237 |
| 8 | Open & Tube Well Irrigation | 10,309 |
| | **Catchment Area wise Available Runoff (ha.m)** | |
| 9 | Good Catchment Area | 2,141 |
| 10 | Average Catchment Area | 215 |
| 11 | Bad Catchment Area | 4,743 |
| | **Watershed and Drainage Networks** | |
| 12 | Length of Natural Drainage Lines (m) | 3,41,715 |
| 13 | Number of Natural Drainage Lines (No.) | 291 |
| 14 | Number of micro -watersheds (No.) | 228 |
| | **Water Demand** | |
| 15 | For Humans (ha.m) | 389 |
| 16 | For Livestock (ha.m) | 202 |
| 17 | For Agriculture (ha.m) | 13,099 |
| 18 | GW utilization for Drinking (%) | 55 |
| 19 | GW utilization for Livestock (%) | 90 |
| 20 | GW utilization for Agriculture. (%) | 84 |
| 21 | SW utilization for Drinking (%) | 45 |
| 22 | SW utilization for Livestock (%) | 10 |
| 23 | SW utilization for Agriculture (%) | 16 |

#### 3.5.2.1 Existing Water Structures

The Block has structured traditional water storage units such as tanks which is the life line of local communities for their lives and livelihoods. It is noticed that the tanks (85) are dominant in the Chengam (Figure 3.9). Ooranis and other surface water bodies are not exist in the Block.

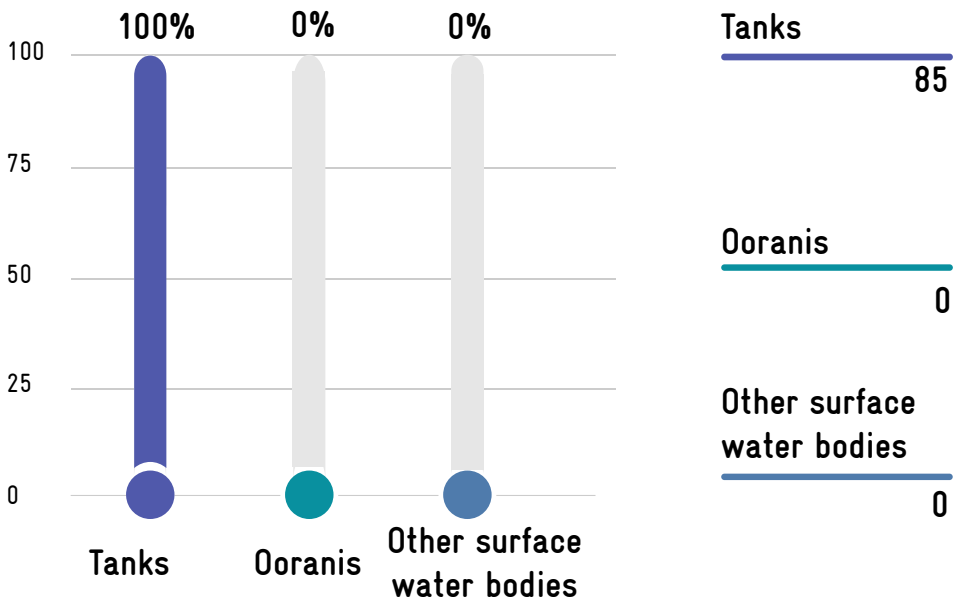



*Figure 3.9. Traditional Waterbodies*

### 3.5.2.2 Sources of Irrigation

The total area under irrigation in the Block is 11,044 ha, of which 93.3 % (10,308.6 ha) is irrigated through ground water stored in open/tube wells followed by 4.5 % (498.4 ha) is through tanks and the remaining 2 % (236.8 ha) area is through canals based irrigation (Figure 3.10).

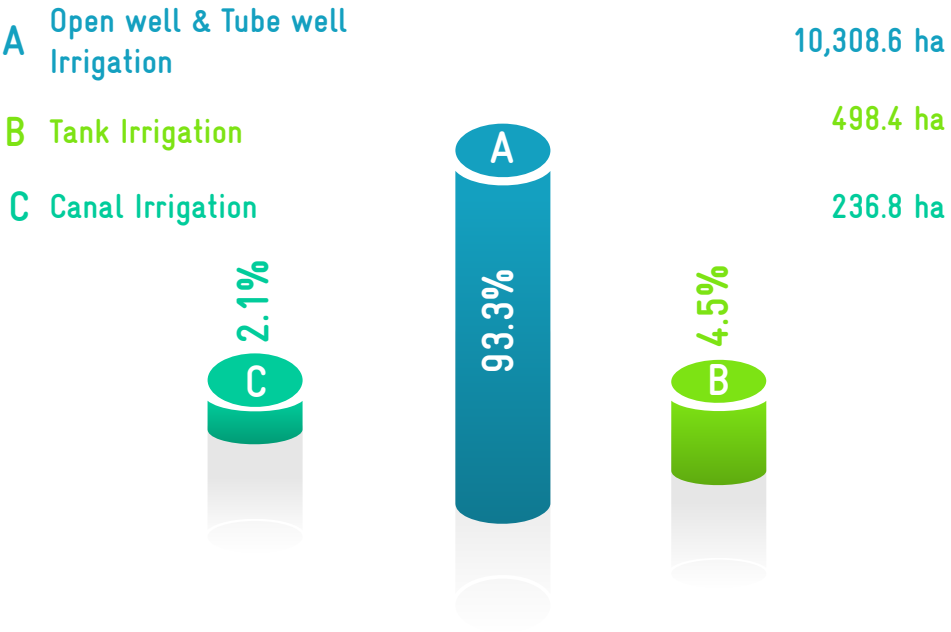



*Figure 3.10. Irrigation sources*

### 3.5.2.3 Available Run off

The total available runoff in the catchment area is 1,509 ha.m out of which 63.6 % is from good catchment area followed by 25.6 % from bad catchment area and the remaining 10.8 % is from average catchment area. As the area is dominated with good catchment zone which indicates that the rainfall is highly conserved using some water conservation structures. From the table, it is evident that one fourth of the rainwater is flowing as runoff which can be well managed with the increase of some more water conservative structures (Figure 3.11).

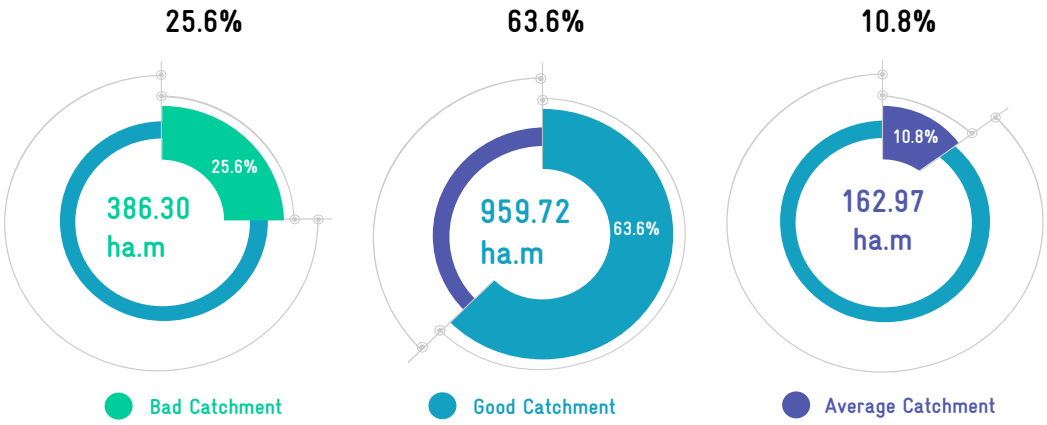
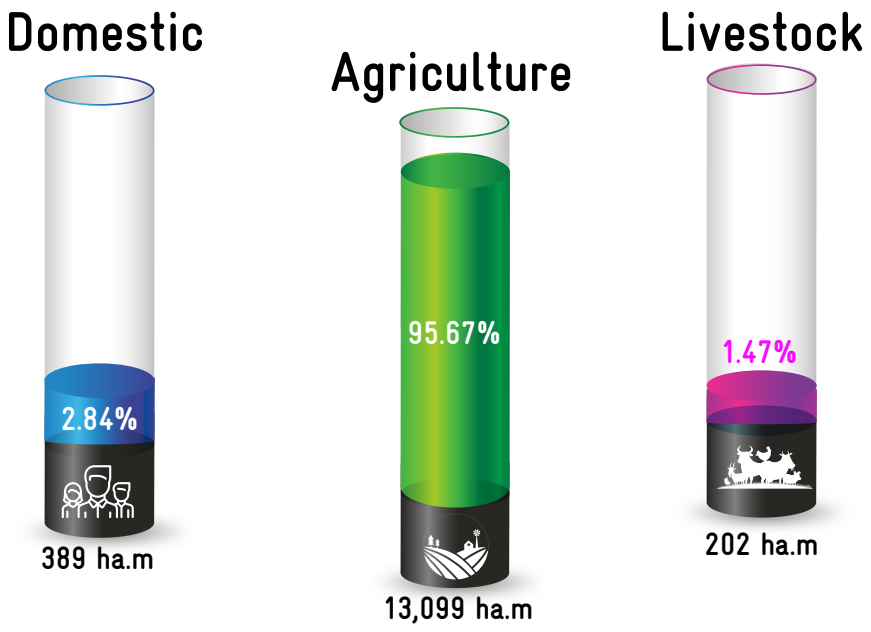



*Figure 3.11. Runoff from catchments*

### 3.5.2.4 Water Demand

The total demand for water including domestic, agriculture and livestock purpose is 13,691 ha.m. The highest demand is for the agriculture sector of 13,099 ha.m (96 %) followed by domestic use demand of 389 ha.m (2.8 %) and rest is for livestock. Out of the total water demand, 55 % for domestic purpose usage is met through ground water while the remaining 45 % from surface water resources. Utilization of 84 % for agriculture and 90 % for livestock is met by ground water (Figure 3.12).



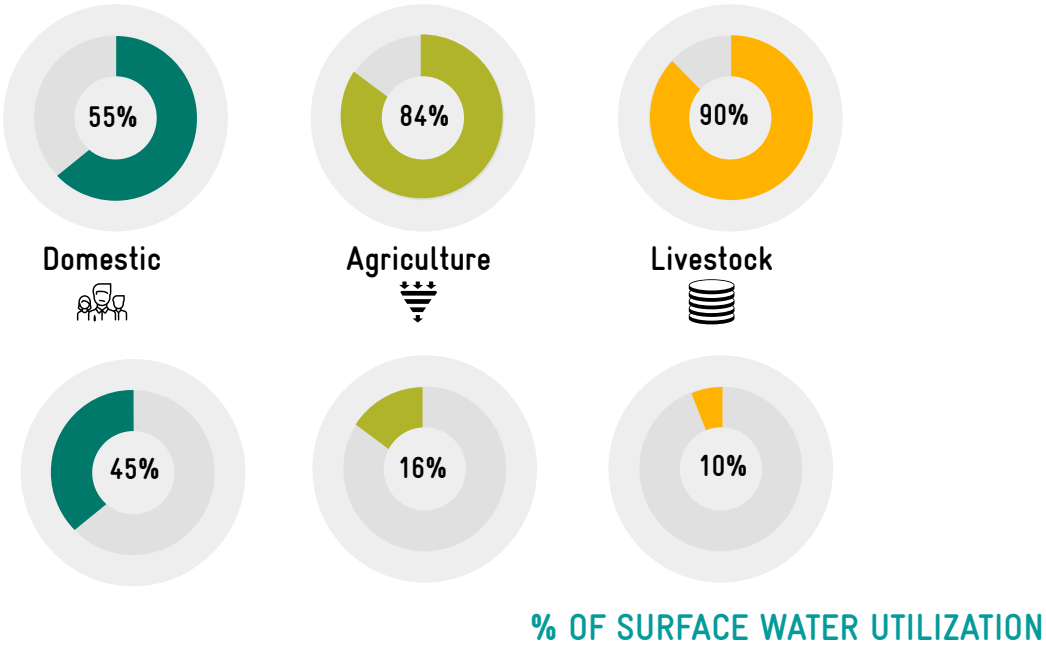



*Figure 3.12. Sector-wise water utilization*

## 3.6 CWRM PLANNING ANALYSIS-AGRICULTURE

Agriculture and livestock are the livelihood resources of the households in Chengam Block of Tiruvannamalai district. 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, wasteland, salt affected land, soil erosion and soil texture were taken into consideration to understand Chengam Block problems in order to draft scientific key water actions.

**3.6.1.1 Soil texture:** The soil consistency of particle size is distinguished through types of soil texture , especially determined by the amount of sand, silt or clay. Soil texture reveals details about the soil properties such as water holding capacity, permeability, soil workability and also the ability of plants to grow. This information will help in proposing the relevant conservation measures for natural resources. Majorly, Block has clay skeltel, texture soil followed by fine and fine loamy (Figure 3.13).

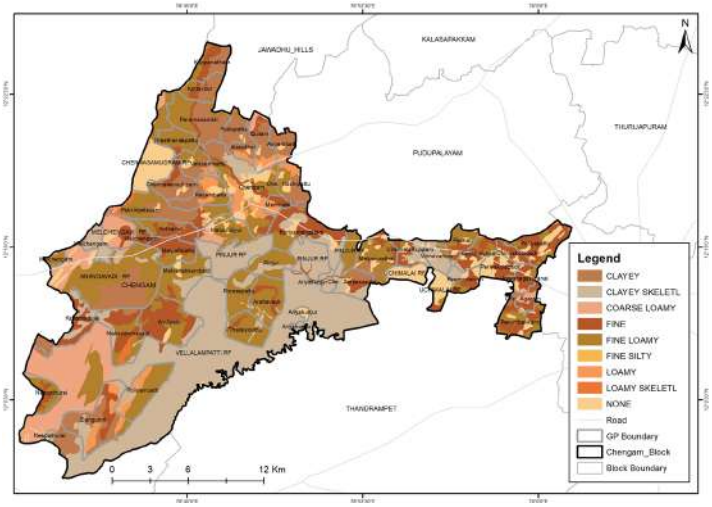



*Figure 3.13. Soil texture*

**3.6.1.2 Soil erosion:** Soil erosion is a natural process of displacement of upper layer of soil caused by dynamic erosion agents i.e. water, air, plants and humans. Almost forty percent of Block area witnessed the sheet erosion, majorly in southwest region of the Chengam which is may be due to the increase in deforestation (Figure 3.14). Soil eroded sites are the challenging tasks in implementation of various measures to conserve soil and watershed management.

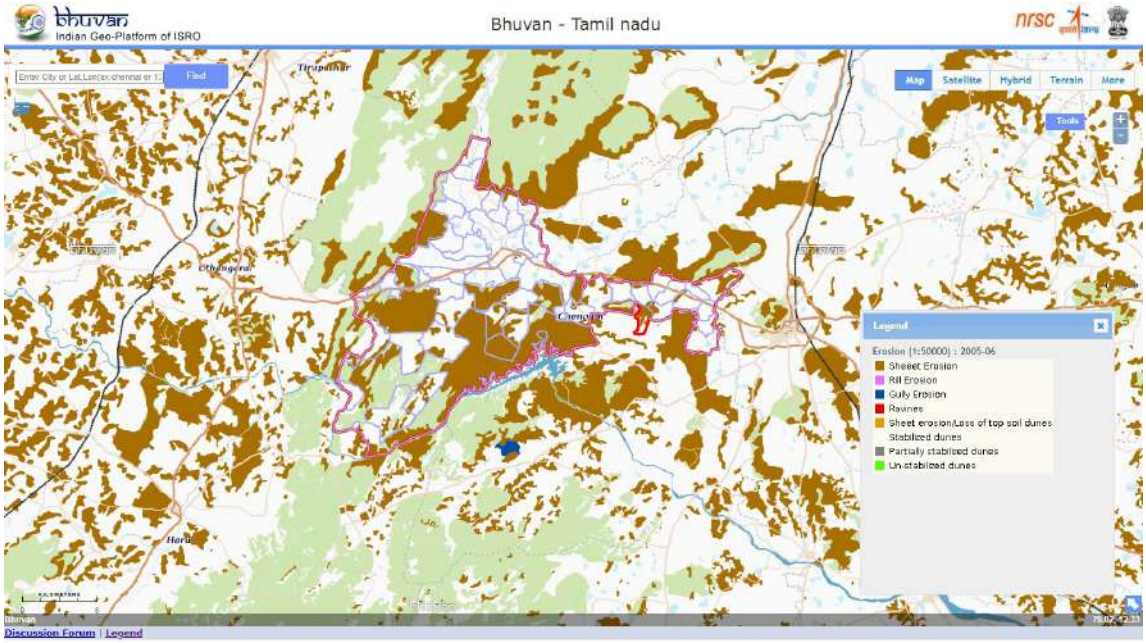
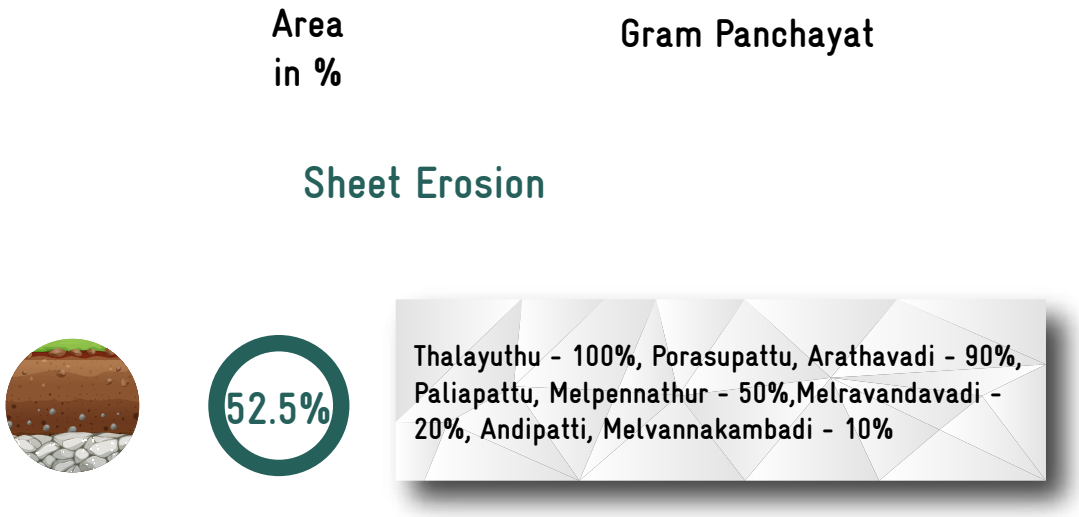



*Figure 3.14. Soil Erosion map*




**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. Chengam Block is dominated with agriculture and forest area (Figure 3.15). The GP wise LULC tabulated in the illustration. LULC map helps the decision makers and planners to focus on the developmental activities in the fallow land.

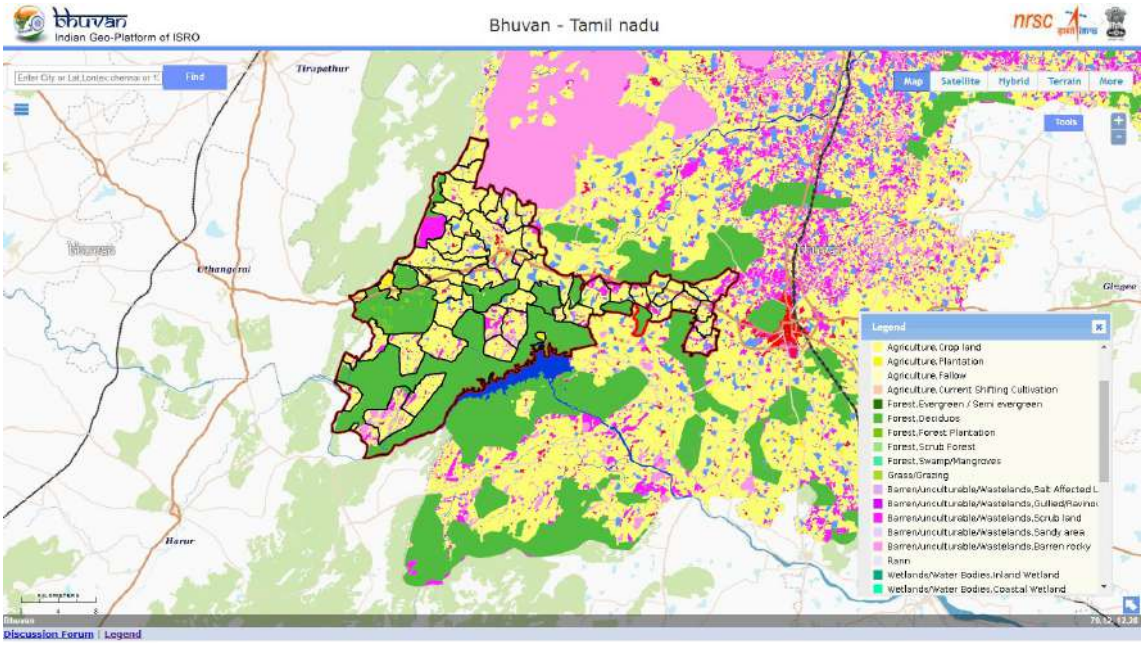
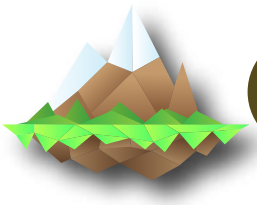



*Figure 3.15. Land Use Land Cover map*

| Land Use | Area coverage in % | Gram Panchayat |
|---|---|---|

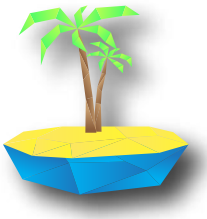
## Barren Lands



39%

Porasupattu, Arathavadi - 80%, Elangunni, Paliyapattu - 50%, Melpennathur, Uchimalaikuppam - 40%, Perumbakkam - 30%, Puliyampatti, Andipatti, Kattamaduvu - 5%

## Agriculture crop lands and Plantation



86%

All GPs

**3.6.1.4 Waste land:** A Parcel of land that is not suitable for agriculture activity and mostly covered with dense or open scrub is termed with wasteland. The extent of wasteland will act as a direct input for preparation of plans for land development activities or greenery. Degraded forest, scrub land and barren rock types of wasteland is noticed in the Block (Figure 3.16).The area and type of waste land in each GP is given below. Measures to arrest forest degradation by implementing deforestation activities such as horticulture plantation are proposed in these areas.

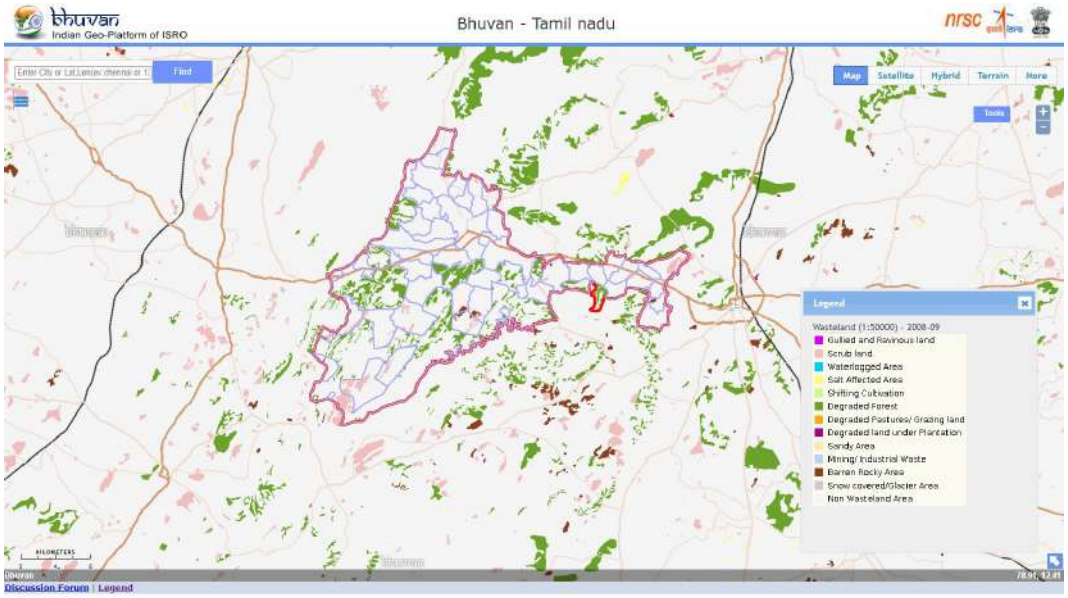
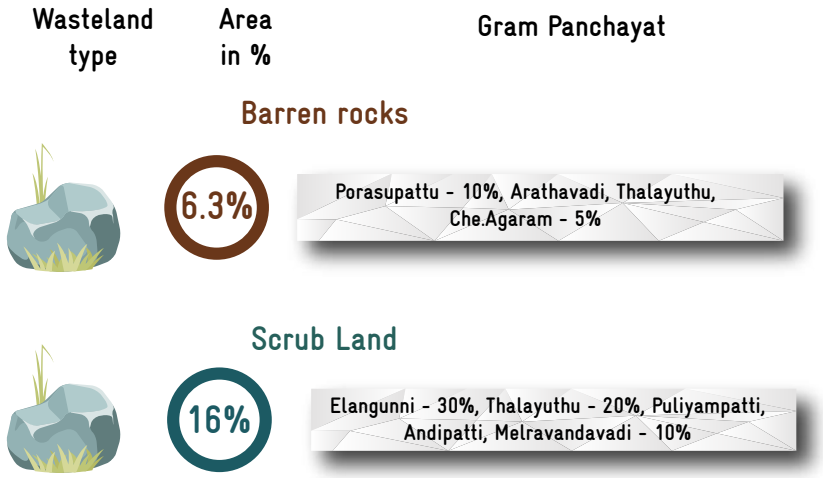



*Figure 3.16. Wasteland map*




**3.6.1.5 Salt affected area:** Salt affected area is observed in the North region of the Block. Almost fifty per-cent of Che-Nachipattu GP witnessed the above normal salinity (Figure 3.17). These parcels will act as a direct input during planning process to propose soil conservation measures, mainly activities to reduce salinization and suggestions for alternative cropping.

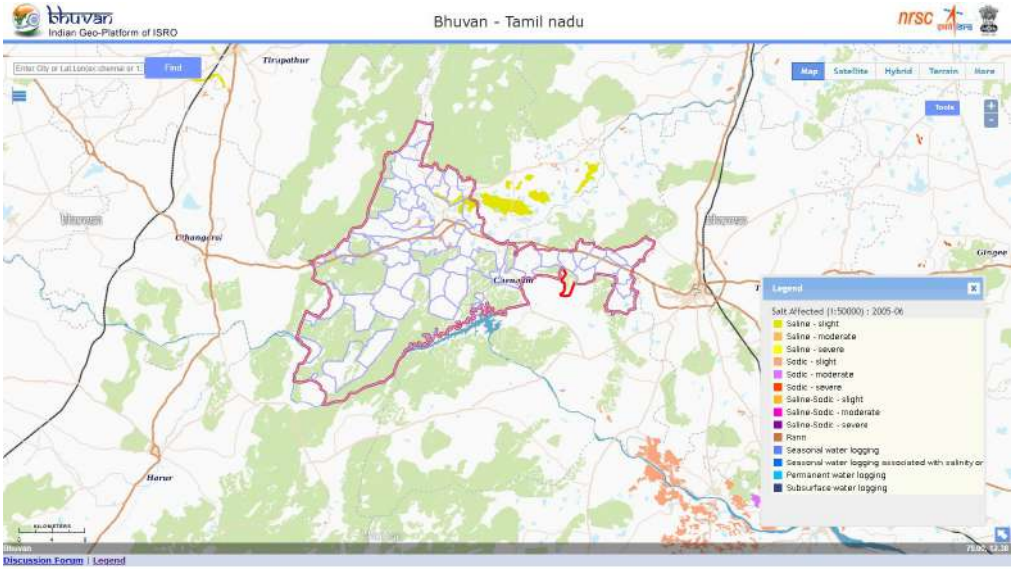
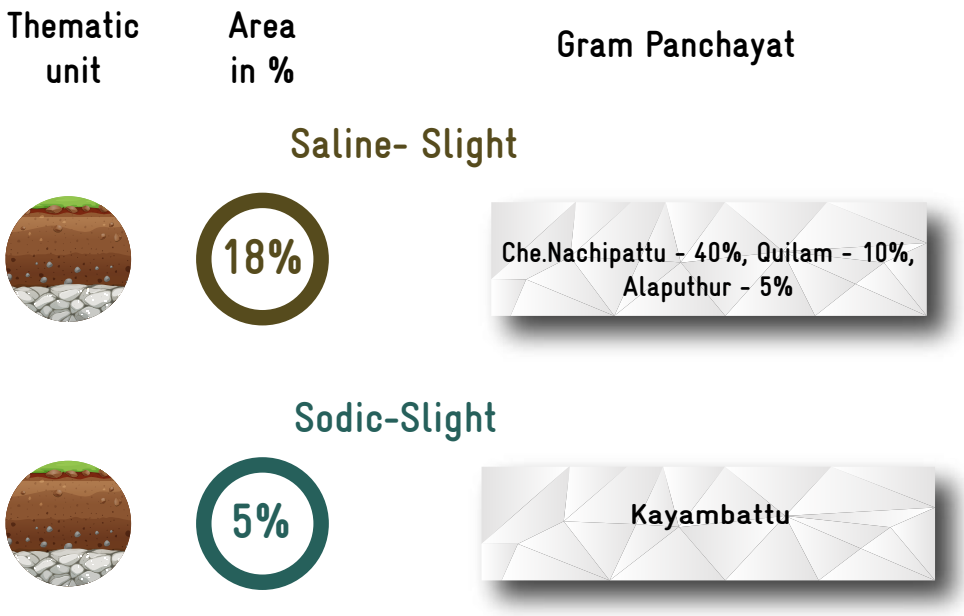



*Figure 3.17. Salt Affected Area*




### 3.6.2 NON SPATIAL DATA

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

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

| Sl. No. | Key parameter | Extent |
|---|---|---|
| | **Area under Land Resources (ha.)** | |
| 1 | Area Irrigated by Source | 10,838 |
| 2 | Current Fallow land | 10,421 |
| 3 | Non-Agricultural Uses | 3,818 |
| 4 | Fallow Land other than Current Fallows | 2,139 |
| 5 | Unirrigated Land | 1,967 |
| 6 | Barren & Un-cultivable Land | 1,891 |
| 7 | Cultivable Waste Land | 760 |
| 8 | Land Under Miscellaneous Tree Crops etc. | 3 |
| 9 | Permanent Pastures and Other Grazing Land | 3 |
| | **Land under Catchment Area (ha)** | |
| 10 | Good Catchment | 5,709 |
| 11 | Average Catchment | 765 |
| 12 | Bad Catchment | 25,365 |
| | **Crop Details** | |
| 13 | Irrigated Area (ha) | 8,478 |
| 14 | Rainfed area (ha) | 4,740 |
| 15 | Paddy Cultivation (ha) | 6,132 |
| 16 | Crop Water Requirement - Irrigated condition (ha.m) | 11,299 |
| 17 | Crop Water Requirement - Rainfed condition (ha.m) | 1,800 |

| | | |
|---|---|---|
| | **Soil Resources: Status of Available Nitrogen (%)** | |
| 18 | Very Low | 31 |
| 19 | Low | 67 |
| 20 | Medium | 1 |
| | **Status of Organic Carbon (%)** | |
| 21 | Very Low | 33 |
| 22 | Low | 63 |
| 23 | Medium | 3 |
| 24 | High | 0 |
| | **Status of Soil Micro Nutrients (%)** | |
| 25 | Sufficient | 68 |
| 26 | Deficient | 32 |
| | **Status of Physical condition of the soil (%)** | |
| 27 | Acidic Sulphate | 0 |
| 28 | Moderately Acidic | 1 |
| 29 | Slightly Acidic | 10 |
| 30 | Neutral | 7 |
| 31 | Moderately Alkaline | 79 |
| | **Soil Texture (%)** | |
| 32 | % of Clay Soil | 27 |
| 33 | % of Fine Soil | 50 |
| 34 | % of Coarse loamy | 7 |
| 35 | Soil Water Permeability (Low, Moderate, high) | Moderate |
| | **Soil moisture and ET** | |
| 36 | Volumetric Soil Moisture (%) | 23 |
| 37 | Estimated Soil Moisture (ha.m) | 28,021 |
| 38 | ET Losses (ha.m) | 6,687 |
| | **Means of Water Extraction (%)** | |
| 39 | Gravity | 2 |
| 40 | Lifting | 98 |
| | **Irrigation Methods (%)** | |
| 41 | Wild Flooding | 6 |
| 42 | Control Flooding | 94 |
| | **Livestock (No.)** | |
| 43 | Cattle population | 50,850 |
| 44 | Sheep population | 17,839 |
| 45 | Goat population | 18,750 |

### 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 31,840 ha, the highest of 34 % land is used for irrigation, followed by 33 % land is current fallow land, while less than 5 % of land is cultivable wasteland, permanent pastures and other grazing land and land under miscellaneous tree crop etc., (Figure 3.18).

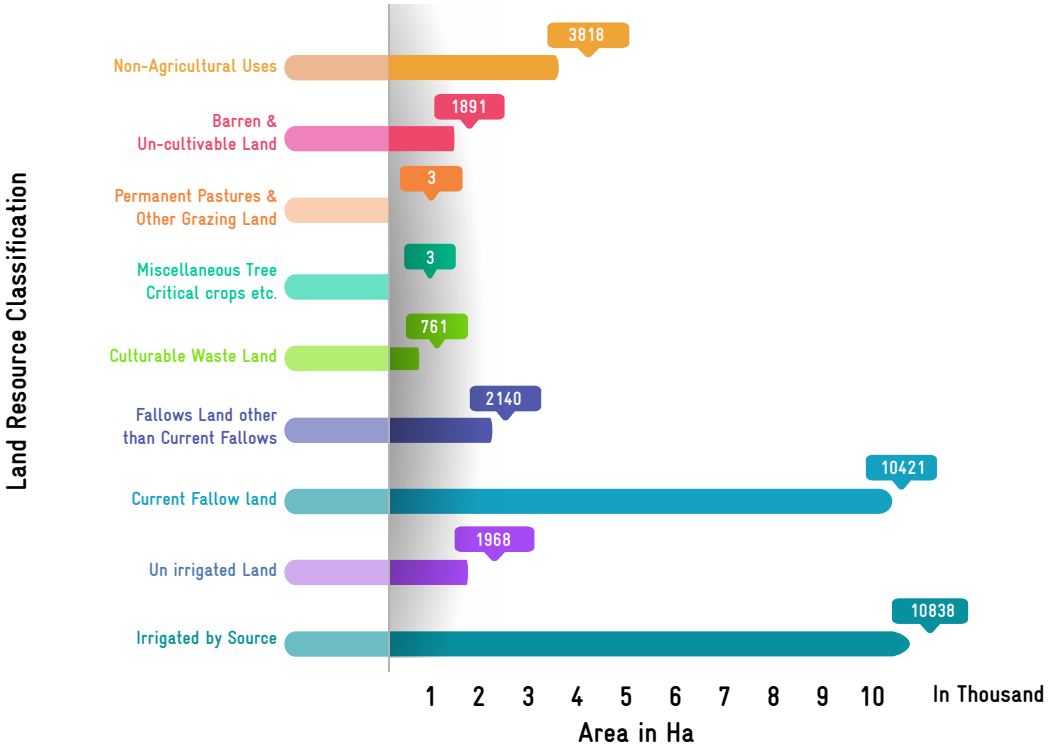



*Figure 3.18. Land utilization*

### 3.6.2.2 Catchment Area

The land use types in each of the GPs are categorized into three different types of runoff; good, average and bad catchment area. Out of total catchment area of 31,840 ha, of the Block, the highest of about 80 % is bad catchment area followed by 18 % of good and remaining is under average catchment area. This analysis helps to focus on prioritizing the works in the land use systems under the good and bad catchment areas (Figure 3.19).

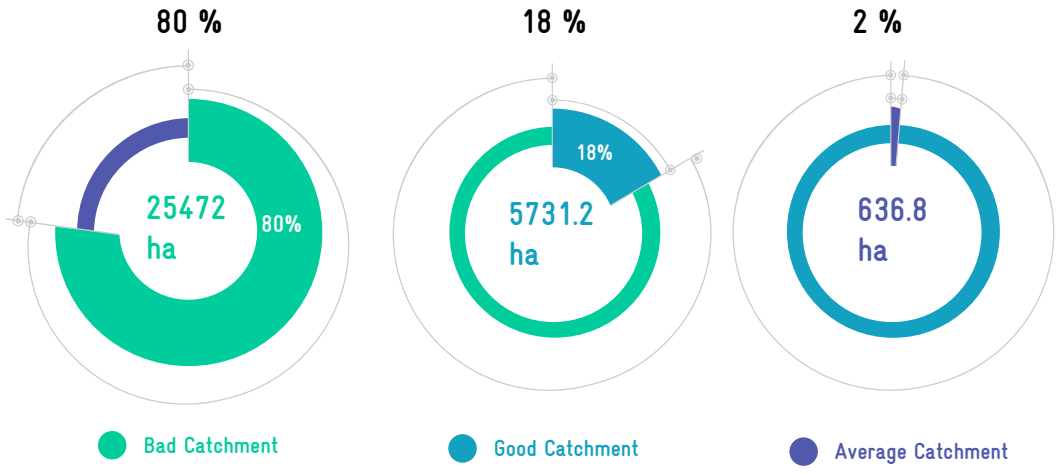


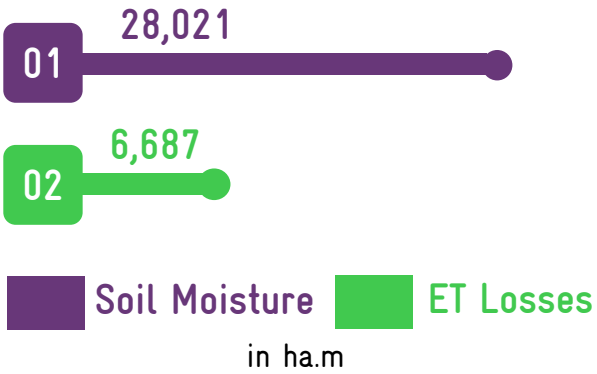

*Figure 3.19. Catchment area*

### 3.6.2.3 Soil moisture

Soil is an important medium to store the available water and the storage capacity varies with the type of soil especially its textural composition. In overall composite water budgeting, estimation of stored water in the soil assumes greater significance in this Block because of its significant proportion of area under rain-fed cultivation. The annual average volumetric soil moisture of this Block (23%), is taken for estimating the amount of water stored as soil moisture which accounts to 28,021 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 6,687 ha.m.




### 3.6.2.5 Macro-nutrients
### Nitrogen

The macro soil nutrients such as nitrogen and organic carbon falls under very low to moderate category in all the soil samples tested. The available nitrogen is very low in 31 % of the samples tested while it was 67 % under low category and remaining is moderate Nitrogen (Figure 3.20). According to soil resource map, this Block is identified as one of the nitrogen deficient Block (Tiruvannamalai district profile 2020).

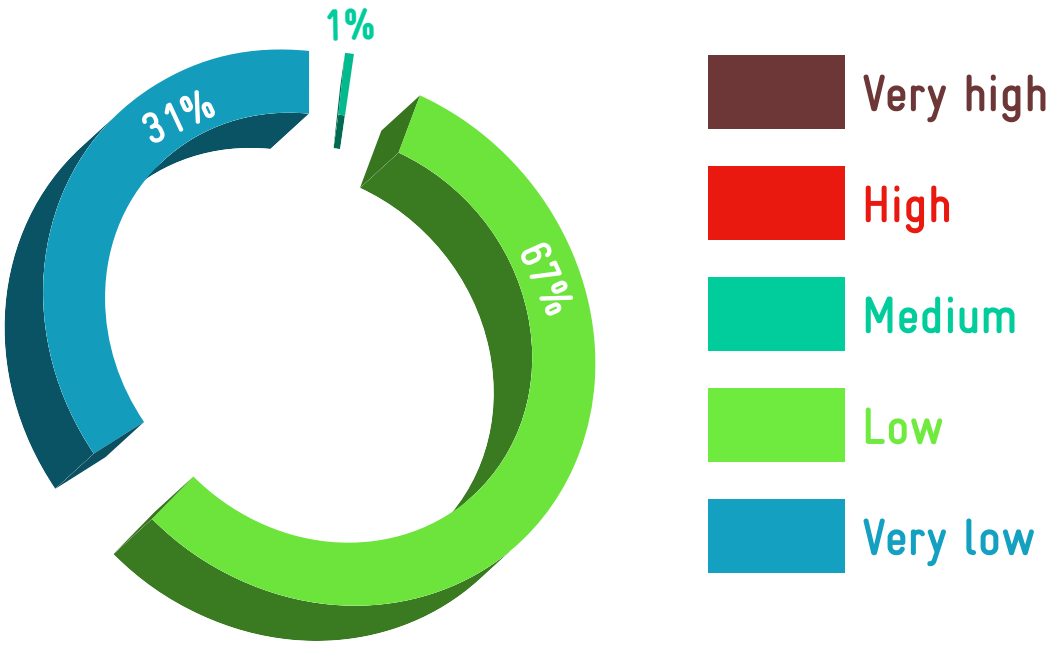



*Figure 3.20. Status of available Nitrogen*

## Organic Carbon Status

A similar trend was recorded for soil organic carbon. Soil organic carbon is also ranges between very low and low in the Block. Nearly 63 % of the soil samples tested fall under low category followed by 33 % is falls under very low category while less than 5 % under medium 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.

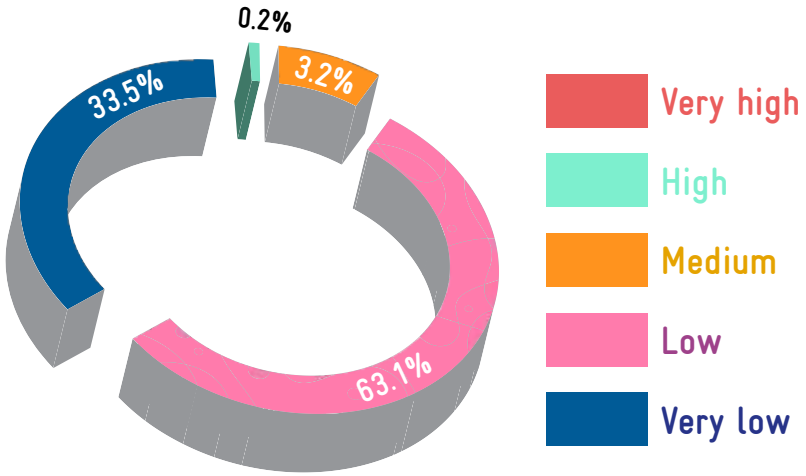



*Figure 3.21. Status of soil Organic Carbon*

### 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 32 % and 68 % sufficient in the soils tested. (Figure 3.22).

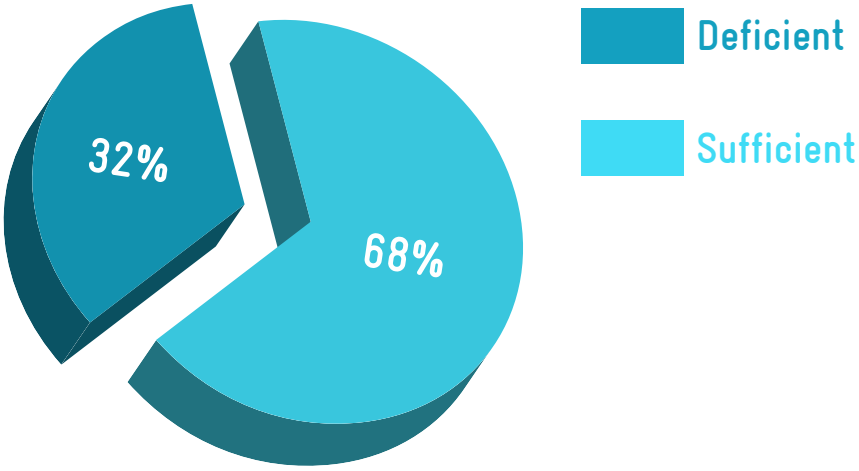



*Figure 3.22. Status of soil micro-nutrients*

### 3.6.2.7 Physical parameters – pH status

With reference to the physical parameters, 78.7 % of the soil is moderately alkaline in nature followed by 10.5 % is slightly acidic, 7.1 % is neutral in nature and 1.4% is moderately acidic in nature (Figure 3.23).

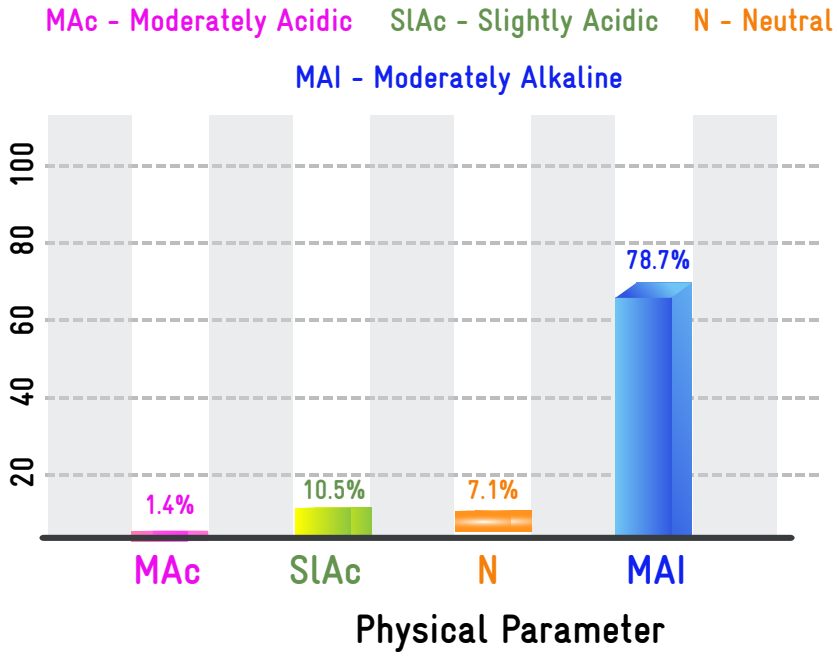



*Figure 3.23. Status of pH of soil*

### 3.6.2.8 Cropping pattern and the irrigation

A total of 18,533.7 ha area is used for crop cultivation in which irrigation shares the highest area of 56 % rest is rain-fed irrigation. About 10,000 ha is irrigated area in which paddy crop is dominated (60 %) followed by Groundnut (16 %) while, vegetables are less in area. In rain fed cultivation, pulses are dominated and cover an area of 58 % followed by groundnut of 34 % (Figure 3.24). While red gram, ragi, dry chilli, brinjal, water melon, ladies finger, gourds, banana, guava, medicinal plants, lemon, mango, tomato, coconut were cultivate in less than five percent of the area.

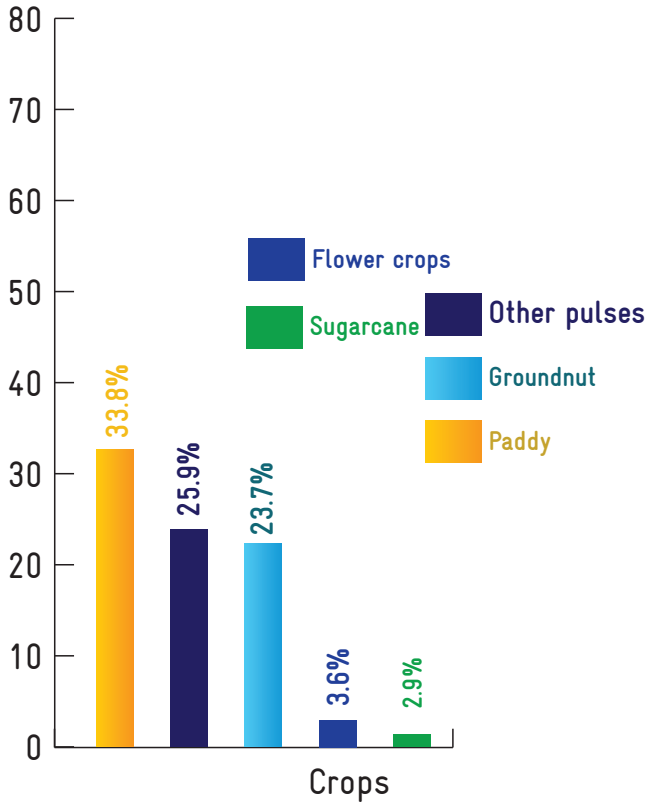



*Figure 3.24. Crop patterns Irrigation methods*

### 3.6.2.9 Irrigation methods

In case of the surface water resources, wild flooding is the primary method of irrigation. But in case of ground water resources, the predominant type of irrigation is control flooding. In the Block, 94 % of the irrigation is done by control flooding and only 6 % of the irrigation is done by wild flooding (Figure 3.25).

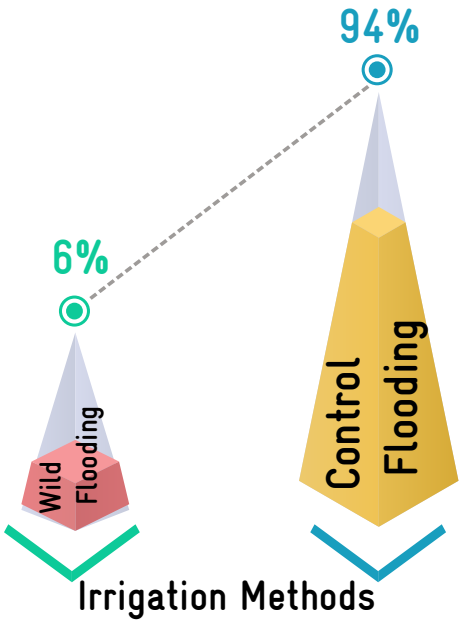



*Figure 3.25. Irrigation methods*

### 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, 98 % of the water extraction methods are under lifting means of extraction and only 2 % comes under gravity means of water extraction (Figure 3.26).

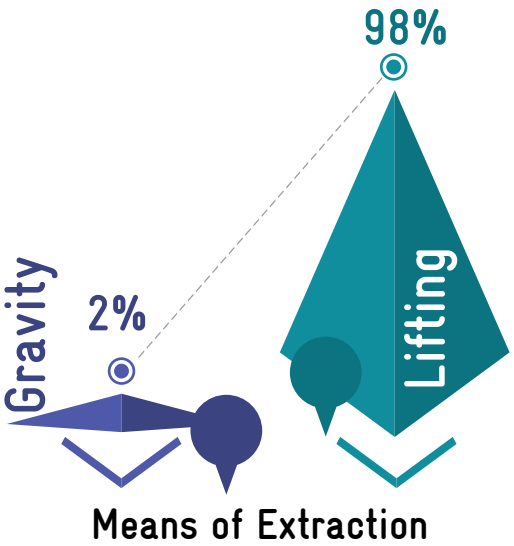



*Figure 3.26. Means of water extraction*

### 3.6.2.11 Livestock details

This Block has considerable proportion of livestock resources of which small ruminants such as goat and sheep constitute 21 % (18,750) and 20 % (17,839) of the total livestock. Cattle population is higher in this Block 58 % (50,850) (Figure 3.27). The total water requirement for livestock is 202 ha.m. Of the total water demand of 90 % is met through ground water and remaining is from surface water resources.

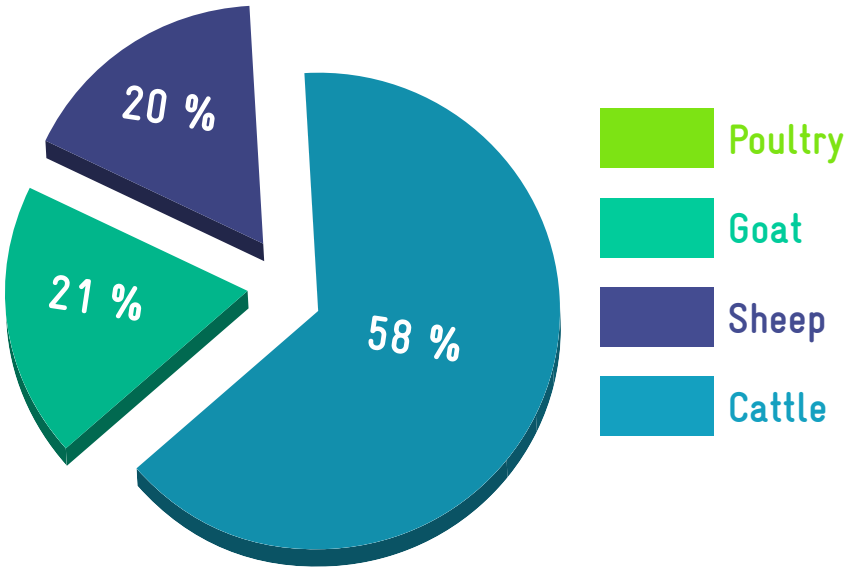



*Figure 3.27. Livestock details*

## 3.7 CWRM PLANNING ANALYSIS-SOCIO-ECONOMIC

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

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

| Sl.No. | Parameter | Total |
|---|---|---|
| 1 | Geographical Area (ha) | 30,138 |
| 2 | Male population (No.) | 71,962 |
| 3 | Female population (No.) | 70,145 |
| 4 | Total population (No.) | 1,41,012 |
| 5 | SC population (No.) | 49,472 |
| 6 | ST population (No.) | 2,381 |
| 7 | Vulnerable population (No.) | 51,853 |
| 8 | Households (HH's) (No.) | 35,882 |
| 9 | Only one room HH's (SECC) (No.) | 3,481 |
| 10 | Female Headed HH's (SECC) (No.) | 1,547 |
| 11 | Vulnerable Households (SECC) (No.) | 2,901 |
| 12 | Vulnerable Households (%) | 8 |

| | | |
|---|---|---|
| 13 | Registered MGNREGA Job cards (Persons) | 60,632 |
| 14 | Active person working in MGNREGA job Cards (Persons) | 44,217 |
| 15 | Drinking Water Sources (No.) | 10,979 |
| 16 | Ground Water - Drinking source (No.) | 176 |
| 17 | Surface water - Drinking source (No.) | 47 |
| 18 | Sum of drinking water sources (No.) | 223 |
| 19 | HH's have tap water connection for drinking water (No.) | 13,321 |
| 20 | HH's dependent on other sources for drinking water (No.) | 4,670 |
| 21 | Annual Greywater Generation (ha.m) | 260 |

### 3.7.1 Population:

The total population of this Block is 1.41 Lakhs *of which male and female population are balancing equally. 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 37 % of the total population are under vulnerable population (Figure 3.28).

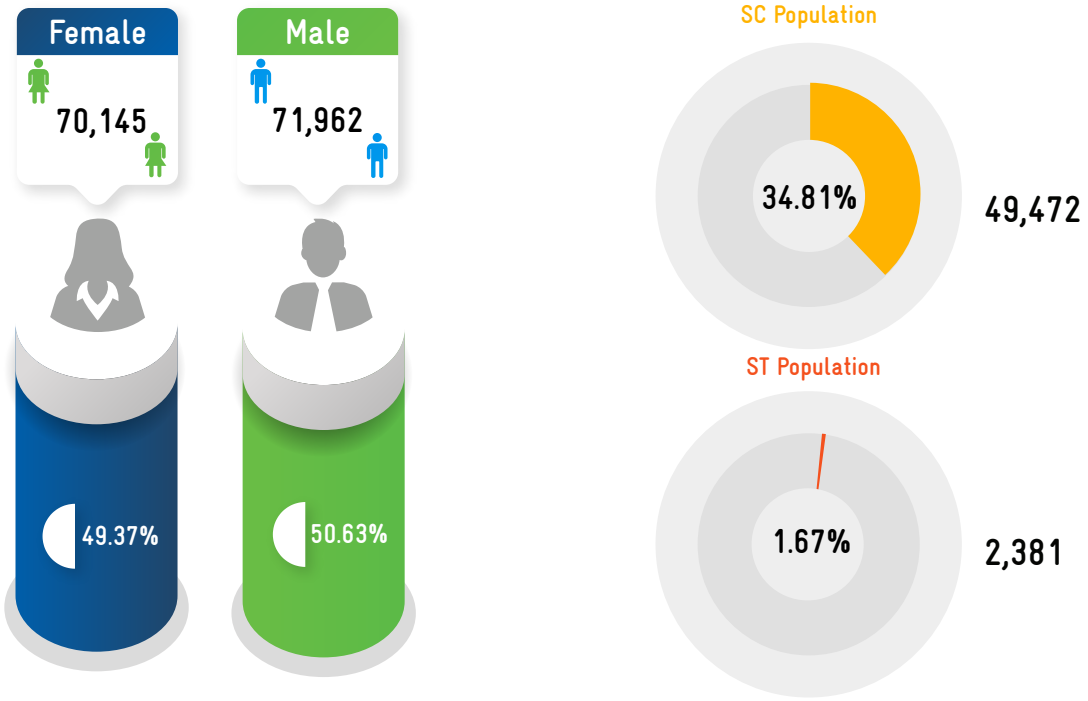



*Figure 3.28. Population details*

**population figures 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 35,882 households in which 10 % households have only one room, 4 % households are headed by women and 8 % are vulnerable households (Figure 3.29).

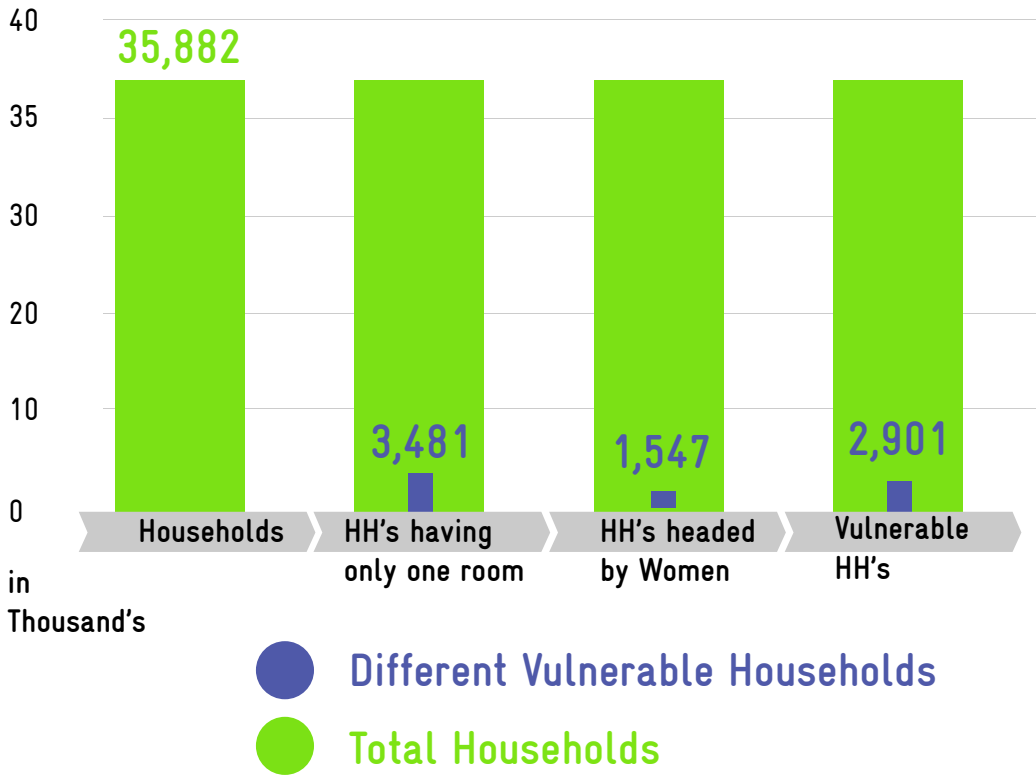



*Figure 3.29. Details of Households*

### 3.7.3 Status of Mahatma Gandhi NREGA - job card status

In the Block of the total population of 1.41 Lakhs, 60,632 are registered for job cards in Mahatma Gandhi NREGA scheme in which 73 % of the job cards are in active category (Figure 3.30).

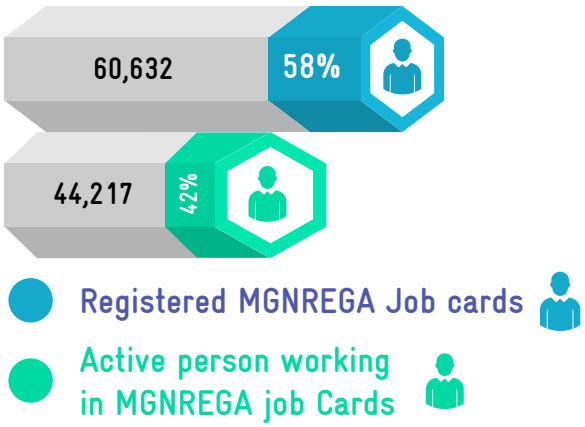



*Figure 3.30. Status of MGNREGA job cards*

### 3.7.4 Drinking Water Sources

Nearly 13,321 households have tap water connection and 4,670 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

13,321
Households

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

4,670
Households

### 3.7.5 Annual Greywater Generation

The grey water generation estimated across this Block is 260 ha.m which is available for reuse or recycle.

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

Morphology

Thalayuthu, Elangunni, Melravandavadi, Elangunni

Wasteland

Porasupattu, Elangunni, Porasupattu, Arathavadi

Soil erosion

Thalayuthu, Porasupattu, Arathavadi, Paliapattu, Melpennathur

Upland/Slope

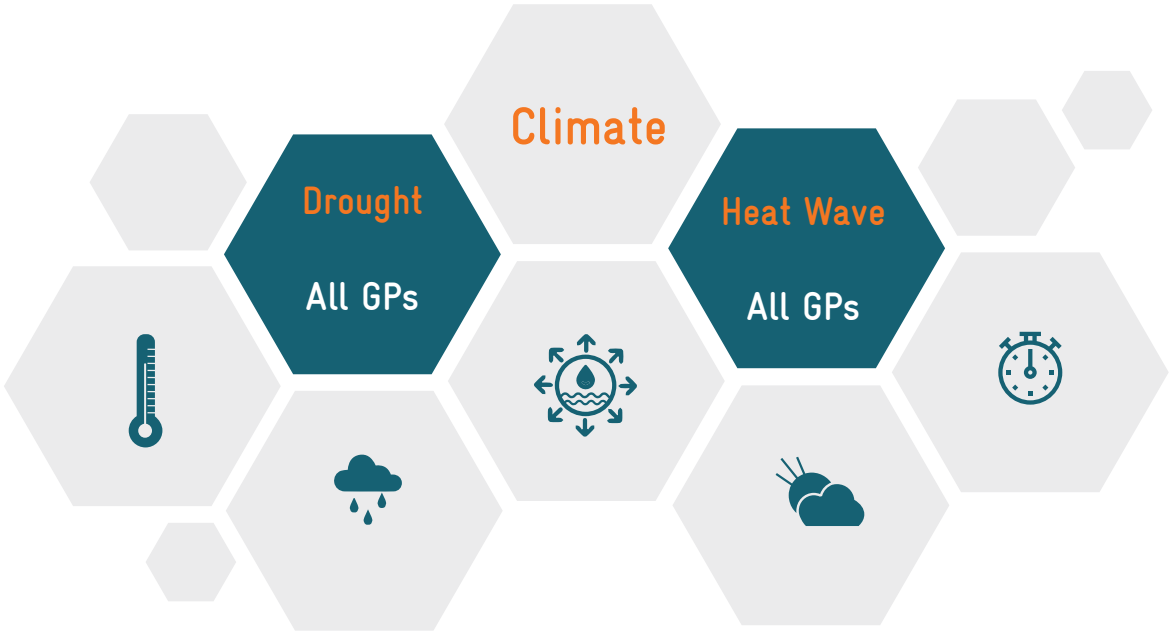
Puliyampatti, Arathavadi, Porasupattu, Thalayuthu

Ground water prosperity

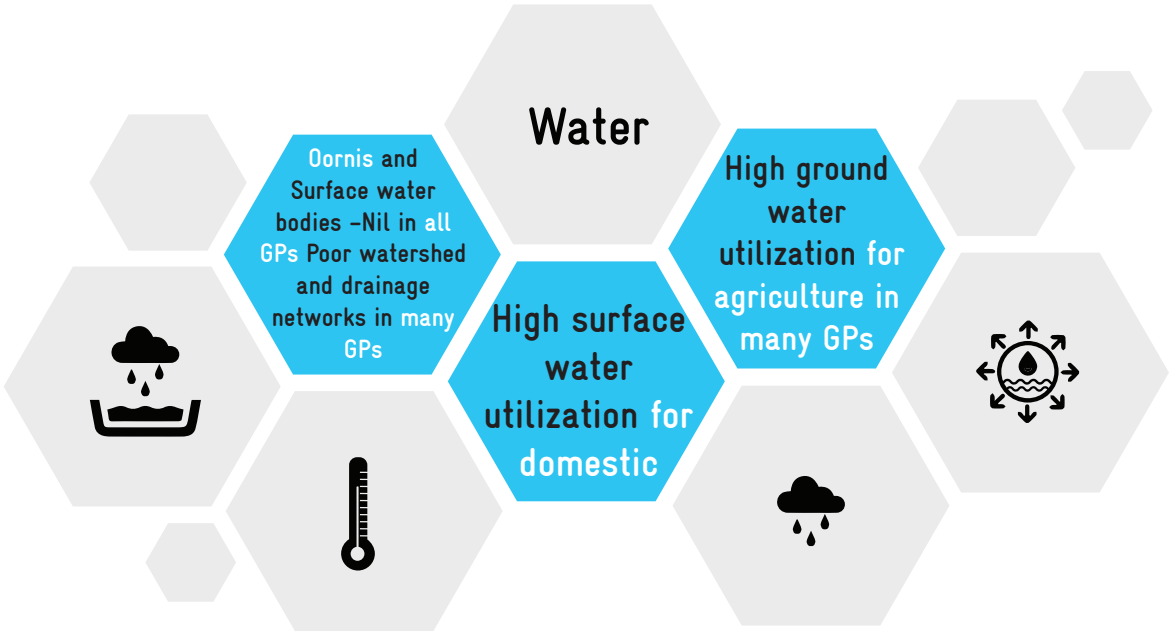
Perumbakkam, Paliyapatu, Periyakolapadi

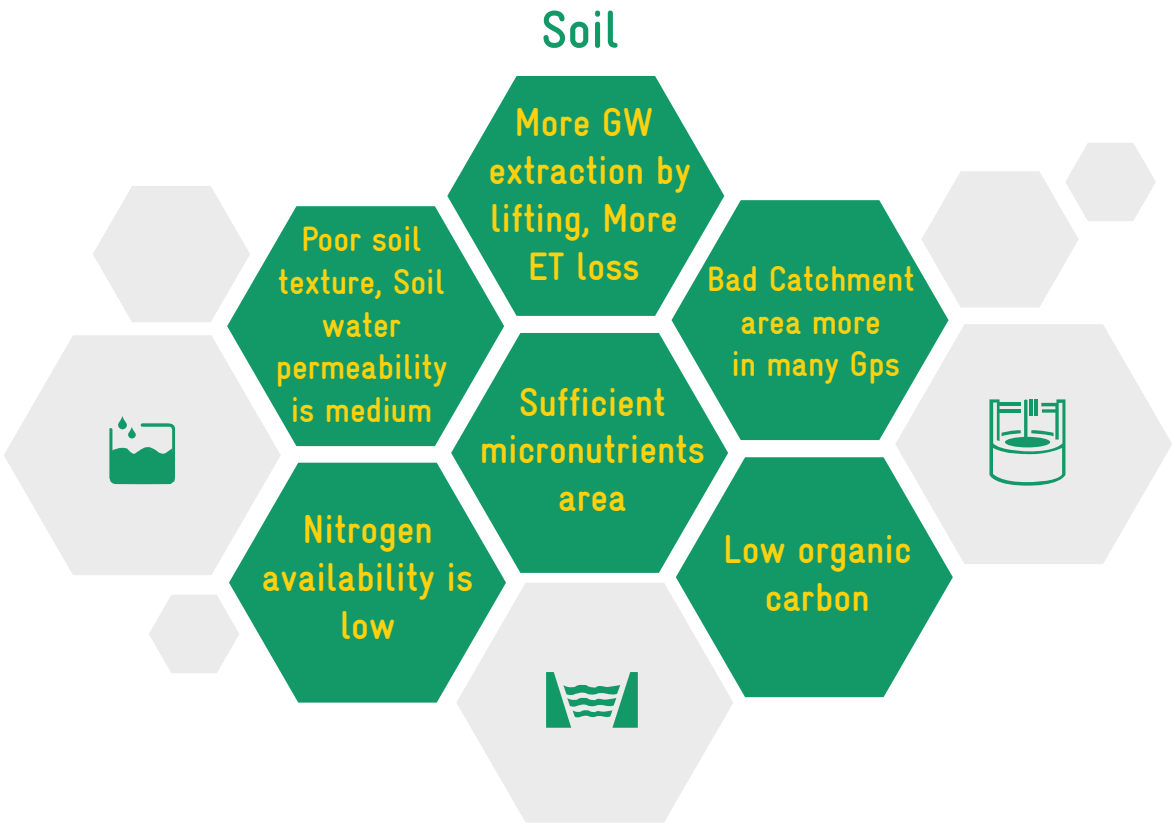

Salt affected area

Che-Nachipattu, Quilam, Alaputhur, Kayambattu


Climate
Drought
All GPs
Heat Wave
All GPs


Socio economic
Population density high in Manmalai, Melpallipattu, Valayambattu
Vulnerable population high in Paramanandal, Quilam
% of vulnerable households high in Manmalai, Valayambattu, Melchengam
Grey water generation more in Paramanandal, Pakkiripalayam, Kariyamangalam
No. of households and female headed households high in Kottavoor, Paramanandal, Kariyamangalam
Total population, Female population high Paramanandal, Pakkiripalayam, Kariyamangalam
Registered MGNREGA job cards and active persons working are low in Ariyakunjur, Beemanandal, Alaputhur, Anwarabath
Most of GP HH's have tap water connection for drinking water


Water
Oornis and Surface water bodies –Nil in all GPs Poor watershed and drainage networks in many GPs
High ground water utilization for agriculture in many GPs
High surface water utilization for domestic


Soil
More GW extraction by lifting, More ET loss
Poor soil texture, Soil water permeability is medium
Bad Catchment area more in many Gps
Sufficient micronutrients area
Nitrogen availability is low
Low organic carbon

கெடுப்பதூஉம் கெட்டார்க்குச் சார்வாய்மற் றாங்கே
எடுப்பதூஉம் எல்லாம் மழை

குறள் - 15

Destruction it may sometimes pour
But only rain can life restore

Thirukkural - 15

# CHAPTER 4

# 4 VULNERABILITY RANKING OF GP

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

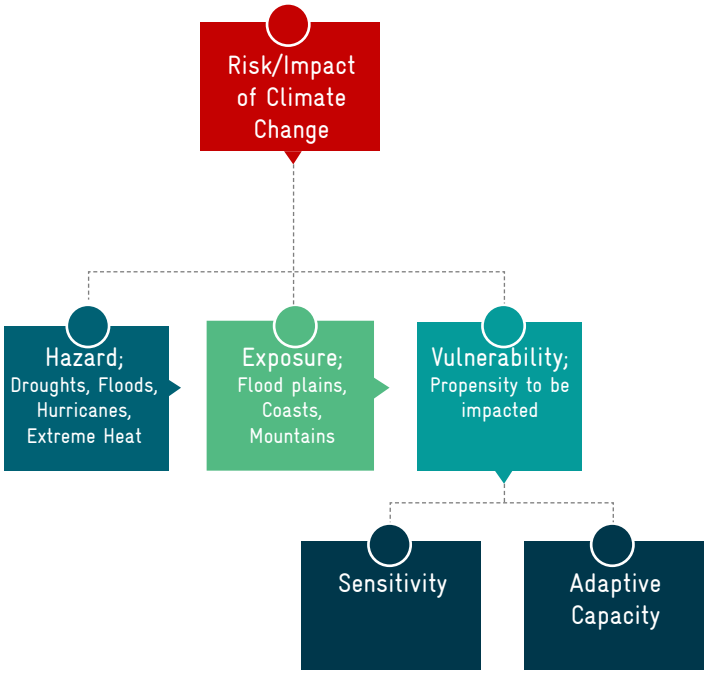



*Figure 4.1. Vulnerability of the system as defined by IPCC*

Generally, vulnerability assessments are made to identify.

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

The CWRM parameters which been explored through rigorous study were considered here to address the key water challenges at GP level. About 70 spatial and non-spatial parameters/ indicators under 4 dimensions via Climate (3), Water (25), Agriculture (31) and Sociodemographic (11) are categorized into adaptive capacity, sensitivity and exposure indicators for vulnerability analysis as per IPCC norms. Table 9 lists CWRM parameters/indicators, its rationale to vulnerability, source of data and its linkage with WASCA TN's primary 18 indicators.

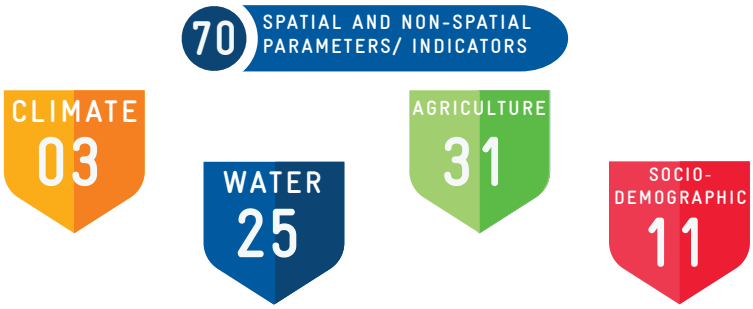


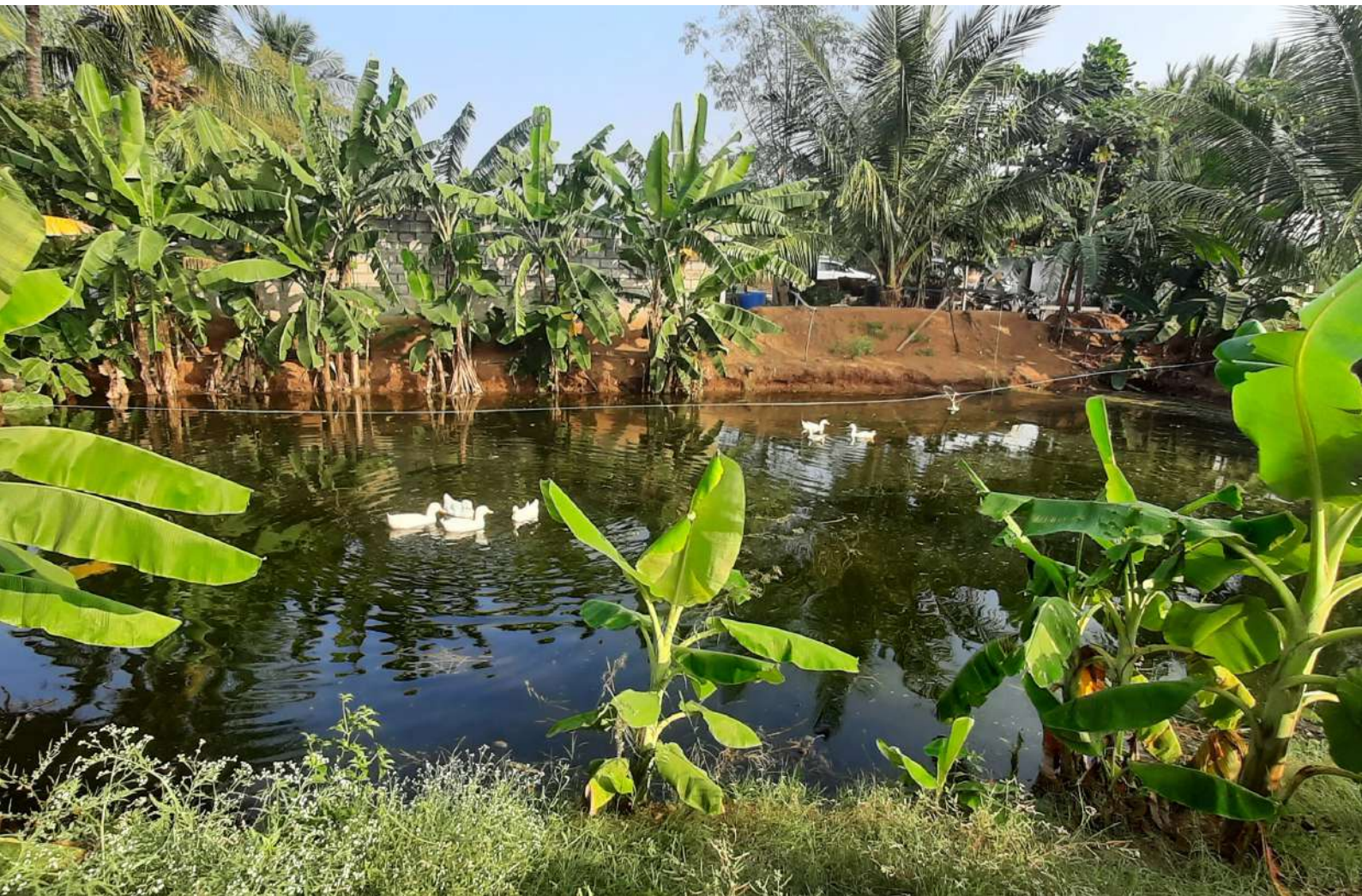
TABLE 9. CWRM PARAMETERS/INDICATORS SELECTED FOR BLOCK LEVEL VULNERABILITY

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

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

The identified indicators are from different sources and measured in different units. As the vulnerability assessment is about ranking, the indicators have to be in common units. This is done through normalization. The normalized indicators are aggregated and categorized to different vulnerability levels very high, high, medium, low and very low category. The methodology vulnerability assessment is given in Annexure 4. Valayambattu, Paramanandal, Kottavoor, Chennasamudram, Kayambattu and Melvanakkambadi GP's have very high rural water security vulnerability to climate risks. Uchimalaikuppam, Arattavadi, Agaram (Se), Paliapattu, Kuppanatham, Porasapattu, Kannakurkkai, Perumbakkam, Aswanagasurunai, Chinnakolapadi and Thazhaiyuthu GP's have very low vulnerability.

| Upto | Category | Color range |
|---|---|---|
| 0.569 | Very High | |
| 0.542 | High | |
| 0.515 | Medium | |
| 0.487 | Low | |
| 0.460 | Very low | |



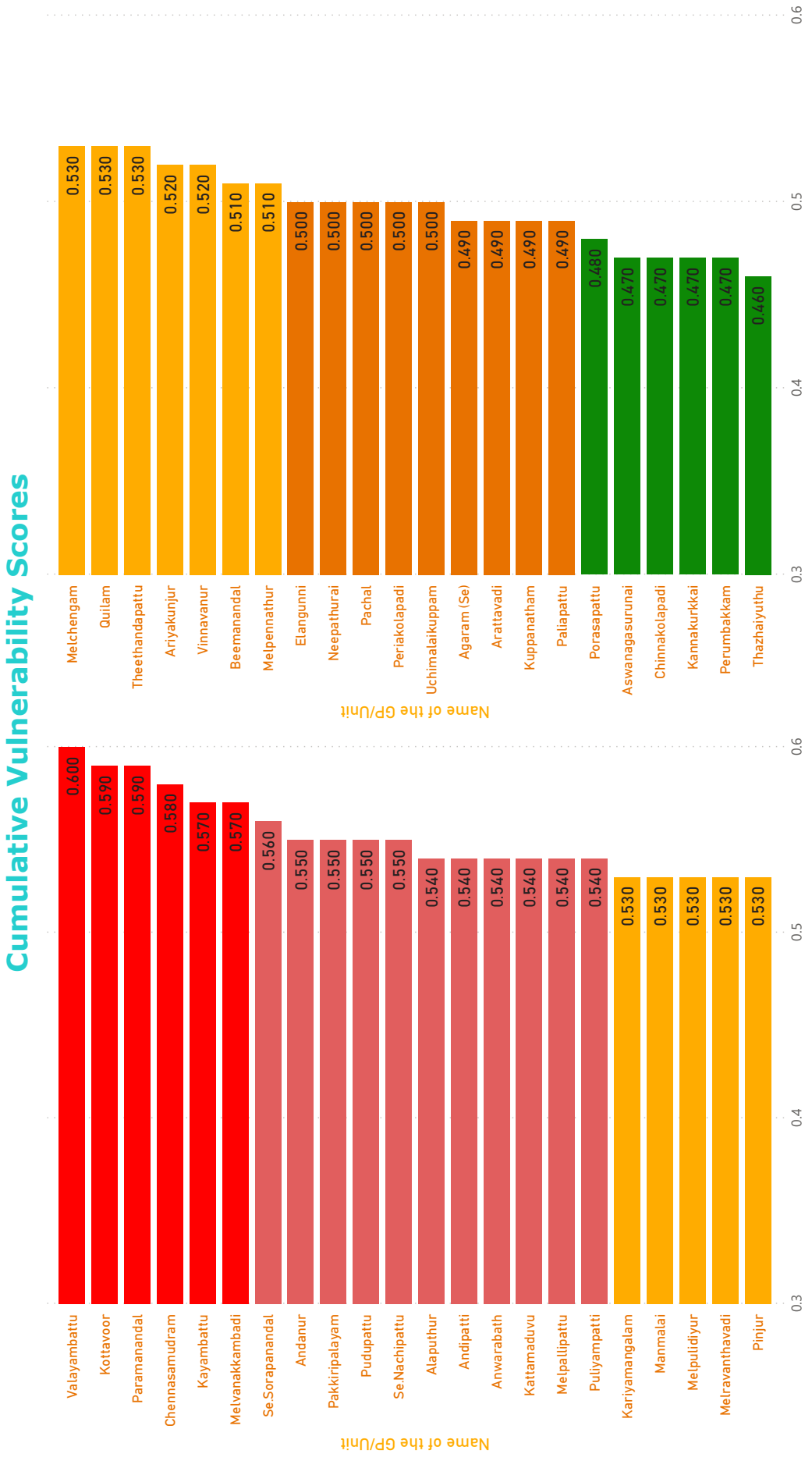



*Figure 4.2. Final cumulative vulnerability scores*

## 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 GPs in this Block are affected with droughts and heat waves in last decades.

**ALL GPS**

**Water resource vulnerability**

The water resources vulnerability index shows that Paramanandal, Kottavoor, Kayambattu, Melpulidiyur and Melvanakkambadi GP have high vulnerability followed by Kottavoor while Melchengam GP with lower CVI.

**PARAMANANDAL, KOTTAVOOR, KAYAMBATTU, MELPULIDIYUR MELVANAKKAMBADI, KOTTAVOOR , MELCHENGAM**

**Agriculture resources vulnerability**

In agriculture and allied sectors, GPs has highest vulnerable score are Kottavoor, followed by Pudupattu while less was in Aswanagasurunai.

**KOTTAVOOR, PUDUPATTU, ASWANAGASURUNAI**

**Socio-economic vulnerability**

Valayambattu, Manmalai, Se.Sorapanandal, Paramanandal, Andanur, Melvanakkambadi GPs have high socio economic vulnerability

**VALAYAMBATTU, MANMALAI, SE.SORAPANANDAL, PARAMANANDAL, ANDANUR, MELVANAKKAMBADI**

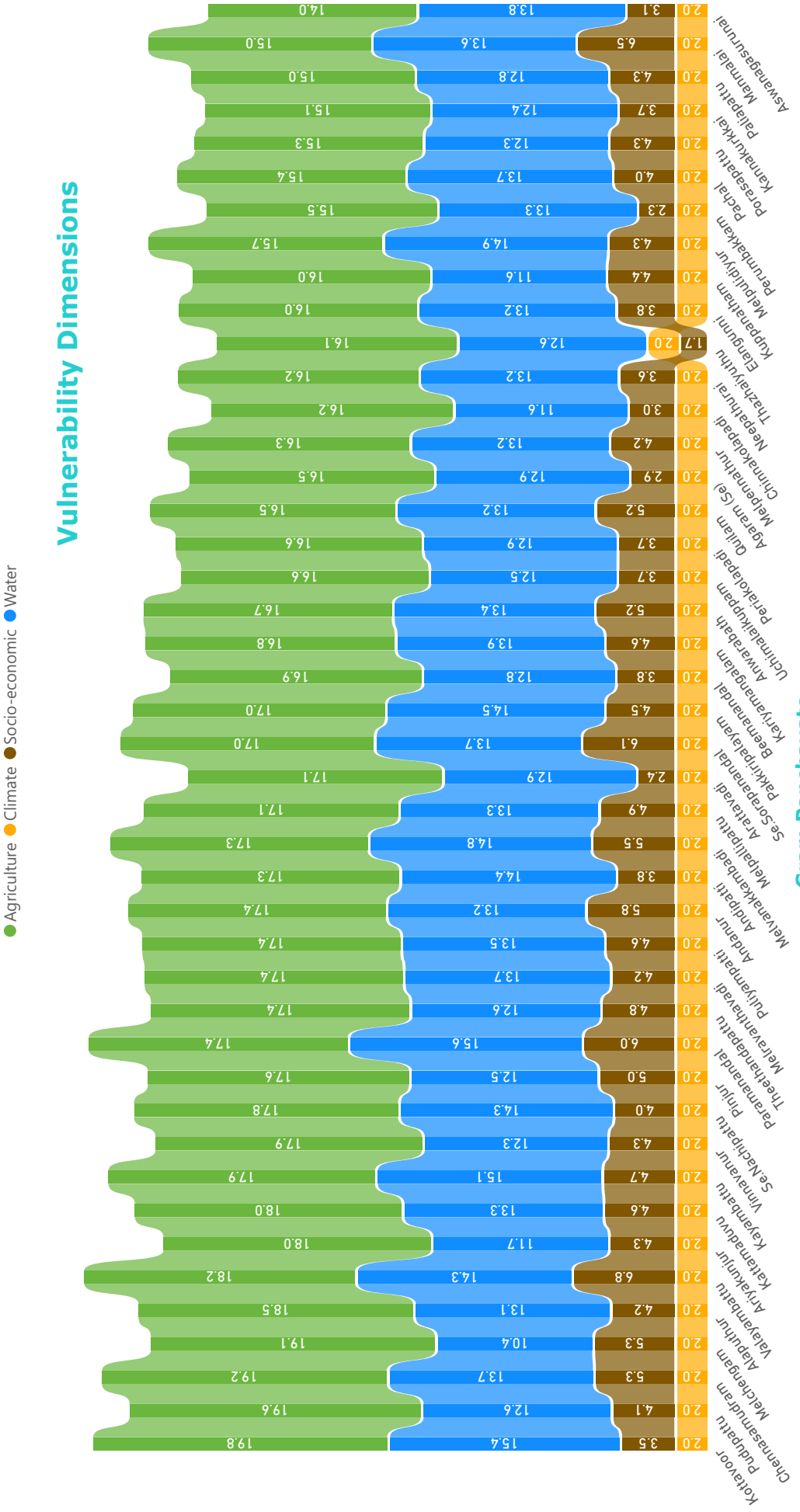
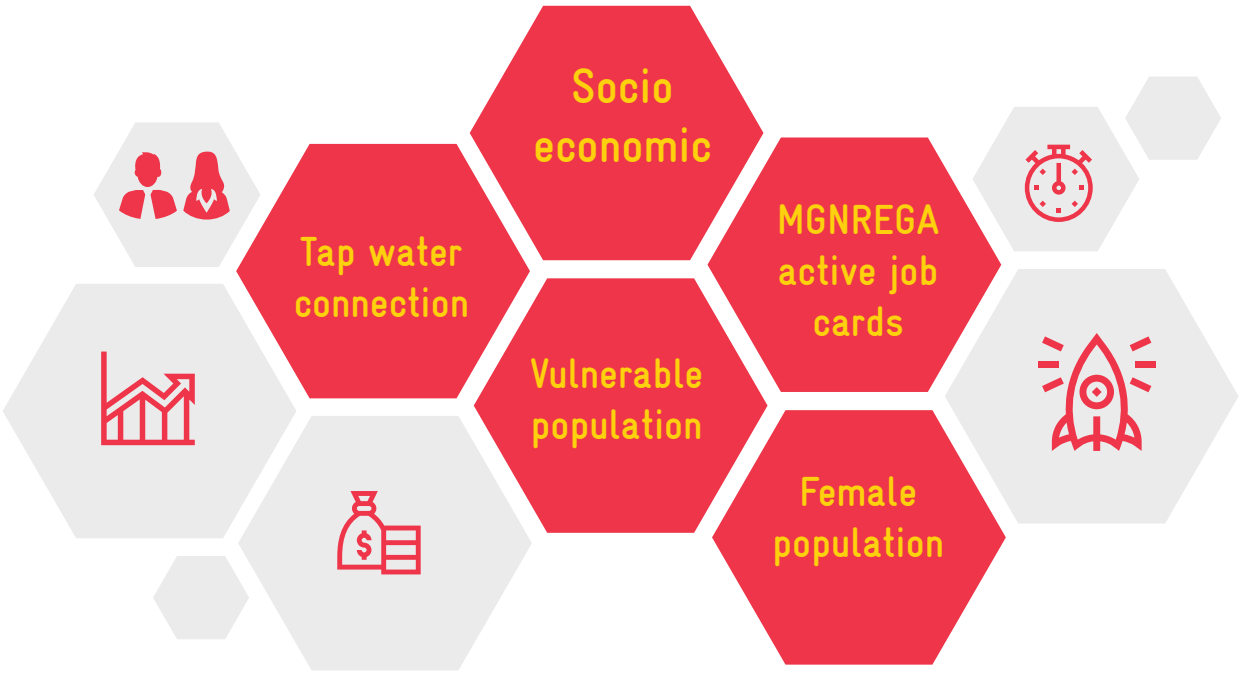
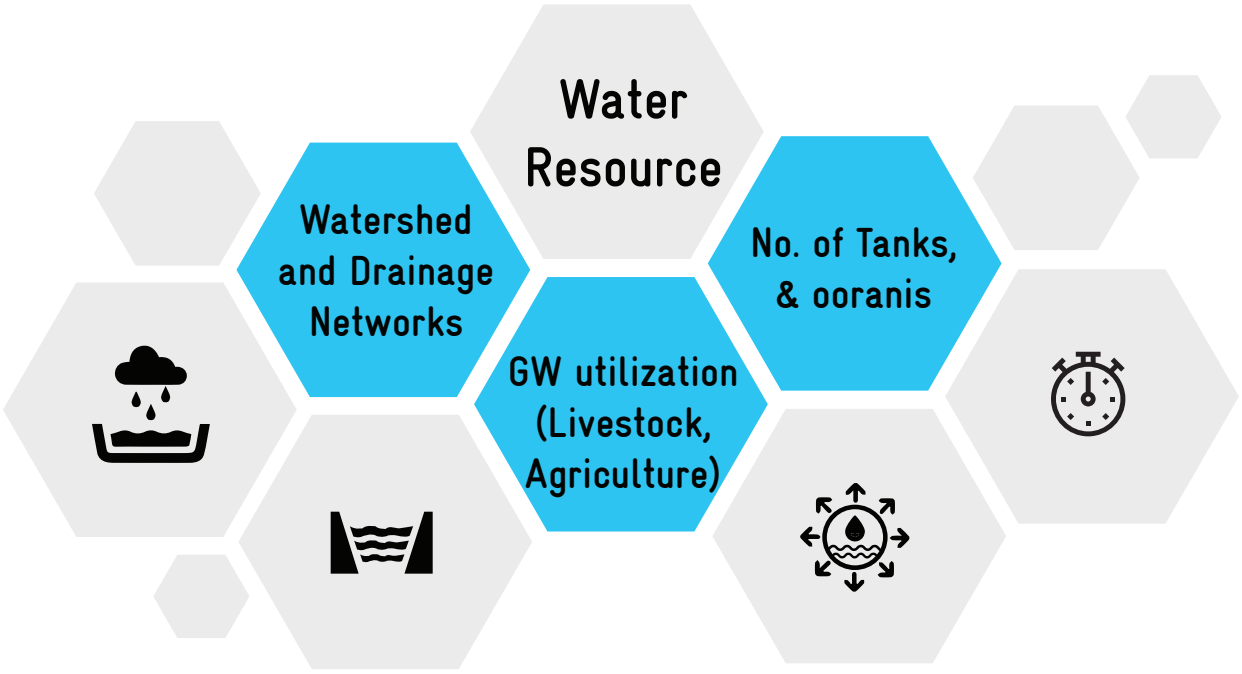
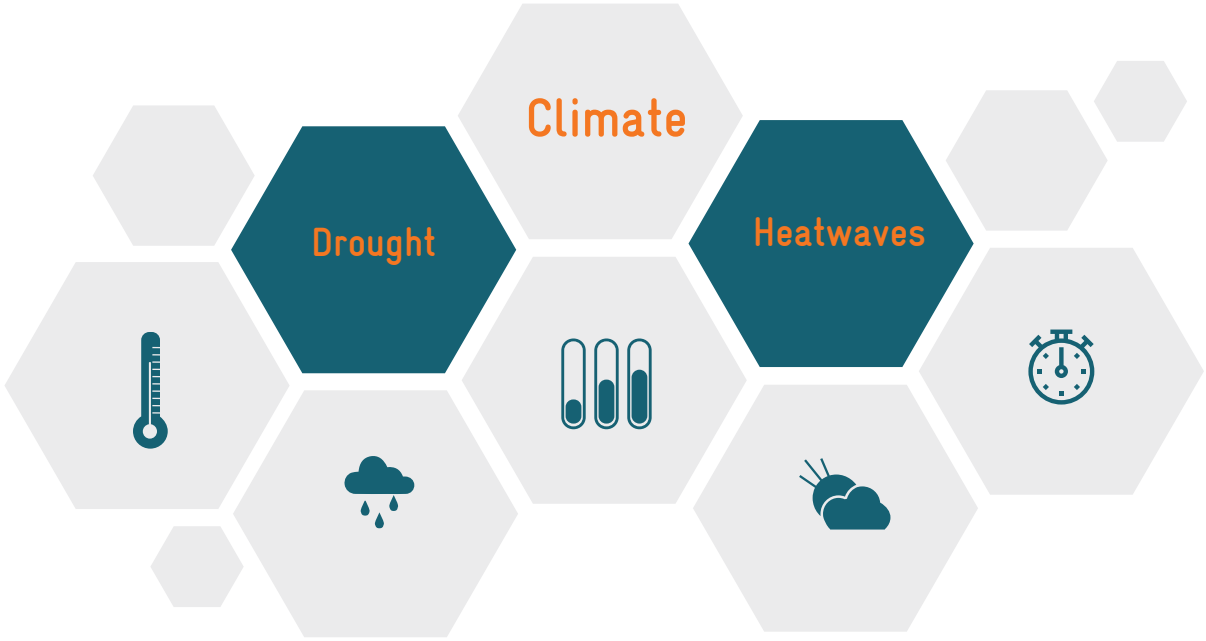


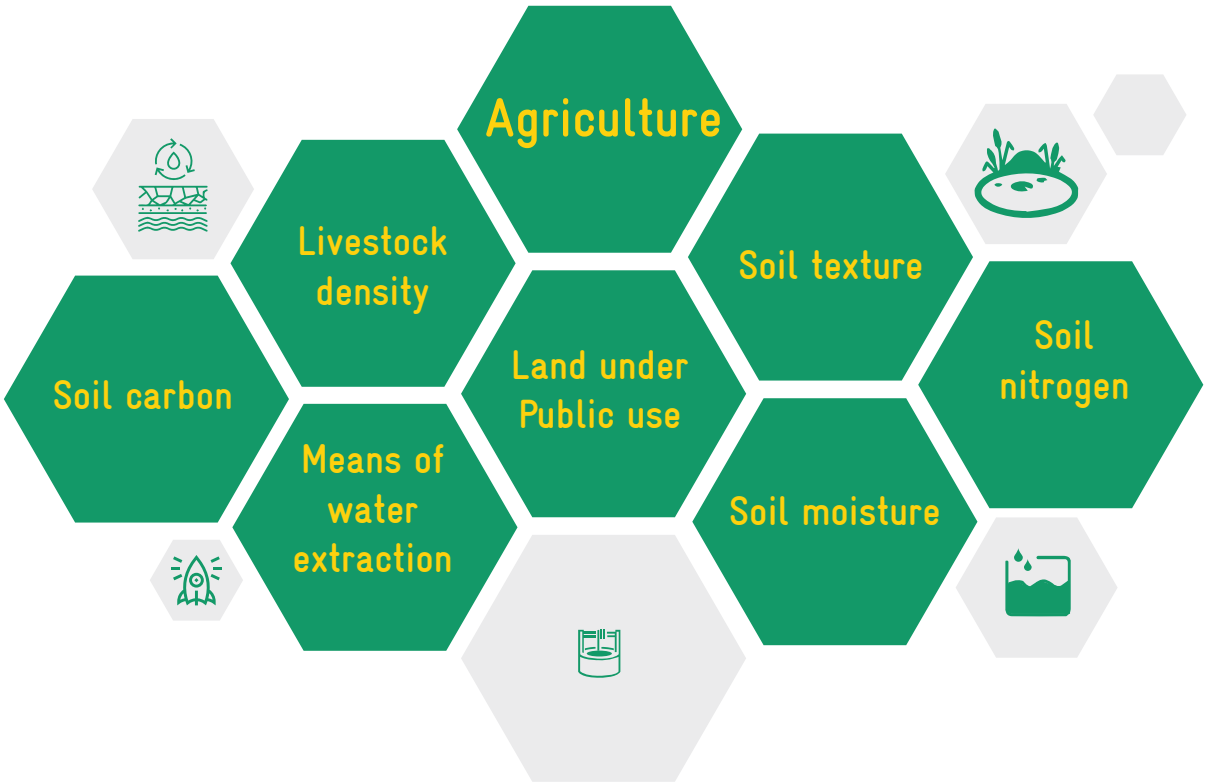

*Figure 4.3. GP wise vulnerability dimensions*

## 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 the 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 31,840 ha available land in Chengam Block, 4,592 ha (14.4 %) area is proposed for treatment under WASCA TN– CWRM planning. A major portion of key water actions is proposed in barren & uncultivable land i.e. 1,418 ha (30.8 %) followed by irrigation land in 921 ha (20 %) while less than five percent of permanent pastures and other grazing land, unirrigated land, forest land, miscellaneous tree crops etc. land area is proposed for water actions.

TABLE 10. THE PROPOSED AREA FOR WASCA TREATMENT

| Land use | Total available land (ha) | WASCA proposed treatment area (ha) |
|---|---|---|
| Area Irrigated by Source | 10,838 | 921 |
| Current Fallow land | 10,421 | 753 |
| Non-Agricultural Uses | 3,818 | 572 |
| Fallow Land other than Current Fallows | 2,139 | 185 |
| Unirrigated Land | 1,967 | 169 |
| Barren & Un-cultivable Land | 1,891 | 1,418 |
| Cultivable Waste Land | 760 | 570 |
| Land Under Miscellaneous Tree Crops etc. | 3 | 2 |
| Permanent Pastures and Other Grazing Land | 3 | 2 |

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.

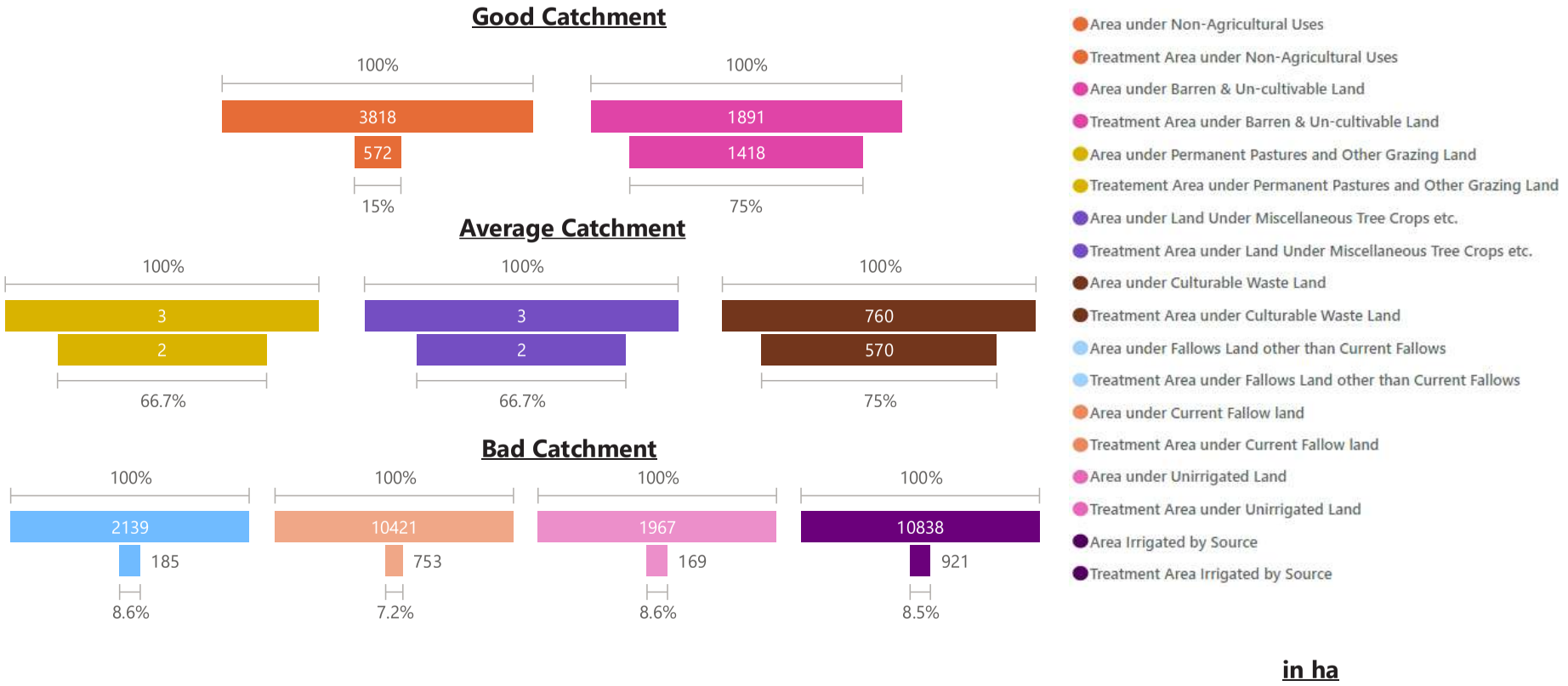



*Figure 5.1. WASCA treatment area in percentage*

## 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 1,509 ha.m which is 21 % of the total runoff. Of the expected runoff conservation, 63.6 % comes from good catchment area, 10.8 % comes under average catchment area and 25.6 % comes from bad catchment area (Figure 5.2).

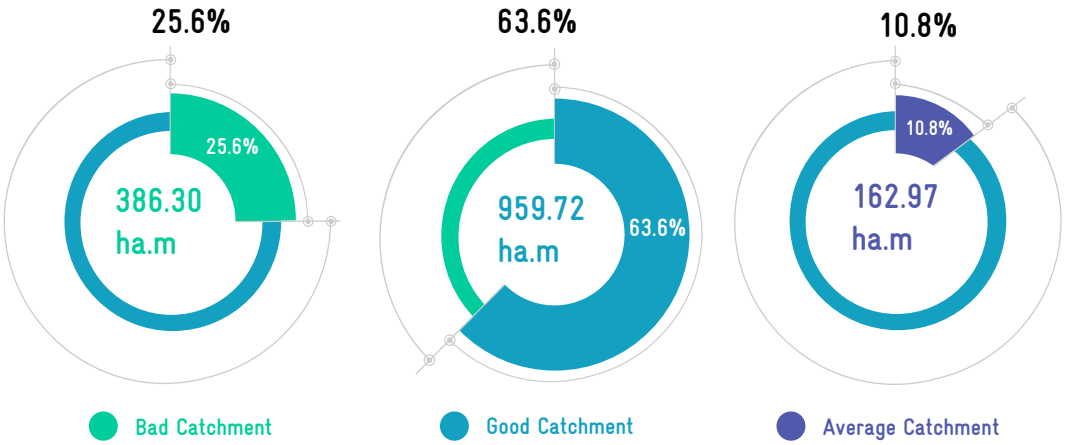



*Figure 5.2. Expected conservation after WASCA treatment*

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

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

| Work (unit) | Abbreviation (unit) | No. | Extent (area in ha or length in m ) |
|---|---|---|---|
| Azolla units - Individual (Number of units) | Az | 1,861 | |
| Cattle Shelters (Number of units) | CS | 2,371 | |
| Cattle Trough(Number of units) | CT | 2,371 | |
| Fodder development - Community & Individual | FD | 1,464 | |
| Goat Sheep Shelters (Number of units) | GSS | 657 | |
| Poultry Shed (Number of units) | PS | 0 | |
| Silvi-pasture Development(ha) | SPD | 816 | 1.03 |
| Soak Pits (Community) (Number of units) | SPC | 269 | |
| Soak Pits (Individual) (Number of units) | SPI | 668 | |
| Artificial Recharge Structure(Number of units) | ARS | 0 | 4,647.50 |
| Construction of Farm Ponds - Individual (Number of units) | FP | 1,062 | |

| | | | |
|---|---|---|---|
| Construction of new open wells & Recharge Shafts (Number of units) | COWRS | 2,545 | |
| Restotaration of water bodies:a.PWD and Tanks(Number) | RPWDT | 85 | |
| Restotaration of water bodies:b. Ooran-is(Number) | Ro | 0 | |
| Restotaration of water bodies:c. Ponds(Num-ber) | RP | 249 | |
| Roof Rain Water Harvesting (Number of units) | RRWH | 88 | |
| Water Course - Irrigation Channels - Desilt-ing (Mtrs) | WCICD | | 8,572 |
| Afforestation in Public/common lands(ha) | Aff | 517,261 | 621.12 |
| Avenue plantation(km) | AVP | 2,298.60 | 21,288 |
| Block Plantation (Community)(ha) | BP | 1,098,285 | 1,449.56 |
| Canal Bund Plantation(ha) | CBP | 6,460.20 | 29,726 |
| Contour Continous Bunds (CCB) for Affor-estaion area(Mtrs) | CCBF | 357,721 | 2,409.64 |
| Drainage Line Treatment (DLT)(Mtrs) | DLT | 17,410 | 87,047 |
| Dry land Horticulture/Agro-forestry - Indi-vidual (ha) | DLHAI | 6,46,629 | 2,734 |
| Irrigation Channel Plantation (Mtrs) | ICP | 1,714 | 8,572 |
| Linear Plantation(km) | LP | 17,833 | 74,139 |
| Micro Irrigation(ha) | MI | 35 | 88 |
| Nursery Development(Number of units) | ND | 1,19,462 | 23,892 |
| Composting (Number of units) | Co | 357 | 277 |
| Farm Bunding with Boundary Trenches - Individual (ha) | FBBTI | 211 | 524 |
| Land development - Individual (ha) | LDI | 200 | 530 |
| NADEP Vermi compost (Number of units) | NADEP | 1,867 | |


Proposed works are included the drought proofing, livelihood, land development and WCWH, measures
Land development works over 1,330 ha area
More than 27.8 Lakhs plants planting
4,000 sites for WCWH
10,000 livelihood works

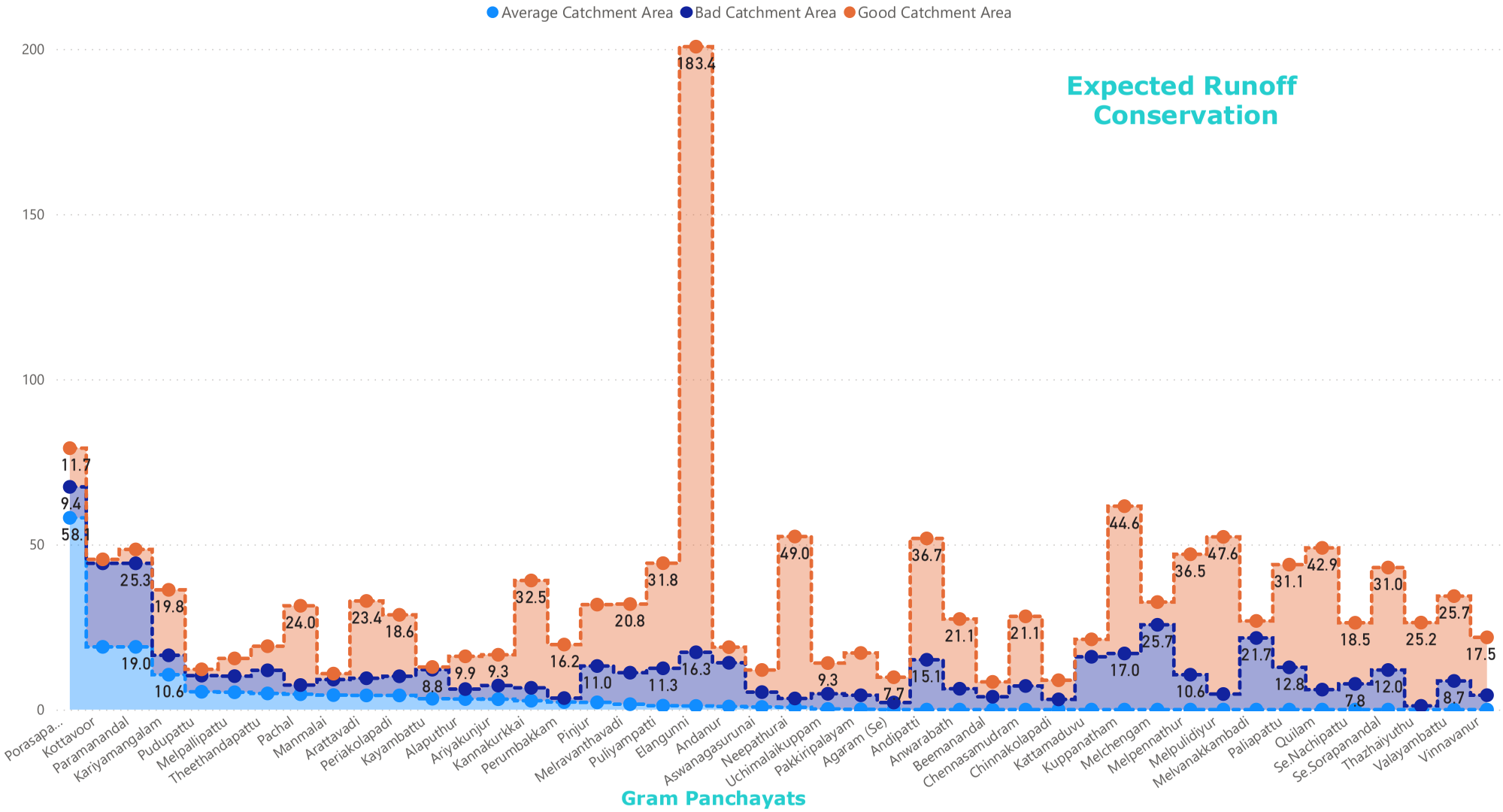



*Figure 5.3. Expected GP wise runoff conservation after WASCA treatment*

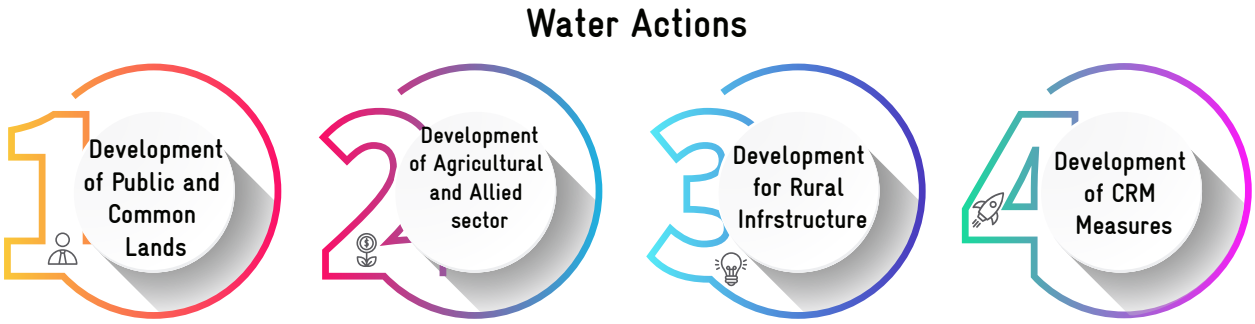
## MAHATMA GANDHI NREGS Annual circular 2020-21 (Clause 6.3)

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

| | NO. OF WORKS | PERSON DAYS PER UNIT | UNIT COST IN INR (LAKHS) | ESTIMATED COST IN INR (LAKHS) | ESTIMATED PERSON DAYS |
|---|---|---|---|---|---|
| CONTOUR CONTINOUS BUNDS (CCB) FOR AFFORESTATION AREA(m) | 7,154 | 10 | - | 178.9 | 71,544.2 |
| COMPOSTING(NUMBER OF UNITS) | 357 | 15 | 0.2 | 60.7 | 5,355 |
| AFFORESTATION IN PUBLIC/ COMMON LANDS(ha) | 621 | 3,344 | 8.6 | 5,341.6 | 20,77,025.3 |
| BLOCK PLANTATION (COMMUNITY)(ha) | 1,449 | 4320 | 11.1 | 16,083.9 | 62,59,680 |
| SILVI-PASTURE DEVELOPMENT(ha) | 28 | 6,664 | 17.1 | 478.8 | 1,86,592 |
| LINEAR PLANTATION(km) | 1 | 703 | 1.8 | 1.1 | 415.5 |
| CANAL BUND PLANTATION(ha) | 1,021 | 2,930 | 7.5 | 6,593 | 2,536,400 |
| IRRIGATION CHANNEL PLANTATION (m) | 51 | 6 | - | 0.8 | 303.6 |
| AVENUE PLANTATION(km) | 0.2 | 703 | 1.8 | 0.4 | 146.2 |
| NURSERY DEVELOPMENT (NUMBER OF UNITS) | 45 | 2,344 | 15 | 680.1 | 1,06,277 |
| RESTOTARATION OF WATER BODIES: A) PWD AND TANKS (NUMBER) | 86 | 800 | 5 | 430 | 68,800 |
| RESTORATION OF WATER BODIES: B.PONDS (NUMBER) | 249 | 200 | 1 | 498 | 49,800 |
| ARTIFICIAL RECHARGE STRUCTURE (NUMBER OF UNITS) | 2,574 | 391 | 2.5 | 6,435 | 10,06,434 |
| WATER COURSE - IRRIGATION CHANNELS - DESILTING (M) | 50 | 3 | - | 0.4 | 151.8 |
| DRAINAGE LINE TREATMENT (m) | 1,121 | 5 | - | 33.6 | 5,606.5 |

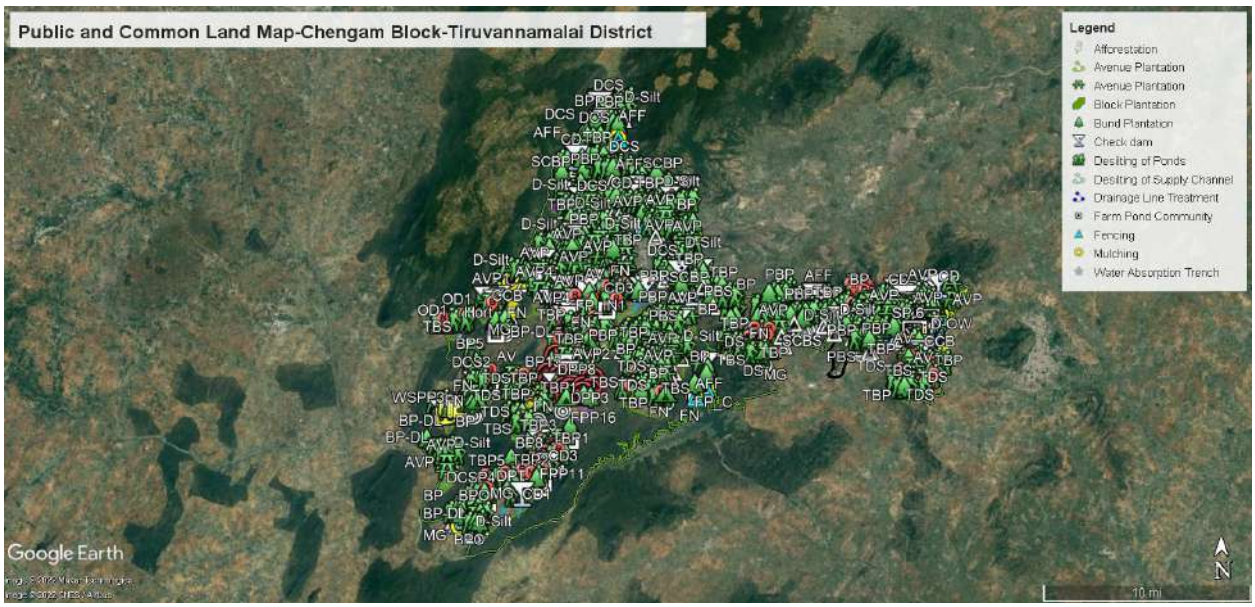



*Figure 5.4. Proposed development activities in public and common land*

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

| | NO. OF WORKS | PERSON DAYS PER UNIT | UNIT COST IN INR (LAKHS) | ESTIMATED COST IN INR (LAKHS) | ESTIMATED PERSON DAYS |
|---|---|---|---|---|---|
| FARM BUNDING WITH BOUNDARY TRENCHES - INDIVIDUAL (ha) | 524 | 586 | 2 | 786 | 3,07,064 |
| MICRO IRRIGATION (ha) | 35 | 0 | 1 | 35 | 0 |
| CONSTRUCTION OF FARM PONDS - INDIVIDUAL (NUMBER OF UNITS) | 105 | 781 | 2 | 210 | 82,005 |
| LAND DEVELOPMENT - INDIVIDUAL (ha) | 521 | 3,906 | 10 | 5,210 | 20,35,026 |
| DRY LAND HORTICULTURE/AGRO-FORESTRY - INDIVIDUAL (ha) | 254 | 3,321 | 9 | 2,159 | 8,43,534 |
| AZOLLA UNITS - INDIVIDUAL (NUMBER OF UNITS) | 1,861 | 23 | 0 | 279 | 42,803 |
| NADEP VERMI-COMPOST (NUMBER OF UNITS) | 1,867 | 27 | 0 | 336 | 50,409 |
| FODDER DEVELOPMENT - COMMUNITY & INDIVIDUAL | 1,464 | 2,344 | 1 | 2,167 | 34,31,616 |
| CATTLE SHELTERS (NUMBER OF UNITS) | 1,464 | 331 | 2 | 3,104 | 4,84,584 |
| GOAT SHEEP SHELTERS (NUMBER OF UNITS) | 1,661 | 355 | 2 | 3,770 | 5,89,655 |
| CATTLE TROUGH (NUMBER OF UNITS) | 1,931 | 6 | 0 | 97 | 13,586 |
| POULTRY SHED (NUMBER OF UNITS) | 655 | 10 | 1 | 59 | 6,550 |
| CONSTRUCTION OF NEW OPEN WELLS & RECHARGE SHAFTS (NUMBER OF UNITS) | 2,545 | 926 | 5 | 12,725 | 23,56,670 |

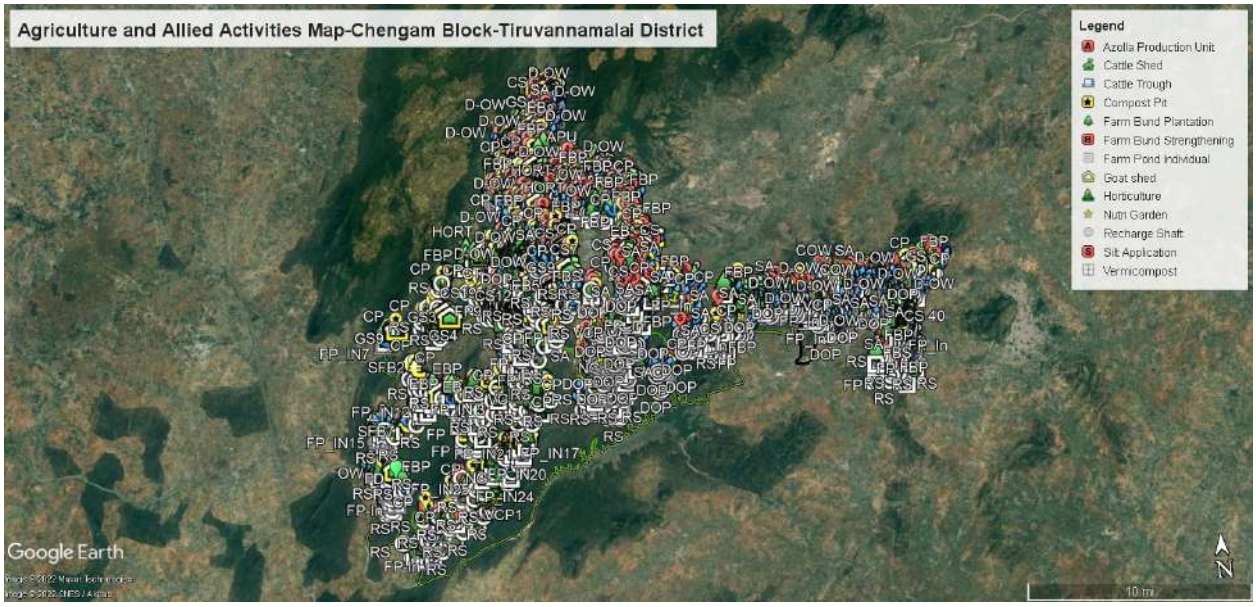



*Figure 5.5. Proposed development activities in Agriculture and allied Sectors*

## 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) | 182 | 20 | 0.13 | 23.66 | 3,640 |
| SOAK PITS (INDIVIDUAL) (NUMBER OF UNITS) | 500 | 16 | 0.1 | 50 | 8,000 |
| ROOF RAIN WATER HARVESTING (NUMBER OF UNITS) | 225 | 625 | 4 | 900 | 1,40,625 |

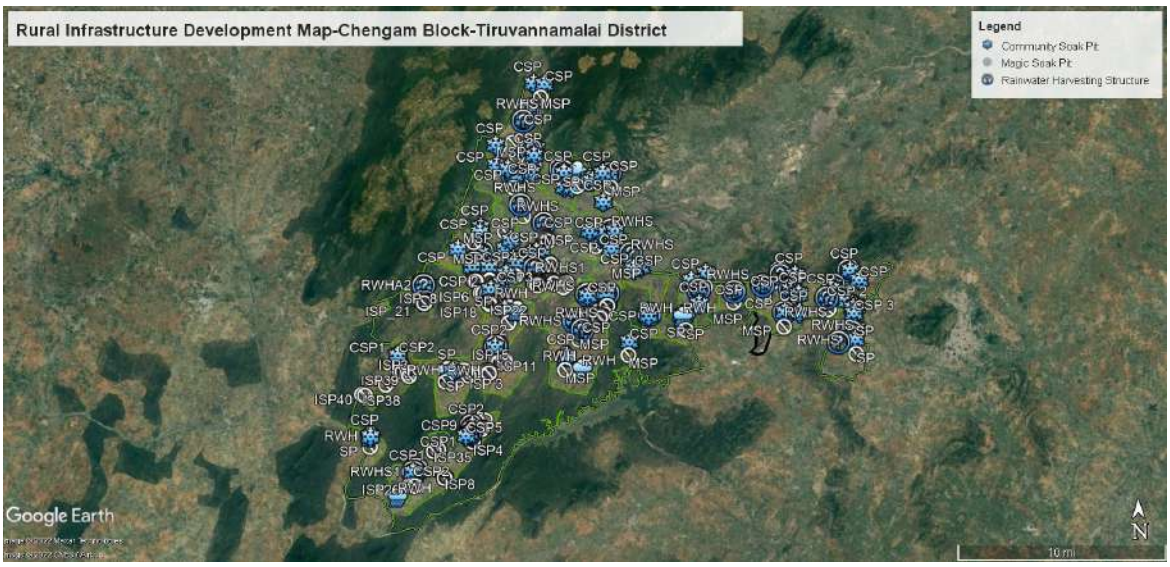



*Figure 5.6. Proposed rural infrastructure activities*

## 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 Chengam 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 Greening of Hills (Table 17) are proposed in this Block in saturation mode.


*Figure 5.7. Proposed climate resilient measures*

### TABLE 14. GP WISE PROPOSED CRM

| GP | Agriculture and allied activities | Public and common land |
|---|---|---|
| Anandavadi RF | | Greening of Hillocks |
| Andipatti | Farm pond | |
| Anthanoor | Farm pond | |

| | | |
|---|---|---|
| Anwarabath | Farm pond | |
| Arattavadi | Farm pond | |
| Beemanandal | Farm pond | |
| Che.Nachipattu | Farm pond | |
| Chennasamuthiram | Farm pond | |
| Elangunni | Farm pond | Silvi-pasture Development |
| Kariyamangalam | Farm pond | |
| Kattamaduvu | Farm pond | |
| Kayambattu | Farm pond | |
| Kuyilam | Farm pond | |
| Manmalai | Farm pond | |
| Melchengam | Farm pond | |
| Melpennathur | Farm pond | |
| Melpuluthyur | Farm pond | |
| Melravandavadi | Farm pond | |
| Melvanakkambadi | Farm pond | |
| Pakkiripalayam | Farm pond | |
| Pakkripalayamn | Farm pond | |
| Paliyapattu | Farm pond | |
| Paramanandal | Farm pond | |
| Perumpakkam | Farm pond | |
| Pinjur | Farm pond | |
| Porasapattu | Farm pond | |
| Pudupattu | Farm pond | |
| Puliyampatti | Farm pond | |
| Quilam | Farm pond | |
| Thalaiyouthu | Farm pond | |
| Thalayuthu | Farm pond | Greening of Hillocks |
| Theethandapattu | Farm pond | |
| Valayambattu | Farm pond | |

TABLE 15. DETAILS OF PROPOSED FARM PONDS ACTIVITIES UNDER CRM

| GP | Habitation | No. of Farm pond |
|---|---|---|
| **Andipatti** | Andipatti | 10 |
| **Anthanoor** | Anthanoor | 3 |
| **Anwarabath** | Anwarabath | 1 |
| **Arattavadi** | Arattavadi | 7 |
| **Beemanandal** | Beemanandal | 1 |
| **Che.Nachipattu** | Che.Nachipattu | 11 |
| **Chennasamuthiram** | Chennasamuthiram | 1 |
| **Elangunni** | Elangunni | 2 |
| **Kariyamangalam** | Kariyamangalam | 4 |
| **Kattamaduvu** | Kattamaduvu | 14 |
| **Kayambattu** | Kayambattu | 1 |
| **Kuyilam** | Kuyilam | 1 |
| **Manmalai** | Manmalai | 3 |

| | | |
|---|---|---|
| **Melchengam** | Melchengam | 4 |
| **Melpennathur** | Melpennathur | 4 |
| **Melpuluthyur** | Melpuluthyur | 2 |
| **Melravandavadi** | Melravandavadi | 1 |
| **Melvanakkambadi** | Melvanakkambadi | 4 |
| **Pakkiripalayam** | Pakkiripalayam | 6 |
| **Pakkripalayamn** | Pakkripalayamn | 5 |
| **Paliyapattu** | Paliyapattu | 2 |
| **Paramanandal** | Paramanandal | 2 |
| **Perumpakkam** | Perumpakkam | 3 |
| **Pinjur** | Pinjur | 7 |
| **Porasapattu** | Porasapattu | 3 |
| **Pudupattu** | Pudupattu | 2 |
| **Puliyampatti** | Puliyampatti | 5 |
| **Quilam** | Quilam | 4 |
| **Thalaiyouthu** | Thalaiyouthu | 4 |
| **Thalayuthu** | Thalayuthu | 1 |
| **Theethandapattu** | Theethandapattu | 4 |
| **Valayambattu** | Valayambattu | 1 |

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

| Sl.No | GP | Survey Number | Area for Plantation In ha | Total Number of Plants |
|---|---|---|---|---|
| 1 | **Elangunni** | **46/10** | 0.45 | 986 |
| **Total** | | | **0.45** | **986** |

TABLE 17. DETAILS OF PROPOSED GREENING OF HILLOCKS ACTIVITY UNDER CRM

| GP | Category | Recommended Area in ha | Survey number | Area in ha | Classification of land |
|---|---|---|---|---|---|
| Thalayuthu | Very High | 8 | 49 | 54.32 | Karadu-Paarai |
| Anandavadi RF | High | 95 | - | | RF |
| **Total** | | **103** | | | |

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 | 4,592 ha (14.4 %) of the total area treated under WASCA |
| 2 | Percentage reduction of run off | 1,509 ha.m i.e 21.2 % of the total runoff harvested due to WASCA interventions |
| 3 | No. of waterbodies restored | 335 waterbodies (tanks/pond and ooranis) restored |
| 4 | Area under afforestation | 621.12 ha area under afforestation |
| 5 | Area under silvi-pasture development | 28 ha under Silvi-pasture plantation |
| 6 | Length of drainage line treated | 870 m length of drainage line treated |
| 7 | Canal Bund Plantation | 6,460 number of plants through 1,021 works |
| 8 | Nursery development | 45 units |

**4,592 ha** AREA TREATED

**1,509 ha.m** TOTAL RUNOFF HARVESTED

**335** WATER BODIES RESTORED

**621.12 ha** AREA AFFORESTATION

**28 ha** SILVI-PASTURE PLANTATION

**870 m** DRAINAGE LINE TREATED

**6,460** PLANTS

**45 UNITS** NURSERY DEVELOPMENT

# 6.2 OUTCOMES OF DEVELOPMENT OF AGRICULTURE AND ALLIED SECTOR

## OUTCOMES OF DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

| | INDICATOR | OUTCOMES/ IMPACT |
|---|---|---|
| 1 | Assessment of sources of water for live-stock and agriculture demand<br>No of structures established for on-farm (in-situ) water harvesting in dry lands | 105 farm ponds established which target the harvest of 1,84,800 cu.m of water which has the potential to irrigate 36.75 ha area in both kharif and rabi seasons |
| 2 | Improvement in soil health | 1,867 NADEP vermi compost units for soil health improvement |
| 3 | Dry land development with agro-forestry | 254 ha |
| 4 | Households established fodder plots | 2,901 vulnerable households established fodder plots |

**105** FARM PONDS

**1,867** COMPOST UNITS

**2,901** FODDER PLOTS

**254 ha** DRY LAND DEVELOPMENT WITH AGRO-FORESTRY

# 6.3 OUTCOMES OF RURAL INFRASTRUCTURE DEVELOPMENT

## OUTCOMES OF RURAL INFRASTRUCTURE DEVELOPMENT

| | INDICATOR | OUTCOMES/ IMPACT |
|---|---|---|
| 1 | No. of villages having liquid waste management systems | 500 individual and 182 community level soak pits established for recycle of grey water benefiting 35,882 HHs |
| 2 | Roof rain water harvesting measures | 225 common roof rainwater harvesting and storage structures with a target to harvest and store 0.28 ha.m of rainwater for use |
| 3 | Nutri-garden | 35,882 HHs established nutri-gardens in homesteads and planted 1,79,410 saplings |

**182** COMMON & **500** INDIVIDUAL SOAK PITS

**225** COMMON ROOF RAINWATER HARVESTING

**35,882** NUTRI-GARDENS

**1,79,410** 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 Greening of Hillocks<br>123 farm ponds in 32 GPs<br>0.45 ha under silvi-pasture with 986 plants<br>Greening of hillocks in 54.32 ha area |

**123**
FARM PONDS

**0.45 ha**
SILVI PASTURE

**986**
PLANTS

**54.32 ha**
GREENING OF HILLOCKS

## Estimated person days

The total estimated person days required for the above propose activities are 2,27,70,298 as specified below Figure 6.1.

## Estimated Cost

The total estimated cost budgeted for the above propose activities is Rs. 68,726 Lakhs as specified below Figure 6.2.

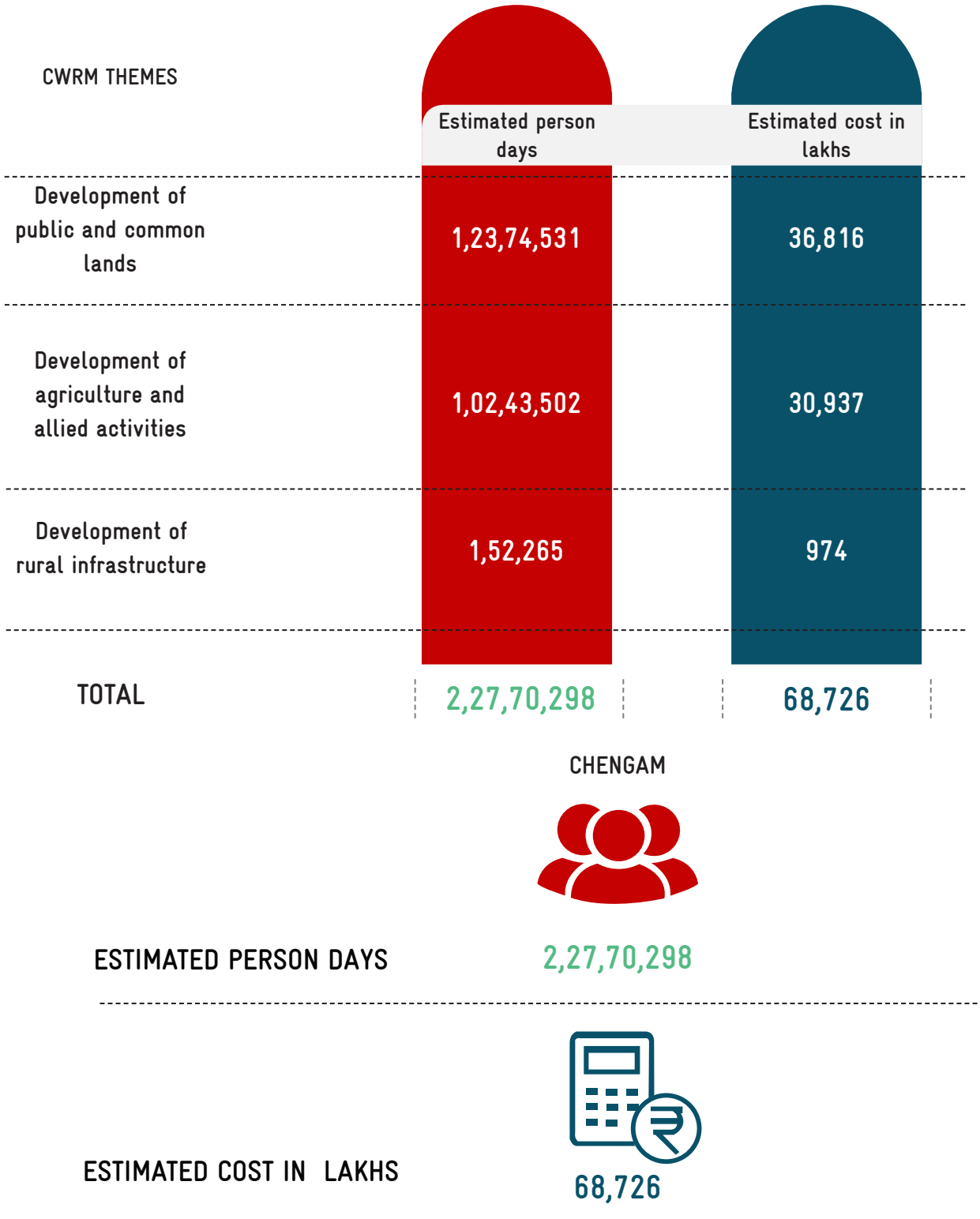



*Figure 6.1 & 6.2. Estimated person days & cost for all water actions*

# 6.5 LINKAGES TO SDGS, NDCS

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

## 6.5.1 NATIONALLY DETERMINED CONTRIBUTION GOALS AND WASCA TN PROGRESS THROUGH NDC

2015 was a historic year in which 196 Parties came together under the Paris Agreement to transform their development trajectories so that they set the world on a course towards sustainable development, aiming at limiting warming to 1.5 to 2 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.

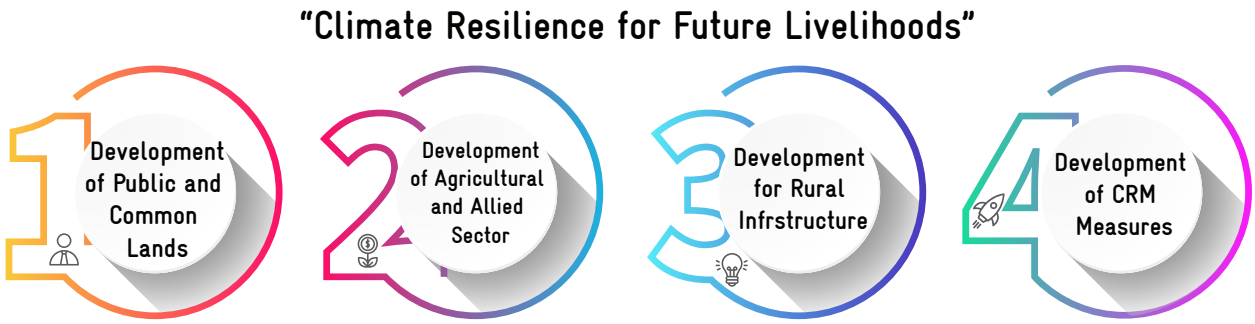
Internationally, the recent process on NDC Enhancement (2020) significantly acknowledge the climate change vulnerability on national sectors including agriculture, energy, and urban areas, especially through impacts on water resources. The role that water and water-related activities play in national 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 | Climate Vulnerability Index Impacting (WASCA TN) | Linked SDG Goal |
|---|---|---|---|
| Contour Continuous Bunds for Afforestation area (m) | 7,154 | W3 | SDG 1,2, 6,13&15 |
| Composting (No. of units) | 357 | W1 | SDG1& 6 |
| Afforestation in Public/common lands (ha) | 621 | C1,C2,C3, W3, | SDG 1, 2,6,13&15 |
| Block Plantation (Community) (ha) | 1,449 | C1,C2,C3,W3,S2 | SDG 1,2, 6 &13, 15 |
| Silvi-pasture Development (ha) | 28 | C1,C2,C3,W3 | SGG 12 &15 |
| Linear Plantation (km) | 1 | C1,C2,C3,W3,S2 | SDG 1,2,6,12&13, 15 |
| Canal Bund Plantation (ha) | 1,021 | C1,C2,C3,W3,S2 | SDG 1, 6&13, 15 |
| Irrigation Channel Plantation (m) | 50 | W4,W5,S2 | SDG 1,2& 6, 15 |
| Avenue plantation (m) | 0.2 | C1,C2,C3,W3,S2 | SDG 1, 6&13 |

| | | | |
|---|---|---|---|
| Nursery Development (No. of units) | 45 | C1,S2,S4 | SDG 1,2 &6 |
| Restoration of waterbodies :PWD and Tanks (No.) | 86 | S2, S1 | SDG 6, 1, 13 |
| Restoration of water bodies : Ooranis (No.) | 0 | S2, S1 | SDG 6, 1, 13 |
| Restoration of waterbodies :Ponds (No.) | 249 | S2, S1 | SDG 6,1, 13 |
| Artificial Recharge Structure (No. of units) | 2,574 | W3 | SDG 1, 2, & 6 |
| Water Course - Irrigation Channels - Desilting (m) | 50 | C1,C2,C3,W3,S2 | SDG 1, 6&13 |
| Drainage Line Treatment (m) | 1,121 | W1,W3,W4 | SDG1 & 6 |

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

| Name of the Work | No. of CWRM works | CVI | SDG |
|---|---|---|---|
| Farm Bunding with Boundary Trenches - Individual (ha) | 524 | A1,A3,W1,W3 | SDG 1,2&6 |
| Micro Irrigation(ha) | 35 | A1,A3,A5,W5 | SDG 1, 2&6 |
| Construction of Farm Ponds - Individual (No. of units) | 105 | A1,A3,W5,W1, W3 | SDG 2& 6 |
| Land development - Individual (ha) | 521 | W1,W5,A1,A3,S2,S4 | SDG 2, 6&15 |
| Dry land Horticulture/Agro-forestry - Individual (ha) | 254 | A1,A3,A4,W1,S4,S2,C1 | SDG 1& 2,15 |
| Azolla units - Individual (No. of units) | 1,861 | A3,A4,S4 | SDG 1& 2 |
| NADEP Vermi compost (No. of units) | 1,867 | A3, W1, S4 | SDG 1& 2,6 |
| Fodder development - Community & Individual | 1,464 | A3, S4 | SDG 1& 2, 15 |
| Cattle shelters (No. of units) | 1,464 | S4 | SDG 1& 2 |
| Goat/sheep shelters (No. of units) | 1,661 | S4 | SDG 1& 2 |
| Cattle trough(No. of units) | 1,931 | W5,S4 | SDG 1& 2 |
| Poultry Shed (No. of units) | 655 | S2,S4 | SDG 1& 2 |
| Construction of new open wells & Recharge Shafts (No. of units) | 2,545 | 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) | 182 | W3,S2 | SDG 1& 6 |
| Soak Pits (Individual) (No. of units) | 500 | W3,S2 | SDG 1& 6 |
| Roof Rain Water Harvesting (No. of units) | 225 | 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

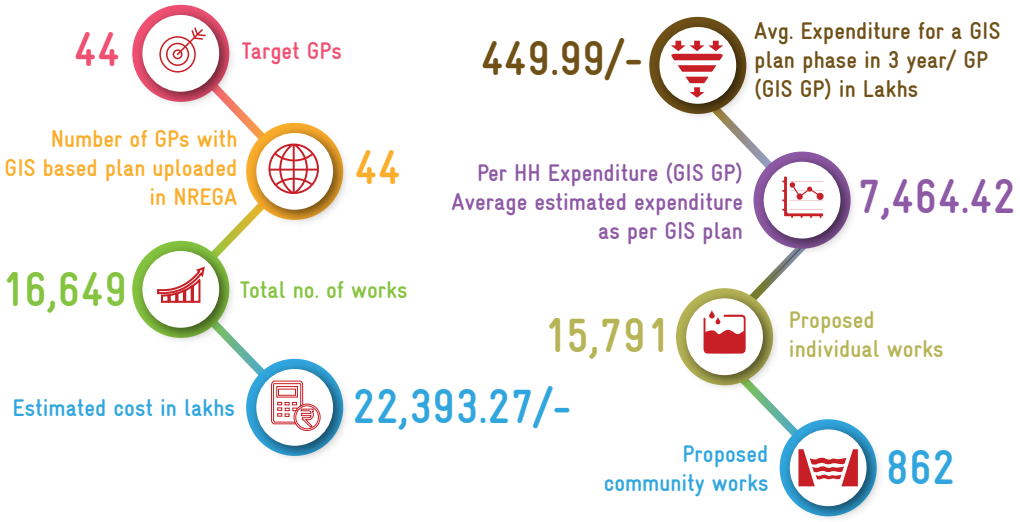
# 7 IMPLEMENTATION OF GP PLANS

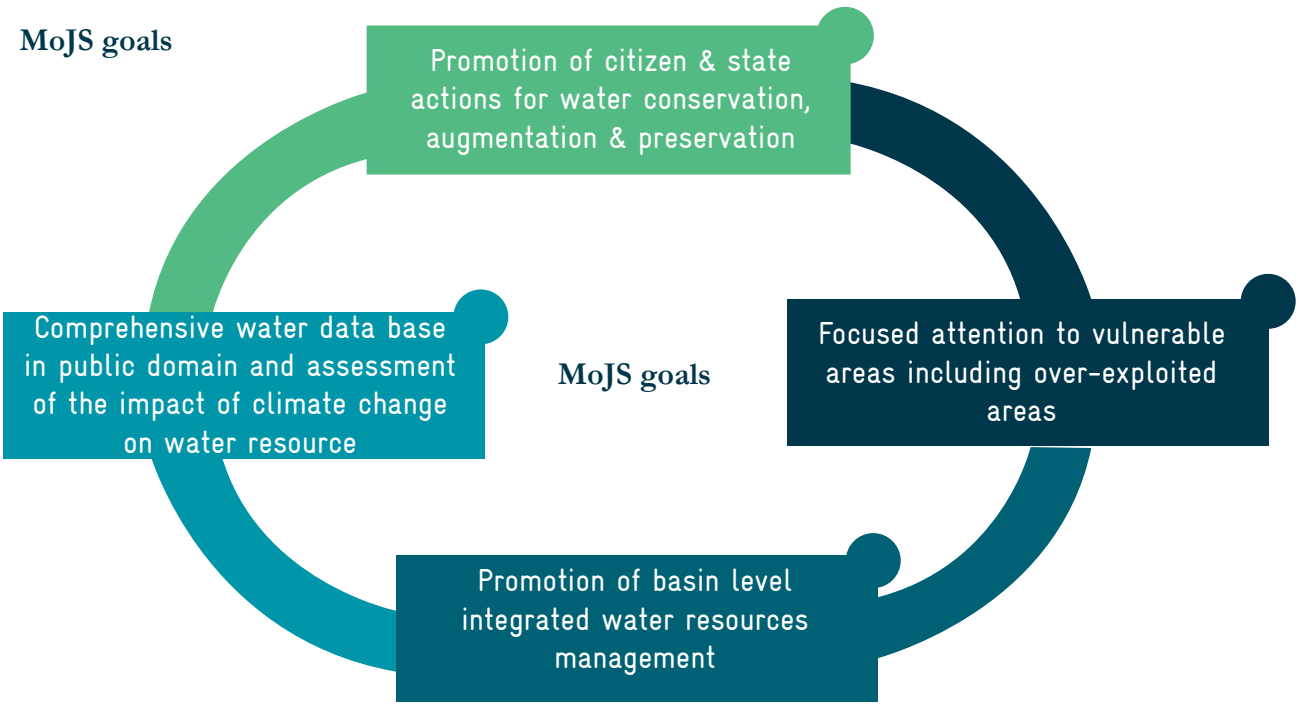
Execution of GP plans includes integrating all verified, approved works in MORD's web enabled ap-plication NREGA Soft (https://nrega.nic.in) for mainstreaming WASCA. The target GPs are iden-tified first, the status of GIS based plans and to-tal works along with its expenditure and category wise esti-mation 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 inte-grating GP level GIS based plans, both NRM and Non NRM activities into Mahatma Gandhi NREGS portal. The performance and implementation of GP plans of Chengam Block is listed in Table 22 and the details of work progress, expenditure dur-ing 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 CHENGAM BLOCK



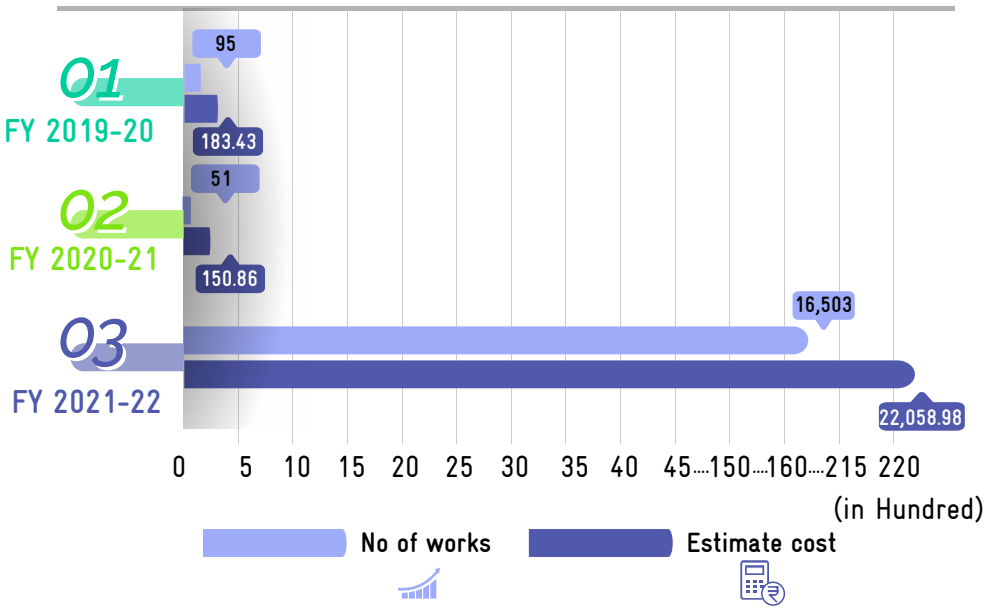



*Figure 7.1. Work progress in last three years*

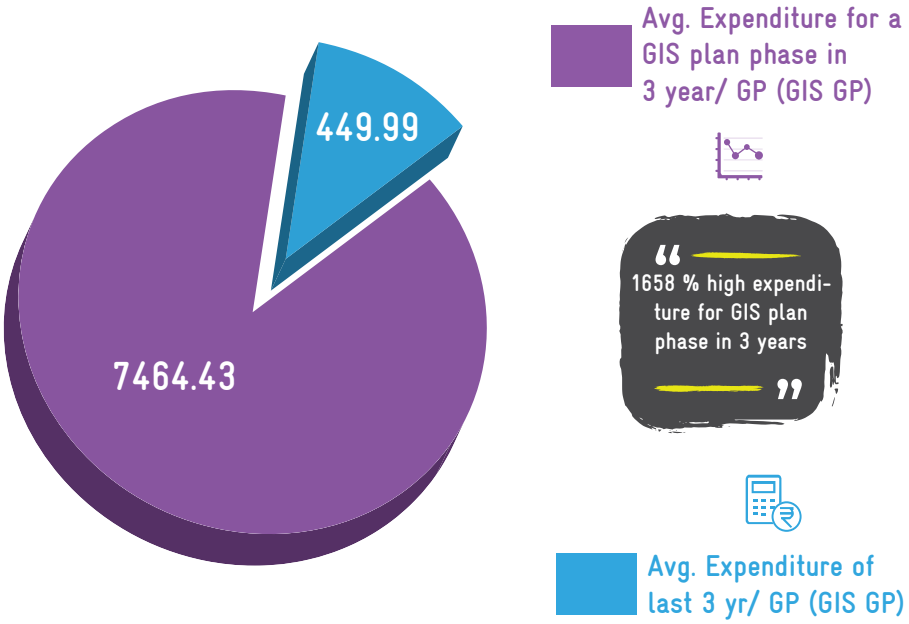
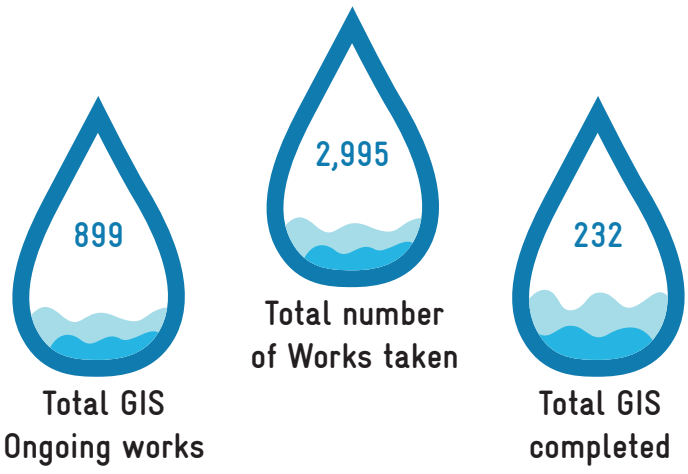



*Figure 7.2. Average Expenditure for GIS plan in last 3 years*



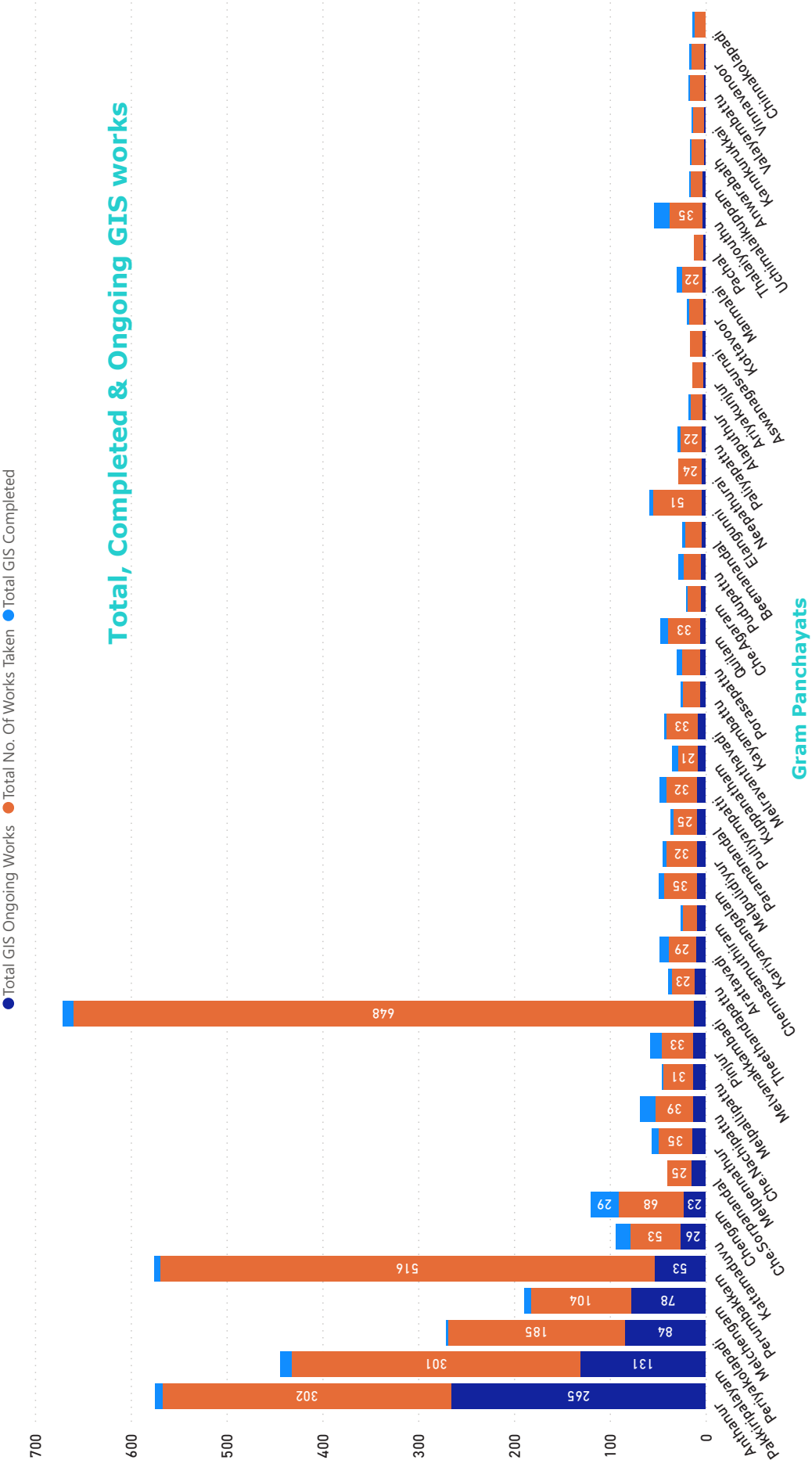
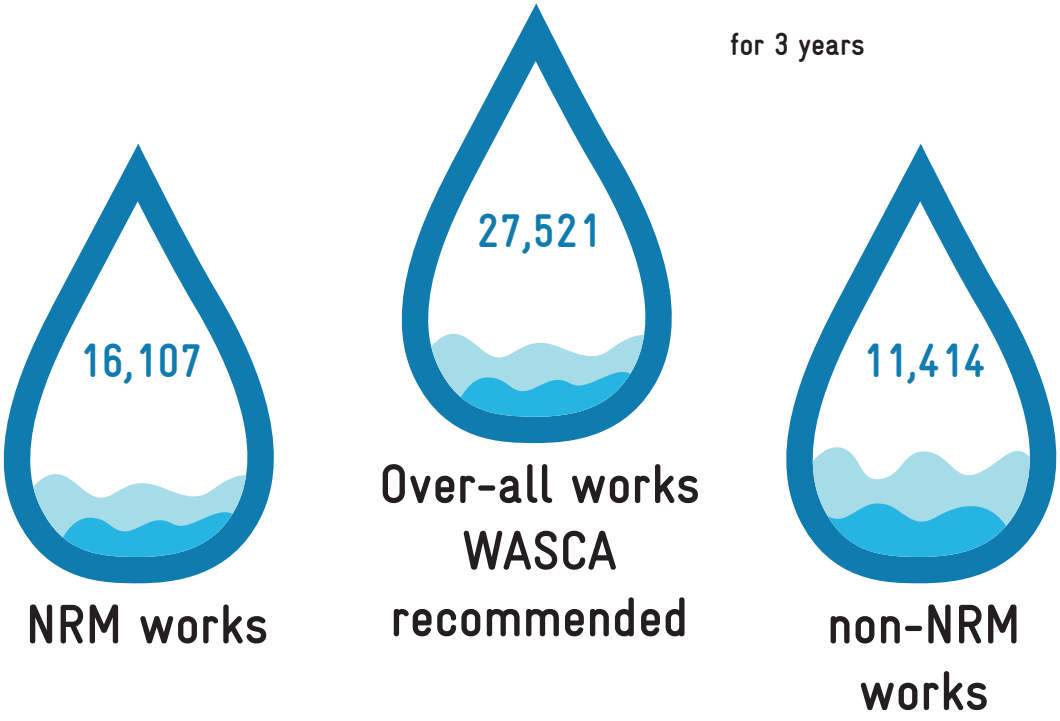



*Figure 7.3. GP wise total, completed and ongoing GIS works*

## 7.2 WASCA RECOMMENDED NRM AND NON-NRM WORKS

WASCA recommended 27,521 works for a period of 3 years, out of which 16,107 are NRM works and 11,414 are non NRM works (Figure 7.4). A total of 15,241 works has been uploaded so far for the financial year 2021-22 as on 04/02/2022.



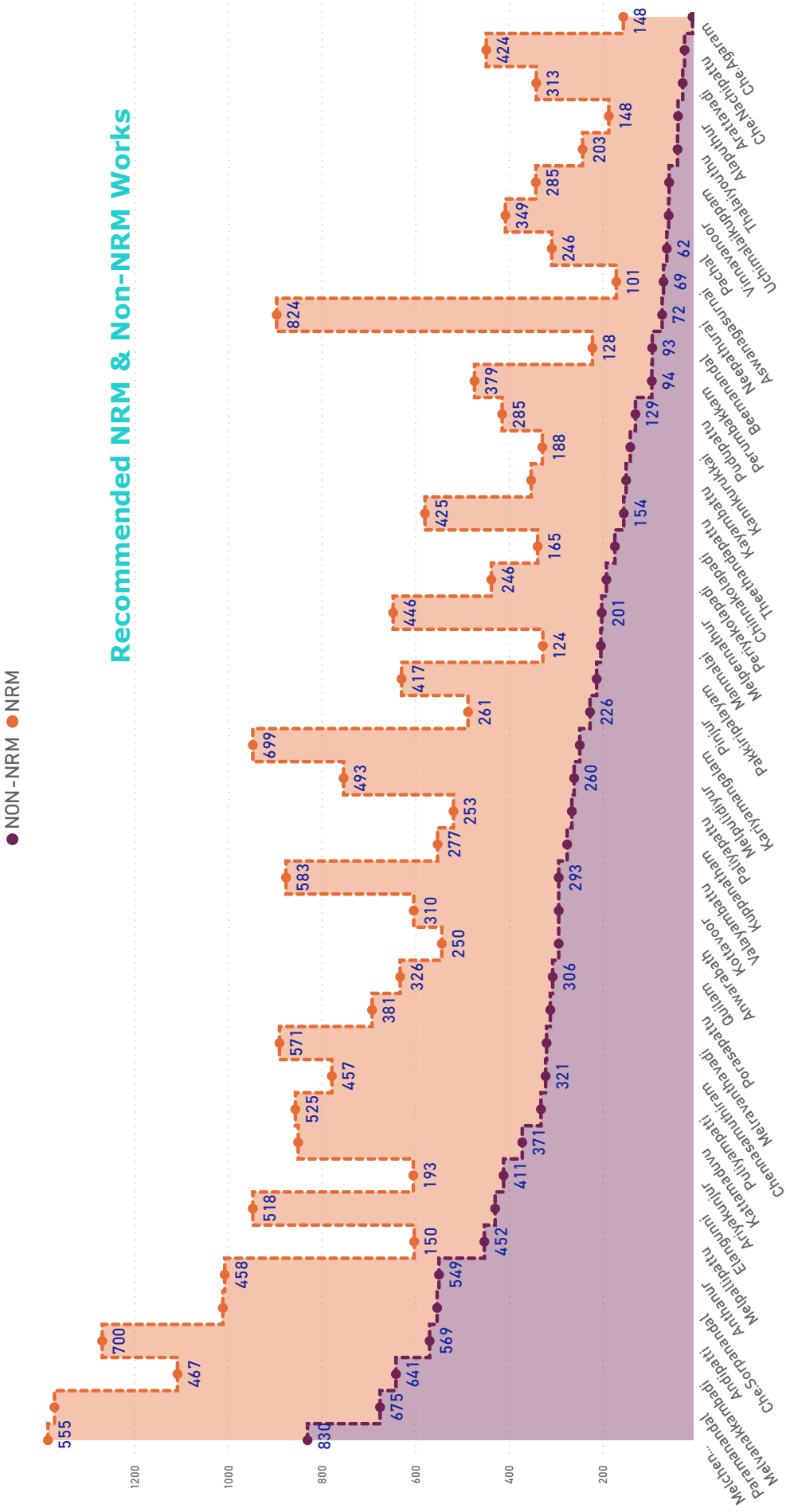




*Figure 7.4. GP wise recommended NRM and non-NRM works*

## 7.3 ONGOING WORKS

The ongoing works in Chengam Block includes Anganwadi/Other Rural Infrastructure, Drought Proofing, Rural Connectivity, Rural Sanitation, WCWH, Works on Individuals Land (Category IV). A total of 20 works are ongoing works in the Block (Figure 7.5) in which infrastructure activates share higher in number while WCWH area less as one. detailed GP and work category wise ongoing works are tabulated in Annexure 7.2.

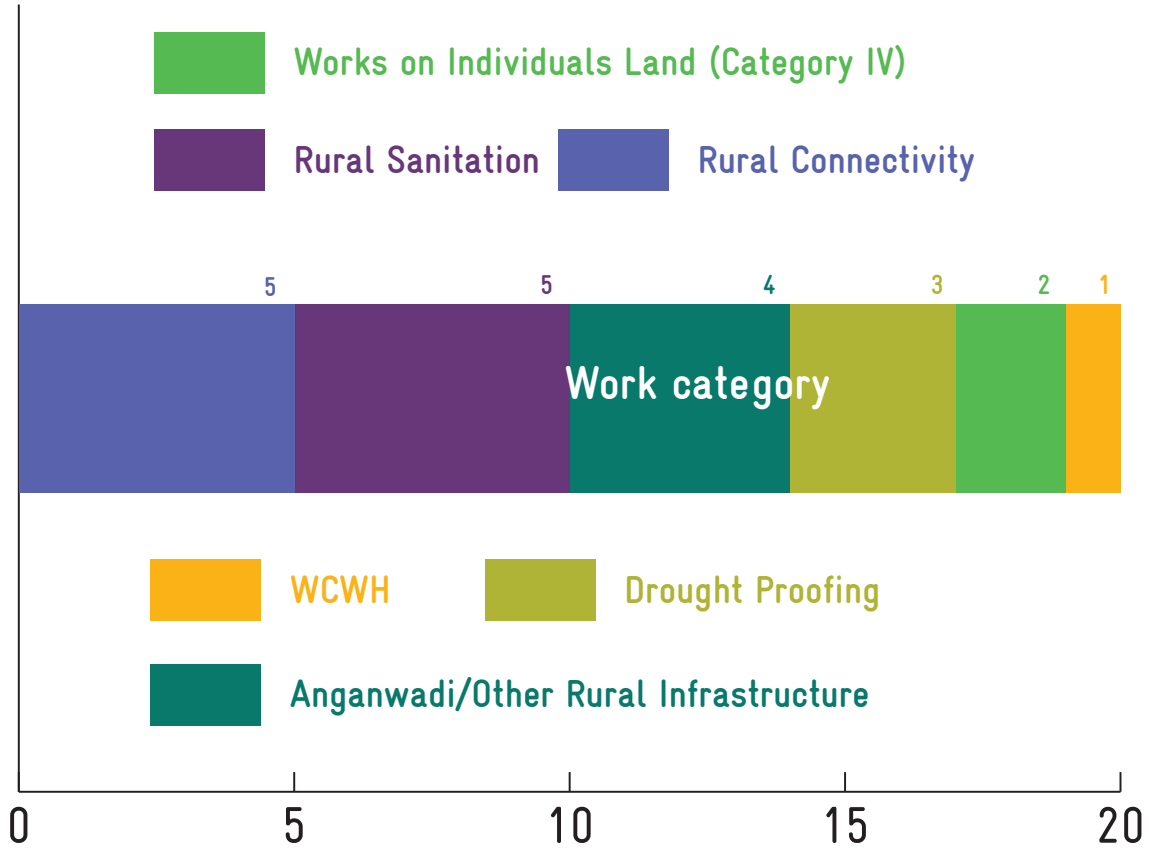



*Figure 7.5. Work category-wise ongoing works in Chengam Block*

## 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 Chengam Block is shown in Figure 7.6. The expenditure is high for watershed development followed by rain water conservation.

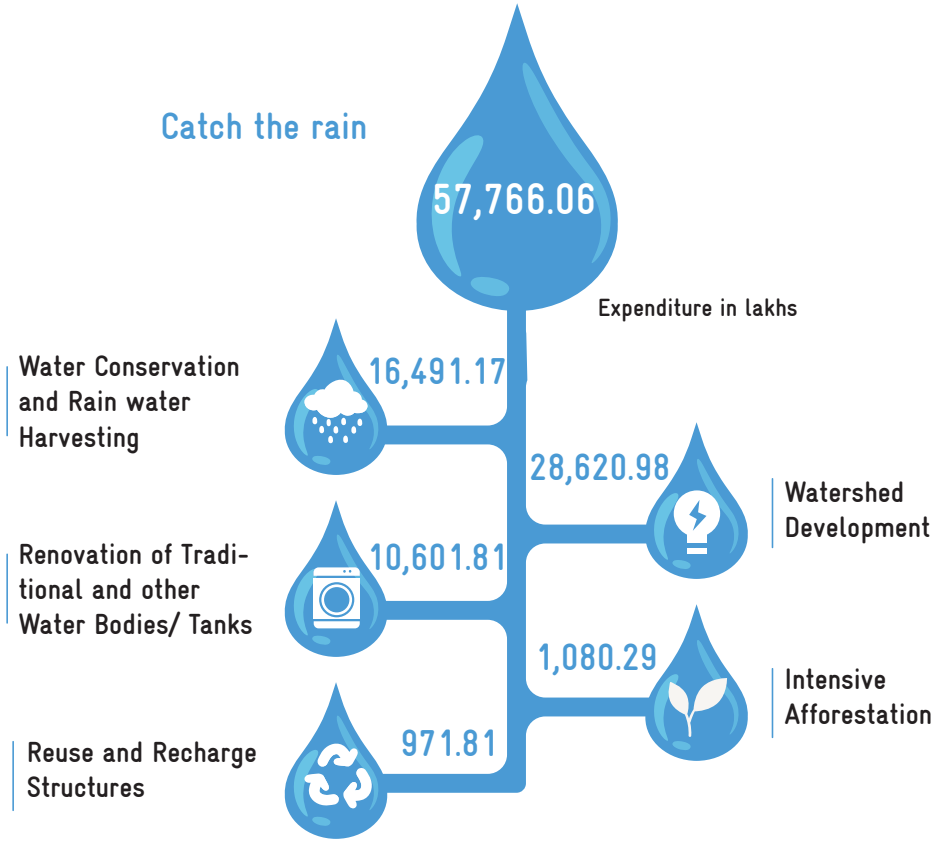
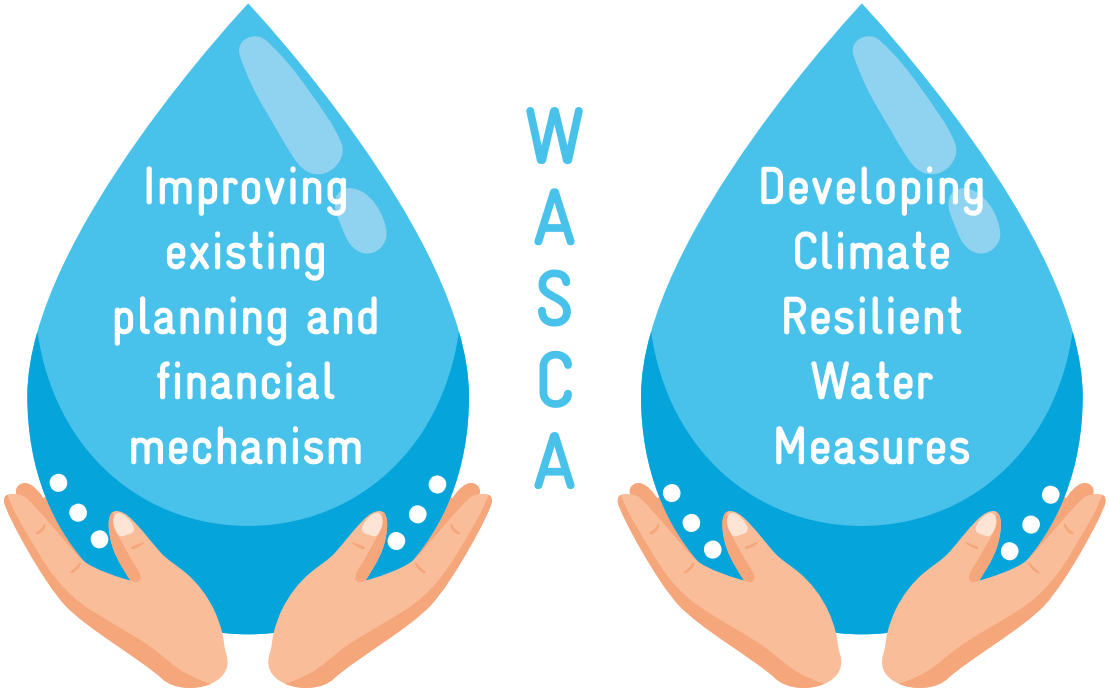



*Figure 7.6. Catch the rain campaign in Chengam Block*



தானம் தவம்இரண்டும் தங்கா வியன்உலகம்
வானம் வழங்கா தெனின்

குறள் - 19

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

Thirukkural - 19

# CHAPTER 8

# 8 CASE STUDIES

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

## 8.1 MACRO-WATERSHED IN CHENGAM BLOCK

Chengam Block comes under four macro-watershed, namely Cheyyar River, Kallar, Pamban and Thurinjalar macro-watersheds (Figure 8.1). Cheyyar River (4C2A4) covering 53 micro-watersheds with an area of 26,753.25 ha, whereas area shares under 19 GPs. Similarly, Kallar (4C1C1) has 49 micro-watersheds covering an area of 24,671.31 ha area shares under 11 GPs. Pamban watershed (4C1B5) has 22 micro-watersheds covering an area of 12,223.27 ha with six GPs and Thurinjalar watershed (4C1B3) has 11 micro-watersheds covering an area of 6,065.70 ha with two GPs (Table 23, 24 and Figure 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.

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

| Macro-watershed | Area in ha | No. of micro-watersheds |
|---|---|---|
| Cheyyar River | 26,753.25 | 53 |
| Kallar | 24,671.31 | 49 |
| Pamban | 12,223.27 | 22 |
| Thurinjalar | 6,065.70 | 11 |

TABLE 24. NUMBER OF GPs COVERED UNDER MACRO-WATERSHEDS IN CHENGAM BLOCK

| Macro-watershed | No. of GPs |
|---|---|
| Cheyyar River | 19 |
| Kallar | 11 |
| Pamban | 8 |
| Thurinjalar | 6 |

Understanding the Block area with respect to its nature of terrain aids in treating the area with appropriate measures at the right place and also ensures that the watershed is well managed (micro or macro). Ridge-based Block area is mapped (zoning) by referring to the spatial thematic datasets and showcased with macro-watershed (Table 25 & Figure 8.3) and GPs boundaries (Table 26 & Figure 8.4). Based on the ridge range types such as high, middle and lower and inter variations Block area is distinguished into 4 kinds of ridge zones.

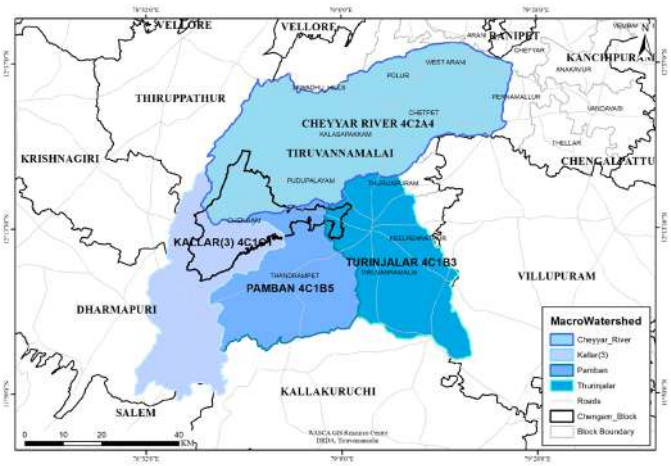



*Figure 8.1. Macro-watershed Map- Chengam Block*

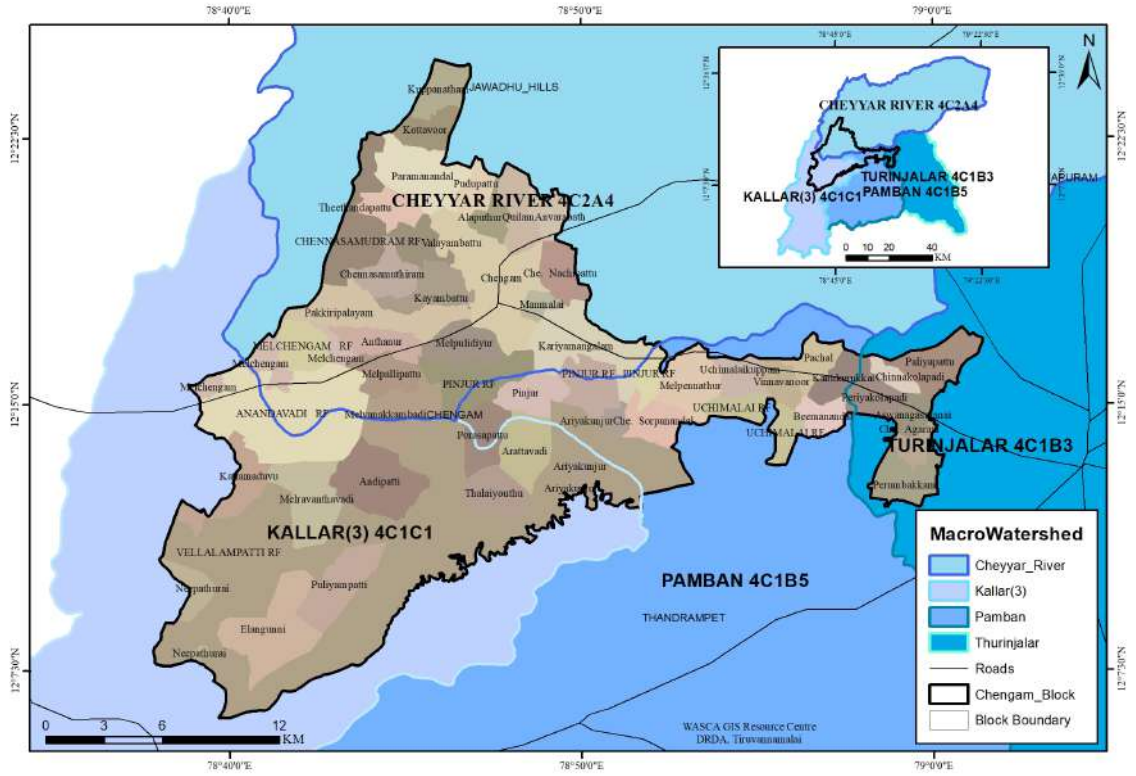



*Figure 8.2. Macro-watershed with Gram Panchayat Map- Chengam Block*

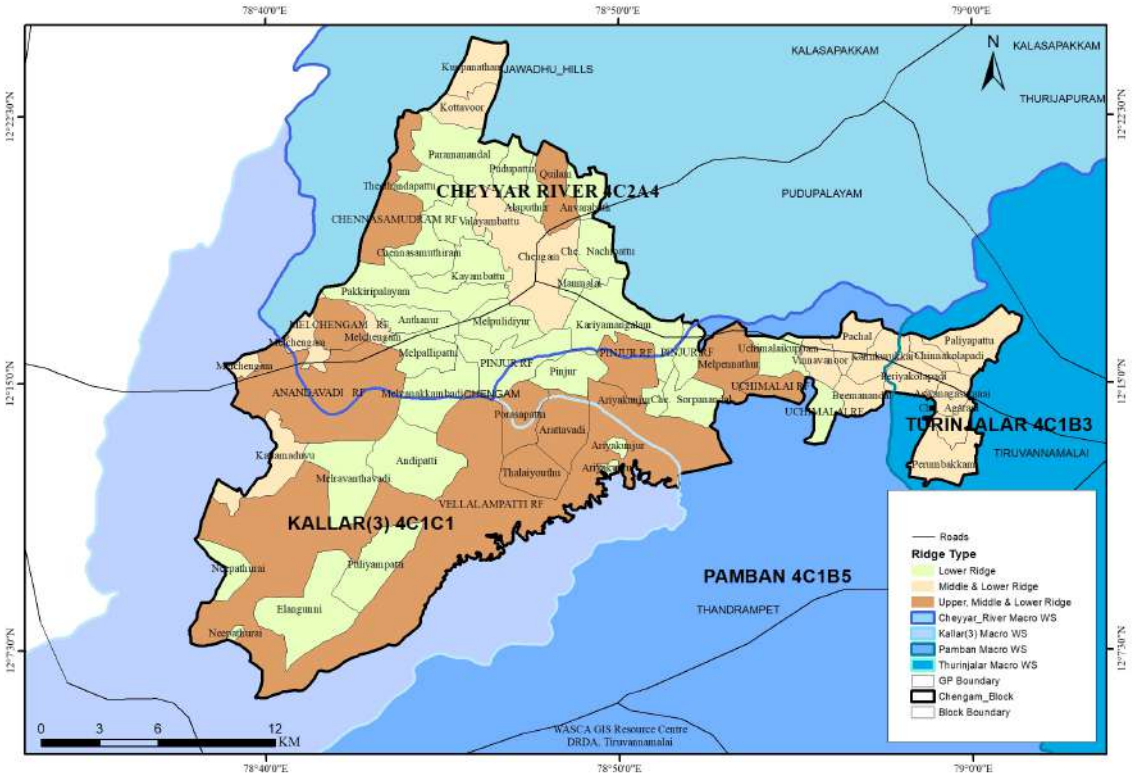



*Figure 8.3. Macro-watershed ridge map-Chengam Block*

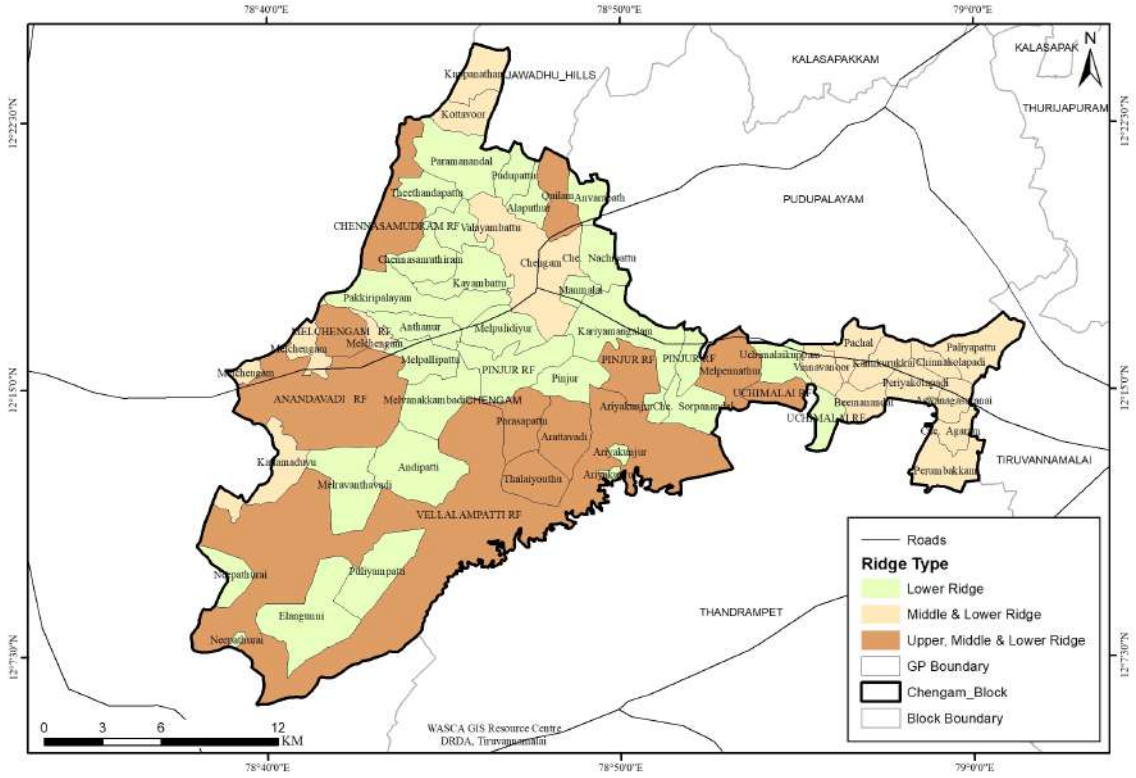



*Figure 8.4. GP level ridge map*

All the proposed works are identified using basin, sub-basin, and micro-watershed with GP administrative boundaries through Composite Water Resources Management plan approach. The ridge details, GPs proposed works in all macro watersheds in Chengam Block are listed in Table 25 to Table 40.

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

| Sl.No | Micro-watershed Code | Micro-watershed Area in ha | Ridge Type |
|---|---|---|---|
| 1 | 4C2A4h04b | 838.36 | Upper, Middle & Lower |
| 2 | 4C2A4g06b | 330.43 | |
| 3 | 4C2A4h02c | 356.22 | |
| 4 | 4C2A4h04a | 307.33 | |
| 5 | 4C2A4h03b | 403.93 | |
| 6 | 4C2A4h03c | 426.97 | |
| 7 | 4C2A4f12a | 707.77 | |
| 8 | 4C2A4h02b | 323.43 | |
| 9 | 4C2A4h11c | 680.98 | |
| 10 | 4C2A4h14c | 446.03 | |
| 11 | 4C2A4h14b | 997.59 | |
| 12 | 4C2A4h14a | 310.25 | |
| 13 | 4C2A4h13c | 276.77 | |
| 14 | 4C2A4h13b | 761.96 | |
| 15 | 4C2A4h12c | 1060.93 | |
| 16 | 4C2A4h13d | 433.42 | |

| | | | |
|---|---|---|---|
| 17 | 4C2A4i10b | 840.45 | Middle & Lower |
| 18 | 4C2A4i10a | 566.15 | |
| 19 | 4C2A4h08a | 479.36 | |
| 20 | 4C2A4h02a | 328.76 | |
| 21 | 4C2A4h07c | 666.03 | |
| 22 | 4C2A4h07a | 506.26 | |
| 23 | 4C2A4h07b | 483 | |
| 24 | 4C2A4h01b | 607.44 | |
| 25 | 4C2A4h01c | 671.54 | |
| 26 | 4C2A4h05b | 595.63 | |
| 27 | 4C2A4h05a | 495.52 | |
| 28 | 4C2A4h05c | 610.52 | |
| 29 | 4C2A4i01c | 373.87 | Lower |
| 30 | 4C2A4i01b | 700.99 | |
| 31 | 4C2A4i01a | 383.42 | |
| 32 | 4C2A4g06c | 395.81 | |
| 33 | 4C2A4g06a | 531.35 | |
| 34 | 4C2A4h03a | 402.18 | |
| 35 | 4C2A4g05b | 796.57 | |
| 36 | 4C2A4h06c | 308.07 | |
| 37 | 4C2A4h06a | 514.73 | |
| 38 | 4C2A4h10c | 405.78 | |
| 39 | 4C2A4h01a | 227.66 | |
| 40 | 4C2A4h06b | 300.43 | |
| 41 | 4C2A4g05a | 270.52 | |
| 42 | 4C2A4h11a | 518.83 | |
| 43 | 4C2A4g04c | 506.17 | |
| 44 | 4C2A4h10b | 750.82 | |
| 45 | 4C2A4h11b | 590.95 | |
| 46 | 4C2A4g10c | 450.33 | |
| 47 | 4C2A4g11b | 428.75 | |
| 48 | 4C2A4g11c | 354.68 | |
| 49 | 4C2A4h09a | 277.55 | |
| 50 | 4C2A4h09b | 820.45 | |
| 51 | 4C2A4g11a | 314.24 | |
| 52 | 4C2A4h12a | 337.86 | |
| 53 | 4C2A4h12b | 278.24 | |

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

| Sl.No | Name of the GP | Ridge Type |
|---|---|---|
| 1 | Quilam | Upper, Middle & Lower |
| 2 | Kottavoor | Middle & Lower |
| 3 | Kuppanatham | |
| 4 | Chengam | |

| | | |
|---|---|---|
| 5 | Melpallipattu | Lower |
| 6 | Kayambattu | |
| 7 | Kariyamangalam | |
| 8 | Pakkiripalayam | |
| 9 | Melpulidiyur | |
| 10 | Anthanur | |
| 11 | Anvarabath | |
| 12 | Paramanandal | |
| 13 | Theethandapattu | |
| 14 | Che. Nachipattu | |
| 15 | Manmalai | |
| 16 | Chennasamuthiram | |
| 17 | Alaputhur | |
| 18 | Valayambattu | |
| 19 | Pudupattu | |
| 20 | Mazhavankarani | |
| 21 | Kilvellivalam | |
| 22 | Srirangarajapuram | |

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

| Sl.No | Proposed Work | Ridge Type | Extent |
|---|---|---|---|
| 1 | Afforestation in Public/common lands (ha) | Upper | 255.91 |
| 2 | Drainage Line Treatment (m) | | 33,355 |
| 3 | CC Check dams (No.) | Middle | 29 |
| 4 | Block Plantation (Community) (ha) | | 245.6 |
| 5 | Silvi-pasture Development (ha) | | 0.32 |
| 6 | Avenue plantation (m) | | 84,785 |
| 7 | Composting (No.) | Lower | 138 |
| 8 | Canal Bund Plantation (m) | | 9,063 |
| 9 | Restoration of water bodies: Tanks and Ooranis (No.) | | 94 |
| 10 | Artificial Recharge Structure (No.) | | 916 |
| 11 | Farm Bunding with Boundary Trenches - Individual (ha) | | 136.79 |
| 12 | Construction of Farm Ponds - Individual (No.) | | 239 |
| 13 | Land development - Individual (ha) | | 193.79 |
| 14 | Azolla units - Individual (No.) | | 662 |
| 15 | NADEP Vermi compost (No.) | | 666 |
| 16 | Cattle Shelters (No.) | | 1,092 |
| 17 | Goat Sheep Shelters (No.) | | 550 |
| 18 | Cattle Trough (No.) | | 732 |
| 19 | Construction of new open wells & Recharge Shafts (No.) | | 1,136 |
| 20 | Soak Pits (Community) (No.) | | 223 |
| 21 | Soak Pits (Individual) (No.) | | 852 |
| 22 | Roof Rain Water Harvesting (No.) | | 29 |
| 23 | Nutri Garden (No.) | | 9,460 |
| 24 | Silt application (No.) | | 59 |

TABLE 28. MICRO-WATERSHED IN CHENGAM BLOCK FALLING UNDER KALLAR MACRO-WATERSHED

| Sl.No | Micro-watershed Code | Micro-watershed Area in ha | Ridge Type |
|---|---|---|---|
| 1 | 4C1C1e06d | 409.93 | Upper, Middle & Lower |
| 2 | 4C1C1e06c | 769.94 | |
| 3 | 4C1C1f10d | 498.49 | |
| 4 | 4C1C1f01c | 739.77 | |
| 5 | 4C1C1f11c | 559.38 | |
| 6 | 4C1C1f01a | 735.76 | |
| 7 | 4C1C1f09d | 350.88 | |
| 8 | 4C1C1f09c | 441.39 | |
| 9 | 4C1C1f02a | 519.47 | |
| 10 | 4C1C1f11b | 615.58 | |
| 11 | 4C1C1f02b | 246.08 | |
| 12 | 4C1C1f02c | 267.87 | |
| 13 | 4C1C1f03d | 562.22 | |
| 14 | 4C1C1f12c | 656.55 | |
| 15 | 4C1C1f12a | 470.3 | |
| 16 | 4C1C1f03a | 407.4 | |
| 17 | 4C1C1e02c | 551.42 | |
| 18 | 4C1C1f03c | 658.54 | |
| 19 | 4C1C1f05d | 809.57 | |
| 20 | 4C1C1f05c | 426.69 | |
| 21 | 4C1C1f04d | 509.96 | |
| 22 | 4C1C1f04a | 309.72 | |
| 23 | 4C1C1f04c | 583.41 | |
| 24 | 4C1C1f04b | 492.33 | |
| 25 | 4C1C1e06b | 508.33 | Middle & Lower |
| 26 | 4C1C1e06a | 334.78 | |
| 27 | 4C1C1f11d | 787.69 | |
| 28 | 4C1C1e05b | 645.05 | |
| 29 | 4C1C1e02b | 564.44 | |
| 30 | 4C1C1e03a | 483.88 | |
| 31 | 4C1C1e02a | 601.55 | |
| 32 | 4C1C1e01d | 569.77 | |
| 33 | 4C1C1d03c | 244.07 | |
| 34 | 4C1C1e01c | 610.43 | |
| 35 | 4C1C1f05b | 483.75 | |
| 36 | 4C1C1f05a | 255.79 | |
| 37 | 4C1C1e01b | 392.29 | |
| 38 | 4C1C1e01a | 377.42 | |
| 39 | 4C1C1e05c | 451.19 | Lower |
| 40 | 4C1C1f10b | 704.54 | |
| 41 | 4C1C1f09b | 644.97 | |
| 42 | 4C1C1f10a | 497.01 | |

| | | | |
|---|---|---|---|
| 43 | 4C1C1f01b | 435.73 | Lower |
| 44 | 4C1C1f10c | 423.04 | |
| 45 | 4C1C1f11a | 582.89 | |
| 46 | 4C1C1e05a | 392.35 | |
| 47 | 4C1C1e03b | 507.27 | |
| 48 | 4C1C1f09a | 310.32 | |
| 49 | 4C1C1f12b | 270.13 | |

TABLE 29. LIST OF GPs WITH TYPE OF RIDGE FALLING UNDER KALLAR MACRO-WATERSHED IN CHENGAM BLOCK

| Sl.No | Name of the GP | Ridge Type |
|---|---|---|
| 1 | Thalaiyouthu | Upper, Middle & Lower |
| 2 | Kattamaduvu | Middle & Lower |
| 3 | Elangunni | Lower |
| 4 | Andipatti | |
| 5 | Melravanthavadi | |
| 6 | Puliyampatti | |
| 7 | Neepathurai | |

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

| Sl.No | Proposed Work | Ridge Type | Extent |
|---|---|---|---|
| 1 | CC Check dams (No.) | Middle | 9 |
| 2 | Block Plantation (Community) (ha) | | 823.36 |
| 3 | Avenue plantation (m) | | 65,144 |
| 4 | Composting (No.) | Lower | 96 |
| 5 | Canal Bund Plantation (m) | | 1,100 |
| 6 | Restoration of water bodies: Tanks and Ooranis (No.) | | 56 |
| 7 | Artificial Recharge Structure (No.) | | 807 |
| 8 | Farm Bunding with Boundary Trenches - Individual (ha) | | 118.17 |
| 9 | Construction of Farm Ponds - Individual (No.) | | 146 |
| 10 | Land development - Individual (ha) | | 118.17 |
| 11 | Azolla units - Individual (No.) | | 437 |
| 12 | NADEP Vermi compost (No.) | | 437 |
| 13 | Cattle Shelters (No.) | | 437 |
| 14 | Goat Sheep Shelters (No.) | | 662 |
| 15 | Cattle Trough (No.) | | 437 |
| 16 | Construction of new open wells & Recharge Shafts (No.) | | 807 |
| 17 | Soak Pits (Community) (No.) | | 60 |
| 18 | Soak Pits (Individual) (No.) | | 913 |
| 19 | Roof Rain Water Harvesting (No.) | | 16 |
| 20 | Nutri Garden (No.) | | 5,909 |
| 21 | Silt application (No.) | | 48 |

TABLE 31. MICRO-WATERSHED IN CHENGAM BLOCK FALLING UNDER PAMBAN MACRO-WATERSHED

| Sl.No | Micro-watershed Code | Micro-watershed Area in ha | Ridge Type |
|---|---|---|---|
| 1 | 4C1B5d07b | 1,053.23 | Upper, Middle & Lower |
| 2 | 4C1B5d10b | 499.69 | |
| 3 | 4C1B5d10a | 957.91 | |
| 4 | 4C1B5d11a | 813.25 | |
| 5 | 4C1B5d07c | 308.65 | |
| 6 | 4C1B5d11c | 350 | |
| 7 | 4C1B5d09c | 622.17 | |
| 8 | 4C1B5d09b | 713 | |
| 9 | 4C1B5d08b | 686.45 | Middle & Lower |
| 10 | 4C1B5d05b | 447.44 | |
| 11 | 4C1B5d08a | 315.88 | |
| 12 | 4C1B5d07a | 691.25 | |
| 13 | 4C1B5d05c | 295.89 | |
| 14 | 4C1B5d08c | 315.57 | Lower |
| 15 | 4C1B5d10c | 446.06 | |
| 16 | 4C1B5d12a | 647.11 | |
| 17 | 4C1B5d12b | 519.65 | |
| 18 | 4C1B5d12c | 721.41 | |
| 19 | 4C1B5d06a | 351.16 | |
| 20 | 4C1B5d11b | 285.12 | |
| 21 | 4C1B5d05a | 610.39 | |
| 22 | 4C1B5d06b | 571.98 | |

TABLE 32. LIST OF GPs WITH TYPE OF RIDGE FALLING UNDER PAMBAN MACRO-WATERSHED IN CHENGAM BLOCK

| S.No | Name of the GP | Ridge Type |
|---|---|---|
| 1 | Melpennathur | Upper, Middle & Lower |
| 2 | Vinnavanoor | Middle & Lower |
| 3 | Beemanandal | |
| 4 | Kannkurukkai | |
| 5 | Pachal | |
| 6 | Uchimalaikuppam | Lower |
| 7 | Che. Sorpanandal | |
| 8 | Pinjur | |

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

| S.No | Proposed Work | Ridge Type | Extent |
|---|---|---|---|
| 1 | Afforestation in Public/common lands (ha) | Upper | 154.63 |
| 2 | Drainage Line Treatment (m) | | 22,987 |
| 3 | CC Check dams (No.) | Middle | 6 |
| 4 | Block Plantation (Community) (ha) | | 79.87 |
| 5 | Avenue plantation (m) | | 19,148 |
| 6 | Composting (No.) | Lower | 41 |
| 7 | Canal Bund Plantation (m) | | 802 |
| 8 | Restoration of water bodies: Tanks and Ooranis (No.) | | 47 |
| 9 | Artificial Recharge Structure | | 403 |
| 10 | Farm Bunding with Boundary Trenches - Individual (ha) | | 114.82 |
| 11 | Construction of Farm Ponds - Individual (No.) | | 80 |
| 12 | Land development - Individual (ha) | | 62.82 |
| 13 | Azolla units - Individual (No.) | | 200 |
| 14 | NADEP Vermi compost (No.) | | 200 |
| 15 | Cattle Shelters (No.) | | 230 |
| 16 | Goat Sheep Shelters (No.) | | 123 |
| 17 | Cattle Trough (No.) | | 200 |
| 18 | Construction of new open wells & Recharge Shafts (No.) | | 240 |
| 19 | Soak Pits (Community) (No.) | | 46 |
| 20 | Soak Pits (Individual) (No.) | | 392 |
| 21 | Roof Rain Water Harvesting (No.) | | 16 |
| 22 | Nutri Garden (No.) | | 4,059 |
| 23 | Silt application (No.) | | 26 |

TABLE 34. MICRO-WATERSHED IN CHENGAM BLOCK FALLING UNDER THURINJALAR MACRO-WATERSHED

| Sl.No | Micro-watershed Code | Micro-watershed Area in ha | Ridge Type |
|---|---|---|---|
| 1 | 4C1B3e14c | 527.73 | Middle & Lower |
| 2 | 4C1B3e17c | 661.92 | |
| 3 | 4C1B3e17b | 622.58 | |
| 4 | 4C1B3e14b | 374.91 | |
| 5 | 4C1B3e13c | 360.5 | |
| 6 | 4C1B3e17a | 763.05 | |
| 7 | 4C1B3e13b | 525.39 | |
| 8 | 4C1B3e12c | 372.93 | |
| 9 | 4C1B3e12a | 784.13 | |
| 10 | 4C1B3e12b | 714.97 | |
| 11 | 4C1B3e13a | 357.6 | Lower |

TABLE 35. LIST OF GPs WITH TYPE OF RIDGE FALLING UNDER THURINJALAR MACRO-WATERSHED IN CHENGAM BLOCK

| S.No | Name of the GP | Ridge Type |
|---|---|---|
| 1 | Paliyapattu | Middle & Lower |
| 2 | Chinnakolapadi | |
| 3 | Aswanagasuranai | |
| 4 | Che.Agaram | |
| 5 | Perumbakkam | |
| 6 | Periyakolapadi | |

TABLE 36. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER THURINJALAR MACRO-WATERSHED IN CHENGAM BLOCK

| S.No | Proposed Work | Ridge Type | Extent |
|---|---|---|---|
| 1 | Afforestation in Public/common lands (ha) | Upper | 153 |
| 2 | Drainage Line Treatment (m) | | 19,177 |
| 3 | CC Check dams (No.) | Middle | 8 |
| 4 | Block Plantation (Community) (ha) | | 47.66 |
| 5 | Avenue plantation (m) | | 17,205 |
| 6 | Composting (No.) | Lower | 27 |
| 7 | Restoration of water bodies: Tanks and Ooranis (No.) | | 43 |
| 8 | Artificial Recharge Structure (No.) | | 282 |
| 9 | Farm Bunding with Boundary Trenches - Individual (ha) | | 101.4 |
| 10 | Construction of Farm Ponds - Individual (No.) | | 50 |
| 11 | Land development - Individual (ha) | | 42.4 |
| 12 | Azolla units - Individual (No.) | | 212 |
| 13 | NADEP Vermi compost (No.) | | 212 |
| 14 | Cattle Shelters (No.) | | 212 |
| 15 | Goat Sheep Shelters (No.) | | 117 |
| 16 | Cattle Trough (No.) | | 212 |
| 17 | Construction of new open wells & Recharge Shafts (No.) | | 126 |
| 18 | Soak Pits (Community) (No.) | | 24 |
| 19 | Soak Pits (Individual) (No.) | | 171 |
| 20 | Roof Rain Water Harvesting (No.) | | 10 |
| 21 | Nutri Garden (No.) | | 2,456 |
| 22 | Silt application (No.) | | 17 |

TABLE 37. LIST OF GPs WITH TYPE OF RIDGE FALLING UNDER CHEYYAR RIVER & KALLAR MACRO-WATERSHED IN CHENGAM BLOCK

| S.No | Name of the GP | Ridge Type |
|---|---|---|
| 1 | Melvanakkambadi | Lower |
| 2 | Melchengam | Middle & Lower |

TABLE 38. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER CHEYYAR RIVER& KALLAR MACRO-WATERSHED IN CHENGAM BLOCK

| S.No | Proposed Work | Ridge Type | Extent |
|---|---|---|---|
| 1 | CC Check dams (No.) | Middle | 4 |
| 2 | Block Plantation (Community) (ha) | | 13.64 |
| 3 | Avenue plantation (m) | | 20,560 |
| 4 | Composting (No.) | Lower | 67 |
| 5 | Canal Bund Plantation (m) | | 1,000 |
| 6 | Restoration of water bodies: Tanks and Ooranis (No.) | | 17 |
| 7 | Artificial Recharge Structure (No.) | | 122 |
| 8 | Farm Bunding with Boundary Trenches - Individual (ha) | | 83.74 |
| 9 | Construction of Farm Ponds - Individual (No.) | | 70 |
| 10 | Land development - Individual (ha) | | 83.74 |
| 11 | Azolla units - Individual (No.) | | 328 |
| 12 | NADEP Vermi compost (No.) | | 328 |
| 13 | Cattle Shelters (No.) | | 328 |
| 14 | Goat Sheep Shelters (No.) | | 142 |
| 15 | Cattle Trough (No.) | | 328 |
| 16 | Construction of new open wells & Recharge Shafts (No.) | | 122 |
| 17 | Soak Pits (Community) (No.) | | 23 |
| 18 | Soak Pits (Individual) (No.) | | 328 |
| 19 | Roof Rain Water Harvesting (No.) | | 4 |
| 20 | Nutri Garden (No.) | | 2,253 |
| 21 | Silt application (No.) | | 34 |

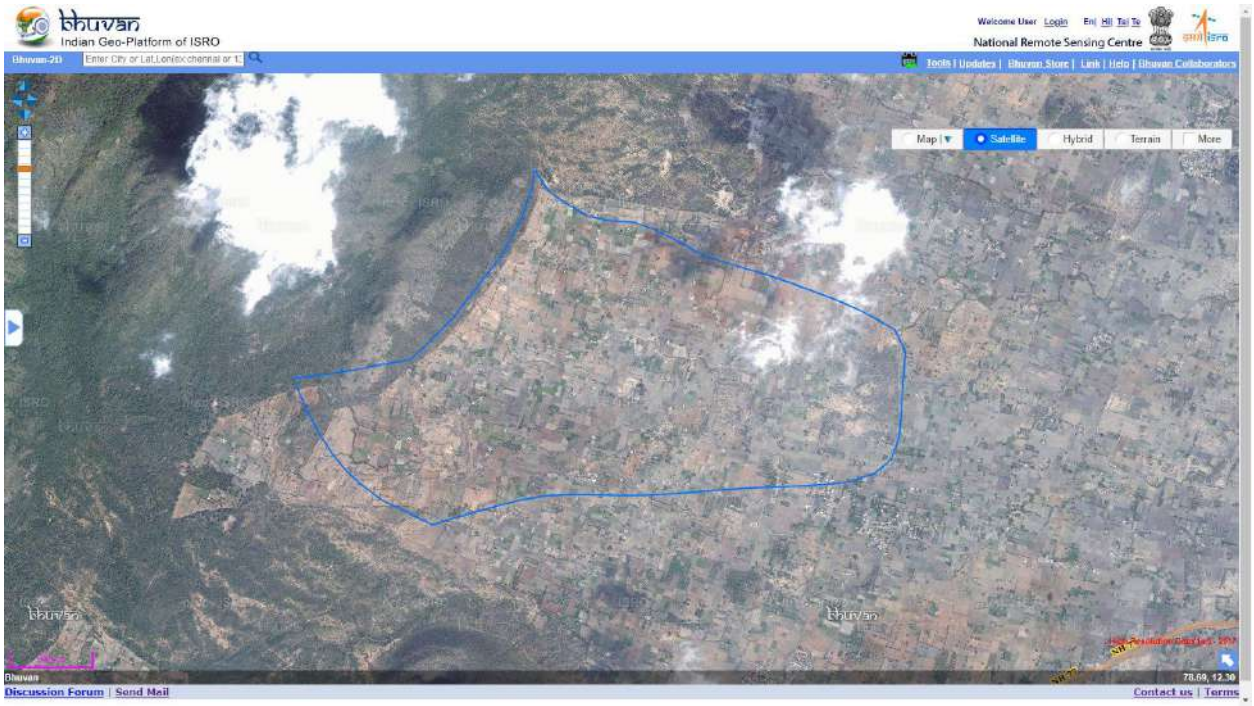
TABLE 39. LIST OF GPs WITH TYPE OF RIDGE FALLING UNDER PAMBAN & KALLAR MACRO-WATERSHED IN CHENGAM BLOCK

| S.No | Name of the GP | Ridge Type |
|---|---|---|
| 1 | Porasapattu | Upper, Middle & Lower |
| 2 | Arattavadi | |
| 3 | Ariyakunjur | Lower |

TABLE 40. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER PAMBAN & KALLAR MACRO-WATERSHED IN CHENGAM BLOCK

| S.No | Proposed Work | Ridge Type | Extent |
|---|---|---|---|
| 1 | Afforestation in Public/common lands (ha) | Upper | 57.58 |
| 2 | Drainage Line Treatment (m) | | 11,528 |
| 3 | CC Check dams (No.) | Middle | 2 |
| 4 | Block Plantation (Community) (ha) | | 247.79 |
| 5 | Avenue plantation (m) | | 12,861 |
| 6 | Composting (No.) | Lower | 25 |
| 7 | Restoration of water bodies: Tanks and Ooranis (No.) | | 20 |
| 8 | Artificial Recharge Structure (No.) | | 136 |
| 9 | Farm Bunding with Boundary Trenches - Individual (ha) | | 16.07 |
| 10 | Construction of Farm Ponds - Individual (No.) | | 76 |
| 11 | Land development - Individual (ha) | | 76.07 |
| 12 | Azolla units - Individual (No.) | | 218 |
| 13 | NADEP Vermi compost (No) | | 220 |
| 14 | Cattle Shelters (No) | | 268 |
| 15 | Goat Sheep Shelters (No) | | 148 |
| 16 | Cattle Trough (No) | | 218 |
| 17 | Construction of new open wells & Recharge Shafts (No) | | 206 |
| 18 | Soak Pits (Community) (No) | | 7 |
| 19 | Soak Pits (Individual) (No) | | 237 |
| 20 | Roof Rain Water Harvesting (No) | | 6 |
| 21 | Nutri Garden (No) | | 3,097 |
| 22 | Silt application (No) | | 30 |

## 8.2 MODEL MICRO-WATERSHED - PAKKIRIPALAYAM



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.

## PAKKIRIPALAYAM MICRO-WATERSHED

Pakkiripalayam micro-watershed falls under Pakkiripalayam, Chengam Block (Figure 8.5). This Micro-watershed is a part of Cheyyar River macro-watershed in Cheyyar sub-basin. The general information, geology, hydrogeology, natural drainage line, catchment area, ground water status, water budget of Pakkiripalayam 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 41 to 51) Proposed activities shown in Figure 8.6 and 8.7. The key CWRM parameters for the GPs falling in this micro-watershed is Annexed in 8.

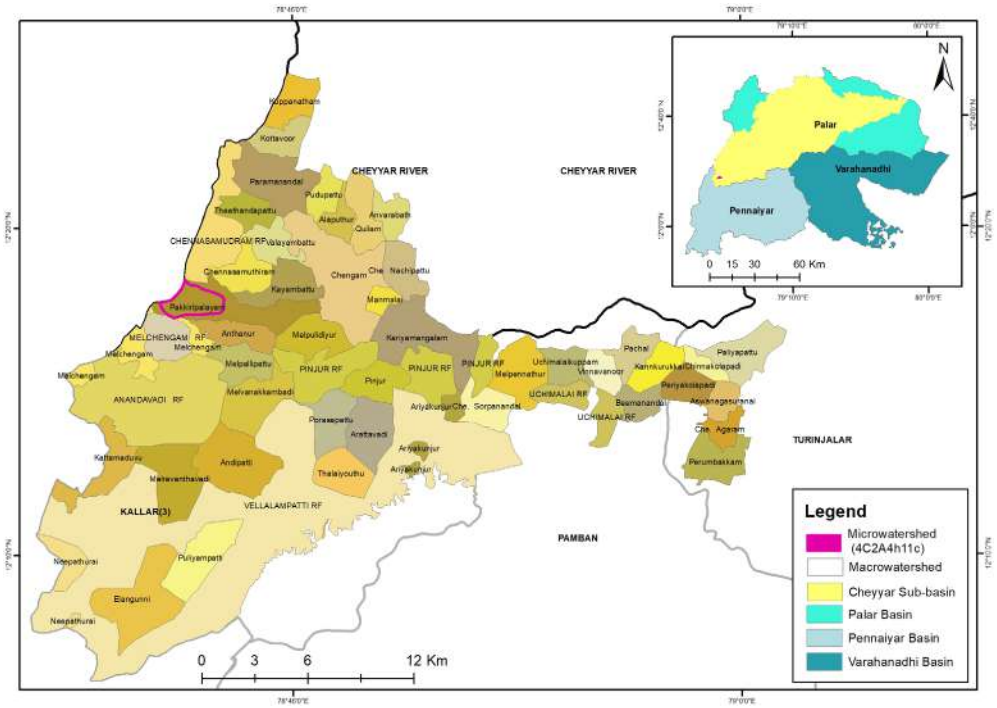



*Figure 8.5. Pakkiripalayam micro-watershed*

### TABLE 41. GENERAL INFORMATION OF THE MICRO-WATERSHED

| Description | Name/ Number/ Quantity/ Status |
|---|---|
| Name of the micro-watershed | **Pakkiripalayam** |
| Micro-watershed Number | **4C2A4h11c** |
| Name of the Basin | Palar Basin |
| Name of the subbasin | Cheyyar Sub Basin |
| Name of the macro-watershed | Cheyyar River |
| No. of GP covered under the micro-watershed | 1 |
| Name of the GP | Pakkiripalayam |
| Latitude of micro-watershed (From To) | 12°17'21.07"N to 12°18'24.53"N |
| Longitude of micro-watershed (From To) | 78°41'50.32"E to 78°43'51.14"E |
| Total area of the micro-watershed in (ha) | 450 ha |
| Micro-watershed area in Pakkiripalayam GP (%) | 100 |
| Area of micro-watershed falling in Pakkiripalayam GP (ha) | 450 |
| Total Population of Pakkiripalayam GP | 7,035 |
| Annual Average Rainfall (mm) | 1,047 |
| Annual maximum Temperature (◦C) | 33 |
| Annual Minimum Temperature (◦C) | 22.8 |
| Evapo-transpiration Losses of Pakkiripalayam GP (ha.m) | 29.44 |
| Volumetric soil moisture availability (%) | 23 |
| Climate Risk | Drought and heat waves |
| CVI Index Value for Pakkiripalayam GP (Based on WASCA Climate study) | 0.546 |
| Agro-Climatic Zone | North eastern zone (TN-1) |
| Agro Ecological Sub-Region (ICAR) | Eastern Ghats |
| Status of Ground water in Pakkiripalayam GP | Over Exploited |

### TABLE 42. GEOLOGY, HYDROGEOLOGY OTHER CHARACTERISTICS OF PAKKIRIPALAYAM 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 |
| Sheet Erosion (ha) | 3 Upper & Middle Ridge |

### TABLE 43. NATURAL DRAINAGE LINES IN PAKKIRIPALAYAM MICRO-WATERSHED

| | |
|---|---|
| No. of 1st Order drains | 3 |
| Total length of natural drainage line (m) | 4,366 m |
| Drainage density (ha.m) | 9.70 |

TABLE 44. CATCHMENT AREA (STRANGE METHODOLOGY- CGWB)

| Catchment Area (in ha) | Pakkiripalayam |
|---|---|
| Good catchment area | 180.66 |
| Average catchment area | 0.42 |
| Bad catchment area | 1,088.38 |

TABLE 45. GROUNDWATER STATUS OF MICRO-WATERSHED

| Firka Assessment Unit for Pakkiripalayam GP in ha.m | |
|---|---|
| Name of the Firka (Assesment Unit) falling under micro-watershed | Melpallipattu |
| Net Annual Ground Water Availability | 1,985.97 |
| Existing gross ground water draft for irrigation | 3,223.50 |
| Existing Gross Ground Water Draft for domestic and industrial water supply | 87.93 |
| Existing Gross Ground Water Draft for All uses | 3,311.43 |
| Provision for domestic and industrial requirement supply to 2025 | 99.94 |
| Net Ground Water Availability for future irrigation development | -1,337.47 |

TABLE 46. GP WISE WATER BUDGET OF MICRO-WATERSHED

| Water Budget | Pakkiripalayam |
|---|---|
| Water for Human (ha.m) | 19.26 |
| Water for Agriculture (ha.m) | 389.5 |
| Water for Animal (ha.m) | 6.29 |
| Village wise water required (ha.m) | 415.1 |
| Available run-off from rain water (derived from Strange method) (ha.m) | 271.4 |
| Harvested Runoff from Water Harvesting Activities (ha.m) | 68.4 |
| Potential Harvesting from proposed Interventions (ha.m) | 17.2 |
| Total Water harvested (ha.m) | 85.5 |
| Water demand and Supply Difference (ha.m) | -329.6 |
| Water Demand Supply Gap Status | Deficient |
| Per capita Water Availability (in cum) | 385.79 |
| International Standard per capita water Availability (in cum) | 1,700 |
| Water Availability Gap (in cum) | -1314.21 |
| Water security status | Water Stress |

TABLE 47. GP WISE PROPOSED MICRO-WATERSHED WORKS

| | |
|---|---|
| Proposed Total No. of works in Upper Ridge | No works falling in upper Ridge |
| Proposed Total No. of works in Middle Ridge | 1 |
| Proposed Total No. of works in Lower Ridge | 182 |
| Total No. of works in Pakkiripalayam | 183 |

TABLE 48. RIDGE WISE TREATMENT AREA, ESTIMATED COST AND PERSON DAYS REQUIRED

| Description | Pakkiripalayam GP |
|---|---|
| **Middle Ridge** | |
| Estimated cost for Middle Ridge area (INR in Lakhs) | 11.1 |
| Total area of Middle Ridge (ha) | 10 |
| **Treatment cost of Middle Ridge per (INR in lakhs/ ha)** | **1.11** |
| **Estimated Person days generated for Treatment of Middle Ridge** | **4,320** |
| **Lower Ridge** | |
| Estimated cost for Lower Ridge area (INR in Lakhs) | 219.19 |
| Total area of Lower Ridge (ha) | 430 |
| **Estimated Person days generated for Treatment of Lower Ridge** | **84,806** |
| **Treatment cost of Lower Ridge (INR in Lakhs/ha)** | **0.52** |

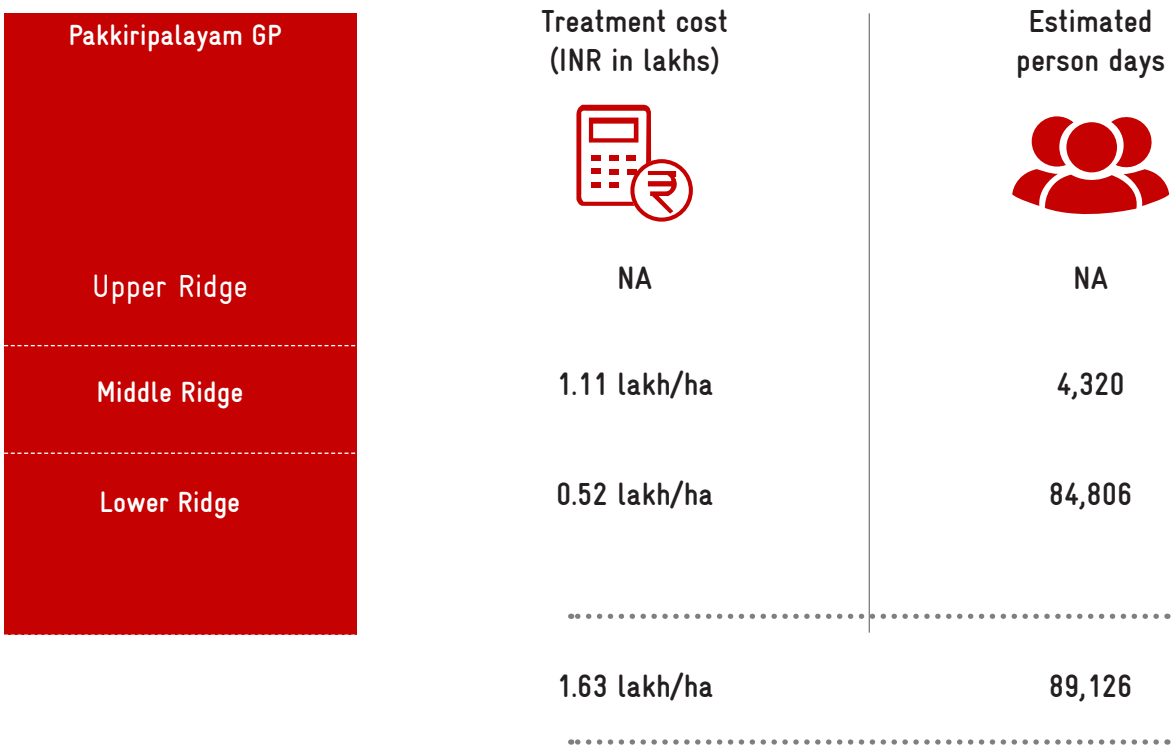
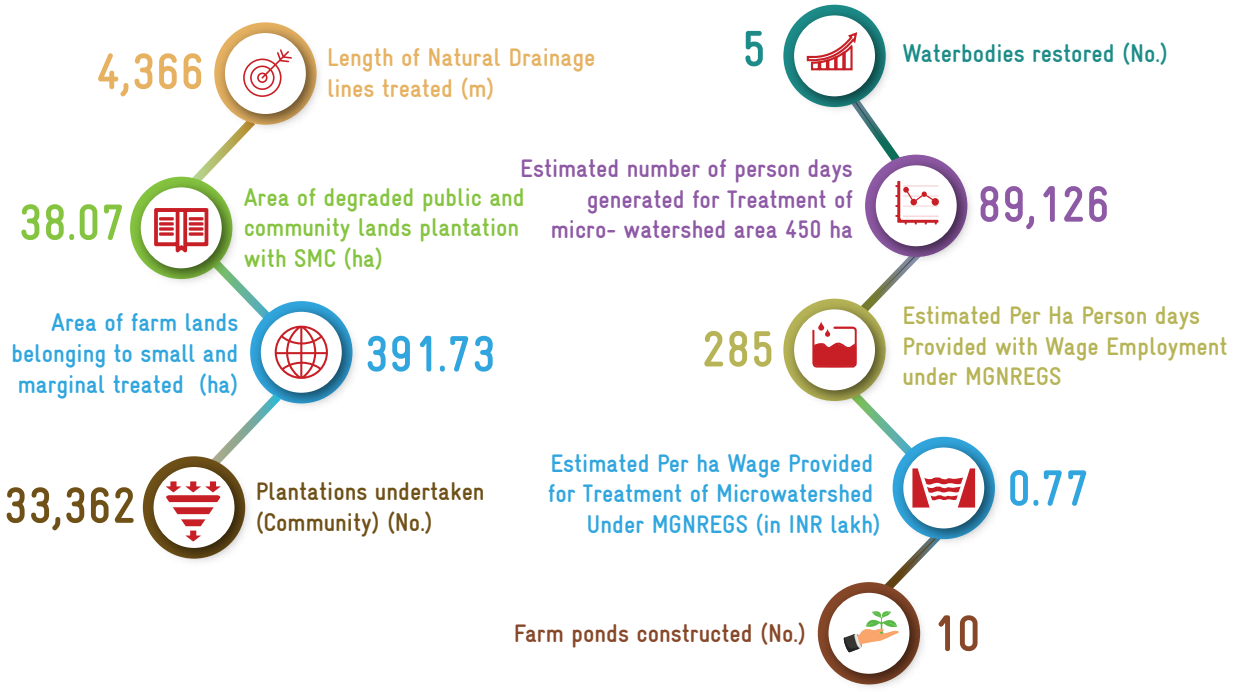



TABLE 49. NATURE AND NUMBER OF WORKS IN MICRO- WATERSHED

| Description | Number |
|---|---|
| Total No. of works in micro- watershed area (Arable, Non arable & DLT) | 103 |
| Total No. of works in micro- watershed including livelihood Activities | 38 |
| Total No. of works in micro-watershed including Rural Greywater Management Activities | 42 |

TABLE 50. KEY OUTCOMES OF INTERVENTION




Expenditure for FY 2020-21 (in INR lakh)

| | |
|---|---|
| Pakkiripalayam GP | 158.42 lakh |

TABLE 51. ESTIMATES OF MICRO-WATERSHED IN PAKKIRIPALAYAM GP

| Proposed Work | Ridge Type | Status of Work | Quantity (Area or No.) | No. of works as per KML | Estimate cost (INR in Lakhs) | Person days |
|---|---|---|---|---|---|---|
| **NRM works in Public and Community Lands** | | | | | | |
| Block Plantation (ha) | Middle | Not commenced | 1 | 1 | 11.1 | 4,320 |
| Loose boulder check dam (No.) | Lower | | 4 | 4 | 3.4 | 168 |
| Sunken Pit in 1st order drain (No.) | | | 4 | 4 | 6.16 | 1,532 |
| Tank bund Plantation (No.) | | | 3 | 3 | 5.4 | 2,109 |
| Afforestation (ha) | | | 1 | 1 | 8.6 | 3,344 |
| Compost Pit (No.) | | | 10 | 10 | 1.7 | 150 |
| Avenue plantation (km) | | Commenced | 6.866 | 4 | 12.3 | 4,826 |
| Restoration of Tradational water bodies: (Union Tank) (No.) | | | 3 | 3 | 15 | 2,400 |
| Restoration of Tradational water bodies: (Pond) (No.) | | | 2 | 2 | 2 | 400 |
| **Sub total** | | | | **32** | **65.66** | **19,249** |
| **Works in Individual Farmer lands (Agriculture and Allied Activities)** | | | | | | |
| Artificial Recharge Structure for borewell farmers (No.) | Lower | Not commenced | 10 | 10 | 25 | 3,910 |
| Farm Bunding with Boundary Trenches - Individual (ha & No.) | | | 12<br>5 | 5 | 7.5 | 2,930 |
| Dryland Horticulture (ha & No.) | | | 8<br>3 | 3 | 25 | 9,963 |
| Silt application (No.) | | | 3 | 3 | | |
| Fodder development - Individual (No.) | | | 15 | 15 | 22.2 | 35,160 |
| Azolla Production units - Individual (No.) | | Commenced | 10 | 10 | 1.5 | 230 |
| NADEP Vermi compost (No.) | | | 15 | 15 | 2.7 | 405 |
| Construction of Farm Ponds - Individual (No.) | | Ongoing | 10 | 10 | 20 | 7,810 |
| **Sub total** | | | | **71** | **103.9** | **60,408** |
| **Total** | | | | **103** | **169.56** | **79,657** |
| **Livelihood enhancement activities for Individual Farmers (dryland)** | | | | | | |
| Cattle Shelters (No.) | Lower | Commenced | 15 | 15 | 31.8 | 4,965 |
| Goat Sheep Shelters (No.) | | | 8 | 8 | 18.16 | 2,840 |
| Cattle Trough (No.) | | Not commenced | 15 | 15 | 0.75 | 90 |
| **Sub total** | | | | **38** | **50.71** | **7,895** |

| Rural Greywater and Rooftop Rainwater Management | | | | | | |
|---|---|---|---|---|---|---|
| Rooftop Rainwater Harvesting Structures (No.) | Lower | Not commenced | 2 | 2 | 8 | 1,250 |
| Nutri Garden (No.) | | | 20 | 20 | 0.02 | 4 |
| Soak Pits (Individual) (No.) | | Ongoing | 20 | 20 | 2 | 320 |
| **Sub total** | | | | **42** | **10.02** | **1,574** |
| **Total** | | | | **183** | **230.29** | **89,126** |

## TOTAL ESTIMATES OF MICRO-WATERSHED IN PAKKIRIPALAYAM GP

| | No. of works as per KML | Estimate cost in INR (Lakhs) | Person days |
|---|---|---|---|
| Pakkiripalayam GP | 183 | 230.29 | 89,126 |


*Figure 8.6. Proposed plan in Pakkiripalayam micro-watershed*


Proposed NRM activities for community
Write a description for your map.
Legend
AVP
AVP
CSP
DCS
D-Silt
FN
FP_C
LBCD
MG
Dharm
LBCD
AVP
DCS
SP
D-Silt
PBP
PBS
TBS
TBP
BP
MG
FN
FP_C
LBCD
DCS
AFF
CSP
Google Earth
1 km
N


Proposed Non-NRM activities for community
Write a description for your map.
Legend
RWHS
Dharm
RWHS
Google Earth
1 km
N

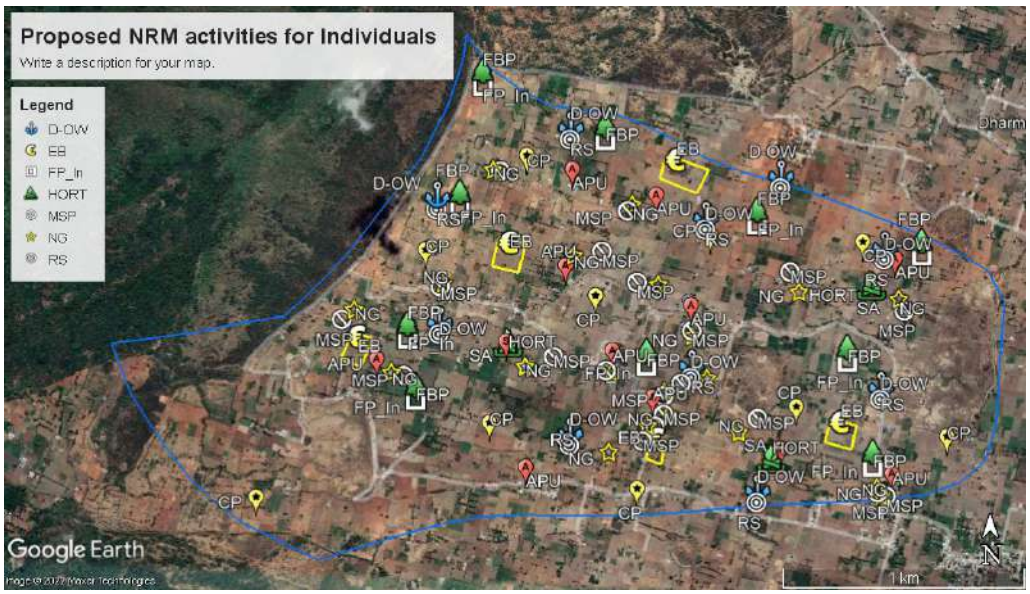




*Figure 8.7. Proposed activities in Pakkiripalayam micro-watershed*

*A: NRM activities for community. B: Non-NRM activities for community. C: NRM activities for Individuals. D: Non-NRM activities for Individuals*

*(APU: Azolla Production unit, AVP: Avenue Plantations, CP: Compost pit, CS: Cattle Shed, D-silt: Desilting, D-OW: De-silting 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 -PERIYAKOLAPADI GP

## PERIYAKOLAPADI GP

## 8.3.1 BACKGROUND OF PERIYAKOLAPADI GP

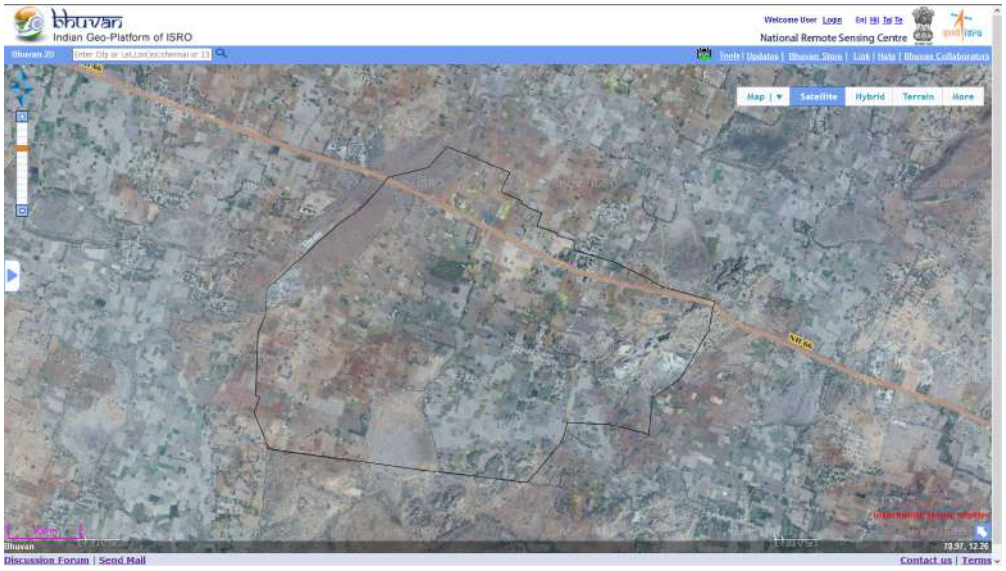
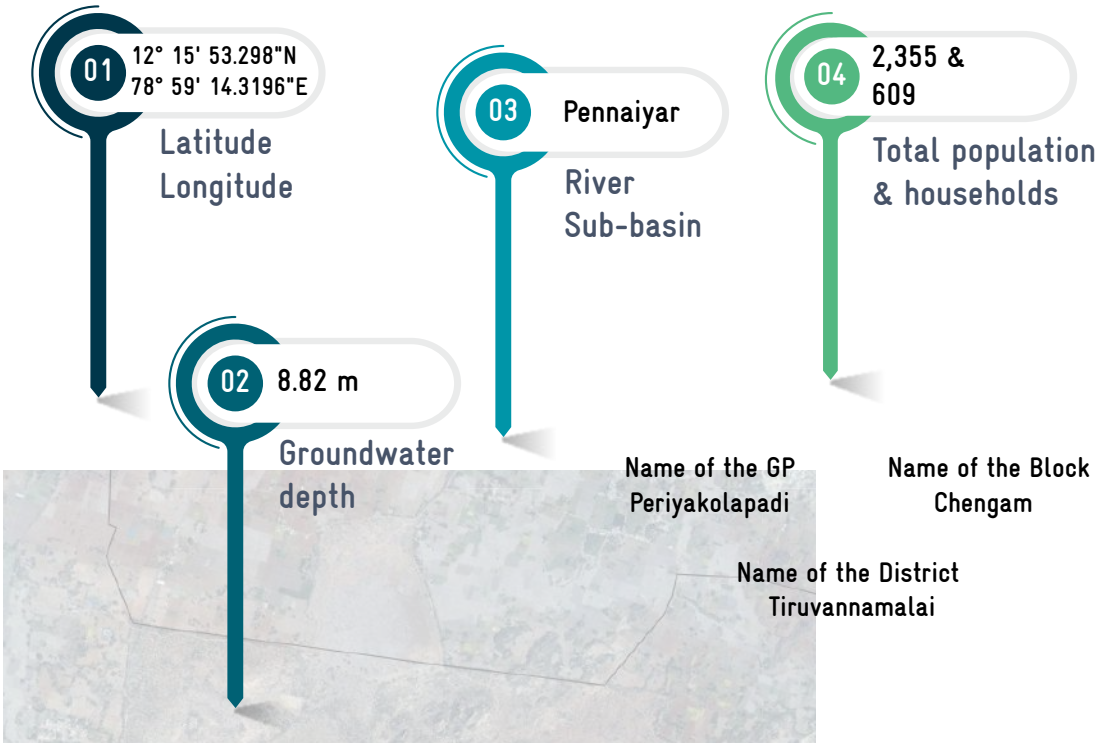



*Figure 8.8. Periyakolapadi GP over satellite image*

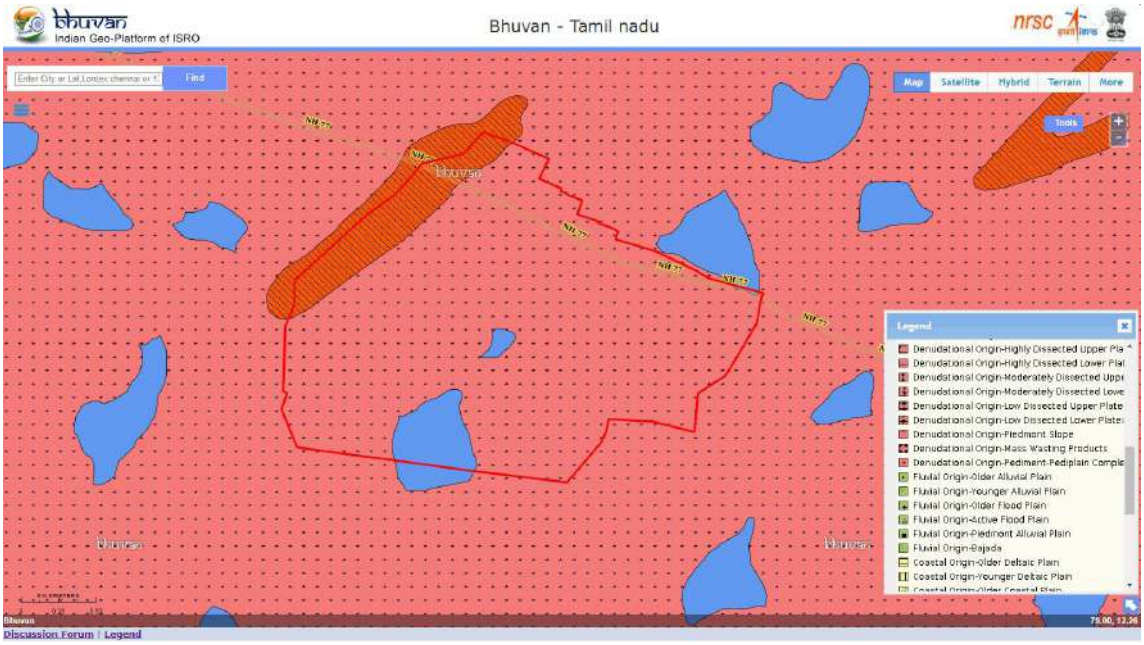
The Periyakolapadi GP is located in Chengam Block of Tiruvannamalai district, Tamil Nadu. (Figure 8.8). The total population is 2,355 of which 1,204 are males while 1,151 are females as per Population Census 2011. The total number of households is 609. There is no Schedule Tribe population and Schedule Caste population is 513 in the Periyakolapadi village. The general description of this GP is given in Table 52.

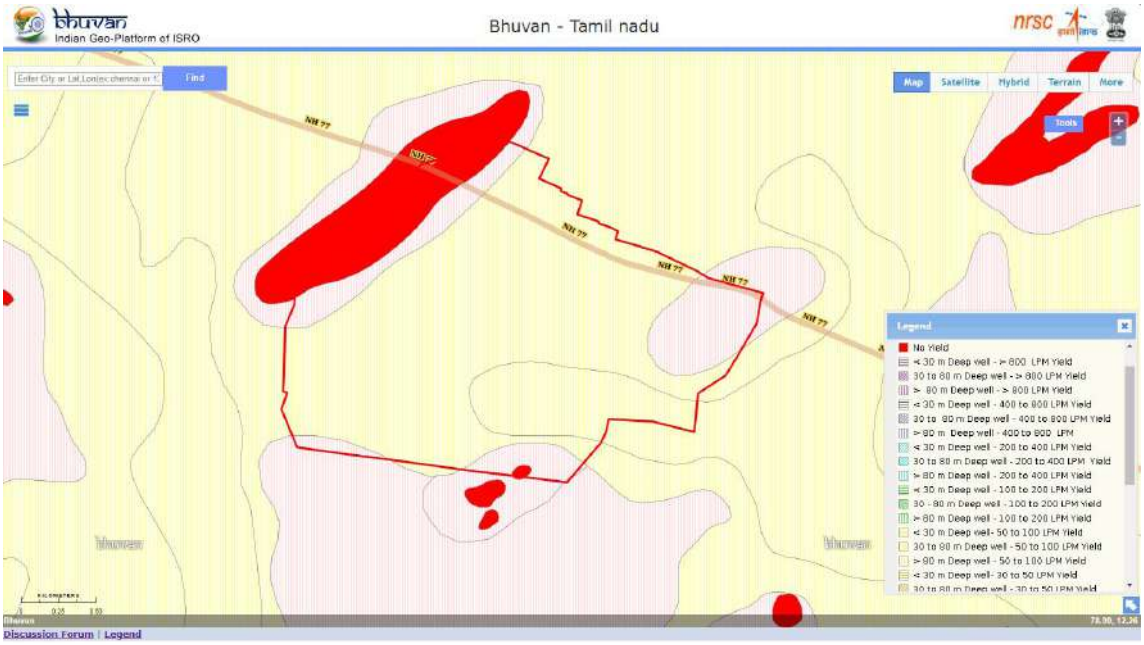
TABLE 52. GENERAL DESCRIPTION OF PERIYAKOLAPADI GP

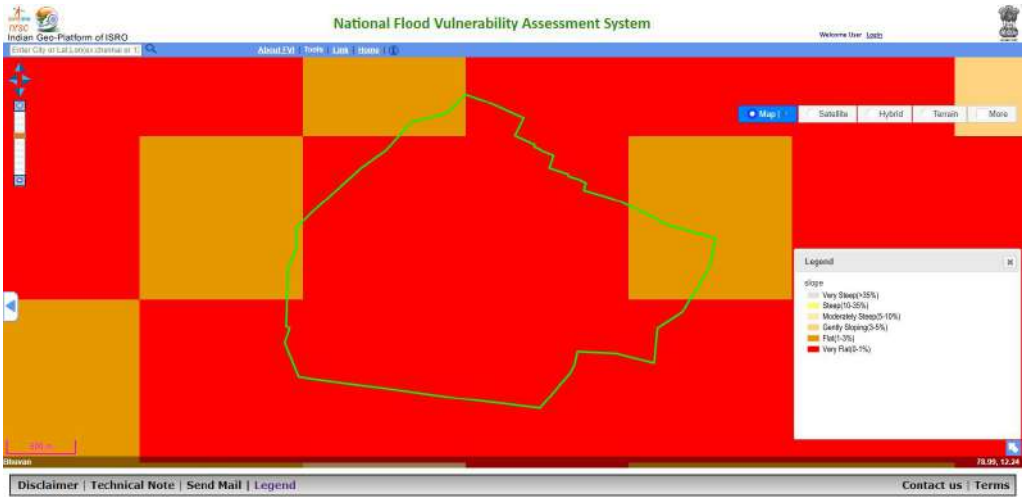


# 8.3.2 CWRM PLANNING - SPATIAL DATA

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 implemented towards conservation of resources. Various thematic datasets for Periyakolapadi GP are discussed below (Figure 8.9).





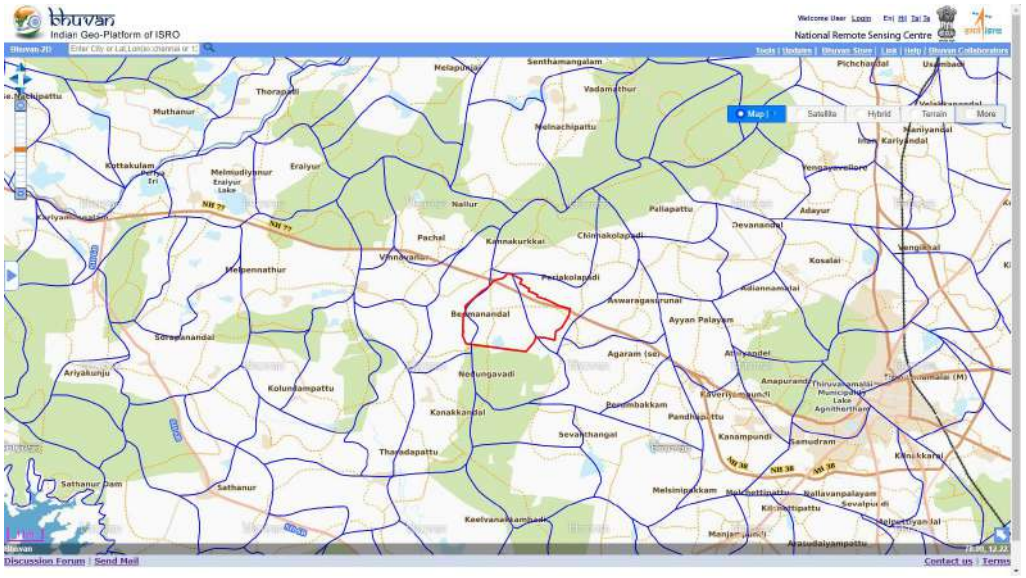





*Figure 8.9. Spatial thematic maps of Periyakolapadi GP. A. Geomorphology, B. GW prosperity, C. Slope, D. Watershed, E.LULC*

Periyakolapadi GP engrossed with denudation origin pediment complex (A) landform unit. It is observed that the groundwater prosperity is greater than 80 m deep well with 50 to 100 LPM capacity and greater than 800 LPM yield (B). Very flat terrain is dominated in the GP (C), Whereas GP area is falls under three micro-watershed units (D). Most of land used for crop cultivation and two large land parcels were indicating the plantation crops and Builtup Mining (E).

## 8.3.3 CWRM PLANNING- NON-SPATIAL DATA

The non-spatial datasets cover four major themes related to the 116 parameters – socio economic, climate, water and agriculture (Table 53). 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 53. NON SPATIAL DATA-PERIYAKOLAPADI GP

| Key CWRM Parameter | Details |
|---|---|
| **Climate Vulnerability Area (CVA) 1: Socio-Economic** | |
| Geographical Area (ha) | 475 |
| Male Population | 1,204 |
| Female Population | 1,151 |
| Total Population | 2,355 |
| SC Population | 513 |
| Vulnerable population | 513 |
| Households (HH's) | 609 |
| Only one room HH's (SECC) | 64 |
| Female-Headed HH's (SECC) | 31 |
| Vulnerable Households (SECC) | 54 |
| % of Vulnerable Households | 9% |
| Registered MGNREGA Job cards | 1,259 |
| Active person working in job Cards | 935 |
| Drinking-Water Sources | 562 |
| Groundwater sources - Drinking water | 5 |
| Surface water sources - Drinking water | 1 |
| Annual Grey water Generation (ha.m) | 4.3 |
| **Climate Vulnerability Area (CVA) 2: Climate** | |
| Average Annual Rainfall (mm) | 1,047 |
| Average Annual Temperature (°C) | 27.9 |
| Ground Water(G.W) Status | Over -Exploited |

| Climate Vulnerability Area (CVA) 3: Water Resources | |
|---|---|
| **Canal Network (m)** | |
| Number of Tanks (PWD & Union) (No.) | 1 |
| Other Surface Water Bodies (No.) | 9 |
| **Irrigation Facilities (ha)** | |
| Area under Open & Tube Well Irrigation | 152.9 |
| **Catchment Area wise Available Runoff (ha.m)** | |
| Good Catchment Area | 47.7 |
| Average Catchment Area | 5.7 |
| Bad Catchment Area | 61.2 |
| **Watershed and Drainage Networks** | |
| Length of Natural Drainage Lines (m) | 4,538 |
| No.of Natural Drainage Lines | 6 |
| No.of micro-watersheds | 3 |
| **Water Demand (ha.m)** | |
| Water Demand For Humans (ha.m) | 6.45 |
| Water Demand for Livestock (ha.m) | 2.73 |
| Water Demand For Agriculture (ha.m) | 199.07 |
| % G.W Utilization for Drinking | 2 |
| % G.W Utilization for Livestock | 87 |
| % G.W Utilization for Agriculture. | 76 |
| % SW Utilization for Drinking | 98 |
| % SW Utilization for Livestock | 13 |
| % SW Utilization for Agriculture | 24 |
| **Climate Vulnerability Area 4: Agriculture** | |
| **Area Under Land Resources (ha)** | |
| Area under Non-Agricultural Uses | 62.16 |
| Area under Barren & Un-cultivable Land | 65 |
| Area under Cultivable Waste Land | 20.24 |
| Area under Fallows Land other than Current Fallows | 47.06 |
| Area under Current Fallow land | 120.98 |
| Area under Unirrigated Land | 6.23 |
| Area Irrigated by Source | 152.9 |
| **Catchment Area (ha)** | |
| Land under Good Catchment | 127.16 |
| Land under Average Catchment | 20.24 |
| Land under Bad Catchment | 327.17 |
| **Crop Details (ha)** | |
| Irrigated Area (ha) | 113.77 |

| | |
|---|---|
| Rainfed area (ha) | 129.09 |
| The area under Paddy Cultivation (ha) | 92.09 |
| Crop Water Requirement - The irrigated condition (ha.m) | 151.03 |
| Crop Water Requirement - Rainfed condition (ha.m) | 48.04 |
| **Soil Resources: Status of Available Nitrogen (%)** | |
| Very Low | 54 |
| Low | 46 |
| **Status of Organic Carbon (%)** | |
| Very Low | 37 |
| Low | 63 |
| **Status of Soil Micro Nutrients (%)** | |
| Sufficient | 58 |
| Deficient | 42 |
| **Status of Physical condition of the soil (%)** | |
| Slightly Acidic | 23 |
| Neutral | 7 |
| Moderately Alkaline | 69 |
| **Soil Texture** | |
| Clay Soil | 1 |
| Fine Soil | 39 |
| Soil Water Permeability | Moderate |
| **Soil moisture and ET** | |
| Volumetric Soil Moisture (%) | 23 |
| Estimated Soil Moisture (ha.m) | 412.41 |
| ET Losses (ha.m) | 83.07 |
| **Means of Water Extraction (%)** | |
| Gravity | 1 |
| Lifting | 99 |
| **Irrigation Methods (%)** | |
| Control Flooding | 100 |
| **Livestock (No)** | |
| Cattle Population | 652 |
| Sheep Population | 754 |
| Goat Population | 213 |

# 8.3.4 KEY WATER CHALLENGES

## Socio-Economic

1. 9% of the households are vulnerable in the GP
2. 64 one room households and 31 female headed households.
3. 21% SC population
4. Access to drinking water through tap water connections inadequate
5. Grey water generation of 4.3 ha.m needs attention

## Water

1. Ground water status – over exploited
2. 10 traditional waterbodies in the GP
3. Irrigation depends 100 % on open and tube well
4. 87% livestock needs and 76% Agriculture needs met through ground water
5. 61.2 ha.m of water is available runoff, from bad catchment area

## Agriculture and Allied Sector

1. 31.05 % of the land covers the common area
2. 68.94 % of the land covers an individual land area
3. Main crop in the GP is paddy which is cultivated about 92.07 ha of land
4. Crop water requirement for irrigated condition is more 151.05 (ha.m)
5. 99% of the water is given to paddy fields by lifting methods of irrigation
6. Remaining water is extracted by gravity method of irrigation.
7. Soil Nitrogen, organic carbon is very low to low
8. Predominant Fine soil in GP
9. Very high ET loss 83.07 ha.m

# 8.3.5 PERSPECTIVE PLAN - WORKS PROPOSED: WATER ACTIONS

The appropriate and site-specific works are identified for the development of public and common land, agriculture and allied activities, rural infrastructures, and climate-resilient measures to reduce the vulnerability in the GP. About 19.95% of the total land area is taken for WASCA treatment activities like plantation and conservation works. The total proposed area for treatment is 94.7 ha. More attention is given for Barren and un-cultivable land, followed by cultivable waste land, area under irrigated by source and area under current fallow land. (Figure 8.10). Through the proposed conservation activities 28.7 ha.m run off would be harvested in which about 64.8% of the run off from good catchment, 14.98 from average catchment area and 20.2% of the conservation is from the bad catchment area. (Figure 8.11)

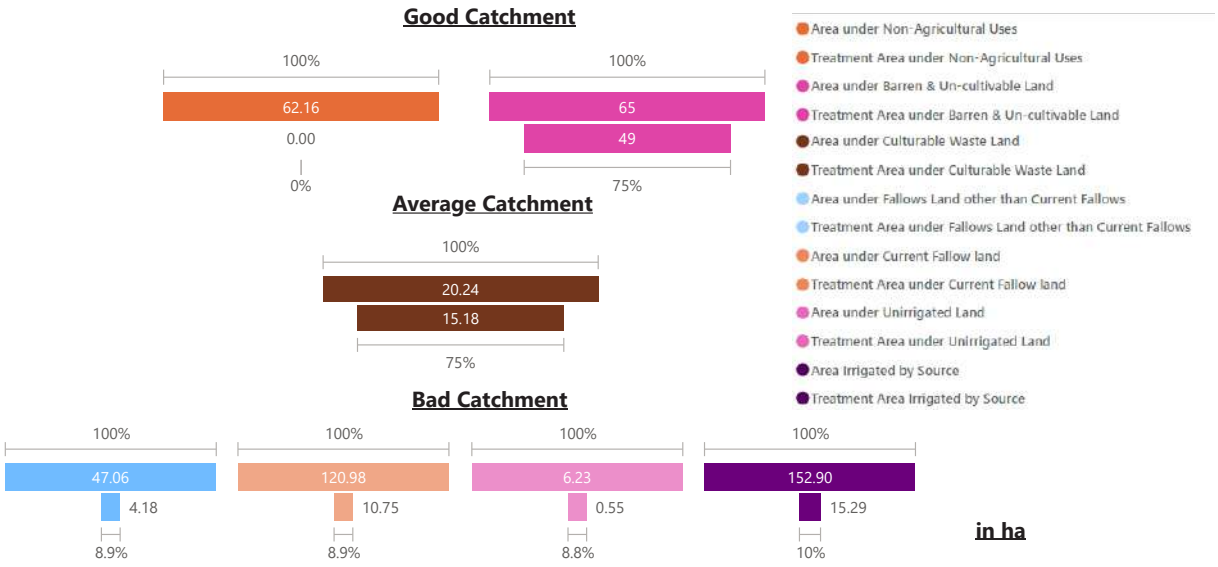



*Figure 8.10. Proposed land resource treatment area in Periyakolapadi GP*

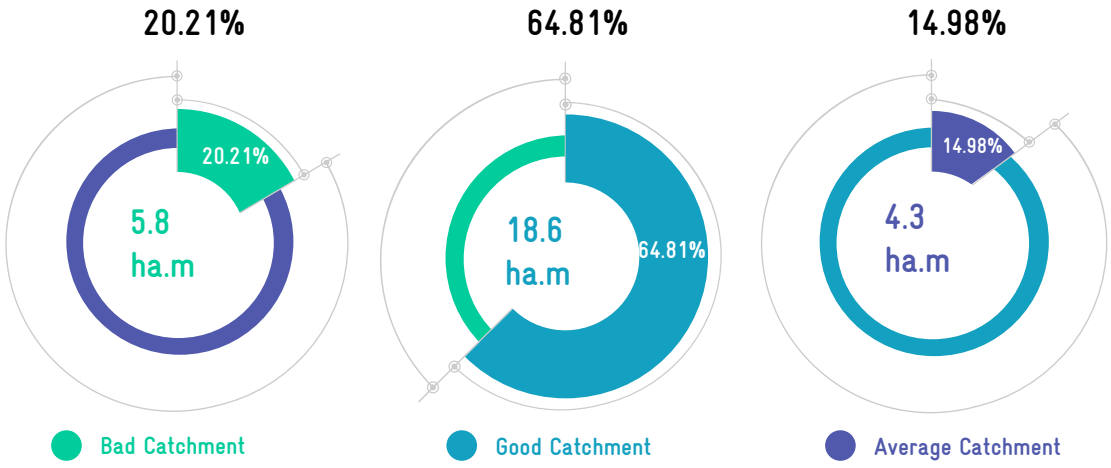



*Figure 8.11. Expected run off conservation after treatment in Periyakolapadi GP*

The appropriate and site-specific works have been identified for the development of public and common land, agriculture and allied activities, rural infrastructures, and climate-resilient measures to reduce the vulnerability in the GP. Table 56 shows the detailed perspective plan and estimates of the work, budget, and person-days for three years from 2021-2022 to 2023-2024 in Tirakoil GP. Since it is a vulnerable village, more attention was given to include appropriate works to improve the common and public land development.

TABLE 54. PERSPECTIVE PLAN – WORKS PROPOSED – WATER ACTIONS OF PERIYAKOLAPADI GP - FY (2021-2024)

| Improvement of Public & Common Lands Development | | | | |
|---|---|---|---|---|
| **Works in Upper& Middle Ridge** | | | | |
| **Name of the Work** | **Ridge Type** | **No of Works** | **Estimated cost (INR in Lakhs)** | **Estimated Person Days** |
| Restoration of water bodies: a.PWD and Tanks (No.) | Lower | 1 | 5 | 800 |
| Restoration of water bodies: c. Ponds (No.) | | 70 | 70 | 14,000 |
| Artificial Recharge Structure (No. of units) | | 61 | 152.5 | 23,851 |
| Composting (No. of units) | | 6 | 1.02 | 90 |
| Block Plantation (Community) (ha) | Middle | 2 | 22.2 | 8,640 |
| Linear Plantation (km) | | 4 | 7.2 | 2,812 |
| Avenue plantation (km) | | 1 | 1.8 | 703 |
| Contour Continuous Bunds (CCB) for Block Plantation area (m) | Upper | 2 | 0.05 | 20 |
| Drainage Line Treatment (DLT) (m) | | 6 | 0.18 | 30 |
| **Sub Total** | | **153** | **260** | **50,946** |
| **Agricultural and allied Sector development** | | | | |
| **Works in Lower Ridge** | | | | |
| Farm Bunding with Boundary Trenches - Individual (ha) | Lower | 35 | 52.5 | 20,510 |
| Micro Irrigation (ha) | | 15 | 15 | 0 |
| Construction of Farm Ponds - Individual (No. of units) | | 10 | 20 | 7,810 |
| Land development - Individual (ha) | | 35 | 350 | 1,36,710 |
| Dry land Horticulture/Agro for-estry - Individual (ha) | | 1 | 8.5 | 3,321 |
| Azolla units - Individual (No. of units) | | 16 | 2.4 | 368 |
| NADEP Vermi compost (No. of units) | | 16 | 2.88 | 432 |
| Fodder development - Communi-ty & Individual | | 16 | 23.68 | 37,504 |
| Cattle Shelters (No. of units) | | 16 | 33.92 | 5,296 |
| Goat Sheep Shelters (No. of units) | | 2 | 4.54 | 710 |
| Cattle Trough (No. of units) | | 16 | 0.8 | 96 |
| **Sub Total** | | **178** | **514** | **2,12,757** |

| Rural Water Management | | | | |
|---|---|---|---|---|
| Works in Lower Ridge | | | | |
| Soak Pits (Community) (No. of units) | Lower | 6 | 0.78 | 120 |
| Soak Pits (Individual) (No. of units) | | 58 | 5.8 | 928 |
| Roof Rain Water Harvesting (No. of units) | | 2 | 8 | 1,250 |
| Sub Total | | 66 | 15 | 2,298 |
| Total | | 397 | 789 | 2,66,001 |

Regarding CWRM themes of the total number of projects identified, 44.8 % works are in agriculture and allied sector while 38.5 % works are in public and common land, and 16.6 % works are in rural infrastructure respectively. Table 55 provides the estimates of the work budget, and personal days for three years from 2021-2024 in Periyakolapadi GP.

TABLE 55. 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 | 153 | 260 | 50,946 |
| Agriculture and Allied sector development | 178 | 514 | 2,12,757 |
| Rural water management | 66 | 15 | 2,298 |
| TOTAL | 397 | 789 | 2,66,001 |

## 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 56). 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 56. WASCA- WATER ACTIONS, INDICATORS AND IMPACTS

## WASCA CWRM ACTION PLAN

### DEVELOPMENT OF PUBLIC AND COMMON LAND

| | INDICATOR | | OUTCOMES/ IMPACT |
|---|---|---|---|
| 1 | No. of water bodies restored in the village | 1 | Four traditional water bodies restored |
| 2 | Block Plantation (ha) | 2 | 64 |
| 3 | Percentage reduction in the annual surface runoff | 3 | 28.11 ha. m surface runoff harvested and stored |
| 4 | The proportion of land treated under WASCA | 4 | 28% of the total geographical area of the village treated under WASCA in three years |
| 5 | Drainage Line Treatment (km) | 5 | 4.5 |

**4** TRADITIONAL WATER BODIES RESTORED

**64 ha.m** BLOCK PLANTATION

**28 %** AREA OF THE VILLAGE TREATED

**4.5 km** DRAINAGE LINES TREATED

## WASCA CWRM ACTION PLAN

### DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

| | INDICATOR | | OUTCOMES/ IMPACT |
|---|---|---|---|
| 1 | No of structures were established for on-farm (in-situ) water harvesting in dry lands | 1 | 10 farm ponds established |
| 2 | The reducing area under fallow lands | 2 | 168.04 ha under fallow land restored for cultivation |
| 3 | Improvement in soil health | 3 | 16 units of vermi compost established |
| 4 | No of artificial recharge structures proposed | 4 | 61 artificial recharge structures were established to replenish groundwater flow |

**10** FARM PONDS

**16** VERMI COMPOST

**61** 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. | 6 community level and 58 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. | 609 households established Nutri-gardens in homesteads |

**6** COMMUNITY & **58** INDIVIDUAL SOAK PITS

**2** COMMON ROOF RAINWATER HARVESTING

**609** 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 57).

TABLE 57. PROPOSALS FOR THE MGNREGS, PERIYAKOLAPADI GP, TIRUVANNAMALAI DISTRICT

| | No of works | No of person days |
|---|---|---|
| Perspective plan | 397 | 2,66,001 |
| Annual plan | 160 | 1,13,292 |

## 8.3.7 PROPOSED ACTIVITY MAP

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

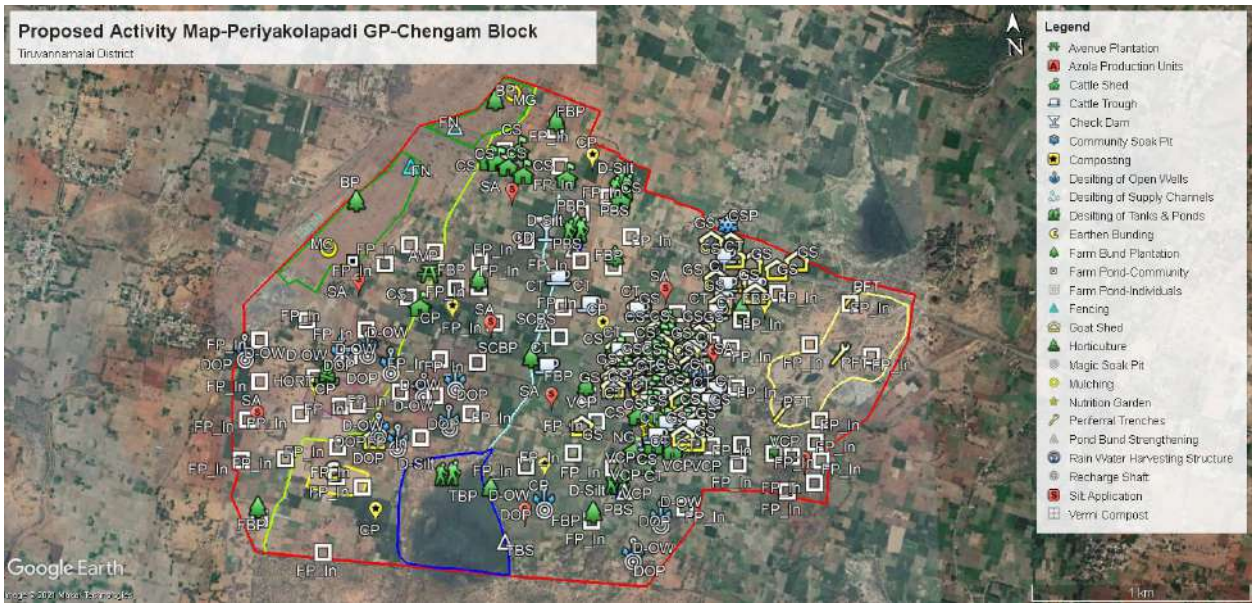



*Figure 8.12. Action plan of Periyakolapadi GP*

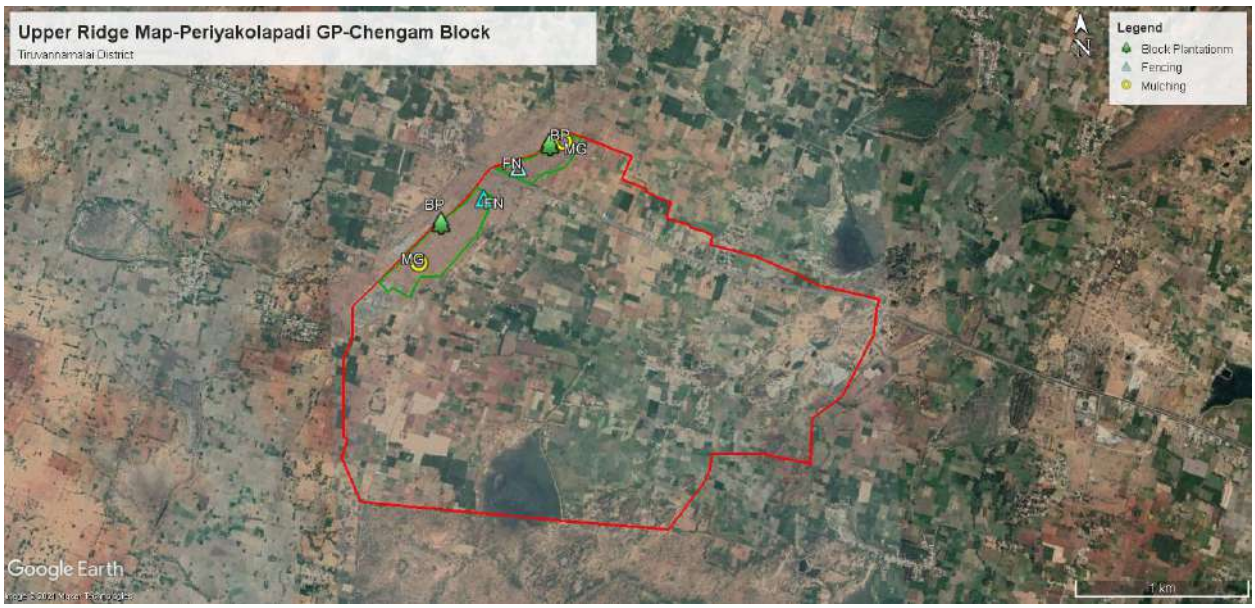



*Figure 8.13. Works on Upper Ridge of Periyakolapadi GP*

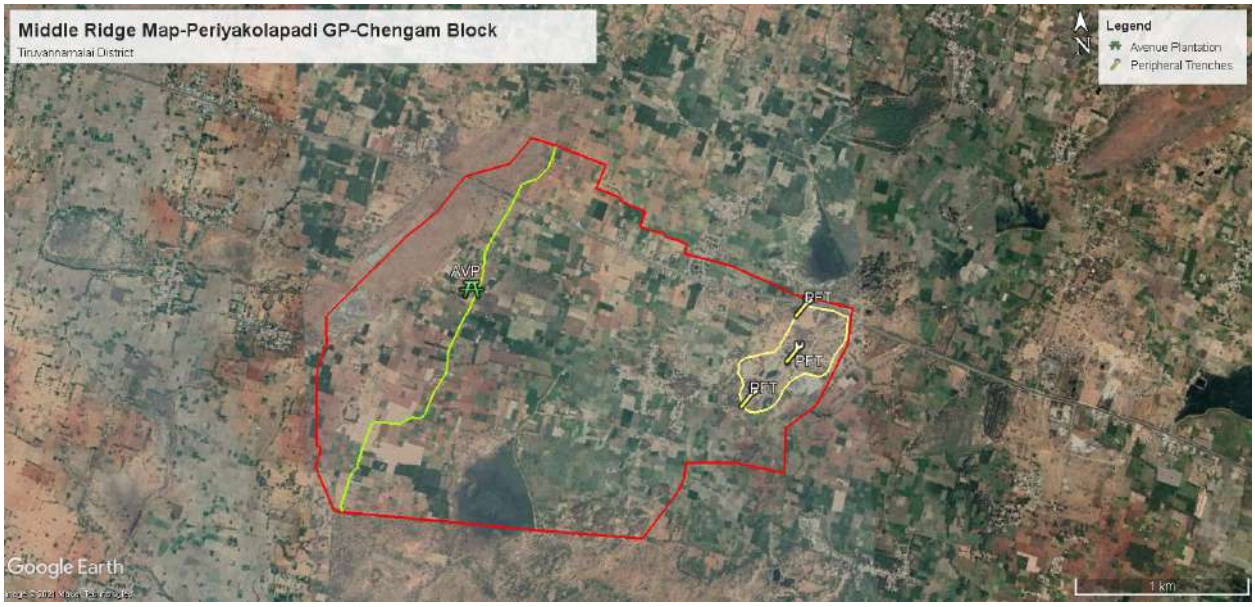



*Figure 8.14. Works on Middle Ridge of Periyakolapadi GP*

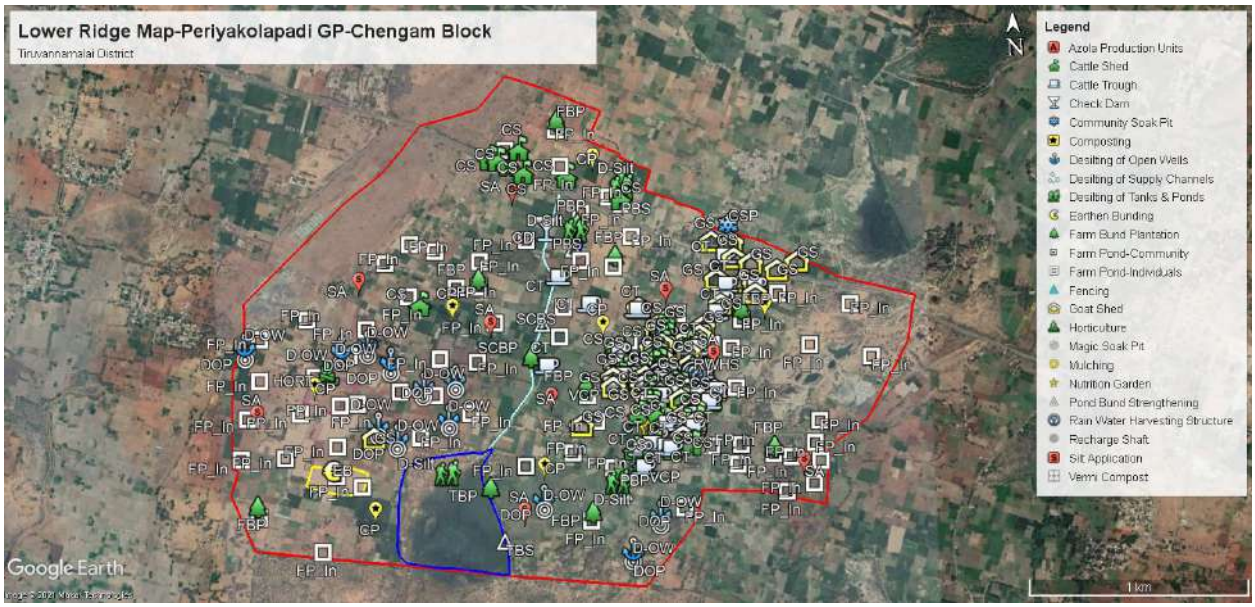
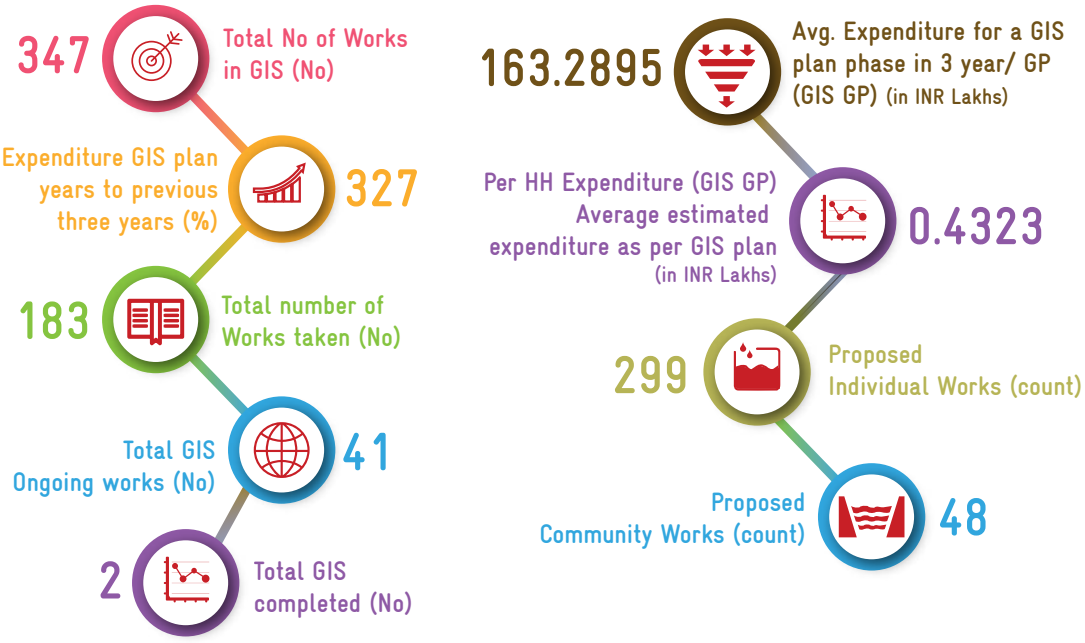



*Figure 8.15. Works on Lower Ridge of Periyakolapadi GP*

# 8.3.8 GIS PLAN IMPLEMENTATION, KEY PARAMETERS

The GIS plan implementation and performance in Chengam Block is represented in Table 58.

TABLE 58. GIS PLAN IMPLEMENTATION, KEY PARAMETERS PERFORMANCE OF PERIYAKOLAPADI GP




நீர்இன்று அமையாது உலகெனின் யார்யார்க்கும்
வான்இன்று அமையாது ஒழுக்கு

குறள் - 20

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

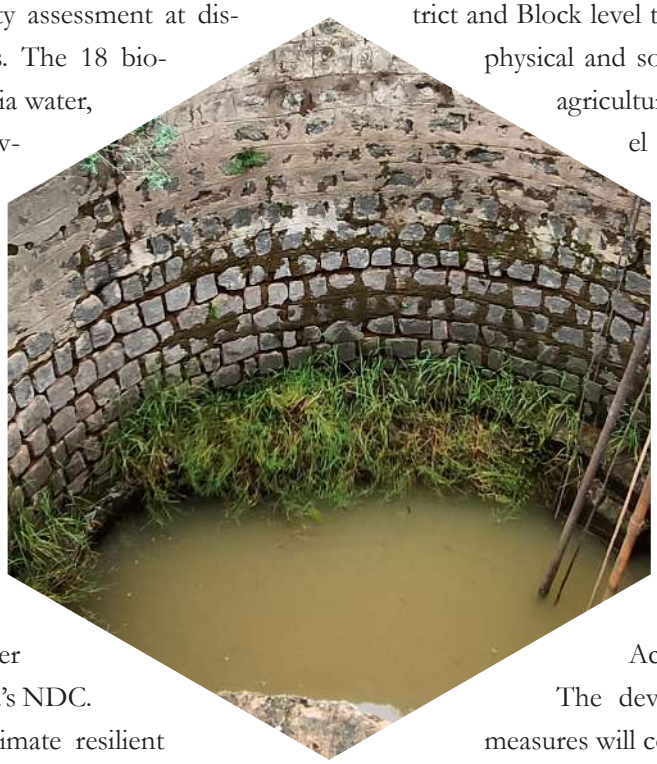
Thirukkural - 20

# CHAPTER 9

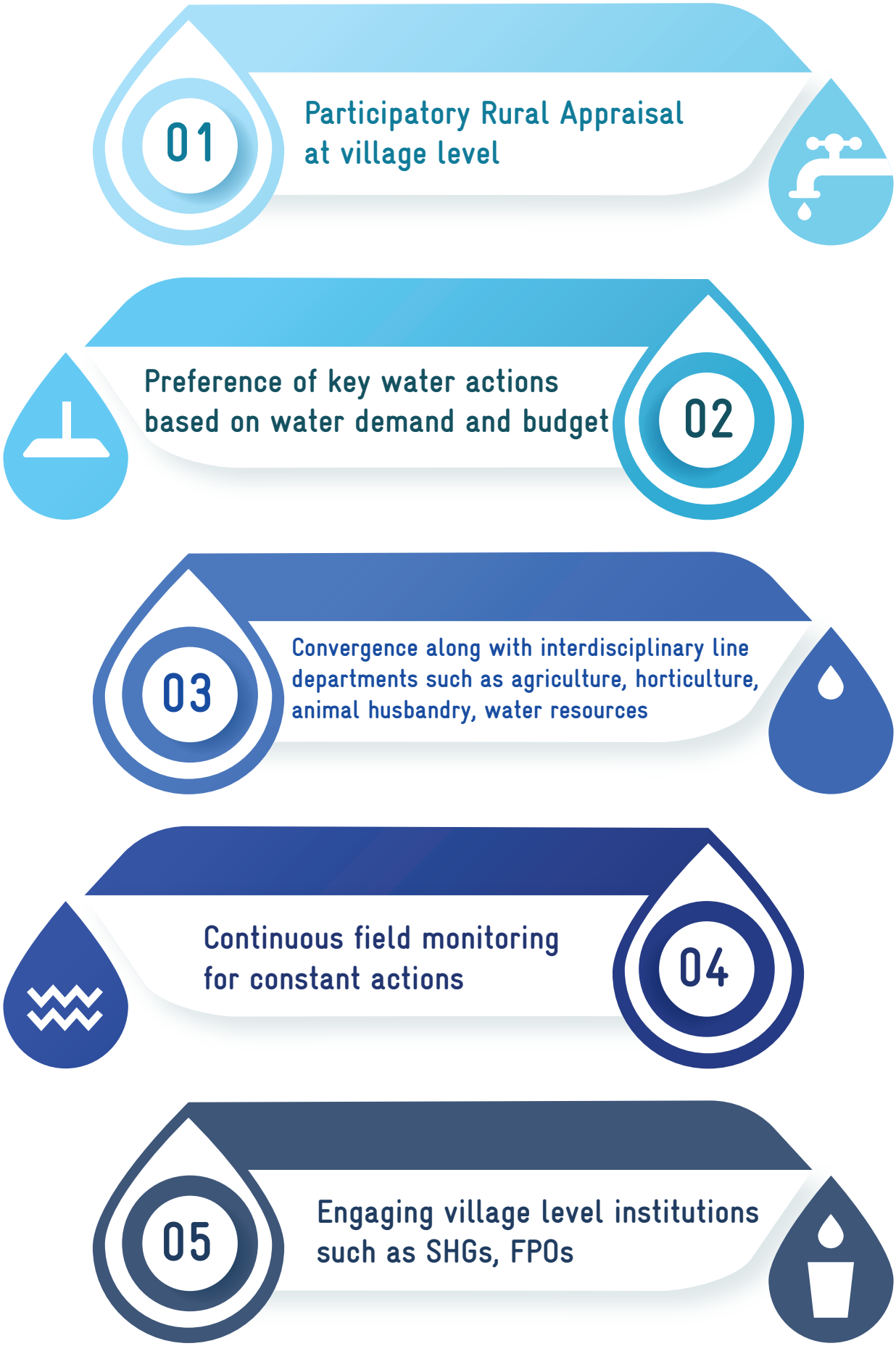
# CONCLUSION

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

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



Recommendations towards stable development and its progressive outcome are:


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

# ANNEXURES

# ANNEXURE 1

## TYPES OF GPs

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

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

# ANNEXURE 3.1

## KEY CWRM PARAMETER FROM SECONDARY SOURCES

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

| | |
|---|---|
| Area under Current Fallow land | *https://censusindia.gov.in/2011census/dchb/DCHB.html* |
| Area under Unirrigated Land | |
| Area Irrigated by Source | |
| **Soil Resources: Status of Available Nitrogen** | *https://soilhealth.dac.gov.in/NewHomePage/NutriPage* |
| Very Low (VL) | |
| Low (L) | |
| Medium (M) | |
| High (H) | |
| Very High (VH) | |
| **Status of Organic Carbon** | |
| Very Low (VL) | |
| Low (L) | |
| Medium (M) | |
| High (H) | |
| Very High (VH) | |
| **Status of Soil Micro Nutrients** | |
| Sufficient | |
| Deficient | |
| **Status of Physical condition of the soil** | *https://soilhealth.dac.gov.in/NewHomePage/NutriPage* |
| Acidic Sulphate | |
| Strongly Acidic | |
| Highly Acidic | |
| Moderately Acidic | |
| Slightly Acidic | |
| Neutral | |
| Moderately Alkaline | |
| Strongly Alkaline | |
| **Soil Texture** | NRSC |
| % of Clay Soil | |
| % of Fine Soil | |
| % of Coarse loamy | |
| Soil Water Permeability | standard table |
| **Soil moisture and ET** | *https://indiawris.gov.in/wris/#/* |
| Volumetric Soil Moisture | |
| **Livestock** | *https://farmer.gov.in/livestockcensus.aspx* |
| Cattle Population | |
| Sheep Population | |
| Goat Population | |
| Poultry | |

# ANNEXURE 3.2

## KEY CWRM PARAMETERS FROM PRIMARY SOURCES

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

# ANNEXURE 3.3

## KEY CWRM PARAMETER GENERATED -PRIMARY DATA

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

# ANNEXURE 3.4

## STANDARD NORMS FOR CALCULATING WATER DEMAND

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

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

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

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

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

# ANNEXURE 3.5

## STANDARD NORMS FOR GREY WATER GENERATION CALCULATION

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

# ANNEXURE 3.6

## GP WISE STATUS OF WATER RESOURCE AND ITS SUPPLY AND DEMAND

| Gram Panchayat | Canal Irrigation | | | | Tradational Water bodies | | |
|---|---|---|---|---|---|---|---|
| | Length of Main Canal (m) | Length of Minor Canal (m) | Length of Distributaries (m) | Water Courses (Field Channels) (m) | Number of Tanks (PWD & Union) (No.) | Number of Ooranis (No.) | Other Surface Water Bodies (No.) |
| Agaram (Se) | - | - | - | - | 2 | - | 4 |
| Alaputhur | 730 | - | - | - | 2 | - | 2 |
| Anwarabath | - | - | - | - | 1 | - | 5 |
| Arattavadi | 2,000 | - | - | - | 2 | - | 9 |
| Beemanandal | - | - | - | - | 1 | - | 4 |
| Aswanagasurunai | - | - | - | - | 1 | - | 3 |
| Chinnakolapadi | - | - | - | - | 1 | - | 5 |
| Ariyakunjur | 204 | - | - | - | - | - | 2 |
| Kannakurkkai | - | - | - | - | 2 | - | 7 |
| Kuppanatham | 4,000 | - | - | - | 2 | - | 7 |
| Kariyamangalam | 510 | 400 | - | - | 4 | - | 12 |
| Chennasamudram | 3,436 | - | - | - | 2 | - | 6 |
| Theethandapattu | 3,702 | - | - | - | 1 | - | 3 |
| Kayambattu | - | - | - | - | 2 | - | 2 |
| Manmalai | - | - | - | - | 2 | - | - |
| Melpallipattu | 3,500 | 1,500 | - | - | 2 | - | 5 |
| Melpennathur | 2,740 | - | - | - | 5 | - | 6 |
| Pakkiripalayam | 2,800 | - | - | - | 4 | - | 7 |
| Paliapattu | - | - | - | - | 2 | - | 3 |
| Periakolapadi | - | - | - | - | 1 | - | 9 |
| Porasapattu | - | - | - | - | 2 | - | 9 |
| Pinjur | 711 | - | - | - | 3 | - | 9 |
| Pudupattu | 1,128 | - | - | - | - | - | 6 |

| Gram Panchayat | Canal Irrigation | | | | Tradational Water bodies | | |
|---|---|---|---|---|---|---|---|
| | Length of Main Canal (m) | Length of Minor Canal (m) | Length of Distributaries (m) | Water Courses (Field Channels) (m) | Number of Tanks (PWD & Union) (No.) | Number of Ooranis (No.) | Other Surface Water Bodies (No.) |
| Quilam | 886 | - | - | - | 3 | - | 5 |
| Uchimalaikuppam | - | - | - | - | 1 | - | 9 |
| Se.Sorapanandal | 1,272 | - | - | - | 1 | - | 7 |
| Kattamaduvu | 1,800 | 700 | - | - | 1 | - | 7 |
| Se.Nachipattu | - | - | - | - | 2 | - | - |
| Thazhaiyuthu | - | - | - | - | 1 | - | 8 |
| Andanur | 2,500 | - | - | - | 2 | - | 7 |
| Valayambattu | - | - | - | - | 1 | - | - |
| Vinnavanur | - | - | - | - | 1 | - | 6 |
| Paramanandal | 3,000 | - | - | - | 1 | - | 8 |
| Kottavoor | - | - | - | - | 1 | - | - |
| Melpulidiyur | - | - | - | - | 2 | - | 6 |
| Andipatti | 1,000 | - | - | - | 1 | - | 15 |
| Elangunni | - | - | - | - | 3 | - | 3 |
| Melchengam | 5,000 | 5,000 | 3,000 | 2,000 | 1 | - | 5 |
| Melravanthavadi | - | - | - | - | 6 | - | 6 |
| Melvanakkambadi | - | - | - | - | 3 | - | 5 |
| Neepathurai | 2,000 | - | - | - | 2 | - | 2 |
| Pachal | - | - | - | - | 2 | - | 7 |
| Perumbakkam | - | - | - | - | 3 | - | 10 |
| Puliyampatti | 1,000 | - | - | - | 3 | - | 8 |

| Gram Panchayat | Irrigation Facilities (ha) | | | Catchment Area wise Available Runoff (ha.m) | | | Watershed and Drainage Networks | | |
|---|---|---|---|---|---|---|---|---|---|
| | Tank Irrigation | Canal Irrigation | Open & Tube Well Irrigation | Good Catchment Area | Average Catchment Area | Bad Catchment Area | Length of Natural Drainage Lines (m) | Number of Natural Drainage Lines (No.) | Number of Micro-watersheds (No.) |
| Agaram (Se) | - | - | 110 | 23 | 0 | 50 | 1,354 | 3 | 4 |
| Alaputhur | 14 | - | 103 | 17 | 4 | 51 | 2,000 | 2 | 4 |
| Anwarabath | - | - | 160 | 38 | - | 58 | 3,759 | 5 | 2 |
| Arattavadi | - | - | 235 | 30 | 6 | 134 | 11,528 | 7 | 5 |
| Beemanandal | - | - | 58 | 26 | - | 65 | 3,964 | 5 | 4 |
| Aswanagasurunai | 40 | - | 84 | 33 | 3 | 40 | 441 | 2 | 4 |
| Chinnakolapadi | - | - | 102 | 24 | - | 31 | 6,653 | 7 | 2 |
| Ariyakunjur | - | - | 79 | 18 | 4 | 35 | 6,441 | 7 | 3 |
| Kannakurkkai | - | - | 102 | 37 | 4 | 64 | 4,762 | 7 | 6 |
| Kuppanatham | - | - | 132 | 134 | - | 207 | 15,968 | 7 | 8 |
| Kariyamangalam | - | - | 622 | 37 | 14 | 70 | 13,697 | 9 | 4 |
| Chennasamudram | 21 | - | 363 | 35 | - | 98 | 7,612 | 4 | 5 |
| Theethandapattu | - | - | 267 | 24 | 7 | 74 | 8,140 | 4 | 7 |
| Kayambattu | - | 237 | 100 | 46 | 4 | 115 | 6,020 | 5 | 5 |
| Manmalai | - | - | 36 | 19 | 6 | 26 | - | - | 2 |
| Melpallipattu | 14 | - | 135 | 20 | 7 | 93 | 3,433 | 2 | 2 |
| Melpennathur | - | - | 319 | 76 | - | 115 | 6,325 | 5 | 3 |
| Pakkiripalayam | 51 | - | 330 | 68 | 0 | 204 | 12,609 | 6 | 7 |
| Paliapattu | - | - | 135 | 64 | - | 132 | 19,841 | 20 | 5 |
| Periakolapadi | - | - | 153 | 48 | 6 | 61 | 4,538 | 6 | 3 |
| Porasapattu | - | - | 105 | 32 | 74 | 60 | - | - | 6 |
| Pinjur | - | - | 152 | 36 | 3 | 90 | 7,936 | 4 | 4 |
| Pudupattu | - | - | 138 | 12 | 7 | 61 | 7,776 | 5 | 4 |
| Quilam | 35 | - | 200 | 65 | - | 83 | 7,530 | 6 | 6 |
| Uchimalaikuppam | - | - | 196 | 29 | 0 | 69 | 9,048 | 6 | 4 |

| Gram Panchayat | Irrigation Facilities (ha) | | | Catchment Area wise Available Runoff (ha.m) | | | Watershed and Drainage Networks | | |
|---|---|---|---|---|---|---|---|---|---|
| | Tank Irrigation | Canal Irrigation | Open & Tube Well Irrigation | Good Catchment Area | Average Catchment Area | Bad Catchment Area | Length of Natural Drainage Lines (m) | Number of Natural Drainage Lines (No.) | Number of Micro-watersheds (No.) |
| Se.Sorapanandal | 43 | - | 179 | 45 | - | 82 | 8,576 | 6 | 4 |
| Kattamaduvu | 3 | - | 244 | 15 | - | 139 | 7,814 | 7 | 5 |
| Se.Nachipattu | - | - | 400 | 38 | - | 91 | 3,578 | 5 | 5 |
| Thazhaiyuthu | 4 | - | 126 | 38 | - | 109 | 10,864 | 7 | 9 |
| Andanur | 3 | - | 161 | 27 | 1 | 90 | 4,290 | 4 | 3 |
| Valayambattu | - | - | 284 | 34 | - | 73 | 4,668 | 7 | 5 |
| Vinnavanur | - | - | 147 | 29 | - | 53 | 3,906 | 6 | 6 |
| Paramanandal | 7 | - | 704 | 71 | 25 | 264 | 22,193 | 15 | 7 |
| Kottavoor | - | - | 704 | 71 | 25 | 264 | 12,120 | 14 | 3 |
| Melpulidiyur | 73 | - | 344 | 56 | - | 113 | 7,769 | 4 | 7 |
| Andipatti | 10 | - | 406 | 72 | - | 206 | 15,221 | 7 | 7 |
| Elangunni | 18 | - | 264 | 267 | 1 | 155 | 14,319 | 7 | 10 |
| Melchengam | 7 | - | 231 | 29 | - | 153 | 7,276 | 6 | 12 |
| Melravanthavadi | 41 | - | 394 | 45 | 2 | 182 | 10,880 | 19 | 7 |
| Melvanakkambadi | 37 | - | 75 | 50 | - | 159 | 7,568 | 7 | 5 |
| Neepathurai | 7 | - | 238 | 78 | 1 | 128 | 10,598 | 10 | 6 |
| Pachal | 45 | - | 333 | 85 | 6 | 132 | 4,109 | 9 | 5 |
| Perumbakkam | 15 | - | 316 | 47 | 3 | 114 | 6,040 | 8 | 5 |
| Puliyampatti | 9 | - | 347 | 56 | 2 | 151 | 8,551 | 9 | 8 |

| Gram Panchayat | Water Demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | For Humans (ha.m) | For Livestock (ha.m) | For Agriculture (ha.m) | % GW Utilization for Drinking (%) | % GW Utilization for Livestock (%) | % GW Utilization for Agriculture. (%) | % SW Utilization for Drinking (%) | % SW Utilization for Livestock (%) | % SW Utilization for Agriculture (%) |
| Agaram (Se) | 4 | 3 | 158 | 5 | 92 | 80 | 95 | 8 | 20 |
| Alaputhur | 4 | 2 | 164 | 44 | 89 | 80 | 56 | 11 | 20 |
| Anwarabath | 6 | 2 | 204 | 14 | 93 | 94 | 86 | 7 | 6 |
| Arattavadi | 6 | 7 | 75 | 9 | 90 | 81 | 91 | 10 | 19 |
| Beemanandal | 4 | 3 | 113 | 7 | 90 | 84 | 93 | 10 | 16 |
| Aswanagasurunai | 4 | 1 | 2 | - | - | 100 | 100 | 100 | - |
| Chinnakolapadi | 3 | 2 | 74 | 76 | 80 | 65 | 24 | 20 | 35 |
| Ariyakunjur | 2 | 5 | 78 | - | 81 | 82 | 100 | 19 | 18 |
| Kannakurkkai | 8 | 4 | 163 | 93 | 88 | 96 | 7 | 12 | 4 |
| Kuppanatham | 9 | 2 | 586 | 83 | 95 | 97 | 17 | 5 | 3 |
| Kariyamangalam | 17 | 6 | 578 | 17 | 98 | 90 | 83 | 2 | 10 |
| Chennasamudram | 9 | 8 | 454 | 85 | 98 | 93 | 15 | 2 | 7 |
| Theethandapattu | 9 | 4 | 569 | 94 | 93 | 98 | 6 | 7 | 2 |
| Kayambattu | 11 | 5 | 308 | 79 | 99 | 89 | 21 | 1 | 11 |
| Manmalai | 6 | 1 | 199 | - | 97 | 85 | 100 | 3 | 15 |
| Melpallipattu | 14 | 7 | 159 | 79 | 93 | 67 | 21 | 7 | 33 |
| Melpennathur | 9 | 3 | 443 | 82 | 87 | 91 | 18 | 13 | 9 |
| Pakkiripalayam | 19 | 6 | 390 | 92 | 98 | 78 | 8 | 2 | 22 |
| Paliapattu | 10 | 3 | 228 | 84 | 87 | 76 | 16 | 13 | 24 |
| Periakolapadi | 6 | 3 | 199 | 2 | 87 | 76 | 98 | 13 | 24 |
| Porasapattu | 7 | 2 | 173 | 91 | 92 | 79 | 9 | 8 | 21 |
| Pinjur | 7 | 2 | 111 | 4 | 90 | 68 | 96 | 10 | 32 |
| Pudupattu | 8 | 4 | 256 | 4 | 95 | 85 | 96 | 5 | 15 |
| Quilam | 10 | 3 | 250 | 88 | 92 | 97 | 12 | 8 | 3 |
| Uchimalaikuppam | 6 | 4 | 202 | 5 | 90 | 85 | 95 | 10 | 15 |
| Se.Sorapanandal | 10 | 6 | 254 | 73 | 99 | 89 | 27 | 1 | 11 |

| Gram Panchayat | Water Demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | For Humans (ha.m) | For Livestock (ha.m) | For Agriculture (ha.m) | % GW Utilization for Drinking (%) | % GW Utilization for Livestock (%) | % GW Utilization for Agriculture. (%) | % SW Utilization for Drinking (%) | % SW Utilization for Livestock (%) | % SW Utilization for Agriculture (%) |
| Kattamaduvu | 6 | 4 | 211 | 73 | 93 | 70 | 27 | 7 | 30 |
| Se.Nachipattu | 9 | 2 | 429 | - | 94 | 98 | 100 | 6 | 2 |
| Thazhaiyuthu | 7 | 3 | 114 | 65 | 79 | 78 | 35 | 21 | 22 |
| Andanur | 11 | 4 | 208 | 84 | 97 | 92 | 16 | 3 | 8 |
| Valayambattu | 11 | 4 | 574 | 7 | 98 | 95 | 93 | 2 | 5 |
| Vinnavanur | 5 | 2 | 209 | 38 | 86 | 91 | 62 | 14 | 9 |
| Paramanandal | 22 | 18 | 753 | 80 | 95 | 94 | 20 | 5 | 6 |
| Kottavoor | 5 | 18 | 753 | - | 95 | 94 | 100 | 5 | 6 |
| Melpulidiyur | 15 | 4 | 472 | 82 | 97 | 88 | 18 | 3 | 12 |
| Andipatti | 15 | 5 | 572 | 84 | 87 | 81 | 16 | 13 | 19 |
| Elangunni | 10 | 5 | 217 | 94 | 89 | 55 | 6 | 11 | 45 |
| Melchengam | 12 | 6 | 369 | 97 | 96 | 85 | 3 | 4 | 15 |
| Melravanthavadi | 11 | 4 | 496 | 80 | 86 | 79 | 20 | 14 | 21 |
| Melvanakkambadi | 14 | 9 | 406 | 88 | 94 | 79 | 12 | 6 | 21 |
| Neepathurai | 6 | 4 | 231 | 97 | 96 | 64 | 3 | 4 | 36 |
| Pachal | 7 | 3 | 112 | 79 | 88 | 87 | 21 | 12 | 13 |
| Perumbakkam | 7 | 3 | 272 | 96 | 88 | 71 | 4 | 12 | 29 |
| Puliyampatti | 9 | 6 | 313 | 81 | 92 | 78 | 19 | 8 | 22 |

# ANNEXURE 3.7

## GP WISE STATUS OF AGRICULTURE RESOURCE

| Gram Panchayat | Land Resources (ha) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Area under Forest land | Non-Agricultural Uses | Area under Barren & Un-cultivable Land | Area under Permanent Pastures and Other Grazing Land | Land Under Miscellaneous Tree Criticalops etc. | Cultivable Waste Land | Fallows Land other than Current Fallows | Current Fallow land | Unirrigated Land | Area Irrigated by Source |
| Agaram (Se) | - | 43.54 | 17.83 | 0.50 | - | - | 4.73 | 116.60 | 36.86 | 109.60 |
| Alaputhur | - | 45.45 | - | - | - | 15.20 | - | 87.25 | 67.61 | 116.91 |
| Anwarabath | - | 76.38 | 25.17 | - | - | - | 25.80 | 119.63 | 5.27 | 160.32 |
| Arattavadi | - | 32.61 | 48.40 | - | - | 20.60 | 262.10 | 169.96 | 49.60 | 235.28 |
| Beemanandal | - | 53.62 | 15.16 | - | - | - | - | 287.34 | 3.57 | 58.15 |
| Aswanagasurunai | | 66.11 | 21.73 | | | 11.43 | 33.84 | 53.35 | 0.61 | 123.74 |
| Chinnakolapadi | - | 52.46 | 10.16 | - | - | - | 2.56 | 100.15 | 6.36 | 58.15 |
| Ariyakunjur | - | 45.38 | 1.26 | - | - | 15.00 | 65.23 | 32.27 | 11.55 | 78.64 |
| Kannakurkkai | - | 66.17 | 32.55 | - | - | 13.01 | 20.50 | 219.87 | 0.77 | 101.71 |
| Kuppanatham | - | 39.27 | 58.47 | - | - | 47.90 | 56.12 | 172.12 | 15.27 | 131.84 |
| Kariyamangalam | - | 330.30 | 26.70 | - | - | - | - | 451.44 | 35.12 | 621.88 |
| Chennasamudram | - | 91.75 | 1.15 | - | - | - | - | 152.46 | 6.54 | 363.12 |
| Theethandapattu | - | 57.80 | 5.98 | - | - | 23.12 | 21.74 | 87.04 | 20.59 | 267.34 |
| Kayambattu | - | 121.60 | 0.83 | - | - | 15.64 | 30.58 | 175.73 | 69.55 | 336.59 |
| Manmalai | - | 47.29 | 4.41 | - | - | 20.76 | 25.56 | 70.91 | 4.19 | 36.29 |
| Melpallipattu | - | 52.84 | - | - | - | 23.83 | 60.73 | 298.00 | 5.66 | 134.55 |
| Melpennathur | - | 145.30 | 57.68 | - | - | - | 20.04 | 274.27 | - | 319.09 |
| Pakkiripalayam | - | 160.80 | 19.86 | 0.42 | - | - | 34.47 | 614.83 | 57.76 | 381.32 |
| Paliapattu | - | 63.10 | 108.48 | - | - | - | 116.00 | 442.46 | 10.98 | 134.63 |
| Periakolapadi | - | 62.16 | 65.00 | - | - | 20.24 | 47.06 | 120.98 | 6.23 | 152.90 |
| Porasapattu | - | 48.74 | 35.22 | - | - | 263.17 | 120.04 | 16.75 | 77.43 | 104.92 |

| Gram Panchayat | Land Resources (ha) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Area under Forest land | Non-Agricultural Uses | Area under Barren & Un-cultivable Land | Area under Permanent Pastures and Other Grazing Land | Land Under Miscellaneous Tree Criticalops etc. | Cultivable Waste Land | Fallows Land other than Current Fallows | Current Fallow land | Unirrigated Land | Area Irrigated by Source |
| Pinjur | - | 94.57 | 0.23 | - | - | 10.51 | 148.78 | 142.95 | 37.95 | 151.64 |
| Pudupattu | - | 32.65 | - | - | - | 25.52 | 85.50 | 94.66 | 8.01 | 137.71 |
| Quilam | - | 104.72 | 68.78 | - | - | - | - | 215.81 | 26.52 | 199.67 |
| Uchimalaikuppam | - | 46.54 | 31.48 | 0.78 | - | - | - | 150.73 | 24.20 | 196.15 |
| Se.Sorapanandal | - | 105.26 | 14.71 | - | - | - | - | 230.35 | 28.05 | 179.15 |
| Kattamaduvu | - | 31.09 | 7.84 | - | - | - | 59.58 | 307.20 | 132.40 | 243.69 |
| Se.Nachipattu | - | 101.55 | - | - | - | - | - | 86.38 | 0.34 | 399.59 |
| Thazhaiyuthu | - | 24.34 | 77.29 | - | - | - | 160.66 | 258.15 | 36.95 | 126.29 |
| Andanur | - | 69.49 | 1.22 | - | - | 4.32 | 33.02 | 243.15 | 42.41 | 163.98 |
| Valayambattu | - | 89.28 | - | - | - | - | 11.95 | 64.20 | 28.79 | 283.60 |
| Vinnavanur | - | 52.98 | 25.40 | - | - | - | 6.25 | 130.79 | 0.60 | 147.40 |
| Paramanandal | - | 190.43 | - | - | - | 90.37 | 24.50 | 645.12 | 36.82 | 703.86 |
| Kottavoor | - | 190.43 | - | - | - | 90.37 | 24.50 | 645.12 | 36.82 | 703.86 |
| Melpulidiyur | - | 148.84 | 0.10 | - | - | - | 10.11 | 237.96 | 11.13 | 343.58 |
| Andipatti | - | 123.14 | 69.94 | - | - | - | 26.34 | 546.38 | 122.67 | 405.54 |
| Elangunni | - | 102.49 | 610.06 | - | - | 5.00 | 7.00 | 353.97 | 205.27 | 264.21 |
| Melchengam | - | 65.02 | 11.14 | - | - | - | 284.11 | 59.51 | 238.24 | 238.00 |
| Melravanthavadi | - | 64.71 | 55.85 | - | 1.30 | 6.15 | 150.65 | 391.80 | 38.77 | 393.65 |
| Melvanakkambadi | - | 125.03 | 7.04 | - | - | - | 16.70 | 480.77 | 74.69 | 279.95 |
| Neepathurai | - | 48.77 | 158.86 | - | - | 3.17 | 22.15 | 346.50 | 78.71 | 237.73 |
| Pachal | - | 159.88 | 66.21 | 0.94 | - | 20.24 | 91.34 | 205.50 | 76.39 | 334.17 |
| Perumbakkam | - | 92.96 | 31.85 | - | 1.47 | 8.89 | 3.55 | 246.69 | 30.27 | 331.08 |
| Puliyampatti | - | 51.63 | 96.98 | - | - | 5.35 | 25.01 | 273.55 | 159.85 | 346.96 |

| Gram Panchayat | Land under Catchment Area (ha) | | | Crop Details | | | | |
|---|---|---|---|---|---|---|---|---|
| | Good Catchment | Average Catchment | Bad Catchment | Irrigated Area (ha) | Rainfed area (ha) | Paddy Cultivation (ha) | Crop Water Requirement - Irrigated condition (ha.m) | Crop Water Requirement - Rainfed condition (ha.m) |
| Agaram (Se) | 61.37 | 0.50 | 267.79 | 87.93 | 86.52 | 75.87 | 125.81 | 31.85 |
| Alaputhur | 45.45 | 15.20 | 271.77 | 88.00 | 84.50 | 66.00 | 131.20 | 33.18 |
| Anwarabath | 101.55 | - | 311.02 | 141.26 | 33.51 | 86.44 | 191.95 | 12.37 |
| Arattavadi | 81.01 | 20.60 | 716.94 | 49.27 | 35.81 | 37.24 | 60.75 | 13.83 |
| Beemanandal | 68.78 | - | 349.06 | 71.24 | 47.84 | 48.63 | 95.43 | 17.58 |
| Aswanagasurunai | 87.84 | 11.43 | 211.54 | 2.83 | - | - | 1.56 | - |
| Chinnakolapadi | 62.62 | - | 167.22 | 39.32 | 68.05 | 27.15 | 48.54 | 25.69 |
| Ariyakunjur | 46.64 | 15.00 | 187.69 | 43.50 | 37.23 | 32.00 | 64.00 | 14.30 |
| Kannakurkkai | 98.72 | 13.01 | 342.85 | 134.64 | 16.49 | 92.90 | 156.16 | 7.32 |
| Kuppanatham | 97.74 | 47.90 | 375.35 | 393.13 | 47.19 | 140.73 | 566.62 | 19.72 |
| Kariyamangalam | 357.00 | - | 1108.44 | 370.44 | 144.77 | 315.01 | 522.79 | 55.67 |
| Chennasamudram | 92.90 | - | 522.12 | 312.13 | 70.20 | 218.00 | 421.47 | 32.52 |
| Theethandapattu | 63.78 | 23.12 | 396.71 | 417.78 | 34.00 | 347.00 | 556.69 | 12.10 |
| Kayambattu | 122.43 | 15.64 | 612.45 | 191.00 | 84.00 | 162.00 | 274.30 | 33.75 |
| Manmalai | 51.70 | 20.76 | 136.95 | 124.12 | 75.92 | 99.09 | 169.90 | 29.57 |
| Melpallipattu | 52.84 | 23.83 | 498.94 | 101.06 | 125.01 | 55.00 | 105.94 | 53.18 |
| Melpennathur | 202.98 | - | 613.40 | 241.10 | 111.22 | 125.41 | 402.65 | 40.44 |
| Pakkiripalayam | 180.66 | 0.42 | 1088.38 | 253.95 | 233.20 | 171.00 | 302.60 | 86.93 |
| Paliapattu | 171.58 | - | 704.07 | 140.74 | 142.68 | 103.00 | 174.10 | 53.54 |
| Periakolapadi | 127.16 | 20.24 | 327.17 | 113.77 | 129.09 | 92.09 | 151.03 | 48.04 |
| Porasapattu | 83.96 | 263.17 | 319.14 | 105.07 | 94.90 | 80.94 | 135.75 | 36.75 |
| Pinjur | 94.80 | 10.51 | 481.32 | 57.15 | 96.21 | 47.33 | 75.69 | 34.93 |
| Pudupattu | 32.65 | 25.52 | 325.88 | 147.75 | 102.75 | 65.00 | 218.19 | 37.68 |
| Quilam | 173.50 | - | 442.00 | 166.55 | 22.21 | 127.43 | 241.44 | 8.18 |
| Uchimalaikuppam | 78.02 | 0.78 | 371.08 | 122.58 | 83.30 | 100.00 | 170.76 | 31.05 |
| Se.Sorapanandal | 119.97 | - | 437.55 | 161.06 | 78.01 | 112.30 | 225.01 | 28.80 |

| Gram Panchayat | Land under Catchment Area (ha) | | | Crop Details | | | | |
|---|---|---|---|---|---|---|---|---|
| | Good Catchment | Average Catchment | Bad Catchment | Irrigated Area (ha) | Rainfed area (ha) | Paddy Cultivation (ha) | Crop Water Requirement - Irrigated condition (ha.m) | Crop Water Requirement - Rainfed condition (ha.m) |
| **Kattamaduvu** | 38.93 | - | 742.87 | 117.27 | 159.28 | 85.75 | 147.60 | 63.44 |
| **Se.Nachipattu** | 101.55 | - | 486.31 | 290.03 | 18.92 | 221.89 | 421.88 | 7.15 |
| **Thazhaiyuthu** | 101.63 | - | 582.05 | 66.38 | 66.26 | 49.21 | 88.96 | 24.54 |
| **Andanur** | 70.71 | 4.32 | 482.56 | 152.51 | 41.47 | 115.64 | 191.74 | 16.08 |
| **Valayambattu** | 89.28 | - | 388.54 | 397.50 | 62.00 | 342.00 | 544.62 | 28.90 |
| **Vinnavanur** | 78.38 | - | 285.04 | 126.17 | 51.09 | 105.73 | 189.53 | 19.62 |
| **Paramanandal** | 190.43 | 90.37 | 1410.30 | 549.51 | 130.82 | 437.26 | 707.29 | 45.79 |
| **Kottavoor** | 190.43 | 90.37 | 1410.30 | 549.51 | 130.82 | 437.26 | 707.29 | 45.79 |
| **Melpulidiyur** | 148.94 | - | 602.78 | 297.01 | 158.11 | 230.19 | 416.28 | 55.50 |
| **Andipatti** | 193.08 | - | 1100.93 | 395.61 | 292.18 | 266.93 | 465.66 | 106.31 |
| **Elangunni** | 712.55 | 5.00 | 830.45 | 115.48 | 276.31 | 56.90 | 119.70 | 97.61 |
| **Melchengam** | 76.16 | - | 819.86 | 236.43 | 150.32 | 190.89 | 314.39 | 54.39 |
| **Melravanthavadi** | 120.56 | 7.45 | 974.87 | 307.75 | 293.26 | 233.83 | 390.67 | 105.36 |
| **Melvanakkambadi** | 132.07 | - | 852.11 | 269.19 | 246.68 | 156.35 | 319.47 | 86.43 |
| **Neepathurai** | 207.63 | 3.17 | 685.09 | 118.80 | 223.75 | 80.75 | 148.25 | 82.30 |
| **Pachal** | 226.09 | 21.18 | 707.40 | 73.01 | 42.10 | 57.95 | 96.92 | 14.73 |
| **Perumbakkam** | 124.81 | 10.36 | 611.59 | 138.97 | 122.34 | 99.17 | 192.83 | 79.52 |
| **Puliyampatti** | 148.61 | 5.35 | 805.37 | 199.68 | 189.97 | 136.43 | 245.64 | 67.81 |

| Gram Panchayat | Soil Resources: Status of Available Nitrogen (%) | | | | | Status of Organic Carbon (%) | | | | | Status of Soil Micro Nutrients (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Very Low | Low | Medium | High | Very High | Very Low | Low | Medium | High | Very High | Suffi-cient | Defi-cient |
| Agaram (Se) | 7.32 | 92.68 | - | - | - | 42.68 | 56.10 | - | - | 1.22 | 69.00 | 31.00 |
| Alaputhur | 1.72 | 94.83 | 3.45 | - | - | 48.28 | 48.28 | 3.45 | - | - | 83.00 | 17.00 |
| Anwarabath | 18.67 | 76.00 | 5.33 | - | - | 26.67 | 69.33 | 4.00 | - | - | 81.00 | 19.00 |
| Arattavadi | 70.00 | 30.00 | - | - | - | 43.33 | 56.67 | - | - | - | 66.00 | 34.00 |
| Beemanandal | - | 100.00 | - | - | - | 34.00 | 66.00 | - | - | - | 62.00 | 38.00 |
| Aswanagasurunai | 33.93 | 64.29 | 1.79 | - | - | - | 19.64 | 80.36 | - | - | 62.00 | 38.00 |
| Chinnakolapadi | 2.08 | 97.92 | - | - | - | 31.25 | 68.75 | - | - | - | 61.00 | 39.00 |
| Ariyakunjur | 75.00 | 25.00 | - | - | - | 36.67 | 63.33 | - | - | - | 64.00 | 36.00 |
| Kannakurkkai | 38.74 | 59.46 | 1.80 | - | - | 47.75 | 48.65 | 1.80 | - | - | 56.00 | 44.00 |
| Kuppanatham | 21.21 | 77.78 | 1.01 | - | - | 51.52 | 48.48 | - | - | - | 87.00 | 13.00 |
| Kariyamangalam | - | 100.00 | - | - | - | 0.35 | 99.65 | - | - | - | 55.00 | 45.00 |
| Chennasamudram | 42.48 | 57.52 | - | - | - | 49.56 | 50.44 | - | - | - | 74.00 | 26.00 |
| Theethandapattu | 79.03 | 20.97 | - | - | - | 41.13 | 58.87 | - | - | - | 63.00 | 37.00 |
| Kayambattu | 56.07 | 43.93 | - | - | - | 57.94 | 34.58 | 7.48 | - | - | 73.00 | 27.00 |
| Manmalai | 94.12 | 5.88 | - | - | - | 70.59 | 29.41 | - | - | - | 68.00 | 32.00 |
| Melpallipattu | 81.42 | 18.58 | - | - | - | 44.25 | 55.75 | - | - | - | 67.00 | 33.00 |
| Melpennathur | 0.78 | 99.22 | - | - | - | 32.56 | 67.44 | - | - | - | 60.00 | 40.00 |
| Pakkiripalayam | 3.87 | 87.74 | 8.39 | - | - | 16.77 | 79.35 | 3.23 | - | - | 78.00 | 22.00 |
| Paliapattu | 9.34 | 80.22 | 10.44 | - | - | 14.84 | 76.37 | 8.79 | - | - | 81.00 | 19.00 |
| Periakolapadi | 53.76 | 46.24 | - | - | - | 36.56 | 63.44 | - | - | - | 58.00 | 42.00 |
| Porasapattu | 1.33 | 98.67 | - | - | - | 32.00 | 68.00 | - | - | - | 61.00 | 39.00 |
| Pinjur | 75.00 | 25.00 | - | - | - | 42.86 | 57.14 | - | - | - | 65.00 | 35.00 |
| Pudupattu | 74.51 | 25.49 | - | - | - | 37.25 | 62.75 | - | - | - | 63.00 | 37.00 |
| Quilam | 80.65 | 19.35 | - | - | - | 51.61 | 47.31 | 1.08 | - | - | 63.00 | 37.00 |
| Uchimalaikuppam | 39.05 | 60.95 | - | - | - | 43.81 | 55.24 | 0.95 | - | - | 61.00 | 39.00 |
| Se.Sorapanandal | 18.52 | 75.93 | 5.56 | - | - | 10.19 | 84.26 | 5.56 | - | - | 92.00 | 8.00 |

| Gram Panchayat | Soil Resources: Status of Available Nitrogen (%) | | | | | Status of Organic Carbon (%) | | | | | Status of Soil Micro Nutrients (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Very Low | Low | Medium | High | Very High | Very Low | Low | Medium | High | Very High | Suffi-cient | Defi-cient |
| Kattamaduvu | 24.82 | 69.34 | 5.84 | - | - | 32.12 | 66.42 | 1.46 | - | - | 74.00 | 26.00 |
| Se.Nachipattu | 76.58 | 23.42 | - | - | - | 43.24 | 55.86 | 0.90 | - | - | 62.00 | 38.00 |
| Thazhaiyuthu | 37.50 | 59.38 | 3.13 | - | - | 50.00 | 45.31 | 4.69 | - | - | 56.00 | 44.00 |
| Andanur | - | 100.00 | - | - | - | 4.46 | 95.54 | - | - | - | 77.00 | 23.00 |
| Valayambattu | - | 100.00 | - | - | - | 21.93 | 78.07 | - | - | - | 63.00 | 37.00 |
| Vinnavanur | 2.04 | 97.96 | - | - | - | 14.29 | 77.55 | 8.16 | - | - | 92.00 | 8.00 |
| Paramanandal | 0.31 | 99.69 | - | - | - | 6.58 | 93.10 | 0.31 | - | - | 72.00 | 28.00 |
| Kottavoor | 0.31 | 99.69 | - | - | - | 6.58 | 93.10 | 0.31 | - | - | 72.00 | 28.00 |
| Melpulidiyur | 24.59 | 65.57 | 9.84 | - | - | 37.70 | 62.30 | - | - | - | 62.00 | 38.00 |
| Andipatti | 37.84 | 58.11 | 4.05 | - | - | 37.84 | 60.81 | - | 1.35 | - | - | 100.00 |
| Elangunni | 97.37 | 2.63 | - | - | - | 98.68 | 1.32 | - | - | - | 79.00 | 21.00 |
| Melchengam | - | 100.00 | - | - | - | 20.51 | 79.49 | - | - | - | 75.00 | 25.00 |
| Melravanthavadi | - | 100.00 | - | - | - | - | 100.00 | - | - | - | 81.00 | 19.00 |
| Melvanakkambadi | 2.27 | 96.21 | 1.52 | - | - | 9.09 | 87.12 | 3.79 | - | - | 77.00 | 23.00 |
| Neepathurai | - | 100.00 | - | - | - | 31.37 | 68.63 | - | - | - | 66.00 | 34.00 |
| Pachal | - | 100.00 | - | - | - | 4.35 | 89.13 | - | 6.52 | - | 92.00 | 8.00 |
| Perumbakkam | 100.00 | - | - | - | - | 99.15 | - | 0.85 | - | - | 46.00 | 54.00 |
| Puliyampatti | - | 100.00 | - | - | - | 10.71 | 85.71 | 3.57 | - | - | 91.00 | 9.00 |

| Gram Panchayat | Status of Physical condition of the soil (%) | | | | | | | | Soil Texture (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mod-erately Acidic | Strongly Acidic | Highly Acidic | Mod-erately Acidic | Slighly Acidic | Neutral | Mod-erately Alkaline | Strong-ly Al-kaline | Clay soil | Fine Soil | Coarse loamy | Soil Water Per-meability (Low, Moderate, high) |
| Agaram (Se) | - | - | - | - | - | - | 100.00 | - | 15.15 | 48.18 | 30.61 | Moderate |
| Alaputhur | - | - | - | - | 1.72 | 8.62 | 89.66 | - | 73.00 | 1.00 | 21.00 | Moderate |
| Anwarabath | - | - | - | 1.33 | 12.00 | 6.67 | 80.00 | - | 72.15 | - | 18.00 | Moderate |
| Arattavadi | - | - | - | - | 25.00 | - | 75.00 | - | 8.11 | 92.00 | - | Moderate |
| Beemanandal | - | - | - | - | 1.00 | 15.00 | 84.00 | - | 24.88 | 49.52 | - | Moderate |
| Aswanagasurunai | - | - | - | - | - | 1.79 | 98.21 | - | 0.64 | 79.10 | 4.18 | Moderate |
| Chinnakolapadi | - | - | - | - | - | 6.25 | 93.75 | - | - | 76.00 | 2.00 | Moderate |
| Ariyakunjur | - | - | - | - | 8.33 | - | 91.67 | - | 85.54 | 3.00 | - | Moderate |
| Kannakurkkai | - | - | - | 0.90 | 27.93 | 9.91 | 61.26 | - | 5.05 | 77.36 | 3.74 | Moderate |
| Kuppanatham | - | - | - | 10.56 | 12.68 | 0.35 | 76.41 | - | 33.00 | 56.00 | - | Moderate |
| Kariyamangalam | - | - | - | 1.01 | 22.22 | 11.11 | 65.66 | - | 43.71 | 52.45 | 3.85 | Moderate |
| Chennasamudram | - | - | - | 5.31 | 1.77 | - | 87.61 | 5.31 | 66.02 | 24.00 | - | Moderate |
| Theethandapattu | - | - | - | - | 0.81 | 0.81 | 98.39 | - | - | 100.00 | - | Moderate |
| Kayambattu | - | - | - | 8.41 | 8.41 | 1.87 | 81.31 | - | 38.48 | 48.00 | - | Moderate |
| Manmalai | - | - | - | - | 17.65 | 23.53 | 58.82 | - | - | 49.00 | 50.00 | Moderate |
| Melpallipattu | - | - | - | - | 1.77 | 2.21 | 96.02 | - | 0.34 | 98.81 | - | Moderate |
| Melpennathur | - | - | - | - | - | 21.54 | 78.46 | - | 15.00 | 79.00 | - | Moderate |
| Pakkiripalayam | - | - | - | - | - | - | 99.35 | 0.65 | 35.00 | 57.00 | 8.00 | Moderate |
| Paliapattu | - | - | - | 0.55 | 17.03 | 11.54 | 70.88 | - | 3.00 | 70.00 | - | Moderate |
| Periakolapadi | - | - | - | - | 23.40 | 7.45 | 69.15 | - | 1.00 | 39.00 | - | Moderate |
| Porasapattu | - | - | - | - | - | 13.33 | 86.67 | - | 23.00 | 76.00 | - | Moderate |
| Pinjur | - | - | - | - | 17.14 | - | 82.86 | - | 26.20 | 74.00 | - | Moderate |
| Pudupattu | - | - | - | - | 11.76 | - | 88.24 | - | 84.00 | 8.00 | 1.00 | Moderate |
| Quilam | - | - | - | - | 9.68 | 23.66 | 66.67 | - | 52.00 | 32.00 | 13.00 | Moderate |
| Uchimalaikuppam | - | - | - | - | 19.05 | 14.29 | 66.67 | - | 46.00 | 39.00 | - | Moderate |
| Se.Sorapanandal | - | - | - | - | - | - | 100.00 | - | 39.00 | 24.00 | - | Moderate |

| Gram Panchayat | Status of Physical condition of the soil (%) | | | | | | | | Soil Texture (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mod-erately Acidic | Strongly Acidic | Highly Acidic | Mod-erately Acidic | Slighly Acidic | Neutral | Mod-erately Alkaline | Strong-ly Al-kaline | Clay soil | Fine Soil | Coarse loamy | Soil Water Per-meability (Low, Moderate, high) |
| Kattamaduvu | - | - | - | 5.93 | 10.37 | 4.44 | 79.26 | - | 25.00 | 23.00 | 2.00 | Moderate |
| Se.Nachipattu | - | - | - | 0.90 | 9.01 | 0.90 | 89.19 | - | 45.00 | 22.00 | 20.00 | Moderate |
| Thazhaiyuthu | - | - | - | - | 15.63 | 23.44 | 60.94 | - | 6.43 | 80.00 | 13.00 | Moderate |
| Andanur | - | - | - | 2.68 | 4.46 | - | 92.86 | - | 6.15 | 43.85 | - | Moderate |
| Valayambattu | - | - | - | - | - | 6.14 | 93.86 | - | 35.00 | 42.00 | 12.00 | Moderate |
| Vinnavanur | - | - | - | - | - | - | 100.00 | - | 74.00 | 13.00 | 2.20 | Moderate |
| Paramanandal | - | - | - | 2.19 | 18.18 | 0.63 | 78.68 | 0.31 | - | - | - | Moderate |
| Kottavoor | - | - | - | - | - | - | - | - | 48.62 | 46.46 | 4.92 | Moderate |
| Melpulidiyur | - | - | - | - | 19.67 | 21.31 | 59.02 | - | 2.77 | 62.05 | 19.11 | Moderate |
| Andipatti | - | - | - | 1.35 | 36.49 | 16.22 | 45.95 | - | 5.00 | 44.00 | - | Moderate |
| Elangunni | - | - | - | - | 30.23 | 11.63 | 58.14 | - | 38.55 | 21.25 | 15.99 | Low |
| Melchengam | - | - | - | 5.13 | 10.26 | - | 84.62 | - | 39.30 | 39.86 | 16.08 | Moderate |
| Melravanthavadi | - | - | - | 3.21 | 3.85 | - | 92.95 | - | 24.00 | 65.00 | - | Moderate |
| Melvanakkambadi | - | - | - | 6.82 | 12.88 | 3.79 | 75.76 | 0.76 | 24.76 | 70.00 | - | Moderate |
| Neepathurai | - | - | - | - | - | 31.37 | 68.63 | - | 5.00 | 84.00 | 11.00 | Moderate |
| Pachal | - | - | - | - | 13.04 | 8.70 | 78.26 | - | 2.74 | 80.59 | 4.22 | Moderate |
| Perumbakkam | - | - | - | 4.27 | 36.75 | 2.56 | 56.41 | - | 1.49 | 64.00 | 0.41 | Moderate |
| Puliyampatti | - | - | - | - | - | - | 100.00 | - | 13.51 | 62.00 | 24.00 | Moderate |

| Gram Panchayat | Soil moisture and ET | | | Means of Water Extraction (%) | | Irrigation Methods (%) | | Livestock (No.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Volumetric Soil Moisture (%) | Estimated Soil Moisture (ha.m) | ET Losses (ha.m) | Gravity | Lifting | Wild Flooding | Control Flooding | Cattle Population | Sheep Population | Goat Population | Poultry |
| Agaram (Se) | 23.00 | 286.12 | 76.71 | 3.00 | 97.00 | - | 100.00 | 641 | 334 | 258 | - |
| Alaputhur | 23.00 | 286.97 | 96.32 | 2.00 | 98.00 | 12.00 | 88.00 | 385 | 176 | 264 | - |
| Anwarabath | 23.00 | 336.19 | 86.44 | 1.00 | 99.00 | - | 100.00 | 601 | 195 | 205 | - |
| Arattavadi | 23.00 | 785.94 | 148.71 | 1.00 | 99.00 | - | 100.00 | 1,305 | 904 | 955 | - |
| Beemanandal | 23.00 | 364.22 | 32.22 | 2.00 | 98.00 | - | 100.00 | 631 | 295 | 393 | - |
| Aswanagasurunai | 23.00 | 244.70 | 64.91 | 17.00 | 83.00 | 32.00 | 68.00 | 341 | 309 | 72 | - |
| Chinnakolapadi | 23.00 | 177.38 | 33.67 | 2.00 | 98.00 | - | 100.00 | 502 | 763 | 502 | - |
| Ariyakunjur | 23.00 | 203.95 | 47.08 | - | 100.00 | - | 100.00 | 1,072 | 1,600 | 1,030 | - |
| Kannakurkkai | 23.00 | 388.41 | 53.49 | 2.00 | 98.00 | - | 100.00 | 1,015 | 674 | 725 | - |
| Kuppanatham | 23.00 | 481.72 | 76.79 | 3.00 | 97.00 | 1.00 | 99.00 | 564 | 43 | 120 | - |
| Kariyamangalam | 23.00 | 1135.14 | 342.95 | 1.00 | 99.00 | - | 100.00 | 1,621 | - | 207 | - |
| Chennasamudram | 23.00 | 523.27 | 192.96 | 2.00 | 98.00 | 5.00 | 95.00 | 2,136 | 139 | 355 | - |
| Theethandapattu | 23.00 | 425.81 | 150.30 | 1.00 | 99.00 | - | 100.00 | 978 | 341 | 337 | - |
| Kayambattu | 23.00 | 628.92 | 212.01 | 3.00 | 97.00 | 70.00 | 30.00 | 1,388 | 9 | 142 | - |
| Manmalai | 23.00 | 162.12 | 21.13 | 12.00 | 88.00 | - | 100.00 | 265 | 67 | 7 | - |
| Melpallipattu | 23.00 | 522.77 | 73.19 | 2.00 | 98.00 | 10.00 | 90.00 | 1,692 | 571 | 461 | - |
| Melpennathur | 23.00 | 671.08 | 166.56 | 3.00 | 97.00 | - | 100.00 | 651 | 650 | 350 | - |
| Pakkiripalayam | 23.00 | 1108.66 | 229.42 | 1.00 | 99.00 | 13.00 | 87.00 | 1,689 | 234 | 89 | - |
| Paliapattu | 23.00 | 812.55 | 76.01 | 2.00 | 98.00 | - | 100.00 | 810 | 850 | 356 | - |
| Periakolapadi | 23.00 | 412.41 | 83.07 | 1.00 | 99.00 | - | 100.00 | 652 | 754 | 213 | - |
| Porasapattu | 23.00 | 617.53 | 95.19 | 3.00 | 97.00 | - | 100.00 | 490 | 51 | 387 | - |
| Pinjur | 23.00 | 492.06 | 98.97 | 3.00 | 97.00 | - | 100.00 | 470 | 83 | 398 | - |
| Pudupattu | 23.00 | 351.40 | 76.07 | - | 100.00 | - | 100.00 | 1,056 | 289 | 262 | - |
| Quilam | 23.00 | 510.78 | 118.07 | 2.00 | 98.00 | 15.00 | 85.00 | 741 | 240 | 133 | - |
| Uchimalaikuppam | 23.00 | 403.34 | 115.43 | 1.00 | 99.00 | - | 100.00 | 897 | 540 | 432 | - |

| Gram Panchayat | Soil moisture and ET | | | Means of Water Extraction (%) | | Irrigation Methods (%) | | Livestock (No.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Volumetric Soil Moisture (%) | Estimated Soil Moisture (ha.m) | ET Losses (ha.m) | Gravity | Lifting | Wild Flooding | Control Flooding | Cattle Population | Sheep Population | Goat Population | Poultry |
| Se.Sorapanandal | 23.00 | 452.26 | 108.16 | 2.00 | 98.00 | 11.00 | 89.00 | 1,548 | - | 212 | - |
| Kattamaduvu | 23.00 | 750.71 | 196.32 | 1.00 | 99.00 | 1.00 | 99.00 | 1,010 | 238 | 542 | - |
| Se.Nachipattu | 23.00 | 486.31 | 208.76 | 1.00 | 99.00 | - | 100.00 | 415 | 159 | 105 | - |
| Thazhaiyuthu | 23.00 | 659.34 | 85.21 | 1.00 | 99.00 | 3.00 | 97.00 | 747 | 1,063 | 662 | - |
| Andanur | 23.00 | 488.10 | 107.74 | 2.00 | 98.00 | 2.00 | 98.00 | 1,083 | 237 | 82 | - |
| Valayambattu | 23.00 | 388.54 | 163.07 | 1.00 | 99.00 | - | 100.00 | 1,072 | 59 | 102 | - |
| Vinnavanur | 23.00 | 310.44 | 77.26 | 1.00 | 99.00 | - | 100.00 | 368 | 368 | 249 | - |
| Paramanandal | 23.00 | 1500.67 | 386.63 | - | 100.00 | 1.00 | 99.00 | 4762 | 773 | 1135 | - |
| Kottavoor | 23.00 | 1500.67 | 386.63 | - | 100.00 | - | 100.00 | 4762 | 773 | 1135 | - |
| Melpulidiyur | 23.00 | 602.88 | 185.16 | 1.00 | 99.00 | 18.00 | 82.00 | 1154 | 119 | 256 | - |
| Andipatti | 23.00 | 1170.87 | 275.73 | 1.00 | 99.00 | 2.00 | 98.00 | 1286 | 657 | 1125 | - |
| Elangunni | 23.00 | 1445.51 | 245.07 | 3.00 | 97.00 | 6.00 | 94.00 | 1207 | 372 | 510 | - |
| Melchengam | 23.00 | 831.00 | 248.60 | 1.00 | 99.00 | 2.00 | 98.00 | 1463 | 67 | 372 | - |
| Melravanthavadi | 23.00 | 1038.17 | 226.40 | 3.00 | 97.00 | 9.00 | 91.00 | 1025 | 598 | 974 | - |
| Melvanakkambadi | 23.00 | 859.15 | 185.12 | 3.00 | 97.00 | 33.00 | 67.00 | 2335 | 543 | 740 | - |
| Neepathurai | 23.00 | 847.12 | 165.18 | 1.00 | 99.00 | 2.00 | 98.00 | 1030 | 159 | 271 | - |
| Pachal | 23.00 | 794.79 | 214.80 | 1.00 | 99.00 | 12.00 | 88.00 | 735 | 493 | 419 | - |
| Perumbakkam | 23.00 | 653.80 | 189.39 | 1.00 | 99.00 | 5.00 | 95.00 | 724 | 455 | 569 | - |
| Puliyampatti | 23.00 | 907.70 | 264.55 | 1.00 | 99.00 | 2.00 | 98.00 | 1531 | 595 | 637 | - |

# ANNEXURE 3.8

## GP WISE DEMOGRAPHIC AND SOCIO ECONOMIC STATUS

| Gram Panchayat | Geo-graphical Area | Male Popula-tion (No.) | Female Popula-tion (No.) | Total Popula-tion (No.) | SC Pop-ulation (No.) | ST Pop-ulation (No.) | Vulnera-ble pop-upation (No.) | House-holds (HH's) (No.) | Only one room HH's (SECC) (No.) | Female Headed HH's (SECC) (No.) | Vul-nerable House-holds (SECC) (No.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Agaram (Se) | 330 | 756 | 774 | 1,530 | 516 | - | 516 | 359 | - | 4 | 1 |
| Alaputhur | 332 | 774 | 756 | 1,530 | 1,266 | - | 1,266 | 318 | 8 | 12 | 9 |
| Anwarabath | 413 | 1,005 | 1,005 | 2,010 | 1,505 | - | 1,505 | 486 | 75 | 16 | 57 |
| Arattavadi | 819 | 1,176 | 1,126 | 2,302 | 760 | 50 | 810 | 537 | - | 16 | 5 |
| Beemanandal | 418 | 686 | 680 | 1,366 | 598 | - | 598 | 320 | 18 | 14 | 17 |
| Aswanagasurunai | 311 | 747 | 693 | 1,440 | 594 | - | 594 | 320 | 18 | 14 | 17 |
| Chinnakolapadi | 230 | 606 | 588 | - | 299 | 6 | 305 | 293 | 37 | 12 | 30 |
| Ariyakunjur | 249 | 406 | 405 | 811 | 54 | - | 54 | 195 | 32 | 10 | 25 |
| Kannakurkkai | 455 | 1,550 | 1,448 | 2,998 | - | - | - | 752 | 30 | 41 | 33 |
| Kuppanatham | 564 | 1,622 | 1,589 | 3,211 | 963 | 37 | 1,000 | 898 | 83 | 40 | 70 |
| Kariyamangalam | 1,465 | 3,116 | 3,053 | 6,169 | 2,330 | 22 | 2,352 | 1,585 | 100 | 77 | 93 |
| Chennasamudram | 615 | 1,548 | 1,586 | 3,134 | 1,308 | - | 1,308 | 746 | 66 | 38 | 58 |
| Theethandapattu | 484 | 1,717 | 1,601 | 3,318 | 977 | 206 | 1,183 | 751 | 75 | 36 | 63 |
| Kayambattu | 751 | 1,971 | 1,969 | 3,940 | 1,758 | - | 1,758 | 840 | 45 | 29 | 40 |
| Manmalai | 209 | 953 | 1,051 | 2,103 | 679 | 12 | 691 | 492 | 141 | 18 | 104 |
| Melpallipattu | 575 | 2,529 | 2,487 | 5,016 | 1,765 | 6 | 1,771 | 1,254 | 66 | 59 | 64 |
| Melpennathur | 817 | 1,767 | 1,638 | 3,405 | 1,287 | - | 1,287 | 797 | 81 | 33 | 67 |
| Pakkiripalayam | 1,289 | 3,599 | 3,436 | 7,035 | 1,270 | 117 | 1,387 | 1,607 | 29 | 58 | 38 |
| Paliapattu | 876 | 1,799 | 1,685 | 3,484 | 996 | - | 996 | 837 | 95 | 49 | 81 |
| Periakolapadi | 475 | 1,204 | 1,151 | 2,355 | 513 | - | 513 | 609 | 64 | 31 | 54 |
| Porasapattu | 666 | 1,313 | 1,219 | 2,532 | 1,002 | - | 1,002 | 598 | 109 | 36 | 87 |
| Pinjur | 587 | 1,367 | 1,364 | 2,731 | 663 | - | 663 | 687 | 114 | 39 | 92 |

| Gram Panchayat | Geo-graphical Area | Male Popula-tion (No.) | Female Popula-tion (No.) | Total Popula-tion (No.) | SC Pop-ulation (No.) | ST Pop-ulation (No.) | Vulnera-ble pop-upation (No.) | House-holds (HH's) (No.) | Only one room HH's (SECC) (No.) | Female Headed HH's (SECC) (No.) | Vul-nerable House-holds (SECC) (No.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pudupattu | 384 | 1,386 | 1,364 | 2,750 | 540 | - | 540 | 679 | 56 | 22 | 46 |
| Quilam | 616 | 1,751 | 1,805 | 3,556 | 2,508 | - | 2,508 | 792 | 60 | 42 | 55 |
| Uchimalaikuppam | 401 | 1,072 | 1,062 | 2,134 | 956 | - | 956 | 493 | 17 | 7 | 14 |
| Se.Sorapanandal | 558 | 1,715 | 1,788 | 3,503 | 1,620 | - | 1,620 | 917 | 157 | 72 | 132 |
| Kattamaduvu | 782 | 1,154 | 1,116 | 2,270 | 820 | 431 | 1,251 | 635 | 92 | 27 | 73 |
| Se.Nachipattu | 528 | 1,581 | 1,565 | 3,146 | 1,456 | - | 1,456 | 723 | 10 | 25 | 15 |
| Thazhaiyuthu | 684 | 1,265 | 1,155 | 2,420 | 331 | 113 | 444 | 665 | 6 | 10 | 7 |
| Andanur | 558 | 2,045 | 1,959 | 4,004 | 1,460 | 28 | 1,488 | 890 | 161 | 45 | 126 |
| Valayambattu | 478 | 2,094 | 1,946 | 4,040 | 2,178 | - | 2,178 | 850 | 191 | 42 | 146 |
| Vinnavanur | 363 | 973 | 953 | 1,926 | 870 | - | 870 | 470 | 36 | 14 | 29 |
| Paramanandal | 1,195 | 4,034 | 4,120 | 8,154 | 3,118 | 123 | 3,241 | 2,176 | 257 | 66 | 200 |
| Kottavoor | 508 | 909 | 857 | 1,766 | 660 | 30 | 690 | 2,176 | 257 | 66 | 200 |
| Melpulidiyur | 752 | 2,696 | 2,652 | 5,348 | 2,179 | 10 | 2,189 | 1,241 | 56 | 52 | 55 |
| Andipatti | 1,313 | 2,772 | 2,642 | 5,414 | 985 | 153 | 1,138 | 1,457 | 120 | 71 | 105 |
| Elangunni | 1,548 | 1,905 | 1,753 | 3,658 | 1,045 | 137 | 1,182 | 885 | 110 | 38 | 88 |
| Melchengam | 896 | 2,148 | 2,115 | 4,263 | 733 | 212 | 945 | 1,257 | 251 | 66 | 196 |
| Melravanthavadi | 1,103 | 2,146 | 2,017 | 4,163 | 1,412 | 223 | 1,635 | 912 | 47 | 47 | 47 |
| Melvanakkambadi | 984 | 2,680 | 2,561 | 5,241 | 2,024 | 18 | 2,042 | 996 | 167 | 51 | 132 |
| Neepathurai | 896 | 1,082 | 1,120 | 2,202 | 462 | 339 | 801 | 491 | 6 | 14 | 8 |
| Pachal | 955 | 1,261 | 1,283 | 2,544 | 867 | - | 867 | 609 | 2 | 33 | 11 |
| Perumbakkam | 747 | 1,354 | 1,286 | 2,640 | 986 | - | 986 | 423 | 1 | 8 | 3 |
| Puliyampatti | 959 | 1,728 | 1,722 | 3,450 | 1,159 | 108 | 1,267 | 864 | 135 | 47 | 109 |

| Gram Panchayat | % of Vulnerable House-holds (%) | Registered MGN-REGA Job cards (Persons) | Active person working in MGN-REGA job Cards (Persons) | Drinking Water Sources (No.) | Ground Water - Drinking source (No.) | Surface water - Drinking source (No.) | Sum of drinking water sources (No.) | HH's have tap water connection for drink-ing water (No.) | HH's dependent on other sources for drink-ing water (No.) | Annual Greywater Generation (ha.m) |
|---|---|---|---|---|---|---|---|---|---|---|
| Agaram (Se) | 0.3 | 876 | 443 | 331 | 6 | 1 | 7 | 445 | 0 | 2.79 |
| Alaputhur | 2.9 | 650 | 333 | 79 | 4 | 1 | 5 | 347 | 0 | 2.79 |
| Anwarabath | 11.8 | 657 | 540 | 251 | 5 | - | 5 | 0 | 0 | 3.67 |
| Arattavadi | 0.9 | 1,231 | 961 | 497 | 4 | 2 | 6 | 390 | 0 | 4.2 |
| Beemanandal | 5.3 | 582 | 395 | 361 | 5 | 1 | 6 | 429 | 324 | 2.49 |
| Aswanagasurunai | 5.3 | 867 | 484 | 12 | 4 | 1 | 5 | 401 | 0 | 2.62 |
| Chinnakolapadi | 10.07 | 665 | 532 | 25 | 4 | 1 | 5 | 420 | 0 | 2.18 |
| Ariyakunjur | 13 | 514 | 333 | - | 1 | 1 | 2 | 0 | 0 | 1.48 |
| Kannakurkkai | 4.4 | 1,143 | 849 | 40 | 4 | 1 | 5 | 370 | 0 | 5.47 |
| Kuppanatham | 8 | 1,315 | 962 | 163 | 4 | 1 | 5 | 355 | 0 | 5.86 |
| Kariyamangalam | 5.9 | 2,347 | 1,825 | 330 | 5 | 1 | 6 | 558 | 0 | 11.26 |
| Chennasamudram | 7.72 | 1,687 | 933 | 53 | 3 | 1 | 4 | 0 | 0 | 5.72 |
| Theethandapattu | 8.4 | 1,664 | 1,084 | 51 | 3 | 1 | 4 | 0 | 0 | 6.06 |
| Kayambattu | 4.8 | 1,278 | 944 | 39 | 3 | 1 | 4 | 0 | 0 | 7.19 |
| Manmalai | 21.2 | 1,146 | 962 | - | 1 | 1 | 2 | 0 | 0 | 3.84 |
| Melpallipattu | 5 | 1,734 | 1,229 | 527 | 5 | 2 | 7 | 860 | 123 | 9.15 |
| Melpennathur | 8.4 | 1,438 | 1,102 | 34 | 3 | - | 3 | 0 | 0 | 6.21 |
| Pakkiripalayam | 2 | 2,055 | 1,441 | 166 | 3 | 1 |  | 0 | 0 | 12.84 |
| Paliapattu | 9.7 | 1,538 | 1,085 | 38 | 4 | - | 4 | 400 | 0 | 6.36 |
| Periakolapadi | 8.9 | 1,259 | 935 | 562 | 5 | 1 | 6 | 435 | 0 | 4.3 |
| Porasapattu | 15 | 1,298 | 1,118 | 487 | 5 | 2 | 7 | 228 | 0 | 4.62 |
| Pinjur | 13.3 | 2,148 | 1,360 | 498 | 5 | 2 | 7 | 800 | 1320 | 4.98 |
| Pudupattu | 6.7 | 935 | 661 | 844 | 5 | - | 5 | 520 | 0 | 5.02 |
| Quilam | 7 | 815 | 659 | 176 | 4 | 1 | 5 | 525 | 0 | 6.49 |

| Gram Panchayat | % of Vulnerable House-holds (%) | Registered MGN-REGA Job cards (Persons) | Active person working in MGN-REGA job Cards (Persons) | Drinking Water Sources (No.) | Ground Water - Drinking source (No.) | Surface water - Drinking source (No.) | Sum of drinking water sources (No.) | HH's have tap water connection for drink-ing water (No.) | HH's dependent on other sources for drink-ing water (No.) | Annual Greywater Generation (ha.m) |
|---|---|---|---|---|---|---|---|---|---|---|
| Uchimalaikuppam | 2.8 | 926 | 712 | 414 | 4 | 1 | 5 | 383 | 520 | 3.89 |
| Se.Sorapanandal | 14 | 1,877 | 1,409 | 498 | 5 | 1 | 6 | 260 | 324 | 6.39 |
| Kattamaduvu | 11 | 1,029 | 719 | 456 | 4 | 1 | 5 | 94 | 0 | 4.14 |
| Se.Nachipattu | 2.01 | 1,756 | 1,304 | - | 1 | 1 | 2 | 0 | 0 | 5.74 |
| Thazhaiyuthu | 1 | 1,264 | 1,092 | 34 | 3 | 1 | 4 | 468 | 0 | 4.42 |
| Andanur | 14 | 1,517 | 1,271 | 49 | 3 | 1 | 4 | 0 | 660 | 7.31 |
| Valayambattu | 17.2 | 1,776 | 859 | 468 | 5 | 1 | 6 | 0 | 0 | 7.37 |
| Vinnavanur | 6.3 | 833 | 573 | 37 | 4 | 1 | 5 | 28 | 0 | 3.51 |
| Paramanandal | 9.2 | 2,005 | 1,499 | 46 | 3 | 1 | 4 | 0 | 0 | 14.88 |
| Kottavoor | 9.2 | 1,188 | 906 | - | 1 | 1 | 2 | 0 | 0 | 3.22 |
| Melpulidiyur | 4 | 2,450 | 1,546 | 355 | 5 | 1 | 6 | 1,505 | 204 | 9.76 |
| Andipatti | 7 | 2,027 | 1,704 | 764 | 4 | 2 | 6 | 1,105 | 0 | 10 |
| Elangunni | 10 | 1,933 | 1,437 | 128 | 5 | 1 | 6 | 243 | 0 | 7 |
| Melchengam | 16 | 1,611 | 1,230 | 367 | 5 | 2 | 7 | 306 | 0 | 8 |
| Melravanthavadi | 5 | 1,551 | 1,260 | 304 | 5 | 1 | 6 | 0 | 0 | 8 |
| Melvanakkambadi | 13 | 2,039 | 1,560 | 310 | 4 | 1 | 5 | 0 | 0 | 10 |
| Neepathurai | 2 | 1,002 | 734 | 376 | 5 | 2 | 7 | 0 | 0 | 4 |
| Pachal | 2 | 1,055 | 828 | 329 | 5 | 1 | 6 | 201 | 445 | 5 |
| Perumbakkam | 1 | 1,203 | 885 | 361 | 5 | 1 | 6 | 495 | 0 | 5 |
| Puliyampatti | 13 | 1,748 | 1,519 | 119 | 5 | 1 | 6 | 750 | 750 | 6 |

# ANNEXURE 4

## IPCC VULNERABILITY ASSESSMENT METHODOLOGY

### Normalization of Indicators:

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

- for indicators with positive relationship with vulnerability

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

- for indicators with negative relationship with vulnerability

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

### Aggregation and categorization of Indicators

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

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

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

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

# ANNEXURE 5.1

## GP WISE WASCA PROPOSED TREATMENT AREA

| Gram Panchayat | Forest Land | Non-Agricultural Uses | Barren & Un-cultivable Land | Permanent Pastures and Other Grazing Land | Land Under Miscellaneous Tree Criticalops etc. | Cultivable Waste Land | Fallows Land other than Current Fallows | Current Fallow land | Unirrigated Land | Treatment Area Irrigated by Source |
|---|---|---|---|---|---|---|---|---|---|---|
| Agaram (Se) | - | - | 13.37 | 0.38 | - | - | 0.02 | 0.39 | 0.12 | 10.96 |
| Alaputhur | - | - | - | - | - | 11.40 | - | 2.52 | 1.96 | 11.69 |
| Anwarabath | - | 38.19 | 18.88 | - | - | - | 3.04 | 14.10 | 0.62 | 16.03 |
| Arattavadi | - | - | 36.30 | - | - | 15.45 | 2.34 | 1.52 | 0.44 | 23.53 |
| Beemanandal | - | - | 11.37 | - | - | - | - | 15.09 | 0.19 | 5.82 |
| Aswanagasurunai | - | - | 16.30 | - | - | 8.57 | 8.46 | 13.34 | 0.15 | 12.37 |
| Chinnakolapadi | - | 1.47 | 7.62 | - | - | - | 0.26 | 10.08 | 0.64 | 5.82 |
| Ariyakunjur | - | 22.69 | 0.95 | - | - | 11.25 | 8.50 | 4.20 | 1.50 | 7.86 |
| Kannakurkkai | - | 33.09 | 24.41 | - | - | 9.76 | 0.91 | 9.74 | 0.03 | 10.17 |
| Kuppanatham | - | - | 43.85 | - | - | 35.93 | 4.49 | 13.77 | 1.22 | 10.55 |
| Kariyamangalam | - | 8.26 | 20.03 | - | - | - | - | 26.52 | 2.06 | 62.19 |
| Chennasamudram | - | 45.88 | 0.86 | - | - | - | - | 10.67 | 0.46 | 25.42 |
| Theethandapattu | - | - | 4.49 | - | - | 17.34 | 1.83 | 7.34 | 1.74 | 26.73 |
| Kayambattu | - | - | 0.62 | - | - | 11.73 | 1.46 | 8.41 | 3.33 | 33.66 |
| Manmalai | - | 1.23 | 3.31 | - | - | 15.57 | 5.41 | 15.00 | 0.89 | 3.63 |
| Melpallipattu | - | - | - | - | - | 17.87 | 3.04 | 14.90 | 0.28 | 6.73 |
| Melpennathur | - | 72.65 | 43.26 | - | - | - | 1.67 | 22.92 | - | 31.91 |
| Pakkiripalayam | - | - | 14.90 | 0.32 | - | - | 0.69 | 12.30 | 1.16 | 7.63 |
| Paliapattu | - | - | 81.36 | - | - | - | 11.25 | 42.92 | 1.07 | 13.46 |
| Periakolapadi | - | - | 48.75 | - | - | 15.18 | 4.18 | 10.75 | 0.55 | 15.29 |
| Porasapattu | - | - | 26.42 | - | - | 197.38 | 18.01 | 2.51 | 11.61 | 15.74 |
| Pinjur | - | 47.29 | 0.17 | - | - | 7.88 | 19.82 | 19.04 | 5.05 | 15.16 |

| Gram Panchayat | Forest Land | Non-Agricultural Uses | Barren & Un-cultivable Land | Permanent Pastures and Other Grazing Land | Land Under Miscellaneous Tree Criticalops etc. | Cultivable Waste Land | Fallows Land other than Current Fallows | Current Fallow land | Unirrigated Land | Treatment Area Irrigated by Source |
|---|---|---|---|---|---|---|---|---|---|---|
| Pudupattu | - | - | - | - | - | 19.14 | 5.77 | 6.39 | 0.54 | 13.77 |
| Quilam | - | 52.36 | 51.59 | - | - | - | - | 15.11 | 1.86 | 13.98 |
| Uchimalaikuppam | - | - | 23.61 | 0.59 | - | - | - | 4.28 | 0.69 | 19.62 |
| Se.Sorapanandal | - | 52.63 | 11.03 | - | - | - | - | 32.25 | 3.93 | 25.08 |
| Kattamaduvu | - | - | 5.88 | - | - | - | 6.55 | 33.79 | 14.56 | 26.81 |
| Se.Nachipattu | - | 50.78 | - | - | - | - | - | 1.73 | 0.01 | 39.96 |
| Thazhaiyuthu | - | - | 57.97 | - | - | - | 1.61 | 2.58 | 0.37 | 1.26 |
| Andanur | - | - | 0.92 | - | - | 3.24 | 4.62 | 34.04 | 5.94 | 22.96 |
| Valayambattu | - | 44.64 | - | - | - | - | 2.06 | 11.05 | 4.96 | 28.36 |
| Vinnavanur | - | 26.49 | 19.05 | - | - | - | 0.39 | 8.18 | 0.04 | 14.74 |
| Paramanandal | - | - | - | - | - | 67.78 | 2.25 | 59.21 | 3.38 | 70.39 |
| Kottavoor | - | - | - | - | - | 67.78 | 2.25 | 59.21 | 3.38 | 70.39 |
| Melpulidiyur | - | 74.42 | 0.08 | - | - | - | 0.40 | 9.52 | 0.45 | 13.74 |
| Andipatti | - | - | 52.46 | - | - | - | 1.84 | 38.25 | 8.59 | 28.39 |
| Elangunni | - | - | 457.55 | - | - | 3.75 | 0.70 | 35.40 | 20.53 | 26.42 |
| Melchengam | - | - | 8.36 | - | - | - | 45.46 | 9.52 | 38.12 | 38.08 |
| Melravanthavadi | - | - | 41.89 | - | 0.98 | 4.61 | 7.53 | 19.59 | 1.94 | 19.68 |
| Melvanakkambadi | - | - | 5.28 | - | - | - | 2.17 | 62.50 | 9.71 | 36.39 |
| Neepathurai | - | - | 119.15 | - | - | 2.38 | 0.44 | 6.93 | 1.57 | 4.75 |
| Pachal | - | - | 49.66 | 0.71 | - | 15.18 | 1.83 | 4.11 | 1.53 | 6.68 |
| Perumbakkam | - | - | 23.89 | - | 1.10 | 6.67 | 0.04 | 2.47 | 0.30 | 3.31 |
| Puliyampatti | - | - | 72.74 | - | - | 4.01 | 3.25 | 19.15 | 11.19 | 24.29 |

| 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

| Key CWRM Parameter | Good Catchment Area | Average Catchment Area | Bad Catchment Area |
|---|---|---|---|
| Agaram (Se) | 8 | - | 2 |
| Alaputhur | 10 | 3 | 3 |
| Anwarabath | 21 | - | 6 |
| Arattavadi | 23 | 4 | 5 |
| Beemanandal | 5 | - | 4 |
| Aswanagasurunai | 7 | 1 | 5 |
| Chinnakolapadi | 6 | - | 3 |
| Ariyakunjur | 9 | 3 | 4 |
| Kannakurkkai | 33 | 3 | 4 |
| Kuppanatham | 45 | - | 17 |
| Kariyamangalam | 20 | 11 | 6 |
| Chennasamudram | 21 | - | 7 |
| Theethandapattu | 7 | 5 | 7 |
| Kayambattu | 1 | 3 | 9 |
| Manmalai | 2 | 4 | 5 |
| Melpallipattu | 5 | 5 | 5 |
| Melpennathur | 36 | - | 11 |
| Pakkiripalayam | 13 | 0 | 4 |
| Paliapattu | 31 | - | 13 |
| Periakolapadi | 19 | 4 | 6 |
| Porasapattu | 12 | 58 | 9 |
| Pinjur | 19 | 2 | 11 |
| Pudupattu | 2 | 5 | 5 |
| Quilam | 43 | - | 6 |
| Uchimalaikuppam | 9 | 0 | 5 |
| Se.Sorapanandal | 31 | - | 12 |
| Kattamaduvu | 5 | - | 16 |
| Se.Nachipattu | 19 | - | 8 |
| Thazhaiyuthu | 25 | - | 1 |
| Andanur | 5 | 1 | 13 |
| Valayambattu | 26 | - | 9 |
| Vinnavanur | 18 | - | 4 |
| Paramanandal | 4 | 19 | 25 |
| Kottavoor | 1 | 19 | 25 |
| Melpulidiyur | 48 | - | 5 |
| Andipatti | 37 | - | 15 |
| Elangunni | 183 | 1 | 16 |
| Melchengam | 7 | - | 26 |
| Melravanthavadi | 21 | 2 | 10 |
| Melvanakkambadi | 5 | - | 22 |

| Key CWRM Parameter | Good Catchment Area | Average Catchment Area | Bad Catchment Area |
|---|---|---|---|
| **Neepathurai** | 49 | 1 | 3 |
| **Pachal** | 24 | 5 | 3 |
| **Perumbakkam** | 16 | 2 | 1 |
| **Puliyampatti** | 32 | 1 | 11 |

# ANNEXURE 5.3

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

| Gram Panchayat | Aff | | ARS | AVP | | Az | BP | | CBP | | CS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Area | No. | No. | Length | No. | Plants | Area | No. | Length | No. |
| Agaram | 311 | - | - | - | - | 160 | 2,675 | 13 | - | - | 160 |
| Alaputhur | 25,000 | 25 | - | - | 525 | - | - | - | 146 | 730 | 50 |
| Andanur | - | - | - | - | - | 126 | 3,324 | 4 | 500 | - | 126 |
| Andipatti | - | - | - | - | - | 105 | 41,964 | 52 | - | - | 105 |
| Anwarabath | 9,500 | 4 | - | 217 | 1,083 | - | - | 25 | - | - | 50 |
| Arattavadi | 41,400 | 52 | - | - | - | 131 | 19,566 | 24 | - | - | 131 |
| Ariyakunjur | 5,400 | 6 | - | - | - | - | - | - | - | - | 50 |
| Aswanagasurunai | | | | | | | | | | | |
| Beemanandal | 9,096 | 11 | - | - | - | 16 | 730 | 1 | - | - | 16 |
| Chennasamudram | 36,700 | 46 | - | - | - | 58 | 690 | 1 | 687 | 3,436 | 58 |
| Chinnakolapadi | 6,096 | 8 | - | - | - | 13 | 714 | 1 | - | - | 13 |
| Elangunni | - | - | - | - | - | 88 | 369,036 | 461 | - | - | 88 |
| Kannakurkkai | 27,336 | 34 | - | - | - | 25 | 901 | 1 | - | - | 25 |
| Kariyamangalam | 6,500 | 6 | - | - | - | - | - | - | 195 | 900 | 70 |
| Kattamaduvu | - | - | - | - | - | 73 | 4,704 | 6 | 500 | 2,500 | 73 |
| Kayambattu | 1,100 | 1 | - | - | 730 | - | - | - | - | - | 55 |
| Kottavoor | 22,400 | 22 | - | - | 3,160 | - | - | | - | - | 65 |
| Kuppanatham | 1,300 | 3 | - | - | - | 70 | 63,822 | 80 | 804 | 4,020 | 70 |
| Manmalai | - | - | - | 1,236 | 6,180 | | - | - | - | - | |
| Melchengam | - | - | - | - | - | 196 | 6,684 | 8 | 1,000 | 5,000 | 196 |
| Melpallipattu | - | - | - | - | - | 64 | 14,298 | 18 | 700 | 3,500 | 64 |
| Melpennathur | 34,608 | 43 | - | - | - | 16 | 1,978 | 2 | 548 | 2,740 | 16 |
| Melpulidiyur | 59,536 | 74 | - | - | - | 55 | 60 | 0 | - | - | 55 |
| Melravanthavadi | - | - | - | - | - | 47 | 37,980 | 47 | - | - | 47 |
| Melvanakkambadi | - | - | - | - | - | 132 | 4,224 | 5 | - | - | 132 |

| Gram Panchayat | Aff | | ARS | AVP | | Az | BP | | CBP | | CS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Area | No. | No. | Length | No. | Plants | Area | No. | Length | No. |
| Neepathurai | - | - | - | - | - | 8 | 97,218 | 122 | 400 | 2,000 | 8 |
| Pachal | - | - | - | - | - | 11 | 51,870 | 65 | - | - | 11 |
| Pakkiripalayam | - | - | - | - | - | 38 | 11,916 | 15 | - | - | 38 |
| Paliapattu | 65,088 | 81 | - | - | - | 20 | 859 | 1 | - | - | 20 |
| Paramanandal | 8,000 | 8 | | | | | - | - | 40 | 200 | 20 |
| Periakolapadi | 51,144 | 64 | - | - | - | 16 | 846 | 1 | - | - | 16 |
| Perumbakkam | - | - | - | - | - | 3 | 25,326 | 32 | - | - | 3 |
| Pinjur | 10,960 | 14 | - | - | 2,280 | - | - | - | - | - | 30 |
| Porasapattu | - | - | - | - | - | 87 | 179,034 | 224 | - | - | 87 |
| Pudupattu | 4,850 | 5 | - | - | - | | - | - | - | - | 25 |
| Puliyampatti | - | - | - | - | - | 109 | 61,398 | 77 | 200 | 1,000 | 109 |
| Quilam | 41,888 | 52 | - | - | - | 55 | 41,268 | 52 | - | - | 55 |
| Se.Nachipattu | - | - | - | 256 | 1,280 | | - | - | - | - | |
| Se.Sorapanandal | 42,104 | 53 | - | - | - | 132 | 8,826 | 11 | - | - | 132 |
| Thazhaiyuthu | - | - | - | - | - | 7 | 46,374 | 58 | - | - | 7 |
| Theethandapattu | 6,944 | 9 | - | - | - | - | - | 43 | 740 | 3,700 | 30 |
| Uchimalaikuppam | - | - | - | 458 | 2,290 | | - | - | - | - | |
| Valayambattu | - | - | - | - | 3,100 | - | - | - | - | - | 65 |
| Vinnavanur | - | - | - | 132 | 660 | | - | - | - | - | |

| Gram Panchayat | CT | Co | | FP | COWRS | CCBF | | DLT | | DLHAI | | FBBTI | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | No. | Area | No. | No. | No. | Area | Plants | Length | No. | Area | No. | Area |
| Agaram | 160 | 6 | 16 | 10 | - | - | - | - | - | 11,928 | 15 | - | 1 |
| Alaputhur | 50 | - | 22 | 3 | 45 | - | - | 400 | 2,000 | - | 30 | 9 | 22 |
| Andanur | 126 | 18 | - | 20 | 64 | 5,355 | 72 | - | - | 6,756 | 34 | 9 | 22 |
| Andipatti | 105 | 19 | - | 29 | 162 | 15,521 | 130 | - | - | 7,707 | 39 | 10 | 24 |
| Anwarabath | 50 | - | - | 3 | 45 | - | - | 752 | 3,759 | - | - | - | - |
| Arattavadi | 131 | 12 | - | 19 | 94 | - | - | 2,306 | 11,528 | | | - | - |
| Ariyakunjur | 50 | - | - | - | 70 | - | - | - | - | 6,500 | 66 | - | - |
| Aswanagasurunai | | | | | | | | | | | | | |
| Beemanandal | 16 | 6 | 59 | 10 | - | - | - | 793 | 3,964 | 23,457 | 29 | 20 | 49 |
| Chennasamudram | 58 | 13 | - | 481 | 145 | 10,765 | 89 | - | - | 402,032 | 2,010 | 3 | 6 |
| Chinnakolapadi | 13 | 6 | 17 | 10 | - | - | - | 1,331 | 6,653 | 6,689 | 8 | 4 | 11 |
| Elangunni | 88 | 23 | - | - | 106 | 98,027 | 544 | - | - | 8,305 | 42 | 11 | 28 |
| Kannakurkkai | 25 | 6 | 15 | 10 | - | - | - | 952 | 4,762 | 6,034 | 8 | 8 | 20 |
| Kariyamangalam | 70 | - | - | 4 | 150 | - | - | - | - | 10,500 | 11 | - | - |
| Kattamaduvu | 73 | 22 | - | 24 | 97 | 6,764 | 88 | - | - | 8,172 | 41 | 11 | 27 |
| Kayambattu | 55 | 20 | - | 3 | 65 | - | - | - | - | 3,500 | 4 | - | - |
| Kottavoor | 65 | 14 | - | 6 | 32 | - | - | - | - | 14,500 | 1 | - | - |
| Kuppanatham | 70 | 8 | - | 25 | - | 17,956 | 110 | - | - | 3,003 | 15 | 4 | 10 |
| Manmalai | | - | - | - | | - | - | - | - | | | - | - |
| Melchengam | 196 | 37 | - | 39 | 92 | 11,073 | 140 | - | - | 13,118 | 66 | 19 | 47 |
| Melpallipattu | 64 | 8 | - | 12 | 54 | 5,450 | 43 | - | - | 2,495 | 12 | 4 | 9 |
| Melpennathur | 16 | 6 | 49 | 10 | - | - | - | 1,265 | 6,325 | 19,629 | 25 | 9 | 24 |
| Melpulidiyur | 55 | 6 | - | 22 | 137 | 16,073 | 99 | - | - | 2,411 | 12 | 2 | 5 |
| Melravanthavadi | 47 | 12 | - | 21 | 157 | 12,559 | 96 | - | - | 4,874 | 24 | 6 | 15 |
| Melvanakkambadi | 132 | 30 | - | 31 | 30 | 8,524 | 116 | - | - | 11,077 | 55 | 15 | 37 |
| Neepathurai | 8 | 4 | - | 28 | 95 | 25,294 | 135 | - | - | 1,370 | 7 | 2 | 4 |
| Pachal | 11 | 3 | - | 18 | 133 | 13,988 | 80 | - | - | 1,415 | 7 | 2 | 4 |
| Pakkiripalayam | 38 | 7 | - | 11 | 132 | 4,588 | 37 | - | - | 2,177 | 11 | 3 | 7 |

| Gram Panchayat | CT | Co | | FP | COWRS | CCBF | | DLT | | DLHAI | | FBBTI | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | No. | Area | No. | No. | No. | Area | Plants | Length | No. | Area | No. | Area |
| Paliapattu | 20 | 6 | 70 | 10 | - | - | - | 1,597 | 7,986 | 28,163 | 35 | 23 | 57 |
| Paramanandal | 20 | - | - | 12 | 30 | - | - | 2,385 | 11,926 | | | - | - |
| Periakolapadi | 16 | 6 | 29 | 10 | - | - | - | 908 | 4,538 | 11,778 | 15 | 12 | 31 |
| Perumbakkam | 3 | 3 | - | 10 | 126 | 6,738 | 38 | - | - | 612 | 3 | 1 | 1 |
| Pinjur | 30 | 6 | - | 4 | 90 | - | - | 1,587 | 7,936 | - | - | - | - |
| Porasapattu | 87 | 13 | - | 57 | 42 | 48,014 | 272 | - | - | 4,787 | 24 | 6 | 16 |
| Pudupattu | 25 | - | - | - | 44 | - | - | - | - | 550 | 1 | - | - |
| Puliyampatti | 109 | 13 | - | 29 | 139 | - | - | - | - | 5,788 | 29 | 7 | 17 |
| Quilam | 55 | 7 | - | 27 | 80 | 22,565 | 135 | 1,506 | 7,530 | 3,094 | 15 | 3 | 8 |
| Se.Nachipattu | | - | - | - | - | - | - | - | - | | | - | - |
| Se.Sorapanandal | 132 | 14 | - | 28 | 17 | 16,367 | 125 | - | - | 6,126 | 31 | 7 | 18 |
| Thazhaiyuthu | 7 | 3 | - | 15 | 51 | 12,100 | 64 | - | - | 582 | 3 | 1 | 2 |
| Theethandapattu | 30 | - | - | 9 | 10 | - | - | 1,628 | 8,140 | 4,500 | 5 | - | - |
| Uchimalaikuppam | | - | - | - | - | - | - | - | - | | | - | - |
| Valayambattu | 65 | - | - | 2 | 11 | - | - | - | - | 3,000 | 3 | - | - |
| Vinnavanur | | - | - | - | - | - | - | - | - | | | - | - |

| Gram Panchayat | FD | GSS | ICP | | LDI | | LP | | MI | | NADEP | ND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | No. | Plants | Length | No. | Area | Plants | Length | No. | Area | No. | Plants | HH |
| Agaram | | 43 | - | - | - | - | 492 | 2,460 | 6 | 15 | 160 | 1,600 | 320 |
| Alaputhur | | 29 | - | - | 3 | 25 | 356 | 1,780 | - | - | - | 1,600 | 320 |
| Andanur | 126 | | - | - | 9 | 22 | 236 | 1,180 | - | - | 126 | 4,450 | 890 |
| Andipatti | 105 | | 200 | 1,000 | 10 | 24 | 412 | 2,060 | - | - | 105 | 7,285 | 1,457 |
| Anwarabath | | 44 | - | - | 3 | 25 | 261 | 1,305 | - | - | - | 2,275 | 455 |
| Arattavadi | | 93 | - | - | 24 | 60 | 268 | 1,340 | - | - | 131 | 537 | 107 |
| Ariyakunjur | | | - | - | - | - | - | - | - | - | 2 | - | - |
| Aswanagasurunai | | | | | | | | | | | | | |
| Beemanandal | | 5 | - | - | 10 | 24 | 32 | 160 | 4 | 10 | 16 | 1,630 | 326 |
| Chennasamudram | 58 | | - | - | 3 | 6 | 821 | 4,105 | - | - | 58 | 3,730 | 746 |
| Chinnakolapadi | | 43 | - | - | 2 | 5 | 590 | 2,950 | 2 | 6 | 13 | 1,500 | 300 |
| Elangunni | 88 | | - | - | 11 | 28 | 964 | 4,820 | - | - | 88 | 4,425 | 885 |
| Kannakurkkai | | 10 | - | - | 2 | 5 | 152 | 760 | 2 | 4 | 25 | 3,665 | 733 |
| Kariyamangalam | | 10 | - | - | - | - | 733 | 0 | - | - | - | - | - |
| Kattamaduvu | 73 | | - | - | 11 | 27 | 606 | 3,030 | - | - | 73 | 3,175 | 635 |
| Kayambattu | | 35 | - | - | - | - | 480 | 2,400 | - | - | - | - | - |
| Kottavoor | | 75 | - | - | - | - | 70 | 350 | - | - | - | - | - |
| Kuppanatham | 70 | | - | - | 4 | 10 | 119 | 594 | - | - | 70 | 4,490 | 898 |
| Manmalai | | | - | - | - | - | 603 | 3,017 | - | - | | | |
| Melchengam | 196 | | 400 | 2,000 | 19 | 47 | 248 | 0 | - | - | 196 | 6,285 | 1,257 |
| Melpallipattu | 64 | | 300 | 1,500 | 4 | 9 | 562 | 0 | - | - | 64 | 6,270 | 1,254 |
| Melpennathur | | 37 | - | - | 5 | 12 | 327 | 1,633 | 10 | 26 | 16 | 3,960 | 792 |
| Melpulidiyur | 55 | | - | - | 2 | 5 | 251 | 1,256 | - | - | 55 | 6,205 | 1,241 |
| Melravanthavadi | 47 | | - | - | 6 | 15 | 386 | 1,932 | - | - | 47 | 4,560 | 912 |
| Melvanakkambadi | 132 | | - | - | 15 | 37 | 791 | 3,954 | - | - | 132 | 4,980 | 996 |
| Neepathurai | 8 | | - | - | 2 | 4 | 79 | 395 | - | - | 8 | 2,455 | 491 |
| Pachal | 11 | | - | - | 1 | 4 | 449 | 0 | - | - | 11 | 3,045 | 609 |
| Pakkiripalayam | 38 | | 560 | 2,800 | 3 | 7 | 506 | 0 | - | - | 38 | 8,035 | 1,607 |

| Gram Panchayat | FD | GSS | ICP | | LDI | | LP | | MI | | NADEP | ND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | No. | Plants | Length | No. | Area | Plants | Length | No. | Area | No. | Plants | HH |
| Paliapattu | | 47 | - | - | 11 | 28 | 579 | 2,894 | 5 | 13 | 20 | 4,150 | 830 |
| Paramanandal | | 6 | - | - | - | - | 297 | 1,484 | - | - | 1 | 1,535 | 307 |
| Periakolapadi | | 40 | - | - | 3 | 8 | 242 | 1,208 | 6 | 14 | 16 | 2,915 | 583 |
| Perumbakkam | 3 | | - | - | 1 | 1 | 389 | 1,947 | - | - | 3 | 2,115 | 423 |
| Pinjur | | 20 | - | - | - | - | 300 | 1,500 | - | - | - | 3,410 | 682 |
| Porasapattu | 87 | | - | - | 6 | 16 | 953 | 4,763 | - | - | 87 | 2,990 | 598 |
| Pudupattu | | 65 | - | - | - | | - | - | - | - | 1 | - | - |
| Puliyampatti | 109 | | - | - | 7 | 17 | 597 | 2,983 | - | - | 109 | 4,320 | 864 |
| Quilam | 55 | | - | - | 3 | 8 | 730 | 3,652 | - | - | 55 | 3,960 | 792 |
| Se.Nachipattu | | | - | - | - | - | 503 | 2,515 | - | - | | | |
| Se.Sorapanandal | 132 | | 254 | 1,272 | 7 | 18 | 568 | 2,840 | - | - | 132 | 4,585 | 917 |
| Thazhaiyuthu | 7 | | - | - | 1 | 2 | 257 | 1,285 | - | - | 7 | 3,325 | 665 |
| Theethandapattu | | 20 | - | - | 12 | 29 | 506 | 0 | - | - | - | - | - |
| Uchimalaikuppam | | | - | - | - | - | 579 | 2,894 | - | - | | | |
| Valayambattu | | 35 | - | - | - | - | 297 | 1,484 | - | - | 2 | - | - |
| Vinnavanur | | | - | - | - | - | 242 | 1,208 | - | | | - | - |

| Gram Panchayat | PS | RPWDT | Roo | RP | RRWH | SPD | | SPC | SPI | WCICD |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | No. | No. | No. | No. | No. | Area | No. | No. | Length |
| Agaram | - | 2 | - | 4 | 2 | - | - | - | - | - |
| Alaputhur | - | 2 | - | 2 | 2 | - | - | 6 | - | - |
| Andanur | - | 2 | - | 7 | 2 | - | - | 9 | | - |
| Andipatti | - | 1 | - | 15 | 2 | - | - | 15 | | 1,000 |
| Anwarabath | - | 1 | - | 5 | 2 | - | - | 3 | - | - |
| Arattavadi | - | 2 | - | 9 | 2 | - | - | 5 | 5 | - |
| Ariyakunjur | - | - | - | 2 | 2 | - | - | 1 | 20 | - |
| Aswanagasurunai | | 1 | - | 3 | | | | | | |
| Beemanandal | - | 1 | - | 4 | 2 | - | - | 3 | 33 | - |
| Chennasamudram | - | 2 | - | 6 | 2 | - | - | 9 | | - |
| Chinnakolapadi | - | 1 | - | 5 | 2 | - | - | 3 | 30 | - |
| Elangunni | - | 3 | - | 3 | 2 | - | - | 9 | | - |
| Kannakurkkai | - | 2 | - | 7 | 2 | - | - | 7 | 73 | - |
| Kariyamangalam | - | 4 | - | 12 | 2 | - | - | 2 | 30 | - |
| Kattamaduvu | - | 1 | - | 7 | 2 | - | - | 6 | | - |
| Kayambattu | - | 2 | - | 2 | 2 | - | - | 2 | 85 | - |
| Kottavoor | - | 1 | - | - | 2 | - | - | 3 | 9 | - |
| Kuppanatham | - | 2 | - | 7 | 2 | - | - | 9 | | - |
| Manmalai | - | 2 | - | - | 2 | - | - | - | | - |
| Melchengam | - | 1 | - | 5 | 2 | - | - | 13 | | 2,000 |
| Melpallipattu | - | 2 | - | 5 | 2 | - | - | 13 | | 1,500 |
| Melpennathur | - | 5 | - | 6 | 2 | - | - | 8 | 79 | - |
| Melpulidiyur | - | 2 | - | 6 | 2 | - | - | 12 | | - |
| Melravanthavadi | - | 6 | - | 6 | 2 | - | - | 9 | | - |
| Melvanakkambadi | - | 3 | - | 5 | 2 | - | - | 10 | | - |
| Neepathurai | - | 2 | - | 2 | 2 | - | - | 5 | | - |
| Pachal | - | 2 | - | 7 | 2 | 564 | 1 | 6 | | - |
| Pakkiripalayam | - | 4 | - | 7 | 2 | 252 | 0 | 16 | | 2,800 |

| Gram Panchayat | PS | RPWDT | Roo | RP | RRWH | SPD | | SPC | SPI | WCICD |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | No. | No. | No. | No. | No. | Area | No. | No. | Length |
| Paliapattu | - | 2 | - | 3 | 2 | - | - | 8 | 83 | - |
| Paramanandal | - | 1 | - | 8 | 2 | - | - | 8 | 13 | - |
| Periakolapadi | - | 1 | - | 9 | 2 | - | - | 6 | 58 | - |
| Perumbakkam | - | 3 | - | 10 | 2 | - | - | 4 | | - |
| Pinjur | - | 3 | - | 9 | 2 | - | - | 2 | 75 | - |
| Porasapattu | - | 2 | - | 9 | 2 | - | - | 6 | | - |
| Pudupattu | - | - | - | 6 | 2 | - | - | 5 | 15 | - |
| Puliyampatti | - | 3 | - | 8 | 2 | - | - | 9 | | - |
| Quilam | - | 3 | - | 5 | 4 | - | - | 8 | | - |
| Se.Nachipattu | - | 2 | - | - | 2 | - | - | - | | - |
| Se.Sorapanandal | - | 1 | - | 7 | 2 | - | - | 9 | | 1,272 |
| Thazhaiyuthu | - | 1 | - | 8 | 2 | - | - | 7 | | - |
| Theethandapattu | - | 1 | - | 3 | 2 | - | - | 7 | 15 | - |
| Uchimalaikuppam | - | 1 | - | 9 | 2 | - | - | - | | - |
| Valayambattu | - | 1 | - | - | 2 | - | - | 6 | 45 | - |
| Vinnavanur | - | 1 | - | 6 | 2 | - | - | - | | - |

# ANNEXURE 7.1

## GP WISE WASCA RECOMMENDATION AND WORKS UPLOADED

| S. No | GP | WASCA Recommendation for 3 Years | Works uploaded for FY-2021-22 as on 02/02/2022 |
|---|---|---|---|
| 1 | Alaputhur | 186 | 11 |
| 2 | Anthanur | 1007 | 949 |
| 3 | Andipatti | 1269 | 124 |
| 4 | Anwarabath | 543 | 129 |
| 5 | Aswanagasurnai | 170 | 361 |
| 6 | Arattavadi | 341 | 138 |
| 7 | Ariyakunjur | 604 | 112 |
| 8 | Beemanandal | 221 | 274 |
| 9 | Chennasamuthiram | 778 | 101 |
| 10 | Chinnakolapadi | 338 | 11 |
| 11 | Elangunni | 947 | 206 |
| 12 | Kattamaduvu | 850 | 183 |
| 13 | Kannkurukkai | 328 | 329 |
| 14 | Kariyamangalam | 947 | 475 |
| 15 | Kayambattu | 352 | 118 |
| 16 | Kottavoor | 603 | 13 |
| 17 | Kuppanatham | 552 | 128 |
| 18 | Manmalai | 327 | 191 |
| 19 | Melchengam | 1385 | 1054 |
| 20 | Melpallipattu | 602 | 620 |
| 21 | Melpennathur | 647 | 420 |
| 22 | Melpulidiyur | 753 | 508 |
| 23 | Melravanthavadi | 890 | 510 |
| 24 | Melvanakkambadi | 1108 | 909 |
| 25 | Neepathurai | 896 | 460 |
| 26 | Pachal | 308 | 101 |
| 27 | Pakkiripalayam | 629 | 2285 |
| 28 | Paliyapattu | 518 | 102 |
| 29 | Paramanandal | 1371 | 343 |
| 30 | Periyakolapadi | 437 | 262 |
| 31 | Perumbakkam | 473 | 202 |
| 32 | Pinjur | 487 | 410 |
| 33 | Porasapattu | 692 | 479 |
| 34 | Pudupattu | 414 | 493 |
| 35 | Puliyampatti | 856 | 282 |
| 36 | Quilam | 632 | 75 |
| 37 | Che. Agaram | 155 | 763 |
| 38 | Che. Nachipattu | 448 | 190 |
| 39 | Che. Sorpanandal | 1011 | 24 |
| 40 | Thalaiyouthu | 242 | 215 |
| 41 | Theethandapattu | 579 | 165 |

| S. No | GP | WASCA Recommendation for 3 Years | Works uploaded for FY-2021-22 as on 02/02/2022 |
|---|---|---|---|
| 42 | **Uchimalaikuppam** | 342 | 128 |
| 43 | **Valayambattu** | 876 | 223 |
| 44 | **Vinnavanoor** | 407 | 165 |

# ANNEXURE 7.2

## GP AND WORK CATEGORY-WISE ONGOING WORKS IN CHENGAM BLOCK

| GP | Work Category | No of ongoin works |
|---|---|---|
| **Alaputhur** | Water Conservation and Water Harvesting | 1 |
| **Anthanur** | Water Conservation and Water Harvesting | 1 |
| | Works on Individuals Land (Category IV) | 7 |
| **Anwarabath** | Water Conservation and Water Harvesting | 1 |
| **Arattavadi** | Drought Proofing | 1 |
| | Water Conservation and Water Harvesting | 1 |
| | Works on Individuals Land (Category IV) | 3 |
| **Ariyakunjur** | Water Conservation and Water Harvesting | 1 |
| **Aswanagasurnai** | Water Conservation and Water Harvesting | 2 |
| **Beemanandal** | Water Conservation and Water Harvesting | 1 |
| **Che.Agaram** | Water Conservation and Water Harvesting | 2 |
| **Che.Nachipattu** | Water Conservation and Water Harvesting | 2 |
| **Che.Sorpanandal** | Water Conservation and Water Harvesting | 2 |
| **Chengam** | Water Conservation and Water Harvesting | 2 |
| | Works on Individuals Land (Category IV) | 5 |
| **Chennasamuthiram** | Water Conservation and Water Harvesting | 1 |
| | Works on Individuals Land (Category IV) | 1 |
| **Chinnakolapadi** | Water Conservation and Water Harvesting | 1 |
| **Elangunni** | Water Conservation and Water Harvesting | 1 |
| | Works on Individuals Land (Category IV) | 1 |
| **Kannkurukkai** | Water Conservation and Water Harvesting | 1 |
| **Kariyamangalam** | Water Conservation and Water Harvesting | 2 |
| | Works on Individuals Land (Category IV) | 1 |
| **Kattamaduvu** | Drought Proofing | 1 |
| | Water Conservation and Water Harvesting | 1 |
| | Works on Individuals Land (Category IV) | 7 |
| **Kayambattu** | Water Conservation and Water Harvesting | 1 |
| **Kottavoor** | Water Conservation and Water Harvesting | 1 |
| **Kuppanatham** | Water Conservation and Water Harvesting | 1 |
| **Manmalai** | Water Conservation and Water Harvesting | 1 |
| **Melchengam** | Drought Proofing | 1 |
| | Water Conservation and Water Harvesting | 1 |
| | Works on Individuals Land (Category IV) | 2 |
| **Melpallipattu** | Water Conservation and Water Harvesting | 2 |
| | Works on Individuals Land (Category IV) | 3 |
| **Melpennathur** | Drought Proofing | 1 |
| | Water Conservation and Water Harvesting | 2 |
| | Works on Individuals Land (Category IV) | 2 |
| **Melpulidiyur** | Water Conservation and Water Harvesting | 2 |
| **Melravanthavadi** | Drought Proofing | 1 |
| | Rural Sanitation | 1 |

| | | |
|---|---|---|
| **Melravanthavadi** | Water Conservation and Water Harvesting | 1 |
| | Works on Individuals Land (Category IV) | 1 |
| **Melvanakkambadi** | Drought Proofing | 1 |
| | Water Conservation and Water Harvesting | 3 |
| | Works on Individuals Land (Category IV) | 1 |
| **Neepathurai** | Drought Proofing | 1 |
| | Water Conservation and Water Harvesting | 1 |
| **Pachal** | Drought Proofing | 1 |
| | Water Conservation and Water Harvesting | 1 |
| **Pakkiripalayam** | Drought Proofing | 1 |
| | Works on Individuals Land (Category IV) | 10 |
| **Paliyapattu** | Water Conservation and Water Harvesting | 2 |
| **Paramanandal** | Water Conservation and Water Harvesting | 2 |
| **Periyakolapadi** | Water Conservation and Water Harvesting | 1 |
| **Perumbakkam** | Drought Proofing | 1 |
| | Rural Connectivity | 1 |
| | Water Conservation and Water Harvesting | 1 |
| **Pinjur** | Water Conservation and Water Harvesting | 1 |
| | Works on Individuals Land (Category IV) | 2 |
| **Porasapattu** | Water Conservation and Water Harvesting | 3 |
| **Pudupattu** | Water Conservation and Water Harvesting | 2 |
| | Works on Individuals Land (Category IV) | 2 |
| **Puliyampatti** | Drought Proofing | 1 |
| | Water Conservation and Water Harvesting | 1 |
| **Quilam** | Anganwadi/Other Rural Infrastructure | 1 |
| | Works on Individuals Land (Category IV) | 1 |
| **Thalaiyouthu** | Water Conservation and Water Harvesting | 1 |
| | Works on Individuals Land (Category IV) | 2 |
| **Theethandapattu** | Works on Individuals Land (Category IV) | 1 |
| **Uchimalaikuppam** | Water Conservation and Water Harvesting | 2 |
| **Valayambattu** | Anganwadi/Other Rural Infrastructure | 1 |
| | Water Conservation and Water Harvesting | 1 |
| **Vinnavanoor** | Water Conservation and Water Harvesting | 1 |

# ANNEXURE 8

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

| CWRM Parameter | Thirakoil |
|---|---|
| **Soil Resources: Status of Available Nitrogen (%)** | |
| Very Low | 4 |
| Low | 88 |
| Medium | 8 |
| **Status of Organic Carbon (%)** | |
| Very Low | 17 |
| Low | 79 |
| Medium | 3 |
| **Status of Soil Micro Nutrients (%)** | |
| Sufficient | 78 |
| Deficient | 22 |
| **Status of Physical condition of the soil (%)** | |
| Strongly Alkaline (SIAI) | 1 |
| Moderately Alkaline | 99 |
| **Soil Texture (%)** | |
| Clay soil | 35 |
| Fine Soil | 57 |
| Course loamy | 8 |
| Soil Water Permeability (Low, Moderate, high) | Moderate |
| **Soil moisture and ET** | |
| Volumetric Soil Moisture (%) | 23 |
| Estimated Soil Moisture (ha.m) | 1108.66 |
| ET Losses (ha.m) | 229.42 |
| **Means of Water Extraction (%)** | |
| Gravity | 1 |
| Lifting | 99 |
| **Irrigation Methods (%)** | |
| Wild Flooding | 13 |
| Control Flooding | 87 |
| **Livestock (No.)** | |
| Cattle Population | 1689 |
| Sheep Population | 234 |
| Goat Population | 89 |
| **Land Resources (ha)** | |
| Area under Non-Agricultural Uses | 160.80 |
| Area under Barren & Un-cultivable Land | 19.86 |
| Area under Permanent Pastures and Other Grazing Land | 0.42 |
| Area under Fallows Land other than Current Fallows | 34.47 |
| Area under Current Fallow land | 614.83 |
| Area under Unirrigated Land | 57.76 |
| Area Irrigated by Source | 381.32 |

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