



सत्यमेव जयते
Ministry of Rural Development



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Ministry of Jal Shakti



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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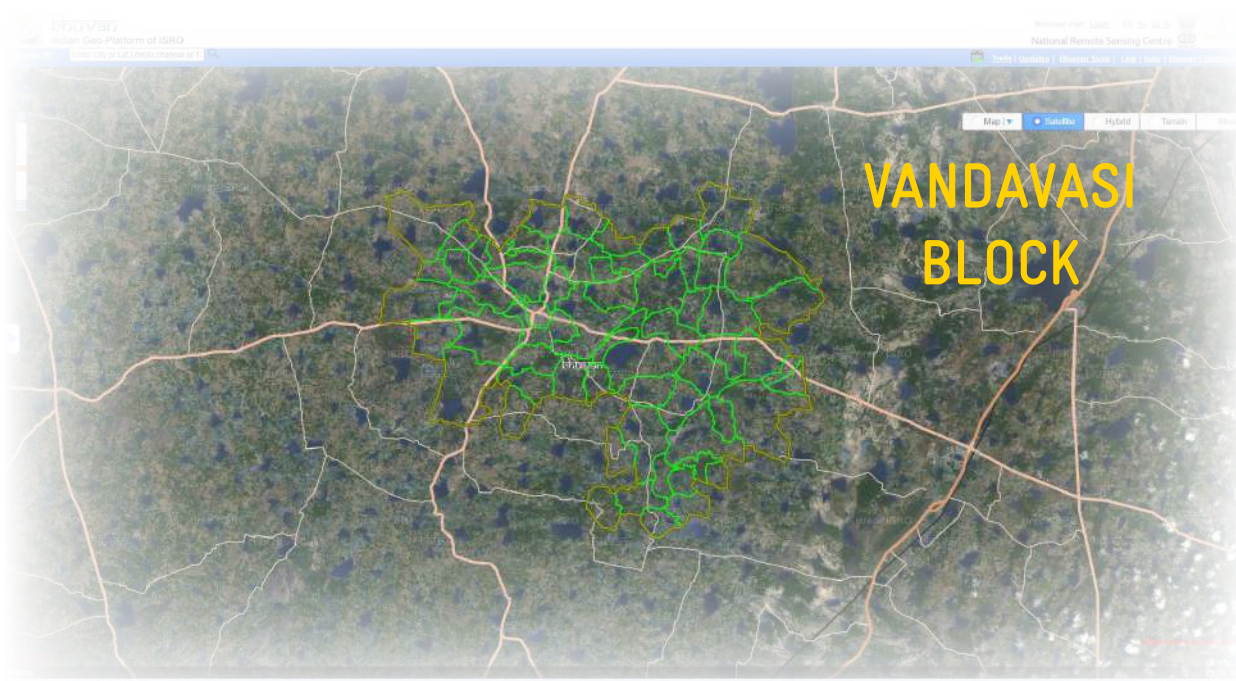
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New Delhi, India, Jan 2022

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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 convergence model.

There will be a reorientation with livelihood promotion goals in addition to Natural Resource Management with GIS based plan-vention will be maximised

In this context, implementation of Climate Adaptation (WASCA) 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) framework 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 Panchayat. Out of the shelf

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NRM and Non- NRM
works are identified,
verified, approved by
Gram Panchayat**
”

of priorities under MGNREGS and poverty alleviation as Resource Management, asset development. The approach to ment will be on a saturation ning. The impact of each inter-through convergence.

tation of Water Security and CA) a technical cooperation

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.

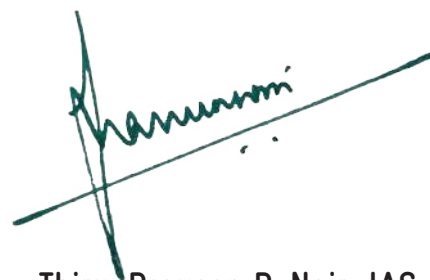
1.	Development of Public and Common lands
2.	Development of Agriculture and allied activities
3.	Development of Rural Infrastructure Management
4.	Development of Climate Resilience Measures

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 plan-
ning, 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 a 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 Mission, Ministry of Jal supported by National Water Shakti.

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

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

Tamil Nadu, with core support from Director Thiru. Praveen Nair I.A.S., Department of Rural Development of Rural Development-related departments, under District Collector, Thiru. B.Murugesh, I.A.S., has embarked on this strategic response to the strong crisis affected by climate change 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!

A handwritten signature in black ink that reads "Rajeev Ahal". The signature is written in a cursive style with a long horizontal stroke underneath the name.

Rajeev Ahal
Director,
NRM & Agroecology, GIZ India

FOREWORD



Thiru. B. Muruges, 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.

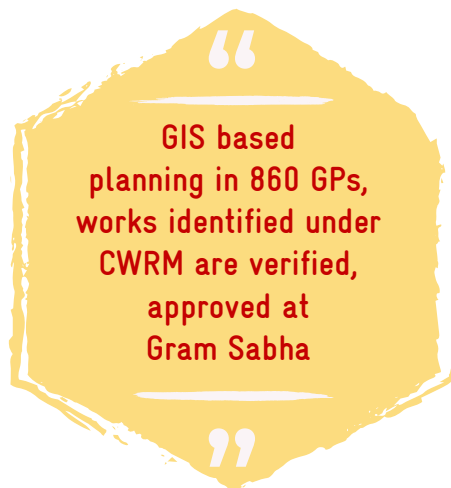
All eighteen Blocks in the district are categorized as over exploited or critical as per latest state reports on groundwater status. Mahatma Gandhi NREGA is key scheme in the district, providing unskilled wage employment, asset creation for district has implemented in cam-farm pond construction.

To enhance scientific works with technical support of GIZ project, the Composite Water (CWRM) approach is used for various parameters including spatial and technique to provide solution water (Ground water, Surface 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 status 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 (Natural Resource Management) and non NRM works.

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

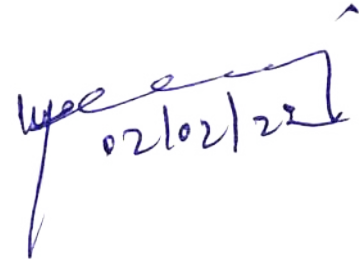


identification in MGNREGS, under WASCA bilateral water Resource Management analyzing various parameters temporal changes and also solution for improving the four water, Rain water and Soil

860 GPs, works identified

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 quality and 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 technical process including socio economic perspectives. The district officials with the technical ground level by the Block and consolidated at Block and district 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
”

capacity of the Engineers in GIS based planning adopting the technical process including socio economic perspectives. The district officials with the technical ground level by the Block and consolidated at Block and district and planning. The expected

M. Prathap

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.

Through District level GIS partners MSSRF build technical officers of Rural Depletion of 1,289 GP plans. In Nationally approved Commitment (CWRMP) framework Bhuvan NRSC ISRO GIS

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

resource centres, GIZ with the capacity of Block, GP level development Department in preparation of GP level plans, composite Water Resources Management is adopted along with platform.

Total 3,00,000 works identified in NREGA Soft. The 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 overcoming 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
Chief 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 (Socio-economic, agriculture, etc.) and identified the most for project implementation. vannamalai in Northern Tamil South coastal aspirational WASCA project Composite Water Resource Management (CWRM) Plan is used.

The CWRM plans assessed both water using data pertaining parameters, catchment agriculture and prepared a water identified a set of key water 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.

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

18 Vulnerability parameters water and climate parameters vulnerable two districts The two districts are Tirunadu and Ramanathapuram district. For implementing Water Resource Management

the supply and demand for to land resources, climate as, soil, surface runoff, agriculture budget. Besides, it has actions for the development

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



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ABBREVIATIONS AND ACRONYMS

A - D	D - H	I - M
% Percentage	DLSC District Level Steering Committee	ha.m Hectare Meter
°C Degree Celsius	DLT Drainage Line Treatment	HH Households
AR Assessment Report	DRD&PR Department of Rural Development & Panchayat Raj	ICAR Indian Council for Agriculture Research
CCB Contour Continuous Bunds	ET Evapo-transpiration	IMD Indian Meteorological Department
CCCDM Centre for Climate Change and Disaster Management	FPO Farmer Producer Organization	INR Indian Rupees
CRM Climate Resilient Measures	FY Financial Year	IPCC Intergovernmental Panel on Climate Change
CuM Cubic Meter	GIS Geographical Information System	IWRM Integrated Water Resources Management
CVI Climate Vulnerability Index	GIZ Deutsche Gesellschaft für Internationale	Kharif crop Sown in Monsoon and harvested close to Autumn
CWRM Composite Water Resource Management	Govt. Government	Km Kilometer
CWRMP Composite Water Resource Management Plan	GP Gram Panchayat	KML Keyhole Markup Language
DEM Digital Elevation Model	GW Ground Water	LULC Land use and land cover
	ha Hectare	





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



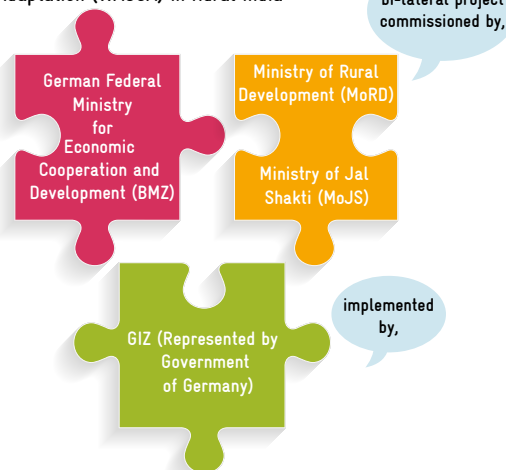
“Aims to improve water resource management with respect to water security and climate adaptation”



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.

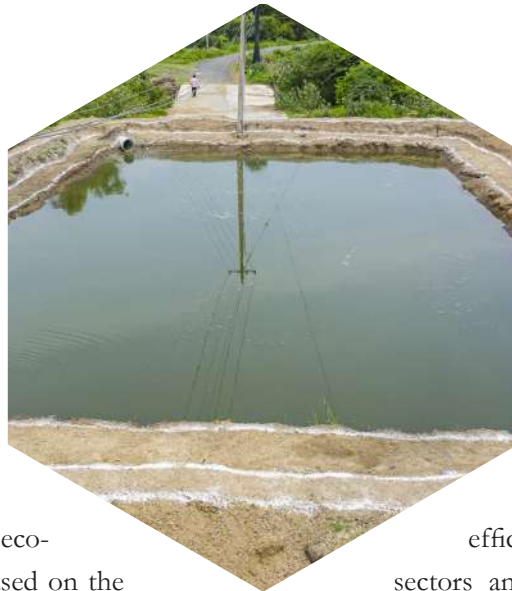
The Indo-German Project “Water Security and Climate Adaptation in Rural India” (WASCA), is a bi-lateral project commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) in partnership with the Ministry of Rural Development (MoRD) and Ministry of Jal Shakti (MoJS) and 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.

Indo-German Project Water Security and Climate Adaptation (WASCA) in Rural India



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

With focus on water-related climate action and integrated water resource management (IWRM) principles, the project WASCA aims to significantly contribute towards Sustainable Development Goals for ensuring efficient, sustainable, and inclusive water outcomes. Implementation of key water actions also support the National Water Mission, one of the eight missions under the National Action Plan



for Climate Change (NAPCC) to achieve their objective of promoting basin level IWRM. It also explored possible contributions towards the larger goals of Nationally Determined Contribution's (NDC) of climate adaptation through its work on improving water efficiency in agriculture and allied sectors and ecosystem development. The State and District Steering Committee approved the process during May 2020 and the whole progress was jointly accomplished with research organizations and key sectoral experts in February 2021.

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



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



This report is structured with nine chapters

1

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

2

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

3

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

4

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

5

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

7

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

6

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

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

ABOUT THE BLOCK



1 | ABOUT THE BLOCK

Vandavasi Block of Thiruvannmalai District lies between $12^{\circ}25'40.563''\text{N}$ to $12^{\circ}33'16.509''\text{N}$ latitude and $79^{\circ}31'19.429''\text{E}$ to $79^{\circ}44'58.564''\text{E}$ longitude and is surrounded by Thellar, Pernamallur, and Anakkavur Blocks (Figure 1.1). The total geographical area of this Block is 28,890 ha (288.9 Sq. Km). Administratively, this Block comes under Vandavasi taluk, with 61 Gram panchayats and 252 habitations in it.

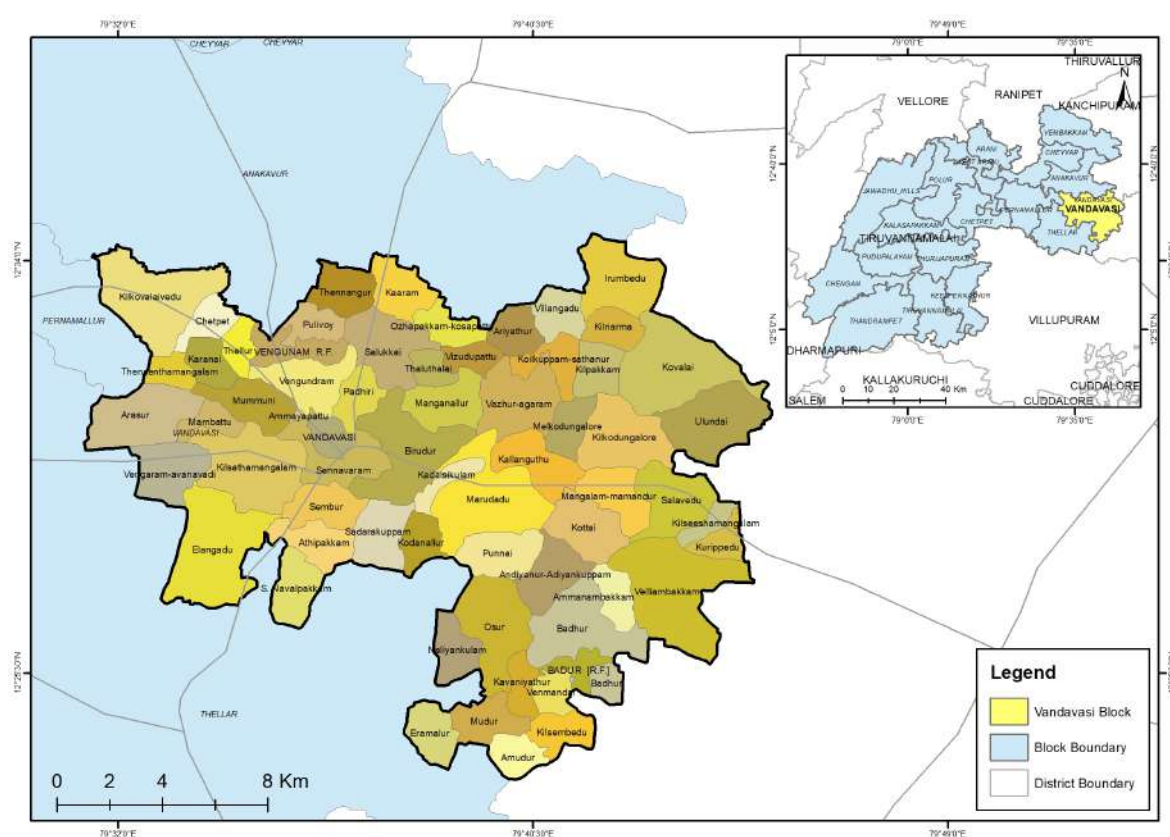


Figure 1.1. Vandavasi Block and its environ

According to Census 2011, the population of Vandavasi Block is 1,48,392. The population density of the Block is 389 per Sq. Km which is higher than the district population density (473 per Sq. Km) and lower than the State's density (555 per Sq.Km). There is a 17.07 % increase in the population observed since 2001 in this rural Block. The percentage of male population is slightly higher than (50.33%) female population (49.66%). The proportion of sex ratio is 997 females per 1000 males, which is slightly higher compared to the District average sex-ratio (994 females per 1,000 males). At 75.9 % the literacy rate of the Block is slightly higher than the national average (72.98%). Scheduled Castes and

Scheduled Tribes accounted for 23% of the total population (Thiruvannmalai District profile 2020).

Economically, Vandavasi is among the top ten revenue Blocks of the Tiruvannmalai District. The primary source of income for most of the Block's inhabitants is agriculture. Ground nut tops as the predominant crop, with 40 % of the irrigated area cultivated with it. The other major crops grown in the Block area are other pulses, Paddy and Sugar-cane. Under rainfed crops also Ground nut is the predominant crop with 58.66% of the area being cultivated followed by other pulses (40.24). Significant cultivated areas of Maize, dry chilli, coconut,

“
 The proportion of sex ratio is 997 females per 1000 males, which is slightly higher compared to the District average sex-ratio (994 females per 1,000 males).
 ”

“
 At 75.9 % the literacy rate of the Block is slightly higher than the national average (72.98%).
 ”

mango and other fruits and vegetables can also be seen. Groundnut and other pulses is cultivated both under irrigated and rainfed conditions. About 70.95 acres are under sericulture practises however large number of families (428) are engaged in handlooms. A livestock count of 42,081 was recorded during 2019-20. The cattle count is 28,284 and the Block has 34 milk societies with 18,416 litres of milk being produced per day. Vandavasi Fort is an important landmark in Vandavasi, where the Battle of Wandiwash was witnessed.

“
 Ground nut is the predominant crop with 58.66% of the area being cultivated
 ”

Hydrologically, Vandavasi Block comes under Kiliyar and Ongur sub-basins of Palar and Varahanadhi basins. Kiliyar River flows through the Block. Kiliyar, Cheyyar and Ongur macro-watersheds cover the Block and has 71 micro-watersheds (Figure 1.2).

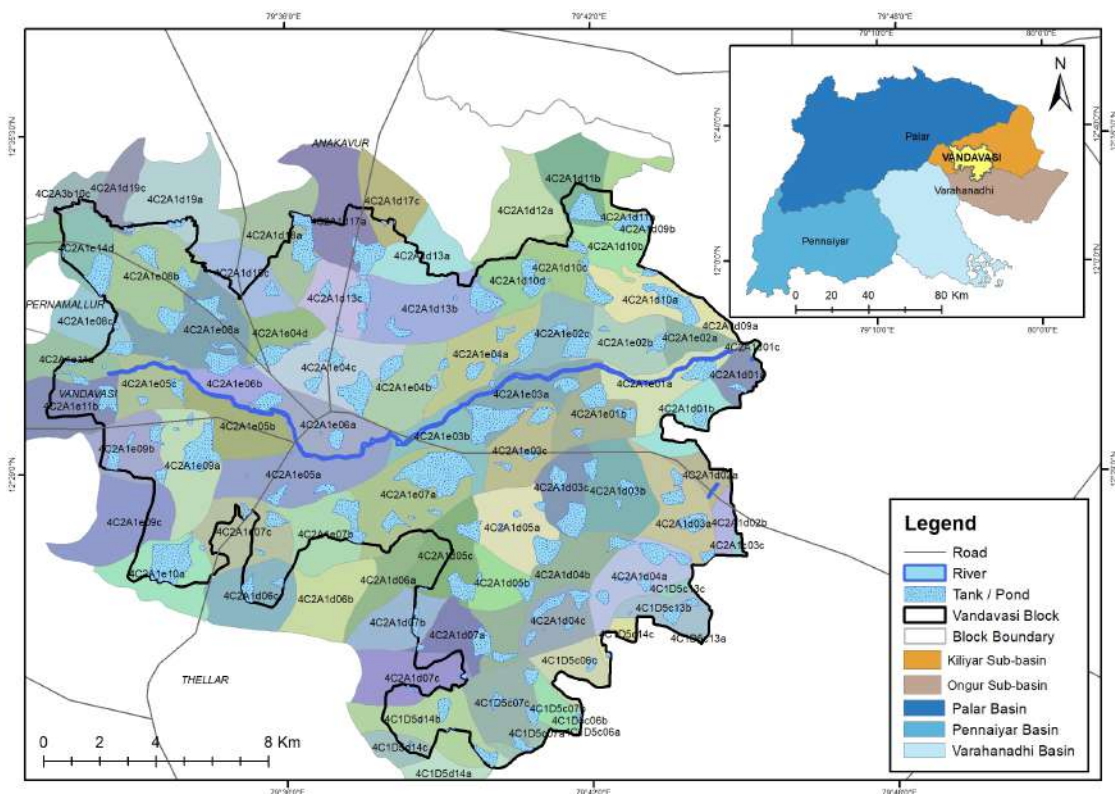


Figure 1.2. Watersheds- Vandavasi Block

There are 232 tanks in the Block with the largest tank being the Marudhadu Tank with a area of 302.8 ha. Other important tanks are Elangadu Tank (209.45 ha), Kilsathamangalam Tank (194.3 ha), Birudhur Tank (187.8 ha) and Karam Hissa Tank (183.6 ha) (Figure 1.3). The ground water levels in Vandavasi Block is in an over exploited state of depletion stage of ground water development. Vandavasi, Kilkodungalur, Chennavaram and Osur firkas cover the Block and all are in an over exploited stage.

GROUND WATER LEVEL OF THIS BLOCK

OVER EXPLOITED- > 100% Vandavasi, Kilkodungalur, Chennavaram, Osur

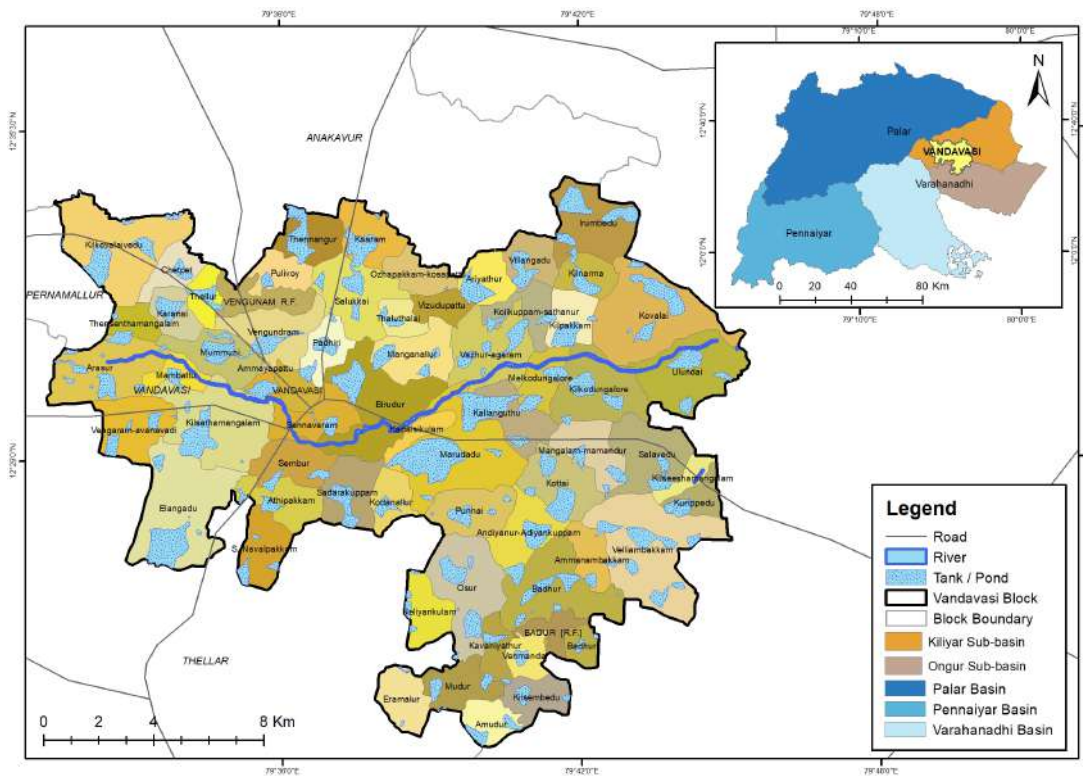
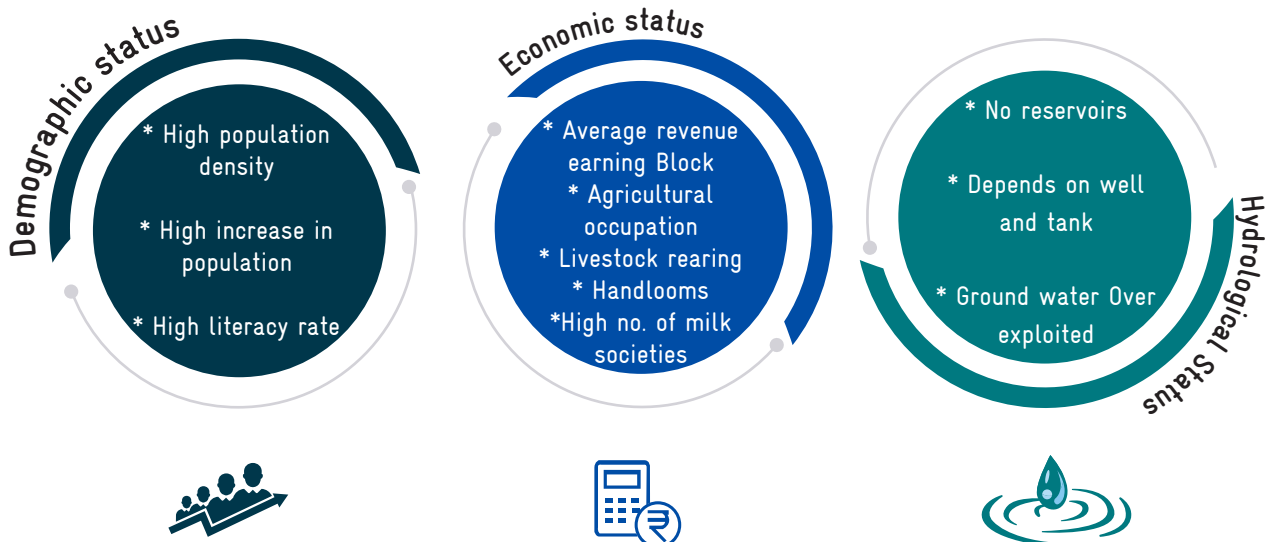


Figure 1.3. Spatial distribution of waterbodies



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

CLIMATE AND WATER SECURITY



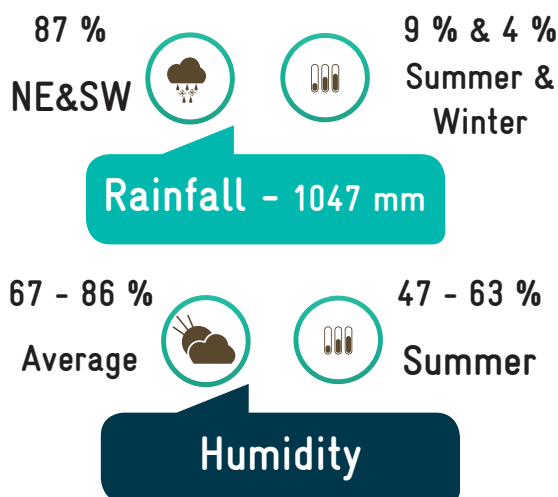
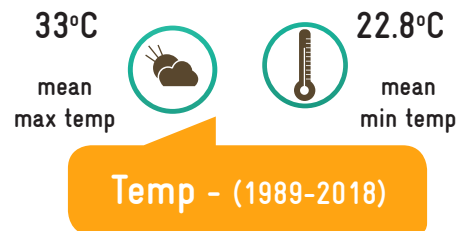
2 | CLIMATE AND WATER SECURITY

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

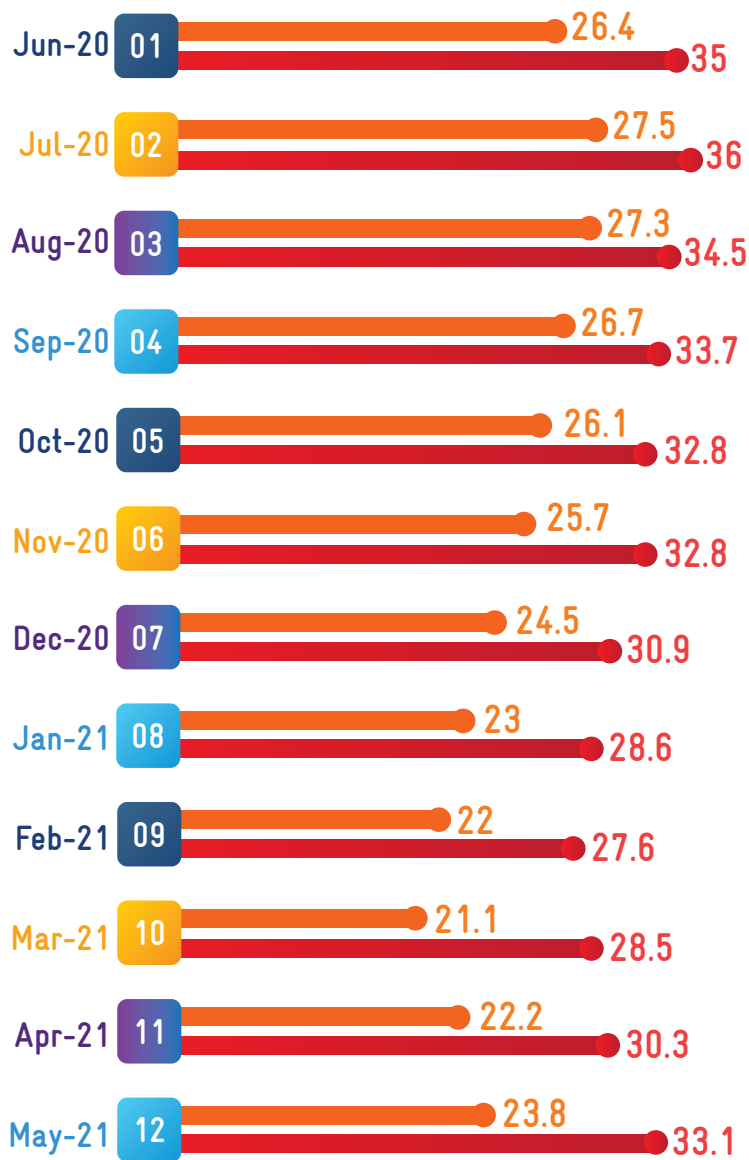
TABLE 1. GENERAL CLIMATE DESCRIPTION



In general, this semi arid region has dry and hot weather. The mean maximum temperature is 33°C and mean minimum temperature is 22.8°C during last 30 years (1989-2018) (IMD). In summer months the maximum temperature goes up to 45°C for 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 1,047 mm (WRIS, GoI). Both North-East and South-West Monsoons contribute nearly 87 % of the annual rainfall in which SWM is slightly stronger. While summer (March to May) rainfall accounts for 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 %.



Monthly Temperature

in degree celsius (°C)

Minimum temperature

Maximum temperature

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.

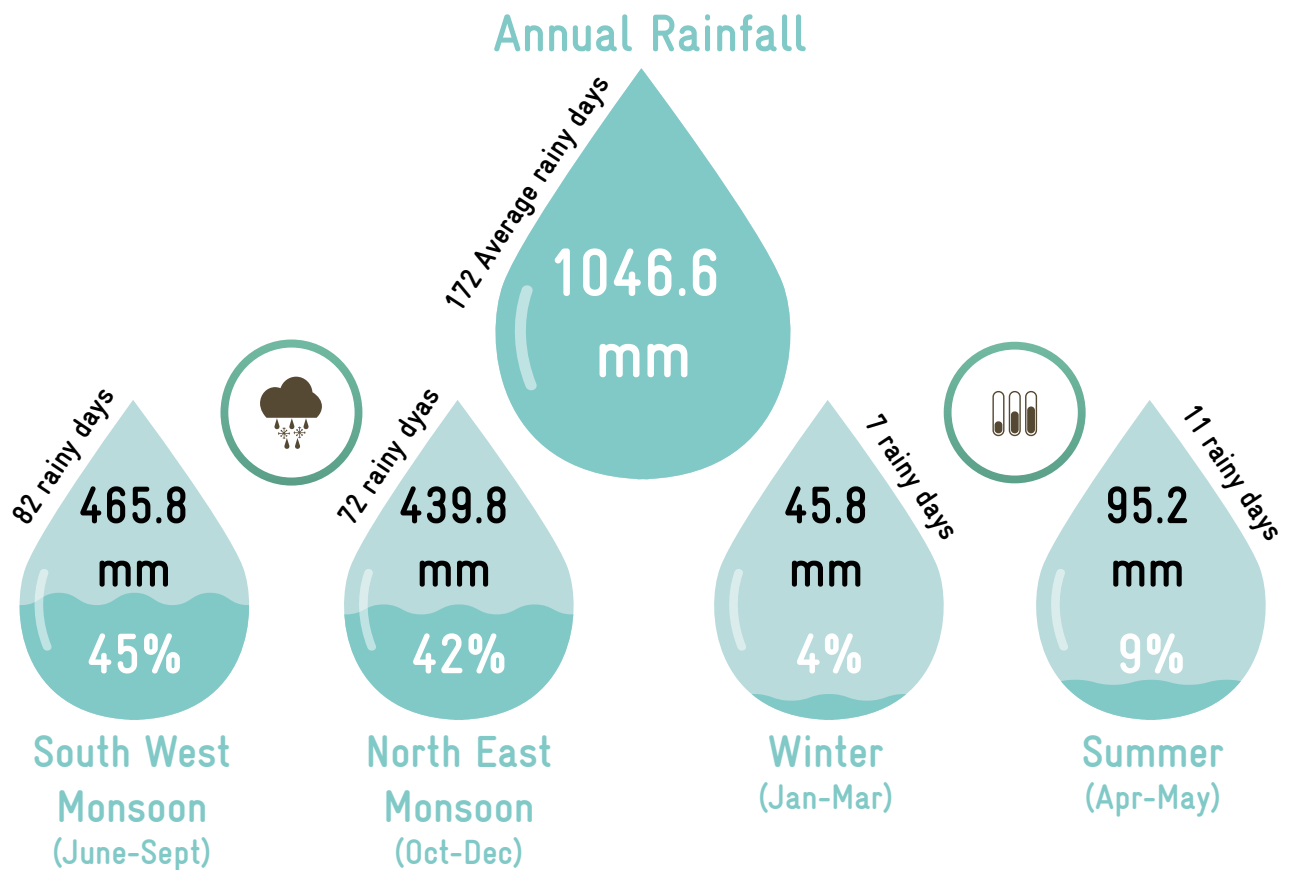


Figure 2.2. Season-wise distribution of annual rainfall

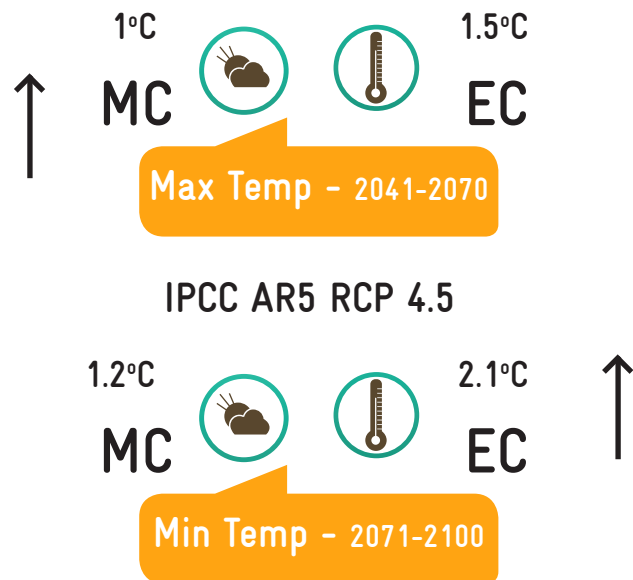
In recent decades, the world is witnessing significant changes in its climate. These changes include increase in average temperature, variations in the rainfall intensity and its frequency. This region is also no exception, and an increase in maximum and minimum temperature of 1.2°C and 0.5°C was observed 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 1.5°C increase in end-century (EC) period (2071-2100) from the baseline scenario under RCP 4.5 climate scenario in this region. The minimum temperature would increase nearly 1.2°C and 2.1°C during MC and EC periods. Average annual rainfall for IPCC AR5 RCP4.5 scenarios is projected to increase about 13 % towards MC and increase by about 21 % towards EC period.



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



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



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



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

2.1 | CLIMATE RISKS

Increasing temperature, fluctuating rainfall patterns and its extremities 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

Being situated approximately 100 Km from Bay of Bengal, this region experiences heavy rain and flood during deep depressions/cyclones forms in the Bay of Bengal. In recent decades, all parts were severely affected during 2005, 2010, 2015 heavy rainfall events and Thane (2011) and Vardah (2016) cyclones. State Disaster Management Authority, Government of Tamil Nadu identified 75 locations of Thiruvannamalai District as flood vulnerability spots. In Vandavasi Block, 10 GPs are identified for moderate vulnerable to floods.

Flood

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 Vandavasi Block, all GP's are prone to drought.

A heatwave is a period of abnormal high temperatures, more than the normal maximum temperature that occurs during the (hot weather) summer season. Heatwaves 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 Vandavasi Block are prone to heatwaves.

Heat Wave

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 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 observations, WASCA TN study proposed 18 indicators to reflect the 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 (°C)	C1	Goal 13
	Changes in min temperature (°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

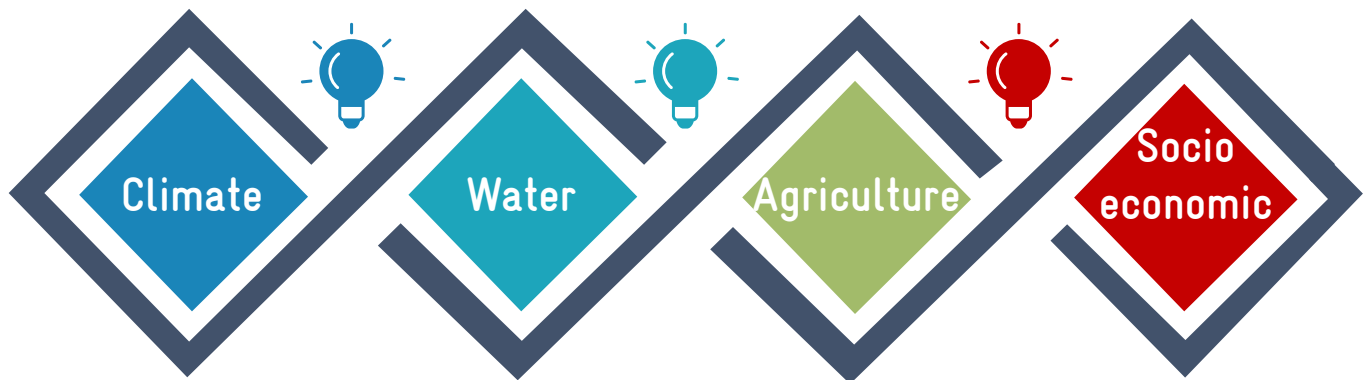
2.3 | COMPREHENSIVE ANALYSIS OF BLOCK LEVEL VULNERABILITY

WASCA TN has progressed towards Block level climate vulnerability mapping in order to strengthen water resources and build context specific climate resilient models at GP level. The 18 vulnerability indicators at District level under four areas via climate, water, agriculture and socio-economic are further explored at GP level through Composite Water Resource Management (CWRM) approach by GIZ, Department of Rural Development (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

headed by the Secretary RD&PR in November 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.

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 to be analyzed statistically and geospatially.

TABLE 3. MAJOR PARAMETERS IDENTIFIED FOR BLOCK LEVEL VULNERABILITY ASSESSMENT



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 adaptation. 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.



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.

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

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

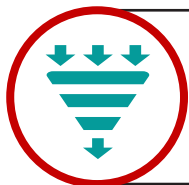


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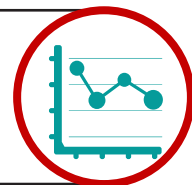
Water related works out of NRM

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, this should typically change 'relief works mode' to an integrated NRM perspective. Planned and systematic development of land and harnessing of rain-water following watershed principles should become the central focus of Mahatma Gandhi NREGS work across the country to sustainably enhance farm productiv-

ity and income of poor people. Even the works on private lands should be taken up following the principles of watershed management in an integrated manner. To facilitate evidence based scientific NRM planning process, technological support shall be taken from National Remote Sensing Centre, ISRO for identification and holistic planning of permissible works in the watersheds using web-GIS platform (Bhuvan Geoportal). The GIS (Geographical Information System) plans shall be comprehensive ones incorporating all eligible works under Mahatma Gandhi NREGS and the same shall be implemented in a phased manner. Section 22 of Annual Master Circular provides the key steps for GIS based planning.



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



3.1 | COMPOSITE WATER RESOURCE MANAGEMENT APPROACH

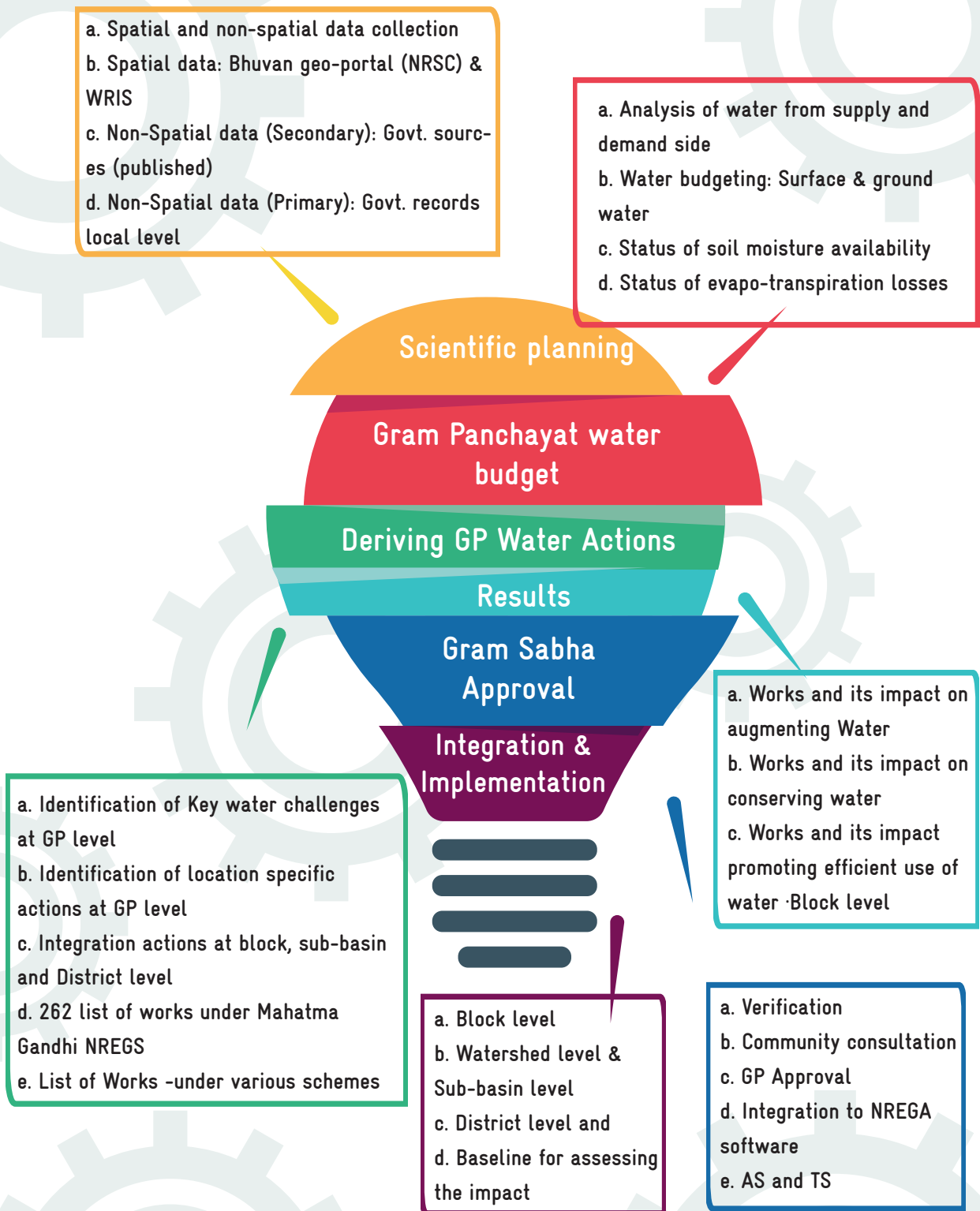
CWRM approach for WASCA uses simple scientific tools that can help Block or GP level officer to organize, analyze and prepare a developmental draft plan for participatory discussion at GP level. This approach involves analyzing key water challenges using both non-spatial and geo-spatial data in GIS,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

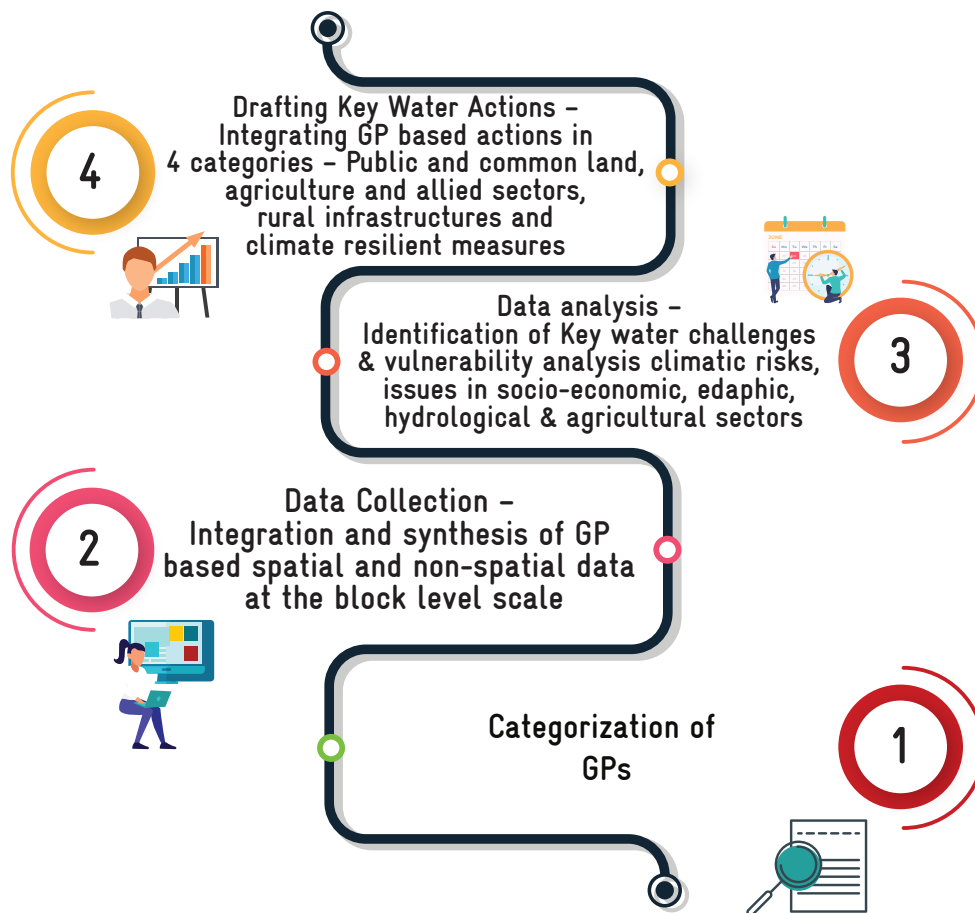


Such a comprehensive analysis helps in preparing the water budget integrating ground water, surface water through runoff from rainfall, evapo-transpiration and soil moisture which further helps to identify potential areas of action to augment the water resources in public /common land, agriculture and allied sectors and rural infrastructure dimensions. The analysis also helps to understand the areas of interest and appropriate climate resilient measure as an adaptive measure to the emerging climate change scenarios. The water challenge linked water actions are the key in developing the perspective plan for the water secured GPs, and serve as a shelf of projects. This shelf of projects is again mapped with the schemes available 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), and convergence are some of the key aspects that needs attention for a tangible outcome in both NRM as well as livelihoods.

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

STEPS INVOLVED IN BLOCK LEVEL ANALYSIS THROUGH CWRM APPROACH



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

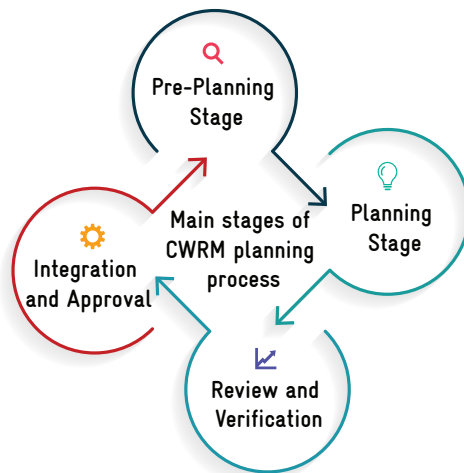
1. DEVELOPING PLANS AT LOWEST ADMINISTRATIVE LEVEL: GP LEVEL PLANS

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 NREGS
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 GPs 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 and basis on which GPs are categorized is given in Annexure 1. The details of categorization of GPs of Vandavasi Block is tabulated in Table 4.

TABLE 4. CATEGORIZATION OF VANDAVASI BLOCK GPs

NUMBER OF GP	GP TYPE	NAME OF THE PANCHAYAT
43	GP and revenue village data and boundary match (Type-I)	Ammanambakkam, Amudur, Birudur, Arasur, Ariyathur, Athipakkam, Chetpattu, Elangadu, Irumbedu, Karam, Karanai, Eramalur, Kilnarma, Kilkovalaivedu, Kavaniyathur, Kilpakkam, Kilsathamangalam, Kottai, Kilsembedu, Kodanallur, Kovalai, Manganallur, Melkodungalur, Mudur, Nelliankulam, Osur, Mambattu, Padiri, Pulivoy, Punnai, Salavedu, Sedarakuppam, Sembur, Sennavaram, Thazhuthazhy, Thellur, Thennangur, Vilangadu, Thensenthamangalam, Ulundai, Vengunam, Venmandai, Vizhuthupattu
5	GPs Having more than one GPs in one Revenue Village (Type -II)	Mummuni, Ammayampattu, Kadaisikulam, Kalankuthu, Marudhadu
11	One GP is falling under more than Type 1 one Revenue Village (Type -III)	Adiyanur-Adiyankuppam, Badur Kilkodungalur, Kilseeshamangalam, Koilkuppam-Sathanoor, Mangalam mamandur, Ozhapakkam-kosapattu, S.Navalpakkam, Vangaram, Avnavadi, Salukkai, Vazhur Agaram
2	GPs having more than one GP, one Revenue Villages data, boundary (Type -IV)	Veliyambakkam, Kuripedu

3.3 | DATA COLLECTION: SPATIAL & NON-SPATIAL

The CWRM planning framework has four vulnerability areas, integrating both non-spatial and spatial parameters with 18 indicators based on the IWRM and climate adaptation principles. The planning pro-







cess comprises of the following dimensions in a scientific and organized manner to prepare a meaningful plan at the lowest administrative unit i.e. GP plans.

SPATIAL DATA

The spatial datasets are supportive evidence to understand the existing conditions and issues in the area/ region. Considering the spatial datasets such as Land Use and Land Cover (LULC), waste lands, salt and erosion affected lands, drainage lines, ground water potential, lineament, geomorphology,

and slope will contribute significantly in the preparation of appropriate and suitable science-based plans for holistic development of the region, emphasized with the water actions. The use of different spatial data to assess and confirm the key water challenges along with the non-spatial data is discussed below:

NON SPATIAL DATA

-  Characterization of catchment landscapes based on the ten-fold land use classification to know available land area in both public and individual land ownership and its current position in terms of available area and use, its links with surface runoff as good, average and bad runoff
-  Watershed based analysis is to understand the hydrological and administrative boundaries. This aids in understanding the profile and condition of the watershed at macro or micro level for planning relevant water actions
-  Soil characteristics including the macro and micro nutrient status, physical quality of the land using pH values and textural soil quality to understand its permeability, infiltration and water holding capacity which are crucial for soil moisture content
-  The agriculture and livestock datasets help in understanding the quantum of water requirement of the key crops and type of cropping systems adopted, number and type of different livestock resources and its water requirement vis-a-vis its linkage to livelihoods of the vulnerable population in the village
-  Grey water generation at GP level to understand the quantum of grey water available and existing methods of its use. This information is essential to plan effective strategies for recycle and reuse
-  Water budgeting at GP level to demonstrate the sector wise water demand and available water through the traditional water harvesting and storage bodies and the potential runoff that can be conserved through appropriate actions on the supply side. The difference between demand and supply at the GP level helps the communities to understand the gap and practice the necessary water actions

Data from a total of 99 parameters were collected, out of which 13 parameters are primary source data and were collected at GP administrative units by GPs officers. 65 parameters are secondary source data collected from Govt. sources and authentic websites and the remaining 21 requisite parameters

3.4 | CWRM PLANNING ANALYSIS - CLIMATE

All the CWRM parameters are intended at Block level. On the other hand, all the climate change observations and projections are at District or regional level and currently, data at Block level is not available. Hence, previous hydro-meteorological disasters

for water budgeting and grey water were calculated using standards/suitable methods or formulas. CWRM parameters and its data sources is attached in the Annexure 3.1 to 3.3. The methods, and formulas used for water budgeting is attached in Annexure 3.4 and for grey water generation in Annexure 3.5.

are considered to denote the Block's change in climate (temperature, rainfall) extremities and its risks, which was recorded by State Disaster Management Agency, 2020 (Table 5).

TABLE 5. CLIMATE RISKS AND VULNERABLE LOCATIONS

Flood	Drought	Heat Wave
Irumbedu, Vengunam, Padiri, Kilsathamangalam, Birudur, Sennavaram, Marudhadu, Vazhur, Kadaisikulam, Adiyankuppam	All GPs	All GPs

3.5 | CWRM PLANNING ANALYSIS - WATER

For effective planning, the available traditional water storage and conveyance structures along with its supply and demand status for different sectors at Block level are necessary. Both spatial and non-spatial data including details and status on watershed and drainage network, canal network, irrigation fa-

cilities, 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 are as follow

3.2.1 SPATIAL DATA

Spatial data on watershed, drainage and surface waterbodies, ground water potential, lineament, geomorphology, terrain, slope is collected to understand the site-specific problems and take deci-

sions to draft scientific key water actions together with non-spatial data. The spatial Block level maps downloaded from NRSC, BHUVAN, GoI website are used.

3.5.1.1 Geomorphology: Geomorphology deals on scientific study of “landforms and landscapes, including their description, type, and genesis”. Landform is the end product resulting from the interactions of the natural surface genesis and the type of rock. The scope of geomorphology has further expended with landform maps, were widely used in various fields of hydrology, pedology, geoscience, urban and regional planning etc. Vandavasi Block is completely engrossed with denudation origin pediment and pediplain complex (Figure 3.1). Pediment is the low relied or plain with gentle slope area close to the foot of the mountains with or without debris whereas pediplain is relatively flat rock surface formed by joining of several pediments. Fundamental information of landform by its units will act as critical input in the identification of suitable sites for NRM activities under CWRM plan preparation.

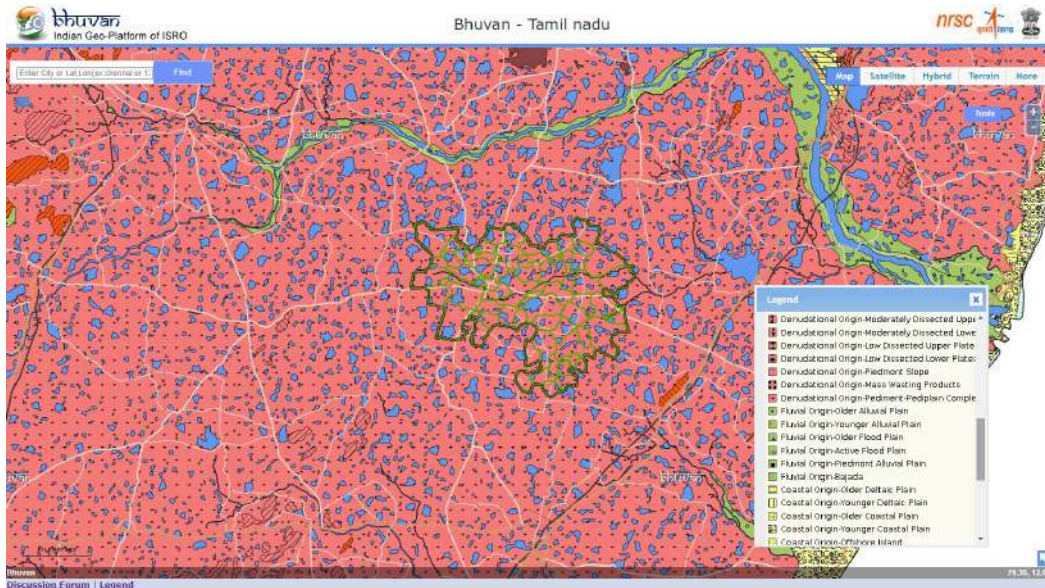


Figure 3.1. Geomorphology map

Landform unit	Area in %	Gram Panchayat
Denudational origin Pediment Pediplain complex		



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

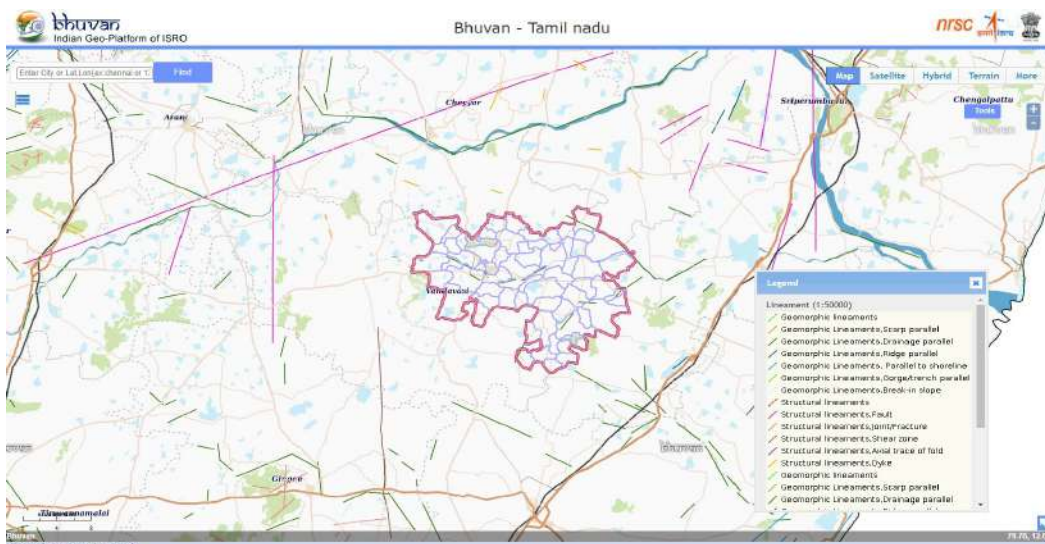


Figure 3.2. Lineament map

**Lineament
type**

Gram Panchayat

Geomorphic lineaments, Drainage parallel



Irumbedu, Kilseeshamangalam, Veliambakkam,
Kottai, Badur, Eramalur, Birudhur, Marudhadu,
Kil-Sathamangalam, Mambattu, Arasur

3.5.1.3 Terrain: The terrain map is a product of Digital Elevation Model (DEM), which gives information related to elevation from above sea level used to represent the relief features. It is noticed that the Block area belongs to a lower range of elevation (Figure 3.3).

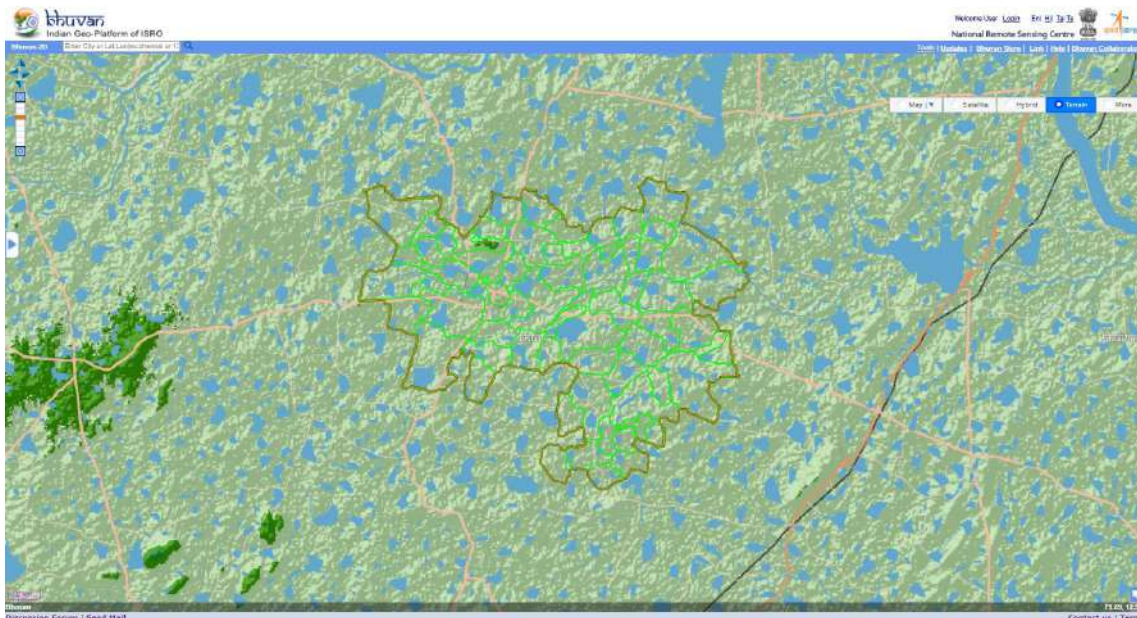


Figure 3.3. Terrain map

3.5.1.4 Contour map: The contour is the most important element in the cartographic representation of the terrain and 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. The closely spaced contour lines indicate steep slope and the lines spaced far apart would indicate a gentler slope. North-West and Western region of the Block witnessed the dense contour interval indicating the upper land with steep slope (Figure 3.4). The contour map also plays a vital role in delineation of watershed & its units, used in planning and identifying the recharge structures, farm ponds and construction of grey water drain network etc.

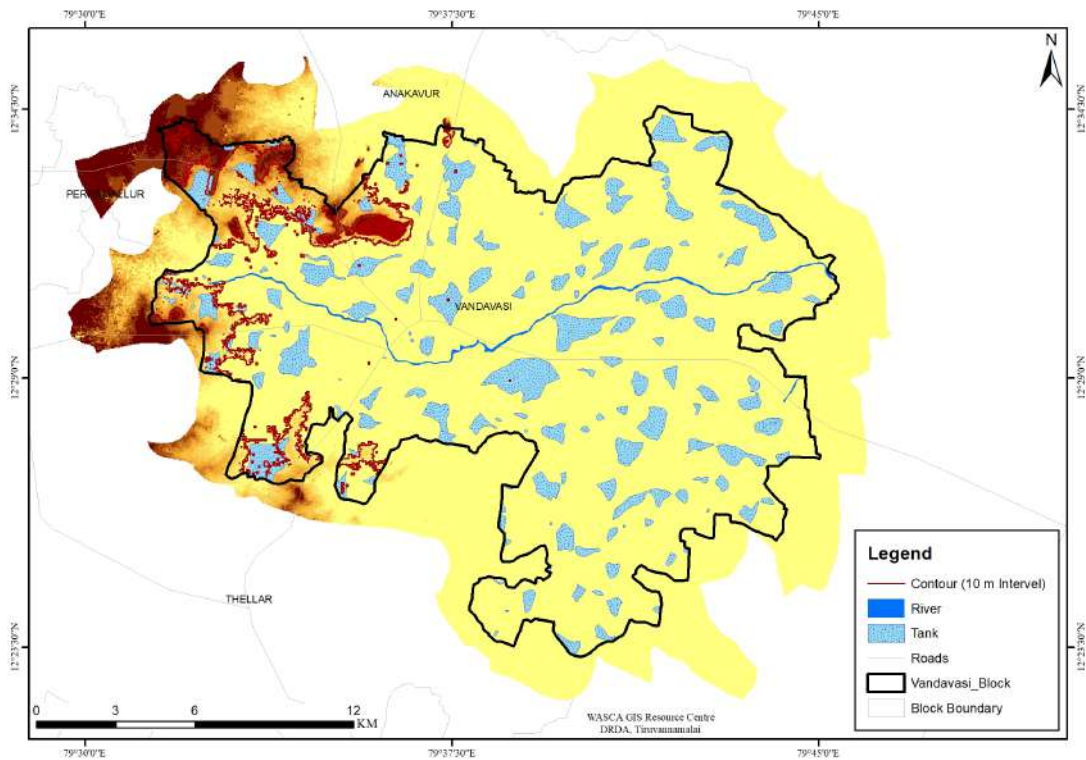


Figure 3.4. Contour map

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. Very flat (0-1 %) to flat (1-3 %) slope ranges were 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.

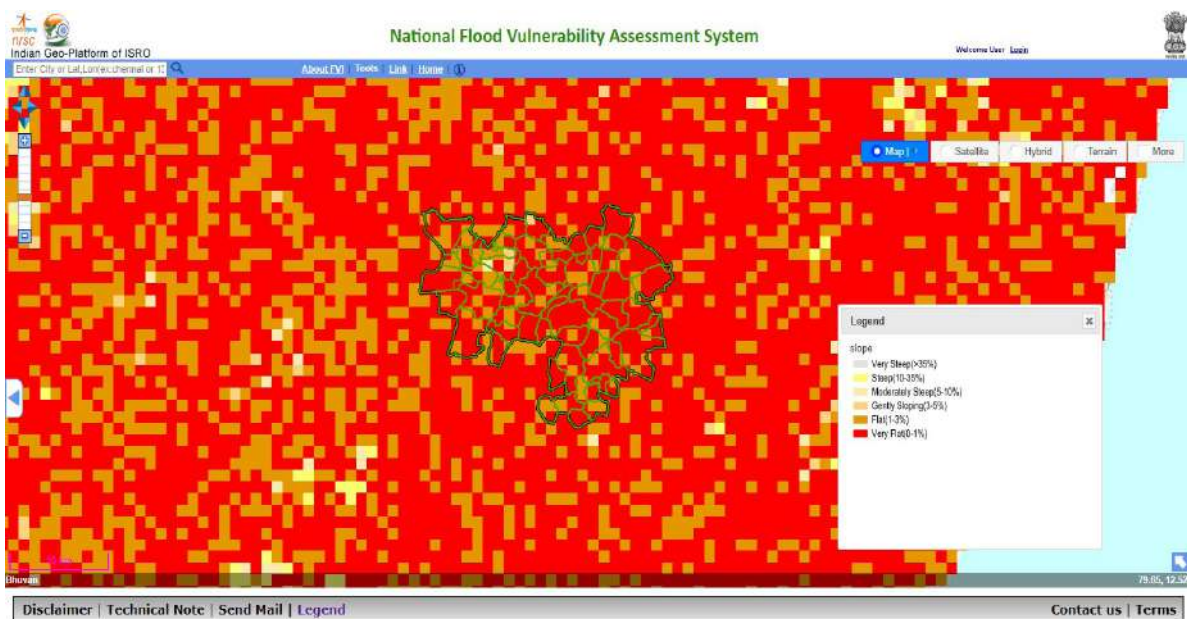


Figure 3.5. Slope map

Slope
range

Area
in %

Gram Panchayat

Very Flat (0-1%)



92%

Mangalam Mamandur, Irumbedu, Kodungallur, Sedarakuppam, Vandavasi, Vizhuthupattu, Koilkuppam Sathanoor, Ariyathur, Padiri, Nelliyankulam, Amudur - 100%, Amanambakkam, Marudhadu, Salavedu, Arasur - 90%, Thennangur, Veliambakkam, Elangadu, Sallukai - 70%

Flat (1-3%)



80%

Thensenthamangalam, Kil-sembedu, Kavaniyathur, Kosapattu, Settupattu - 90%, Mummuni - 80%, Kilsathamangalam - 60%, Vazhur Agaram - 50%

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 Vandavasi Block. The Block witnessed the low density drainage network (Figure 3.6). 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.

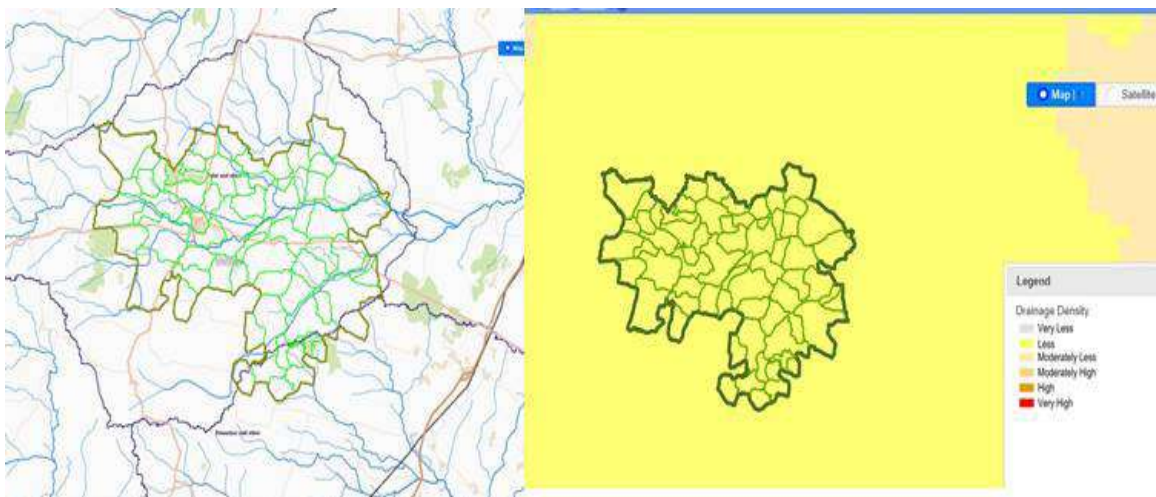


Figure 3.6. Drainage network and density

3.5.1.7 Watershed: Implementation of any water management measures 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. Vandavasi Block watershed map is illustrated in Figure 3.7. Watershed is used for the interventions based on Ridge to Valley (R2V) concept and sequencing the plan accordingly. R2V approach intends to conserve each drop of rain water from ridge to a reasonable extent and it ensures the better surface water flow management also aids in strengthening the durability of land, soil and water conservation structures of the downstream.

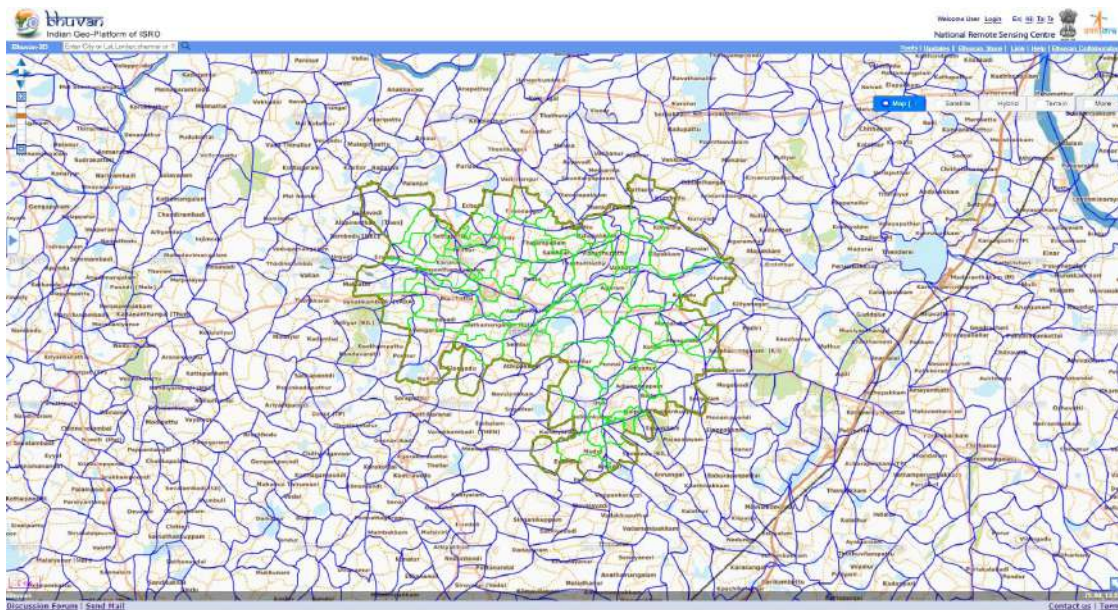


Figure 3.7. Watershed map

3.5.1.8 Ground water perspectives: Ground water is one of the important natural resource in semi-arid region like Vandavasi Block. The ground water perspectives map is the integration of lithology, geomorphology, geological structures, hydro geomorphic datasets, which provides the required information related to ground water exploration and the probable ground water prospects. This map will help in identification of tentative locations for construction of recharge structures. In the Block, most of GPs area witnessed with enrich yield of 50 to 100 LPM in above 80 m deep well, whereas few GPs witnessed 20 to 30 LPM in above 80 m deep well yield (Figure 3.8). The GPs wise detailed Groundwater prosperity shown in the illustration below. This specific information will play a crucial role in identifying sites for recharge structures in order to address water scarcity issues in the Block.

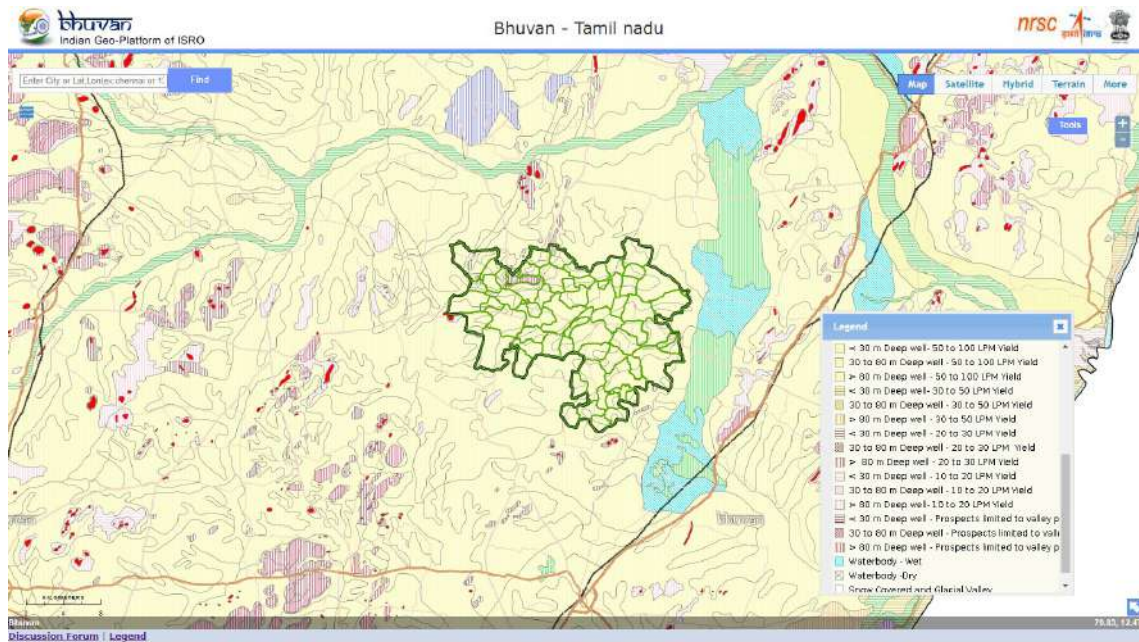


Figure 3.8. Ground water perspective map

Groundwater Prospects	Area in %	Gram Panchayat
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> 80 m Deep Well- 50 to 100 LPM Yield



95%

All GPs

> 80 m Deep Well- 20 to 30 LPM Yield



36%

Vengunam RF - 90%, Kovalaivedu - 20%,
Karam - 20%, Thellur - 15%

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.	Parameter	Total
	Canal Network (m)	
1	Length of Main Canal	98,241
2	Length of Minor Canal	9,315
3	Length of Distributaries	8,870
4	Water Courses (Field Channels)	47,785
	Traditional Water bodies (No.)	
5	Number of Tanks (PWD & Union)	104
6	Number of Ooranis	195
	Irrigation Facilities (ha)	
7	Tank Irrigation	2,516
8	Canal Irrigation	25
9	Open & Tube Well Irrigation	6,060
	Catchment Area wise Available Runoff (ha.m)	
10	Good Catchment Area	3,228
11	Average Catchment Area	343
12	Bad Catchment Area	4,352
	Watershed and Drainage Networks	
13	Length of Natural Drainage Lines (m)	1,80,254
14	Number of Natural Drainage Lines (No.)	209
15	Number of critical Watersheds (No.)	264
	Water Demand	
16	For Humans (ha.m)	304
17	For Livestock (ha.m)	133
18	For Agriculture (ha.m)	9,438
19	GW utilization for Drinking (%)	25
20	GW utilization for Livestock (%)	58
21	GW utilization for Agriculture. (%)	76
22	SW utilization for Drinking (%)	75
23	SW utilization for Livestock (%)	42
24	SW utilization for Agriculture (%)	24

3.5.2.1 Existing Water Structures

The Block has structured traditional water storage units such as tanks and Ooranis which are the life line of local communities for their lives and livelihoods. It is noticed that the Ooranis (195) are more than tanks (104) (Figure 3.9).

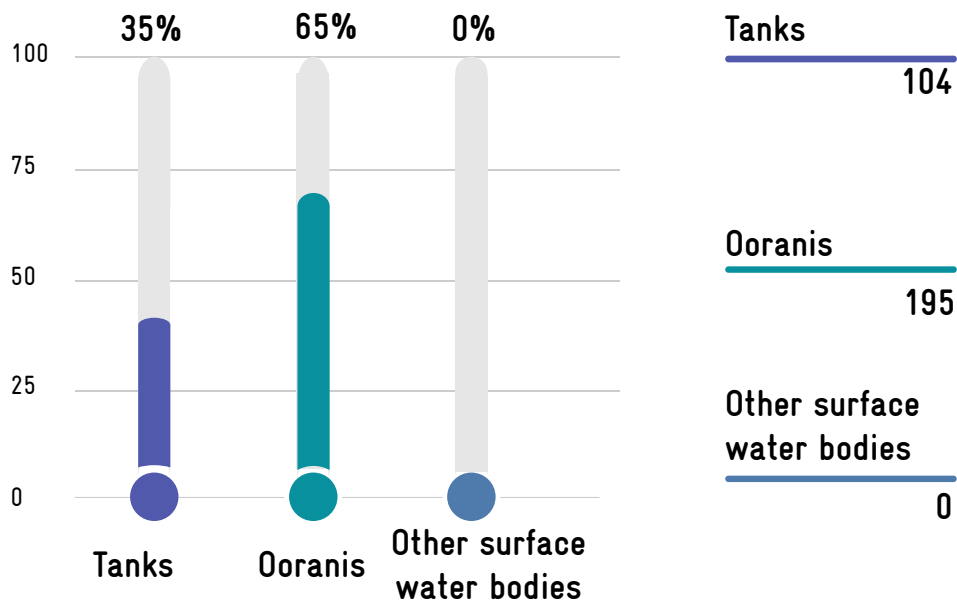


Figure 3.9. Traditional Waterbodies

3.5.2.2 Sources of Irrigation

The total area under irrigation in the Block is 8,600.74 ha, of which 70.46 % (6,060 ha) is irrigated through ground water stored in open/tube wells followed by 29.25 % (2,516 ha) area which depends on tanks based irrigation and the remaining 0.29 % (25 ha) is canal based irrigation. (Figure 3.10).

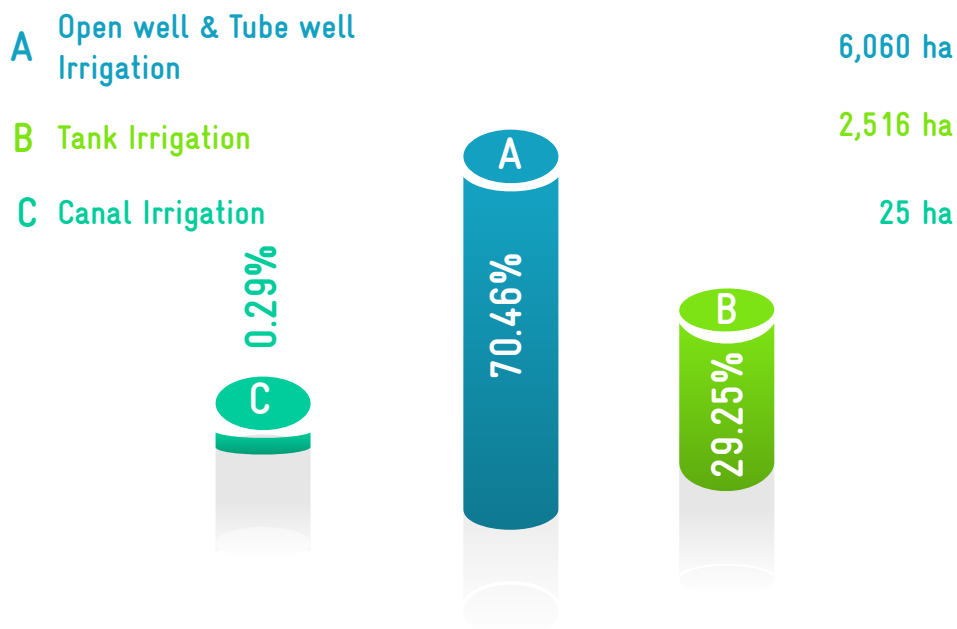


Figure 3.10. Irrigation sources

3.5.2.3 Available Run off

The total available runoff in the catchment area is 7,923.1 ha.m out of which 54.93 % is from bad catchment area followed by 40.74 % from good catchment area and the remaining 4.33 % is from average catchment area. As the area is dominated with bad catchment zone which indicates that the rainfall is not being conserved properly, there is a strong requirement for construction of water conservation structures. From the table, it is evident that more than half of the total rainwater is flowing as runoff which can be well managed with the increase of some water conservative structures (Figure 3.11).

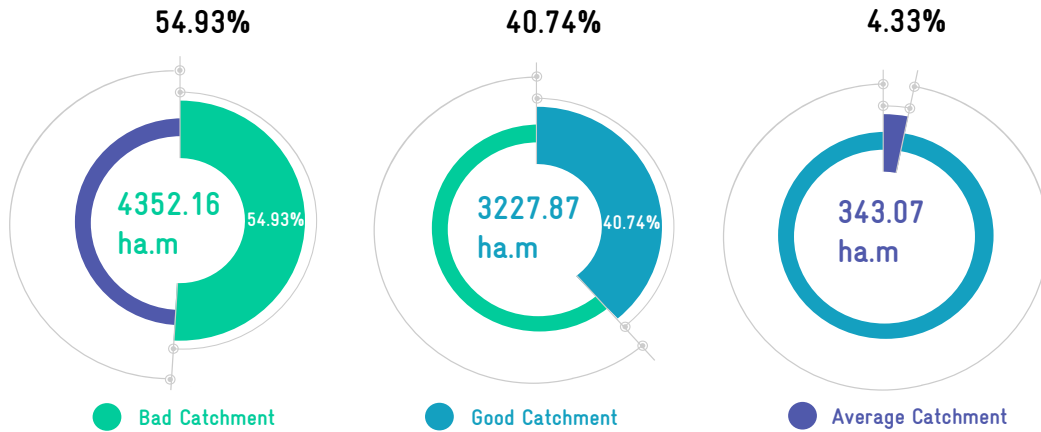
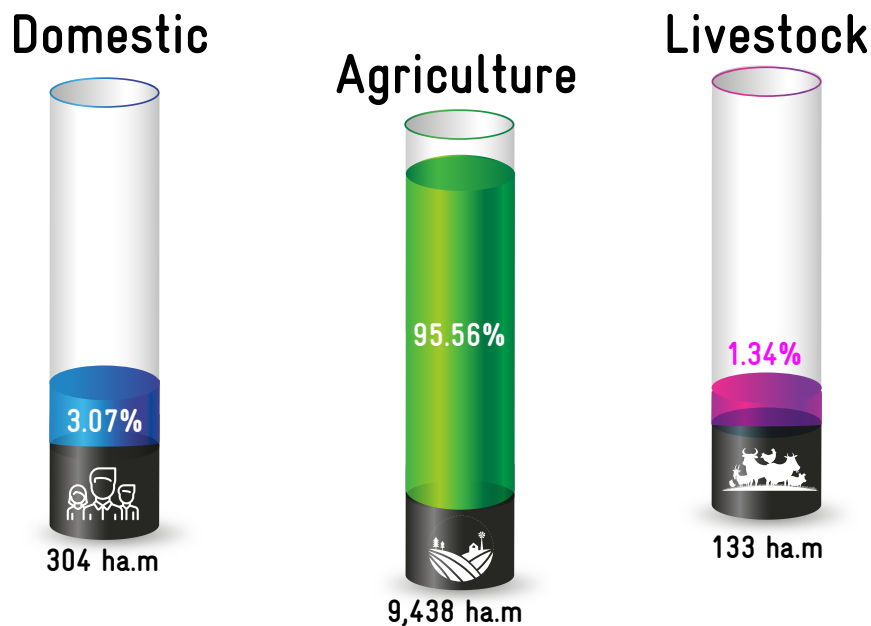


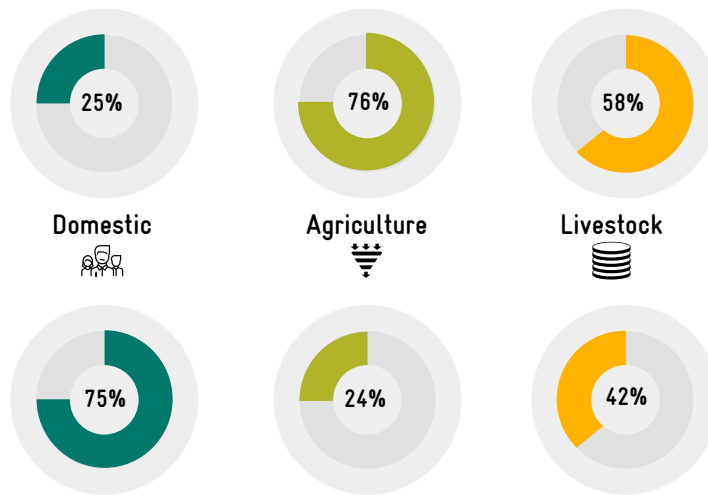
Figure 3.11. Runoff from catchments

3.5.2.4 Water Demand

The total demand for water including domestic, agriculture and livestock purpose is 9,875.94 ha.m. The highest demand is from the agriculture sector of 9,438 ha.m (95.57 %) followed by domestic use demand of 304 ha.m (3.08 %) and rest is from livestock. Out of the total water demand, 75 % for domestic purpose usage is met through surface water while the remaining 25 % from ground water resources. Utilization of 76 % for agriculture and 58 % for livestock is met by ground water (Figure 3.12).



% OF GROUND WATER UTILIZATION



% OF SURFACE WATER UTILIZATION

Figure 3.12. Sector-wise water utilization

3.6 | CWRM PLANNING ANALYSIS- AGRICULTURE

Agriculture and allied activities are the livelihood resources of most of the households in Vandavasi Block. 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 Vandavasi

Block’s problems in order to draft scientific key water actions.

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

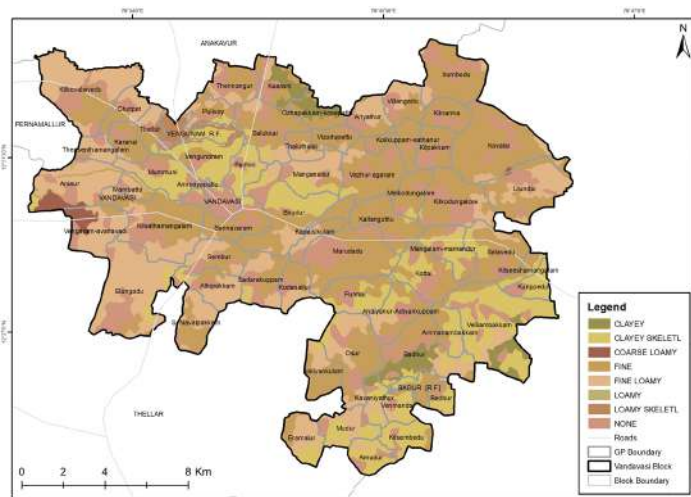


Figure 3.13. Soil texture

3.6.1.2 Soil erosion: Soil erosion is a natural process of displacement of upper layer of soil caused by dynamic erosion agents i.e. water, air, plants and humans. Sheet erosion is noticed in the Block which is 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.

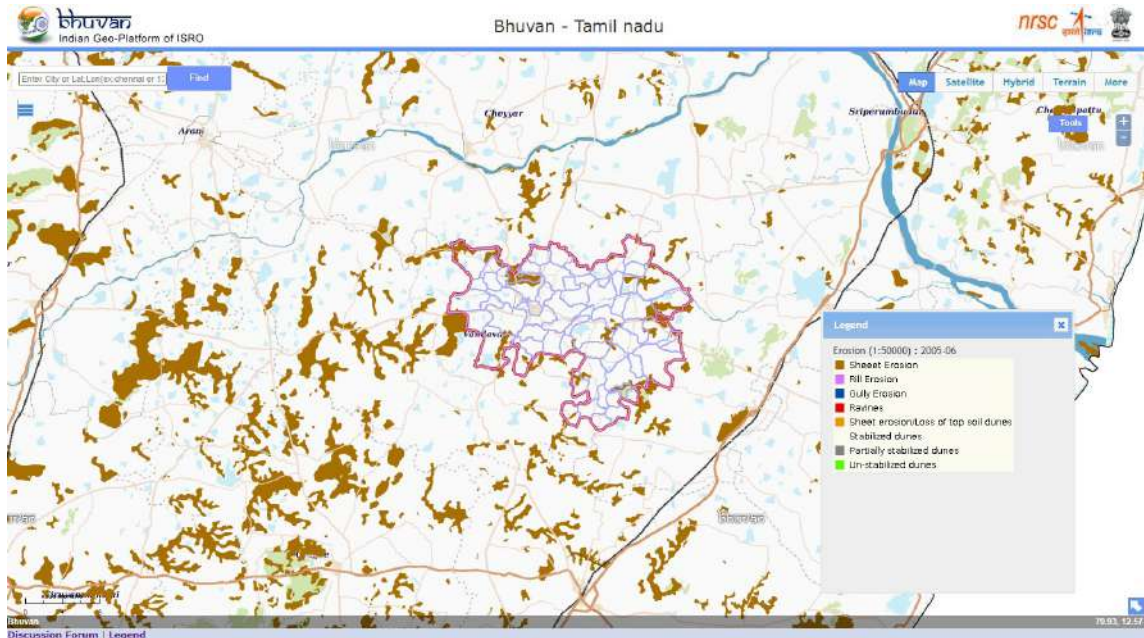
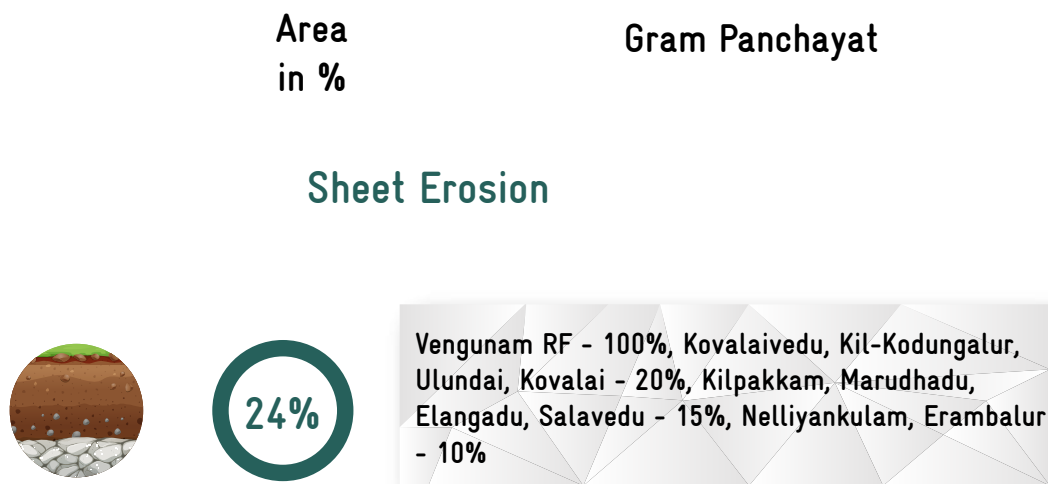


Figure 3.14. Soil Erosion map



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. Vandavasi Block is dominated with barren land followed by agriculture land (Figure 3.15). The GP wise LULC illustrated below. LULC map helps the decision makers and planners to focus on the developmental activities in the fallow land.

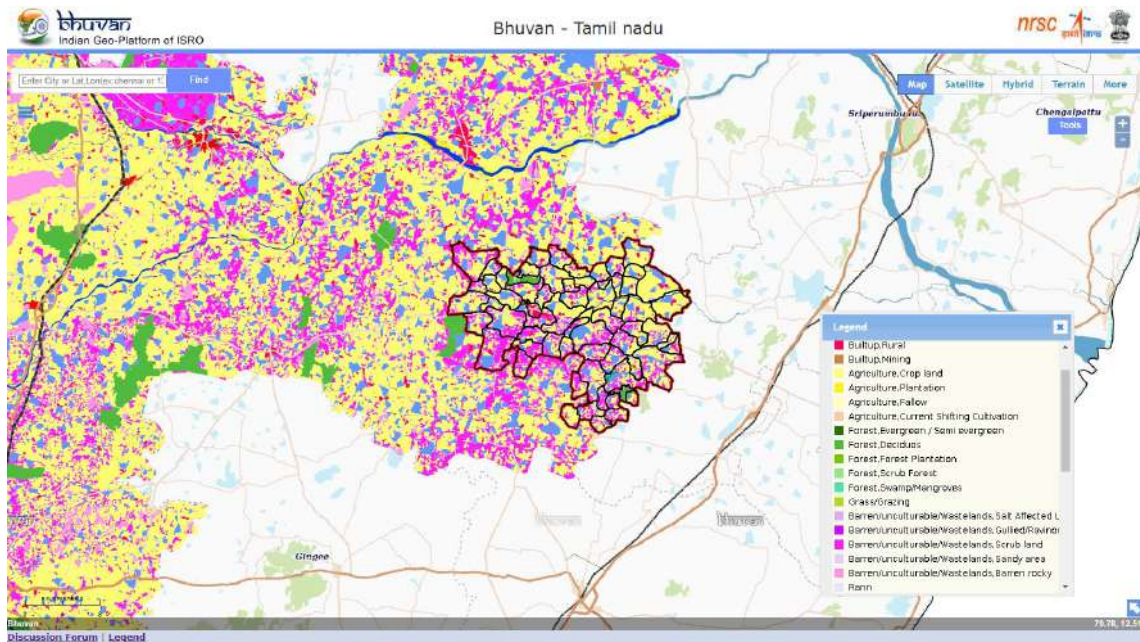
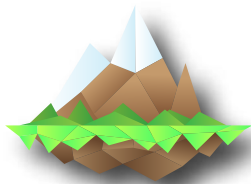


Figure 3.15. Land use land cover map

Land Use	Area coverage in %	Gram Panchayat
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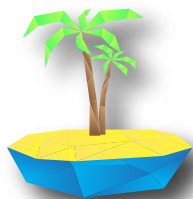
Barren Lands



57%

Sirunavalpakkam - 90%, Athipakkam, Elangadu, Kavaniyathur - 80, Sembur - 75%, Nelliyankulam - 70%, Kottai, Marudhadu, Kilsathamangalam, Vengaram, Mudur, Punnai - 50%, Kadasikulam - 40%, Manganallur - 30%, Arasur - 10%

Agriculture crop lands and Plantation



82%

Kovalai, Ulundai, Kilpakkam, Kilnarma, Vizhuthupattu, Kodungallur, Karanai, Thellur, Mambattu - 95%, Ermallur, Kosapattu, Vazhur Agaram, Kuripedu, Ammanambakkam - 80%, Mummuni, Vengunam, Salavedu - 70%, Osur, Veliambakkam - 50%

3.6.1.4 Waste land: A Parcel of land that is not suitable for any agriculture activity and mostly covered with dense or open scrub is called as wasteland. The extent of wasteland will act as a direct input for preparation of plans for land development activities or greenery. Degraded forest is observed in the Block area (Figure 3.16). Measures are being taken for arresting the forest degradation by implementing deforestation activities such as horticulture plantation.

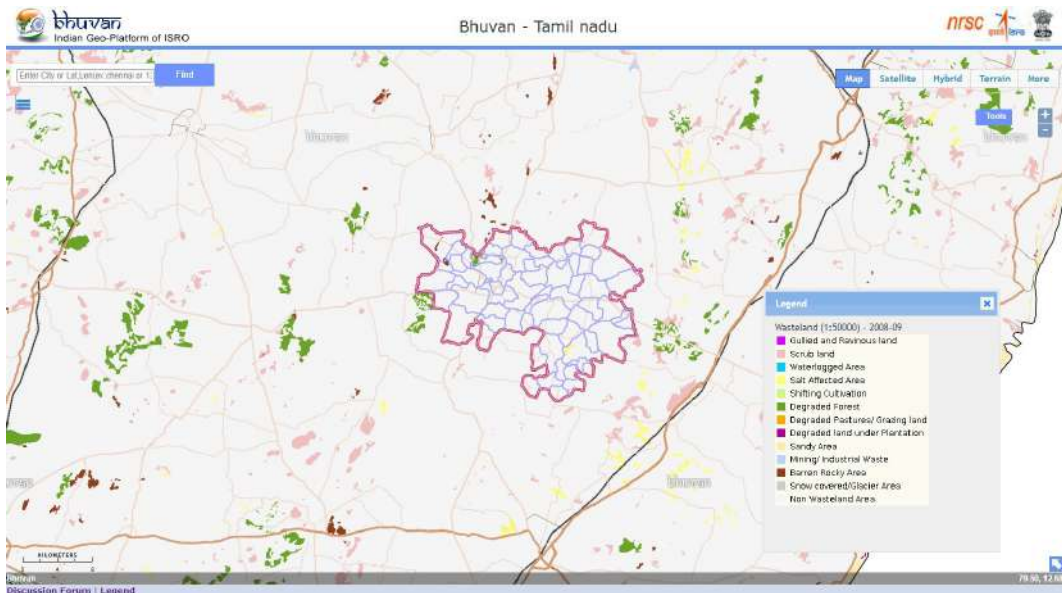
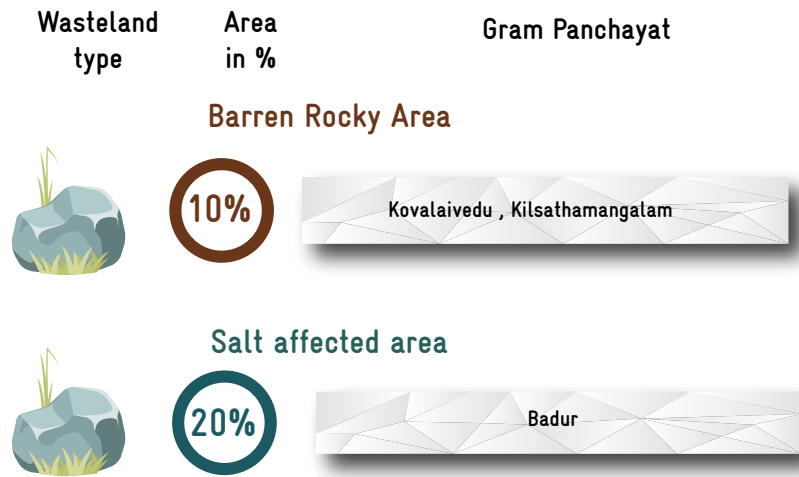


Figure 3.16. Wasteland map



3.6.1.5 Salt affected area: Vandavasi Block witnessed the moderate sodic and saline affected area, GPs wise details area illustrated below and shown in Figure 3.17. These parcels will act as a direct input while planning process to propose soil conservation measures, mainly activities to reduce salinization and suggestions for alternative cropping.

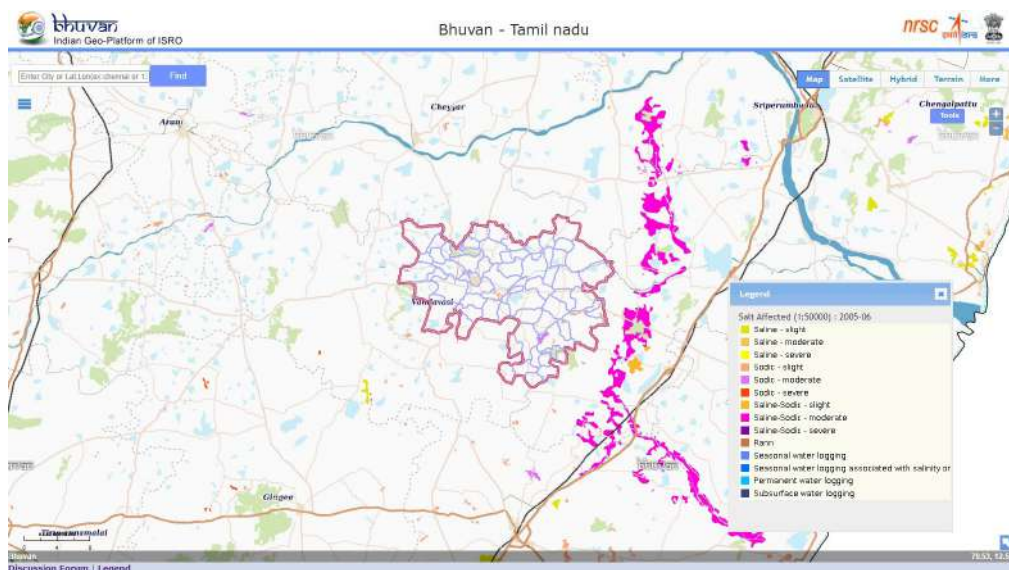


Figure 3.17. Salt Affected Area

Thematic
unitArea
in %

Gram Panchayat

Sodic Moderate



Saline Moderate



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.	Parameter	Total
	Land Resources (ha)	
1	Area Irrigated by Source	8,660
2	Current Fallow land	8,390
3	Non-Agricultural Uses	8,190
4	Unirrigated Land	4,952
5	Fallow Land other than Current Fallows	1,269
6	Cultivable Waste Land	572
7	Permanent Pastures and Other Grazing Land	447
8	Barren & Un-cultivable Land	387
9	Land Under Miscellaneous	203
10	Forest land	31
	Land under Catchment Area (ha)	
11	Good Catchment	8,608
12	Average Catchment	1,222
13	Bad Catchment	23,272
	Crop Details	
14	Irrigated Area (ha)	6,459
15	Rainfed area (ha)	820
16	Paddy Cultivation (ha)	3,868
17	Crop Water Requirement - Irrigated condition (ha-m)	8,891

18	Crop Water Requirement - Rainfed condition (ha-m)	624
Soil Resources: Status of Available Nitrogen (%)		
19	Very Low	31
20	Low	62
21	Medium	7
Status of Organic Carbon (%)		
22	Very Low	42
23	Low	57
24	Medium	1
Status of Soil Micro Nutrients (%)		
25	Sufficient	46
26	Deficient	54
Status of Physical condition of the soil (%)		
27	Moderately Acidic	2
28	Slightly Acidic	5
29	Neutral	5
30	Moderately Alkaline	86
31	Strongly Alkaline	2
Soil Texture (%)		
32	% of Clay Soil	20
33	% of Fine Soil	60
34	% of Coarse loamy	4
35	Soil Water Permeability (Low, Moderate, high)	Moderate
Soil moisture and ET		
36	Volumetric Soil Moisture (%)	23
37	Estimated Soil Moisture (ha.m)	5,730
38	ET Losses (ha.m)	11,060
Means of Water Extraction (%)		
39	Gravity	8
40	Lifting	92
Irrigation Methods (%)		
41	Wild Flooding	27
42	Control Flooding	73
Livestock (No.)		
43	Cattle population	30,989
44	Sheep population	5,532
45	Goat population	43,005
46	Poultry	900

3.6.2.1 Land utilization

The standard land use classification helps to understand the distribution and the extent of different categories of land use. 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 33,102 ha, the highest of 26.16 % land is used for irrigation by sources, followed by 25.35 % area is used for current fallow land, while less than 5 % of land is fallow land other than current fallows, Barren & Un-cultivable land, cultivable waste land and Permanent Pastures and other grazing land, forest land etc., (Figure 3.18).

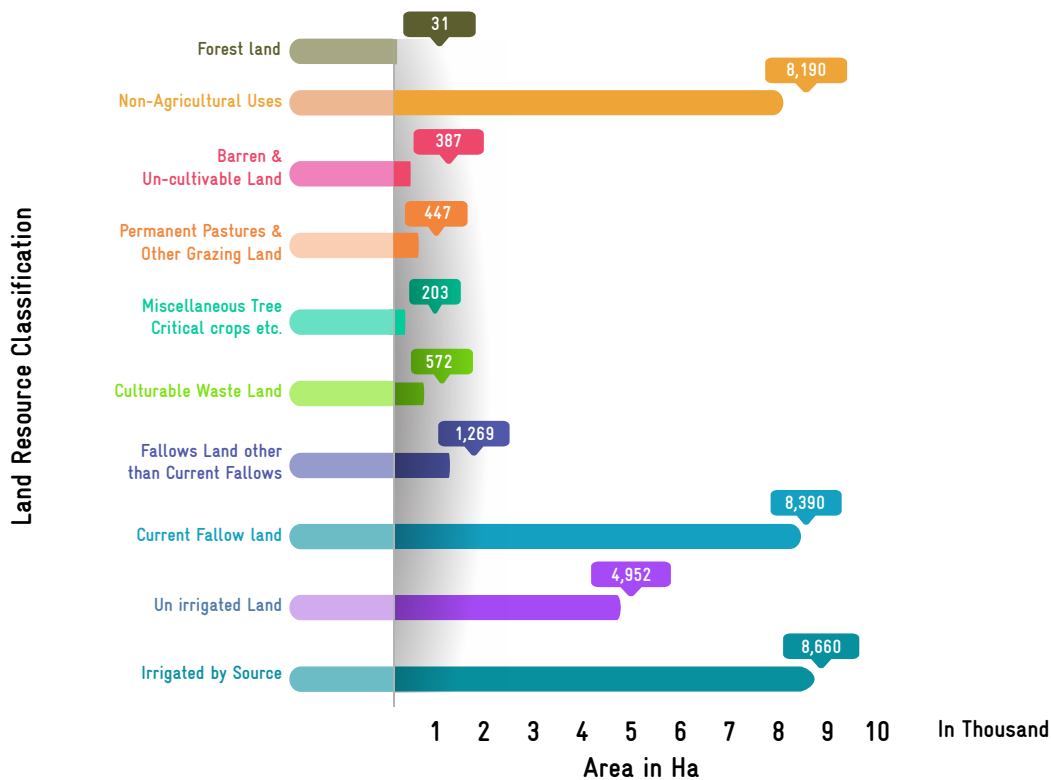


Figure 3.18. Land utilization

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 33,102.13 ha, in Vandavasi Block, the highest of about 70.3 % is bad catchment area followed by 26 % 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).

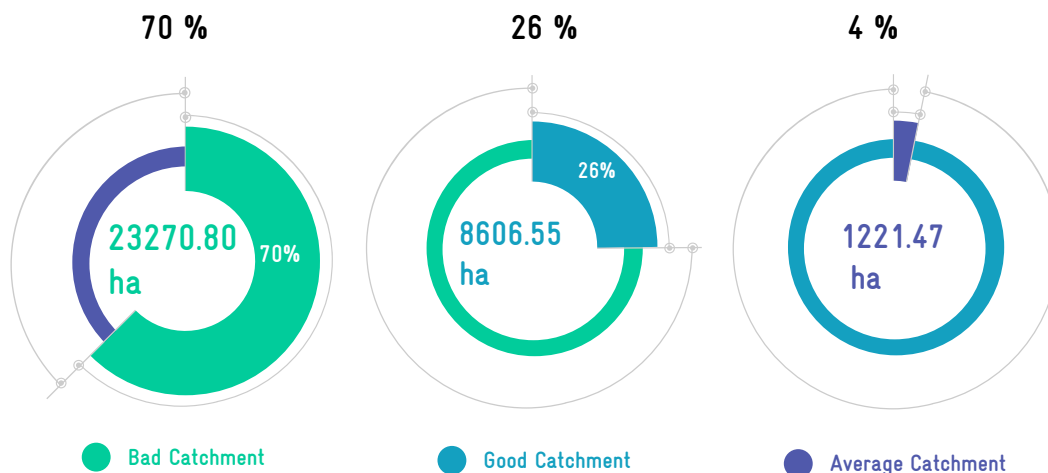


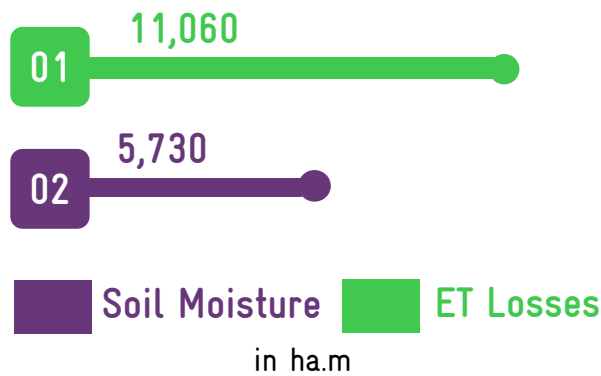
Figure 3.19. Catchment area

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 5,730 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 11,060 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 62 % under low category and remaining is medium Nitrogen (Figure 3.20). According to soil resource map, this Block is identified as one of the nitrogen deficient Blocks. (Tiruvannamalai district profile 2020).

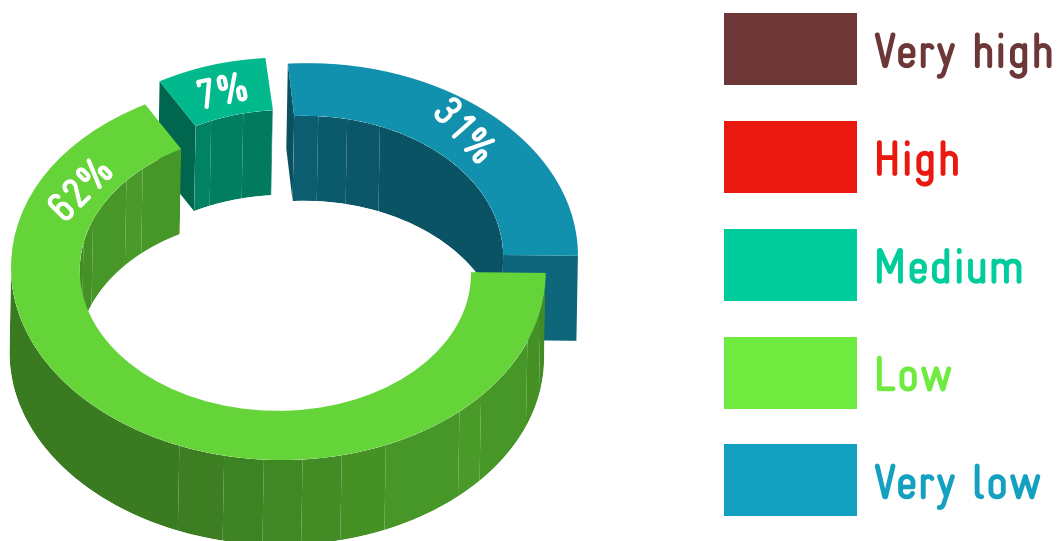


Figure 3.20. Status of available Nitrogen

Organic Carbon Status

A similar trend was recorded for soil organic carbon. Soil organic carbon also ranges between very low and low in the Block. Nearly 57 % of the soil samples tested witnessed low category carbon content followed by 42 % falls under very low category while only 1 % falls 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.

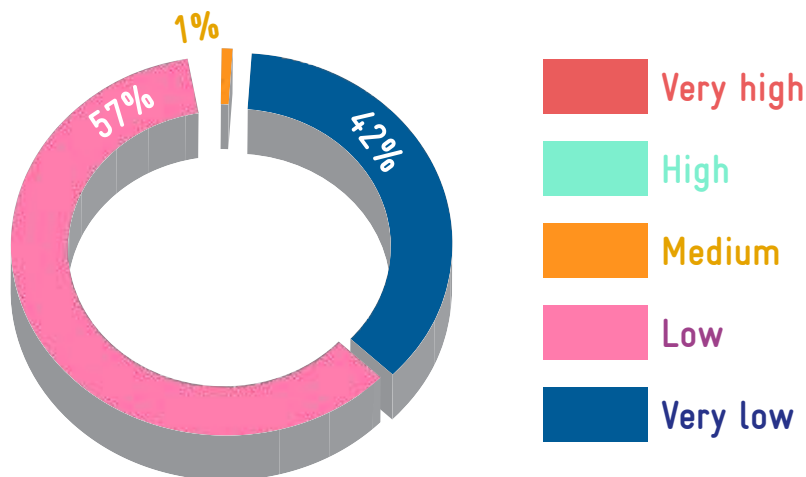


Figure 3.21. Status of soil Organic Carbon

3.6.2.6 Status of the soil micro-nutrients

This Block is one of the Nitrogen, zinc and ferrous deficient Blocks 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 54 % and 46 % sufficient in the soils tested. (Figure 3.22).

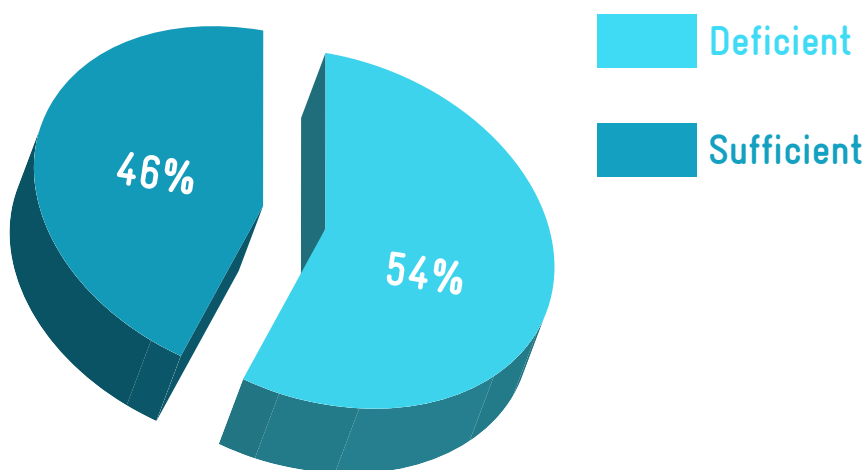


Figure 3.22. Status of soil micro-nutrients

3.6.2.7 Physical parameters – pH status

With reference to the physical parameters, 86 % of the soil is moderately alkaline in nature followed by 5 % is slightly acidic and 5 % is neutral in nature (Figure 3.23).

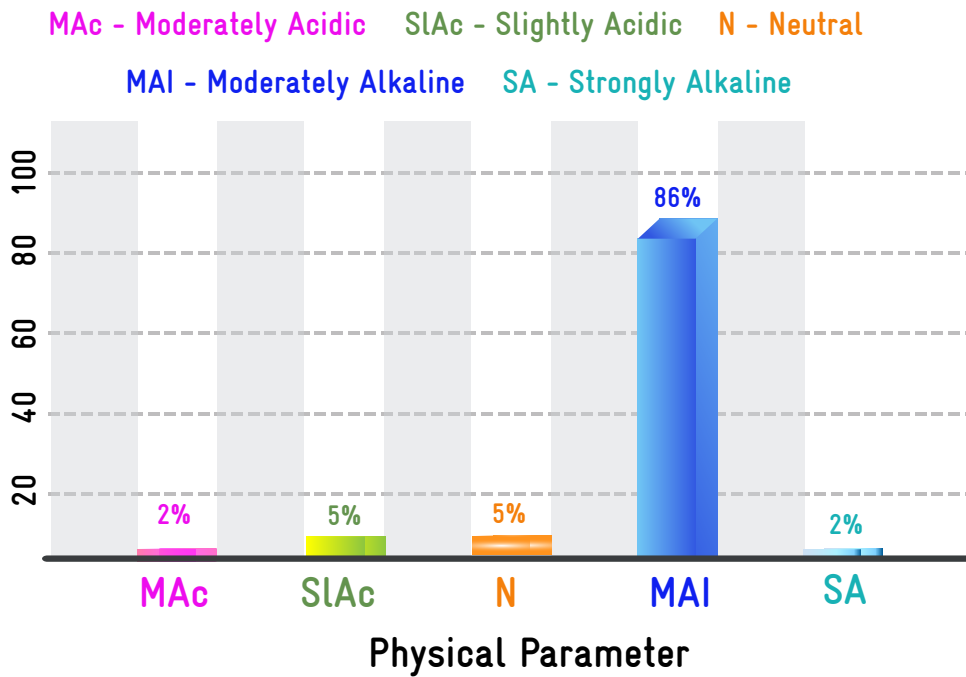


Figure 3.23. Status of pH of soil

3.6.2.8 Cropping pattern and the irrigation

A total of 10,136 ha area is used for crop cultivation in which irrigation shares the highest area of 80.67 %, rest is rain-fed irrigation. Overall paddy is the dominant crop (38.54 %) followed by groundnut (28.3 %) while vegetable, red gram, ragi, dry chilli, brinjal, water melon, ladies finger, gourds, banana, guava, medicinal plants, lemon, mango, tomato, coconut are cultivated in less than a percent of the area (Figure 3.24).

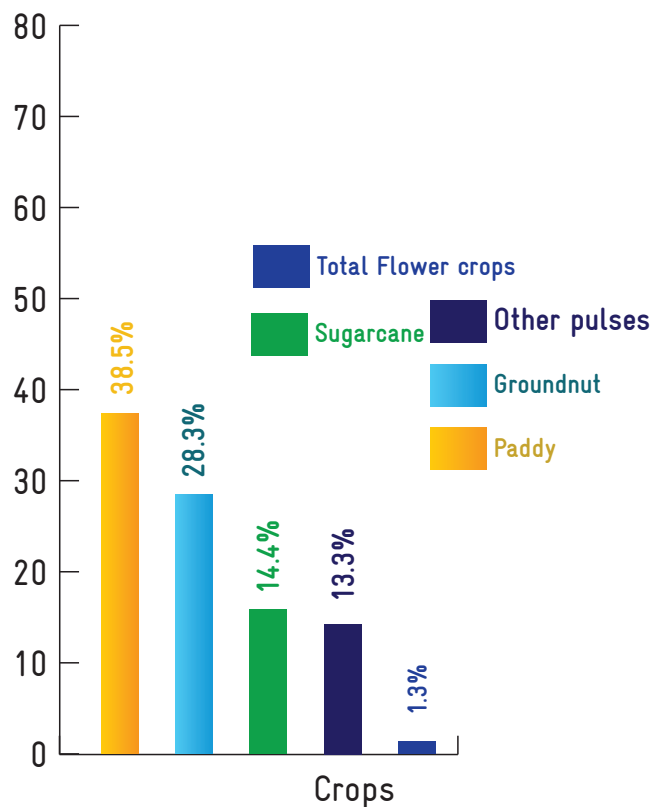


Figure 3.24. Cropping pattern

3.6.2.9 Irrigation methods

In case of the surface water resources, wild flooding is the primary method of irrigation. But in case of ground water resources, the predominant type of irrigation is control flooding. In the Block, 73 % of the irrigation is done by control flooding and only 27 % of the irrigation is done by wild flooding (Figure 3.25).

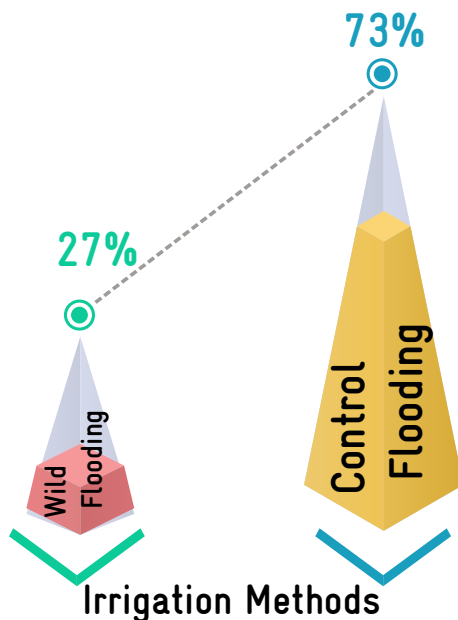


Figure 3.25. Irrigation methods

3.6.2.10 Means of water extraction

Water is extracted in two ways, one by gravity and another is by lifting. Water is drawn from surface water sources such as tanks, ponds etc., by using gravity method and that of ground water sources such as open well, hand pump, bore well by using lifting method. In the Block, since the dependence on ground water sources is more, 92 % of the water extraction methods are under lifting means of extraction and only 8 % comes under gravity means of water extraction (Figure 3.26).

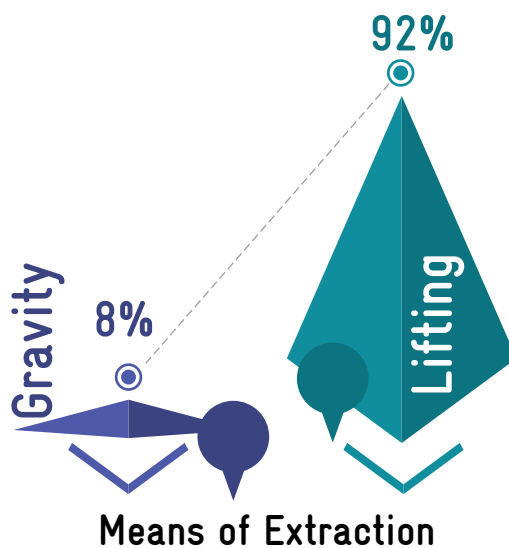


Figure 3.26. Means of water extraction

3.6.2.11 Livestock details

This Block has considerable proportion of livestock resources of which small ruminants such as goat and sheep constitute 60.3 % (48,537), followed by 38.5 % (30,989) which constitutes cattle population and remaining 1.1 % (900) constitutes poultry (Figure 3.27). The total water requirement for livestock is 133 ha.m. Of the total water demand of 58 % is met through ground water and remaining is from surface water resources.

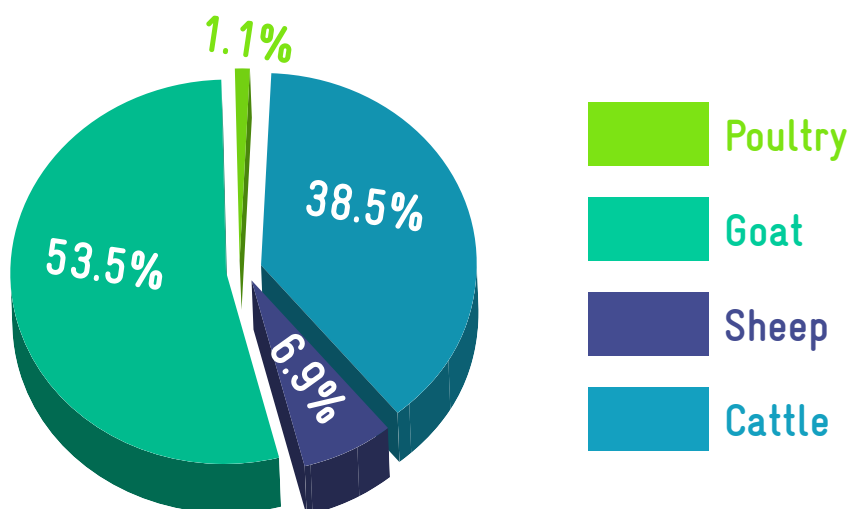


Figure 3.27. Livestock details

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 Vandavasi 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)	28,714
2	Male population (No.)	55,569
3	Female population (No.)	55,057
4	Total population (No.)	1,10,626
5	SC population (No.)	34,201
6	ST population (No.)	2,351
7	Vulnerable population (No.)	36,552
8	Households (HH's) (No.)	34,876
9	Only one room HH's (SECC) (No.)	6,130
10	Female Headed HH's (SECC) (No.)	2,038
11	Vulnerable Households (SECC) (No.)	5,487
12	% of Vulnerable Households (%)	16

13	Registered MGNREGA Job cards (Persons)	41,618
14	Active person working in MGNREGA job Cards (Persons)	29,317
15	Drinking Water Sources (No.)	4,942
16	Ground Water - Drinking source (No.)	270
17	Surface water - Drinking source (No.)	41
18	Sum of drinking water sources (No.)	311
19	HH's have tap water connection for drinking water (No.)	450
20	HH's dependent on other sources for drinking water (No.)	120
21	Annual Greywater Generation (ha.m)	198

3.7.1 Population:

The total population of this Block is 1.1 Lakh* of which male and female population are almost equal. 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 33 % of the total population are under vulnerable population (Figure 3.28).

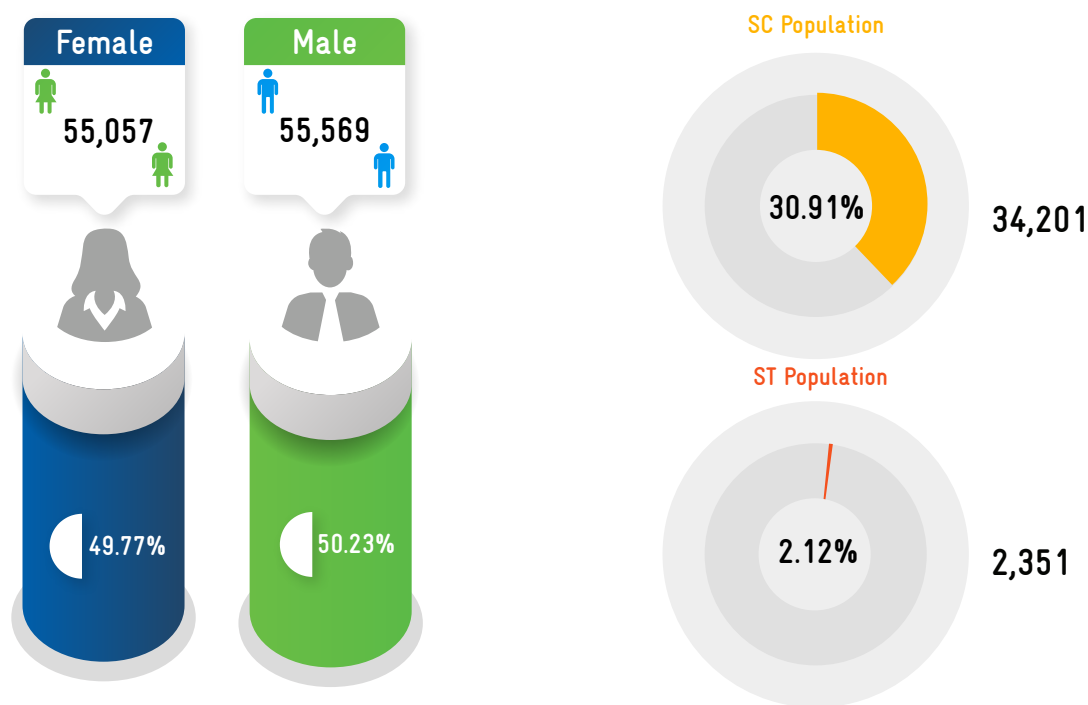


Figure 3.28. Population details

*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 34,876 households in which 18 % households have only one room, 6 % households are headed by women and 16 % are vulnerable households (Figure 3.29)

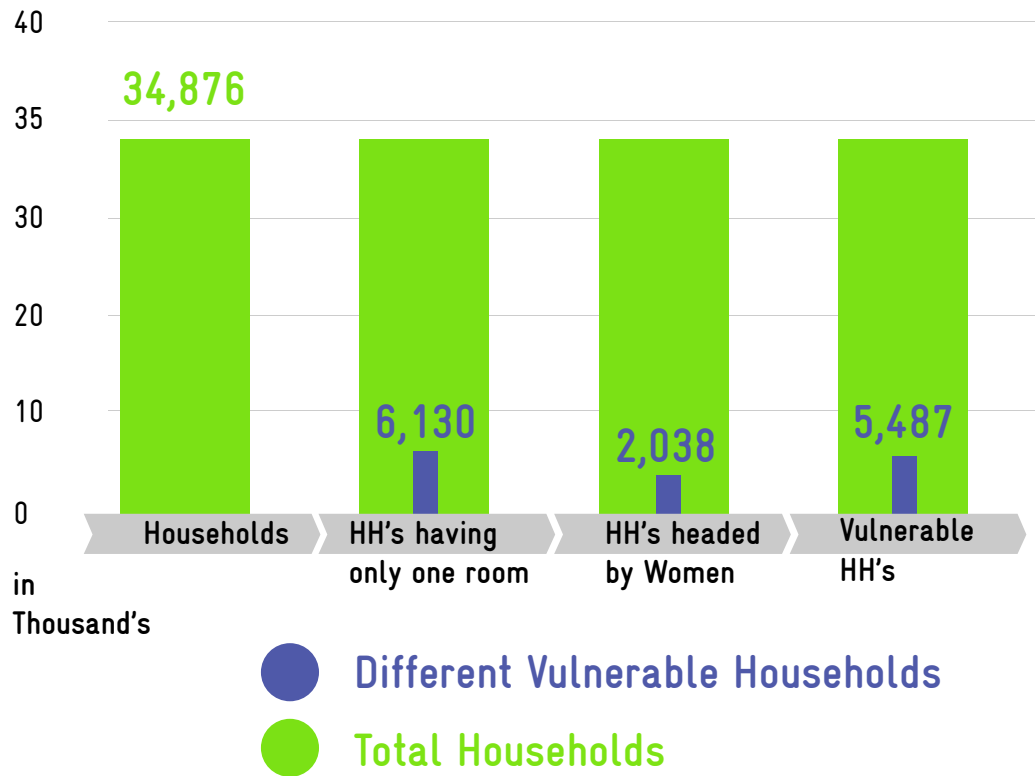


Figure 3.29. Details of Households

3.7.3 Status of Mahatma Gandhi NREGA - job card status

In the Block of the total population of 1.1 lakhs, 41,618 are registered for job cards under Mahatma Gandhi NREGA scheme, in which 70 % of the job cards are in active category (Figure 3.30)

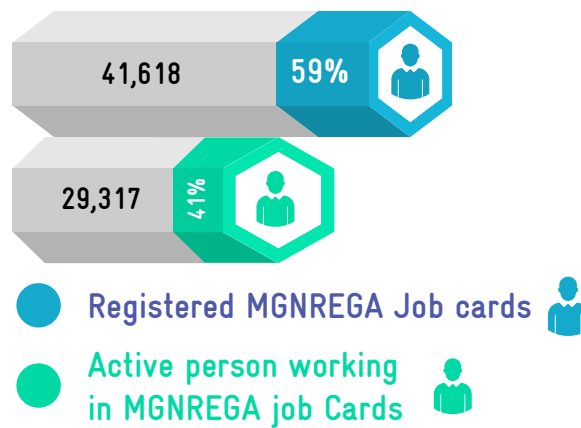


Figure 3.30. Status of MGNREGA job cards

3.7.4 Drinking Water Sources

Nearly 450 households have tap water connection and 120 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

450
Households



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

120
Households

3.7.5 Annual Greywater Generation

The grey water generation estimated across this Block is 198 ha.m which is available for reuse or recycle.

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



Irumbedu, Kil-Seeshamangalam



Sirunavalpakkam, Athipakkam, Elangadu, Kavaniyathur



Kovalaivedu, Kil-Kodungalur, Ulundai



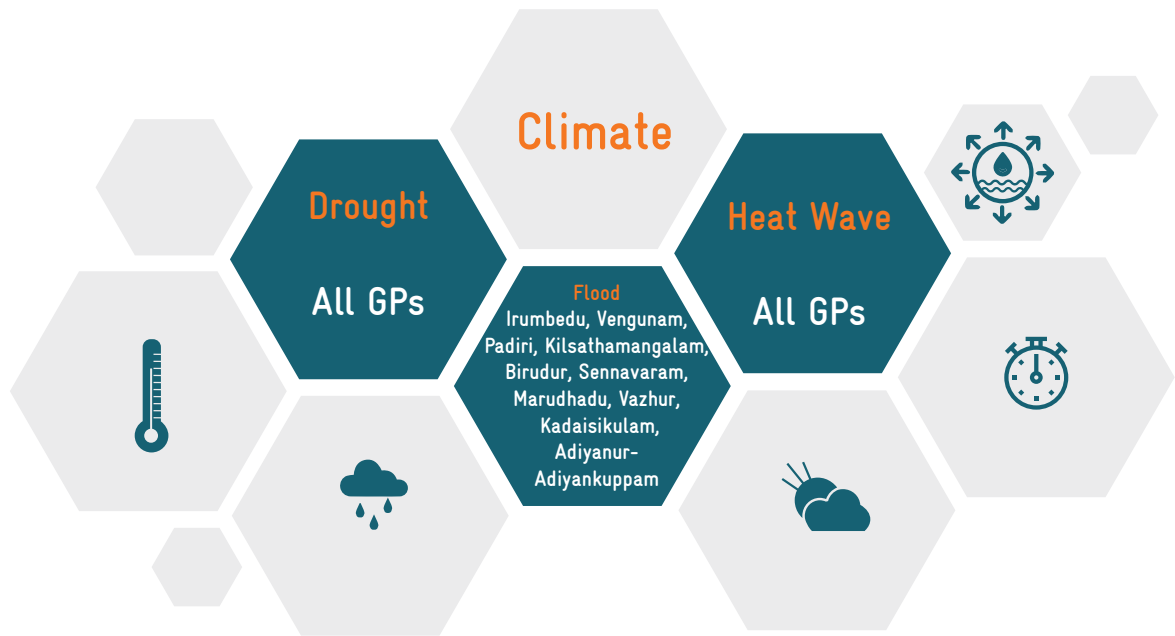
Thensenthamangalam, Kil-Sembedu, Kavaniyathur, Kosapattu



Vengunam RF, Kovalaivedu, Karam, Thellur

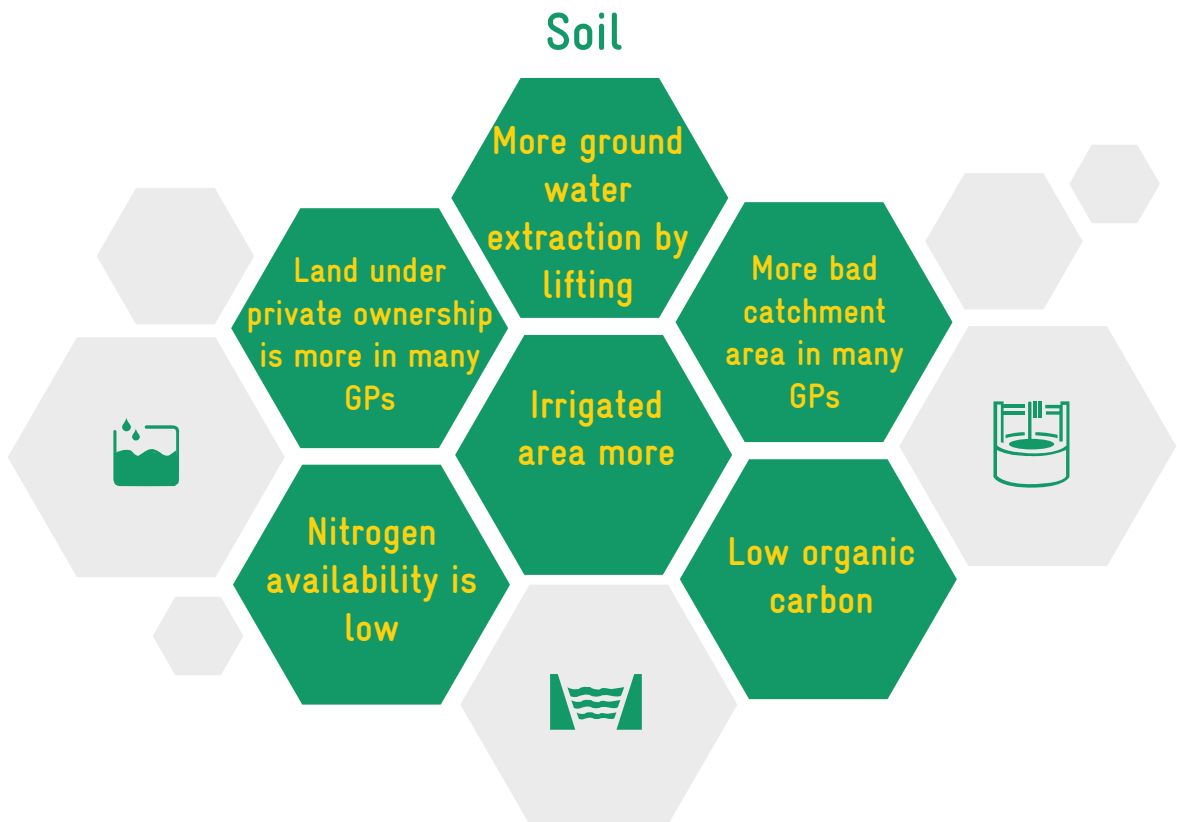
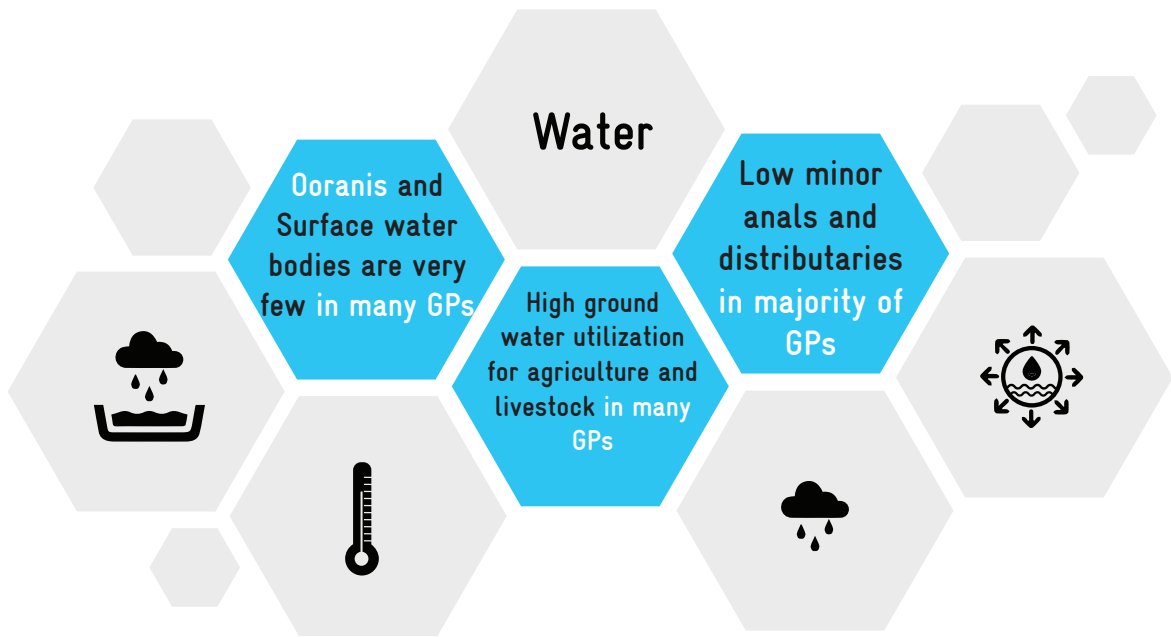


Badur, Birudur, Veliambakkam, Kuripedu



Socio economic





கெடுப்பதூஉம் கெட்டார்க்குச் சார்வாய்மற் றாங்கே
எடுப்பதூஉம் எல்லாம் மழை

குறள் - 15

Destruction it may sometimes pour
But only rain can life restore

Thirukkural - 15

CHAPTER 4

VULNERABILITY RANKING OF GP



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).

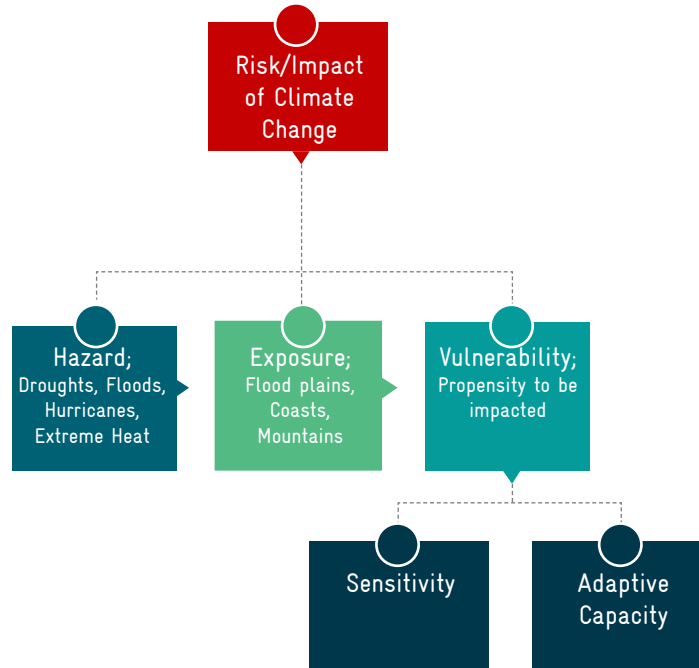


Figure 4.1. Vulnerability of the system as defined by IPCC

Generally, vulnerability assessments are made to identify:

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

The CWRM parameters which have 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 cate-

gorized into adaptive capacity, sensitivity and exposure indicators for vulnerability analysis as per IPCC norms. Table 9 lists CWRM parameters/indicators, its rationale to vulnerability, source of data and its linkage with WASCA TN’s primary 18 indicators.

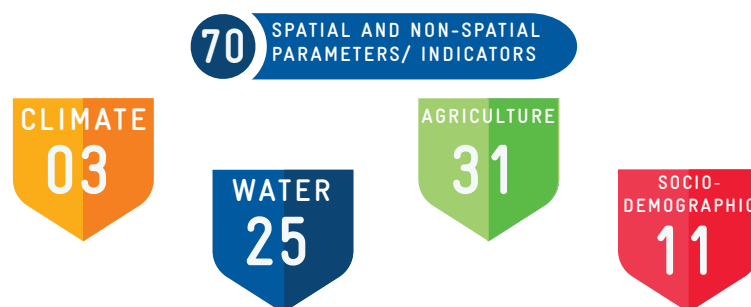


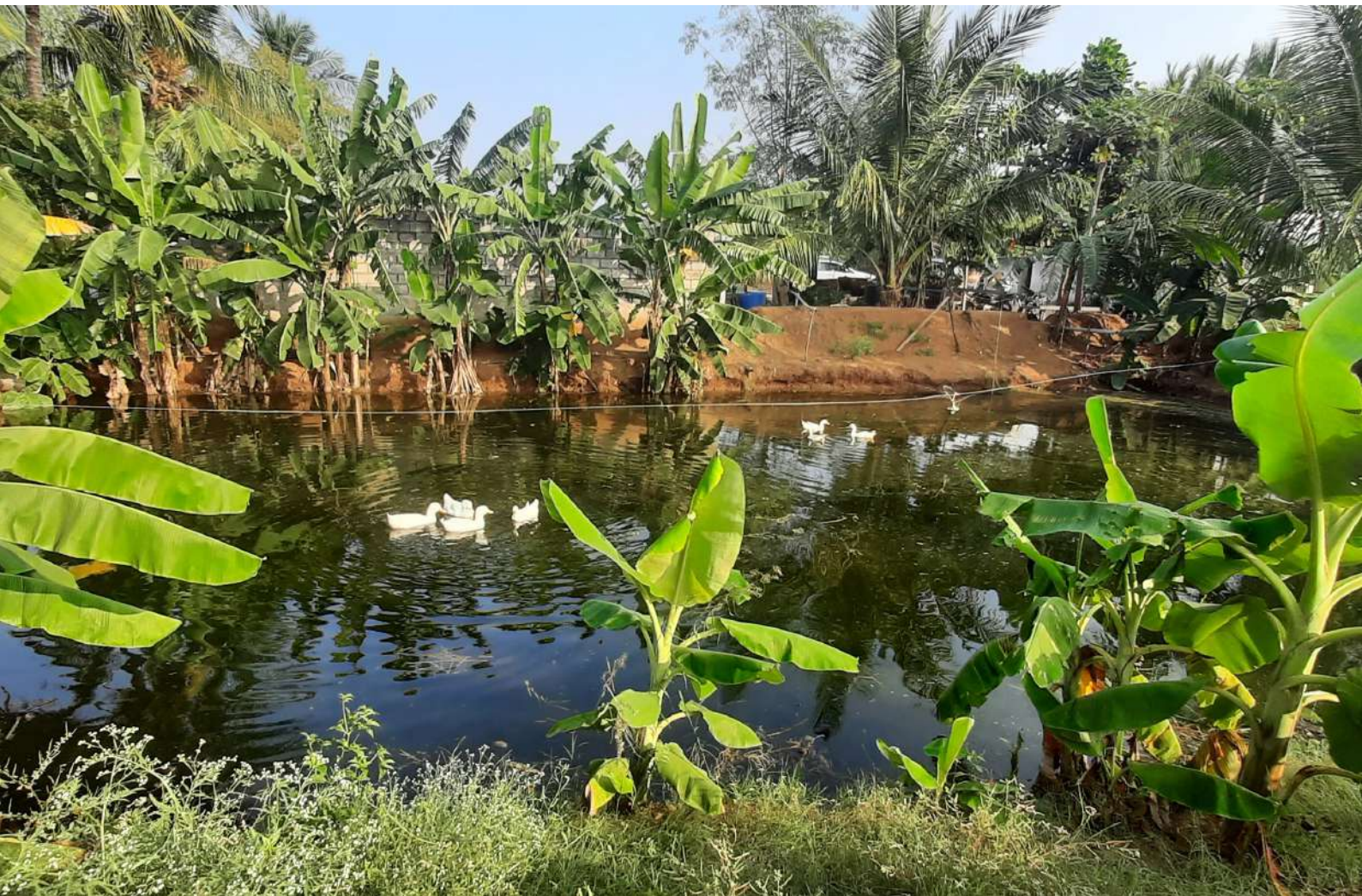
TABLE 9. CWRM PARAMETERS SELECTED FOR BLOCK LEVEL VULNERABILITY

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

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

The identified indicators are from different sources and measured in different units. As the vulnerability assessment is about ranking, the indicators have to be in common units. This is done through normalization. The normalized indicators are aggregated and categorized to different vulnerability levels very high, high, medium, low and very low category. The vulnerability assessment methodology is given in Annexure 4. Kadaisikulam, Marudhadu, Venmandai, Vengunam, Padiri, Adiyampur-Adiyankuppam and Kilsebedu GP's have very high rural water security vulnerability to climate risks. Whereas Ammayampattu, Sembur and Thennangur GPs have very low vulnerability. Figure 4.2 depicts the GPs vulnerability category and its CVI scores.

Upto	Category	Color range
0.562	Very High	Red
0.541	High	Light Red
0.520	Medium	Yellow
0.499	Low	Orange
0.478	Very low	Green



Cumulative Vulnerability Scores

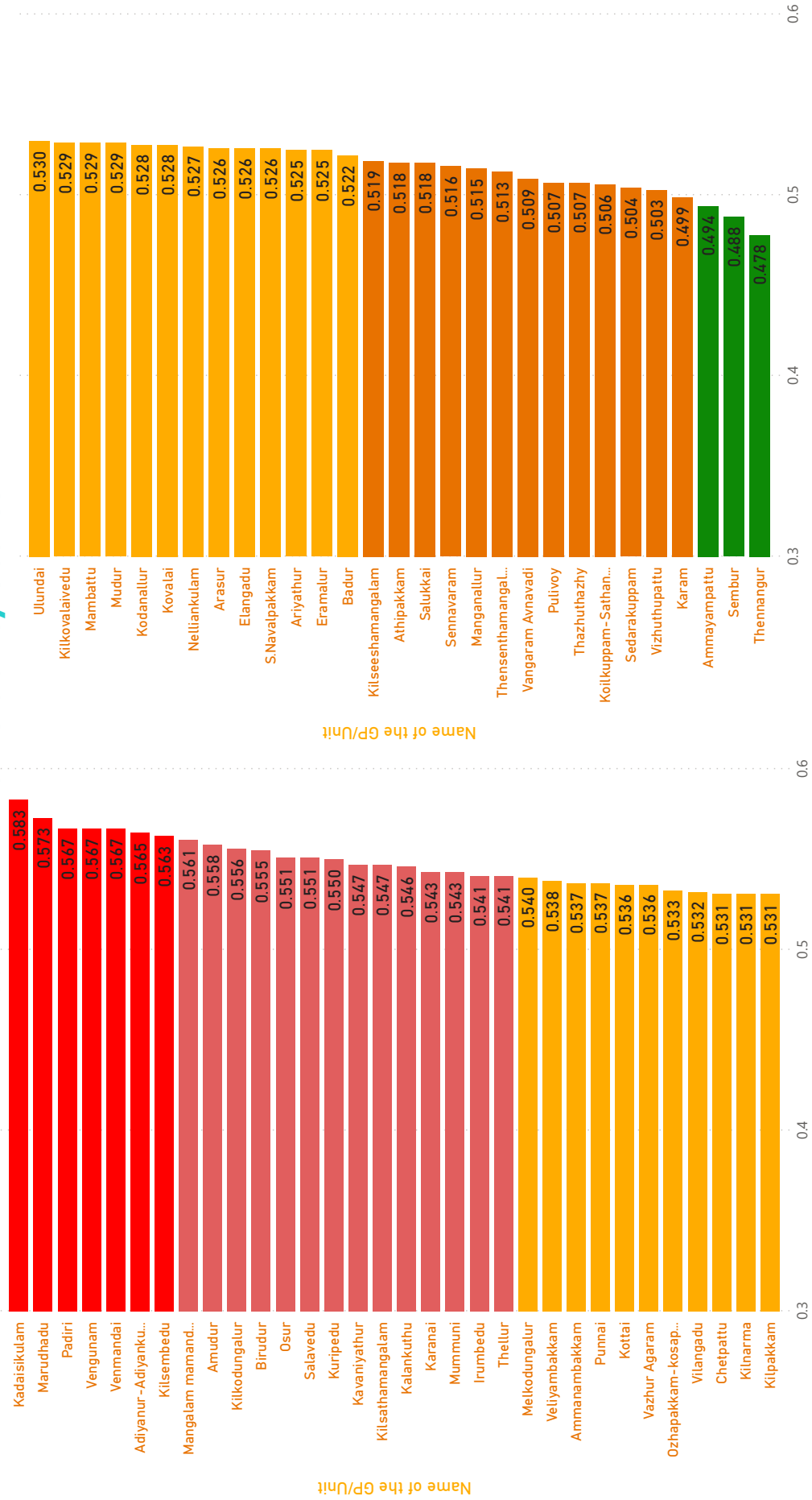


Figure 4.2. Final cumulative vulnerability scores

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 whereas Irumbedu, Vengunam, Padiri, Kilsathamangalam, Birudur, Sennavaram, Marudhadu, Vazhur, Kadaisikulam, Adiyankurupam GPs have moderate vulnerability to flood.

IRUMBEDU, VENGUNAM, PADIRI, KILSATHAMANGALAM, BIRUDUR, SENNAVARAM, MARUDHADU, VAZHUR, KADAIKULAM, ADIYANKURUPAM

Water resource vulnerability

The water resources vulnerability index shows that Salavedu, Marudhadu, Kadaisikulam, Kilkodungalur, Kalankuthu etc. GPs have high vulnerable score while Ammyampattu GP has low vulnerable score.

SALAVEDU, MARUDHADU, KADAIKULAM, KILKODUNGALUR, KALANKUTHU, AMMYAMPATTU

Agriculture resources vulnerability

In agriculture and allied sectors, GPs that has the highest vulnerable score are Kuriperu, Venmandai, Padiri, Veliyambakkam, Kilsembedu and Mangalam mamndur while Thennangur has low vulnerable score.

KURIPERU, VENMANDAI, PADIRI, VELIYAMBAKKAM, KILSEMBEDU, MANGALAM MAMNDUR, THENNANGUR

Socio-economic vulnerability

Ammanambakkam, Kottai, Marudhadu, Vengunam, Thellur and Ulundai GPs has a high socio economic vulnerability while Kuripedu has a low vulnerable score.

AMMANAMBAKKAM, KOTTAI, MARUDHADU, VENGUNAM, THELLUR, ULUNDAI, KURIPEDU

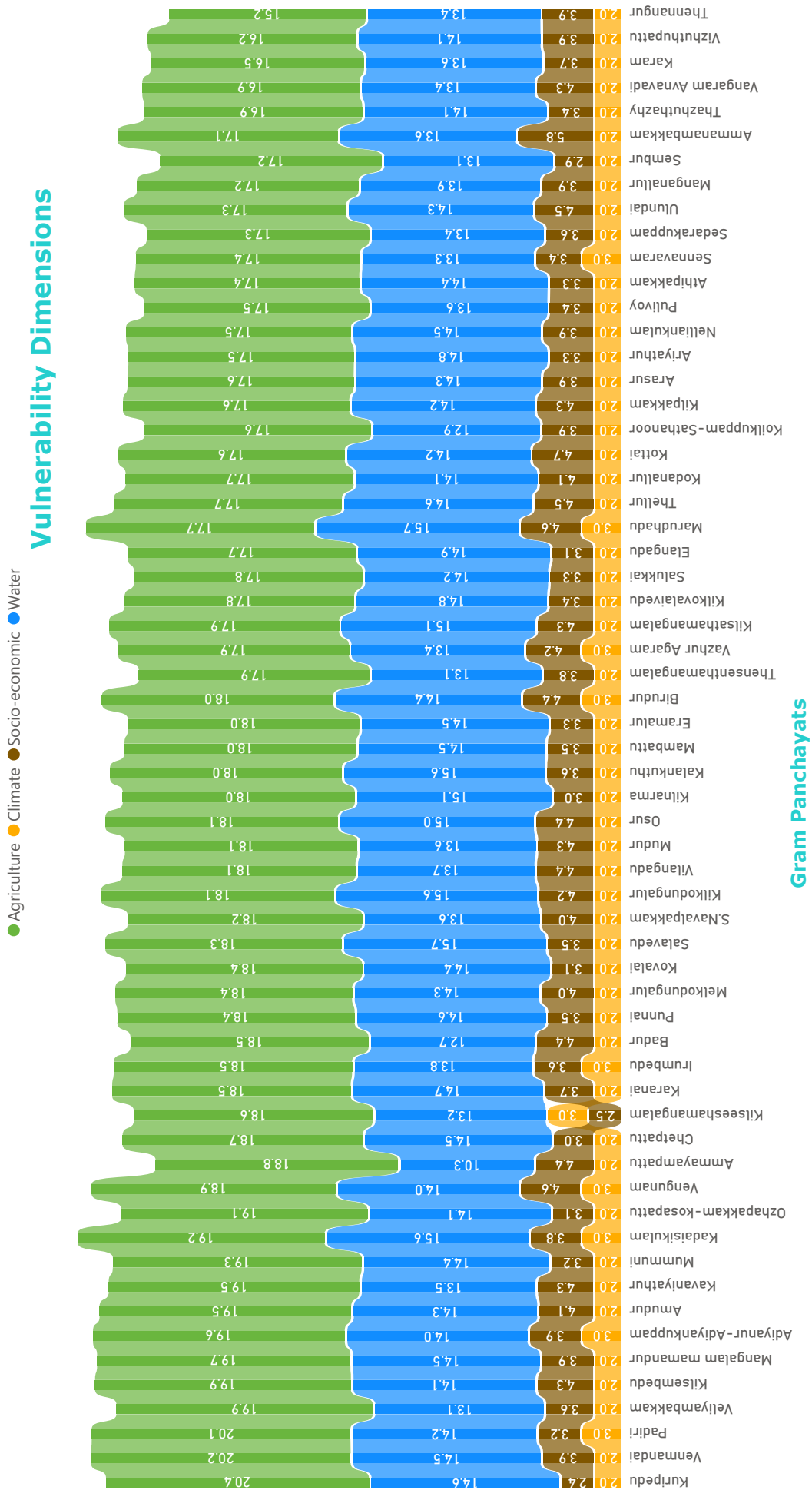
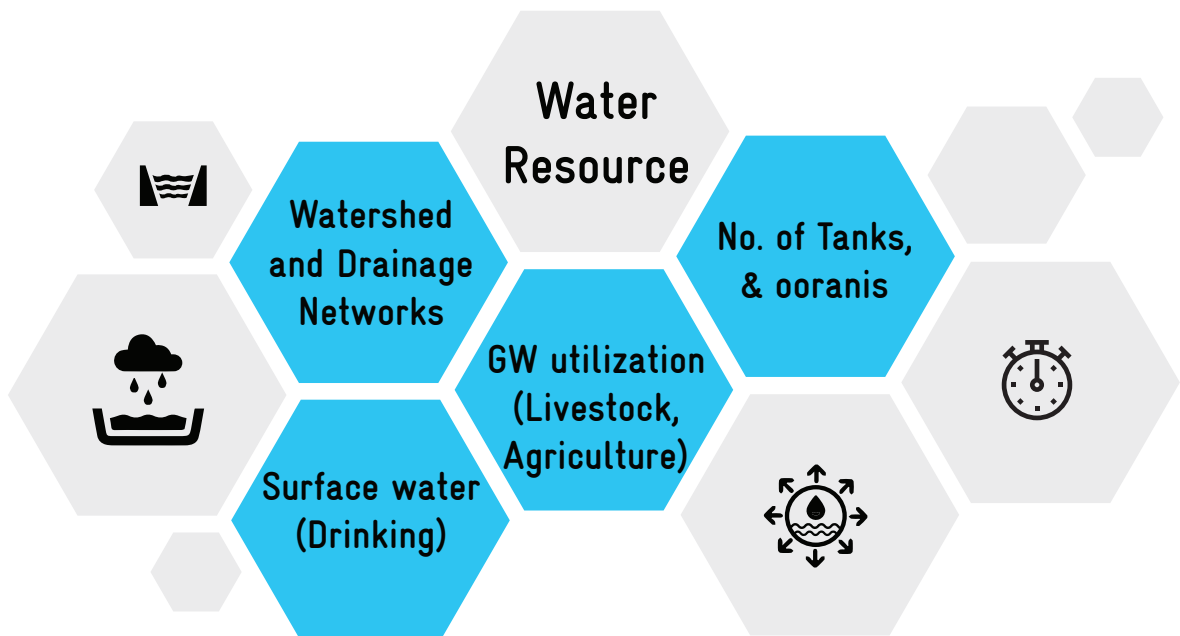
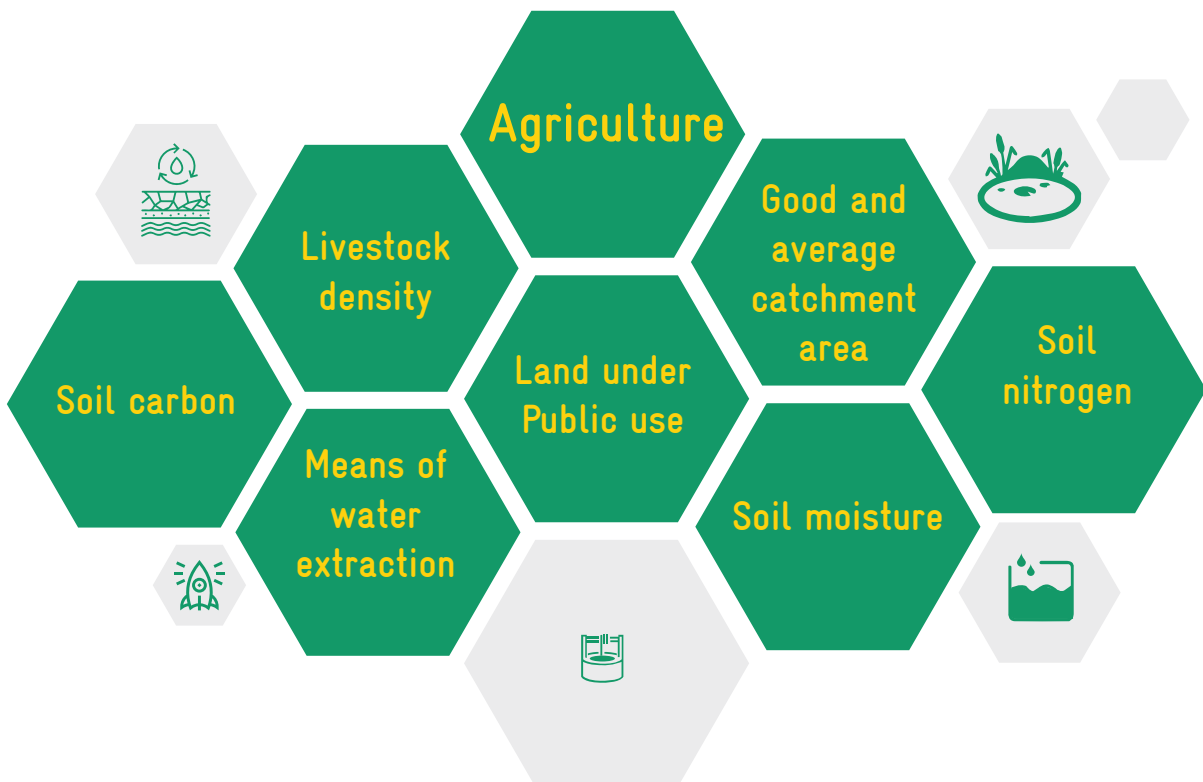
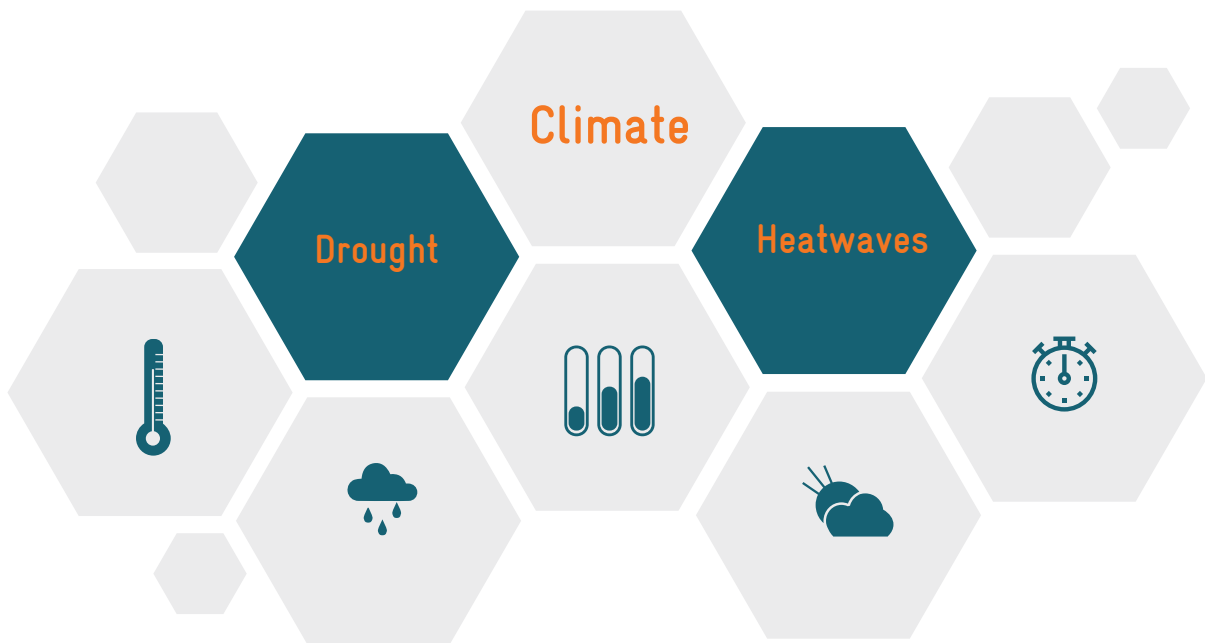


Figure 4.3. GP wise vulnerability dimensions

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.

விசம்பின் துளிவீழின் அல்லால்மற் றாங்கே
பசும்புல் தலைகாண்பு அரிது

குறள் - 16

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

Thirukkural - 16

CHAPTER 5



**PROPOSED KEY WATER ACTIONS
UNDER MAHATMA GANDHI
NREGS CONVERGENCE**

5 | PROPOSED KEY WATER ACTIONS UNDER MAHATMA GANDHI NREGS CONVERGENCE

After identifying the key water issues at GP level through vulnerability analysis, the area for key water action treatments were proposed. The comprehensive and holistic understanding of the key water challenges adopting the eco-system approach enable to identify water action works in public and common land (afforestation, soil and water conser-

vation, 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 33,102.13 ha available land in Vandavasi Block, 6,014.56 ha (18.16 %) area is proposed for treatment under WASCA TN- CWRM planning. A major portion of key water actions is proposed in Non-agricultural uses i.e. 1,589 ha (26.43 %) followed by current fallow land in 1,221 ha (20.3 %) while less than five percent of Barren and Uncultivable land, fallow land other than current fallow, 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	8,660.5	1,079.3
Current Fallow land	8,390.4	1,220.8
Non-Agricultural Uses	8,190.4	1,589.4
Unirrigated Land	4,951.7	732.9
Fallows Land other than Current Fallow	1,269.2	
Cultivable Waste Land	572.5	430.2
Permanent Pastures and Other Grazing Land	446.7	332.1
Barren & Un-cultivable Land	386.7	292.1
Land Under Miscellaneous Tree Crops etc.	202.9	150.7
Forest land	31.1	12.8

The detailed land wise proposal for WASCA treatments is given in Table 10 and Figure 5.1. GP wise proposed area for treatment is also attached in Annexure 5.1.

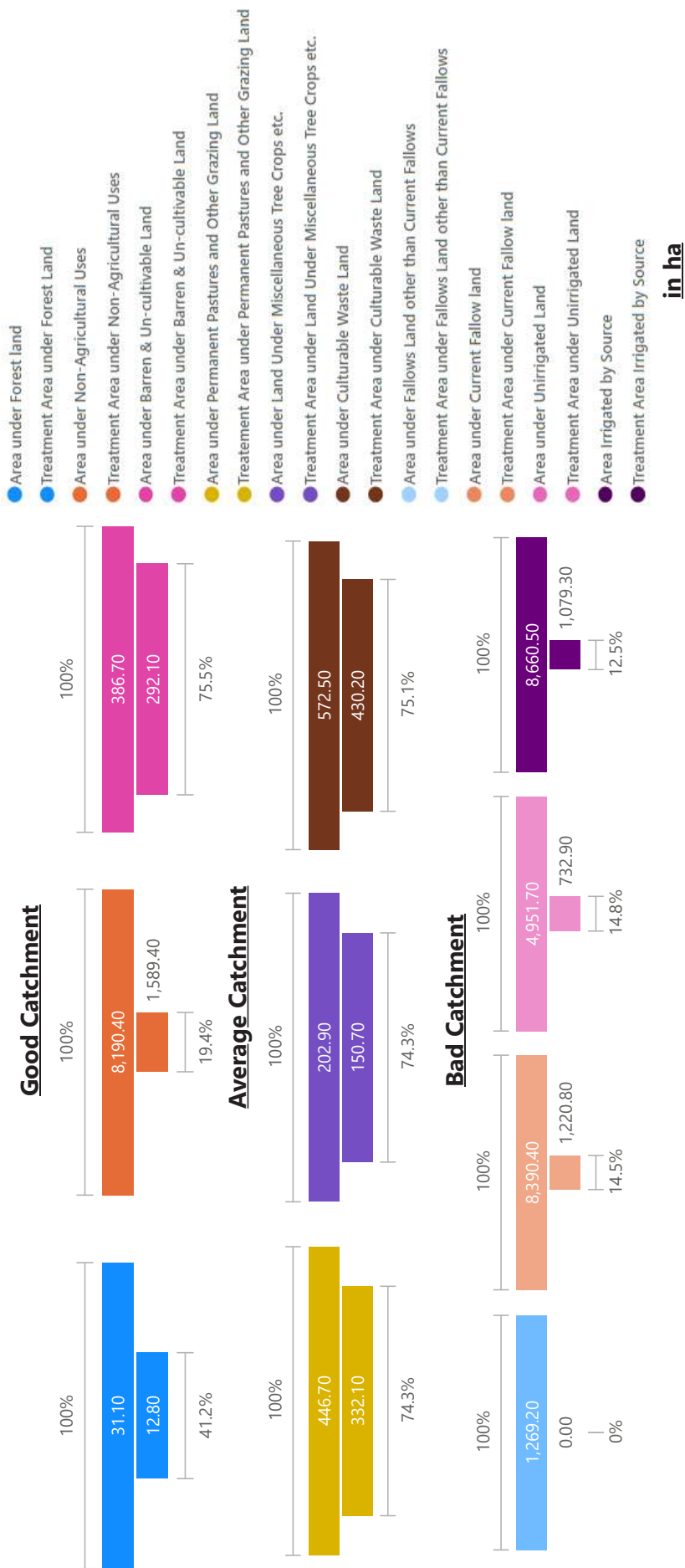


Figure 5.1. WASC-A treatment area in percentage

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 1,571.83 ha.m which is 19.84 % of the total runoff. Of the expected runoff conservation, 49.44 % comes from good catchment area, 14.19 % comes under average catchment area and 36.36 % comes from bad catchment area (Figure 5.2).

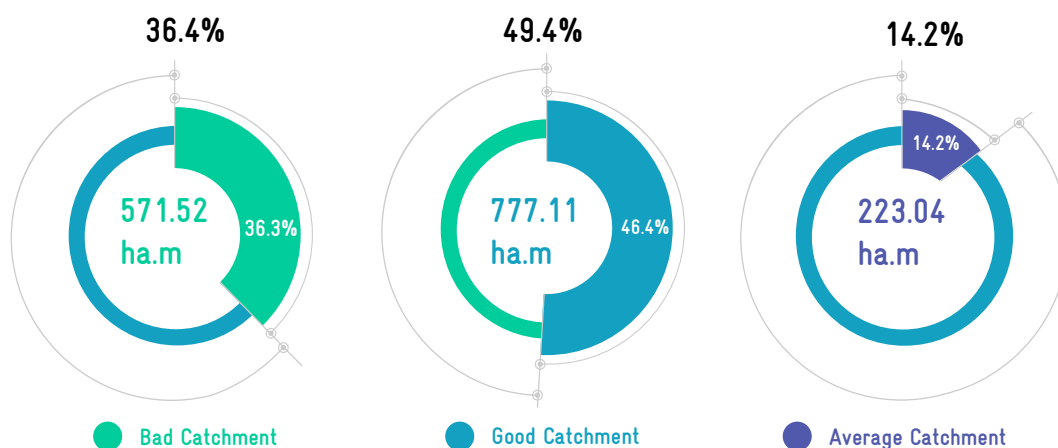


Figure 5.2. Expected conservation after WASCA treatment

The GP wise expected runoff conservation after completion of WASCA treatment is shown in Figure 5.3 (Annexure 5.2). All the works are proposed based on watershed and livelihood approach. The GP wise works are tabulated in Annexure 5.3.

Work (unit)	Abbreviation (unit)	No.	Extent (area in ha or length in m)
Azolla units - Individual (Number of units)	Az	2,785	
Cattle Shelters (Number of units)	CS	1,542	
Cattle Trough (Number of units)	CT	1,542	
Fodder development - Community & Individual	FD	336	
Goat Sheep Shelters (Number of units)	GSS	1,243	
Poultry Shed (Number of units)	PS	59	
Silvi-pasture Development (ha)	SPD	130,384	162.98
Soak Pits (Community) (Number of units)	SPC	389	
Soak Pits (Individual) (Number of units)	SPI	1,398	
Artificial Recharge Structure (Number of units)	ARS	7,801	31,225
Construction of Farm Ponds - Individual (Number of units)	FP	832	
Construction of new open wells & Recharge Shafts (Number of units)	COWRS	1,087	
Restoration of water bodies: a.PWD and Tanks (Number)	RPWDT	104	

Restoration of water bodies:b. Oorans(Number)	Ro	59	
Restoration of water bodies:c. Ponds(Number)	RP	195	
Roof Rain Water Harvesting (Number of units)	RRWH	122	
Water Course - Irrigation Channels - Desilting (Mtrs)	WCICD		43,039
Afforestation in Public/common lands(ha)	Aff	444,338	554.64
Avenue plantation(Km)	AVP	52,708	224,181
Block Plantation (Community)(ha)	BP	422,859	527.64
Canal Bund Plantation(ha)	CBP	18,503	82,489.12
Contour Continuous Bunds (CCB) for Afforestation area(Mtrs)	CCBF	66,471	359.19
Drainage Line Treatment (DLT)(Mtrs)	DLT	15,174	75,862
Dry land Horticulture/Agro-forestry - Individual (ha)	DLHAI	2,98,958	888
Irrigation Channel Plantation (Mtrs)	ICP	8,596	43,039
Linear Plantation(Km)	LP	21,581	87,004
Micro Irrigation(ha)	MI	271	629
Nursery Development(Number of units)	ND	57,891	11,578
Composting (Number of units)	Co	671	1,514.70
Farm Bunding with Boundary Trenches - Individual (ha)	FBBTI	966	2,128
Land development - Individual (ha)	LDI	242	3,517
NADEP Vermi compost (Number of units)	NADEP	1,718	

Proposed works are included the drought proofing, livelihood, land development and WCWH, measures



Land development works over 7,160 ha area



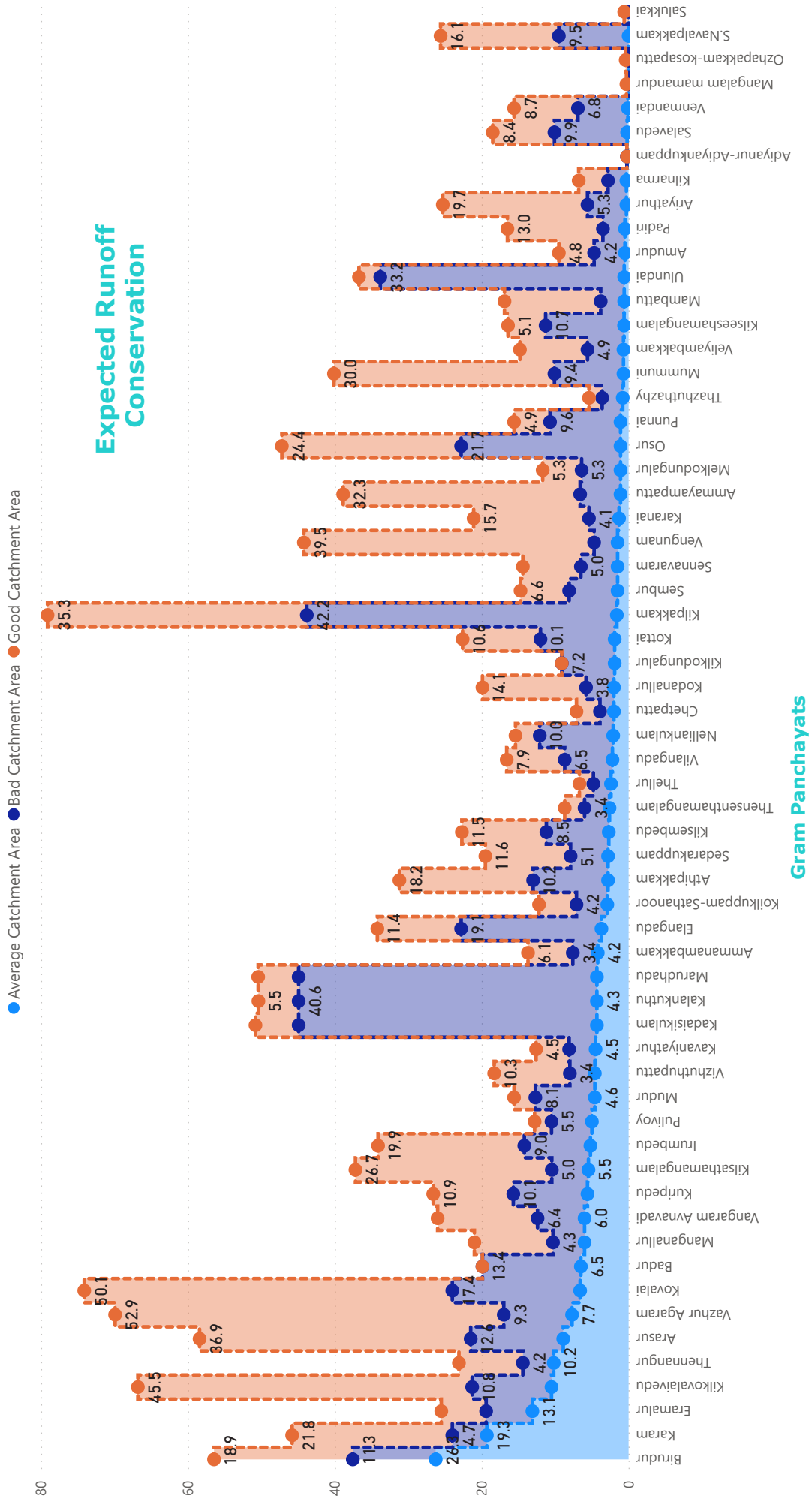
More than 14 Lakhs plants planting



10,200 sites for WCWH



9,000 livelihood works



Gram Panchayats

Figure 5.3. Expected C/P wise runoff conservation after W/ASCA treatment

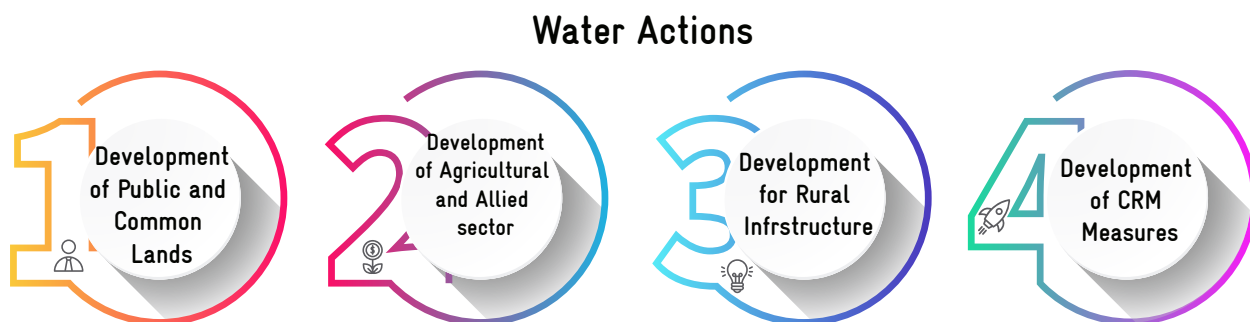
MAHATMA GANDHI NREGS Annual circular 2020-21 (Clause 6.3)

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 CONTINUOUS BUNDS (CCB) FOR AFFORESTATION AREA(m)	1,329.4	10	-	33.2	13,294.2
COMPOSTING(NUMBER OF UNITS)	623	15	0.2	105.9	9,345
AFFORESTATION IN PUBLIC/ COMMON LANDS(ha)	545	3,344	8.6	4,687	18,22,480
BLOCK PLANTATION (COMMUNITY)(ha)	522	4,320	11.1	5,794.2	22,55,040
SILVI-PASTURE DEVELOPMENT(ha)	151	6,664	17.1	2,582.1	10,06,264
LINEAR PLANTATION(km)	3.4	703	1.8	6.1	2,397.9
CANAL BUND PLANTATION(ha)	510	2,930	7.5	3,825	10,39,170
IRRIGATION CHANNEL PLANTATION (m)	121.5	6	-	1.8	729
AVENUE PLANTATION(km)	0.1	703	1.8	0.2	96.3
NURSERY DEVELOPMENT (NUMBER OF UNITS)	62.9	2,344	15	943.9	1,47,496.2
RESTOTARATION OF WATER BODIES: A) PWD AND TANKS (NUMBER)	232	800	5	1,160	1,85,600
RESTORATION OF WATER BODIES: OORANIS (NUMBER)	0	200	2	-	-
RESTORATION OF WATER BODIES: PONDS (NUMBER)	165	200	1	330	33,000
ARTIFICIAL RECHARGE STRUCTURE (NUMBER OF UNITS)	1,084	391	2.5	1,646	4,23,844
WATER COURSE - IRRIGATION CHANNELS - DESILTING (M)	121.5	3	-	0.9	364.5
DRAINAGE LINE TREATMENT (m)	95.6	5	-	2.9	478.1

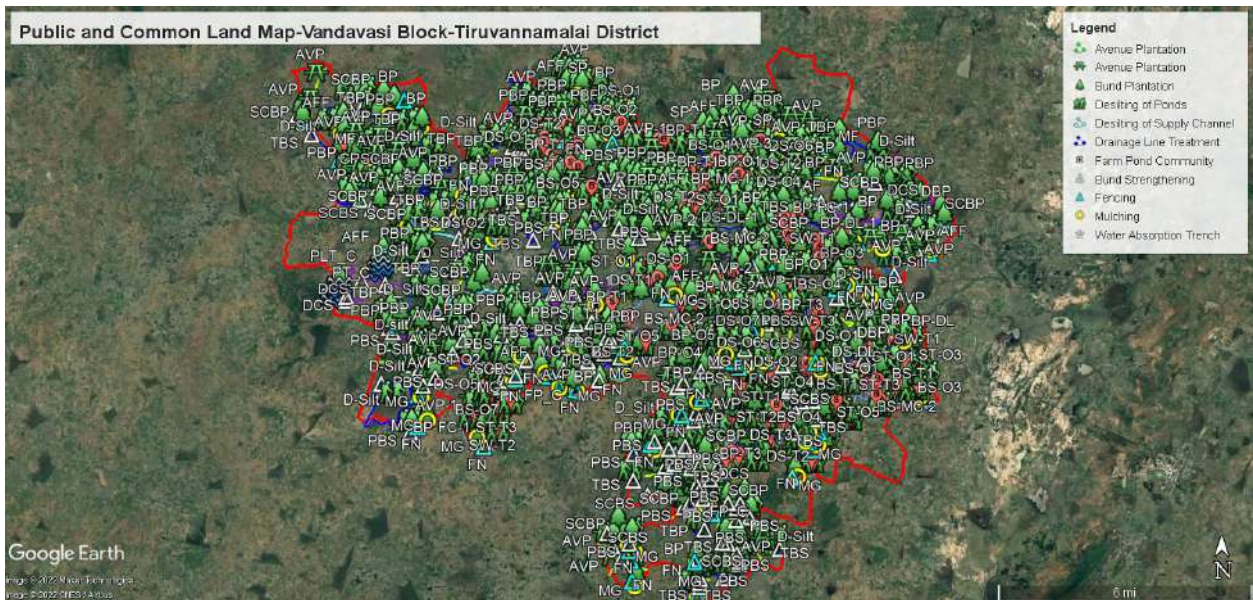


Figure 5.4. Proposed development activities in public and common land







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 livestock 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)	1,546	586	1.5	2,319	905,956
MICRO IRRIGATION (ha)	238	0	1	238	0
CONSTRUCTION OF FARM PONDS - INDIVIDUAL (NUMBER OF UNITS)	708	781	2	1,416	552,948
LAND DEVELOPMENT - INDIVIDUAL (ha)	3,481	3,906	10	34,810	13,596,786
DRY LAND HORTICULTURE/AGRO-FORESTRY - INDIVIDUAL (ha)	198	3,321	8.5	1,683	657,558
AZOLLA UNITS - INDIVIDUAL (NUMBER OF UNITS)	2,476	23	0.2	371.4	56,948
NADEP VERMI-COMPOST (NUMBER OF UNITS)	1,429	27	0.2	257.2	38,583
FODDER DEVELOPMENT - COMMUNITY & INDIVIDUAL	326	2,344	1.5	482.5	764,144
CATTLE SHELTERS (NUMBER OF UNITS)	1,253	331	2.1	2,656.4	414,743
GOAT SHEEP SHELTERS (NUMBER OF UNITS)	1,545	355	2.3	3,507.2	548,475
CATTLE TROUGH (NUMBER OF UNITS)	1,323	6	0.1	66.2	27,938
POULTRY SHED (NUMBER OF UNITS)	590	10	0.1	53.1	5,900
CONSTRUCTION OF NEW OPEN WELLS & RECHARGE SHAFTS (NUMBER OF UNITS)	935	926	5	4,675	865,810

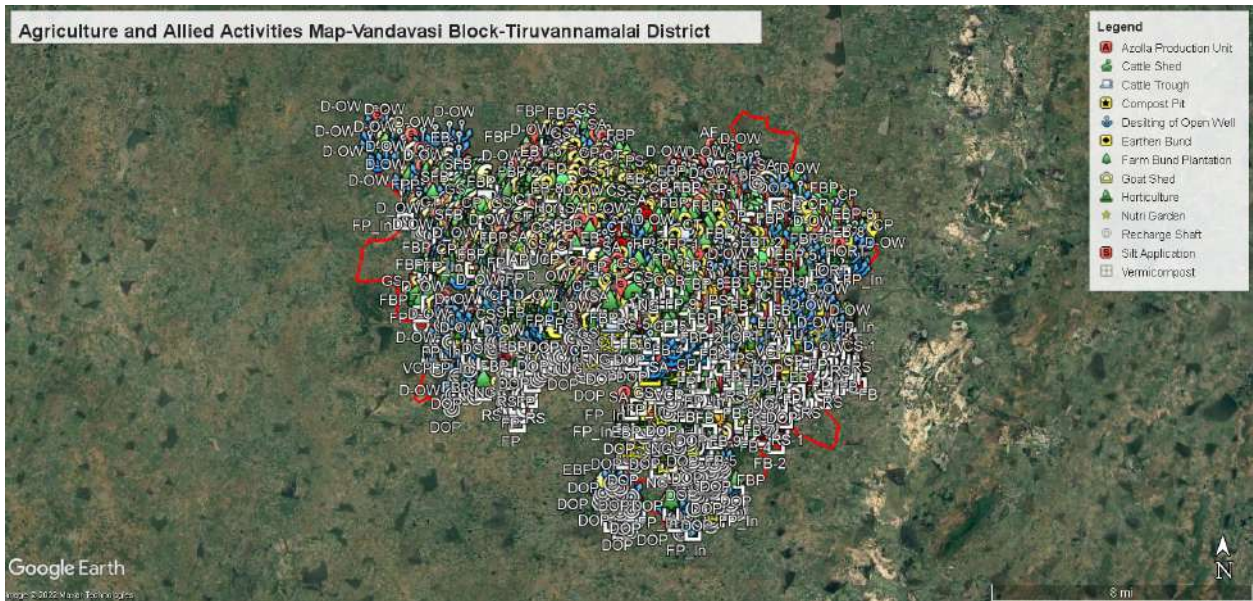







Figure 5.5. Proposed development activities in Agriculture and allied Sectors

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)	99	20	0.13	12.87	1,980
SOAK PITS (INDIVIDUAL) (NUMBER OF UNITS)	9,334	16	0.1	933.4	1,49,344
ROOF RAIN WATER HARVESTING (NUMBER OF UNITS)	122	625	4	488	76,250

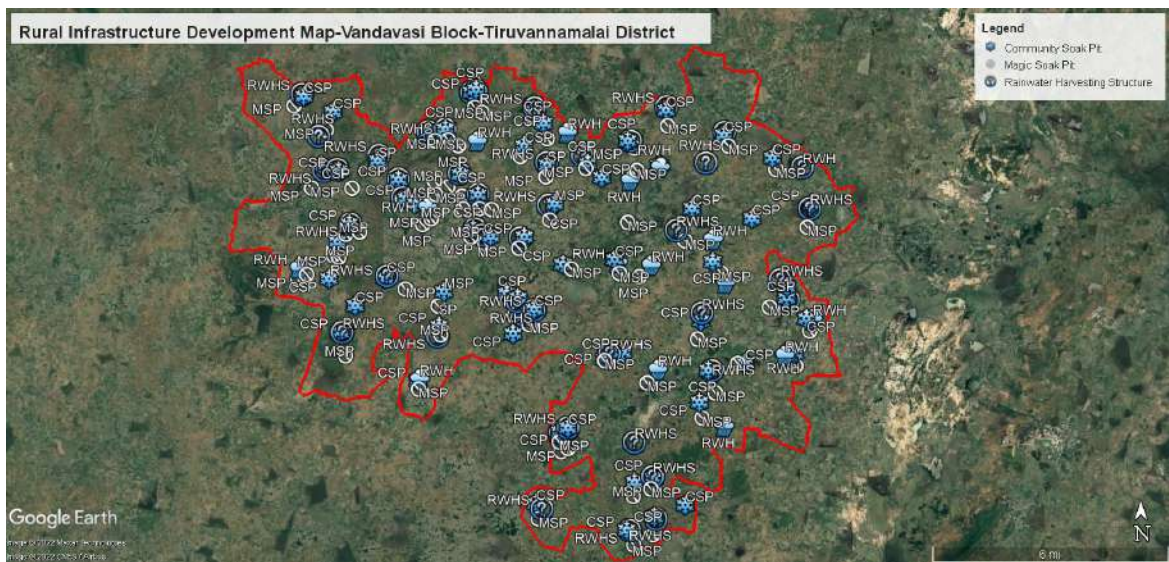


Figure 5.6. Proposed rural infrastructure activities

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 Vandavasi 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), Greening of Hillocks (Table 16), Silvi-pasture (Table 17) and Bamboo Plantation (Table 18) are proposed in this Block in saturation mode.

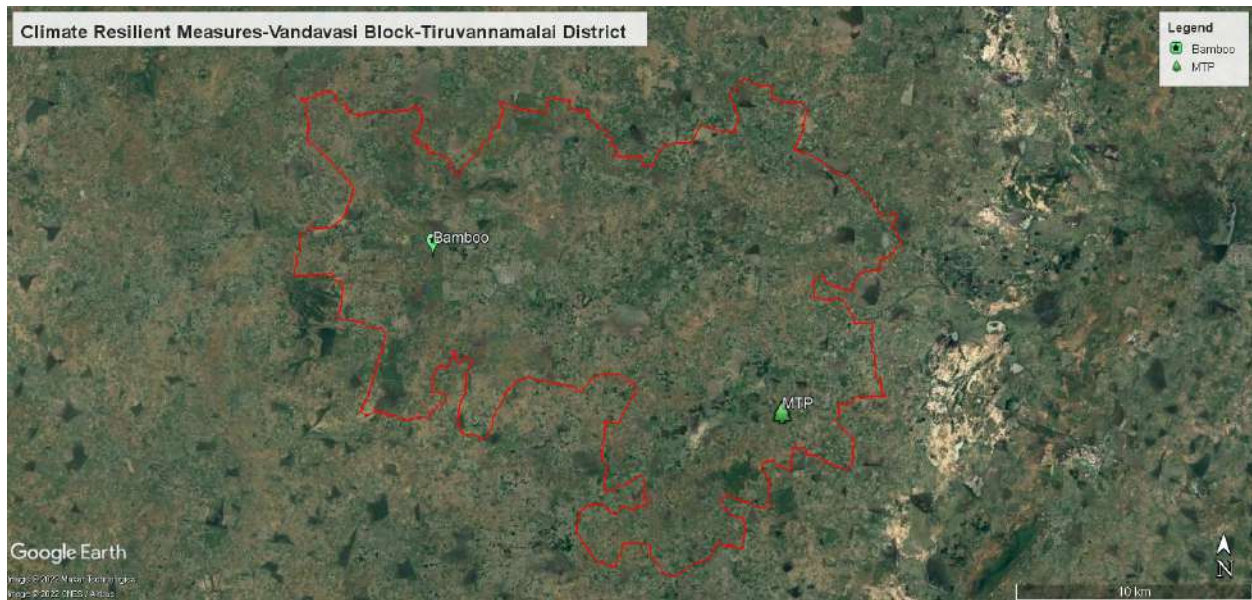


Figure 5.7. Proposed climate resilient measures

TABLE 14. GP WISE PROPOSED CRM

GP	Public and common land	Agriculture and allied activities
Amudur		Farm Pond
Arasur		Farm Pond
Ariyathur		Farm Pond
Athipakkam		Farm Pond

Badhur		Farm Pond
Badur		Farm Pond
Biruthur		Farm Pond
Eramalur		Farm Pond
Kadaisikulam		Farm Pond
Kallanguthu		Farm Pond
Karam	Silvi Pasture	
Kavaniyathur		Farm Pond
Kilkodungalore		Farm Pond
Kilkovalaivedu		Farm Pond
Kilsathamangalam		Farm Pond
Kilseesamangalam		Farm Pond
Kuripedu		Farm Pond
Mampattu	Bamboo Plantation	
Maruthadu		Farm Pond
Melkodungalore		Farm Pond
Mudur		Farm Pond
Mummuni		Farm Pond
Osur		Farm Pond
S.Navalpakkam		Farm Pond
Salavedu		Farm Pond
Salukai		Farm Pond
Sembur		Farm Pond
Thellur		Farm Pond
Thensenthamangalam		Farm Pond
Ulundhai		Farm Pond
Velliyambakkam		Farm Pond
Vengunam RF	Greening of Hillocks	
Venkundram		Farm Pond
Venmanthai		Farm Pond

TABLE 15. DETAILS OF PROPOSED FARM PONDS ACTIVITY UNDER CRM

GP	Habitation	No. of Farm ponds
Amudur	Amudur	1
Arasur	Arasur	2
	Arasur ADC	4
Ariyathur	Ariyathur Village	1
Athipakkam	Athipakkam	1
	Athipakkam Village	1
Badhur	Badhur	2
	Manimangalam	1
Badur	Badur	1
Biruthur	Biruthur	2
Eramalur	Eramalur	2
Kadaisikulam	Kadaisikulam	1
Kallanguthu	Kallanguthu	1

Kavaniyathur	Kavaniyathur	2
	Rajalakshmi / Rajan	1
Kilkodungalore	Kilkodungalore	1
Kilkovalaivedu	Kilkovalaivedu	2
Kilsathamangalam	Anna Nagar	1
	Old ADC	1
Kilseesamangalam	Kilseesamangalam	1
Kuripedu	Kuripedu	1
Maruthadu	Maruthadu	4
Melkodungalore	Melkodungalore	1
Mudur	Mudur Village	2
Mummuni	Mummuni	1
Osur	Osur	1
	Vandavasi	1
S.Navalpakkam	Navalpakkam	1
	Navalpakkam ADC	1
Salavedu	Salavedu	1
Salukai	Salukkai	2
Sembur	Sembur	3
Thellur	Thellur	1
Thensenthamangalam	Jainar Kudieruppu	1
Ulundhai	Singapailli	1
	Ulundhai	1
Velliyambakkam	Veliyambakkam	1
Venkundram	Pandarathoppu	8
Venmanthai	Venmandhai	1

TABLE 16. DETAILS OF PROPOSED GREENING OF HILLOCKS ACTIVITY UNDER CRM

GP	Category	Recommended Area in ha	Classification of land
Vengunam RF	High	125	RF
Vengunam RF	High	120	RF
Total		245	

TABLE 17. DETAILS OF PROPOSED SILVI-PASTURE ACTIVITY UNDER CRM

GP	Area for Plantation in ha	Total Number of Plants
Karam	0.56	454

TABLE 18. DETAILS OF PROPOSED BAMBOO PLANTATION ACTIVITY UNDER CRM

GP	Area for Plantation in ha	Total Number of Plants	Classification of Land
Mampattu	0.62	1,550	Meyccal nilam

நெடுங்கடலும் தன்நீர்மை குன்றும் தடிந்தெழிலி
தான்நல்கா தாகி விடின

குறள் - 17

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

Thirukkural - 17

CHAPTER 6

PROJECTED OUT COMES OF PLANNING



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

were envisaged on successful accomplishment of all proposed key water actions. The anticipated outcome will reduce the water security vulnerability and increase the resilience of the GPs under current and projected climatic change scenarios.

6.1 | OUTCOMES OF DEVELOPMENT OF PUBLIC AND COMMON LANDS

OUTCOMES OF DEVELOPMENT OF PUBLIC AND COMMON LANDS

INDICATOR		OUTCOMES/ IMPACT	
1	Proportion of Land development under WASCA treatment	1	6,014.56 ha (18.16 %) of the total area treated under WASCA
2	Percentage reduction of run off	2	1,571.83 ha.m (19.84 %) of the total runoff harvested due to WASCA interventions
3	No. of waterbodies restored	3	299 waterbodies (tanks/pond and ooranis) restored
4	Area under afforestation	4	545 ha area under afforestation
5	Area under silvi-pasture development	5	151 ha under Silvi-pasture plantation
6	Length of drainage line treated	6	4,781 m length of drainage line treated
7	Canal Bund Plantation	7	8,018 number of plants through 510 works
8	Nursery development	8	63 units

6,014.56 ha
AREA TREATED

1,571.83 ha.m
TOTAL RUNOFF
HARVESTED

299
WATER BODIES
RESTORED

545 ha
AREA
AFFORESTATION

151 ha
SILVI-PASTURE
PLANTATION

4,781 m
DRAINAGE LINE TREATED

8,018
PLANTS

63 UNITS
NURSERY DEVELOPMENT

6.2 | OUTCOMES OF DEVELOPMENT OF AGRICULTURE AND ALLIED SECTOR

OUTCOMES OF DEVELOPMENT OF AGRICULTURE AND ALLIED ACTIVITIES

INDICATOR

1	Assessment of sources of water for live-stock and agriculture demand No of structures established for on-farm (in-situ) water harvesting in dry lands
2	Improvement in soil health
3	Farm bunding with boundary trenches
4	Dry land development with agro-forestry
5	Households established fodder plots

OUTCOMES/ IMPACT

1	708 farm ponds established which target the harvest of 12,46,080 cu.m liter of water which has the potential to irrigate 247.8 ha area
2	1,429 NADEP vermi compost units for soil health improvement
3	1,546 m in 1,546 works
4	198 ha under dry land horticulture
5	5,487 vulnerable households established fodder plots

708

FARM PONDS

1,429

COMPOST UNITS

5,487

FODDER PLOTS

198 ha

DRY LAND DEVELOPMENT
WITH AGRO-FORESTRY

1,546 m

FARM BUNDING

6.3 | OUTCOMES OF RURAL INFRASTRUCTURE DEVELOPMENT

OUTCOMES OF RURAL INFRASTRUCTURE DEVELOPMENT

INDICATOR

1	No. of villages having liquid waste management systems
2	Roof rain water harvesting measures
3	Nutri garden

OUTCOMES/ IMPACT

1	9,334 individual and 99 community level soak pits established for recycle of grey water benefiting 34,876 HHs
2	122 common roof rainwater harvesting and storage structures with a target to harvest and store 0.2 ha.m of rainwater for use
3	34,876 HHs established nutri-gardens in homesteads and planted 1,74,380 saplings

99 COMMON &
9,334 INDIVIDUAL
SOAK PITS

122
COMMON ROOF
RAINWATER HARVESTING

34,876
NUTRI-GARDENS

1,74,380
SAPLINGS

6.4 | OUTCOMES OF CLIMATE RESILIENCE MEASURES

OUTCOMES OF CLIMATE RESILIENCE MEASURES

INDICATOR

1	Climate resilient measures are identified for climate risks
---	---

OUTCOMES/ IMPACT

1	<p>4 models are identified via., Farm ponds, Silvi pasture, Bamboo Plantation and Greening of Hillocks</p> <p>62 farm ponds in 31 GPs</p> <p>0.56 ha under silvi-pasture with 454 plants</p> <p>0.62 ha under bamboo plantation with 1,550 plants</p> <p>Greening of Hillocks in 245 ha area</p>
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62
FARM PONDS

0.56 ha
SILVI PASTURE

0.62 ha
BAMBOO PLANTATION

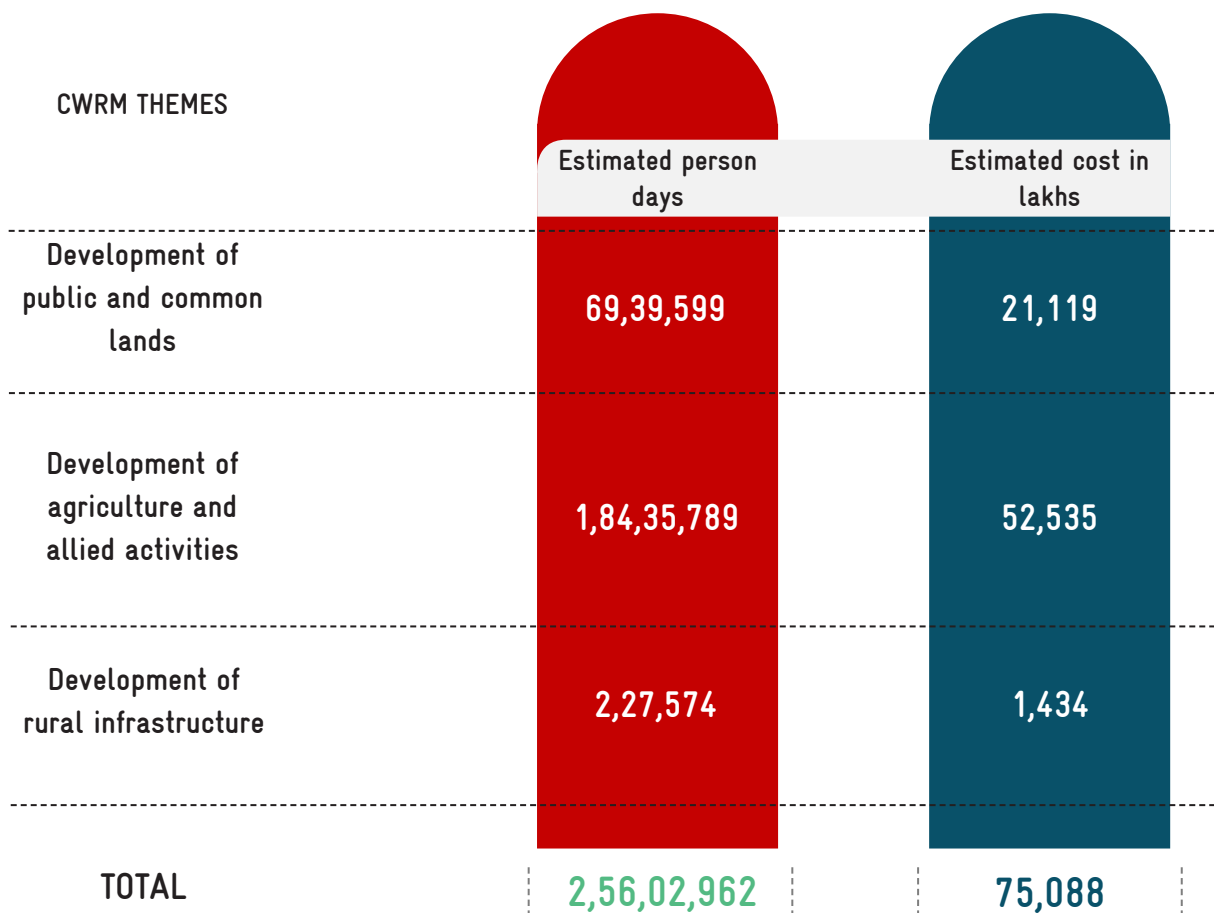
245 ha
GREENING OF HILLOCKS

Estimated person days

The total estimated person days required for the above proposed activities are 2,56,02,962 as specified below (Figure 6.1).

Estimated Cost

The total estimated cost budgeted for the above proposed activities is Rs 75,088 Lakhs as specified below (Figure 6.2).



VANDEVASI



ESTIMATED PERSON DAYS

2,56,02,962



ESTIMATED COST IN LAKHS

75,088

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.



India's NDC

India's NDC emphasis Sustainable Development, Climate Justice, and Lifestyles

Activities

Activities includes Adaptation, Mitigation, requirement for Finance, Technology transfer, Capacity Building



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

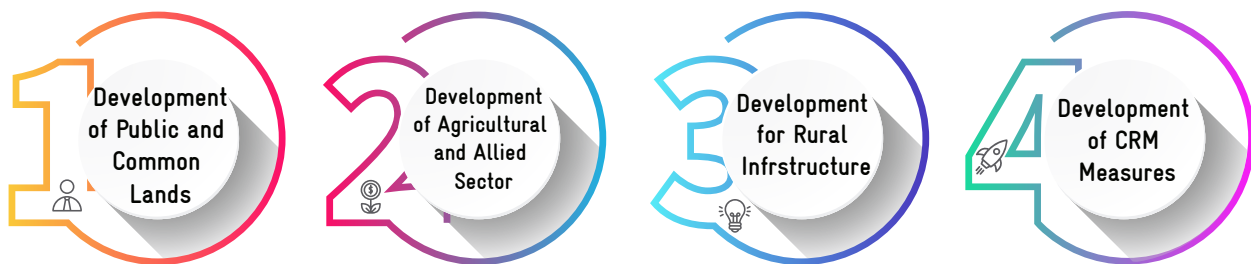


- 1 Supporting creation of an additional carbon sink of 2.5–3 billion tonnes through additional forest and tree cover
- 2 Enhancing investments in development programs for climate change adaptation in vulnerable sectors
- 3 Implementing programs to achieve the sustainable natural resource management 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.

“Climate Resilience for Future Livelihoods”



TN WASCA will achieve the above actions working closely with Mahatma Gandhi NREGA programme of Ministry of Rural Development and National Water Mission programme of (MoJS). These two ministries are the key stakeholders for WASCA. Apart from these two ministries, the works under WASCA TN are closely linked with Ministry of

Agriculture and MoEFCC. The commitments of the above mentioned four ministries towards SDG goals achievements are mapped in connection with the interventions under WASCA Tamil Nadu. The intervention under WASCA TN has direct and indirect contribution to the SDGs and its national targets set as per NITI Aayog.



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



SDG GOAL 6

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



6.1

Achieve universal and equitable access to safe and affordable drinking water for all

6.2

Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

6.3

Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

6.4

Increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

6.5

Implement integrated water resources management at all levels (6.5.1)

6.6

Protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

6.A

Expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

6.B

Support and strengthen the participation of local communities in improving water and sanitation management

Indicators considered for district and Block level vulnerability assessment of WASCA TN which is also used in SDG India 2020-21 report (Table 19).

TABLE 19. 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 SDGs are tabulated in Table 20 to 22.

TABLE 20. 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)	1,329	W3	SDG 1,2, 6,13&15
Composting (No. of units)	623	W1	SDG1& 6
Afforestation in Public/common lands (ha)	545	C1,C2,C3, W3,	SDG 1, 2,6,13&15
Block Plantation (Community) (ha)	522	C1,C2,C3,W3,S2	SDG 1,2, 6 &13, 15
Silvi-pasture Development (ha)	151	C1,C2,C3,W3	SGG 12 &15
Linear Plantation (Km)	3	C1,C2,C3,W3,S2	SDG 1,2,6,12&13, 15
Canal Bund Plantation (ha)	510	C1,C2,C3,W3,S2	SDG 1, 6&13, 15
Irrigation Channel Plantation (m)	122	W4,W5,S2	SDG 1,2& 6, 15
Avenue plantation (Km)	0	C1,C2,C3,W3,S2	SDG 1, 6&13

Nursery Development (No. of units)	63	C1,S2,S4	SDG 1,2 &6
Restoration of waterbodies :PWD and Union tanks (No.)	232	S2, S1	SDG 6, 1, 13
Restoration of water bodies : Ooranis (No.)	0	S2, S1	SDG 6, 1, 13
Restoration of waterbodies :Ponds (No.)	165	S2, S1	SDG 6,1, 13
Artificial Recharge Structure (No. of units)	1,084	W3	SDG 1, 2, & 6
Water Course - Irrigation Channels - Desilting (m)	122	C1,C2,C3,W3,S2	SDG 1, 6&13
Drainage Line Treatment (m)	96	W1,W3,W4	SDG1 & 6

TABLE 21. WATER ACTIONS ON DEVELOPMENT OF AGRICULTURAL AND ALLIED SECTORS & ITS LINKED SDG

Name of the Work	No. of CWRM works	CVI	SDG
Farm Bunding with Boundary Trenches - Individual (ha)	1,546	A1,A3,W1,W3	SDG 1,2&6
Micro Irrigation (ha)	238	A1,A3,A5,W5	SDG 1, 2&6
Construction of Farm Ponds - Individual (No. of units)	708	A1,A3,W5,W1, W3	SDG 2& 6
Land development - Individual (ha)	3,481	W1,W5,A1,A3,S2,S4	SDG 2, 6&15
Dry land Horticulture/Agro-forestry - Individual (ha)	198	A1,A3,A4,W1,S4,S2,C1	SDG 1& 2,15
Azolla units - Individual (No. of units)	2,476	A3,A4,S4	SDG 1& 2
NADEP Vermi compost (No. of units)	1,429	A3, W1, S4	SDG 1& 2,6
Fodder development - Community & Individual	326	A3, S4	SDG 1& 2, 15
Cattle shelters (No. of units)	1,253	S4	SDG 1& 2
Goat/sheep shelters (No. of units)	1,545	S4	SDG 1& 2
Cattle trough(No. of units)	1,323	W5,S4	SDG 1& 2
Poultry Shed (No. of units)	590	S2,S4	SDG 1& 2
Construction of new open wells & Recharge Shafts (No. of units)	935	S3,W5,W1	SDG 1,2 & 6

TABLE 22. 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)	99	W3,S2	SDG 1& 6
Soak Pits (Individual) (No. of units)	9,334	W3,S2	SDG 1& 6
Roof Rain Water Harvesting (No. of units)	122	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

IMPLEMENTATION OF GP PLANS



7 | IMPLEMENTATION OF GP PLANS

Execution of GP plans includes integrating all verified, approved works in MORD’s web enabled ap-plication NREGA Soft (<https://nrega.nic.in>) for mainstreaming WASCA. The target GPs are identified first, the status of GIS based plans and to-

tal works along with its expenditure and category wise estimation cost of works as per GIS Plan, GIS based planning cumulative report are uploaded as given below.

7.1 | INTEGRATION INTO NREGA SOFT

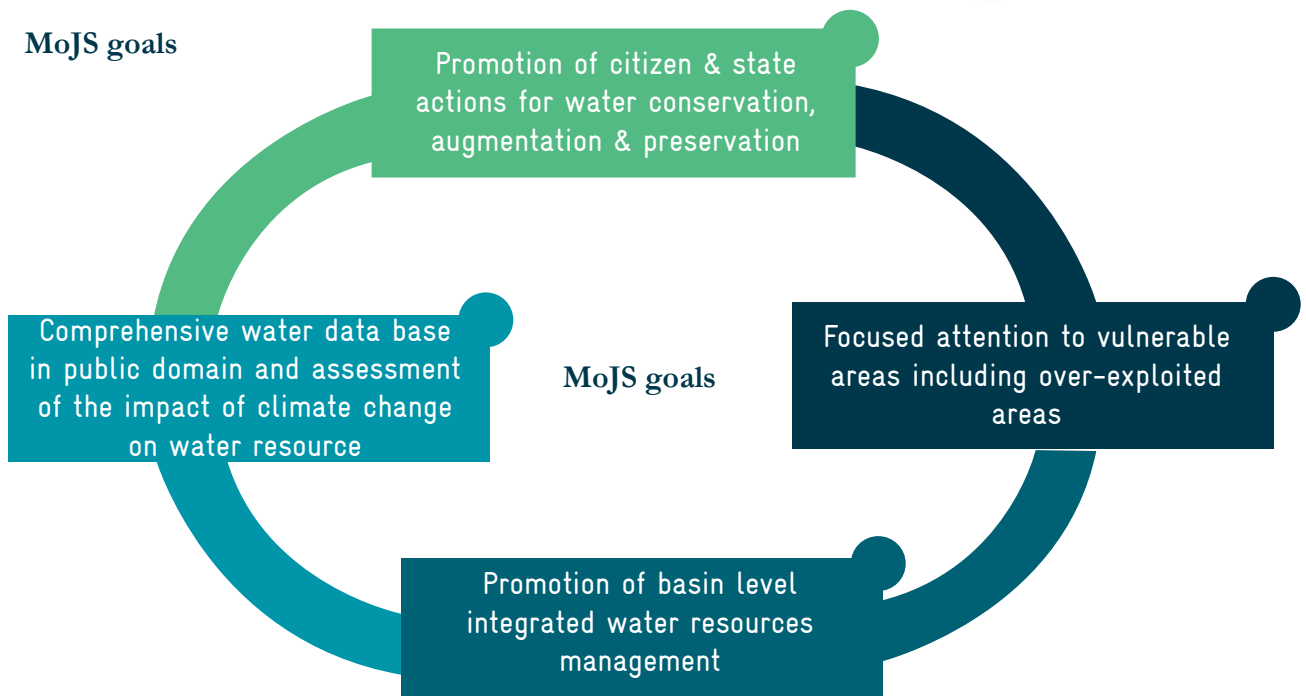
WASCA is progressing towards digitizing and integrating GP level GIS based plans, both NRM and Non-NRM activities into Mahatma Gandhi NREGS portal. The performance and implementation of GP plans of Vandavasi Block is listed in Table 23 and the details of work progress, expenditure

during the past 3 financial years are shown in Figure 7.1 and 7.2. The Total No. of works, ongoing and completed GIS works are shown in Figure 7.3. The GP wise recommendations and works uploaded are given in Annexure 7.1.

TABLE 23. GIS PLAN IMPLEMENTATION- KEY PARAMETERS PERFORMANCE IN VANDAVASI BLOCK



MoJS goals



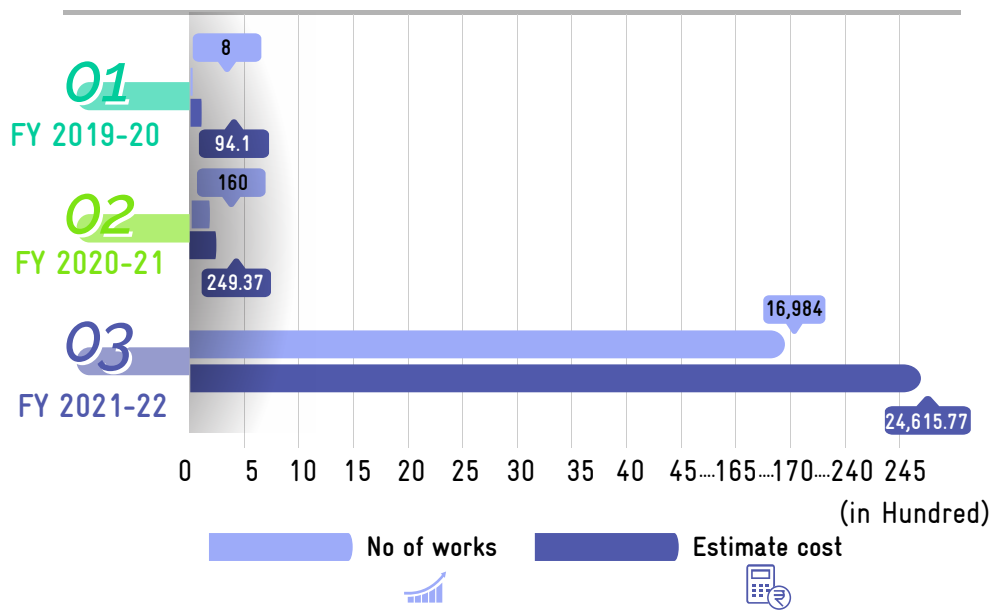


Figure 7.1. Work progress in last three years

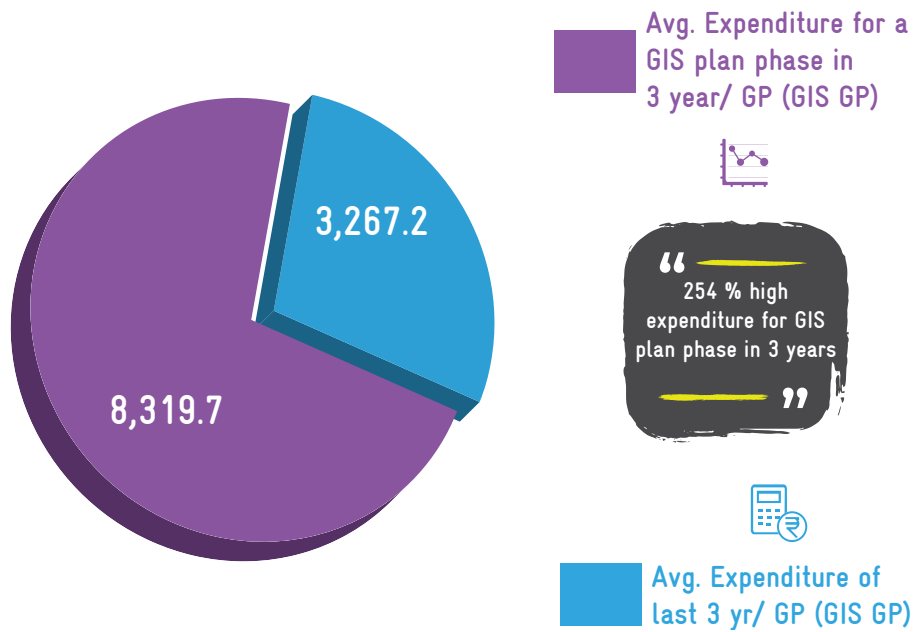


Figure 7.2. Average Expenditure for GIS plan in last 3 years

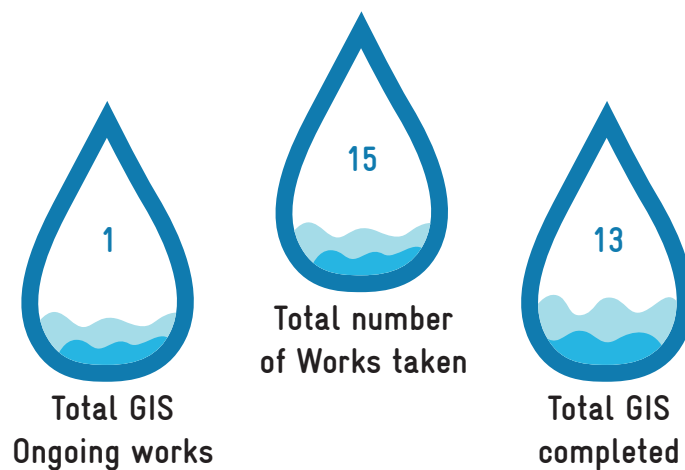


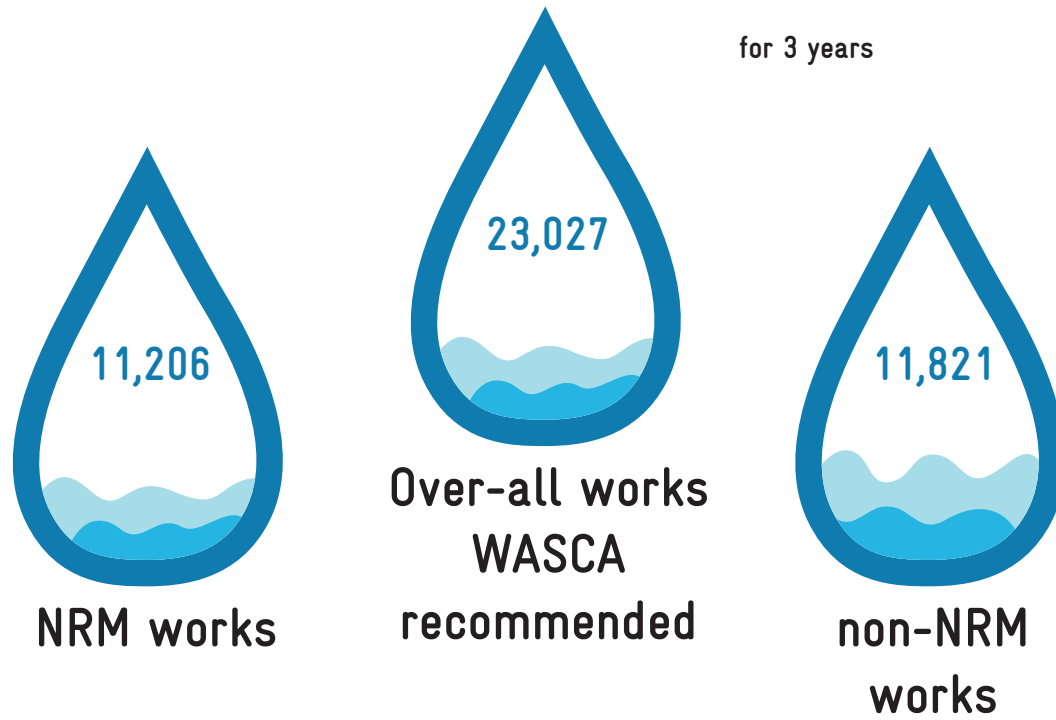


Figure 7.3. GP wise total, completed and ongoing GIS works

7.2 | WASCA RECOMMENDED NRM AND NON-NRM WORKS

WASCA recommended 23,027 works for a period of 3 years, out of which 11,206 are NRM works and 11,821 are non-NRM works (Figure 7.4). A total of

15,772 works has been uploaded so far for the financial year 2021-22 as on 04/02/2022.



7.3 | ONGOING WORKS

The ongoing works in Vandavasi Block includes Drought Proofing, Rural Connectivity, Rural Sanitation, Water Conservation and Water Harvesting (WCWH) and Works on Individuals Land (Category IV). A total of 174 works are ongoing in the Block, in which WCWH are more (54.02) followed by Works on Individual Land (44.82 %) while drought proofing and rural sanitation works are less in number (< 5 %) (Figure 7.5), GP and work category wise ongoing works are tabulated in Annexure 7.2.

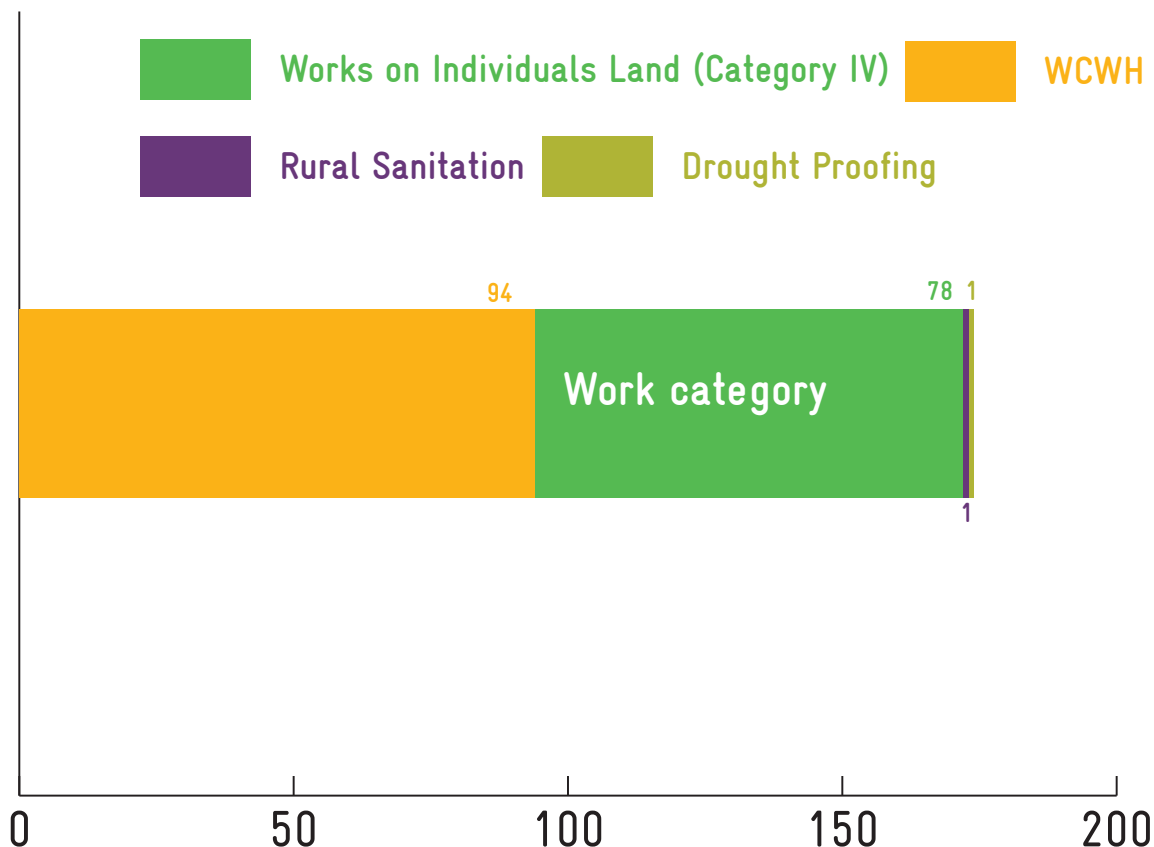


Figure 7.5. Category-wise ongoing works in Vandavasi Block

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 obstruc-

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

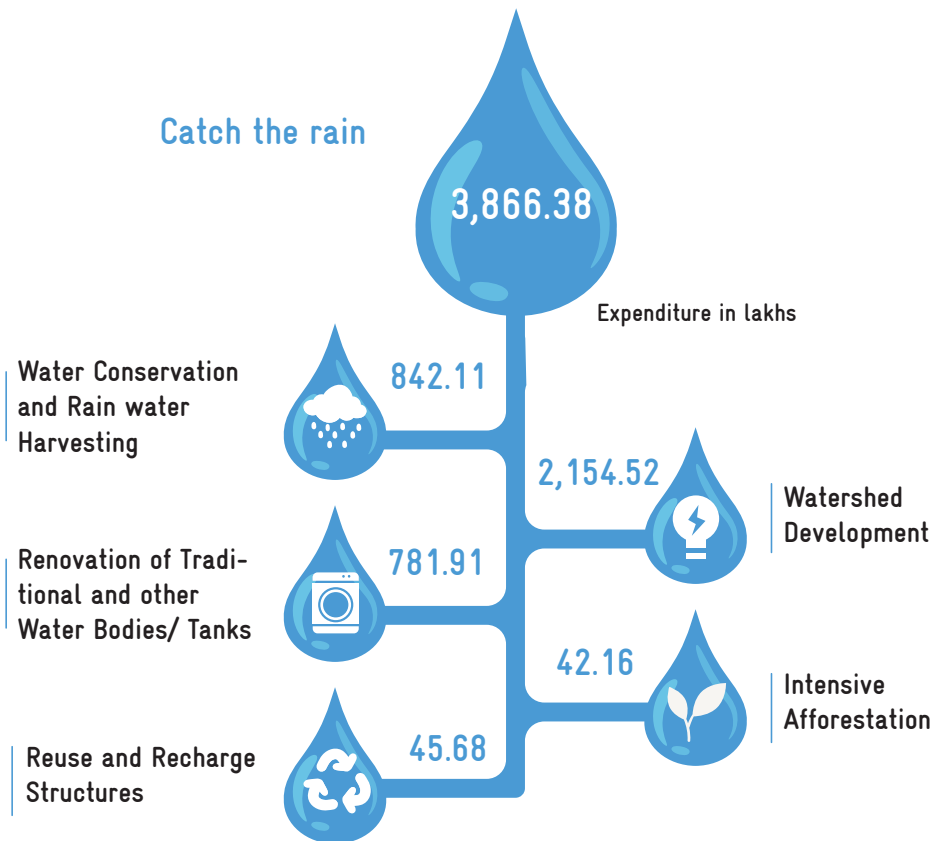
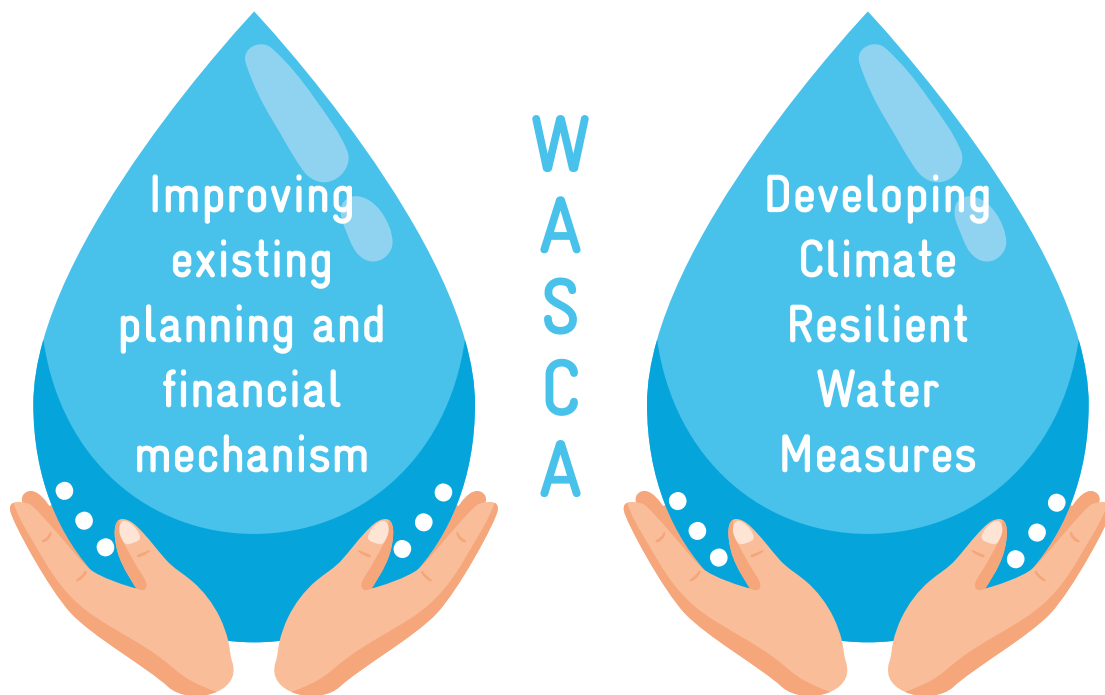


Figure 7.6. Catch the rain campaign in Vandavasi Block



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

CASE STUDY



8 | CASE STUDY

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

8.1 | MACRO-WATERSHEDS OF VANDAVASI BLOCK

Vandavasi Block comes under Kiliyar and Ongur sub-basins of Palar and Varahanadhi basins. Kiliyar, Cheyyar and Ongur macro-watersheds cover the Block. Killiyar watershed (4C2A1) has 61 micro-watersheds covering an area of 37315.49 ha. Under Ongur watershed (4C1D5) are 9 micro-watersheds covering an area of 4121.91 ha. Cheyyar watershed (4C2A3) has 1 micro-watershed covering an area of 228.74 ha. (Table 24 & Figure 8.1). Out of 61 GPs in the Block 52 GPs fall under Killiyar (4C2A1) Watershed, 4 GPs fall under Ongur (4C1D5) Watershed. One GP has watershed boundaries passing through Cheyyar and Killiyar. Four GPs have watershed boundaries passing through Kiliyar and Ongur watersheds. (Table 25 & 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 24. GENERAL DESCRIPTION OF MACRO-WATERSHEDS COVERING VANDAVASI BLOCK

Macro-watershed	Area in ha	No. of micro-watersheds
Kiliyar	37315.49	61
Ongur	4121.91	9
Cheyyar	228.74	1

TABLE 25. OF GPs COVERED UNDER WATERSHEDS IN VANDAVASI BLOCK

Name of watershed	No. of GPs
Kiliyar	52
Ongur	4
Cheyyar & Kiliyar	1
Kiliyar & Ongur	4

Understanding the Block area with respect to its nature of terrain aids in treating the area with appropriate measures at the right place which also ensures efficient management of the watershed (micro or macro). Ridge-based Block area is mapped (zoning) by referring to the spatial thematic datasets and showcased with macro-watershed (Table 26 & Figure 8.3) and GPs boundaries (Table 27 & Figure 8.4). Based on ridge range types such as high, middle, lower and inter variations of the Block area is distinguished into 4 kinds of ridge zones.

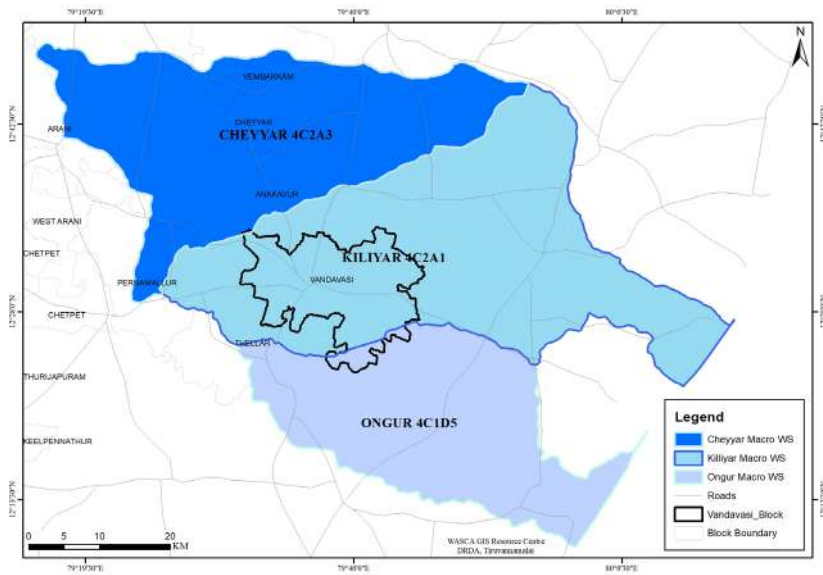


Figure 8.1. Macro-watershed Map of Vandavasi Block

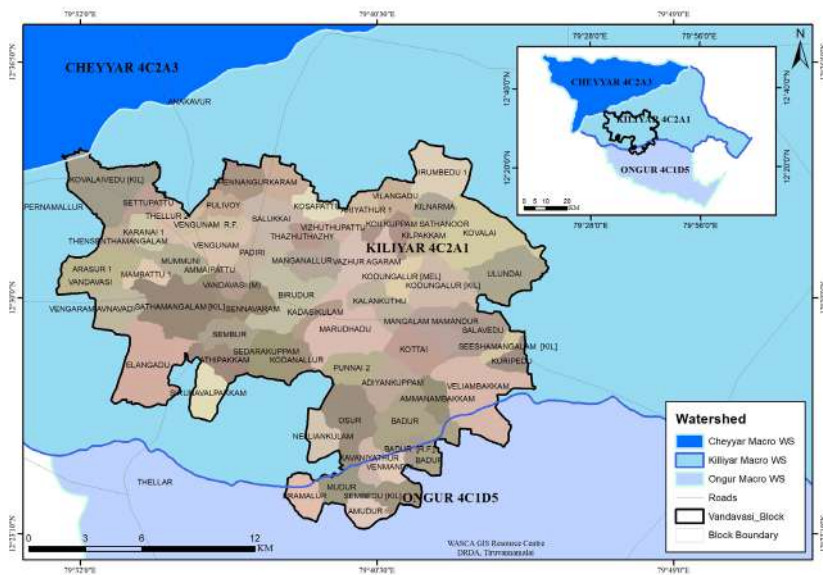


Figure 8.2. Macro-watershed with GPs map

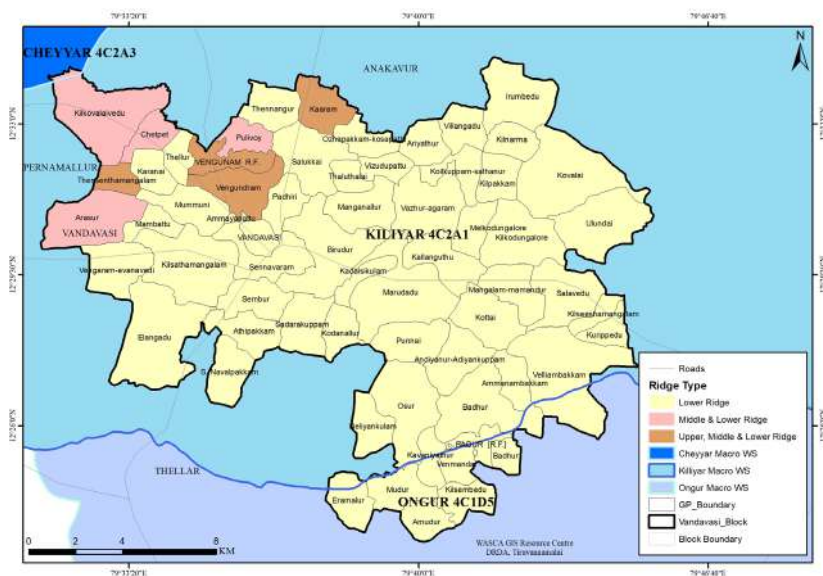


Figure 8.3. Macro-watershed Ridge Map

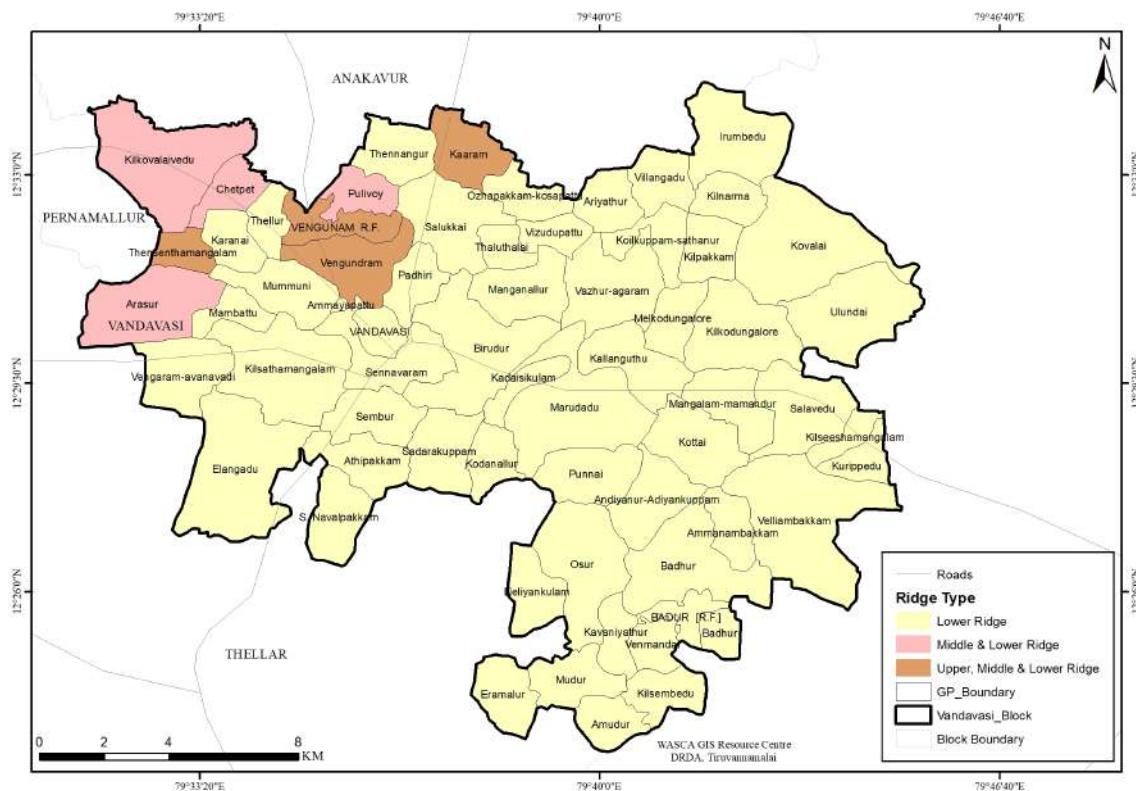


Figure 8.4. GP level Ridge Map

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 Vandavasi Block are listed in Tables 26 to 36.

TABLE 26. MICRO-WATERSHED IN VANDAVASI BLOCK FALLING UNDER KILIYAR MACRO-WATERSHED

Sl.No	Micro-watershed Code	Micro-watershed Area in ha	Ridge Type
1	4C2A1d17a	884.08	Upper, Middle & Lower
2	4C2A1e08b	905.35	
3	4C2A1d18c	547	
4	4C2A1d13c	469.73	
5	4C2A1e08a	885.67	
6	4C2A1e04d	357.93	
7	4C2A1e14d	445.18	Middle & Lower
8	4C2A1e11b	1053.73	
9	4C2A1d11b	601.41	Lower
10	4C2A1d19a	916.39	
11	4C2A1d17c	502.24	
12	4C2A1d11a	694.28	
13	4C2A1d18a	760.02	
14	4C2A1d13a	545.04	
15	4C2A1d10b	412.71	
16	4C2A1d10c	420.91	

17	4C2A1d10d	387.13
18	4C2A1d10a	638.54
19	4C2A1d13b	971.32
20	4C2A1e08c	429.08
21	4C2A1e02c	498.7
22	4C2A1e04a	682.77
23	4C2A1e02b	519.4
24	4C2A1e02a	220.06
25	4C2A1e11a	523.18
26	4C2A1e04c	846.02
27	4C2A1e04b	622.9
28	4C2A1d01a	526.86
29	4C2A1e01a	599.56
30	4C2A1e05c	446.81
31	4C2A1e01b	566.09
32	4C2A1e03a	640.32
33	4C2A1e06b	343.44
34	4C2A1e05b	579.44
35	4C2A1d01b	681.12
36	4C2A1e06a	604.53
37	4C2A1e03c	530.29
38	4C2A1e03b	471.16
39	4C2A1e09a	737.25
40	4C2A1e09b	525.49
41	4C2A1d02a	549.73
42	4C2A1e05a	902.2
43	4C2A1d03a	696.01
44	4C2A1d03b	708.57
45	4C2A1d03c	437.39
46	4C2A1e07a	1068.53
47	4C2A1d02b	390.02
48	4C2A1c03c	615.58
49	4C2A1e09c	800.82
50	4C2A1d05a	673.47
51	4C2A1e07b	618.13
52	4C2A1d05c	645.15
53	4C2A1e07c	695.03
54	4C2A1d04b	787.51
55	4C2A1e10a	739.41
56	4C2A1d04a	648.99
57	4C2A1d05b	335.08
58	4C2A1d06c	662.4
59	4C2A1d04c	499.76
60	4C2A1d07b	473.42
61	4C2A1d07a	375.17

Lower

TABLE 27. LIST OF GPs WITH TYPE OF RIDGE FALLING UNDER KILIYAR MACRO-WATERSHED IN VANDAVASI BLOCK

Sl.No	Name of the GP	Ridge Type
1	Thensenthamangalam	Upper, Middle & Lower
2	Vengundram	
3	Kaaram	
4	Pulivoy	Middle & Lower
5	Arasur	
6	Chetpet	
7	Vizudupattu	Lower
8	Melkodungalore	
9	Ulundai	
10	Vazhur-agaram	
11	Kilnarma	
12	Kilpakkam	
13	Thaluthalai	
14	Villangadu	
15	Koilkuppam-sathanur	
16	Thennangur	
17	Manganallur	
18	Salukkai	
19	Punnai	
20	Mangalam-mamandur	
21	Marudadu	
22	Sembur	
23	Kodanallur	
24	Sadarakuppam	
25	Mummuni	
26	Mambattu	
27	Thehellur	
28	Kurippedu	
29	Neliyankulam	
30	S. Navalpakkam	
31	Vengaram-avanavadi	
32	Ozhapakkam-kosapattu	
33	Kovalai	
34	Irumbedu	
35	Ammanambakkam	
36	Ariyathur	
37	Athipakkam	
38	Birudur	
39	Elangadu	
40	Kottai	
41	Kallanguthu	
42	Kilseeshamangalam	
43	Salavedu	

44	Ammayapattu	Lower
45	Andiyanur-Adiyankuppam	
46	Karanai	
47	Kilkodungalore	
48	Kilsathamangalam	
49	Osur	
50	Padhiri	
51	Sennavaram	
52	Kadaisikulam	

TABLE 28. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER KILLIYAR MACRO-WATERSHED IN VANDAVASI BLOCK

Sl.No	Proposed Work	Ridge Type	Extent
1	Afforestation in Public/common lands (ha)	Upper	487.04
2	Drainage Line Treatment (m)		64,742.09
3	CC Check dams (No.)	Middle	42
4	Block Plantation (Community) (ha)		384.56
5	Silvi-pasture Development (ha)		125.86
6	Avenue plantation (m)		1,81,806
7	Agro Forestry (ha)		126.53
8	Mini Forest (ha)		29.61
9	Composting (No.)	Lower	608
10	Canal Bund Plantation		31,504
11	Restoration of water bodies: Tanks and Ooranis (No.)		214
12	Artificial Recharge Structure (No.)		1,219
13	Farm Bunding with Boundary Trenches - Individual (ha)		25
14	Construction of Farm Ponds - Individual (No.)		740
15	Land development - Individual (ha)		3,493.6
16	Azolla units - Individual (No.)		2,345
17	NADEP Vermi compost (No.)		713
18	Cattle Shelters (No.)		1,300
19	Goat Sheep Shelters (No.)		1,463
20	Cattle Trough (No.)		1,290
21	Construction of new open wells & Recharge Shafts (No.)		843
22	Soak Pits (Community) (No.)		4,643
23	Soak Pits (Individual) (No.)		136
24	Roof Rain Water Harvesting (No.)		104
25	Nutri Garden (No.)		45,319
26	Silt application (No.)		324

TABLE 29. MICRO-WATERSHED IN VANDAVASI BLOCK FALLING UNDER ONGUR MACRO-WATERSHED

Sl.No	Micro-watershed Code	Micro-watershed Area in ha	Ridge Type
1	4C1D5c13c	179.36	Lower
2	4C1D5c13b	775.11	
3	4C1D5c14c	501.01	

4	4C1D5c06c	498.10	Lower
5	4C1D5c07c	599.35	
6	4C1D5c07b	226.21	
7	4C1D5d14b	735.75	
8	4C1D5c07a	405.68	
9	4C1D5d14c	201.32	

TABLE 30. LIST OF GPs WITH TYPE OF RIDGE FALLING UNDER ONGUR MACRO-WATERSHED IN VANDAVASI BLOCK

Sl.No	Name of the GP	Ridge Type
1	Kilsembedu	Lower
2	Mudur	
3	Amudur	
4	Venmandai	

TABLE 31. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER ONGUR MACRO-WATERSHED IN VANDAVASI BLOCK

Sl.No	Proposed Work	Ridge Type	Extent
1	Afforestation in Public/common lands (ha)	Upper	4.9
2	Drainage Line Treatment (m)		4299
3	CC Check dams (No.)	Middle	3
4	Block Plantation (Community) (ha)		3
5	Silvi-pasture Development (ha)		3.9
6	Avenue plantation (m)		10031
7	Agro Forestry (ha)		4.07
8	Mini Forest (ha)		4.65
9	Composting (No.)		26
10	Canal Bund Plantation (m)		2358
11	Restoration of water bodies: Tanks and Ooranis (No.)	Lower	20
12	Artificial Recharge Structure (No.)		36
13	Farm Bunding with Boundary Trenches - Individual (ha)		30
14	Construction of Farm Ponds - Individual (No.)		43
15	Land development - Individual (ha)		2
16	Azolla units - Individual (No.)		229
17	NADEP Vermi compost (No.)		175
18	Cattle Shelters (No.)		175
19	Goat Sheep Shelters (No.)		114
20	Cattle Trough (No.)		175
21	Construction of new open wells & Recharge Shafts (No.)		111
22	Soak Pits (Community) (No.)		7
23	Soak Pits (Individual) (No.)		464
24	Roof Rain Water Harvesting (No.)		8
25	Nutri Garden (No.)		389
26	Silt application (No.)		13

TABLE 32. MICRO-WATERSHED IN VANDAVASI BLOCK FALLING UNDER CHEYYAR MACRO-WATERSHED

Sl.No	Micro-watershed Code	Micro-watershed Area in ha	Ridge Type
1	4C2A3b10c	228.74	Lower

TABLE 33. LIST OF GPs WITH TYPE OF RIDGE FALLING UNDER CHEYYAR & KILLIYAR MACRO-WATERSHED IN VANDAVASI BLOCK

Sl.No	Name of the GP	Ridge Type
1	Kilkovalaivedu	Middle & Lower

TABLE 34. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER CHEYYAR & KILLIYAR MACRO -WATERSHED IN VANDAVASI BLOCK

Sl.No	Proposed Work	Ridge Type	Extent
1	Afforestation in Public/common lands (ha)	Upper	18.9
2	CC Check dams (No)	Middle	1
3	Block Plantation (Community) (ha)		77.7
4	Avenue plantation (m)		5405
5	Agro Forestry (ha)		10.6
6	Composting (No)		8
7	Restoration of water bodies: Tanks and Ooranis (No)	Lower	6
8	Artificial Recharge Structure (No)		36
9	Farm Bunding with Boundary Trenches - Individual (ha)		3
10	Construction of Farm Ponds - Individual (No)		15
11	Azolla units - Individual (No)		39
12	NADEP Vermi compost (No)		20
13	Cattle Shelters (No)		13
14	Goat Sheep Shelters (No)		18
15	Cattle Trough (No)		13
16	Construction of new open wells & Recharge Shafts (No)		36
17	Soak Pits (Community) (No)		2
18	Soak Pits (Individual) (No)		339
19	Roof Rain Water Harvesting (No)		2
20	Nutri Garden (No)		39

TABLE 35. LIST OF GPS WITH TYPE OF RIDGE FALLING UNDER KILLIYAR & ONGUR MACRO-WATERSHED IN VANDAVASI BLOCK

Sl.No	Name of the GP	Ridge type
1	Kavaniyathur	Lower
2	Eramalur	
3	Badhur	
4	Velliambakkam	

TABLE 36. LIST OF WORKS PROPOSED UNDER CWRM – WASCA WITH TYPE OF RIDGE FALLING UNDER KILLIYAR & ONGUR MACRO-WATERSHED IN VANDAVASI BLOCK

Sl.No	Proposed Work	Ridge Type	Extent
1	Afforestation in Public/common lands (ha)	Upper	43.8
2	Drainage Line Treatment (m)		3,300
3	CC Check dams (No.)	Middle	4
4	Block Plantation (Community) (ha)		62.42
5	Avenue plantation (m)		14,621
6	Agro Forestry (ha)		14.47
7	Composting (No.)	Lower	29
8	Canal Bund Plantation (m)		340
9	Restoration of water bodies: Tanks and Ooranis (No.)		12
10	Artificial Recharge Structure (No.)		22
11	Farm Bunding with Boundary Trenches - Individual (ha)		29.22
12	Construction of Farm Ponds - Individual (No.)		34
13	Land development - Individual (ha)		11.22
14	Azolla units - Individual (No.)		172
15	NADEP Vermi compost (No.)		140
16	Cattle Shelters (No.)		54
17	Goat Sheep Shelters (No.)		156
18	Cattle Trough (No.)		54
19	Construction of new open wells & Recharge Shafts (No.)		97
20	Soak Pits (Community) (No.)		10
21	Soak Pits (Individual) (No.)		1,057
22	Roof Rain Water Harvesting (No.)		8
23	Nutri Garden (No.)		5,385
24	Silt application (No.)		26

8.2 | MODEL MICRO-WATERSHED- VENGUNDRAM



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.

VENGUNDRAM MICRO-WATERSHED

Vengundram micro-watershed falls under Vengundram GP, Vandavasi Block in Thiruvannamalai District (Figure 8.5 and 8.6). This micro-watershed is a part of Kiliyar macro-watershed in Kiliyar sub-basin. The general information, geology, hydrogeology, natural drainage line, catchment area, ground water status, water budget of Vengundram

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.

micro-watershed is given below in separate sections followed by proposed works (Figure 8.7 and 8.8), ridge wise proposed treatment area, estimated cost and required person days and key outcomes (Table 37 to 46). The key CWRM parameters for the GPs falling in this micro-watershed is Annexed 8.

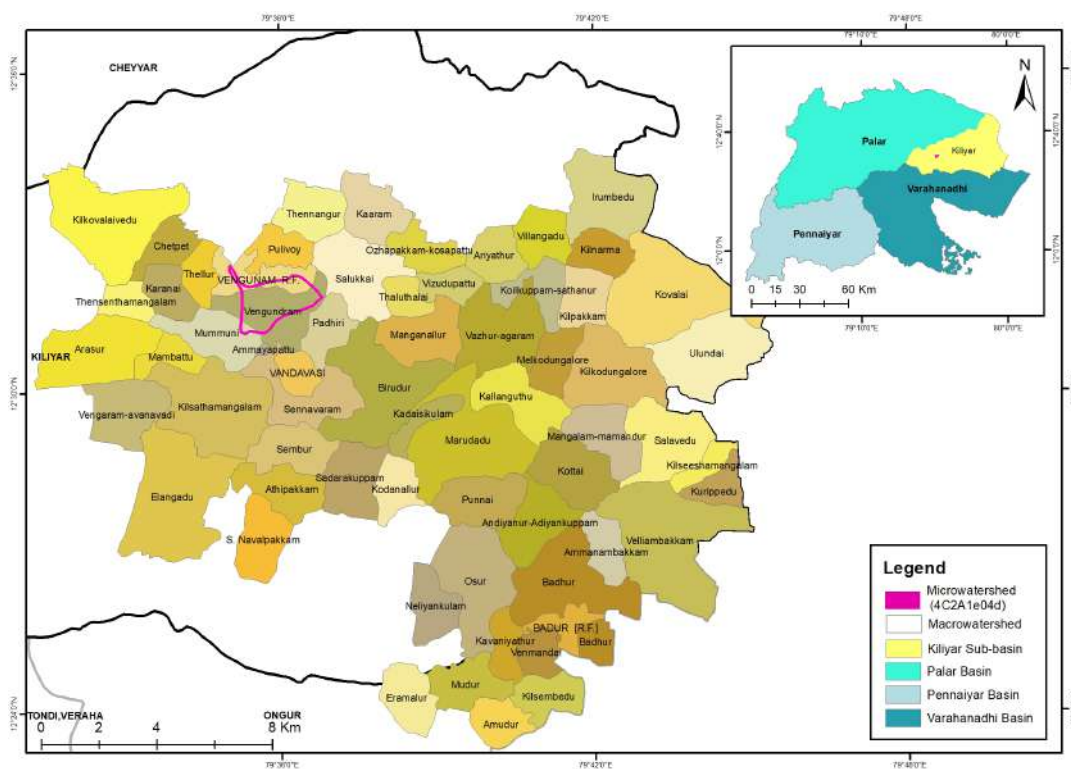


Figure 8.6. Vengundram micro-watershed with GPs

TABLE 37. GENERAL INFORMATION OF THE MICRO-WATERSHED

Description	Name/ Number/ Quantity/ Status
Name of the Micro-watershed	Vengundram
Micro-watershed Number	4C2A1e04d
Name of the Basin	Palar Basin
Name of the subbasin	Kiliyar Sub Basin
Name of the Macro-watershed	Kiliyar
No. of GPs covered under the micro-watershed	1
No. of Reserved Forest covered under the Micro-watershed	1
Name of the GP	Vengundram
Name of the Reserved Forest	Vengundram R.F
Latitude of micro-watershed (From To)	12°31'6.93"N to 12°32'5.91"N
Longitude of micro-watershed (From To)	79°35'2.99"E to 79°36'47.90"E
Total area of the micro-watershed in ha	358
% of micro-watershed area in Vengundram GP	78
% of micro-watershed area in Vengundram R.F	22
Area of micro-watershed falling in Vengundram GP (ha)	281
Area of micro-watershed falling in Vengundram R.F (ha)	77
Total Population of Vengundram GP	3,882
Annual Average Rainfall (mm)	1047
Annual maximum Temperature °C	33
Annual Minimum Temperature °C	22.8
Evapo-Transpiration Losses of Vengundram GP (ha.m)	15.96
Volumetric soil moisture availability (%)	23
Climate Risk	Drought and heat waves
CVI Index Value for Vengundram (Based on WASCA Climate study)	0.567
Agro-Climatic Zone	North eastern zone (IN-1)
Agro Ecological Sub-Region (ICAR)	Eastern Ghats
Status of Ground water in Vengundram GP	Over Exploited

TABLE 38. GEOLOGY, HYDROGEOLOGY OTHER CHARACTERISTICS IN MICRO-WATERSHED

Geology occurrence in % (Hard rock)	100
Geology Quality	Moderate
Depth of weathered zone and/or maximum depth of fractures in Hard Rock area (m)	30 to 60
Bottom of the unconfined aquifer in soft rock areas (m)	20 to 40
No of lineaments passing through the micro-watershed	One
Type of lineaments passing through the micro-watershed	Structural lineaments, Dyke
Sheet Erosion (ha)	170 (upper and middle ridge)
Barren & waste lands (ha)	64 (lower ridge)

TABLE 39. MICRO-WATERSHED'S CATCHMENT AREA

Catchment Area in ha	Vengundram GP
Good catchment area	177.92
Average catchment area	9.69
Bad catchment area	375.41

TABLE 45. GROUNDWATER STATUS OF MICRO-WATERSHED

Firka Assessment Unit for Vengundram in ha.m	
Name of the Firka (Assessment Unit) falling under micro-watershed	Vandavasi
Net Annual Ground Water Availability	1,637.66
Existing Gross Ground Water Draft for Irrigation	1,738.80
Existing Gross Ground Water Draft for domestic and industrial water supply	65.38
Existing Gross Ground Water Draft for All uses	1,804.18
Provision for domestic and industrial requirement supply to 2025	74.31
Net Ground Water Availability for future irrigation development	-175.45

TABLE 41. GP WISE WATER BUDGET OF MICRO-WATERSHED- VENGUNDRAM

Water Budget in ha.m	Vengundram GP
Water for Human	10.63
Water for Agriculture	191
Water for Animals	0.7
Village wise water required	202.3
Available run-off from rain water (derived from strange method)	139.6
Harvested Runoff from Water Harvesting Activities	1.7
Potential Harvesting from proposed Interventions	53.3
Total Water harvested	55
Water demand and Supply Difference	-147.4
Water Demand Supply Gap Status	Deficient
Per capita Water Availability in cum	359.60
International Standard per capita water Availability in cum	1,700
Water Availability Gap in cum	-1340.39
Water security status	Water Stress

TABLE 42. GP WISE PROPOSED MICRO-WATERSHED WORKS – VENGUNDRAM

Ridge type	Vengundram GP
Upper	No works in Upper Ridge
Middle	No works in Middle Ridge
Lower	95
Total	95

TABLE 43. RIDGE WISE TREATMENT AREA, ESTIMATED COST AND PERSON DAYS REQUIRED - VENGUNDRAM

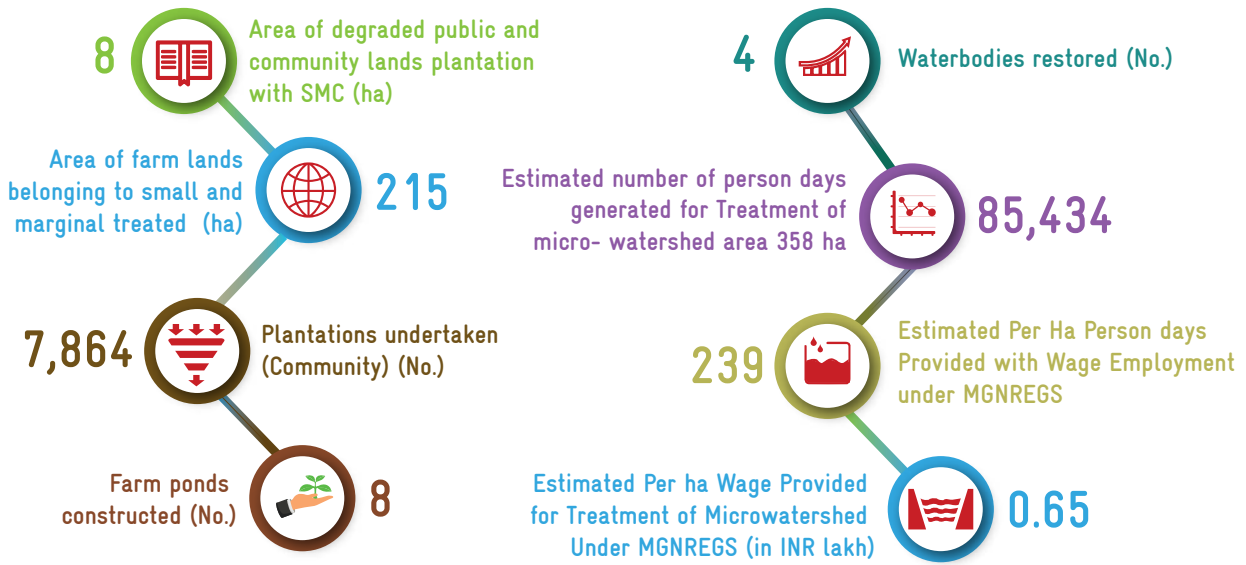
Description	Vengundram GP
Lower Ridge	
Estimated cost for Lower Ridge area (INR in Lakhs)	228.46
Total area in ha of Lower Ridge	281
Treatment cost of Lower Ridge (INR in Lakhs per ha)	0.81
Estimated Person days generated for Treatment of Lower Ridge	85,434

Vengundram GP	Treatment cost (INR in lakhs)	Estimated person days
Upper Ridge	NA	NA
Middle Ridge	NA	NA
Lower Ridge	0.81 lakh/ha	85,434
	0.81 lakh/ha	85,434

TABLE 44. NATURE AND NO. OF WORKS IN MICRO-WATERSHED

Description	Number
Total No. of works in micro-watershed area (Arable, Non arable & DLT)	62
Total No. of works in micro-watershed including livelihood Activities	13
Total No. of works in micro-watershed including Rural Greywater Management Activities	20

TABLE 45. KEY OUTCOMES OF INTERVENTION



Expenditure for FY 2020-21 (in INR lakh)



Vengundram GP

75.39 lakh



TABLE 46. ESTIMATES OF MICRO-WATERSHED IN VENGUNDRAM 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						
Afforestation	Middle	Not commenced	5	1	43	16,720
Block Plantation			2	1	22.2	8,640
Avenue plantation	Lower	Commenced	2.469	2	4.4442	1,735
Compost Pit (No.)		Not commenced	10	10	1.7	150
Restoration of Traditional water bodies: (Pond) (No.)			3	3	3	600
Silvi- Pasture			1	1	17.1	6,664
Restoration of Traditional water bodies: (Union Tank) (No.)			1	1	40	16,000
Tank bund Plantation (No.)	1	1	1.8	703		
Sub total				20	133.24	51,212
Works in Individual Farmer lands (Agriculture and Allied Activities)						
Dryland Horticulture (ha & No.)	Middle	Not commenced	5			
			2	2	17	6,642
Farm Bunding with Boundary Trenches - Individual (ha & No.)			6			
Construction of Farm Ponds - Individual (No.)	Lower	Ongoing	8	8	16	6,248
Azolla Production units - Individual (No.)		Commenced	5	5	0.75	115
NADEP Vermi compost (No.)			5	5	0.9	135
Silt application (No.)		Not commenced	2	2		
Fodder development - Individual (No.)			5	5	7.4	11,720
Artificial Recharge Structure for borewell farmers (No.)	12		12	30	4,692	
Sub total				42	76.55	31,310
Total no. of works for treatment of micro-watershed (Arable, Non arable & DLT)				62	209.79	82,522
Livelihood enhancement activities for Individual Farmers (dryland)						
Cattle Shelters (No.)	Lower	Commenced	5	5	10.6	1,655
Goat Sheep Shelters (No.)			3	3	6.81	1,065
Cattle Trough (No.)		Not commenced	5	5	0.25	30
Sub total				13	17.66	2,750
Rural Greywater and Rooftop Rainwater Management						
Soak Pits (Individual) (No.)	Lower	Ongoing	10	10	1	160
Nutri Garden (No.)		Not commenced	10	10	0.01	2
Sub total				20	1.01	162
Total no. of works under Vengundram GP for micro-watershed development (IWRM)				95	228.46	85,434

TOTAL ESTIMATES OF MICRO-WATERSHED IN VENGUNDRAM GP

	No. of works as per KML	Estimate cost in INR (Lakhs)	Person days
Vengundram GP	95	228.46	85,434

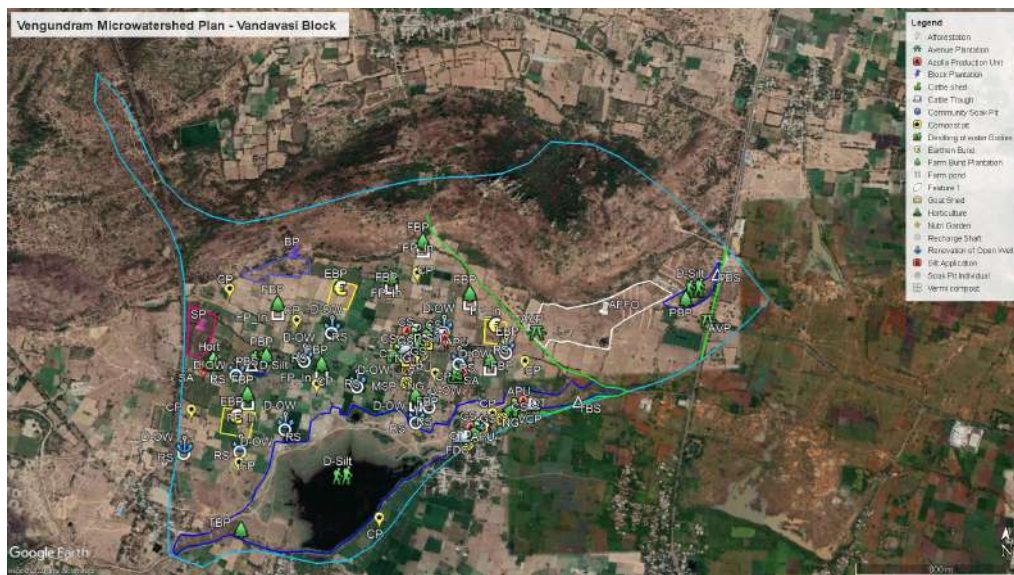
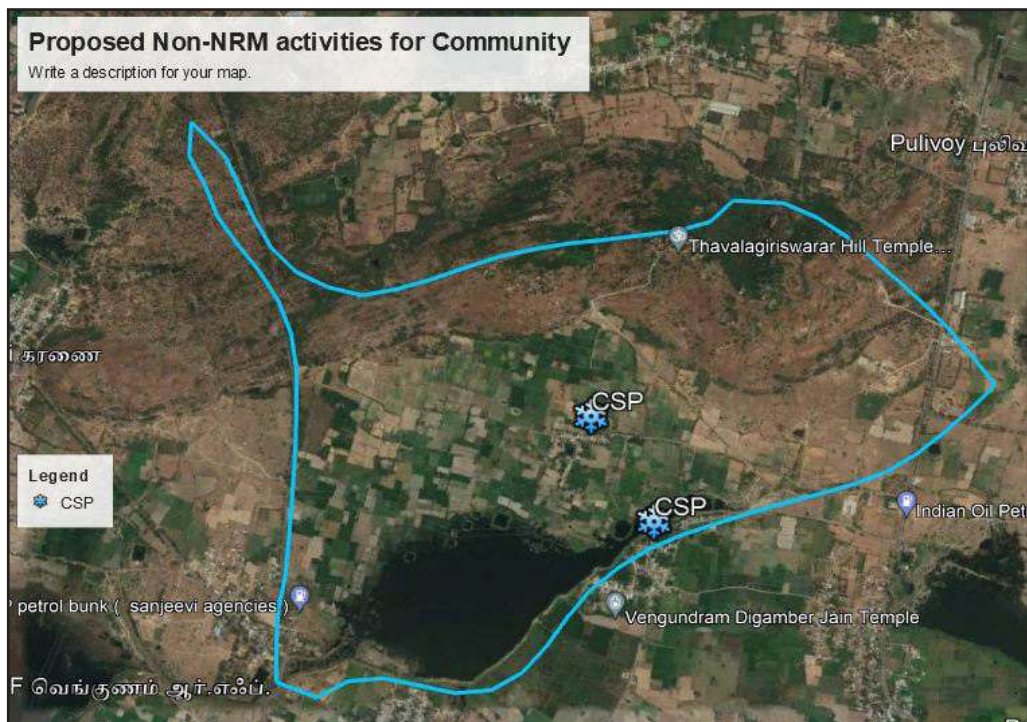
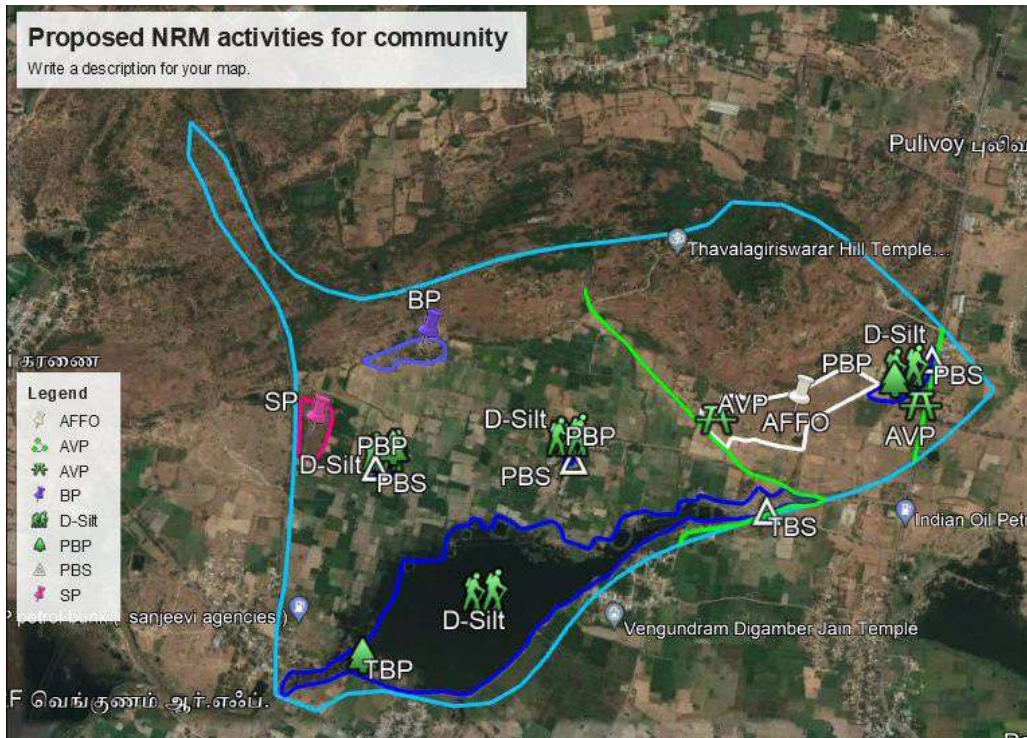


Figure 8.7. Proposed activities in Vengundram micro-watershed



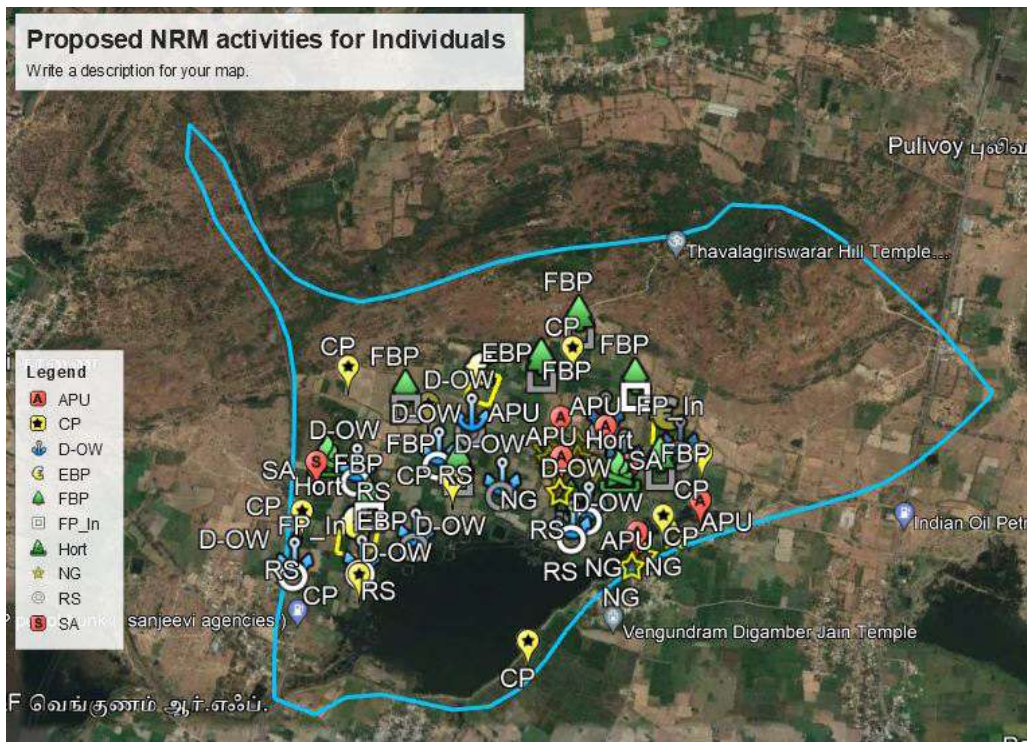
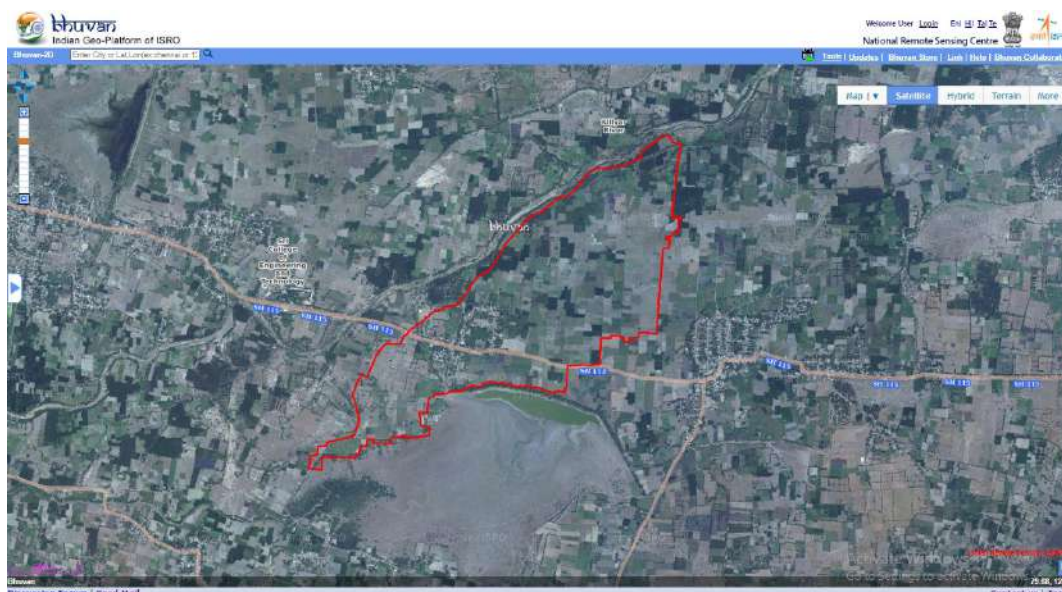


Figure 8.8. Proposed activities in Vengundram micro-watershed A: NRM activities for community. B: Non-NRM activities for community. C: NRM activities for Individuals. D: Non-NRM activities for Individuals

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

8.3 | MODEL GP- KADAISIKULAM

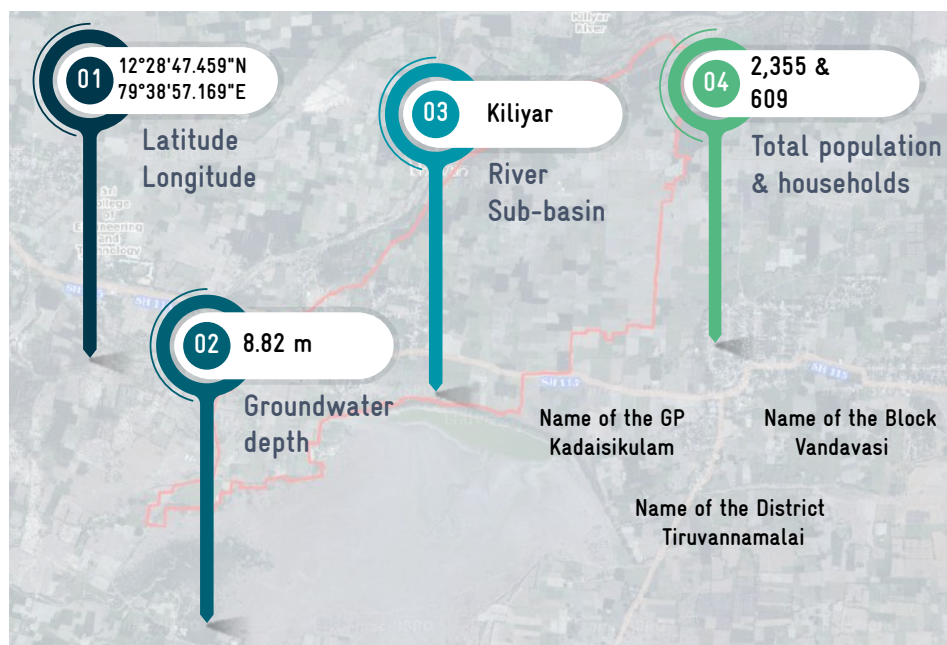
8.3.1 BACKGROUND OF GRAM PANCHAYAT – KADAISIKULAM



Kadaisikulam GP is geographically situated between $12^{\circ}28'47.459''\text{N}$ to $12^{\circ}29'57.534''\text{N}$ and $79^{\circ}38'27.006''\text{E}$ to $79^{\circ}38'57.169''\text{E}$ located in Vandavasi Block of Tiruvannamalai District. (Table 47). The average annual temperature of GP is 27.9°C , and receives annual average rainfall of 1,047 mm.

The total geographical area of GP is 192 ha. As per Census 2011, the total population is 1,809 of which 917 are males and the female population is 892. The total number of households is 2,035. The Scheduled Caste and Scheduled Tribes constitute 6.46 % of the total population in Kadaisikulam GP.

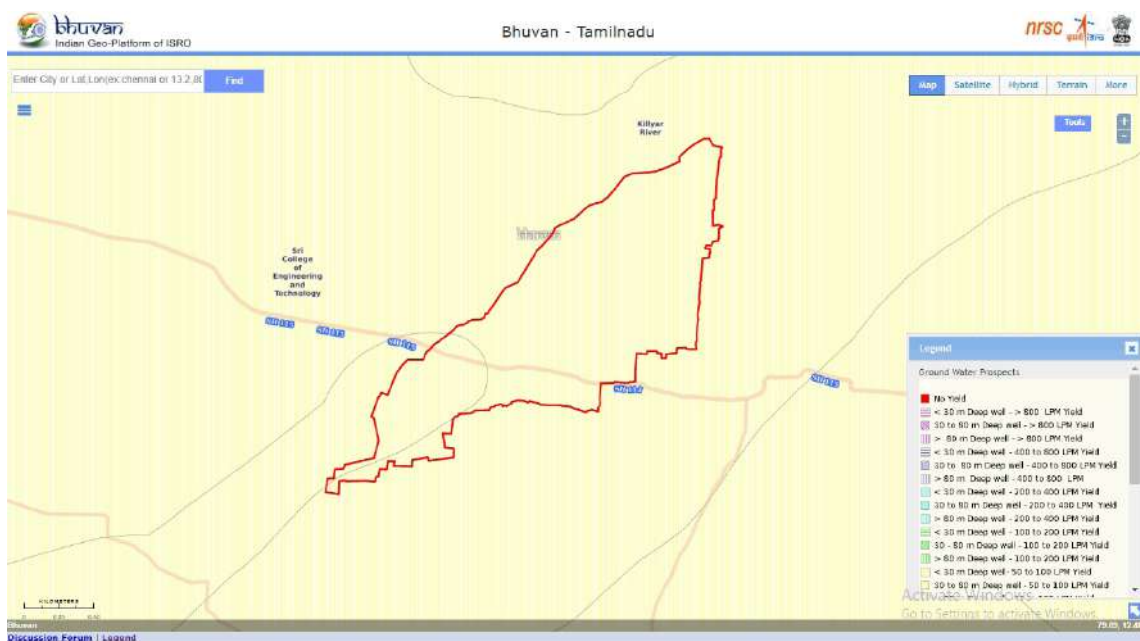
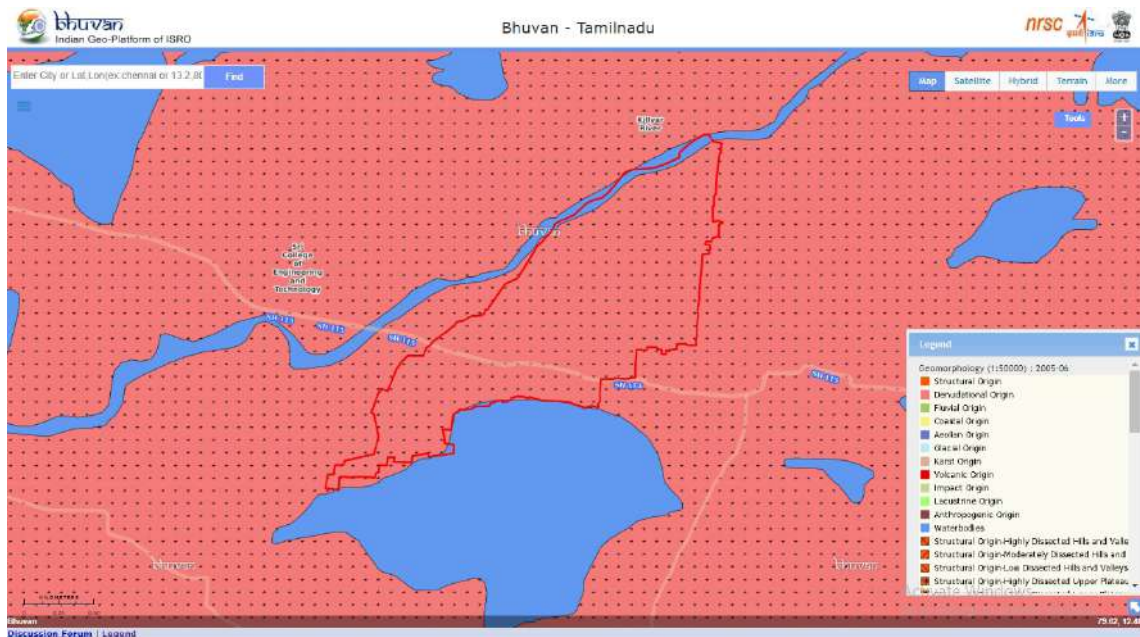
TABLE 47. GENERAL DESCRIPTION OF KADAISIKULAM GP, VANDAVASI BLOCK



The detailed spatial and non-spatial data considered in the process of preparation of climate resilient measures under CWRM for Kadaisikulam GP is illustrated as follows:

8.3.2 CWRM PLANNING - SPATIAL DATA

CWRM adapted the geospatial technologies in its process of plan preparation towards climate-resilient infrastructure, Water Conservation and Water Harvesting (WCWH) 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 implement towards conservation of resources. Various thematic datasets for Kadaisikulam GP are shown in Figure 8.9 (A, B, C, D, E).



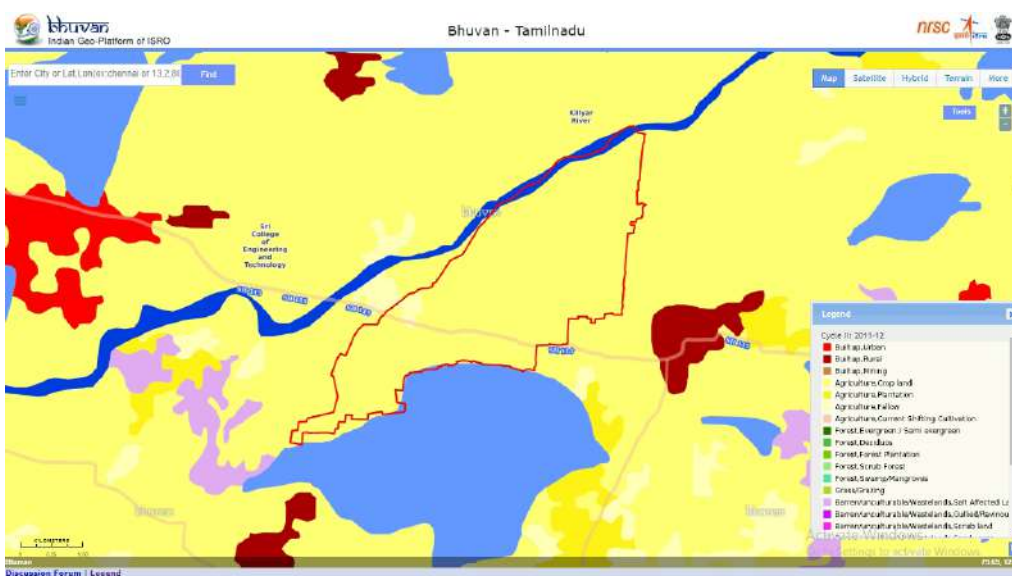
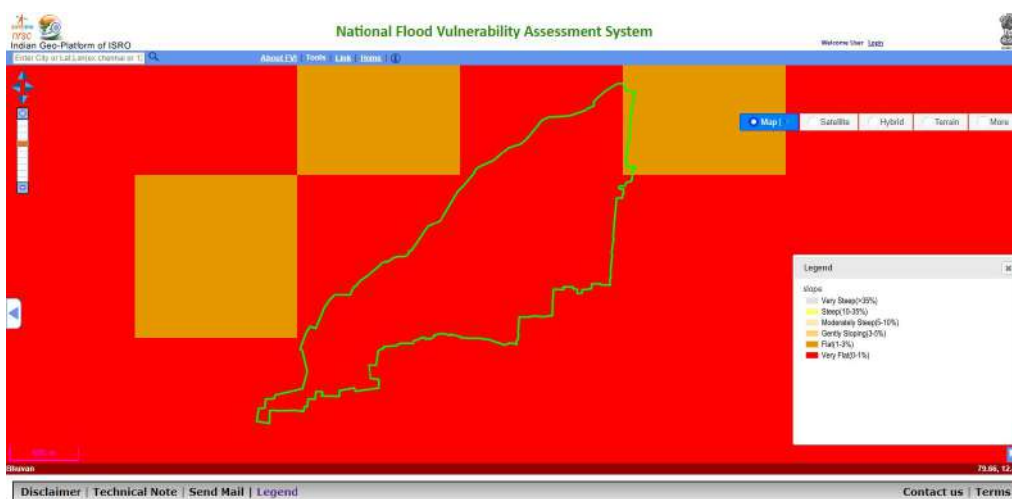
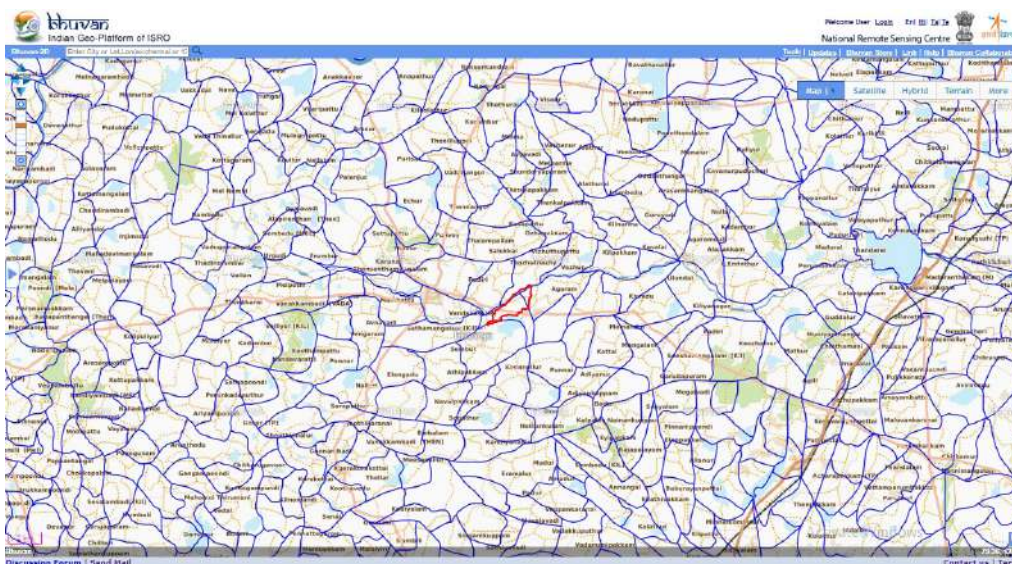


Figure 8.9. Spatial thematic maps of Kadaisikulam GP. A. Geomorphology, B. GW prosperity, C. Watershed, D. Slope, E. LULC

Kadaisikulam GP engrossed with denudation origin pediment complex (Figure 8.9 A). It is observed that the groundwater prosperity is less than 30 m deep well with 50 to 100 LPM capacity (B) indicates that, a very flat terrain (0-1 %) is dominant in the GP (D), Whereas GP area falls under three micro-watershed units (C). Agriculture plantation is dominated in the GP (E).

8.3.3 CWRM PLANNING - NON-SPATIAL DATA

The non-spatial data covers four important themes – socio-economic, climate, water and agriculture with 116 parameters (Table 48). The non-spatial data is concurrently used for analysis along with the spatial data mentioned above to identify the key water challenges, prepare water budget by understanding the supply and demand and develop water actions

to the different land use and slope categories. The process starts with mapping of the administrative (habitations/panchayat/revenue village, Block/taluk), agro-ecological (regional and sub-regional, climatic and agricultural zonation's) and hydrological (drainage points/watersheds/sub basin) units keeping GP as the lowest unit of planning and execution.

TABLE 48. NON-SPATIAL DATA- KADAIKULAM GP

Key CWRM Parameter	Details
Climate Vulnerability Area (CVA) 1: Socio-Economic	
Geographical Area (ha)	192
Male Population	917
Female Population	892
Total Population	1,809
SC Population	112
ST Population	5
Vulnerable population	117
Households (HH's)	2,035
Only one room HH's (SECC)	485
Female-Headed HH's (SECC)	135
Vulnerable Households (SECC)	380
% of Vulnerable Households	19
Registered MGNREGA Job cards	571
Active person working in job Cards	403
Drinking-Water Sources	5
Groundwater sources - Drinking water	5
Surface water sources - Drinking water	0
Annual Grey water Generation (ha.m)	3.3
Climate Vulnerability Area (CVA) 3: Water Resources	
Canal Network (m)	
Length of Main Canal	2,300

No. of Ooranis	4
Other Surface Water Bodies	3
Irrigation Facilities (ha)	
Area under Tank Irrigation	205.05
Area under Open & Tube Well Irrigation	375.16
Catchment Area wise Available Runoff (ha.m)	
Good Catchment Area	167.3
Average Catchment Area	6.2
Bad Catchment Area	260.2
Watershed and Drainage Networks	
Length of Natural Drainage Lines (m)	2238
No. of Natural Drainage Lines	5
No. of Micro -Watersheds	2
Water Demand (ha.m)	
Water Demand For Humans	4.95
Water Demand for Livestock	2.12
Water Demand For Agriculture	739
% G.W Utilization for Drinking	100
% G.W Utilization for Livestock	88
% G.W Utilization for Agriculture.	65
% SW Utilization for Livestock	12
% SW Utilization for Agriculture	35
Climate Vulnerability Area 4: Agriculture	
Area Under Land Resources (ha)	
Area under Non-Agricultural Uses	445.26
Area under Barren & Un-cultivable Land	0.9
Area under Permanent Pastures and Other Grazing Land	15.39
Area under Land Under Miscellaneous Tree Crops etc.	6.66
Area under Fallows Land other than Current Fallows	86.36
Area under Current Fallow land	576.01
Area under Unirrigated Land	149
Area Irrigated by Source	580.21
Catchment Area (ha)	
Land under Good Catchment	446.16
Land under Average Catchment	22.05
Land under Bad Catchment	1,391.58
Crop Details (ha)	
Irrigated Area	476.73
Rainfed area	44.72
The area under Paddy Cultivation	273

Crop Water Requirement - The irrigated condition (ha.m)	723.61
Crop Water Requirement - Rainfed condition (ha.m)	15.87
Soil Resources: Status of Available Nitrogen (%)	
Very Low (VL)	5
Low (L)	93
Medium (M)	2
Status of Organic Carbon (%)	
Very Low (VL)	23
Low (L)	73
Medium (M)	3
High (H)	1
Status of Soil Micro Nutrients (%)	
Sufficient	61
Deficient	39
Status of Physical condition of the soil (%)	
Slightly Acidic (SIAC)	6
Neutral (N)	10
Moderately Alkaline (MAI)	84
Soil Texture	
% of Fine Soil	88
Soil Water Permeability	Moderate
Soil moisture and ET	
Volumetric Soil Moisture (%)	23
Estimated Soil Moisture (ha.m)	325.34
ET Losses (ha.m)	604.01
Means of Water Extraction (%)	
Lifting	100
Irrigation Methods (%)	
Wild Flooding	35
Control Flooding	65
Livestock (No)	
Cattle Population	510
Sheep Population	290
Goat Population	137

8.3.4 KEY WATER CHALLENGES

Socio-Economic



1. According to SECC data, 19% of the households are vulnerable in the village
2. Female population less than male population
3. 485 one room households, and 135 female headed households
4. Access to drinking water through tap water connections is nil
5. Grey water generation is 3.3 ha.m; Handling of grey water from households needs attention

Water



1. Ground water status -critical
2. 7 traditional waterbodies in the GP
3. Irrigation depends more on open and tube well
4. 65 % Agriculture and 88% livestock and 100 % drinking water needs met through groundwater
5. 433.7 ha-m of water is available runoff
-Bad catchment area is more

Agriculture and Allied Sector



1. 25 % of the land covers the common area
2. 74.8 of the land covers an individual land area
3. Main crop in the GP is paddy which is cultivated about 273 ha of land
4. Crop water requirement for irrigated condition is more
5. 100% of the water is given to paddy fields by lifting methods of irrigation
6. Soil Nitrogen and organic carbon is low
7. 84% Moderately Alkaline soil
8. 88% fine soil is predominant in the GP
9. Slightly high ET loss at 604.01 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 infrastructure, and climate-resilient measures to reduce the vulnerability of the GP. About 16% of the total land area is taken for WASCA treatment activities like plantation and conservation works. The total proposed area for treatment is 18.86 ha with more attention being given for area irrigated by source followed by area under current fallow

land, area under Fallows Land other than Current Fallows, and area under Non-Agricultural Uses and area under Permanent Pastures and Other Grazing Land. (Figure 8.10). Through the proposed conservation activities, 50.79 ha.m run off would be harvested in which, about 80 % of the runoff is from the bad catchment, 11.5% of the run off is from the good catchment and 8.5% of conservation is from the average catchment area (Figure 8.11).

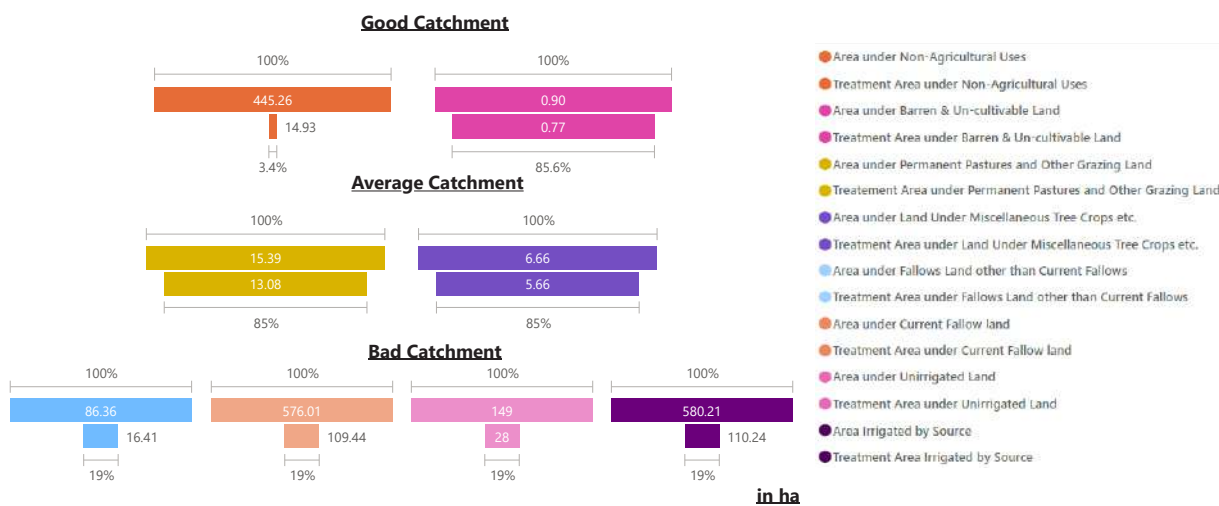


Figure 8.10. Proposed land resource treatment area in Kadaisikulam GP

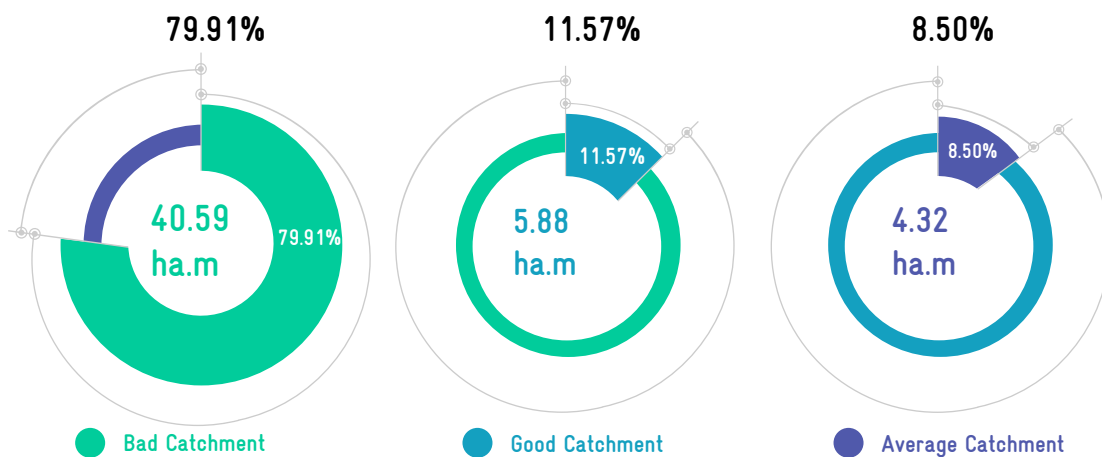


Figure 8.11. Expected run off conservation after treatment in Kadaisikulam GP

The detailed proposed activities along with salient parameters are showed in the Table 49 for 2021-2024. More attention towards common and public

land developments are given with appropriate works to improve the resilience of the GP.




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

CWRM Water Action 1: Improvement of Public & Common Lands Development					
CWRM Water Action 1: Works in Upper, Middle & Lower Ridge					
Name of the Work	Ridge Type	No of Works	Estimated cost (INR in Lakhs)	Estimated Person Days	
Contour Continuous Bunds (CCB) for Afforestation area (m)	Upper	1	0.03	10	
Composting (No.of units)	Lower	62	10.54	930	
Afforestation in Public/common lands (ha)	Upper	1	8.6	3,344	
Block Plantation (Community) (ha)	Middle	1	11.1	4,320	
Linear Plantation (Km)		2	5.4	1,406	
Canal Bund Plantation (Km)	Lower	3	15	8,790	
Avenue plantation (Km)	Middle	2	3.6	1,406	
Nursery Development (No.of units)	Lower	2	26.3	4,110	
Restoration of water bodies: a. Ponds (No.)		2	2	400	
Artificial Recharge Structure (No. of units)		150	375	58,650	
Drainage Line Treatment (m)	Upper	5	0.15	25	
Sub Total Water Action -1		231	458	83,391	
CWRM Water Action 2: Agricultural and allied Sector development					
CWRM Water Action 2: Works in Lower Ridge					
Farm Bunding with Boundary Trenches - Individual (ha)	Lower	106	159	62,116	
Micro Irrigation (ha)		44	44	0	
Construction of Farm Ponds - Individual (No.of units)		62	124	48,422	
Land development - Individual (ha)		31	310	1,21,086	
Dry land Horticulture/Agro-forestry - Individual (ha)		5	42.5	16,605	
Azolla units - Individual (Number of units)		13	1.95	299	
NADEP Vermi compost (No. of units)		13	2.34	351	
Fodder development - Community & Individual (No.)		13	19.24	30,472	
Cattle Shelters (No. of units)		128	271.36	42,368	
Goat Sheep Shelters (No. of units)		21	47.67	7,455	
Cattle Trough (No. of units)		13	0.65	78	
Construction of new open wells & Recharge Shafts (No. of units)		150	750	1,800	
Sub Total Water Action -2		599	1773	3,31,052	

CWRM Water Action 3: Rural Water Management				
CWRM Water Action 3: Works in Lower Ridge				
Soak Pits (Community) (No.of units)	Lower	5	0.65	100
Soak Pits (Individual) (No. of units)		53	5.3	848
Roof Rain Water Harvesting (No. of units)		2	8	1,250
Sub Total Water Action -3		60	14	2,198
Overall GP Total		890	2245	4,16,641

Of the total number of projects identified under CWRM themes, 67.30 % works are in agriculture and allied sectors while 6.74 % works are in rural water management and 25.95 % works are in public and common land. Table 50 provides the estimates of the work budget, and personal days for three years from 2021-2024 in Kadaisikulam GP.

TABLE 50. SUMMARY OF WORKS IDENTIFIED AND ESTIMATED PERSON-DAYS FOR 2021-2024

CWRM themes	No of works 	Estimated budget (INR in lakhs) 	Estimated person days 
Public and common land development	231	458	83,391
Agriculture and Allied sector development	599	1,773	3,31,052
Rural water management	60	14	2,198
TOTAL	890	2,245	4,16,614

8.3.6 IMPACTS

The proposed water actions based on the above key water challenges cover a period of three years from 2021- 2022 to 2023-2024, At the end of the implementation period i.e. in the year 2024, the following

impacts are envisaged (Table 51). It is expected that the impacts will potentially reduce the vulnerability and improve the resilience of the system to the projected climatic change events and ensured water security.

TABLE 51. WASCA- WATER ACTIONS AND INDICATORS

WASCA CWRM ACTION PLAN

DEVELOPMENT OF PUBLIC AND COMMON LAND

INDICATOR		OUTCOMES/ IMPACT	
1	Number of water bodies restored in the village	1	Two traditional water bodies restored
2	Area under Block plantation	2	18.74 ha under Block plantation
3	Percentage reduction in the annual surface runoff	3	50.30 ha.m surface runoff harvested and stored
4	The proportion of land treated under WASCA	4	10 % of the total geographical area of the village treated under WASCA in three years
5	Drainage Line Treatment	5	2.2 Km length of drainage lines treated

2
TRADITIONAL WATER
BODIES RESTORED

18.74 ha.m
BLOCK PLANTATION

10 %
AREA OF THE VILLAGE
TREATED

2.2 km
DRAINAGE LINES
TREATED

50.30 ha.m
SURFACE RUNOFF HAR-
VESTED

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	62 Farm ponds established
2	Reducing area under fallow lands	2	662.32 ha under fallow land restored for cultivation
3	Improvement in soil health	3	13 units of vermi compost established
4	No of artificial recharge structures proposed	4	150 artificial recharge structures were established to replenish groundwater flow

62
FARM PONDS

13
VERMI COMPOST

150
ARTIFICIAL RECHARGE
STRUCTURES

662.32 ha
FALLOW LAND
RESTORED

WASCA CWRM ACTION PLAN
DEVELOPMENT OF RURAL INFRASTRUCTURE

INDICATOR

1.	Number of villages having complete solid and liquid waste management systems
2.	Roof rainwater harvesting measures
3.	Nutri gardens

OUTCOMES/ IMPACT

1.	5 community level and 53 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.	526 households established Nutri-gardens in homesteads





5 COMMUNITY & **53**
INDIVIDUAL SOAK PITS

2
COMMON ROOF
RAINWATER HARVESTING

526
NUTRI-GARDENS

Table 52 provides both the perspective plan for three years' period and the annual plan for the one-year period from 2021-2022 on the shelf of projects/number of works and number of person-days.

TABLE 52. PROPOSALS FOR THE MGNREGS, KADAIKULAM GP

	No of works	No of person days
 Perspective plan	 890	 4,16,641
<hr/>		
 Annual plan	356	1,66,656

8.3.7 PROPOSED ACTIVITY MAP

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

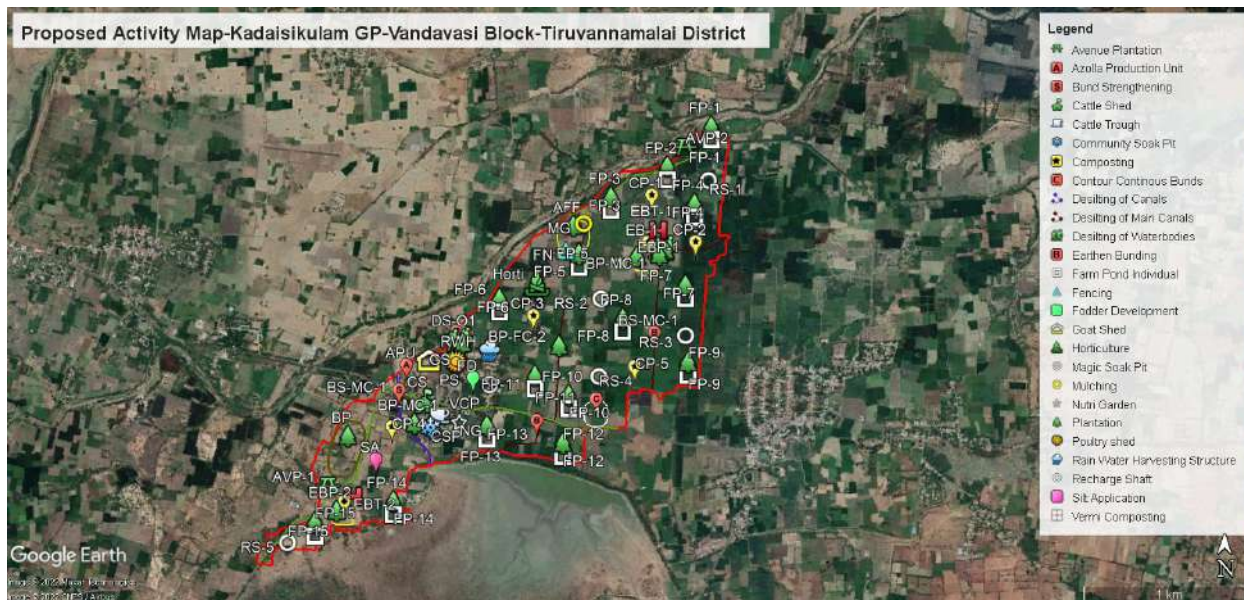


Figure 8.12. Proposed action plan of Kadaisikulam GP



Figure 8.13. Works on Upper Ridge of Kadaisikulam GP



Figure 8.14. Works on Middle Ridge of Kadaisikulam GP

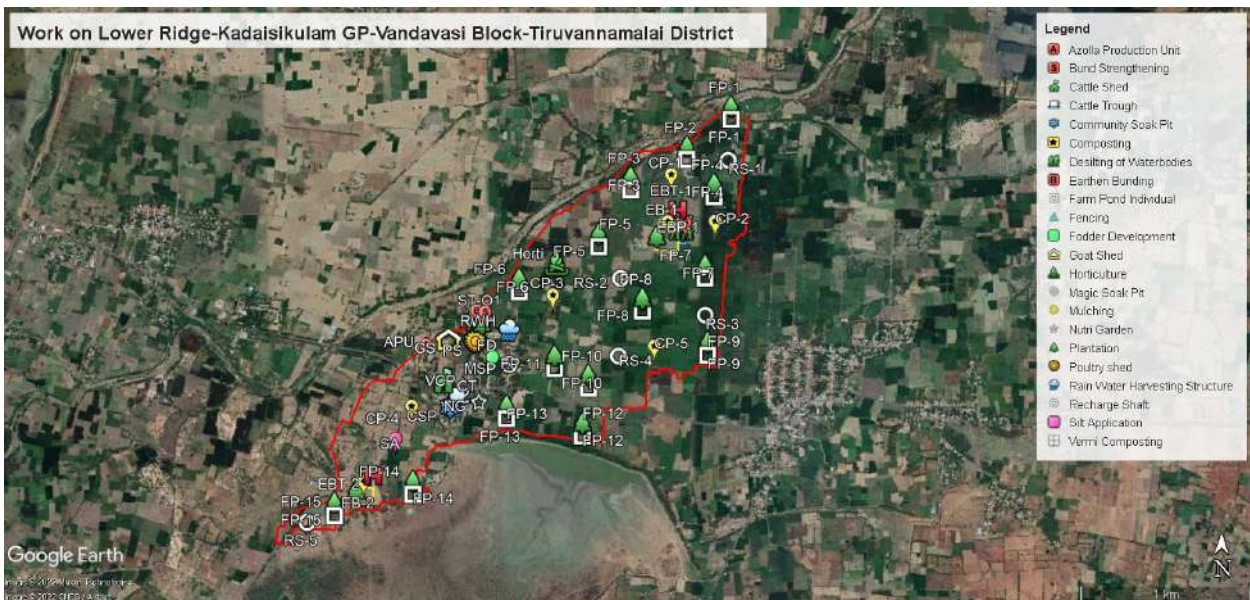
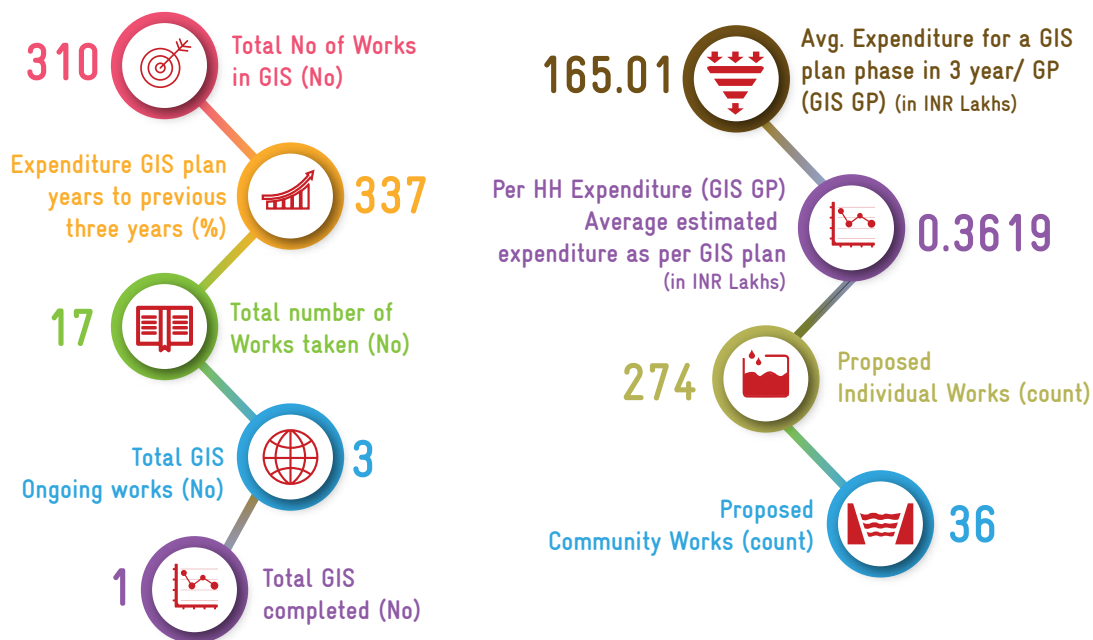


Figure 8.15. Works on Lower Ridge of Kadaisikulam GP

8.3.8 GIS PLAN IMPLEMENTATION, KEY PARAMETERS

The GIS plan implementation and performance of Kadaisikulam GP, Vandavasi Block is represented in Table 53.

TABLE 53. KEY PARAMETERS PERFORMANCE IN KADAIKULAM GP -VANDAVASI BLOCK



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 initiative 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 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 Water Action and the best possible adaptation options ‘Key Water Actions’ are drawn up under WASCA initiatives in public and common land, agricultural infrastructure and allied sector, rural infrastructure 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



Convergence along with interdisciplinary line
departments such as agriculture, horticulture,
animal husbandry, water resources

03



Continuous field monitoring
for constant actions

04



Engaging village level institutions
such as SHGs, FPOs

05



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/dccb/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&flag=eng&state_name=TAMIL%20NADU&state_code=29&fin_year=2020-2021&source=national&Digest=3ics8+9Z9fEQ8y7j5E3qcQ
Active person working in MGNREGA job Cards	
Water Resources	
Irrigation Facilities	Census-2011, MoHA, GOI https://censusindia.gov.in/2011census/dccb/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/dccb/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/dccb/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	standard table
Soil Water Permeability	
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			Water Courses			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.)		
Ammanambakkam	1,100	350	1,350	950	2	3	-		
Amudur	950	-	-	985	2	1	-		
Birudur	2,100	185	-	1,050	1	1	-		
Arasur	1,300	260	350	950	2	4	-		
Ariyathur	1,620	-	350	960	1	-	-		
Athipakkam	-	-	-	2,000	2	4	-		
Chetpattu	890	-	-	720	1	3	3		
Elangadu	2,500	-	-	1,650	2	3	2		
Irumbedu	950	-	450	650	4	3	2		
Karam	2,800	-	-	1,050	1	2	2		
Karanai	1,050	-	650	750	1	1	-		
Eramalur	1,350	-	600	650	-	3	-		
Kilnarma	1,650	-	-	950	1	2	-		
Kilkovaiavedu	1,850	-	-	1,050	2	4	-		
Kavaniyathur	1,550	-	450	750	2	2	-		
Kilpakkam	950	-	-	760	2	4	-		
Kilsathamangalam	650	600	350	1,800	2	3	-		
Kottai	1,320	650	-	890	3	1	-		
Kilsembedu	1,250	350	-	980	2	2	-		
Kodanallur	1,350	-	-	-	1	5	-		
Kovalai	1,850	-	-	980	2	4	-		
Manganallur	985	-	-	650	3	5	-		
Melkodungalur	550	-	-	450	2	3	-		

Gram Panchayat	Canal Irrigation					Tradational Water bodies			
	Length of Main Canal (m)	Length of Minor Canal (m)	Length of Distributaries (m)	Water Courses (Field Channels) (m)	Number of Tanks (PWD & Union) (No.)	Number of Ooranis (No.)	Other Surface Water Bodies (No.)		
Mudur	1,650	-	-	950	3	-	-		
Nelliakulam	1,060	-	-	950	1	4	-		
Osor	1,450	-	-	980	3	1	-		
Mambattu	1,260	-	-	960	2	4	-		
Padiri	350	-	-	650	2	4	-		
Pulivoy	1,050	250	100	850	1	4	-		
Punnai	890	250	-	750	2	2	-		
Salavedu	950	150	250	650	2	3	-		
Sedarakuppam	1,300	260	350	950	2	4	-		
Sembur	2,360	670	350	1,250	3	6	-		
Sennavaram	1,650	350	-	980	1	-	-		
Thazhuthazhy	1,350	250	-	950	3	-	-		
Thellur	1,050	-	-	850	3	-	-		
Thennangur	1,350	250	160	850	1	5	-		
Vilangadu	975	350	-	650	2	3	-		
Thensenthamangalam	1,590	350	-	950	2	4	-		
Ulundai	1,650	350	-	950	3	1	-		
Vengunam	1,650	350	-	950	2	7	-		
Venmandai	980	250	-	750	1	2	-		
Vizhuthupattu	980	-	-	450	-	6	-		
Mummuni	2,500	-	-	-	2	2	-		
Ammayampattu	1,500	270	350	950	2	4	-		
Kadaisikulam	2,300	-	-	-	-	4	3		
Kalankuthu	2,600	-	-	-	-	3	3		
Marudhadu	2,700	-	-	-	-	3	4		
Adiyanur-Adiyankuppam	1,500	-	-	-	1	4	2		

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.)
Badur	2,000	-	-	6,000	3	10	2
Kilkodungalur	3,000	2,000	2,000	-	-	5	3
Kilseeshamangalam	3,500	-	-	-	5	2	7
Koilkuppam-Sathanoor	4,000	-	-	-	2	4	5
Mangalam mamandur	1,500	-	-	-	1	2	3
Ozhapakkam-kosapattu	2,500	-	-	-	-	3	2
S.Navalpakkam	550	-	-	-	-	5	2
Vangaram Avnavadi	3,500	-	-	-	2	4	2
Salukkai	1,800	-	-	-	-	5	3
Vazhur Agaram	3,581	-	-	-	2	4	3
Veliyambakkam	1,500	300	400	980	2	5	3
Kuripedu	1,600	270	360	960	2	3	3

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	
Ammanambakkam	22.30	-	52.26	26.00	5.50	34.10	3500	2	-	
Amudur	-	-	88.79	29.40	0.70	31.20	1700	2	4	
Birudur	70.80	-	107.18	77.60	35.00	116.50	4000	1	8	
Arasur	-	-	214.87	71.60	11.90	100.60	1800	1	5	
Ariyathur	20.74	-	40.35	37.20	0.50	38.90	1800	1	3	
Athipakkam	-	-	93.70	37.10	3.70	55.40	2000	1	3	
Chetpattu	32.93	-	33.34	27.00	2.70	34.70	2200	1	3	
Elangadu	66.56	-	100.00	122.10	4.90	154.00	2500	1	6	
Irumbedu	94.28	-	127.49	103.40	6.90	77.50	900	1	7	
Karam	31.28	-	66.88	38.60	25.70	37.30	2500	1	4	
Karanai	54.32	-	28.01	30.60	1.70	32.10	1200	1	2	
Eramalur	-	-	140.67	9.70	17.40	52.20	2000	2	4	
Kilnarma	32.35	-	66.14	30.30	0.40	33.80	2500	1	4	
Kilkovalaivedu	54.30	-	90.14	87.20	14.00	148.70	2500	1	9	
Kavaniyathur	-	-	54.67	28.60	6.00	24.60	3300	2	3	
Kilpakkam	10.36	-	60.08	35.30	1.60	42.20	1500	1	4	
Kilsathamangalam	34.05	-	53.58	121.90	7.00	119.10	2300	1	6	
Kottai	53.83	-	125.30	68.70	2.50	65.60	2700	3	6	
Kilsembedu	-	-	70.23	21.80	3.60	46.00	3500	2	6	
Kodanallur	-	-	65.22	25.30	2.70	35.00	2300	1	3	
Kovalai	91.71	-	146.89	99.30	8.90	160.30	1200	1	8	
Manganallur	47.72	-	69.00	42.90	9.20	63.10	2500	1	4	
Melkodungalur	25.06	-	58.17	35.20	1.40	37.10	2257	1	4	
Mudur	-	-	151.43	33.10	6.10	51.30	4845	7	3	
Nelliakulam	50.17	-	67.00	6.20	2.80	60.00	3203	4	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.)
Osor	120.10	-	165.68	46.50	1.50	127.10	3686	7	8
Mambattu	-	25.11	30.00	21.80	0.80	26.50	4300	2	4
Padiri	43.96	-	53.40	44.20	0.60	33.70	924	4	2
Pulivoy	17.44	-	44.93	14.00	6.70	39.20	1859	5	3
Punnai	22.10	-	127.00	46.50	1.50	65.50	2082	3	4
Salavedu	-	-	118.21	40.50	0.20	98.80	-	-	6
Sedarakuppam	-	-	106.59	61.40	3.70	51.10	5518	6	3
Sembur	39.20	-	90.30	35.10	1.90	57.30	7304	8	4
Sennavaram	12.10	-	31.58	29.20	2.00	24.80	6334	7	5
Thazhuthazhy	12.00	-	20.05	18.80	7.90	20.70	-	-	3
Thellur	26.70	-	11.34	28.10	2.50	24.60	40	1	2
Thennangur	40.00	-	62.14	27.80	26.30	41.10	2410	6	3
Vilangadu	11.07	-	35.92	43.10	2.90	37.00	2586	3	4
Thensenthamangalam	19.14	-	20.81	19.40	3.50	25.10	2686	5	3
Ulundai	-	-	-	63.80	0.90	106.80	5297	6	6
Vengunam	101.41	-	39.85	66.70	2.70	70.20	4220	6	4
Venmandai	-	-	58.05	16.30	0.10	28.20	-	-	5
Vizhuthupattu	40.00	-	55.02	18.90	6.10	26.60	2261	1	2
Mummuni	-	-	66.39	60.30	0.90	55.30	4129	7	5
Ammayampattu	-	-	66.39	60.30	1.50	55.30	-	-	2
Kadaisikulam	205.05	-	375.16	167.30	6.20	260.20	2238	5	2
Kalankuthu	205.05	-	375.16	167.30	6.20	260.20	2723	5	5
Marudhadu	205.05	-	375.16	167.30	6.20	260.20	5943	11	7
Adiyanur-Adiyankuppam	39.15	-	65.95	63.80	1.60	56.00	3127	7	5
Badur	51.05	-	243.02	102.60	8.70	133.70	7034	7	7

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	
Kilkodungalur	31.47	-	117.15	68.70	2.60	98.10	2238	4	5	
Kilseeshamangalam	33.57	-	164.93	44.70	0.90	68.50	3336	2	2	
Koilkuppam-Sathanoor	7.11	-	56.88	26.00	3.90	42.00	4000	4	5	
Mangalam mamandur	50.12	-	113.11	48.10	3.50	55.60	1421	3	3	
Ozhapakkam-kosapattu	65.28	-	61.56	15.50	5.70	40.30	1866	4	2	
S.Navalpakkam	-	-	118.46	31.90	-	60.60	4281	9	4	
Vangaram Avnavadi	29.00	-	106.81	55.90	8.00	63.50	8056	11	4	
Salukkai	107.79	-	108.31	68.00	14.00	73.70	3460	4	5	
Vazhur Agaram	78.97	-	188.01	106.10	10.30	63.00	3581	5	4	
Veliyambakkam	31.25	-	72.05	30.50	0.90	48.70	10369	9	9.00	
Kuripedu	78.08	-	142.90	55.60	7.50	101.30	240	1	4.00	

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 (%)	
Ammanambakkam	4.29	1.77	37	21.00	87.00	95.00	79.00	13.00	5.00	
Amudur	3.78	1.50	90	18.00	85.00	94.00	82.00	15.00	6.00	
Birudur	5.35	2.09	233	24.00	87.00	98.00	76.00	13.00	2.00	
Arasur	6.38	2.63	-	19.00	83.00	-	81.00	17.00	100.00	
Ariyathur	3.27	1.79	153	8.00	82.00	99.00	92.00	18.00	1.00	
Athipakkam	5.09	2.30	76	1.00	87.00	98.00	99.00	13.00	2.00	
Chetpattu	3.92	3.65	151	17.00	30.00	95.00	83.00	70.00	5.00	
Elangadu	7.99	2.52	352	17.00	87.00	98.00	83.00	13.00	2.00	
Irumbedu	7.34	-	288	26.00	-	98.00	74.00	100.00	2.00	
Karam	2.84	1.97	133	24.00	93.00	98.00	76.00	7.00	2.00	
Karanai	1.96	1.81	144	18.00	81.00	94.00	82.00	19.00	6.00	
Eramalur	3.41	2.16	137	19.00	85.00	99.00	81.00	15.00	1.00	
Kilnarma	2.07	5.11	199	19.00	86.00	100.00	81.00	14.00	-	
Kilkovalaivedu	6.78	1.86	343	20.00	78.00	97.00	80.00	22.00	3.00	
Kavaniyathur	2.14	1.65	66	17.00	89.00	99.00	83.00	11.00	1.00	
Kilpakkam	3.41	2.63	56	28.00	-	85.00	72.00	100.00	15.00	
Kilsathamangalam	12.58	4.02	75	95.00	91.00	96.00	5.00	9.00	4.00	
Kottai	6.41	1.67	-	27.00	78.00	-	73.00	22.00	100.00	
Kilsembedu	5.55	1.28	128	22.00	86.00	99.00	78.00	14.00	1.00	
Kodanallur	2.76	1.97	-	20.00	83.00	-	80.00	17.00	100.00	
Kovalai	6.35	1.13	-	-	12.00	-	100.00	88.00	100.00	
Manganallur	3.10	1.90	90	16.00	96.00	94.00	84.00	4.00	6.00	
Melkodungalur	3.29	1.47	149	23.00	87.00	99.00	77.00	13.00	1.00	
Mudur	3.08	1.53	106	23.00	83.00	99.00	77.00	17.00	1.00	
Neliankulam	3.22	1.13	310	70.00	81.00	100.00	30.00	19.00	-	
Osur	7.85	1.47	214	-	77.00	100.00	100.00	23.00	-	

Gram Panchayat	Water Demand									
	For Hu- mans (ha.m)	For Live- stock (ha.m)	For Agricul- ture (ha.m)	% GW Utilization for Drinking (%)	% GW Utili- zation for Livestock (%)	% GW Utili- zation for Agriculture, (%)	% SW Utili- zation for Drinking (%)	% SW Utili- zation for Livestock (%)	% SW Utili- zation for Agriculture (%)	
Mambattu	3.26	2.64	90	-	83.00	94.00	100.00	17.00	6.00	
Padiri	4.00	2.41	103	56.00	76.00	98.00	44.00	24.00	2.00	
Pulivoy	2.24	1.54	54	-	98.00	96.00	100.00	2.00	4.00	
Punnai	5.23	1.90	128	19.00	77.00	100.00	81.00	23.00	-	
Salavedu	7.10	4.27	240	20.00	90.00	99.00	80.00	10.00	1.00	
Sedarakuppam	3.22	1.32	90	19.00	83.00	94.00	81.00	17.00	6.00	
Sembur	5.20	2.63	96	91.00	78.00	95.00	9.00	22.00	5.00	
Sennavaram	8.93	2.74	64	17.00	80.00	97.00	83.00	20.00	3.00	
Thazhuthazhy	2.16	1.35	44	100.00	5.00	4.00	-	95.00	96.00	
Thehur	2.81	2.12	112	100.00	-	-	-	100.00	100.00	
Thennangur	5.32	1.67	81	100.00	-	-	-	100.00	100.00	
Vilangadu	1.66	1.43	104	14.00	90.00	99.00	86.00	10.00	1.00	
Thensenthamangalam	2.44	2.41	118	12.00	76.00	95.00	88.00	24.00	5.00	
Ulundai	6.23	1.02	116	13.00	10.00	97.00	87.00	90.00	3.00	
Vengunam	10.63	0.70	191	89.00	28.00	28.00	11.00	72.00	72.00	
Venmandai	1.86	1.15	79	13.00	86.00	98.00	87.00	14.00	2.00	
Vizhuthupattu	2.15	1.66	56	21.00	83.00	92.00	79.00	17.00	8.00	
Mummuni	5.79	3.82	149	-	97.00	-	100.00	3.00	100.00	
Ammayampattu	4.64	1.01	-	13.00	85.00	-	87.00	15.00	100.00	
Kadaisikulam	4.95	2.12	739	100.00	88.00	65.00	-	12.00	35.00	
Kalankuthu	4.45	2.11	739	-	25.00	65.00	100.00	75.00	35.00	
Marudhadu	12.78	1.96	739	10.00	20.00	65.00	90.00	80.00	35.00	
Adiyanur-Adiyankup- pam	4.97	2.52	140	19.00	87.00	-	81.00	13.00	100.00	
Badur	7.78	-	34	-	-	86.00	100.00	100.00	14.00	

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 (%)	
Kilkodungalur	17.01	5.51	243	-	-	96.00	100.00	100.00	4.00	
Kilseeshamangalam	3.41	3.17	129	100.00	92.00	83.00	-	8.00	17.00	
Koilkuppam-Sathanoor	2.27	2.38	152	-	-	96.00	100.00	100.00	4.00	
Mangalam mamandur	4.60	2.56	134	-	-	99.00	100.00	100.00	1.00	
Ozhapakkam-kosapattu	2.19	1.32	59	-	-	97.00	100.00	100.00	3.00	
S.Navalpakkam	2.89	1.27	84	-	-	96.00	100.00	100.00	4.00	
Vangaram Avnavadi	4.66	2.27	355	-	-	91.00	100.00	100.00	9.00	
Salukkai	6.82	2.35	185	-	-	97.00	100.00	100.00	3.00	
Vazhur Agaram	6.41	2.36	-	5.00	84.00	-	95.00	16.00	100.00	
Veliyambakkam	6.26	6.22	178	-	-	98.00	100.00	100.00	2.00	
Kuripedu	3.58	4.42	83	-	-	99.00	100.00	100.00	1.00	

ANNEXURE 3.7

GP WISE STATUS OF AGRICULTURE RESOURCE

Gram Panchayat	Land Resources (ha)									
	Forest land	Non-Agricultural Uses	Barren & Un-cultivable Land	Permanent Pastures and Other Grazing Land	Land Under Miscellaneous Tree Crotalops etc.	Cultivable Waste Land	Fallows Land other than Current Fallows	Current Fallow land	Unirrigated Land	Area Irrigated by Source
Ammanambakkam	-	66.91	2.49	3.26	0.35	16.09	10.09	42.36	55.23	74.56
Amudur	-	78.29	-	-	2.48	-	-	23.15	54.86	88.79
Birudur	-	146.54	60.36	11.35	3.10	110.16	97.30	264.59	82.90	177.98
Arasur	1.05	176.57	13.39	12.10	10.15	20.10	-	166.25	156.90	214.87
Ariyathur	-	98.70	0.54	1.17	0.21	0.26	13.27	103.39	30.06	61.09
Athipakkam	-	97.74	1.12	7.26	6.08	-	-	71.08	131.63	93.70
Chetpattu	-	68.05	3.86	9.70	-	-	12.47	77.05	29.59	66.27
Elangadu	-	325.71	-	16.58	0.96	-	-	426.73	230.36	166.56
Irumbedu	-	274.03	1.65	17.69	0.44	6.47	22.16	108.02	62.69	221.77
Karam	-	77.20	25.68	1.65	2.60	87.36	41.01	17.37	43.04	98.16
Karanai	-	77.88	3.60	6.19	-	-	-	47.75	41.34	82.33
Eramalur	-	25.76	0.13	8.10	3.38	50.60	-	60.93	77.30	140.67
Kilnarma	-	80.31	0.40	-	1.42	-	23.56	37.06	21.58	98.49
Kilkovalaivedu	-	207.41	25.20	20.05	29.89	-	33.75	263.73	353.38	144.44
Kavaniyathur	-	76.25	-	21.33	-	-	-	6.32	70.51	54.67
Kilpakkam	-	94.06	-	1.98	3.45	0.25	33.52	92.38	29.16	70.44
Kilsathamangalam	-	324.87	0.17	-	4.20	20.60	76.10	421.96	51.19	87.63
Kottai	-	183.16	-	5.79	2.80	0.36	-	135.16	36.58	179.13
Kilsembedu	-	58.01	-	-	6.20	6.53	15.95	123.02	37.04	70.23
Kodanallur	-	67.58	-	9.26	0.11	0.34	5.36	71.72	45.11	65.22
Kovalai	-	254.49	10.40	19.37	10.25	1.91	72.12	289.55	257.05	238.60
Manganallur	-	104.32	10.15	12.80	4.27	15.84	68.90	58.67	93.33	116.72

Gram Panchayat	Land Resources (ha)										
	Forest land	Non-Agricultural Uses	Barren & Un-cultivable Land	Permanent Pastures and Other Grazing Land	Land Under Miscellaneous Tree Criticalops etc.	Cultivable Waste Land	Fallows Land other than Current Fallows	Current Fallow land	Unirrigated Land	Area Irrigated by Source	
Melkodungalur	-	93.78	0.03	1.59	3.39	0.14	16.54	68.90	29.59	83.23	
Mudur	-	84.86	3.35	2.10	5.20	14.54	4.05	41.19	77.82	151.43	
Nelliankulam	-	12.85	3.68	3.86	4.06	2.10	6.47	155.41	41.60	117.17	
Osor	-	124.02	-	-	5.20	-	-	233.22	160.45	285.78	
Mambattu	-	49.46	8.67	1.81	-	1.18	2.45	53.01	31.04	55.11	
Padiri	-	93.58	24.22	-	0.73	1.58	10.32	65.61	6.73	97.36	
Pulivoy	-	34.90	2.40	12.62	5.85	5.37	20.01	32.34	94.89	62.37	
Punnai	-	124.02	-	-	5.20	-	-	151.29	50.01	149.10	
Salavedu	-	107.81	0.10	0.75	-	-	5.00	79.58	325.40	118.21	
Sedarakuppam	-	163.67	-	10.82	1.40	0.88	18.27	99.43	48.96	106.59	
Sembur	-	81.68	12.05	5.60	1.21	-	-	113.73	102.50	90.03	
Sennavaram	-	67.80	10.00	1.09	0.86	5.12	19.32	62.57	6.96	43.68	
Thazhuthazhy	-	48.61	1.65	1.63	0.50	26.15	4.36	33.73	40.53	32.05	
Thellur	-	73.14	1.75	8.91	-	-	-	61.56	32.03	38.04	
Thenangur	-	51.00	23.10	10.35	12.60	70.64	11.40	62.24	44.21	102.14	
Vilangadu	-	114.80	-	9.88	-	0.41	28.56	106.34	16.11	46.99	
Thensenthamangalam	-	51.81	-	-	4.40	8.15	19.01	37.46	38.04	39.95	
Ulundai	-	169.66	0.57	-	2.33	0.73	41.26	143.86	285.83	100.21	
Vengunam	30.00	102.37	45.55	2.48	-	7.21	-	169.60	64.55	141.26	
Venmandai	-	43.52	-	-	0.27	-	2.70	45.96	44.02	58.05	
Vizhuthupattu	-	45.15	5.20	4.15	2.10	15.44	10.01	8.50	28.53	95.02	
Mummuni	-	160.53	0.23	3.28	-	-	0.55	212.47	16.51	66.39	
Ammayampattu	-	160.53	0.23	3.28	1.10	0.85	0.55	212.47	16.51	66.39	
Kadaisikulam	-	445.26	0.90	15.39	6.66	-	86.36	576.01	149.00	580.21	

Gram Panchayat	Land Resources (ha)									
	Forest land	Non-Agricultural Uses	Barren & Un-cultivable Land	Permanent Pastures and Other Grazing Land	Land Under Miscellaneous Tree Criticalops etc.	Cultivable Waste Land	Fallows Land other than Current Fallows	Current Fallow land	Unirrigated Land	Area Irrigated by Source
Kalankuthu	-	445.26	0.90	15.39	6.66	-	86.36	576.01	149.00	580.21
Marudhadu	-	445.26	0.90	15.39	6.66	-	86.36	576.01	149.00	580.21
Adiyanur-Adiyankuppam	-	160.27	9.79	2.19	3.46	-	-	114.21	80.23	105.10
Badur	-	273.64	-	22.08	8.91	-	48.38	275.11	97.48	294.07
Kilkodungalur	-	183.28	0.04	7.57	0.99	0.57	71.56	164.11	140.48	148.62
Kilseeshamangalam	-	104.17	15.16	1.66	-	1.52	3.10	97.78	66.69	198.50
Koilkuppam-Sathanoor	-	69.44	-	1.39	9.03	3.52	8.27	115.71	36.71	63.99
Mangalam mamandur	-	128.38	-	10.77	1.53	0.06	-	96.07	37.78	163.23
Ozhapakkam-kosapattu	-	38.93	2.47	3.81	3.45	12.87	11.52	21.47	56.53	125.84
S.Navalpakkam	-	83.22	1.82	-	-	-	21.91	106.54	76.89	118.46
Vangaram Avnavadi	-	131.01	18.12	11.40	1.50	15.60	-	136.17	67.83	135.81
Salukkai	-	168.21	13.02	9.79	1.25	38.88	32.62	74.99	70.25	216.10
Vazhur Agaram	-	270.98	11.93	30.35	4.10	2.10	8.16	36.97	24.94	266.98
Veliyambakkam	-	73.84	7.36	3.11	-	-	-	82.91	74.23	103.30
Kuripedu	-	145.85	2.36	26.59	-	-	58.25	181.63	81.05	220.98

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)		
Ammanambakkam	69.40	19.70	182.24	28.06	5.55	15.30	34.64	1.94		
Amudur	78.29	2.48	166.80	-	-	-	-	-		
Birudur	206.90	124.61	622.77	14.70	-	1.50	5.40	233.15		
Arasur	191.01	42.35	538.02	251.23	42.76	182.50	-	-		
Ariyathur	99.24	1.64	207.81	89.88	3.00	41.50	151.66	1.05		
Athipakkam	98.86	13.34	296.41	56.16	5.40	39.50	74.21	1.89		
Chetpattu	71.91	9.70	185.38	-	142.91	93.55	-	-		
Elangadu	325.71	17.54	823.65	269.41	23.90	203.20	343.47	8.47		
Irumbedu	275.68	24.60	414.64	157.28	17.71	26.60	281.90	6.25		
Karam	102.88	91.61	199.58	83.65	7.14	42.00	130.03	2.73		
Karanai	81.48	6.19	171.42	102.83	24.55	80.40	135.44	8.70		
Eramalur	25.89	62.08	278.90	92.61	3.52	67.40	135.97	1.23		
Kilnarma	80.71	1.42	180.69	112.96	2.51	18.40	198.31	0.88		
Kilkovalaivedu	232.61	49.94	795.30	258.39	23.98	168.00	333.99	8.85		
Kavaniyathur	76.25	21.33	131.50	1.58	-	1.50	0.77	65.59		
Kilpakkam	94.06	5.68	225.50	44.76	4.08	25.30	54.92	1.57		
Kilsathamangalam	325.04	24.80	636.88	58.86	7.60	34.01	72.28	2.81		
Kottai	183.16	8.95	350.87	-	-	-	-	-		
Kilsemedu	58.01	12.73	246.24	100.19	4.77	40.83	125.94	1.67		
Kodanallur	67.58	9.71	187.41	-	-	-	-	-		
Kovalai	264.89	31.53	857.32	-	-	-	-	-		
Manganallur	114.47	32.91	337.62	68.61	15.56	49.00	84.63	5.45		
Melkodungalur	93.81	5.12	198.26	83.99	4.08	18.80	147.17	1.56		
Mudur	88.21	21.84	274.49	69.59	3.90	40.00	104.92	1.37		
Neliankulam	16.53	10.02	320.65	172.82	3.78	59.80	308.27	1.32		
Osur	124.02	5.20	679.45	127.32	3.00	59.64	213.07	1.05		

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)
Mambattu	58.13	2.99	141.61	68.61	15.56	49.00	84.63	5.45
Padiri	117.80	2.31	180.02	70.82	5.04	59.12	101.33	1.76
Pulivoy	37.30	23.84	209.61	38.22	6.39	31.50	51.86	2.31
Punnai	124.02	5.20	350.40	90.55	0.40	52.40	127.82	0.14
Salavedu	107.91	0.75	528.19	183.38	8.41	87.00	236.75	2.94
Sedarakuppam	163.67	13.10	273.25	68.61	15.56	49.00	84.63	5.45
Sembur	93.73	6.81	306.26	65.03	8.45	38.50	91.09	4.92
Sennavaram	77.80	7.07	132.53	41.30	5.33	26.00	62.25	2.06
Thazhuthazhy	50.26	28.28	110.67	31.40	7.20	22.80	41.02	2.57
The'llur	74.89	8.91	131.63	87.16	15.20	63.40	106.14	5.70
Thennangur	74.10	93.59	219.99	51.79	5.13	31.40	79.43	1.95
Vilangadu	114.80	10.29	198.00	69.54	3.94	39.40	102.74	1.48
Thensenthamangalam	51.81	12.55	134.46	84.03	16.20	60.90	112.09	5.90
Ulundai	170.23	3.06	571.16	94.24	9.95	43.20	112.66	3.48
Vengunam	177.92	9.69	375.41	77.65	6.84	63.60	110.49	80.52
Venmandai	43.52	0.27	150.73	56.43	4.00	37.30	77.65	1.40
Vizhuthupattu	50.35	21.69	142.06	33.92	13.30	27.00	51.05	4.66
Mummuni	160.76	3.28	295.92	119.96	4.18	82.00	147.93	1.46
Ammayampattu	160.76	5.23	295.92	119.96	4.18	82.00	147.93	1.46
Kadaisikulam	446.16	22.05	1391.58	476.73	44.72	273.00	723.61	15.87
Kalankuthu	446.16	22.05	1391.58	476.73	44.72	273.00	723.61	15.87
Marudhadu	446.16	22.05	1391.58	476.73	44.72	273.00	723.61	15.87
Adiyanur-Adiyankuppam	170.06	5.65	299.54	97.09	13.30	27.90	134.48	5.03
Badur	273.64	30.99	715.04	50.73	7.94	-	29.28	4.76
Kilkodungalur	183.32	9.13	524.77	154.95	24.80	66.90	233.82	9.23
Kilseeshamangalam	119.33	3.18	366.07	95.51	12.60	59.31	124.29	4.64

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)	
Koilkuppam-Sathanoor	69.44	13.94	224.68	95.56	13.29	61.50	146.03	5.95	
Mangalam mamandur	128.38	12.36	297.08	88.76	5.00	78.70	132.31	1.95	
Ozhapakkam-kosapattu	41.40	20.13	215.36	41.14	4.50	27.90	57.13	1.58	
S.Navalpakkam	85.04	-	323.80	58.19	9.49	40.00	80.76	3.32	
Vangaram Avnavadi	149.13	28.50	339.81	248.09	50.86	181.90	323.17	32.16	
Salukkai	181.23	49.92	393.96	116.86	11.88	77.40	179.77	4.81	
Vazhur Agaram	282.91	36.55	337.05	101.37	15.51	58.85	155.79	6.38	
Veliyambakkam	81.20	3.11	260.44	128.95	9.95	81.30	174.39	3.48	
Kuripedu	148.21	26.59	541.91	54.10	1.42	33.50	82.05	0.50	

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	Sufficient	Deficient
Ammanambakkam	18.75	71.88	9.38	-	-	21.88	78.13	-	-	-	55.00	45.00
Amudur	30.77	59.62	9.62	-	-	40.38	59.62	-	-	-	36.00	64.00
Birudur	27.72	54.46	17.82	-	-	45.54	49.50	4.95	-	-	41.00	59.00
Arasur	48.45	51.55	-	-	-	38.14	61.86	-	-	-	43.00	57.00
Ariyathur	-	33.33	66.67	-	-	78.95	21.05	-	-	-	38.00	62.00
Athipakkam	43.64	52.73	3.64	-	-	47.27	45.45	1.82	1.82	3.64	39.00	61.00
Chetpattu	27.72	54.46	17.82	-	-	45.54	49.50	4.95	-	-	41.00	59.00
Elangadu	25.15	70.06	4.79	-	-	52.69	47.31	-	-	-	40.00	60.00
Irumbedu	54.55	45.45	-	-	-	66.23	33.77	-	-	-	34.00	66.00
Karam	-	60.87	36.96	-	2.17	56.52	43.48	-	-	-	34.00	66.00
Karanai	12.50	87.50	-	-	-	29.17	70.83	-	-	-	46.00	54.00
Eramalur	10.71	66.07	23.21	-	-	28.57	66.07	5.36	-	-	54.00	46.00
Kilnarma	43.48	56.52	-	-	-	52.17	47.83	-	-	-	32.00	68.00
Kilkovaiavedu	6.90	86.21	6.90	-	-	44.83	55.17	-	-	-	41.00	59.00
Kavaniyathur	6.90	86.21	6.90	-	-	44.83	55.17	-	-	-	41.00	59.00
Kilpakkam	26.92	73.08	-	-	-	50.00	50.00	-	-	-	34.00	66.00
Kilsathamangalam	40.59	56.44	2.97	-	-	57.58	42.42	-	-	-	43.00	57.00
Kottai	4.23	70.42	25.35	-	-	9.86	87.32	2.82	-	-	62.00	38.00
Kilsembedu	32.26	67.74	-	-	-	64.52	35.48	-	-	-	51.00	49.00
Kodanallur	31.67	68.33	-	-	-	63.33	36.67	-	-	-	38.00	62.00
Kovalai	70.42	29.58	-	-	-	60.56	39.44	-	-	-	34.00	66.00
Manganallur	10.94	89.06	-	-	-	35.94	64.06	-	-	-	58.00	42.00
Melkodungalur	79.31	20.69	-	-	-	72.41	27.59	-	-	-	36.00	64.00
Mudur	41.27	53.97	4.76	-	-	50.00	48.39	1.61	-	-	38.00	62.00
Nelliankulam	7.58	78.79	13.64	-	-	16.92	83.08	-	-	-	58.00	42.00
Osur	8.33	86.11	5.56	-	-	25.00	75.00	-	-	-	59.00	41.00

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	Sufficient	Deficient
Mambattu	41.86	58.14	-	-	-	41.86	58.14	-	-	-	41.00	59.00
Padiri	25.81	74.19	-	-	-	16.13	83.87	-	-	-	44.00	56.00
Pulivoy	15.91	84.09	-	-	-	27.27	72.73	-	-	-	62.00	38.00
Punnai	53.85	44.23	1.92	-	-	42.31	57.69	-	-	-	46.00	54.00
Salavedu	40.48	54.76	4.76	-	-	26.98	73.02	-	-	-	51.00	49.00
Sedarakuppam	-	51.67	48.33	-	-	36.67	63.33	-	-	-	40.00	60.00
Sembur	4.55	84.85	10.61	-	-	13.64	86.36	-	-	-	57.00	43.00
Sennavaram	12.50	70.83	16.67	-	-	33.33	66.67	-	-	-	42.00	58.00
Thazhuthazhy	50.00	43.33	6.67	-	-	60.00	40.00	-	-	-	33.00	67.00
The llur	10.34	86.21	3.45	-	-	41.38	58.62	-	-	-	60.00	40.00
Thennangur	33.33	49.02	17.65	-	-	39.22	58.82	1.96	-	-	40.00	60.00
Vilangadu	50.00	50.00	-	-	-	53.85	46.15	-	-	-	33.00	67.00
Thensenthamangalam	19.35	80.65	-	-	-	38.71	61.29	-	-	-	46.00	54.00
Ulundai	54.35	42.39	3.26	-	-	67.39	30.43	2.17	-	-	37.00	63.00
Vengunam	42.42	57.58	-	-	-	77.27	22.73	-	-	-	49.00	51.00
Venmandai	27.27	68.18	4.55	-	-	59.09	40.91	-	-	-	45.00	55.00
Vizhuthupattu	33.33	50.00	16.67	-	-	43.33	56.67	-	-	-	48.00	52.00
Mummuni	5.88	94.12	-	-	-	11.76	88.24	-	-	-	58.00	42.00
Ammayampattu	5.88	94.12	-	-	-	11.76	88.24	-	-	-	56.00	44.00
Kadaisikulam	4.94	93.16	1.90	-	-	22.52	73.28	3.05	1.15	-	61.00	39.00
Kalankuthu	4.94	93.16	1.90	-	-	22.52	73.28	3.05	1.15	-	61.00	39.00
Marudhadu	4.94	93.16	1.90	-	-	22.52	73.28	3.05	1.15	-	61.00	39.00
Adiyanur-Adiyankuppam	100.00	-	-	-	-	15.79	68.42	15.79	-	-	32.00	68.00
Badur	52.86	44.29	2.86	-	-	40.00	60.00	-	-	-	45.00	55.00
Kilkodungalur	50.85	47.46	1.69	-	-	42.37	55.93	1.69	-	-	43.00	57.00
Kilseeshamangalam	40.59	56.44	2.97	-	-	57.58	42.42	-	-	-	43.00	57.00
Koilkuppam-Sathanoor	57.14	42.86	-	-	-	85.71	14.29	-	-	-	36.00	64.00

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	Sufficient	Deficient
Mangalam mamandur	61.45	38.55	-	-	-	68.67	31.33	-	-	-	64.00	36.00
Ozhapakkam-kosapattu	56.67	43.33	-	-	-	36.67	63.33	-	-	-	36.00	64.00
S.Navalpakkam	100.00	-	-	-	-	56.41	43.59	-	-	-	37.00	63.00
Vangaram Avnavadi	19.51	80.49	-	-	-	36.59	63.41	-	-	-	61.00	39.00
Salukkai	22.00	78.00	-	-	-	36.00	64.00	-	-	-	56.00	44.00
Vazhur Agaram	36.54	63.46	-	-	-	53.85	46.15	-	-	-	38.00	62.00
Veliyambakkam	12.09	81.32	6.59	-	-	25.27	74.73	-	-	-	58.00	42.00
Kuripedu	12.09	81.32	6.59	-	-	25.27	74.73	-	-	-	58.00	42.00

Gram Panchayat	Status of Physical condition of the soil (%)										Soil Texture (%)			
	Mod-erately Acidic	Strongly Acidic	Highly Acidic	Mod-erately Acidic	Slightly Acidic	Neutral	Mod-erately Alkaline	Strong-ly Al-ka-line	Clay soil	Fine Soil	Coarse loamy	Soil Water Per-meability (Low, Moderate, high)		
Ammanambakkam	-	-	-	-	-	21.88	78.13	-	-	71.33	-	Moderate		
Amudur	-	-	-	-	15.38	-	84.62	-	70.00	11.00	69.00	Low		
Birudur	-	-	-	-	-	-	-	100.00	41.00	49.90	-	Moderate		
Arasur	-	-	-	-	2.02	3.03	94.95	-	3.00	67.00	-	Moderate		
Ariyathur	-	-	-	-	-	-	100.00	-	2.00	73.00	-	Moderate		
Athipakkam	-	-	-	-	9.09	5.45	85.45	-	9.00	70.00	-	Moderate		
Chetpattu	-	-	-	-	-	-	100.00	-	-	75.00	-	Moderate		
Elangadu	-	-	0.60	-	2.98	-	96.43	-	7.00	71.00	65.81	Moderate		
Irumbedu	-	-	-	-	15.58	7.79	76.62	-	-	71.00	-	Moderate		
Karam	-	-	-	-	-	-	100.00	-	36.00	37.00	-	Moderate		
Karanai	-	-	-	-	-	-	100.00	-	-	79.00	-	Moderate		
Eramalur	-	-	-	-	17.86	12.50	69.64	-	70.00	25.00	-	Low		
Kilnarma	-	-	-	-	60.87	8.70	30.43	-	-	81.00	-	Moderate		
Kilkovalaivedu	-	-	-	-	-	3.45	96.55	-	-	81.00	-	Moderate		
Kavaniyathur	-	-	-	-	-	3.45	96.55	-	54.00	30.00	-	Low		
Kilpakkam	-	-	-	-	11.54	57.69	30.77	-	-	90.00	-	Moderate		
Kilsathamangalam	-	-	-	-	3.96	-	96.04	-	2.00	78.00	-	Moderate		
Kottai	-	-	-	4.23	8.45	8.45	78.87	-	31.00	41.00	-	Moderate		
Kilsembedu	-	-	-	19.35	14.52	-	66.13	-	78.00	10.00	-	Low		
Kodanallur	-	-	-	-	6.67	3.33	90.00	-	-	83.00	-	Moderate		
Kovalai	-	-	-	-	-	2.82	97.18	-	-	84.00	14.00	Moderate		
Manganallur	-	-	-	-	4.69	-	95.31	-	-	84.00	20.00	Moderate		
Melkodungalur	-	-	-	-	6.90	-	93.10	-	2.00	74.00	-	Moderate		
Mudur	-	-	1.59	90.48	3.17	1.59	3.17	-	30.00	46.00	-	Moderate		
Nelliakulam	-	-	-	-	-	6.06	93.94	-	-	72.00	-	Moderate		
Osur	-	-	-	22.22	0.93	9.26	67.59	-	6.00	75.00	-	Moderate		
Mambattu	-	-	-	-	2.33	-	97.67	-	8.00	80.00	-	Moderate		

Gram Panchayat	Status of Physical condition of the soil (%)										Soil Texture (%)			
	Mod-erately Acidic	Strongly Acidic	Highly Acidic	Mod-erately Acidic	Slightly Acidic	Neutral	Mod-erately Alkaline	Strong-ly Al- alkaline	Clay soil	Fine Soil	Coarse loamy	Soil Water Per-meability (Low, Moderate, high)		
Padiri	-	-	-	-	-	-	100.00	-	75.00	-	-	Low		
Pulivoy	-	-	-	-	-	-	100.00	-	12.00	68.00	-	Moderate		
Punnai	-	-	-	-	15.09	3.77	81.13	-	37.00	50.00	-	Moderate		
Salavedu	-	-	-	-	0.79	6.35	92.86	-	13.00	76.00	-	Moderate		
Sedarakuppam	-	-	-	1.67	-	-	98.33	-	6.00	70.00	-	Moderate		
Sembur	-	-	-	-	-	9.09	90.91	-	1.00	81.00	-	Moderate		
Sennavaram	-	-	-	-	-	4.17	95.83	-	7.70	55.00	-	Moderate		
Thazhuthazhy	-	-	-	-	10.00	6.67	83.33	-	-	88.00	-	Moderate		
Thellur	-	-	-	-	6.90	-	93.10	-	6.00	67.00	-	Moderate		
Thennangur	-	-	-	-	1.92	-	98.08	-	-	78.00	-	Moderate		
Vilangadu	-	-	-	-	-	3.85	96.15	-	-	89.00	-	Moderate		
Thensenthamangalam	-	-	-	-	-	-	100.00	-	-	70.00	-	Moderate		
Ulundai	-	-	-	-	-	-	100.00	-	-	90.00	-	Moderate		
Vengunam	-	-	-	-	1.52	-	98.48	-	64.00	14.00	-	Low		
Venmandai	-	-	-	-	-	20.45	79.55	-	62.00	24.00	-	Low		
Vizhuthupattu	-	-	-	3.33	-	-	96.67	-	-	79.33	79.33	Moderate		
Mummuni	-	-	-	-	1.96	1.96	96.08	-	50.88	25.00	-	Low		
Ammayampattu	-	-	-	-	1.96	1.96	96.08	-	50.00	-	-	Low		
Kadaisikulam	-	-	-	-	6.08	10.27	83.65	-	-	88.00	-	Moderate		
Kalankuthu	-	-	-	-	6.08	10.27	83.65	-	3.63	86.00	-	Moderate		
Marudhadu	-	-	-	-	6.08	10.27	83.65	-	2.96	72.00	-	Moderate		
Adiyanur-Adiyankup-pam	-	-	-	-	-	-	100.00	-	22.25	0.11	-	Low		
Badur	-	-	-	-	8.57	7.14	84.29	-	41.67	41.76	-	Moderate		
Kilkodungalur	-	-	-	-	47.46	3.39	49.15	-	0.96	69.86	-	Moderate		
Kilseeshamangalam	-	-	-	-	3.96	-	96.04	-	41.03	55.77	-	Moderate		
Koilkuppam-Sathanoor	-	-	-	-	-	-	100.00	-	-	84.59	-	Moderate		

Gram Panchayat	Status of Physical condition of the soil (%)							Soil Texture (%)				
	Mod-erately Acidic	Strongly Acidic	Highly Acidic	Mod-erately Acidic	Slightly Acidic	Neutral	Mod-erately Alkaline	Strong-ly Al-ka-line	Clay soil	Fine Soil	Coarse loamy	Soil Water Per-meability (Low, Moderate, high)
Mangalam mamandur	-	-	-	-	-	-	100.00	-	50.24	28.67	-	Low
Ozhapakkam-kosapattu	-	-	-	3.33	20.00	-	76.67	-	48.94	50.35	-	Moderate
S.Navalpakkam	-	-	-	-	-	-	100.00	-	0.74	92.36	-	Moderate
Vangaram Arnavadi	-	-	2.44	-	2.44	-	95.12	-	-	63.53	20.92	Moderate
Salukkai	-	-	-	-	2.00	-	98.00	-	8.76	72.46	-	Moderate
Vazhur Agaram	-	-	-	-	-	-	100.00	-	4.57	79.86	-	Moderate
Veliyambakkam	-	-	-	-	-	10.99	89.01	-	72.00	13.63	-	Low
Kuripedu	-	-	-	-	-	10.99	89.01	-	75.93	-	-	Low

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
Ammanambakkam	23.00	47.02	69.63	8.73	91.27	29.91	70.09	420	-	640	-
Amudur	23.00	38.93	117.49	5.33	94.67	-	100.00	350	-	600	-
Birudur	23.00	185.78	221.37	2.28	97.72	39.78	60.22	500	-	700	-
Arasur	23.00	136.81	317.64	2.27	97.73	-	100.00	600	-	1200	-
Ariyathur	23.00	48.30	74.39	5.83	94.17	33.95	66.05	400	-	-	900
Athipakkam	23.00	71.50	191.89	5.07	94.93	-	100.00	550	-	800	-
Chetpattu	23.00	45.76	84.87	6.98	93.02	49.69	50.31	300	-	550	-
Elangadu	23.00	193.47	333.23	4.76	95.24	39.96	60.04	600	-	900	-
Irumbedu	23.00	101.40	243.28	7.27	92.73	42.51	57.49	500	-	800	-
Karam	23.00	72.88	116.94	3.60	96.40	31.87	68.13	500	-	400	-
Karanai	23.00	41.68	104.41	8.19	91.81	65.98	34.02	400	-	950	-
Eramalur	23.00	78.46	184.48	-	100.00	-	100.00	500	-	900	-
Kilnarma	23.00	41.98	63.42	3.64	96.36	32.85	67.15	1200	-	2000	-
Kilkovaiavedu	23.00	200.20	440.40	5.26	94.74	37.59	62.41	400	-	1100	-
Kavaniyathur	23.00	35.15	117.79	8.38	91.62	-	100.00	400	-	500	-
Kilpakkam	23.00	53.17	84.44	7.68	92.32	14.71	85.29	600	139	1000	-
Kilsathamangalam	23.00	152.23	114.99	8.54	91.46	38.86	61.14	1000	-	1000	-
Kottai	23.00	82.76	180.34	5.65	94.35	30.05	69.95	350	401	600	-
Kilsembedu	23.00	59.56	91.23	6.65	93.35	-	100.00	300	-	500	-
Kodanallur	23.00	45.34	96.24	3.69	96.31	-	100.00	300	-	500	-
Kovalai	23.00	206.83	422.32	3.29	96.71	38.44	61.56	250	-	600	-
Manganallur	23.00	87.56	182.60	9.80	90.20	40.88	59.12	500	-	200	-
Melkodungalur	23.00	46.78	94.71	7.92	92.08	30.11	69.89	350	-	520	-
Mudur	23.00	68.93	190.19	4.72	95.28	-	100.00	350	-	700	-
Nelliankulam	23.00	76.90	87.01	3.60	96.40	42.82	57.18	250	-	600	-

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	
Osur	23.00	157.47	362.95	4.33	95.67	42.03	57.97	300	300	632	-	
Mambattu	23.00	35.25	70.72	14.29	85.71	46.00	54.44	600	200	1000	-	
Padiri	23.00	47.51	84.28	8.56	91.44	45.15	54.85	500	-	1600	-	
Pulivoy	23.00	54.25	141.29	5.27	94.73	27.96	72.04	407	47	28	-	
Punnai	23.00	81.79	164.27	3.79	96.21	14.82	85.18	400	400	1200	-	
Salavedu	23.00	121.68	357.27	4.06	95.94	-	100.00	1050	-	1200	-	
Sedarakuppam	23.00	65.86	134.89	4.48	95.52	-	100.00	300	300	600	-	
Sembur	23.00	74.78	160.27	7.67	92.33	30.27	69.73	560	-	1600	-	
Sennavaram	23.00	34.41	42.28	7.34	92.66	27.70	72.30	600	-	1500	-	
Thazhuthazhy	23.00	32.34	60.07	27.22	72.78	37.44	62.56	250	-	1200	-	
Thellur	23.00	32.73	63.50	39.81	60.19	70.19	29.81	500	-	800	-	
Thennangur	23.00	77.44	88.37	3.87	96.13	39.16	60.84	400	-	560	-	
Vilangadu	23.00	47.91	58.68	12.22	87.78	23.56	76.44	350	-	400	-	
Thensenthamangalam	23.00	33.81	66.24	19.37	80.63	47.91	52.09	500	-	1600	-	
Ulundai	23.00	132.20	312.25	100.00	-	-	100.00	200	-	400	-	
Vengunam	23.00	105.95	124.39	11.15	88.85	71.79	28.21	170	-	210	-	
Venmandai	23.00	34.73	82.28	4.13	95.87	-	100.00	270	-	450	-	
Vizhuthupattu	23.00	38.86	104.36	-	100.00	42.10	57.90	380	-	750	-	
Mummuni	23.00	68.87	69.29	7.00	93.00	-	100.00	975	106	212	-	
Ammayampattu	23.00	69.32	45.56	7.00	93.00	-	100.00	200	106	280	-	
Kadaisikulam	23.00	325.34	604.01	-	100.00	35.34	64.66	510	290	137	-	
Kalankuthu	23.00	325.34	604.01	-	100.00	35.34	64.66	500	290	220	-	
Marudhadu	23.00	325.34	604.01	-	100.00	35.34	64.66	400	290	800	-	
Adiyanur-Adiyankuppam	23.00	72.45	153.55	3.65	96.35	37.25	62.75	600	-	900	-	
Badur	23.00	171.59	220.57	2.99	97.01	17.36	82.64	-	-	-	-	

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
Kilkodungalur	23.00	122.81	239.32	-	100.00	21.17	78.83	1417	167	261	-
Kilseeshamangalam	23.00	88.41	214.55	7.05	92.95	16.91	83.09	801	405	257	-
Koilkuppam-Sathanoor	23.00	54.88	89.34	8.08	91.92	11.11	88.89	560	583	280	-
Mangalam mamandur	23.00	71.17	171.50	2.16	97.84	30.71	69.29	666	218	133	-
Ozhapakkam-kosapattu	23.00	54.73	98.99	-	100.00	51.47	48.53	300		600	-
S.Navalpakkam	23.00	74.89	157.06	-	100.00	-	100.00	302	254	184	-
Vangaram Avnavadi	23.00	88.88	174.10	4.47	95.53	21.35	78.65	500	267	900	-
Salukkai	23.00	105.09	239.10	-	100.00	49.88	50.12	621	83	151	-
Vazhur Agaram	23.00	88.67	262.40	2.59	97.41	29.58	70.42	530	162	1000	-
Veliyambakkam	23.00	62.31	145.23	6.49	93.51	30.25	69.75	1400	1224	1600	-
Kuripedu	23.00	131.30	264.21	3.38	96.62	35.33	64.67	1100		1100	-

ANNEXURE 3.8

GP WISE DEMOGRAPHIC AND SOCIO ECONOMIC STATUS

Gram Panchayat	Geo-graphical Area (ha)	Male Population (No.)	Female Population (No.)	Total Population (No.)	SC Population (No.)	ST Population (No.)	Vulnerable population (No.)	Households (HH's) (No.)	Only one room HH's (SECC) (No.)	Female Headed HH's (SECC) (No.)	Vulnerable Households (SECC) (No.)
Ammanambakkam	271	796	771	1,567	1,429	-	1,429	376	128	10	93
Amudur	248	711	671	1,382	663	-	663	346	80	17	61
Birudur	954	933	1,022	1,955	616	105	721	506	55	33	48
Arasur	770	1,165	1,165	2,330	619	38	657	543	95	35	77
Ariyathur	309	607	588	1,195	358	-	358	282	51	25	43
Athipakkam	409	943	917	1,860	855	-	855	491	144	29	110
Chetpattu	267	718	714	1,432	256	3	259	312	6	15	9
Elangadu	1,167	1,493	1,427	2,920	563	-	563	738	117	48	96
Irumbedu	715	1,352	1,329	2,681	272	10	282	656	108	42	88
Karam	394	512	526	1,038	131	-	131	266	50	19	41
Karanai	259	344	371	715	-	-	-	177	32	15	27
Eramalur	367	624	620	1,244	256	-	256	358	65	20	52
Kilnarma	263	400	357	757	446	3	449	210	8	13	10
Kilkovalaivedu	1,078	1,226	1,251	2,477	915	66	981	589	34	51	39
Kavaniyathur	229	389	392	781	477	82	559	204	49	9	37
Kilpakkam	229	389	392	781	477	82	559	204	49	9	37
Kilsathamangalam	987	2,283	2,314	4,597	1,146	285	1,431	1,062	84	52	74
Kottai	543	1,173	1,170	2,343	1,139	80	1,219	590	159	42	124
Kilsembedu	317	1,010	1,018	2,028	258	22	280	513	142	40	111
Kodanallur	265	483	526	1,009	389	27	416	222	28	17	25
Kovalai	1,154	1,175	1,145	2,320	162	63	225	576	77	35	64
Manganallur	485	569	562	1,131	457	96	553	284	66	17	51

Gram Panchayat	Geo-graphical Area (ha)	Male Population (No.)	Female Population (No.)	Total Population (No.)	SC Population (No.)	ST Population (No.)	Vulnerable population (No.)	House-holds (HH's) (No.)	Only one room HH's (SECC) (No.)	Female Headed HH's (SECC) (No.)	Vulnerable House-holds (SECC) (No.)
Melkodungalur	297	593	608	1,201	539	-	539	313	70	20	55
Mudur	385	576	550	1,126	392	52	444	253	78	10	58
Neliankulam	347	587	588	1,175	214	-	214	459	121	32	94
Osor	809	1,444	1,423	2,867	596	7	603	683	192	59	152
Mambattu	203	592	600	1,192	204	22	226	302	47	24	40
Padiri	300	739	721	1,460	638	35	673	368	34	16	29
Pulivoy	271	416	404	820	100	84	184	197	40	10	31
Punnai	480	956	953	1,909	595	56	651	509	118	38	94
Salavedu	637	1,361	1,232	2,593	677	66	743	667	124	42	99
Sedarakuppam	450	585	592	1,177	2	33	35	376	128	10	93
Sembur	407	972	926	1,898	200	23	223	490	66	30	55
Sennavaram	217	1,615	1,646	3,261	416	68	484	783	47	21	39
Thazhuthazhy	189	405	384	789	310	-	310	346	80	17	61
Thellur	215	526	499	1,025	261	1	262	256	108	42	88
Thenangur	388	990	953	1,943	858	8	866	513	126	26	96
Vilangadu	324	283	322	605	142	39	181	175	42	20	35
Thensenthamangalam	199	457	434	891	682	-	682	181	36	6	27
Ulundai	744	1,173	1,103	2,276	809	2	811	580	286	30	209
Vengunam	533	1,981	1,901	3,882	1,142	-	1,142	911	78	40	650
Venmandai	195	351	330	681	179	104	283	171	77	13	58
Vizhuthupattu	214	413	372	785	452	28	480	189	47	12	37
Mummuni	453	1,067	1,047	2,114	214	-	214	899	81	47	71
Ammayampattu	16	824	872	1,696	13	-	13	899	81	47	71
Kadaisikulam	192	917	892	1,809	112	5	117	2,035	485	135	380
Kalankuthu	495	800	826	1,626	416	16	432	2,035	485	135	380

Gram Panchayat	Geo-graphical Area (ha)	Male Population (No.)	Female Population (No.)	Total Population (No.)	SC Population (No.)	ST Population (No.)	Vulnerable population (No.)	Households (HH's) (No.)	Only one room HH's (SECC) (No.)	Female Headed HH's (SECC) (No.)	Vulnerable Households (SECC) (No.)
Marudhadu	1,080	2,285	2,383	4,668	1,282	93	1,375	2,035	485	135	380
Adiyapur-Adiyankuppam	475	903	912	1,815	1,290	45	1,335	461	66	37	57
Badur	1,020	1,410	1,432	2,842	1,531	93	1,624	747	126	42	101
Kilkodungalur	717	3,101	3,114	6,215	1,135	219	1,354	1,553	173	65	141
Kilseeshamangalam	489	653	591	1,244	335	-	335	1,862	84	52	74
Koilkuppam-Sathanoor	308	413	418	831	397	-	397	193	33	15	28
Mangalam mamandur	438	835	847	1,682	859	24	883	337	29	17	25
Ozhapakkam-kosapattu	277	410	389	799	277	7	284	172	22	8	18
S.Navalpakkam	409	534	523	1,057	549	24	573	189	47	12	37
Vangaram Avnavadi	517	854	849	1,703	979	90	1,069	463	99	34	80
Salukkai	625	1,241	1,249	2,490	863	97	960	623	29	39	32
Vazhur Agaram	657	1,193	1,148	2,341	1,079	7	1,086	458	117	17	87
Veliyambakkam	345	1,157	1,130	2,287	1,457	24	1,481	917	58	51	56
Kuripedu	717	662	646	1,308	121	17	138	771	58	39	52

Gram Panchayat	% of Vulnerable Households (%)	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 drinking water (No.)	HH's dependent on other sources for drinking water (No.)	Annual Greywater Generation (ha - m)
Ammanambakkam	25	582	361	62	5	1	6	-	120	3
Amudur	18	606	322	49	5	-	5	-	-	3
Birudur	10	649	406	63	5	1	6	-	-	4
Arasur	14	736	553	48	5	1	6	-	-	4
Ariyathur	15	447	376	50	4	1	5	-	-	2
Athipakkam	22	738	472	465	3	1	4	450	-	3
Chetpattu	3	531	366	54	5	1	6	-	-	3
Elangadu	13	1,197	989	81	5	1	6	-	-	5
Irumbedu	13	1,201	790	53	4	1	5	-	-	5
Karam	15	388	264	37	5	1	6	-	-	2
Karanai	15	355	222	44	5	1	6	-	-	1
Eramalur	14	546	398	54	5	1	6	-	-	2
Kilnarma	5	306	212	62	5	1	6	-	-	1
Kilkovalaivedu	7	961	701	81	5	1	6	-	-	-
Kavaniyathur	18	318	203	53	4	1	5	-	-	1
Kilpakkam	18	318	203	39	4	1	5	-	-	2
Kilsathamangalam	7	1,264	844	62	3	-	3	-	-	8
Kottai	21	712	494	37	5	1	6	-	-	4
Kilsembedu	22	911	536	54	5	-	5	-	-	4
Kodanallur	11	414	273	61	4	1	5	-	-	2
Kovalai	11	1,076	755	-	4	1	5	-	-	4
Manganallur	18	279	231	25	3	1	4	-	-	2
Melkodungalur	18	494	349	31	3	1	4	-	-	2
Mudur	23	329	208	39	3	-	3	-	-	2

Gram Panchayat	% of Vulnerable Households (%)	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 drinking water (No.)	HH's dependent on other sources for drinking water (No.)	Annual Greywater Generation (ha - m)
Nelliankulam	21	490	328	44	4	1	5	-	-	2
Osor	22	937	669	74	4	1	5	-	-	5
Mambattu	13	465	350	46	4	1	5	-	-	2
Padiri	8	532	413	65	4	-	4	-	-	3
Pulivoy	16	384	246	55	5	1	6	-	-	2
Punnai	19	975	765	43	4	1	5	-	-	3
Salavedu	15	917	682	50	4	-	4	-	-	5
Sedarakuppam	25	466	326	48	3	1	4	-	-	2
Sembur	11	755	607	43	5	1	6	-	-	4
Sennavaram	5	803	647	47	5	1	6	-	-	6
Thazhuthazhy	18	402	259	36	5	-	5	-	-	1
Thellur	35	408	333	36	4	-	4	-	-	2
Thenangur	19	830	561	54	5	-	5	-	-	4
Vilangadu	20	225	186	36	5	1	6	-	-	1
Thensenthamangalam	15	352	238	51	5	1	6	-	-	2
Ulundai	36	1,068	690	47	5	1	6	-	-	4
Vengunam	71	1,082	814	62	5	-	5	-	-	7
Venmandai	34	320	256	45	5	1	6	-	-	1
Vizhuthupattu	19	306	202	42	4	1	5	-	-	1
Mummuni	8	878	584	165	4	-	4	-	-	4
Ammayampattu	8	302	252	45	5	1	6	-	-	3
Kadaisikulam	19	571	403	207	5	-	5	-	-	3
Kalankuthu	19	669	557	165	5	-	5	-	-	3
Marudhadu	19	1,459	1,122	253	5	-	5	-	-	9

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 drinking water (No.)	HH's dependent on other sources for drinking water (No.)	Annual Greywater Generation (ha - m)
Adiyannur-Adiyankuppam	12	796	625	53	5	1	6	-	-	3
Badur	14	1,350	775	62	5	1	6	-	-	5
Kilkodungalur	9	1,973	1,454	745	5	-	5	-	-	11
Kilseeshamangalam	4	617	388	24	4	-	4	-	-	2
Koilkuppam-Sathanoor	14	277	209	70	5	1	6	-	-	2
Mangalam mamandur	8	486	337	32	3	-	3	-	-	3
Ozhapakkam-kosapattu	10	442	258	23	3	-	3	-	-	1
S.Navalpakkam	19	387	287	67	4	-	4	-	-	2
Vangaram Avnavadi	17	709	462	56	5	1	6	-	-	3
Salukkai	5	886	727	84	4	-	4	-	-	5
Vazhur Agaram	19	1,020	588	219	4	1	5	-	-	4
Veliyambakkam	6	1,192	738	83	5	1	6	-	-	4
Kuripedu	7	529	451	61	5	1	6	-	-	2

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

$$x_{ij}^p = \frac{X_{ij} - \text{Min } i \{X_{ij}\}}{(\text{Max } i \{X_{ij}\} - \text{Min } i \{X_{ij}\})}$$

- for indicators with negative relationship with vulnerability

$$x_{ij}^n = \frac{\text{Max } i \{X_{ij}\} - X_{ij}}{\text{Max } i \{X_{ij}\} - \text{Min } i \{X_{ij}\}}$$

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_{ij}^p is the normalized value

X_{ij} is the value of j^{th} indicator for i^{th} GP and x_{ij}^n 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
Ammanambakkam	-	10.97	1.87	2.45	0.26	12.07	1.01	4.24	5.52	7.46
Amudur	-	9.39	-	-	1.86	-	-	4.09	9.69	8.88
Birudur	-	-	45.27	8.51	2.33	82.62	9.31	25.31	7.93	17.80
Arasur	0.42	88.29	10.04	9.08	7.61	15.08	-	23.58	22.25	21.49
Ariyathur	-	49.35	0.41	0.88	0.16	0.20	2.03	15.84	4.60	6.11
Athipakkam	-	48.87	0.84	5.45	4.56	-	-	15.85	29.36	9.37
Chetpattu	-	3.74	2.90	7.28	-	-	0.35	2.15	0.83	6.63
Elangadu	-	25.73	-	12.44	0.72	-	-	55.68	30.06	16.66
Irumbedu	-	49.33	1.24	13.27	0.33	4.85	2.98	14.52	8.43	22.18
Karam	-	38.60	19.26	1.24	1.95	65.52	6.27	2.66	6.59	9.82
Karanai	-	38.94	2.70	4.64	-	-	-	7.26	6.28	8.23
Eramalur	-	12.88	0.10	6.08	2.54	37.95	-	8.77	11.12	14.07
Kilnarma	-	8.43	0.30	-	1.07	-	1.07	1.68	0.98	9.85
Kilkovalaivedu	-	103.71	18.90	15.04	22.42	-	2.24	17.51	23.46	14.44
Kavaniyathur	-	9.91	-	16.00	-	-	-	1.15	12.79	5.47
Kilpakkam	-	15.43	-	1.49	2.59	0.19	3.35	9.24	2.92	7.04
Kilsathamangalam	-	41.99	0.13	-	3.15	15.45	3.04	16.88	2.05	3.51
Kottai	-	23.81	-	4.34	2.10	0.27	-	28.38	7.68	17.91
Kilsembedu	-	29.01	-	-	4.65	4.90	3.46	26.71	8.04	7.02
Kodanallur	-	33.79	-	6.95	0.08	0.26	0.60	7.98	5.02	6.52
Kovalai	-	127.25	7.80	14.53	7.69	1.43	8.06	32.37	28.74	23.86
Manganallur	-	17.11	7.61	9.60	3.20	11.88	6.89	5.87	9.33	11.67

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
Melkodungalur	-	11.25	0.02	1.19	2.54	0.11	2.91	12.11	5.20	8.32
Mudur	-	1.87	2.51	1.58	3.90	10.91	0.92	9.38	17.72	15.14
Nelliankulam	-	-	2.76	2.90	3.05	1.58	1.33	31.93	8.55	11.72
Osur	-	62.01	-	-	3.90	-	-	51.94	35.73	28.58
Mambattu	-	24.73	6.50	1.36	-	0.89	0.33	7.04	4.12	5.51
Padiri	-	11.04	18.17	-	0.55	1.19	0.80	5.10	0.52	9.74
Pulivoy	0.40	0.75	0.75	0.75	0.75	0.75	0.16	0.16	0.16	0.16
Punnai	-	7.44	-	-	3.90	-	-	27.23	9.00	14.91
Salavedu	-	17.68	0.08	0.56	-	-	0.50	7.96	32.54	11.82
Sedarakuppam	-	26.84	-	8.12	1.05	0.66	1.83	9.94	4.90	10.66
Sembur	-	0.06	9.04	4.20	0.91	-	-	12.51	11.28	9.90
Sennavaram	-	7.46	7.50	0.82	0.65	3.84	4.83	15.64	1.74	4.37
Thazhuthazhy	-	0.83	1.24	1.22	0.38	19.61	0.78	6.07	7.30	5.77
Thehellur	-	1.24	1.31	6.68	-	-	-	8.00	4.16	4.95
Thennangur	-	0.77	17.33	7.76	9.45	52.98	2.05	11.20	7.96	18.39
Vilangadu	-	17.22	-	7.41	-	0.31	5.71	21.27	3.22	4.70
Thensenthamangalam	-	3.11	-	-	3.30	6.11	2.85	5.62	5.71	4.00
Ulundai	-	2.89	0.43	-	1.75	0.55	14.85	51.79	102.90	36.08
Vengunam	12.00	51.19	34.16	1.86	-	5.41	-	11.87	4.52	9.89
Venmandai	-	21.76	-	-	0.20	-	0.89	15.17	14.53	5.81
Vizhuthupattu	-	22.58	3.90	3.11	1.58	11.58	1.90	1.62	5.42	9.50
Mummuni	-	80.27	0.17	2.46	-	-	0.10	40.37	3.14	6.64
Ammayampattu	-	26.33	0.17	2.46	0.83	0.64	0.06	21.25	1.65	6.64
Kadaisikulam	-	14.93	0.77	13.08	5.66	-	16.41	109.44	28.31	110.24
Kalankuthu	-	14.93	0.77	13.08	5.66	-	16.41	109.44	28.31	110.24

Gram Panchayat	Forest Land	Non-Agricultural Uses	Barren & Un-cultivable Land	Permanent Pastures and Other Grazing Land	Land Under Miscellaneous Tree Cereals etc.	Cultivable Waste Land	Fallows Land other than Current Fallows	Current Fallow land	Unirrigated Land	Treatment Area Irrigated by Source
Marudhadu	-	14.93	0.77	13.08	5.66	-	16.41	109.44	28.31	110.24
Adiyannur-Adiyankuppam	-	26.28	7.34	1.64	2.60	-	-	11.42	8.02	10.51
Badur	-	44.88	-	16.56	6.68	-	4.84	27.51	9.75	29.41
Kilkodungalur	-	3.12	0.03	5.68	0.74	0.43	5.22	11.98	10.26	10.85
Kilseeshamangalam	-	1.17	12.89	1.41	-	1.29	0.59	18.58	12.67	37.72
Koilkuppam-Sathanoor	-	11.39	-	1.04	6.77	2.64	0.83	11.57	3.67	6.40
Mangalam mamandur	-	21.05	-	8.08	1.15	0.05	-	9.61	3.78	16.32
Ozhapakkam-kosapattu	-	6.38	1.85	2.86	2.59	9.65	1.15	2.15	5.65	12.58
S.Navalpakkam	-	41.61	1.37	-	-	-	4.16	20.24	14.61	11.85
Vangaram Avnavadi	-	21.49	13.59	8.55	1.13	11.70	-	13.62	6.78	13.58
Salukkai	-	9.89	11.07	8.32	1.06	33.05	6.20	14.25	13.35	41.06
Vazhur Agaram	-	135.49	8.95	22.76	3.08	1.58	2.69	12.20	8.23	26.70
Veliyambakkam	-	12.11	5.52	2.33	-	-	-	8.29	7.42	10.33
Kuripedu	-	23.92	1.77	19.94	-	-	5.83	18.16	8.11	22.10

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

ANNEXURE 5.2

GP WISE EXPECTED RUNOFF CONSERVATION AFTER WASCA TREATMENT

Key CWRM Parameter	Good Catchment Area	Average Catchment Area	Bad Catchment Area
Ammanambakkam	6.1	4.2	3.4
Amudur	4.8	0.5	4.2
Birudur	18.89	26.26	11.28
Arasur	36.9	8.9	12.6
Ariyathur	19.7	0.3	5.3
Athipakkam	18.2	2.8	10.2
Chetpattu	3.2	2	1.9
Elangadu	11.4	3.7	19.1
Irumbedu	19.9	5.2	9
Karam	21.8	19.3	4.7
Karanai	15.7	1.3	4.1
Eramalur	6.1	13.1	6.3
Kilnarma	4	0.3	2.5
Kilkovalaivedu	45.5	10.5	10.8
Kavaniyathur	4.5	4.5	3.6
Kilpakkam	35.3	1.6	42.2
Kilsathamangalam	26.72	5.47	4.99
Kottai	10.6	1.9	10.1
Kilsembedu	11.5	2.7	8.5
Kodanallur	14.1	2	3.8
Kovalai	50.1	6.6	17.4
Manganallur	10.7	6	4.3
Melkodungalur	5.3	1.1	5.3
Mudur	2.9	4.6	8.1
Nelliankulam	3.3	2.1	10
Osur	24.4	1.1	21.7
Mambattu	13.1	0.6	3.2
Padiri	13	0.5	3
Pulivoy	2.3	5	5.5
Punnai	4.9	1.1	9.6
Salavedu	8.4	0.2	9.9
Sedarakuppam	11.6	2.8	5.1
Sembur	6.62	1.5	6.6
Sennavaram	7.9	1.5	5
Thazhuthazhy	1.8	0.8	2.8
Thellur	1.9	2.4	2.4
Thennangur	8.7	10.2	4.2
Vilangadu	7.9	2.2	6.5
Thensenthamangalam	2.7	2.6	3.4
Ulundai	2.9	0.6	33.2
Vengunam	39.5	1.5	3.2
Venmandai	8.7	0.1	6.8

Key CWRM Parameter	Good Catchment Area	Average Catchment Area	Bad Catchment Area
Vizhuthupattu	10.3	4.6	3.4
Mummuni	30	0.7	9.4
Ammayampattu	32.25	1.1	5.5
Kadaisikulam	5.88	4.32	40.59
Kalankuthu	5.48	4.32	40.59
Marudhadu	5.51	4.32	40.59
Adiyanur- Adiyankuppam	-	0.21	0.02
Badur	-	6.5	13.4
Kilkodungalur	-	1.9	7.2
Kilseeshamangalam	5.12	0.62	10.68
Koilkuppam-Sathanoor	5.1	2.9	4.2
Mangalam mamandur	0.3	-	-
Ozhapakkam- kosapattu	0.4	-	-
S.Navalpakkam	16.1	-	9.5
Vangaram Avnavadi	13.6	6	6.4
Salukkai	0.6	-	-
Vazhur Agaram	52.9	7.7	9.3
Veliyambakkam	9.2	0.7	4.9
Kuripedu	10.9	5.6	10.1

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.	Length		No.	Area	No.	Length	
Adiyanur-Adiyankup-pam	21,631	27	-	-	-	28	3,842	5	-	-	28
Ammanambakkam	11,656	15	1,096	-	-	366	40,144	50	2,140	8,560	11
Ammayampattu	16,441	21	-	-	-	24	2,230	3	-	-	24
Amudur	-	-	1,018	-	-	8	2,554	3	2,150	8,598	8
Arasur	8,032	10	1,271	-	3,750	77	3,064	4	643	2,570	35
Ariyathur	-	-	1,567	-	5,083	142	-	-	857	3,426	31
Athipakkam	672	1	-	761	3,042	110	1,760	2	994	3,975	61
Badur	24,640	31	-	-	-	80	34,480	43	340	1,700	-
Birudur	25,000	32	1,460	337	1,349	25	3,200	2	373	1,493	25
Chetpattu	2,320	3	1,239	1,044	4,174	138	1,224	2	1,402	5,609	30
Elangadu	-	-	-	1,854	7,414	96	15,600	20	1,463	5,851	36
Eramalur	-	-	-	1,919	7,674	52	15,456	19	-	-	14
Irumbedu	4,872	6	-	752	3,007	13	3,995	5	410	2,050	13
Kadaisikulam	12,560	16	-	-	-	13	14,994	19	-	-	13
Kalankuthu	12,560	16	-	-	-	13	14,994	19	-	-	13
Karam	22,320	28	-	-	-	41	12,480	16	-	-	42
Karanai	2,160	3	-	1,096	4,385	45	-	-	-	-	30
Kavaniyathur	10,600	13	-	1,101	4,404	40	-	-	-	-	40
Kilkodungalur	3,090	4	-	-	-	-	4,542	6	1,400	7,000	35
Kilkovalaivedu	15,120	19	-	722	2,889	39	62,160	78	-	-	13
Kilnarma	-	-	-	1,271	5,083	13	1,280	2	-	-	60
Kilpakkam	32,474	40	24	2,740	10,961	20	-	-	760	3,800	20
Kilsathamangalam	16,480	21	-	1,644	6,577	74	32,720	41	320	1,600	74
Kilseeshamangalam	11,246	14	-	-	-	20	2,162	3	-	-	20

Gram Panchayat	Aff		ARS		AVP		Az		BP		CBP		CS	
	No.	Area	No.	No.	No.	Length	No.	No.	Plants	Area	No.	Length	No.	No.
Kilsebedu	3,920	5	-	-	1,952	7,807	111	-	-	-	-	-	-	65
Kodanallur	-	-	-	-	2,224	8,896	25	2,992	4	116	578	25	-	-
Koilkuppam-Sathanoor	-	-	-	-	722	2,889	-	-	-	-	-	-	-	-
Kottai	216	-	-	-	1,310	5,241	16	4,174	5	572	2,860	16	-	-
Kovalai	10,637	13	-	-	935	3,741	6	21,440	27	-	-	-	-	6
Kuripedu	-	-	-	-	1,271	5,083	-	-	-	-	-	-	-	-
Mambattu	4,608	6	12	-	1,485	5,940	45	1,304	2	-	-	-	-	45
Mangalam mamandur	-	-	-	-	2,740	10,961	-	-	-	-	-	-	-	-
Manganallur	15,594	19	-	-	1,796	7,185	15	3,982	5	327	1,635	15	-	-
Marudhadu	12,560	16	-	27	1,644	6,577	13	14,994	19	-	-	-	-	13
Melkodungalur	-	-	-	-	1,382	5,527	61	-	-	-	-	-	-	15
Mudur	-	-	-	-	1,096	4,385	58	-	-	-	84	423	68	-
Mummuni	136	0	-	-	1,952	7,807	71	7,928	10	-	-	-	-	27
Neliankulam	2,600	3	27	-	1,018	4,072	38	-	-	-	258	1,288	38	-
Osor	-	-	66	-	1,271	5,082	97	-	-	-	476	2,382	97	-
Ozhapakkam-kosapattu	-	-	-	-	2,224	8,896	-	-	-	-	-	-	-	-
Padiri	11,608	15	21	-	1,567	6,269	19	6,624	8	-	-	-	-	19
Pulivoy	4,662	6	-	-	-	-	32	-	-	-	-	-	-	32
Punnai	-	-	-	-	1,460	5,841	94	4,464	6	-	-	-	-	37
S.Navalpakkam	-	-	-	-	1,310	5,241	-	-	-	-	-	-	-	-
Salavedu	-	-	-	-	1,239	4,956	99	30,320	38	-	-	-	-	45
Salukkai	-	-	-	-	935	3,741	-	-	-	-	-	-	-	-
Sedarakuppam	528	1	-	-	-	-	16	16,105	20	162	811	16	-	-
Sembur	51	0	-	-	-	-	55	7,956	10	676	3,380	55	-	-
Sennavaram	-	-	-	-	-	-	39	-	-	-	-	-	-	15
Thazhuthazhy	16,680	21	-	-	-	-	6	962	1	510	2,550	6	-	-
Thellur	1,050	1	-	-	-	-	8	996	1	380	1,900	8	-	-
Thennangur	56,244	70	-	-	-	-	6	8,173	10	522	2,610	6	-	-

Gram Panchayat	Aff		ARS		AVP		Az		BP		CBP		CS		
	No.	Area	No.	No.	No.	Length	No.	No.	Plants	Area	No.	Length	No.	No.	
Thensenthamangalam	4,890	6	-	-	-	-	27	6	3,704	3,704	578	2,890	37	37	
Ulundai	440	1	-	-	-	3,515	209	3	2,312	2,312	-	-	20	20	
Vangaram Avnavadi	-	-	-	-	1,485	5,940	-	-	-	-	-	-	-	-	-
Vazhur Agaram	-	-	-	-	1,796	8,980	-	-	-	-	-	-	-	-	-
Veliyambakkam	-	-	-	-	1,382	5,527	-	-	-	-	-	-	-	-	-
Vengunam	31,656	40	-	-	-	-	18	2	1,228	1,228	590	2,950	18	18	
Venmandai	-	-	-	-	-	-	52	-	-	-	-	-	34	34	
Vilangadu	-	-	-	-	-	2,770	35	13	10,320	10,320	-	-	40	40	
Vizhuthupattu	12,384	15	-	-	-	1,520	37	-	-	-	-	-	48	48	

Gram Panchayat	CT		Co		FP		COWRS		CCBF		DLT			DLHAI		FBBTI	
	No.		No.	Area	No.	Area	No.	Area	No.	Area	Plants	Length	No.	Area	No.	Area	
Kottai	16	6	46	10	-	-	-	-	-	-	540	2,700	18,245	23	9	23	
Kovalai	6	79	274	79	-	-	2,659	13	-	-	-	-	27,400	137	110	274	
Kuripedu		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mambattu	45	3	-	5	12	-	-	-	-	-	860	4,300	-	-	-	-	
Mangalam mamandur		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Manganallur	15	6	44	10	-	-	-	-	-	-	-	-	17,556	22	16	41	
Marudhadu	13	62	264	62	-	-	3,140	16	-	-	-	-	26,400	132	106	264	
Melkodungalur	15	6	-	23	23	-	-	-	-	-	-	-	-	-	-	-	
Mudur	68	9	-	14	61	-	-	-	-	-	-	-	-	-	-	-	
Mummuni	27	12	-	12	27	-	-	-	-	122	611	-	-	-	-	-	
Neliankulam	38	15	-	19	27	-	-	-	-	641	3,203	-	-	-	-	-	
Osar	97	23	-	27	66	-	-	-	-	1,264	6,322	-	-	-	-	-	
Ozhapakkam-kosapattu		-	-	-	-	-	-	-	-	-	-	-	2,400	12	-	-	
Padiiri	19	3	-	7	21	-	-	-	-	185	924	-	-	-	-	-	
Pulivoy	32	6	-	10	18	-	-	-	-	372	1,859	-	-	9	23	-	
Punnai	37	10	-	11	51	-	-	-	-	-	-	-	-	4	10	-	
S.Navalpakkam	-	33	-	12	-	-	47	94	-	-	-	-	-	-	-	-	
Salavedu	45	9	-	14	52	-	-	-	-	1,182	5,908	-	-	4	10	-	
Salukkai		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sedarakuppam	16	5	-	8	43	-	-	-	-	1,104	5,518	-	-	6	9	-	
Sembur	55	10	-	15	36	-	5,221	48	-	-	-	-	3,369	17	5	12	
Sennavaram	15	5	-	7	13	-	-	-	-	470	2,351	-	-	-	-	-	
Thazhuthazhy	6	6	20	10	-	-	-	-	-	860	4,299	-	7,968	10	14	34	
The'llur	8	6	17	10	-	-	-	-	-	860	4,299	-	6,845	9	5	12	
Thennangur	6	6	40	10	25	-	-	-	-	482	2,410	-	15,839	20	30	74	
Thensenthamangalam	37	6	18	6	13	-	-	-	-	-	-	-	7,269	9	8	20	
Ulundai	20	20	-	21	40	-	-	-	-	247	1,235	-	26,400	33	5	13	
Vangaram Avnavadi		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Gram Panchayat	CT		Co		FP		COWRS		CCBF		DLT		DLHAI		FBBTI		
	No.	No.	No.	Area	No.	No.	No.	No.	No.	Area	Plants	Length	No.	Area	No.	Area	
Vazhur Agaram		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Veliyambakkam		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vengunam	18	6	6	26	10	16	16	-	-	-	844	4,220	10,511	13	9	22	22
Venmandai	34	6	6	-	7	22	22	-	-	-	-	-	-	-	1	20	20
Vilangadu	40	7	7	-	12	14	14	-	-	-	-	-	-	-	1	3	3
Vizhuthupattu	48	6	6	-	6	22	22	-	-	-	530	2,649	-	-	-	-	-

Gram Panchayat	FD		GSS		ICP		LDI		LP		MI		NADEP		ND	
	No.	No.	Plants	Length	No.	Area	Plants	Length	No.	Area	No.	Area	No.	Plants	HH	
Adiyannur-Adiyankuppam	28		-	-	5	13	311	1,244	5	14	28		28	2,225	445	
Ammanambakkam		9	239	1,193	4	67	672	3,372	-	-	20		20	366	73	
Ammayampattu	24		-	-	4	9	8	30	2	5	24		24	1,395	279	
Amudur		7	-	-	2	5	337	1,347	5	12	8		8	1,725	345	
Arasur		53	80	400	1	10	152	607	-	-	35		35	385	77	
Ariyathur		34	-	-	-	-	11	43	-	-	65		65	710	142	
Athipakkam		45	600	3,000	1	1	17	67	-	-	61		61	550	110	
Badur	80		1,200	6,000		11	351	1,403	-	-	80		80	825	165	
Birudur		17	-	-	-	-	84	335	33	33	25		25	125	25	
Chetpattu		28	-	-	3	12	513	2,050	-	-	58		58	690	138	
Elangadu		46	386	1,931	-	-	153	611	-	-	40		40	480	96	
Eramalur		29	188	942	-	-	619	2,475	-	-	20		20	260	52	
Irumbedu		9	-	-	5	13	202	807	12	29	13		13	3,245	649	
Kadaisikulam	13		-	-	31	77	-	-	44	110	13		13	2,630	526	
Kalankuthu	13		-	-	31	77	-	-	44	110	13		13	3,300	660	
Karam		46	500	2,500	-	-	672	2,688	-	-	42		42	205	41	
Karanai		36	103	516	1	3	53	210	-	-	66		66	225	45	
Kavaniyathur		40	-	-	-	-	355	1,420	-	-	40		40	1,000	200	
Kilkodungalur		70	-	-	14	2,831	-	-	4	10	-		-	175	35	
Kilkovalaivedu		18	839	4,193	-	-	511	2,042	-	-	20		20	195	39	
Kilnarma		65	-	-	-	-	-	-	-	-	60		60	65	13	
Kilpakkam	10	8	-	-	-	-	213	850	-	-	20		20	670	134	
Kilsathamangalam	74		360	1,800	4	11	13	52	-	-	74		74	9,310	1,862	
Kilseeshamangalam	20		-	-	6	16	32	129	15	38	20		20	1,520	304	
Kilsembedu		65	139	694	-	-	5,680	22,720	-	-	65		65	555	111	
Kodanallur		25	-	-	2	11	11	43	-	-	25		25	125	25	
Koilkuppam-Sathanoor	-		-	-	-	-	4	15	-	-	-		-	980	196	
Kottai		22	-	-	4	11	74	294	9	23	16		16	2,855	571	

Gram Panchayat	FD		GSS		ICP		LDI		LP		MI		NADEP		ND		
	No.	No.	No.	No.	Plants	Length	No.	Area	Plants	Length	No.	Area	No.	No.	Plants	HH	
Veliyambakkam					-	-	-	-	-	-	-	-	-	-	-	-	-
Vengunam		12		3	-	-	3	8	550	2,200	4	10	18	18	90	18	18
Venmandai		14			120	607	-	-	8	31	-	-	34	34	260	52	52
Vilangadu		3			410	2,050	-	-	212	849	-	-	40	40	175	35	35
Vizhuthupattu		60			401	2,012	-	-	181	725	-	-	48	48	185	37	37

Gram Panchayat	PS	RPWDT	Roo	RP	RRWH	SPD		SPC	SPI	WCICD
	No.	No.	No.	No.	No.	No.	Area	No.	No.	Length
Adiyapur-Adiyankuppam	-	1	2	4	2	-	-	-	-	-
Ammanambakkam		2	-	3	2	1,960	2	36		1,193
Ammayampattu	-	2	-	4	2	-	-	-		-
Amudur		2	-	1	2	-	-	3	35	-
Arasur		2	-	4	2	7,264	9	2		400
Ariyathur		1	-	-	2	-	-	14		-
Athipakkam		2	-	4	2	4,360	5	1		3,000
Badur		3	2	10	2	-	-	9		6,000
Birudur		1	-	1	2	7,200	9	1		-
Chetpattu		1	3	3	2	5,824	7	13		-
Elangadu		2	2	3	2	9,920	12	28		1,931
Eramalur		-	-	3	2	4,864	6	1		942
Irumbedu		4	2	3	2	10,400	13	6	65	-
Kadaisikulam	-	-	3	4	2	-	-	-		-
Kalankuthu	-	-	3	3	2	-	-	-		-
Karam		1	2	2	2	992	1	25		2,500
Karanai	6	1	-	1	2	-	-	45		516
Kavaniyathur		2	-	2	2	12,800	16	-		-
Kilkodungalur		-	3	5	2	-	-	-		-
Kilkovalaivedu		2	-	4	2	12,032	15	33		4,193
Kilnarma		1	-	2	2	-	-	1		-
Kilpakkam		2	-	4	2	-	-	-		-
Kilsathamangalam		2	-	3	2	-	-	19	74	1,800
Kilseeshamangalam	-	5	7	2	2	-	-	-		-
Kilsembedu		2	-	2	2	-	-	2		694
Kodanallur		1	-	5	2	5,560	7	2		-
Koilkuppam-Sathanoor	-	2	5	4	2	-	-	-		-
Kottai		3	-	1	2	3,200	4	6	57	-

Gram Panchayat	PS		RPWDT		Roo		RP		RRWH		SPD		SPC		SPI		WCICD	
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	Area	No.	No.	No.	No.	Length	
Kovalai	4	2	-	4	2	-	4	2	-	-	-	-	-	-	-	-	-	-
Kuripedu		2	3	3	2	-	3	2	-	-	-	-	-	-	-	-	-	-
Mambattu		2	-	4	2	-	4	2	1,088	1	45	-	-	-	-	-	-	-
Mangalam mamandur		1	3	3	2	-	2	2	-	-	-	-	-	-	-	-	-	-
Manganallur		3	-	5	2	-	5	2	8,000	10	27	-	-	-	-	-	-	-
Marudhadu	-	-	4	3	2	-	3	2	-	-	-	-	-	-	-	-	-	-
Melkodungalur	2	2	-	3	2	-	3	2	-	-	-	-	17	-	-	-	2,127	-
Mudur	17	3	-	3	2	-	3	2	-	-	-	-	-	15	-	-	423	-
Mummuni		2	-	2	2	-	2	2	1,968	2	17	-	-	4	-	-	5,819	-
Nelliankulam		1	-	4	2	-	4	2	2,320	3	38	-	-	-	-	-	-	-
Osor		3	-	1	2	-	1	2	-	-	97	-	-	-	-	-	-	-
Ozhakkam-kosapattu		-	2	3	2	-	3	2	-	-	-	-	-	-	-	-	-	-
Padiri		2	-	4	2	-	4	2	-	-	-	-	2	-	-	-	190	-
Pulivoy		1	-	4	2	-	4	2	-	-	-	-	2	-	-	-	31	-
Punnai		2	-	2	2	-	2	2	-	-	-	-	2	-	-	-	-	-
S.Navalpakkam		-	2	5	2	-	5	2	-	-	-	-	-	-	-	-	358	-
Salavedu		2	-	3	2	-	3	2	448	1	-	-	2	-	-	-	-	-
Salukkai		-	3	5	2	-	5	2	-	-	-	-	-	-	-	-	-	-
Sedarakuppam	3	2	-	4	2	-	4	2	6,496	8	29	-	-	3	-	-	-	-
Sembur		3	-	6	2	-	6	2	3,360	4	55	-	-	5	-	-	1,250	-
Sennavaram	2	1	-	-	2	-	-	2	-	-	-	-	-	19	-	-	-	-
Thazhuthazhy		3	-	-	2	-	-	2	800	1	19	-	-	2	-	-	-	-
Thellur		3	-	-	2	-	-	2	5,600	7	26	-	-	3	-	-	-	-
Thennangur		1	-	5	2	-	5	2	6,400	8	49	-	-	5	-	-	-	-
Thensenthamangalam	4	2	-	4	2	-	4	2	-	-	185	-	-	1	-	-	-	-
Ulundai		3	-	1	2	-	1	2	-	-	284	-	-	2	-	-	5,224	-
Vangaram Avnavadi		2	2	4	2	-	4	2	-	-	-	-	-	-	-	-	-	-
Vazhur Agaram		2	3	4	2	-	4	2	-	-	-	-	-	-	-	-	-	-

Gram Panchayat	PS	RPWDT	Roo	RP	RRWH	SPD		SPC	SPI	WCICD
	No.	No.	No.	No.	No.	No.	Area	No.	No.	Length
Veliyambakkam		2	3	5	2	-	-	-	-	-
Vengunam		2	-	7	2	1,600	2	9	92	-
Venmandai	17	1	-	2	2	-	-	9	-	607
Vilangadu		2	-	3	2	5,928	7	2	-	2,050
Vizhuthupattu	4	-	-	6	2	-	-	13	-	2,012

ANNEXURE 7.1

GP WISE WASCA RECOMMENDATION AND WORKS UPLOADED

Sl. No	GP	WASCA Recommendation for 3 Years	Works uploaded for FY-2021-22 as on 02/02/2022
1	Andiyanur-Adiyankuppam	203	180
2	Ammanambakkam	478	290
3	Ammayapattu	180	177
4	Amudur	360	180
5	Arasur	598	326
6	Ariyathur	343	224
7	Athipakkam	587	132
8	Badhur	129	451
9	Birudur	313	603
10	Chetpet	117	251
11	Elangadu	472	191
12	Eramalur	376	247
13	Irumbedu	468	164
14	Kaaram	395	183
15	Karanai	288	99
16	Kadaisikulam	124	310
17	Kallanguthu	157	324
18	Kavaniyathur	440	336
19	Kilkodungalore	278	485
20	Kilkovalaivedu	325	189
21	Kilnarma	301	1,191
22	Kilpakkam	79	346
23	Kilsathamangalam	606	307
24	Kilsembedu	361	208
25	Kilseeshamangalam	291	110
26	Kurippedu	107	260
27	Kodanallur	331	140
28	Kottai	527	317
29	Kovalai	646	320
30	Koilkuppam-sathanur	160	171
31	Mambattu	385	265
32	Mangalam-mamandur	133	176
33	Manganallur	172	361
34	Marudadu	420	406
35	Melkodungalore	418	448
36	Mudur	463	242
37	Mummuni	459	136
38	Neliyankulam	421	224
39	Ozhapakkam-kosapattu	122	197
40	Osur	1,262	554
41	Padhiri	282	170

Sl. No	GP	WASCA Recommendation for 3 Years	Works uploaded for FY-2021-22 as on 02/02/2022
42	Pulivoy	278	142
43	Punnai	424	287
44	Salavedu	702	235
45	Salukkai	645	227
46	Sembur	480	269
47	Sennavaram	480	65
48	Sadarakuppam	280	150
49	S. Navalpakkam	168	220
50	Thaluthalai	145	84
51	Thehellur	582	200
52	Thennangur	233	276
53	Thensenthamangalam	536	93
54	Ulundai	466	113
55	Vazhur-agaram	542	205
56	Velliambakkam	607	223
57	Vengaram-avanavadi	403	370
58	Vengundram	346	467
59	Venmandai	390	117
60	Villangadu	192	76
61	Vizudupattu	551	62

ANNEXURE 7.2

GP AND WORK CATEGORY-WISE ONGOING WORKS IN KALASAPAKKAM BLOCK

GP	Work Category	Ongoing works
Ammanambakkam	Water Conservation and Water Harvesting	2
Ammayapattu	Water Conservation and Water Harvesting	1
Amudur	Water Conservation and Water Harvesting	2
	Works on Individuals Land (Category IV)	1
Andiyar-Adiyankuppam	Water Conservation and Water Harvesting	3
Arasur	Water Conservation and Water Harvesting	2
Ariyathur	Water Conservation and Water Harvesting	2
Athipakkam	Water Conservation and Water Harvesting	2
	Works on Individuals Land (Category IV)	1
Badhur	Drought Proofing	1
	Water Conservation and Water Harvesting	5
	Works on Individuals Land (Category IV)	2
Birudur	Water Conservation and Water Harvesting	2
Chetpet	Water Conservation and Water Harvesting	1
Elangadu	Water Conservation and Water Harvesting	1
Eramalur	Water Conservation and Water Harvesting	1
Irumbedu	Water Conservation and Water Harvesting	3
Kadaisikulam	Water Conservation and Water Harvesting	2
Kallanguthu	Water Conservation and Water Harvesting	2
	Works on Individuals Land (Category IV)	13
Karanai	Water Conservation and Water Harvesting	1
Kavaniyathur	Water Conservation and Water Harvesting	1
Kilkodungalore	Water Conservation and Water Harvesting	2
Kilkovalaivedu	Water Conservation and Water Harvesting	3
Kilnarma	Water Conservation and Water Harvesting	1
	Works on Individuals Land (Category IV)	3
Kilpakkam	Water Conservation and Water Harvesting	1
	Works on Individuals Land (Category IV)	1
Kilsathamangalam	Rural Sanitation	1
	Water Conservation and Water Harvesting	2
	Works on Individuals Land (Category IV)	3
Kilsembedu	Water Conservation and Water Harvesting	2
Kodanallur	Water Conservation and Water Harvesting	1
Kovalai	Works on Individuals Land (Category IV)	3
Kurippedu	Water Conservation and Water Harvesting	2
Mambattu	Water Conservation and Water Harvesting	1
Mangalam-Mamandur	Water Conservation and Water Harvesting	2
Manganallur	Water Conservation and Water Harvesting	1
Marudadu	Water Conservation and Water Harvesting	3
Melkodungalore	Water Conservation and Water Harvesting	2
Mudur	Water Conservation and Water Harvesting	1
	Works on Individuals Land (Category IV)	1

Mummuni	Water Conservation and Water Harvesting	2
	Works on Individuals Land (Category IV)	1
Neliyankulam	Water Conservation and Water Harvesting	2
Osur	Water Conservation and Water Harvesting	2
Padhiri	Water Conservation and Water Harvesting	2
	Works on Individuals Land (Category IV)	8
Pulivoy	Water Conservation and Water Harvesting	1
	Works on Individuals Land (Category IV)	1
Punnai	Works on Individuals Land (Category IV)	32
S.Navalpakkam	Water Conservation and Water Harvesting	2
Sadarakuppam	Water Conservation and Water Harvesting	1
Salavedu	Water Conservation and Water Harvesting	3
Salukkai	Water Conservation and Water Harvesting	3
Sembur	Water Conservation and Water Harvesting	2
	Works on Individuals Land (Category IV)	1
Sennavaram	Water Conservation and Water Harvesting	1
Thaluthalai	Water Conservation and Water Harvesting	2
Thellur	Water Conservation and Water Harvesting	1
Thennangur	Water Conservation and Water Harvesting	2
	Works on Individuals Land (Category IV)	3
Ulundai	Water Conservation and Water Harvesting	4
Velliambakkam	Water Conservation and Water Harvesting	2
Vengaram-Avanavadi	Water Conservation and Water Harvesting	2
	Works on Individuals Land (Category IV)	4
Venmandai	Water Conservation and Water Harvesting	1
Villangadu	Water Conservation and Water Harvesting	1
Vizudupattu	Water Conservation and Water Harvesting	1

ANNEXURE 8

CWRM KEY INDICATORS FOR GPs IN VEERALUR MICRO-WATERSHED

CWRM Parameter	Veeralur
Soil Resources: Status of Available Nitrogen (%)	
Very Low	42.42
Low	57.58
Status of Organic Carbon (%)	
Very Low	77.27
Low	22.73
Status of Soil Micro Nutrients (%)	
Sufficient	49.00
Deficient	51.00
Status of Physical condition of the soil (%)	
Slightly Acidic	2
Moderately Alkaline	98
Soil Texture (%)	
Clay soil	64
Fine Soil	14
Soil Water Permeability (Low, Moderate, high)	Low
Soil moisture and ET	
Volumetric Soil Moisture (%)	23.00
Estimated Soil Moisture (ha.m)	105.95
ET Losses (ha.m)	124.39
Means of Water Extraction (%)	
Gravity	11.15
Lifting	88.85
Irrigation Methods (%)	
Wild Flooding	71.79
Control Flooding	28.21
Livestock (No.)	
Cattle Population	170
Goat Population	210
Land Resources (ha)	
Forest land	30.00
Non-Agricultural Uses	102.37
Barren & Un-cultivable Land	45.55
Permanent Pastures and Other Grazing Land	2.48
Cultivable Waste Land	7.21
Current Fallow land	169.60
Unirrigated Land	64.55
Area Irrigated by Source	141.26











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