



Water Security and Climate Adaptation in Rural India - Tamil Nadu

BASELINE STUDY COMPOSITE WATER RESOURCES MANAGEMENT PLANS RAMANATHAPURAM DISTRICT TAMIL NADU

District Rural Development Agency, Ramanathapuram

Sep 2020


Foreword

The Water Security and Climate Adaptation in Rural India (WASCA), a Bi-lateral Project Commissioned by the German Federal Ministry for Economic Cooperation and Development in partnership with the Ministry of Rural Development (MoRD) and Ministry of Jal Shakti (MoJS) have been implemented in Ramanathapuram District, Tamil Nadu in the month of December 2019 with an Objective to Ensure Water Security at Village Level.

The Project WASCA envisaged to Strengthen the Water Security of the district which is otherwise a Distant Dream for many in the villages. WASCA sets the Platform to converge various Departmental Schemes at Village Level. WASCA is also promoting a Scientific and Innovative approach while planning the Comprehensive Water Resources Management (CWRM) at the Gram Panchayat using Hydrological and Geo-spatial data and Other tools across all GPs in the district.

A Comprehensive Analysis of the Past Data and Scientific Forecast of Water Budget by the Team WASCA supports the District Administration to Manage the Water Stress Over a Period of Time. The key Strategies and Pathways planned to achieve the Objectives are to Strengthen the Convergence of Existing plans, Promoting Climate Resilient Water Management measures, forging cooperation with the Private Sectors for Enhancing Financial Investments in water resources and promoting Climate Resilient and Water Efficient production systems. The Technical support from MSSRF will aid the Project on latest technological advancement in the concerned areas.

I wish the team WASCA and the Supporting Agencies to successfully work together with the District Administration to achieve an objective of Water Security across all Gram Panchayats in the District.



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Preamble

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 in partnership with the Ministry of Rural Development (MoRD) and Ministry of Jal Shakti (MoJS) is implemented by GIZ in five states at the national level namely, Tamil Nadu, Rajasthan, Madhya Pradesh, Karnataka and Uttar Pradesh. The project period is three years from April 2019 to March 2022. The project aims to improve water resource management through an integrated approach at national, state and local levels with respect to water security and climate adaptation. The Project WASCA, seeks to address planning, financing and implementation mechanisms developed in the field of rural water resource management and climate change adaptation. It aims for the following four output areas:

- 1) Improved convergence of existing planning and financing approaches to strengthen water security
- 2) Developing Climate Resilient Water Management measures
- 3) Cooperation with the private sector for integrated and climate adapted management of water resources at state and local levels and
- 4) Enhancing the productivity and income of small farmers through climate resilient and water efficient management models.

In the state of Tamil Nadu, GIZ has conducted a scoping study with the technical support of Anna University which studied the state's rural water security through a systematic analysis via availability, accessibility of water and its governance through climate lens at the district scale¹. At present, the state is one of the water deprived states in India, which is clearly evident from the fast decline in the per capita availability of water in Tamil Nadu and the current per capita water availability is well below national average of 1,544 cubic meters.

The future climate change study pointed that the average annual maximum temperature for IPCC AR5 RCP 4.5 scenario is projected to increase by about 0.9°C towards mid-century and by 1.3°C towards end-century. The another estimate at IPCC AR5 RCP 8.5 scenario, it is projected to increase by about 1.4°C towards mid-century and 3.4°C towards end-century. Such steep changes in temperature and its impact in altering monsoon pattern as captured by the analysis will lead to threats such as increasing water demand for irrigation, domestic and

¹ *Scoping Study Report of Indo-German Project: Water Security and Climate Adaptation in Rural India (WASCA), Anna University, Chennai, 2019.*

industrial purposes and lowering water table. The scoping study used 18 different biophysical, socio-economic indicators under 4 dimensions via climate (5), water (5), agriculture (4) and socio-demographic (4) have been composed and categorized into adaptive capacity, sensitivity and exposure indicators for the analysis. Following are the details of the 18 indicators used in the vulnerability assessment at the scale of district level (Table 1);

Table1. List of Biophysical and socio-economic indicators used in vulnerability assessment

1) Exposure in climate extremities is very high during 1951-2015	<ul style="list-style-type: none"> • Increase in day time temp. is very high (1.4°C) • Rainfall variability is very high • Deficient rainfall years (< 59%)are highest among all districts (18 years)14
2) Water resource vulnerability	<ul style="list-style-type: none"> • Low surface water availability • Supply and Demand gap • Saline/poor quality of water – firkas are more
3) Agriculture vulnerability is very high among all districts	<ul style="list-style-type: none"> • Rain fed area (66.28 %) • Cropping intensity is very low • Evapotranspiration is more • Soil moisture is very less
4) Socio-economic vulnerability	<ul style="list-style-type: none"> • Poverty index is more (0.63) • Source of drinking water within premises in rural area is very low (5.6 %) • Marginal farmers are more (93 %) • High rural proportion (69.7 %)

The Composite Vulnerability Index was prepared using above 18 indicators and ranked the different districts. Ramanathapuram district, Dharmapuri, Perambalur, and Tiruvannamalai districts are ranked high in cumulative vulnerability index and the CVI values are 0.7, 0.64, 0.62 and 0.61, respectively (Table 2).

Table 2. Ranking - Highly Vulnerable districts in the states

Districts	Climate	Water Resource	Agriculture	Socio-economic
Ramanathapuram	4	16	1	13
Dharmapuri	28	1	9	11
Perambalur	18	12	6	7
Thiruvannamalai	6	11	17	5

Of the four highly vulnerable districts, Ramanthapuram is the most vulnerable district in terms of (i) exposure in climate extremities is very high during 1951-2015; (2) wide gap between supply and demand - availability of water resources for productive and domestic use; (3) Agriculture vulnerability is very high and (4) high socio-economic vulnerability. The vulnerability will be further exacerbated in the changing climate scenarios in both mid (2050) and end century (2080). It is projected that there will be an increase in annual rainfall by 2050s and 2080s it will be +1.0% with respect to baseline (1970-2000) of 821 mm along with sharp increase in both minimum and maximum temperatures. Hence implementation of WASCA in Ramanthapuram district is planned to strengthen its water resources and build context specific climate resilient models as a preparedness measure to build better resilience.

Brief Profile of Ramanathapuram

The Ramanthapuram District is one of the two aspirational districts in Tamil Nadu and covers an area of 4123 sq.km. It is geographically located in the latitude from 09°05' to 09°50' and longitude from 78°10' to 79°27'. The district consists of 429 GPs governed under 11 developmental blocks, of which six blocks are in the coastal zone of East Coast of India. The total population of the district is 1.3 million. The soil in the district is largely sandy loam towards the coast, black soil in the inland part of the district and alluvial in the river flowing region, largely upper part of the district (Thiruvadanai and RS Mangalam blocks). The annual average rainfall is 821 mm, 62.84 % of the annual rainfall is received during NEM season in 84 rainy days within the period three months followed by South West Monsoon with a minimum of 9 rainy days out of 120 days total period; The onset of the rain was in the first week of October and cessation is at fourth week of December. The major rivers flowing in the district boundary are Vaigai, Gundar, Manimuthar and Pambar rivers are the major rivers draining the district which are supplemented by small rivers such as Malataru, Gundaru, and Sarugani. These rivers are rainfed and thus remain dry for higher number of months in a year. Agriculture is the primary livelihood to the largest majority of them. Paddy, millets, chilli, cotton, coriander and pulses are the dominant crops, goat and sheep in the inland and fisheries in the coastal areas are the allied enterprises supporting the local population. More than 65% of the agricultural land is under rainfed and tank fed system of irrigation is predominantly supporting farming and drinking water. The district has forest cover to extend of 4488 ha in 2010-2011 which is 1.1% of the total geographical area of the district.

Operationalizing the WASCA in Ramanathapuram

The preparation of Composite Water Resources Management Plan using hydrological and geospatial tools has been initiated in Ramanathapuram district in April 2020. The Grama Panchayat (GP) is the base unit of the planning and water budget is calculated based on the estimated amount of water supply through scientific analysis and identification of appropriate actions works to augment the supply of water for both surface storage and ground water recharge. The district officials were trained in the preparation of the plan and activities are started in the field. In order to assess the impact of the WASCA intervention it is planned to conduct a baseline study adopting the following methodology.

Methodology

The baseline assessment indicators are designed at the level of both outcome and output level results. The outcome level mapping is done at the district level and primarily it was started with the desk review about the schemes on integrated water resources management and its implementation over the last five years in the district to understand the policy/schemes supporting the approach as well as details on the works carried out with financial allocations on possible cases. In order to assess the kind of works undertaken to augment the water resources through on-going government schemes viz MGNREGA and other line departments schemes under convergence mode, review of the available documents - reports, policy documents, technical briefs, research papers etc were carried out (indicator 1 and 2).

At the second level on output level results, data were collected from 11 grama panchayats (GP) in the district, one GP from each block was selected. This was identified in consultation with the district officials and the list is given in the table 3. The table provides the details of the total population and households, number of hamlets and the geographical extend. To understand the demand for the employment, proportion of women's participation and social inclusion as well as type of NRM works carried out along with the expenditure were studied to know the status. It was done by consulting the documents such as : (a) Records of the district annual report to Rural Development on the works done and proposed activities for the year 2018-19 (in the month of February) - Report no.6 and (b) MGNREGA activities details (both physical, financial and list of workers undertaken - annual list/figures) in those selected GPs for five

years ending 2018-19 (2014-15 to 2-18-19)². Also, the data on existing drinking water sources, tap connection and water use for agriculture - area under irrigated and rainfed systems as well as area under paddy cultivation which is the main crop grown having high water requirement was collected from the secondary sources.

Besides, individual discussions was held with the district officials and observed the key issues discussed in the district level meetings and with the block officials to understand the trends in climate change issues and extreme events. Also, to understand the support from CII about the corporate company's that are supporting water management, the study done by IWMI and GIZ at the central level was consulted³. Alongside, a discussion was held with NABARD officials and local Civil Society Organizations to assess the kind of private sector contribution in water related issues. Also, discussion was had with district officials to know the private sector's engagement on water management before 2018-19.

Table 3. List of villages identified for baseline study

S. No	Name of the Block	Name of the panchayat	Total Housholds	Name of the hamlets	Total populations	Geographical area of GP (Ha)
1	Bogalur	Seiyalur	268	Yathava kudiyruppu, Seyyalur, Muhamathiyapuram	680	629
2	Kadaladi	Kokkarasankottai	208	Kokkarasankottai	902	775
3	Kamuthi	Keelaramanathi	446	Keelaramanathi	1597	1118
4	Mandapam	Thamaraikulam	968	A.d.colony, Keelamankundu, Melamankundu, Valangapuri, Tamaraiikulam	3362	551
5	Mudukulathur	Kumarakurichi	390	Eruthankulam, Ramalingapuram, Kumarakurichi, A.D.Colony	1547	619
6	Nainarkoil	Arasanur	335	Agaram, Arasanur, A.D.Colony	1002	712
7	Paramakudi	Melakavanur	279	Muthuramalingapuram, Thangaiyapuram and Melakavanur	1080	347

² source: [www. https://www.nrega.nic.in/netnrega/mgnrega_new/Nrega_home.aspx](https://www.nrega.nic.in/netnrega/mgnrega_new/Nrega_home.aspx)

³ *Convergence and co-financing opportunities for Climate-resilient water management, WASCA, GIZ, June 2020, in partnership with IWMI, Min. of Jal Shakthi and Min of Rural Development, GoI.*

8	Ramanathapuram	Karendhal	450	Kumariyendhal and Karendhal	1313	713
9	R.S.Mangalam	Sengudi	211	Chinna sengudi and Sengudi	735	449
10	Thiruppullani	Komboothi	292	Kamboothi	1525	880
11	Thiruvadana	Nagarikathan	515	Nagarikathan	2475	623

Baseline Assessment – Current status

Indicator 1:		
7 existing schemes and financing mechanisms apart from <i>MGNREGS</i> , comprise approaches for an integrated, climate-adapted water resource management in rural areas.	Evaluation of agreed planning documents at the national, states and local level, qualitative content analysis of financing proposals.	The schemes of both government (state and central) and private sectors which were implemented focusing on integrated water resources management and climate adaptation on district level was reviewed to understand its intensity of works and reach, the details are given below:

No.	Name of the schemes	About the programme details in the scheme/policy reference	Specific allocation to district
1	<i>Kudimaramath:</i> Tamil Nadu Water Resource Conservation and Augmentation Mission	The Government have given Orders in G.O (Ms) No.96, RD & PR Dept., Dated. 26.7.2019 for the implementation of Kudimaramathu – A participatory Programme for the Rejuvenation of 5,000 Minor Irrigation (MI) Tanks under the 142 control of Panchayat Unions and 25,000 Ponds / Kuttai and Ooranes of Village Panchayats at a cost of Rs.1250 Crore.	The details of allocation to the Ramanathapuram district is restoration of 70 tanks and details are given here
2	Tamil Nadu - Irrigated Agriculture Modernization and Water-Bodies Restoration	Under Phase II and III total five sub basins are covered which aims to increase the water use efficiency and productivity and the scheme is supported by	Uthirakosamangai - 9963 Ha Vembar - 1789 Ha Palar - 2598 Ha Girdhamal - 24934 Ha and lower Gundar - 2178 Ha

	and Management (TN-IAMWRM)	World Bank and implemented through Govt of Tamil Nadu	
3	Rainwater Harvesting and Runoff Management Programme	It is a state plan scheme and the kind of works undertaken are percolation ponds, major, medium and minor check dams, farm ponds, rejuvenation of unused wells, village tanks/ooranies	Allocation details are not given and it is taken under convergence with watershed development programmes
4	Mission on Sustainable Dryland Agriculture	Rain water harvesting is adopted as an entry point activities and promoted water harvesting structures such as checkdams, village ponds, community ponds and deepening of Ooranies	Rs 5 lakh per cluster was adopted and for the 24 cluster the total budget for the work in this district was Rs 1.20 Cr.
5	Tamil Nadu Watershed Development Agency (TAWDEVA)	<i>Micro Irrigation scheme under Per Drop More Crop component</i>	Implemented with 100% subsidy for small and marginal farmers, in Ramanathapuram district in the year 2017-18, Rs.113.00 lakhs was allocated which covered 200 ha
		<i>Pradhan Mantri Krishi Sinchayee Yojana (Integrated Watershed Management Programme)</i>	Implemented through 24 District Watershed Development Agencies in 26 Districts covering 2770 watersheds and Rs 5.32 Cr was allocated to the district out of Rs 115.16 Cr for the whole state, through this 123 works were completed, major ones are farm ponds, recharge shaft, renovation of pond, percolation pond and new pond
6	<i>Jal Shakthi Abiyan</i>	Importance was given to the water augmentation initiatives, specifically the block is categorized as saline by CGWB	One block was identified Kadaladi, in which 60 GPs and works are promoted on NRM works such as check dams, trenches
7	<i>Jal Jeevan Mission</i>	The scheme is started from 2019-2020 - focus is given on drinking water	In Ramanathapuram the focus under this scheme has been initiated in 8 blocks, at the state level during 2019-20, Rs 373.87 Cr was allocated to provide tap connections to 13.86 lakh households

Indicator 2.		
Financing decisions at the district and GP level take into consideration approaches for an integrated, climate-adapted water resource management in rural areas.	Financing decisions have been taken the last 5 years under MGNREGA and seven different schemes consider IWRM	Based on the analysis of the 11 GPs, MGNREGA is the primary scheme focusing on water management from both community and individual resources, in that during the in the initial years of this assessment, the financial decisions on water management works were very less - < 40% but during 2018-19 it has increased to around 70%. In addition, eight main schemes which supported for the integrated water management to strengthen the water bodies to capture and store more surface water from the runoff is given below, but still the climate change analysis was not explicit but decisions are supporting the farmers to adapt to the risks of different climate change events - seasonal drought, intra seasonal distribution of rainfall etc
	Under which scheme/ programme these financing decisions have been taken	As indicated above MGNREGA is the main scheme contributing to this, apart from that seven different schemes were covered

A. MGNREGA: As mentioned above in the methodology, from the analysis of 11 GPs, it is evident that the households demanding employment, participation of women, proportion of households completed 100 days, percentage of NRM work and corresponding expenditure over 11-grama panchayats has been increasing from year 2018-19 compared to the previous years since 2015-16 (detailed analysis is given under discussion section indicator 2.1). However, the soil and water conservation works were carried out based on the local needs such as desilting of water bodies, strengthening the peripheral field bunds, water absorption trenches, constructions of earthen check dams, development of dug wells, masonry anicuts, percolation tanks, block and line plantations etc. On the supply side, the above-mentioned works were identified based on the local context and on an average less than 10 NRM works are taken in a year per GP in the initial years and increased to more than 20 works per GP since 2018-19. The implemented work was identified based on the local demand. The primary watershed principle of “ridge to valley” is adopted keeping the village context and planning is done at the GP level without looking into the upstream status. On the demand side, the total water requirement for the drinking for the whole village is largely depend on either bore or open wells supplemented by tanks. Few villages have piped water connection, largely through public connections. In case of agriculture, surface water source is the primary source of water complemented by open

wells in few villages. Wherever surface water sources are supporting agriculture, paddy is the primary crop and in few places chillies, sugarcane and ragi are cultivated using ground water. At the overall level the area under rainfed is higher than the irrigated area.

B. Other schemes: In addition to the MGNREGA works focusing on natural resources management, following are the schemes implemented in the district with specific to IWRM and climate adaptation works

1. Kudimaramath: Tamil Nadu Water Resource Conservation and Augmentation

Mission:

The Government of Tamil Nadu has been implementing *Kudimaramath* scheme to revitalize defunct small water bodies minor irrigation tanks, lakes, ponds and ooranies in rural areas since March 2017. Through this scheme, an attempt has been taken to revive the traditional practice of self-maintenance of water bodies by the user groups at the village level. The scheme is being implemented by aligning with the objectives of *Jal Shakti Abhiyan* and works in convergence with MGNREGA for the works related to inlet, outlet management, surplus weir repair etc. The scheme reiterates the participation of user community, in which water users' association (WUA) is mentioned as the executing authority, that are defunct in most cases. During 2019, in Ramanathapuram, 70 tank restoration works were carried out with a value of Rs 3821.60 lakhs in Paramakudui (15 works), Ramanathapuram (3 works), Mudukulathur (26 works) and Thiruvadana (26 works) blocks⁴. Apart from this 224 MI tanks and 988 ponds were restored during last year.

2. Tamil Nadu - Irrigated Agriculture Modernization and Water-Bodies Restoration and Management (TN- IAMWRM)

It is a multi-disciplinary project funded by World bank implemented by Water Resources Organization in which under phase 3 and 4 following sub basins were covered⁵

- Palar
- Lower Gundar
- Uthiragosamangai
- Vembar and
- Girdhamal nadhi

The main goal of the project is to attain sustainable economic growth and poverty reduction through maximizing the productivity of water. Water saving technologies, climate resilient works and crop diversification. The main technologies promoted in the district were System of Rice Cultivation, mulching, protected cultivation with micro irrigation.

⁴ http://www.wrd.tn.gov.in/Kudimaramath_2019-20_list_of_works.pdf

⁵ <http://www.iamwarm.gov.in/IAMWARM/OLD/index.asp>

3. Rainwater Harvesting and Runoff Management Programme (RHRMP): The main objectives of the project is to harvest rainfall for its use and ground water recharge, increase soil moisture and to prevent soil erosion. It is implemented by Agriculture Engineering Department. The works under this scheme were carried out in watershed approach with 100% grant on works in community lands with harvesting structures such as check dams, village ponds, community ponds, sunken ponds, deepening of Ooranies⁶.

4. Mission on Sustainable Dryland Agriculture (MSDA): This project is being implemented since 2017 in the district by Department of Agriculture with the objectives of enhancing water resources in the dry land managed by individuals. The main activities are construction of on farm water harvesting structures such as field bunding and farm ponds in the identified clusters of the dryland districts. In Ramanathapuram the scheme supported to reach 24000 ha in 24 clusters over three years from 2016-17 and reached 25540 dry land farmers⁷.

5. Tamil Nadu Watershed Development Agency (TAWDEVA): There are two main watershed development programmes are being implemented in the state:

5.1). Micro Irrigation scheme under Per Drop More Crop component: The scheme is being implemented to improve the water use efficiency of garden and dry land crops with 100% subsidy to Small and Marginal farmers and 75% subsidy to Other farmers. In Ramanathapuram district in the year 2017-18, Rs.113.00 lakhs was allocated which covered 200 ha for the Horticulture crops⁸.

5.2). Pradhan Mantri Krishi Sinchayee Yojana of Govt of India: The integrated watershed development programme has been renamed as PMKSY and it was implemented in Ramanathapuram district with a total financial allocation of Rs 5.32 Cr in the district⁹.

5.3) Watershed Development Fund (WDF) assisted by NABARD

6. Jal Shakthi Abiyan(JSA): During 2018-19, the work was focused on saline category block namely Kadaladi, in which 60 GPs on NRM works such as check dams, trenches etc were undertaken to strengthen the water supply sources¹⁰.

7. Jal Jeevan Mission (JJM): The scheme is in operation in 2019-2020, specifically focusing on ensuring rural household water supply with the vision to “provide Functional Household Tap Connection to every rural household by 2024.” The scheme focus on development of storage including overhead tanks and sumps, source like open and bore wells and infrastructure (supply pipelines). During this year it is targeting to reach 51 GPs in 8 blocks and convergence with MGNREGA has been initiated for the open wells. As a co-financing option restoration of

⁶ http://www.agritech.tnau.ac.in/agricultural_engineering/agriengg_govt_schemes.html#scheme6

⁷ <http://164.100.134.74/horti/tnhorticulture/application/site/Final%20Policy%20note%20English.pdf> (page no. 60)

⁸ <https://ramanathapuram.nic.in/departments/horticulture/>

⁹ <http://164.100.134.74/horti/tnhorticulture/application/site/Final%20Policy%20note%20English.pdf> (page no. 351)

¹⁰ Key informant interview with the district official 10 July 2020

ponds and ooranis are being undertaken with the financial assistance of State Finance Commission¹¹.

Other than this, there are a number of other central schemes such as National Food Security Mission (NFSM), National Horticulture Mission (NHM) and state specific fallow land development scheme activities have been focusing on agriculture and horticulture, provisions for constructing and maintaining farm ponds, dug wells and tanks exist to ensure sustainable water supply for agriculture. Also, under *PMKSY- Har Khet Ko Pani (HKKP)* water bodies had been included under Repair, Renovation and Restoration framework and completed of water bodies in 2017¹².

Private sector schemes: There are two NGOs and three private sector institutions under the Corporate Social Responsibility programme had partnered with a civil society organization in the district to implement the watershed schemes joining with NABARD.

Output 2:	Indicator 2.2:	
Water resource management at the local level increasingly takes into consideration integrated climate-adapted approaches.	30 decisions of GPs on water management measures are in line with the integrated, climate-adapted water resource management with equal participation of women and men.	GP records, minutes of meetings, analysis of the decisions with regards to overarching principals of an integrated climate adapted water resource management. Standardised guided interviews / surveys with participating GPs about the use of the conveyed knowledge for the decision taking; analysis of the documentation of user groups with regards to gender participation.

Analysis of the data from the above mentioned sources

The Grama Panchayat wise detailed analysis of the data is given below:

1) Seiyalur Grama Panchayat, Bogalur Block

The Seiyalur Grama panchayat is coming under Bogaur block of Ramanathapuram District. The Grama Panchayat has covers three habitations namely, Yathava Kudiyiruppu, Seyyalur and Muhamathiyapuram. The GP has 268 households and 680 populations. With reference to the existing drinking water sources it does not have tap connections and it has one open well and four borewells. Also, there is no roof top rainwater harvesting structures in the GP. It has 133 ha under irrigated area of which 92 ha is under paddy and 22 ha under dry chilli cultivation while 11 ha is under rainfed cultivation with crops like rainfed paddy and cotton. The village men and women has expressed that in the last two decades they have been observing vast

¹¹ Key informant interview with district official, 20 July 2020

¹² <https://sureshe.files.wordpress.com/2018/01/au4298.pdf>

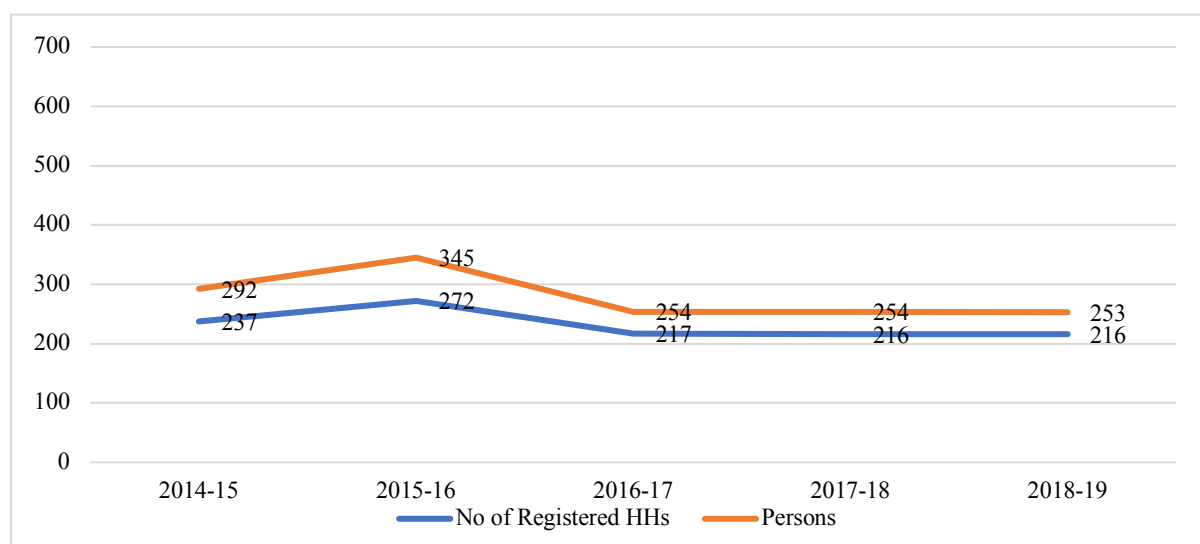
changes in the rainfall pattern especially in the onset of monsoon and intra season distribution along with increasing inter-annual variability.

This has adverse impacts on crop productivity and farmers income as this village has dependent primarily on the surface water sources for agriculture (77%). With regard to work under MGNREGA, the total number of registered job cards in Seiyalur has decreased from 237 in 2014-15 to 216 in 2018-19. Likewise, the number of registered workers under MGNREGS also decreased from 292 to 253 during the same period (Fig 1.). The registered job cards and workers were increased during 2014-15 and 2015-16, but reported decline in 2016-17 and remain same in the following years.

Table 4. Details of MGNREGS participation in Seiyalur GP, Bogalur block

Year	Employment demanded & provided HHs (%)	% of Women	% of HHs completed 100 days	% of SC
2014-15	90.30	87.21	4.69	45.95
2015-16	80.15	88.91	44.95	45.18
2016-17	97.24	89.66	61.14	42.66
2017-18	78.70	88.17	0.59	43.36
2018-19	82.41	90.30	42.70	47.20

Fig.1. No. of Registered Households and Persons under MGNREGS in Seiyalur GP, Bogalur block



Of the total households more than 90 percent of the households demanded and provided employment under MGNREGS during the years 2014-15 to 2016-17. The percentage of households demanded and provided employment were declined in 2017-18 into 79% and the

recorded marginal increase in 2018-19. Overall, the percentage of households demanded and provided employment during the five years were declined from 90 percent to 82 percent (**Table 4**). At the meantime, the percentage of women participation had increased from 87 percent to 90 percent during the same year. In other words, nine out of 10 workers are women workers under MGNREGS in Seiyalur Grama Panchayat.

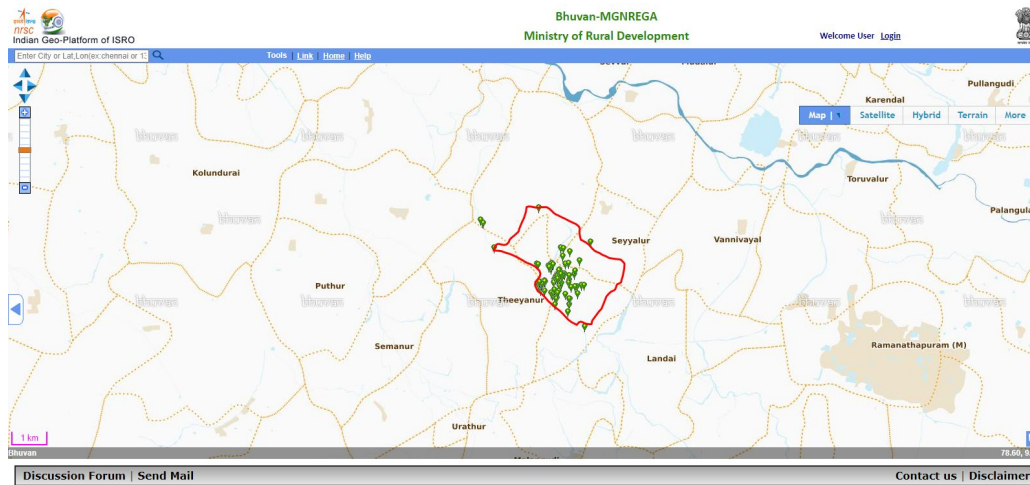
The percentage of household completed 100 days reported increase during the five years, from just 5% in 2014-15 to 43% in 2018-19; however, the percentage reported fluctuations in every year. It was even less than one percent in 2017-18. Of the total MGNREGS workers, more than two-fifth of them were from Scheduled Caste. The proportion reported a marginal increase from 46% to 47% during the five years.

Of the total expenditure, public works relating to NRM reported major share in all five years, except 2015-16. It was 71% in 2014-15, and then it was down to 49% in 2015-16; however, the proportion had increased into 73% in 2016-17. It remains 71% in 2018-19. The number of public works on NRM was 32 in 2018-19 which showed a dramatic increase from just three works in 2014-15. It was mainly due to renovation of traditional water bodies. This is the only category that reported double figure in works undertaken under this category. Other works such as water management and water conservation activities were 3 and 2 in 2018-19. Moreover, renovation of traditional water bodies was the only work that consistently undertaken during the five years (**Table 5**) and activities undertaken in the panchayat during 2018-19 in map 1.

Table 5. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Seiyalur GP, Bogalur Block (Expenditure in Rs. Lakh)

Work Category	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure
Water Conservation	0	0	0	0	0	0	2	0	2	0.59
Watershed management	0	0	0	0	0	0	0	0	3	4.54
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	3	8.48	4	21.36	3	18.29	3	11.52	25	17.67
Afforestation	0	0	0	0	0	2.52	2	1.12	1	0.4
Land development	0	0	2	0.12	0	0	0	0	1	0
Total	3	8.48	6	21.48	3	20.81	7	12.64	32	23.2

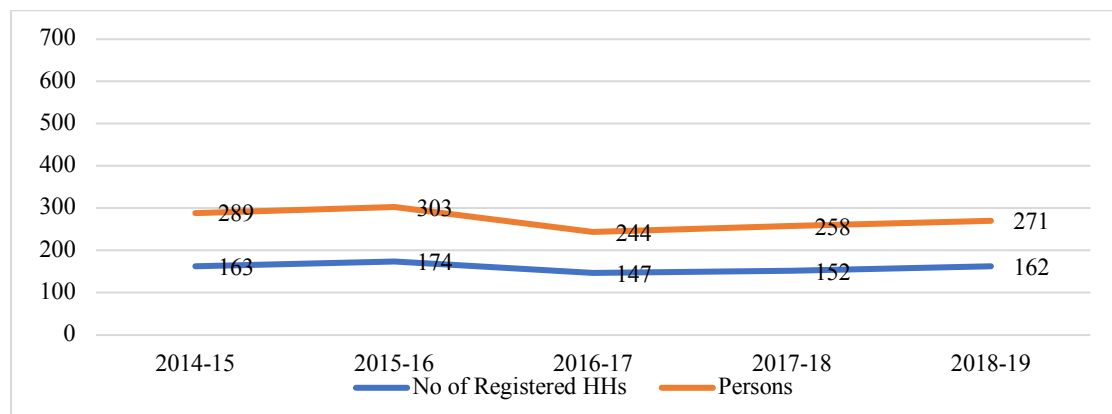
Map 1. Seiyalur Grama Panchayat MGNREGA Map for 2018-10



2. Kokkarasankottai Grama Panchayat, Kadaladi Block

Kokkarasankottai Grama panchayat is coming under Kadaladi block of Ramanathapuram District. The Grama Panchayat doesn't have any additional habitation and the geographical area is 775 hectares. There are 208 households and 902 people in the GP. The village don't have access to tap water connection and the main sources for drinking water is two open wells, two bore wells and one tank. The village has 395 ha under irrigation area and 1061 ha under rainfed cultivation. The key climate risks are frequent high intensity winds and, cyclones which trigger the sea surges, changes in the wind pattern from sea along with the changes in the monsoon rainfall pattern. Total number of registered job cards in Kokkarankottai is more or less same over the last five years. It was 163 in 2014-15 and 162 in 2018-19. The registered households had increased in 2015-16 into 174, but then declined to 147 in the next year and then to 152 in 2017-18. (See Figure 2.)

Fig.2. No. of Registered Households and Persons under MGNREGS



Of the total households more than two-thirds of the households demanded and provided employment under MGNREGS in 2014-15; but declined into 59% in 2018-19. The percentage reported fluctuations in all five years under consideration. It was just 45% in 2017-18 and then increased in the next year (**Table 6**). Another important observation for Kokkarasankottai GP is the percentage of women's participation under MGNREGS. It was only three-fifth in 2014-15; but increased into three-fourth in 2018-19. The proportion is relatively lower than the district and state average. The percentage of household completed 100 days were reported fluctuation and always very minimum except 2016-17 and 2018-19. Even in these years, the proportion was not even two-fifth of the total households that provided employment under MGNREGS. The percentage of SC participation to the total workers under MGNREGS reported a decline from 37% to 26% during the five years. Here is no ST population in the Grama panchayat.

Table 6. Details of MGNREGS participation in Kokkarasankottai GP, Kadaladi Block

Year	Employment demanded & provided HHs (%)	% of Women	% of HHs completed 100 days	% of SC
2014-15	66.3	60.7	12.0	36.7
2015-16	56.3	72.4	3.1	33.7
2016-17	59.2	77.0	39.1	34.0
2017-18	44.7	86.7	0.0	34.0
2018-19	58.6	73.7	37.9	26.3

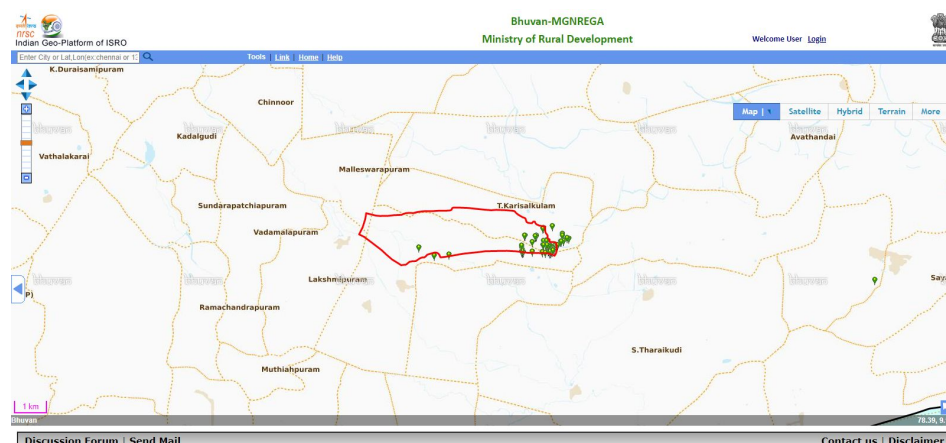
With reference to works undertaken under MGNREGS during 2014-15 to 2018-19 in Kokkarasankottai under NRM is given in Table 7. Of the total expenditure, public works relating to NRM reported significant share in all five years. It was nearly two-fifth in 2014-15 and then declined to less than one-third in 2015-16; but almost all funds used for NRM related works in 2016-17, more than half of the funds used for NRM in 2017-18 and fell down to 44% in 2018-19. Rural infrastructure related works acquires importance in all the years under consideration, except 2016-17 and other works are undertaken during 2017-18 only. The number of public works on NRM was 24 in 2018-19 which was a dramatic increase from 10 in the previous year. It was mainly due to renovation of traditional water bodies activities in 2018-19. Mostly no other works undertaken except renovation of traditional waterbodies in all the five years. An analysis of expenditure of NRM on different sub-activities reveals that

renovation of traditional water bodies grabbed entire amount in 2015-16 and 2016-17. Other categories are yet to explore, particularly irrigation related works.

Table 7. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Kokkarasankottai GP, Kadaladi Block (Expenditure in Rs. Lakh)

Work Details	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure
Water Conservation	0	0	0	0	0	0	0	0.05	3	0.15
Watershed management	0	0	0	0	0	0	0	0	1	0
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	3	4.98	3	7.3	3	8.53	9	8	17	7.24
Afforestation	0	0	0	0	0	0	1	0.44	2	0
Land development	0	0	0	0	0	0	0	0	1	4.95
Sub Total	3	4.98	3	7.3	3	8.53	10	8.49	24	12.34

Map 2. Kokkarasankottai Grama Panchayat MGNREGA Map for 2018-19

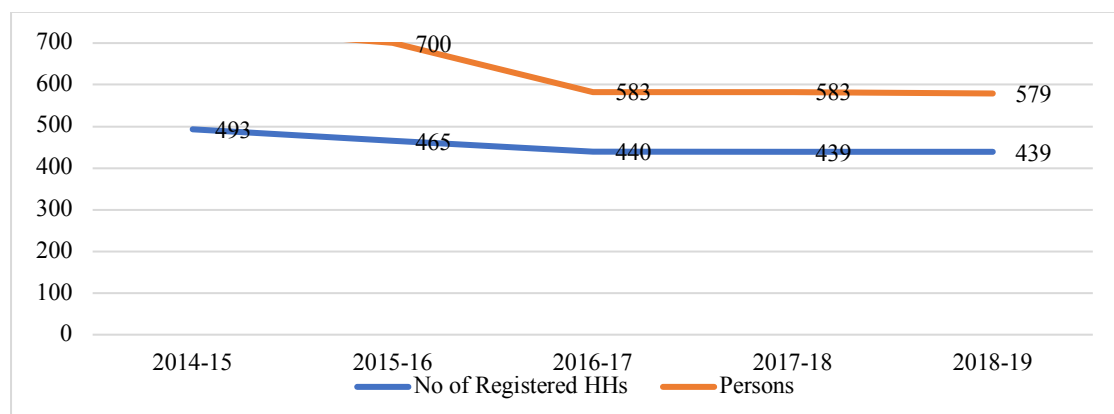


3. Keelaramanathi Grama Panchayat, Kamudhi Block

Keelaramanathi Grama panchayat is coming under Kamudhi block of Ramanathapuram District. The Grama Panchayat doesn't have any other habitation. Total geographical area of the grama panchayat is 1118 hectares. The GP has 446 households and 1597 population. 41% of the households have individual connections and 3% only have public connections. The village has four borewells and do not have any rainwater harvesting structures. The area under irrigation is 179 ha and 500 ha under rainfed lands, of this 78% is under rainfed paddy. The key changes experienced by the farmers are delay in the onset of monsoon with increasing

years of intra seasonal drought. Total number of registered job cards in Keelaramanathi has declined from 493 in 2014-15 to 439 in 2018-19. Likewise, the number of registered workers under MGNREGS also declined from 700 to 579 during the same period (See Figure 3.)

Fig.3. No. of Registered Households and Persons under MGNREGS in Keelaramanadhi GP, Kamudhi Block



Of the total households more than four-fifth of the households demanded and provided employment under MGNREGS during the years 2014-15 to 2018-19. However, the percentage of households demanded and provided employment declined from 88% in 2014-15 to 86% in 2018-19 (Table 12). The percentage of women workers to total workers under MGNREGS also increased from 80% in 2014-15 to 86% in 2018-19. The percentage of household completed 100 days was always negligible during the five years; it reached double figure in 2018-19 only. The percentage of SC participation to the total workers under MGNREGS was less than 10% for all five years. It is because the proportion of SC to total population itself is less one-tenth. There is no ST population in the grama panchayat.

Table 12. Details of MGNREGS participation in Keelaramanadhi GP, Kamudhi Block

Year	Employment demanded & provided HHs (%)	% of Women	% of HHs completed 100 days	% of SC
2014-15	87.6	79.8	1.9	4.5
2015-16	94.4	82.6	4.1	4.4
2016-17	97.0	81.3	5.9	4.0
2017-18	81.3	85.6	0.0	7.7
2018-19	84.5	85.3	10.0	3.3

Of the total expenditure, public works relating to NRM reported major share in three out of five years. Even for the remaining two years, the share of NRM was 46% and 49%. Overall,

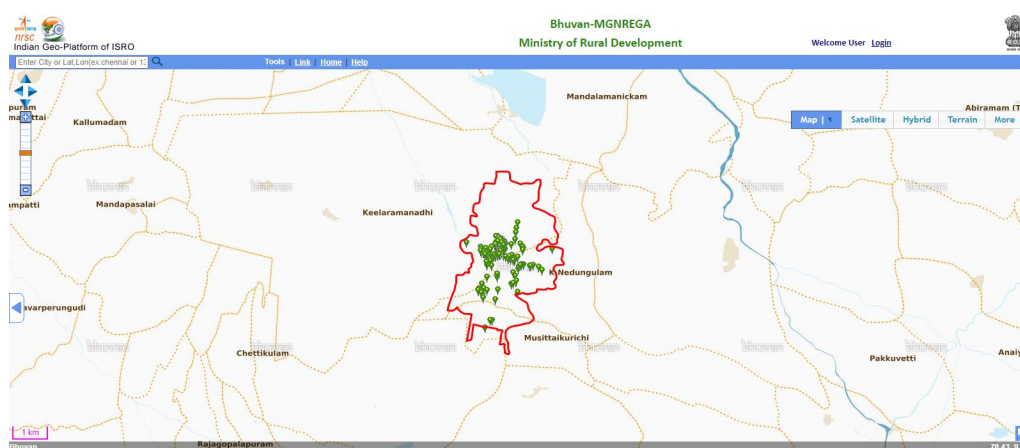
the proportion has increased from 70% in 2014-15 to 84% in 2018-19. Rural infrastructure related works acquires second importance in all the five years. This category reported highest share during 2015-16 and 2016-17 (Table 13) .

The number of public works on NRM was 36 in 2018-19 which was a dramatic increase from nine in the previous year. It was mainly due to renovation of traditional water bodies and afforestation activities in 2018-19. These two categories reported some works done during the five years; water conservation and water management activities were done in the year 2018-19 only (Table 15). An analysis of expenditure of NRM on different sub-activities reveals that afforestation activities grabbed entire amount in 2015-16 and 2016-17 (**Figure 9**). In all five year, among spent on renovation of traditional water bodies is significant. Other categories are yet to explore, particularly irrigation related works.

Table 13. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Keelaramanadhi GP, Kamudhi Block (Expenditure in Rs. Lakh)

Work Details	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure
Water Conservation	0	0	0	0	0	0	1	0.59	9	18.48
Watershed management	0	0	0	0	0	0	0	0	3	1.94
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	11	10.19	8	25.82	4	22.79	4	20.05	19	16.5
Afforestation	1	0	1	0.04	0	0	4	3.59	5	0.88
Land development	2	0.49	2	3.63	0	0	0	0	0	0
Sub Total	14	10.68	11	29.49	4	22.79	9	24.23	36	37.8

Map 3. Keelaramanathi Grama Panchayat MGNREGA Map for 2018-19

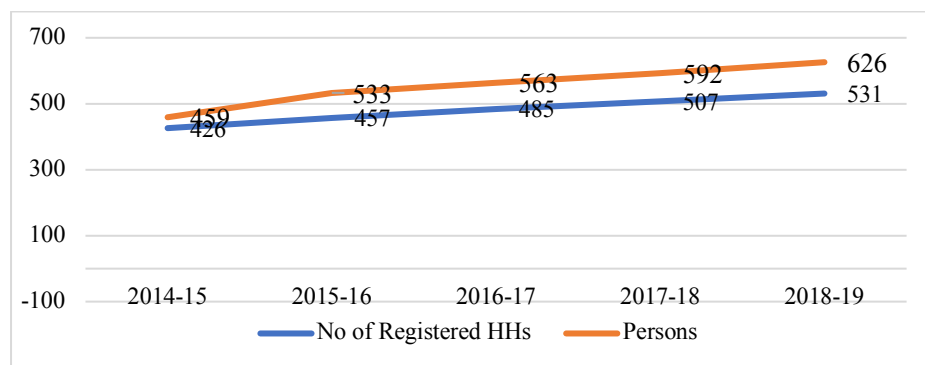


4. Thamaraikulam Grama Panchayat, Mandabam Block

Thamaraikulam Grama panchayat is coming under Rettaiyurani Revenue village in Mandabam block of Ramanathapuram District. The Grama Panchayat has covers five habitations namely, Keezhamankundu, Meelamankundu, AD Colony, Thamaraikulam and Valangapuri. Total area of Thamaraikulam Grama panchayat is 882 hectares. The GP has 968 households and 3362 population. 30% of the households have individual connections and 7% only have public connections and have 16 open wells.

The village has no borewells and do not have any rainwater harvesting structures. The area under irrigation is 333 ha and 473 ha under rainfed lands, of this 439 ha is under rainfed paddy. The key changes experienced by the farmers are frequent high intensity winds and, cyclones which trigger the sea surges, changes in the wind pattern from sea, changes in the monsoon rainfall pattern. Total number of registered job cards in Thamaraikulam has increased from 426 in 2014-15 to 531 in 2018-19. Likewise, the number of registered workers under MGNREGA also increased from 459 to 626 during the same period (See Figure 4.)

Fig.4. No. of Registered Households and Persons under MGNREGS



Of the total households more than two-thirds of the households demanded and provided employment under MGNREGS during the year 2018-19. However, the percentage of households demanded and provided employment fluctuated over the five year and it was maximum during the year 2015-16 at 88% (Table 16). Almost all workers are women and only very negligible proportion is from male, despite the number of registered households and workers increased over the period.

The percentage of household completed 100 days were maximum during the year 2016-17 at 58% followed by 42% in 2015-16. For remaining three years, the percentages are very

negligible. The percentage of SC participation to the total workers under MGNREGS was less than 10% for all five years. It is because the proportion of SC to total population itself is less one-tenth. There is no ST population in the grama panchayat.

Table 16. Details of MGNREGS participation in Thamaraikulam GP, Mandabam block

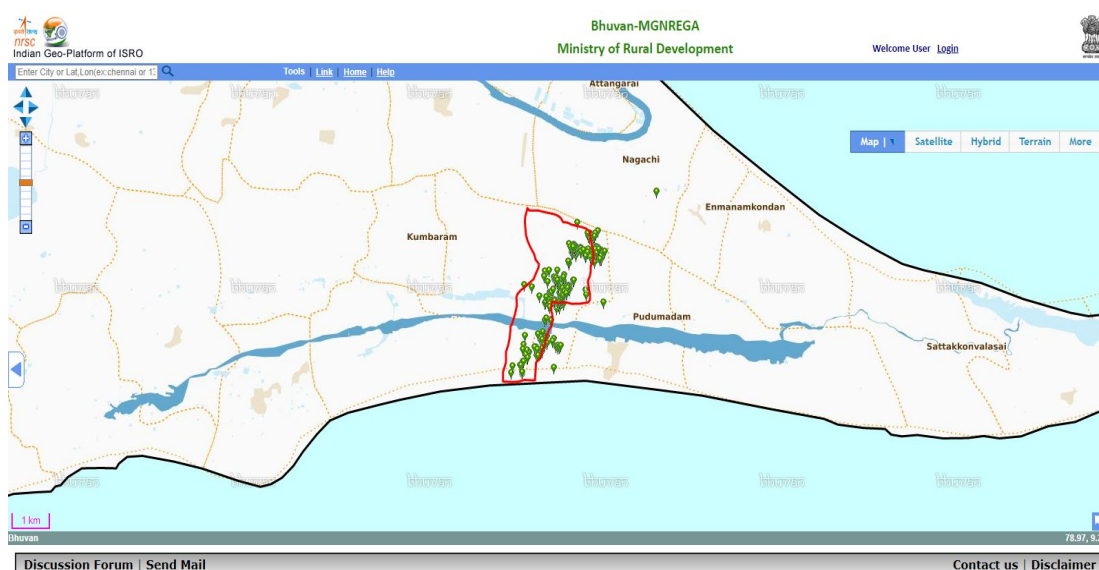
Year	Employment demanded & provided HHs (%)	% of Women participation	% of HHs completed 100 days	% of SC
2014-15	71.4	97.7	1.0	7.3
2015-16	87.7	97.5	42.4	7.9
2016-17	78.8	98.8	58.1	5.6
2017-18	72.4	94.4	1.4	9.6
2018-19	68.4	95.5	11.0	5.5

In the works undertaken under MGNREGS during 2014-15 to 2018-19 in Thamaraikulam, of the total expenditure, public works relating to NRM reported major share in all five years. It was 89% in 2014-15, 57% in 2015-16, reduced to 33% in 2016-17, increase to 66% in 2017-18 and then further increased to 78% in 2018-19. Rural infrastructure related works acquires second importance in all the five years; individual asset creation got some importance during 2015-16 and 2016-17. It was mainly on livelihood development activities. The number of public works on NRM was 22 in 2018-19 which was a dramatic increase from nine in the previous year. It was mainly due to renovation of traditional water bodies and afforestation activities in 2018-19. These two categories reported some works done during the five years; water conservation and water management activities were done in the year 2018-19 only. In all five year, among spent on renovation of traditional water bodies is significant. Other categories are yet to explore, particularly irrigation related works.

Table17. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Tamaraikulam GP, Mandabam Block (Expenditure in Rs. Lakh)

Work Category	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure
Water Conservation	0	0	0	0	0	0	0	0	1	1.93
Watershed management	0	0	0	0	0	0	0	0	2	2.46
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	3	8.01	1	0.55	0	0	2	10.73	14	24.49
Afforestation	2	2.18	3	35.32	0	14.51	7	15.84	5	4.82
Land development	0	0	0	0	0	0	0	0	0	0
Total	5	10.19	4	35.87	0	14.51	9	26.57	22	33.7

Map 4. Thamaraikulam Grama Panchayat MGNREGA work

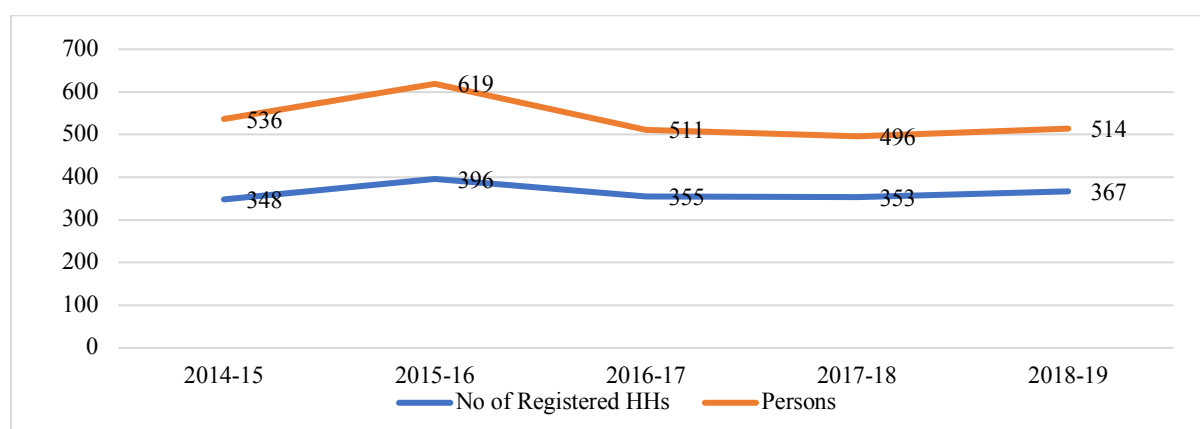


5. Kumarakurichi Grama Panchayat, Mudukulathor Block

Kumarakurichi Grama panchayat is coming under Mudukulathor block of Ramanathapuram District. The Grama Panchayat has covers four habitations namely, Eruthankulam, Ramalingapuram, Kumarakurichi and A.D.Colony. Total area of Kumarakurichi grama panchayat is 619 hectares. The GP has 390 households and 1547 population. The whole village has access to public tap connections which is the only source and there is no rainwater harvesting structures exist in the village. The area under irrigation is 112 ha and 189 ha under rainfed lands, of this 94 ha% is under irrigated paddy. The key changes experienced by the farmers are delay in the onset of monsoon with long dry spells leads to frequent crop losses. Total number of registered job cards in Kumarakurichi has increased from 348 in 2014-15 to 367 in 2018-19. However, the number of registered workers under MGNREGS decreased from 536 to 514 during the same period (See Figure 5.)

Of the total households 86% of the households demanded and provided employment under MGNREGS during the year 2018-19. However, the percentage of households demanded and provided employment fluctuated over the five year and it was maximum during the year 2016-17 at 97% (Table 20).

Fig.5. No. of Registered Households and Persons under MGNREGS in Kumarakurichi GP, Mudukulathor Block



More than four-fifth of the workers was women and the proportion reported an increase from 80% to 87% during 2014-15 to 2018-19. The percentage of household completed 100 days were maximum during the year 2016-17 at 44%; however, it was very negligible in 2014-15 and nil in 2017-18; it was only 14% in 2018-19. The percentage of SC participation to the total workers under MGNREGS was decline from 50% in 2014-15 to 41% in 2018-19. There is no ST population in the grama panchayat.

Table 20. Details of MGNREGS participation in Kumarakurichi GP, Mudukulathore Block

Year	Employment demanded & provided HHs (%)	% of Women	% of HHs completed 100 days	% of SC
2014-15	87.9	80.4	0.7	50.0
2015-16	83.1	86.4	15.5	43.6
2016-17	96.9	87.4	43.6	43.0
2017-18	90.1	84.8	0.0	40.8
2018-19	85.6	86.6	13.7	40.7

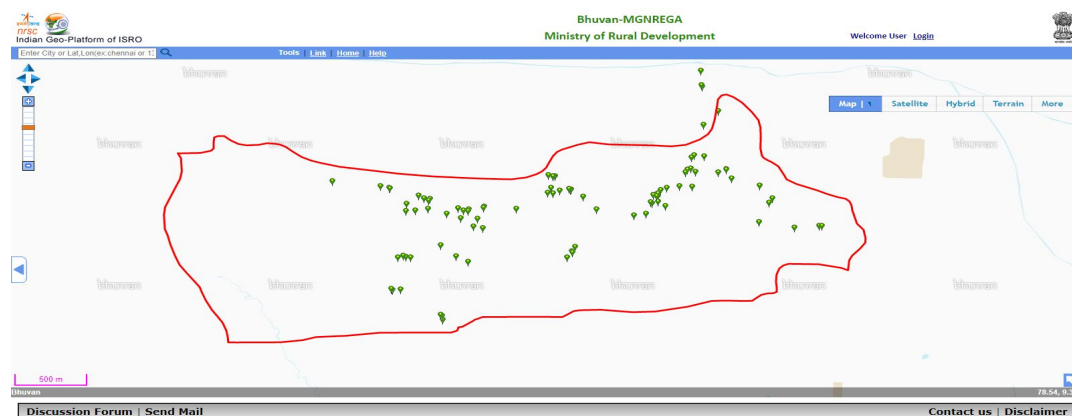
In the works undertaken under MGNREGS during 2014-15 to 2018-19 in Kumarakurichi, of the total expenditure, public works relating to NRM reported significant share for four out of five years. It was maximum at 93% in 2015-16. The proportion was 50% in 2018-19. Rural infrastructure related works acquires important position in terms of expenditure during 2014-15 and 2015-16. However, the proportion had declined in the next three years. Other works are not having considerable expenditure in the GP during the five years. The number of public works on NRM was 23 in 2018-19 which was a dramatic increase from three in 2014-15. It

was mainly due to renovation of traditional water bodies and afforestation activities in 2018-19. These two categories reported some works done during the five years; water conservation and land development activities were done in the year 2018-19 only. An analysis of expenditure of NRM on different sub-activities reveals that traditional water bodies in all five years.

Table 21. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Kumarakurichi GP, Mudukulathor Block (Expenditure in Rs. Lakh)

Work Details	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure
Water Conservation	0	0	0	0	0	0	4	0.77	2	3.54
Watershed management	0	0	0	0	0	0	0	0	2	8.85
Irrigation	0	0	0	0	0	0	0	1.02	0	0
Traditional water bodies	3	0	5	12.23	5	30.88	15	23.02	16	8.94
Afforestation	0	0	2	2.3	0	2.56	7	6.98	3	0.82
Land development	0	0	0	0	0	0.08	6	0.05	0	0
Sub Total	3	0	7	14.53	5	33.52	32	31.84	23	22.15

Map 5. Kumarakurichi Grama Panchayat MGNREGA Works



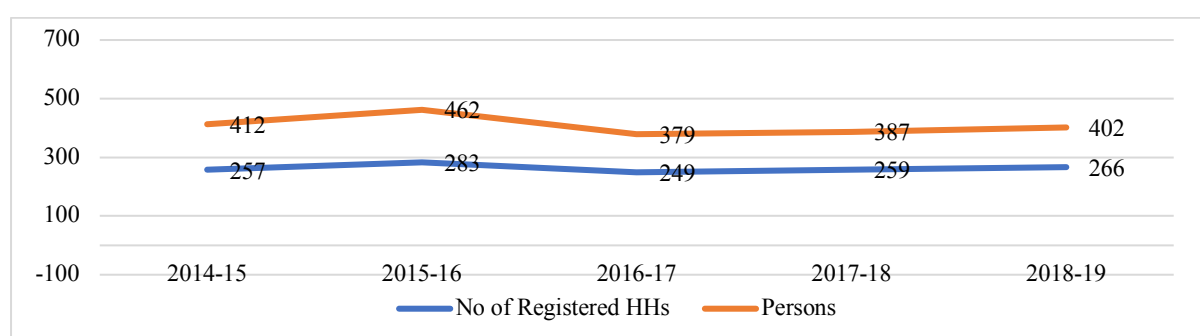
6.

Arasanur Grama Panchayat, Nainarkovil Block

Arasanur Grama panchayat is coming under Nainarkovil block of Ramanathapuram District. The Grama Panchayat has three habitations namely, Agaram, Arasanur and A.D.Colony. Total area of Arasanur is 712 hectares. The GP has 335 households and 1002 population.

The village do not have tap connections, has 2 bore wells and seven tanks for drinking water. There is no rainwater harvesting structures exist in the village. The area under irrigation is 145 ha and 148 ha under rainfed lands, of this 140 ha% is under irrigated paddy. The key changes experienced by the farmers are delay in the onset of monsoon with long dry spells leads to frequent crop losses. Total number of registered job cards in Arasanur has marginally increased from 257 in 2014-15 to 266 in 2018-19. However, the number of registered workers under MGNREGS has declined from 412 to 402 during the same period (See Figure 6.)

Fig.6. No. of Registered Households and Persons under MGNREGS in Arasanur GP, Nainarkovil Block



Of the total households more 90% of the households demanded and provided employment under MGNREGS during the year 2018-19 (Table 23). Almost all workers are women and only very negligible proportion are from male. The percentage of household completed 100 days were maximum during the year 2016-17 at 60% in 2016-17. For remaining three years, the percentages are very negligible. It increased to 26% in 2018-19. There is no SC and ST population in the MGNREGS activities.

Table 23. Details of MGNREGS participation in Arasanur GP, Nainarkovil Block

Year	Employment demanded & provided HHs (%)	% of Women	% of HHs completed 100 days	% of SC
2014-15	91.1	93.4	6.0	0.0
2015-16	84.8	92.5	12.1	0.0
2016-17	96.4	89.3	60.4	0.0
2017-18	86.5	87.0	0.9	0.0
2018-19	91.4	91.4	25.9	0.0

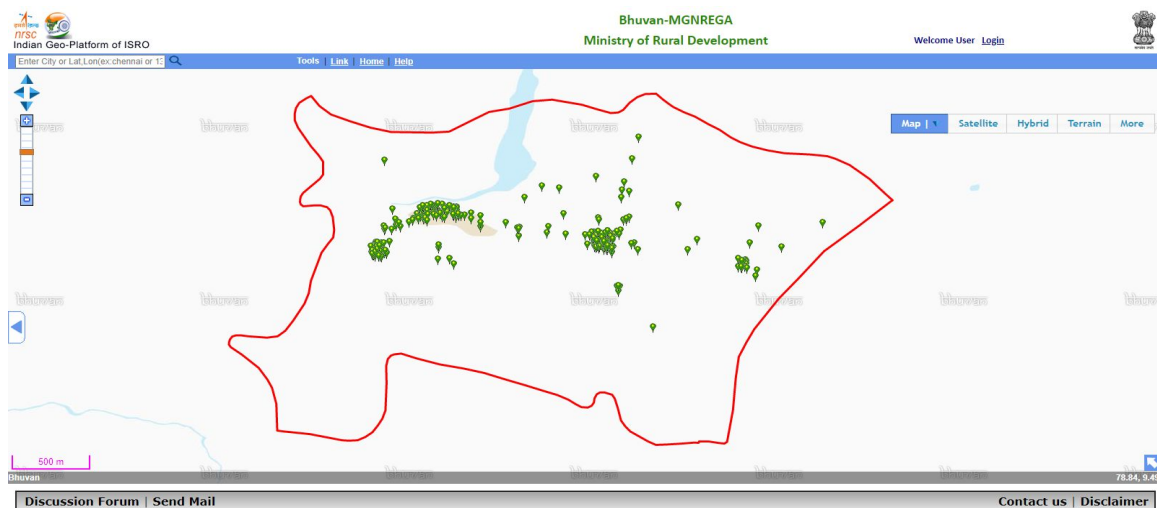
In the works undertaken under MGNREGS during 2014-15 to 2018-19 in Arasanur, of the total expenditure, public works relating to NRM reported major share in four of five years. It was 61% in 2014-15, then increased to 62% in 2015-16, fell down to 29% in 2016-17 and increase

to 79% in 2017-18 and then further increased to 93% in 2018-19. Rural infrastructure related works acquires second importance in all the five years. The number of public works on NRM was 29 in 2018-19 which was a dramatic increase from seven in 2014-15. It was mainly due to renovation of traditional water bodies and afforestation activities in 2018-19. In all five year, among spent on renovation of traditional water bodies is significant. Other categories are yet to explore, particularly irrigation related works.

Table 24. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Arasanur GP, Nainarkovil Block (Expenditure in Rs. Lakh)

Work Details	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure
Water Conservation	0	0	0	0	0	0	1	0	1	0
Watershed management	0	0	0	0	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	5	8.54	4	19.82	0	12.52	6	23.42	27	27.57
Afforestation	2	0.59	2	3.49	0	0.78	3	3.85	1	0
Land development	0	0	0	0	0	0	0	0	0	0
Sub Total	7	9.13	6	23.31	0	13.3	10	27.27	29	27.57

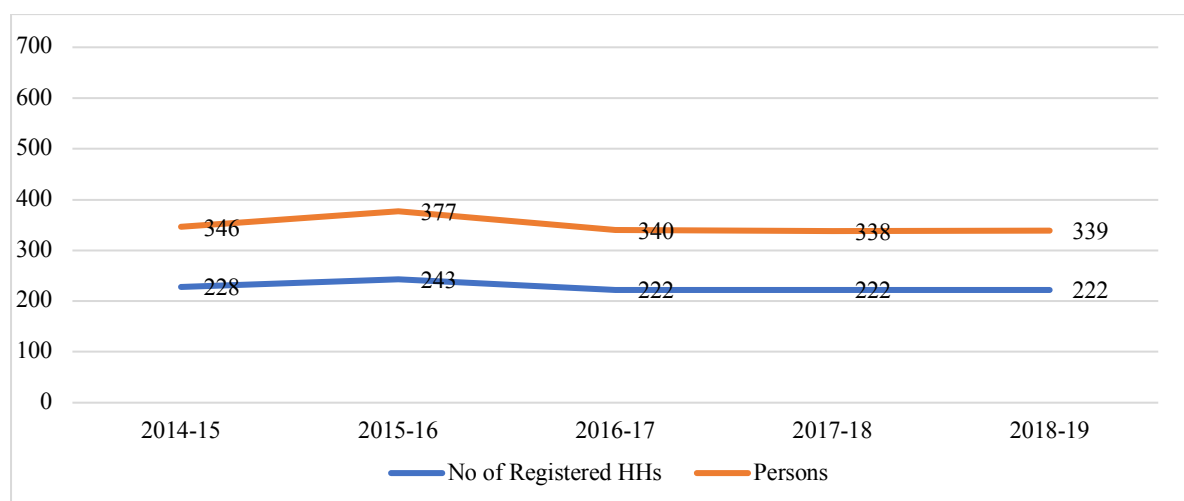
Map 6. Arasanur GP Map with MGNREGA work 2018-19



7. Meelakavanur Grama Panchayat, Paramakudi Block

Meelakavanur Grama panchayat is coming under Paramakudi block of Ramanathapuram District. The Grama Panchayat has covers the habitations of Muthuramalingapuram, Thangaiyapuram and Melakavanur. Total area of Meelakavanur grama panchayat is 347 hectares. The GP has 279 households and 1080 population. 67% of the households in the GP has public tap connections which is supplemented by five bore wells. There is no rainwater harvesting structures exist in the village. The area under irrigation is 55.23 ha and 114.5 ha under rainfed lands, of this 38.5ha% is under irrigated paddy. The key changes experienced by the farmers are delay in the onset of monsoon with long dry spells leads to frequent crop losses. Total number of registered job cards in Meelakavanur has marginally declined from 228 in 2014-15 to 222 in 2018-19. Likewise, the number of registered workers under MGNREGS also marginally declined from 346 to 339 during the same period (See Figure 7.)

Fig.7. No. of Registered Households and Persons under MGNREGS in Meelakavanur GP, Paramakudi block



Of the total households more than three-fourth of the households demanded and provided employment under MGNREGS during the five years. It was 81% in 2018-19. However, the percentage of households demanded and provided employment declined from 2016-17 to 2018-19 (Table 27). Women participation in MGNREGS was more than two-thirds and it was higher than the figure in 2014-15. The percentage of household completed 100 days were maximum during the year 2016-17 at 33%. It was 28% in 2015-16 and only 16% in 2018-19. For

remaining three years, the percentages are very negligible. There is no SC/ST works in the MGNREGS as no SC/ST population in the GP.

Table 27. Details of MGNREGS participation in Meelakavanur GP, Paramakudi Block

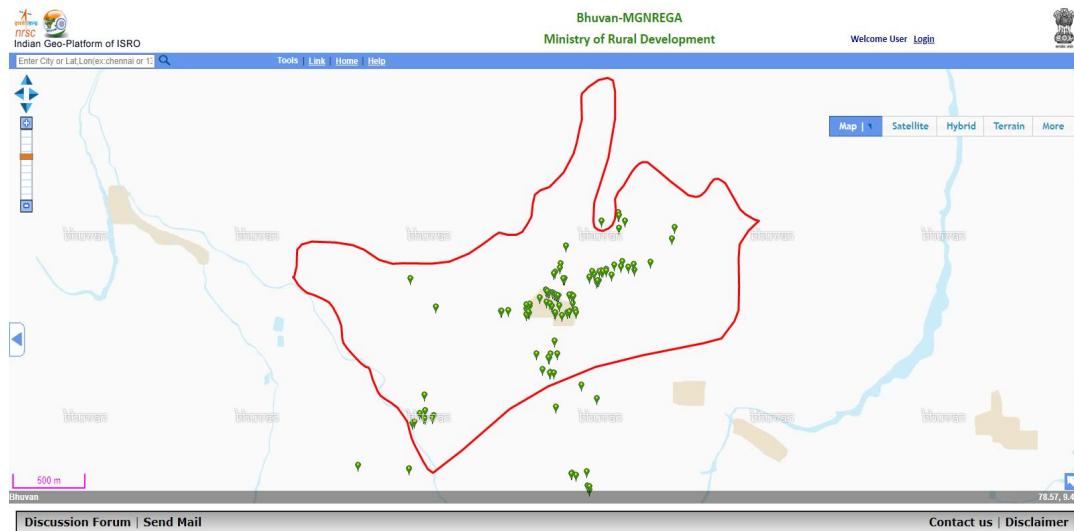
Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of Women	% of SC
2014-15	75.0	0.6	63.8	0.0
2015-16	82.7	28.4	70.9	0.0
2016-17	89.6	33.2	70.9	0.0
2017-18	84.2	0.0	77.4	0.0
2018-19	81.1	16.1	69.1	0.0

Works undertaken under MGNREGS during 2014-15 to 2018-19 in Meelakavanur, of the total expenditure, public works relating to NRM reported considerable share in four out of five years; there was no NRM works reported in the year 2017-18. NRM works constituted maximum proportion in 2015-16 and 2018-19; particularly, in 2018-19, almost all expenditure incurred was towards NRM under MGNREGS. Rural infrastructure related works also constituted important portion in all five years. The number of public works on NRM was 26 in 2018-19 and it was only 2 works in 2014-15. It was mainly due to renovation of traditional water bodies. Land development works also reported during the reference period in the GP.

Table 28 a. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Meelakavanur GP, Paramakudi Block (Expenditure in Rs. Lakh)

Work Details	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure
Water Conservation	1	0.04	0	0	0	0	0	0	0	0
Watershed management	0	0	0	0	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	1	0	2	17.14	2	9.91	1	0	25	18.63
Afforestation	0	0	0	0	0	0	1	0	1	0
Land development	2	1.03	1	1.12	0	0	0	0	0	0
Sub Total	4	1.07	3	18.26	2	9.91	2	0	26	18.63

Map 7 Meelakavanur GP MGNREGA work 2018-19

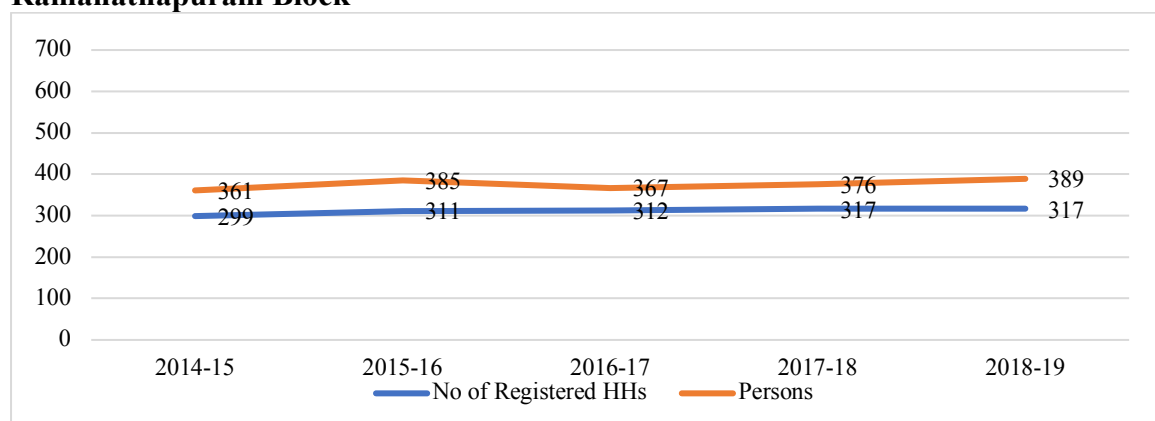


8. Karendal Grama Panchayat, Ramanathapuram Block

Karendal Grama panchayat is coming under Ramanathapuram block of Ramanathapuram District. The Grama Panchayat has two habitations namely, Kumariyendhal and Karendhal. Total area of grama panchayat is 713 hectares. The GP has 450 households and 1313 population.

67% of the households in the GP has public tap connections which is supplemented by two bore wells and four open wells. There is no rainwater harvesting structures exist in the village. The area under irrigation is 118.4 ha and 111 ha under rainfed lands, of this 46.8 ha% is under irrigated paddy. The key changes experienced by the farmers are frequent high intensity winds, changes in the wind pattern from sea as well as monsoon rainfall pattern, delay in the onset of monsoon with long dry spells leads to frequent crop losses. The total number of registered job cards in Karendal has increased from 299 in 2014-15 to 317 in 2018-19. Likewise, the number of registered workers under MGNREGS also increased from 361 to 389 during the same period (Figure 22.)

Fig.22. No. of Registered Households and Persons under MGNREGS in Karendal GP, Ramanathapuram Block



Of the total households more than three-fifth of the households demanded and provided employment under MGNREGS during the year 2018-19. However, the percentage of households demanded and provided employment declined from 89% in 2014-15 (Table 30). Almost all workers are women and only very negligible proportion are from male, despite the number of registered households and workers increased over the period. The percentage of household were completed 100 days negligible in all five years with the maximum of 8% in 2018-19. The percentage of SC participation to the total workers under MGNREGS was more than one-third and also increased during the five years in Karendal GP.

Table 30. Details of MGNREGS participation in Karendal GP, Ramanathapuram Block

Year	Employment demanded & provided HHs (%)	% of Women	% of HHs completed 100 days	% of SC
2014-15	88.6	92.3	0.8	33.8
2015-16	87.8	94.0	5.5	36.7
2016-17	89.1	91.3	2.9	37.3
2017-18	64.0	96.4	0.0	34.5
2018-19	78.5	92.1	8.0	37.1

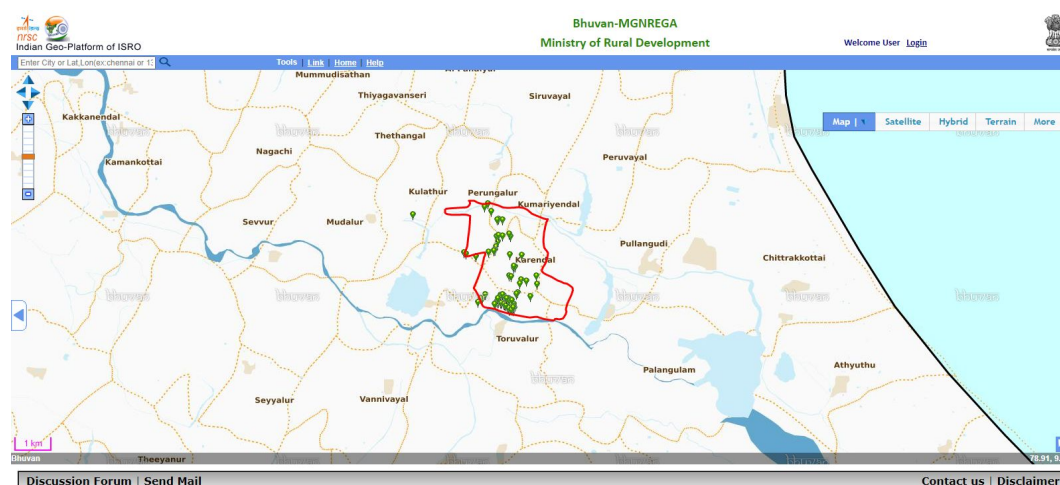
NRM Works undertaken under MGNREGS during 2014-15 to 2018-19 in Karendal, of the total expenditure, public works relating to NRM reported major share in all years except 2015-16. It was 85% in 2018-19; in 2015-16 it was 47% and rural infrastructure related works reported 51%. No significant amount spent for other works other than NRM and rural infrastructure in Karendal GP during 2014-15 to 2018-19. The number of public works on NRM was 21 in 2018-19 and increased from just seven works in 2014-15. It was mainly due to renovation of traditional water bodies and land development activities in 2018-19. These two

categories reported some works done during the five years; water conservation activities were done in the year 2018-19 only.

Table31. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Karendal GP, Ramanathapuram Block(Expenditure in Rs. Lakh)

Work Details	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure
Water Conservation	0	0	0	0	0	0	2	0.2	2	0.46
Watershed management	0	0	0	0	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	4	8.61	1	0.01	0	3.1	10	11.84	18	20.68
Afforestation	1	0.35	1	0	0	2.39	2	0	1	0.64
Land development	2	0	3	21.84	2	14.94	0	0	0	0
Sub Total	7	8.96	5	21.85	2	20.43	14	12.04	21	21.78

Map 8. Karendal GP MGNREGA work in 2018-19

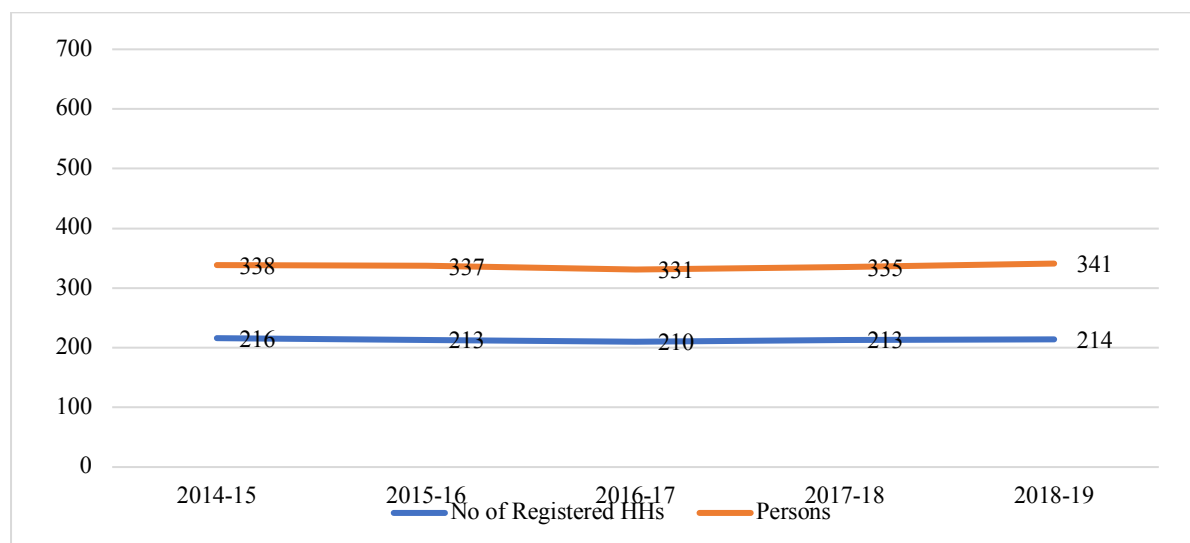


9. Sengudi Grama Panchayat, RS Mangalam Block

Sengudi Grama panchayat is coming under R S Mangalam block of Ramanathapuram District. The Grama Panchayat has Sengudi and Chinna Sengudi habitations. Total area of Sengudi grama panchayat is 449 hectares. The GP has 211 households and 735 populations. 94% of the households in the GP has public tap connections which is supplemented by two bore wells and two open wells. There is no rainwater harvesting structures exist in the village. The area under irrigation is 48.6 ha and 201 ha under rainfed lands, of this 42.5 ha% is under irrigated paddy. The key changes experienced by the farmers are frequent high intensity winds, changes

in the wind pattern from sea as well as monsoon rainfall pattern, delay in the onset of monsoon with long dry spells leads to frequent crop losses. The total number of registered job cards in Sengudi has marginally declined from 216 in 2014-15 to 214 in 2018-19. However, the number of registered workers under MGNREGS marginally increased from 338 to 341 during the same period (See Figure 25.)

Fig.25. No. of Registered Households and Persons under MGNREGS in Sengudi GP, R S Mangalam Block



Of the total households more than four-fifth of the the households demanded and provided employment under MGNREGS during the year 2014-15. However, the percentage had declined into 74 in 2018-19 (Table 34). Most of the workers were female and the proportion remain same during the reference period. The percentage of household completed 100 days was nil in 2018-19; however, it was fluctuated in every year and maximum at 38% in 2015-16. The percentage of SC participation to the total workers under MGNREGS was always more than one-third and was every two-fifth in two years. There is no ST population in the grama panchayat.

Table 34. Details of MGNREGS participation in Sengudi GP, R S Mangalam Block

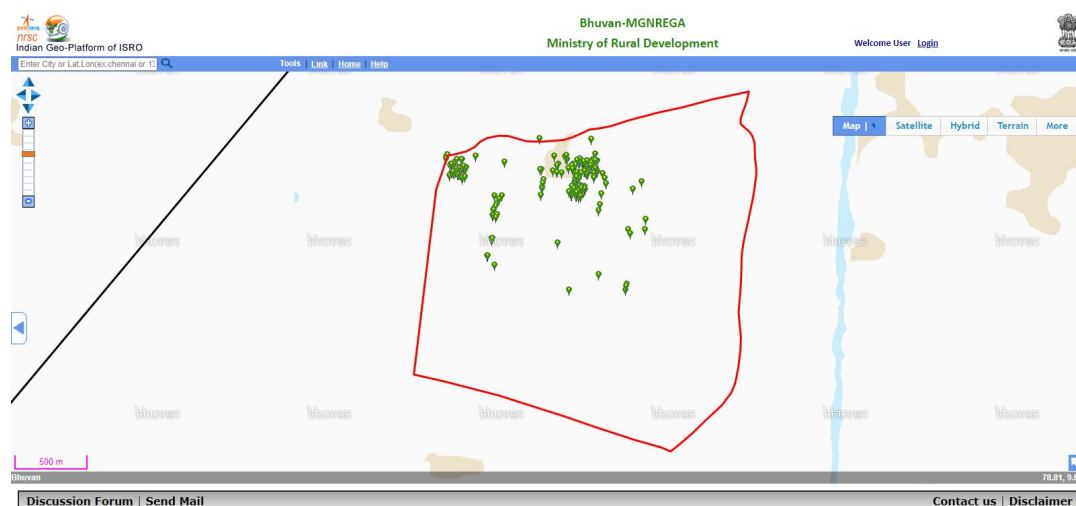
Year	Employment demanded & provided HHs (%)	% of Women	% of HHs completed 100 days	% of SC
2014-15	84.72	85.6	2.73	39.34
2015-16	88.73	85.7	38.10	41.97
2016-17	82.86	83.9	33.33	39.83
2017-18	83.10	85.2	2.26	40.11
2018-19	73.83	86.7	0.00	37.12

NRM works undertaken under MGNREGS during 2014-15 to 2018-19 in Sengudi, of the total expenditure, public works relating to NRM reported major share in all five years. It was 93% in 2018-19. Rural infrastructure related works and individual assets for vulnerable sections also acquires second importance during the period. The number of public works on NRM was 21 in 2018-19. It was only six in 2014-15. It was mainly due to renovation of traditional water bodies, followed by afforestation activities in the five years. These two categories reported some works done during the five years; land development activities were done in the year 2018-19 only.

Works Relating to Natural Resources Management undertaken in MGNREGS, Sengudi GP, R S Mangalam Block (Expenditure in Rs. Lakh)

Work Details	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure
Water Conservation	0	0	0	0	0	0	2	0.59	0	0
Watershed management	0	0	0	0	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0	1	0	1	0
Traditional water bodies	5	3.37	7	14.73	1	11.85	9	13.37	18	6.34
Afforestation	0	0	1	4.08	1	4.27	1	2.24	2	1.63
Land development	1	0.68	1	2.22	0	0	0	0	0	0
Sub Total	6	4.05	9	21.03	2	16.12	13	16.2	21	7.97

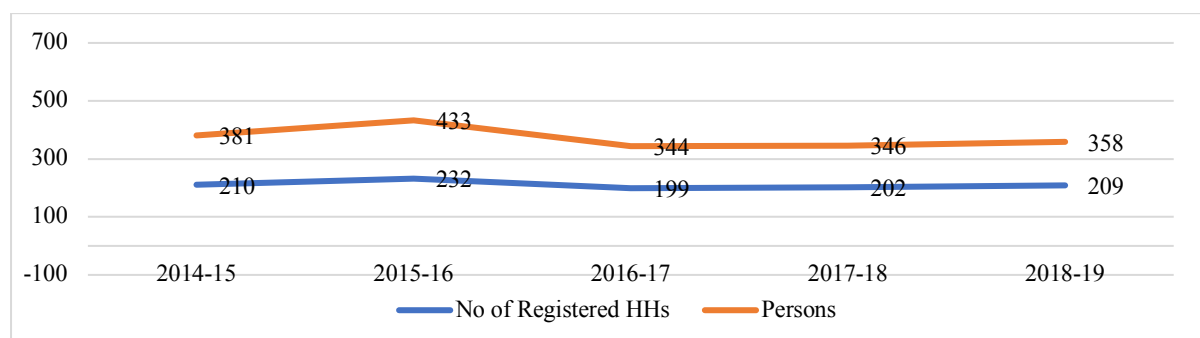
Map 9. Sengudi GP MGNREGA work 2018-19



10. Kompoothi Grama Panchayat, Thiruppullani Block

Kompoothi Grama panchayat is coming under Thiruppullani block of Ramanathapuram District. The Grama Panchayat has 880 hectares of land, with 292 households and the population was 15225. The village has 100% tap water connection under public category and has supplemented with 2 open wells, one bore well and five tanks. The village do not have any rainwater harvesting structures. It has an area of 43 ha under irrigated and 175 under rainfed, of which 35 ha is under rainfed paddy. The village is experiencing the key changes in the high intensity winds, changes in the wind pattern from sea as well as monsoon rainfall pattern. The total number of registered job cards in Thamaraikulam has more or less same during the last five years; it was 210 in 2014-15 and 209 in 2018-19. However, the workers under MGNREGS declined from 381 to 358 during the same period (See Figure 28.)

Fig.28. No. of Registered Households and Persons under MGNREGS in Kompoothi GP, Thiruppullani Block



Of the total households more than four-fifty of the households demanded and provided employment under MGNREGS during the five years (Table 38). Almost all workers are women and only very negligible proportion. The percentage of household completed 100 days were maximum during the year 2016-17 at 14%. Except 2015-16 and 2016-17, the percentages are very negligible for other three years. The percentage of SC participation to the total workers under MGNREGS was less than 10% for all five years. It is because the proportion of SC to total population itself is less one-tenth. There is no ST population in the grama panchayat.

Table 38. Details of MGNREGS participation in Kompoothi GP, Thiruppullani Block

Year	Employment demanded & provided HHs (%)	% of Women	% of HHs completed 100 days	% of SC
2014-15	80.5	86.3	0.6	7.9

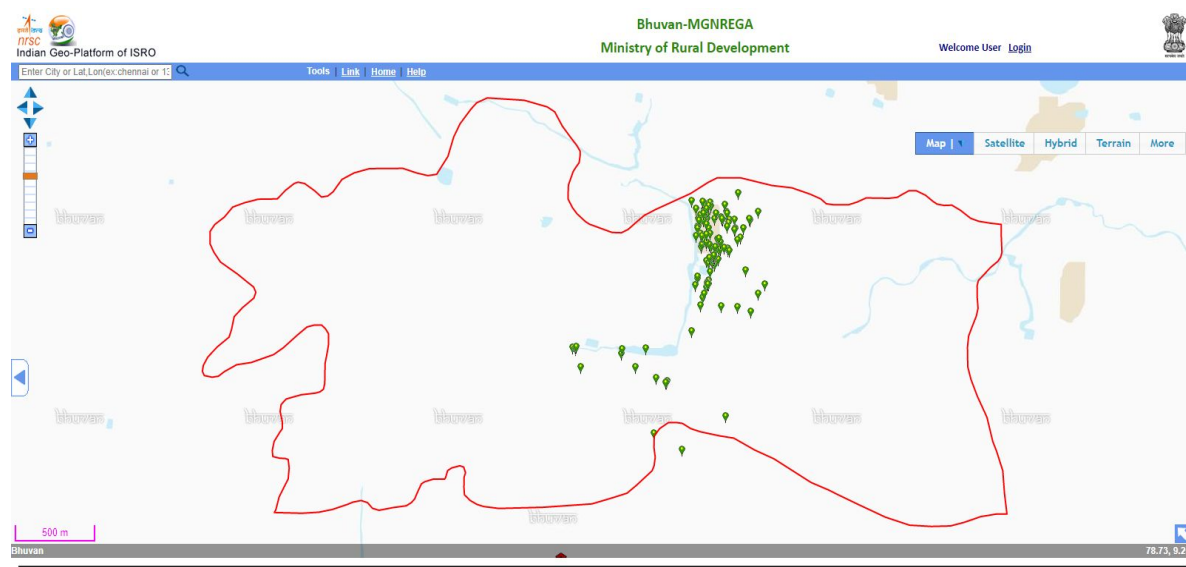
2015-16	72.4	90.7	13.7	6.6
2016-17	82.4	86.8	14.0	6.0
2017-18	76.2	89.2	0.0	6.2
2018-19	80.4	87.0	8.9	6.4

NRM works undertaken under MGNREGS during 2014-15 to 2018-19 in Kompoothi, of the total expenditure, public works relating to NRM reported major share in four years. It was 51% in 2014-15, 49% in 2015-16, increased to 55% in 2016-17, came down to 30% in 2017-18 and then increased to 75% in 208-19. Rural infrastructure related works acquires second importance in all the five years; individual asset creation got some importance during 2017-18. It was mainly on livelihood development activities. The number of public works on NRM was 19 in 2018-19 which was a dramatic increase from seven in the previous year. It was mainly due to renovation of traditional water bodies and water conservation activities in 2018-19.

Table39. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Kompoothi GP, Thiruppullani Block (Expenditure in Rs. Lakh)

Work Details	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure
Water Conservation	0	0	0	0	0	0	1	0.05	3	6.4
Watershed management	0	0	0	0	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	3	3.67	2	8.99	2	4	5	12.08	15	6.68
Afforestation	0	0	0	0	0	3.43	1	0.45	1	0.44
Land development	1	0.01	0	0	0	0	0	0	0	0
Sub Total	4	3.68	2	8.99	2	7.43	7	12.58	19	13.52

Map 10. Kompoothi GP MGNREGA map – 2018-19

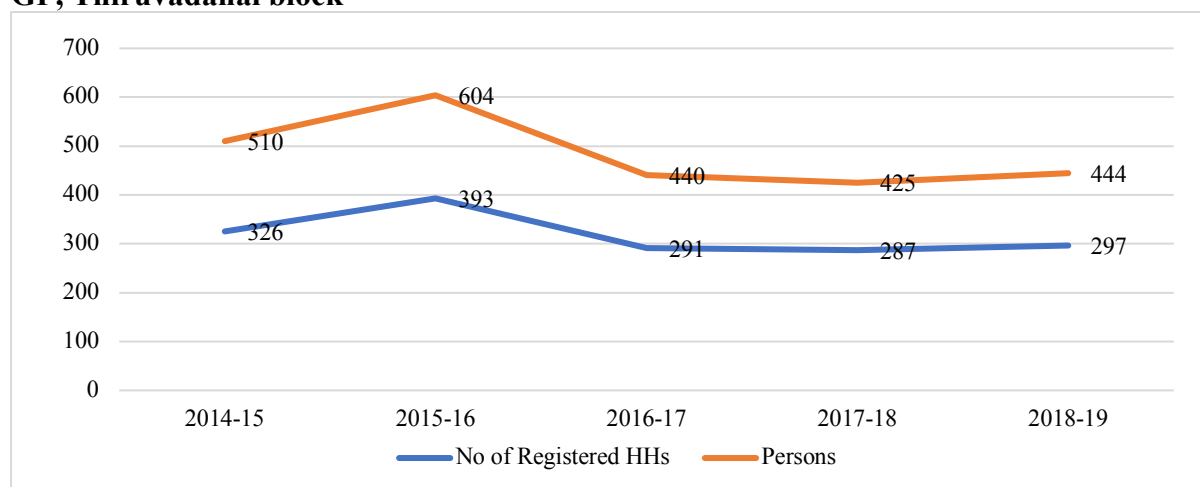


11. Nagarikathan Grama Panchayat, Thiruvadanai Block

Nagarikathan Grama Panchayat is coming under Thiruvadanai block of Ramanathapuram District. The Grama Panchayat has 623 hectares of area, 515 households and the population of 2475. 47% of the households in the GP has public tap connections which is supplemented by nine open wells and two tanks. There is no rainwater harvesting structures exist in the village. The area under irrigation is 147 ha and 615 ha under rainfed lands, of this 146 ha% is under irrigated paddy.

The key changes experienced by the farmers are frequent high intensity winds, changes in the wind pattern from sea as well as monsoon rainfall pattern, delay in the onset of monsoon with long dry spells leads to frequent crop losses. The total number of registered job cards in Nagarikathan has increased from 326 in 2014-15 to 393 in 2-15-16; however, it then decreased into 291 in 2-16-17; it was 297 in 2018-19 (See Fig. 31.) Likewise, the works registered under MGNREGS also increased from 2014-15 to 2016-17 and then declined in subsequent years.

Fig.31. No. of Registered Households and Persons under MGNREGS in Nagarikathan GP, Thiruvadanai block



Of the total households more than four-fifth of the households demanded and provided employment under MGNREGS during the year 2014-15; however, the proportion had declined it was even less than three-fourth 2018-19 (Table 42). Almost all workers are women and only very negligible proportion are from male.

The percentage of household completed 100 days were maximum during the year 2016-17 at 25%. For remaining three years, the percentages are very negligible. The percentage of SC participation to the total workers under MGNREGS was around 10% for all five years. It is

because the proportion of SC to total population itself is less one-tenth. There is no ST population in the grama panchayat.

Table 42. Details of MGNREGS participation in Nagarikathan GP, Thiruvadanai Block

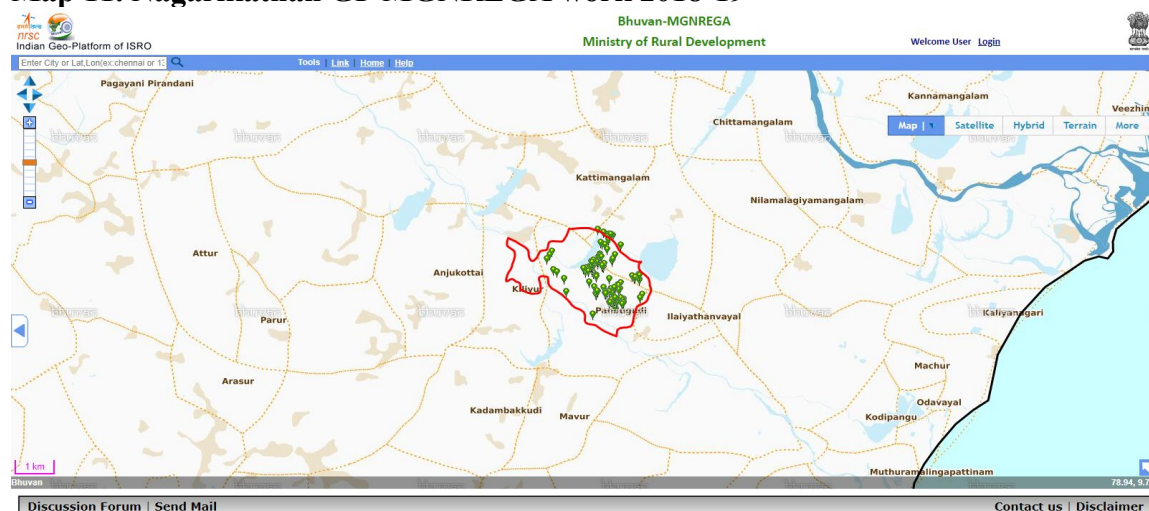
Year	Employment demanded & provided HHs (%)	% of Women	% of HHs completed 100 days	% of SC
2014-15	82.8	80.0	5.2	12.8
2015-16	62.1	82.4	8.2	9.8
2016-17	73.5	87.0	24.8	8.9
2017-18	68.3	85.3	0.5	11.0
2018-19	62.3	87.4	2.2	10.3

NRM works undertaken under MGNREGS during 2014-15 to 2018-19 in Nagarikathan, of the total expenditure, public works relating to NRM reported considerable expenditure during the five years. However, rural infrastructure related works reported significant share, except 2016-17. The number of public works on NRM was 18 in 2018-19 showed an increase from 10 works in 2017-18 which was a dramatic increase from nine in the previous year. It was mainly due to renovation of traditional water bodies in all five years.

Table 43. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Nagarikathan GP, Thiruvadanai Block (Expenditure in Rs. Lakh)

Work Details	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure	Total works	Expenditure
Water Conservation	0	0	0	0	0	0	0	0	3	0
Watershed management	0	0	0	0	0	0	0	0	0	0
Irrigation	0	0	0	0	0	1.9	2	0.73	1	0
Traditional water bodies	2	1.03	3	8.93	3	20.72	8	12.12	13	7.04
Afforestation	0	0	0	0	0	0	0	0	1	1.54
Land development	2	2.94	2	7.2	1	0	0	0	0	0
Total	4	3.97	5	16.13	4	22.62	10	12.85	18	8.58

Map 11. Nagarikathan GP MGNREGA work 2018-19



Output 3:	Indicator 3.1:	
<p>The cooperation with the private sector on integrated, climate-adapted water resource management measures is strengthened at the state and local level.</p>	<p>One cooperation model between rural user groups, communities and the private sector - so far it has happened at the partnership model of Watershed development among NABARD - Civil Society Organization and CSR partners</p>	<p>Explored the CSR cooperation models in water augmentation. Here tripartite partnerships are formed in watershed infrastructure development among NABARD, CSR partners and Civil Society Organizations. From the available information three such CSR partners have worked with two CSOs on mobilization of communities, facilitating the water actions along with institutionalizing the interventions.</p>

Discussion

From the above analysis, indicator 1 and 2 represents the possible potential pathways to build the convergence further based on the local context. Right now seven different schemes are being operational to promote integrated water management programmes in the district over the last five years (Tables 44). Of the eight different schemes focusing on integrated water management, only two schemes are focusing on the water quality issues. Almost all the schemes are giving priority to augmentative actions while four schemes are working on demand side as well to improve the water productivity.

Table 44. Comparison of water augmentation, demand and quality management among the schemes in Ramanathapuram district

Schemes	Water augmentation infrastructure	Water Demand side- efficient use of water	Water quality management
1. MGNREGA	√	-	-
2. Kudimaramathu	√	-	-
3. Tamil Nadu, IAMWARM		√	-
4. Rainwater Harvesting and Runoff Management Programme	√	-	-
5. Mission on Sustainable Dryland Agriculture	√	√	-
6. Tamil Nadu Watershed Development Agency (TAWDEVA)	√	√	-
7. <i>Jal Shakthi Abiyan</i>	√	√	√
8. <i>Jal Jeevan Mission</i>	√	-	√

The schemes were evaluated based on the level of participatory approach in its implementation to ensure the sustainability, governance building, degree of partnership and convergence while promoting the integrated water resource management measures.

Schemes	Participatory approach	Governance and institution building	Convergence and partnerships
1. MGNREGA	-	-	√
2. Kudimaramathu	√	-	√
3. TN- IAMWRM	√	√	√
4. Rainwater Harvesting and Runoff Management Programme	-	-	-
5. Mission on Sustainable Dryland Agriculture		√	√
6. Tamil Nadu Watershed Development Agency (TAWDEVA)	√	√	√
7. <i>Jal Shakthi Abiyan</i>	-	-	√
8. <i>Jal Jeevan Mission</i>	-	-	√

- *Decisions involving users, planners and policy makers:* At present the decisions are not taken completely adopting the participatory approach involving all connected stakeholders – Users, planners and policy makers. The enabling environment for all come together and discuss was very limited here

- Stakeholders voice in water planning and management and social inclusion: Since four out of the ten schemes are central schemes the operational guidelines leaves limited scope for change according to the local context.

- *Decisions have been taken to consider the various use of water (population, agriculture, industry etc.):* Only in the drinking water sector the decisions are made considering the population to ensure safe drinking water to all households. However, water budgeting approach is not adopted in case of Agriculture and Industry, both are the main users of water, while agriculture sector use - surface and ground water resources and industry largely depend on ground water resources. In case of Ramanathapuram, the requirement for industry is very less as there is less number of industries operating here

- *The decisions on water planning taken are incorporated into broader social, economic and environmental goals:* The interaction with the planners and policy makers revealed that such an holistic approach and strategies can be improved with due importance from an ecosystem based framework. Targeting has been adopted while implementing schemes on social and economic dimensions to an extent.

- *The decisions taken consider a) water management (water demand/ supply, water quality, water resources), b) water use efficiency and c) water risk management (climate scenarios, drought, flood):* The point a) water management related decisions are largely restricted to drinking water sector – they see the demand, augment the supply, working out the solutions to improve water quality and increase the water resources by adding new structures such as borewells, bringing water supply from faraway places – eg Cauvery river water supply. However such planning to ensure water supply for agriculture is not in the discourse and also the water use efficiency related schemes were implemented in an isolated manner without aiming for large scale benefits of water resources conservation.

- *With reference to water risk management* – there were traditional practices and structures to ensure resilience against these risk, but such practices are under degradation and planning is not taking place based on such measures – eg cascade of

tanks in the district, one of the key structure built over the years with related governance structures.

Key Observations:

The schemes are implemented with a targeted approach by different line departments as nodal agency based on their level of technical competence to implement it. However at the ground level, the convergence to complement each other activities are limited and efforts are needed to promote such platforms similar to the model of Rajasthan state (*Mukhyamantri Jal Swavlamban Abhiyan*). six out of the ten schemes are adopting similar kind of activities at the field level to augment the water resources. The convergence approach and consistent monitoring will help to guide in its implementation and to integrate the climate change dimension to reduce the risks by strengthening water resources.