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Science for Sustainable Development

Water Security and Climate Adaptation in Rural India - Tamil Nadu

BASELINE STUDY

COMPOSITE WATER RESOURCES MANAGEMENT PLANS

TIRUVANNAMALAI DISTRICT TAMIL NADU

District Rural Development Agency, Tiruvannamalai

NOVEMBER 2020

Forward

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) has been implemented in Tiruvannamalai district of Tamil Nadu. The project was initiated in February 2020 in the district with the consultations at both state and district levels.

The main objective of WASCA is to boost the water resources of the district by addressing the planning, financing and implementation mechanisms to achieve water security and adapt to the changing climate. The key strategies and pathways planned to achieve the objectives are strengthening 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.

WASCA, is promoting a scientific and innovative approach of planning in water resources management at the Gram Panchayat level using hydrological and geo-spatial data and tools across all GPs in the district.

The project envisaged to strengthen the water security of the district in view of the climate change forecast for the mid and end century. The investments in water harvesting and recharge will be useful to meet the future water requirements for human, agriculture and other uses. The argumentation of water resources will also inspire and motivate farmers to sustain in farming and achieve higher production and income.

Project Director,
DRD Tiruvannamalai district,
Tamil Nadu, India

Water Security and Climate Adaptation in Rural India and Basis for selecting Thiruvannamalai district for Implementation in Tamil Nadu

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 scale. 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 industrial purposes and lowering water table.

The scoping 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 categorised 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);

Table 1. List of Biophysical and socio-economic indicators used in vulnerability assessment

1. Exposure in climate extremities is very high during 1951-2015	• Increase in day time temperature is high (1.2^0C) • Minimum temperature increase is high (0.5^0C) • Excess rainfall are more (15 years) • Deficient rainfall years (15)
2. Water resource vulnerability	• Nearly 71 % of the blocks are overexploited • Out of 52 firkas, 37 are OE, 7 are critical, 8 are semi-critical and there is no safe firka • Ground water recharge is low • Low surface water availability • Demand supply gap is more and • Fluoride and Nitrate contamination
3. Agriculture vulnerability is very high among all districts	• Soil moisture is less • Evaporation is more
4. Socio-economic vulnerability	• Poverty index (0.53) • Source of drinking water within premises in rural is 18.8 % • Marginal farmers are very high (94.7 %) • Rural proportion is 79.9 per cent

The Composite Vulnerability Index was prepared using above 18 indicators and ranked the different districts. Ramanathapuram, 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
1) Ramanathapuram	4	16	1	13
2) Dharmapuri	28	1	9	11
3) Perambalur	18	12	6	7
4) **Thiruvannamalai**	6	11	17	5

Of the four highly vulnerable districts, Thiruvannamalai is the one of the most vulnerable district interms of (1) wide gap between supply and demand - availability of water resources for productive and domestic use; (2) Agriculture vulnerability is very high and (3) high socio-economic vulnerability. The vulnerability will be further exacerbated in the changing climate scenarios in both mid(2050) and end century (2080). Climate projection based on global climate models indicate that there would be 1^{o}C increase in maximum temperature in mid-century period (2041-2070) and 1.5^{o}C increase in end-century period (2071-2100) from the baseline scenario under RCP 4.5 climate scenario. The minimum temperature would increase nearly 1.2^{o}C and 2.1^{o}C during MC and EC periods.

In view of this, Thiruvannamalai district is identified under WASCA programme to test the model in the state. In the process it will also help to strengthen its water resources and build context specific climate resilient models as a pilot project demonstration of water security and climate adaptation in rural Tamil Nadu.

Brief Profile of Thiruvannamalai

The Tiruvannamalai District geographically lies between 11.55º and 13.15º North latitude and 78.20º to 79.50º East longitude. The total geographical area of the district is 6188 sq km comprising the three revenue divisions of Thiruvannamalai, Cheyyar and Arni. It consist of 860 Grama or Village Panchayats, 4775 habitation and 1067 Revenue Villages. The total population of the district is 24.64 lakhs (12.35 lakhs male and 12.28 lakhs female), of the total population, 79.9 % of its population living in rural and 20.08 % in urban region. The overall literacy rate of the district is 74.21%, of which 83.11% for male and 65.32% female. The total geographical area of the district is 6.31 lakh Ha. The total gross cropped area of the district was 3.14 lakh Ha and net area sown was 1.77 lakh Ha in 2017-18. The area under forest is 24.20% and the net area sown is 33%

of the total geographical area. The district has 2,14,243 wells and 1,966 tanks based on the G returns of 2018-19[1]. So far to improve the sustainability of drinking water resources, 546 check dams, 39 percolation tanks, 9 ooranies, 24 defunct borewell recharge and 30 roof top rainwater harvesting structures were in place in the district[2]. The area sown more than once has increased from 0.4 lakh Ha in 2016-17 to 1.06 Ha in 2017-18. This increase has implications on ground water exploitation as the recent CGWB survey indicates that 9 blocks namely Chengam, Kalasapakkam, Kilpenathur, Polur, Pudupalayam Thandaranpattu, Thiruvannamalai, Thurinjipuram, Vandavasi are over exploited, two blocks under critical category West Arni and Jawadhi hills while five blocks such as Anakavur, Arni, Chetpet, Cheyyar and Vembakkam are semi-critical. The dominant soil type is red loam followed by black loam in river bed regions of the district. The annual rainfall is 1047 mm and distributed fairly both in SW and NE monsoon season. Paddy and sugarcane, the high water requiring crops are the primary crops followed by groundnut, vegetables and flowers.

Operationalizing the WASCA in Tiruvannamalai

The preparation of Composite Water Resources Management Plan using hydrological and geo-spatial tools has been initiated in Tiruvannamalai district in April 2020. The Gram 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 all 860 GPs in the district will be covered under this assessment and later the GP level analysis will be linked at the different functional scales, eg micro watershed/macro shed levels. The district officials were trained in the preparation of the plan and activities are started in the field. Also, at the district level, at the DRD office a WSACA centre has been established to support the preparation of GIS based scientifically supported village plans for further actions. In this backdrop, to set the current context and to assess the impact of the WASCA interventions later it is planned to conduct a baseline study adopting the following methodology.

[1] https://cdn.s3waas.gov.in/s318997733ec258a9fcaf239cc55d53363/uploads/2019/10/2019101872.pdf
[2] https://www.twadboard.tn.gov.in/content/tiruvannamalai

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 18 grama panchayats (GP) in the district, one GP from each block was selected with the inputs of district officials (indicator 2.2). 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)[3] . 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

[3] *source: www. https://www.nrega.nic.in/netnrega/mgnrega_new/Nrega_home.aspx*

the central level was consulted[4]. 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	Block	Name of the panchayat	Total Households	Name of the hamlets	Total populations	Geographical area of GP (Ha)
1	Tiruvannamalai	Adiannamalai	1284	Adiannamalai	4066	755
2	Kilpenathur	So.Nammiyanthal	366	Nammiandal(SO)	1418	254
3	Thurinjapuram	Meppathurai	366	Meppathurai	1493	796
4	Polur	Kuppam	1121	Kuppam Adidravidar Colony Kuppam Arunthatiyar Colony Melkuppam Anna Nagar Kuppam Kollaimedu Kumpal Kotta Paraikotta Kumpal Kotta Colony Kuppam	4194	640
5	Kalasapakkam	Venkattampalayam	328	Venkattampalayam	1308	160.36
6	Chetpet	Karikkathur	572	Karikathur	1778	529.47
7	Chengam	Anthanur	919	Panpulan Nagar Karumaskulam Thurinjavaram Andanur	5004	557.6
8	Pudupalayam	Unnamalaipalayam	420	Nadupattu Unnamalai Palayam	905	321.25
9	Thandrampet	Kilvanakkambadi	1040	Thesurpalaiyam Thunnaikuttypalaiyam Keelvanakkambadi	4518	1116.79
10	Jawadhumalai	Nammiyampattu	2203	Nammiyampattu	8222	1808
11	Cheyyar	Murugathampoondi	195	Murugathampoondi	813	301

[4] *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.*

12	Anakkavoor	Soundaryapuram	266	Soundariyapuram M Manipuram Soundariyapuram M Thuraiyur Soundariyapuram	1040	348
13	Arni	Paiyur	1764	Paiyur	381.25	7555
14	Vembakkam	Ukkamperumbakkam	404	Madura Vadaku Medu Ukkamperumpakkam	1243	274
15	Vandavasi	Vengunam	923	vengunam	3882	533
16	Thellar	Madam	649	Madam	1196	136
17	Peranamallur	Jaganathapuram	189	J Patti Jaganathapuram	730	303
18	West Arani	Vinnamangalam	726	Vinnamangalam	2931	757

Baseline Assessment – Current status

Outcome 1- Water resource management is enhanced through an integrated approach at national, state and local level with regards to water security and climate adaptation in rural areas. **Indicator 1: Number of existing planning- and financing mechanisms comprise approaches for an integrated, climate-adapted water resource management in rural areas.**		
7 existing schemes and financing mechanisms apart from *MGNEREGS,* 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	*Kudimaramath*: Tamil Nadu Water Resource Conservation and	The Government have given Orders in G.O (Ms) No.96, RD & PR Dept., Dated. 26.7.2019 for the	The details of allocation to the Tiruvannamalai district is restoration of

	Augmentation Mission	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 Ooranies of Village Panchayats at a cost of Rs.1250 Crore.	37 tanks and with an estimated amount of Rs 1607 Lakhs in 2019[5]
2	Tamil Nadu - Irrigated Agriculture Modernization and Water Bodies Restoration and Management (TN- IAMWRM)	Under Phase III total three sub basins[6] are covered which aims to increase the water use efficiency and productivity and the scheme is supported by World Bank and implemented through Govt of Tamil Nadu	Aliyar Sub basin- 2580 Ha[7] Pambanar- Veratar - 1213.54 Ha Thurinjalar - 4442.63 Ha
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 48 cluster the total budget for the work in this district was Rs 2.40 Cr.
5	Tamil Nadu Watershed Development Agency (TAWDEVA)	*Pradhan Mantri Krishi Sinchayee Yojana* (Integrated Watershed Management Programme	9152 ha was covered under micro irrigation during 2018-19[8]

[5] http://www.wrd.tn.gov.in/Kudimaramath_2019-20_list_of_works.pdf
[6] https://www.tniamwarmtnau.org/sub-basins/phase-3
[7] http://www.iamwarm.gov.in/PDF/Project/DPR/PHASE-II/Aliyar.pdf
[8] http://agricoop.nic.in/sites/default/files/PMKSYAchivement2018-19.pdf

6	*Jal Shakthi Abiyan*	Importance was given to the water augmentation initiatives, specifically most of the blocks are categorized as Over exploited and critical by CGWB	A mission mode water conservation campaign was organised to ease water shortage in the district. Under this water banks, auto switch off motors for the over head tanks, mulching, pot irrigation, micro irrigation, village based water budget and IEC activities to raise awareness among general public was carried out[9].
7	*Jal Jeevan Mission*	The scheme is started from 2019-2020 - focus is given on drinking water	18.2% HHs has tap connection in the district,

Indicator 2. Number of 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 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 18 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, similar to Ramanathapuram district, seven 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. However, under JSA, the district has prepared a detailed water budget and initiated innovative

[9] http://sujal-swachhsangraha.gov.in/node/3106

		actions to improve the water conservation, harvesting and efficient use.
	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: The study identified 18 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 18 GPs 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). The soil and water conservation works were carried out based on the local needs such as desilting of traditional water bodies, construction of percolation ponds and check dams, and plantations etc. On the supply side, the above-mentioned works were identified based on the local context and on an average less than five NRM works are taken in a year per GP till 2017-18 while in 2018-19 it was increased ranging from 15 to 41 works. 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 integrated water supply schemes, bore or open wells supplemented by tanks to an least scale. For agriculture, ground water is the primary source of water complemented and the tanks have been increasingly used as recharge structure as well as source for livestock[10]. Paddy and sugarcane are the primary crops followed by vegetables, millets and flowers are cultivated largely using ground water. At the overall level the area under irrigation is higher in proportion.

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

[10] visit to the villages and interaction with the Panchayat and district officials on the status, Velleri village in Arni block

1. *Kudimaramath*: Tamil Nadu Water Resource Conservation and Augmentation Mission:

The Government of Tamil Nadu has been implementing *Kudimaramat*h scheme to revitalize defunct small water bodies minor irrigation tanks, lakes, ponds and ooranies in rural areas since March 2017. With the support of 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 Tiruvannamalai, 37 tank restoration works were carried out with a value of Rs 1607 lakhs in Cheyyar (12 works), Tiruvannamalai (6 works), Kalasapakkam (6 works), Polur (2 works), Arni (2 works), Kil penathur (1 work) and vandavasi (8 works) blocks[11]..

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 following sub basins were covered[12]

a) Aliyar Sub basin- 2580 Ha[13]
b) Pambanar- Veratar - 1213.54 Ha
c) Thurinjalar - 4442.63 Ha

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.

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

[11] http://www.wrd.tn.gov.in/Kudimaramath_2019-20_list_of_works.pdf
[12] http://www.iamwarm.gov.in/IAMWARM/OLD/index.asp
[13] http://www.iamwarm.gov.in/PDF/Project/DPR/PHASE-II/Aliyar.pdf

in community lands with harvesting structures such as check dams, village ponds, community ponds, sunken ponds, deepening of Ooranies[14].

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 Tiruvannamalai district the scheme supported to reach 48000 ha in48 clusters over three years from 2016-17 and reached 25540 dry land farmers.

5. Tamil Nadu Watershed Development Agency (TAWDEVA): ***Pradhan Mantri Krishi Sinchayee Yojana of Govt of India:*** The integrated watershed development programme has been renamed as PMKSY and it was implemented in the district with a total financial allocation of Rs 2.63 Cr in the district[15] with a focus to supplementary water management activities covering 150 Shallow/Medium tubewell/Bore well, 556 Installation of Diesel/Pumpset / Electric Motors606 Laying of Conveyance Pipes and 144 Construction of Storage Structure were focused

6. Jal Shakthi Abiyan(JSA): A mission mode water conservation campaign was organised to ease water shortage in the district. Under this water banks, auto switch off motors for the over head tanks, mulching, pot irrigation, micro irrigation, village based water budget and IEC activities to raise awareness among general public was carried out[16]. A village wise detailed water budget was prepared and water bank was established with the support of volunteers in the district. Apart from this steps have been taken to introduce technologies which increase the water use efficiency in agriculture in the district with the partnership of KVK and Dept of Agriculture.

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).

[14] http://www.agritech.tnau.ac.in/agricultural_engineering/agriengg_govt_schemes.html#scheme6
[15] http://164.100.134.74/horti/tnhorticulture/application/site/Final%20Policy%20note%20English.pdf (page no. 351)
[16] http://sujal-swachhsangraha.gov.in/node/3106

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 2017[17].

Private sector schemes: There are more than three NGOs and quite a few private sector institutions under the Corporate Social Responsibility programme had partnered with a civil society organizations in the district to implement the watershed and afforestation schemes joining with NABARD.

Output 2:	**Indicator 2.2:**	
Water resource management at the local level increasingly takes into consideration integrated climate-adapted approaches.	Number of 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.

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

1. Adiannamalai Grama Panchayat, Tiruvannamalai Block

The Adiannamalai gram panchayat is located in Tiruvannamalai block and has 1284 households with a total population of 4066 persons (2086 M/1980F). The village has a total geographical area of 755 ha and of which 19% is under agriculture. Of the total area, 14% is under irrigation and 5% under rainfed conditions. Nearly 65% of the area is under current fallow in this village in 2011.

[17] https://sureshe.files.wordpress.com/2018/01/au4298.pdf

However, as per the village records of 2018, the area under cultivation has increased to 168 Ha and all the cultivated area is under irrigation. More than ten crops are being cultivated in the village, predominantly paddy is cultivated under 49% followed by pulses up to 25%. The main climate change issues are erratic intra-seasonal distribution of rain which has implications on ground water recharge as well as soil moisture.

With reference to MGNREGA work in the GP, it has reported different pictures for number of households registered compared with number of workers registered during 2014-15 to 2018-19 (Fig.1.1). When total number of households registered increased from 797 to 889 during the five years reported, the number of persons registered under MGNREGS has declined from 1198 to 1192. The number of persons registered increased from 1198 in 2014-15 ton 1207 in 2015-16, but then declined for next two years and then marginally increased in 2018-19. Of the total households registered, nearly nine-tenth of the households demanded employment during the five years period (Table 4.1). Moreover, one-tenth of the households that demanded employment are from SC/ST. SC's participation reported fluctuation during the five years and decline in 2018-19. Regarding women's participation, almost all workers are women and it remains consistent for the five years under consideration.

The main observation is, despite the decline in percentage of households demanded employment, the women's participation remain same. However, the percentage of households that completed 100 days, are very negligible and not even one percent for three out of five years. Further, no household completed 100 days in 2018-19.

The types of works undertaken for the five years in Adiannamalai is predominantly natural resources related public works. NRM works proportion reported lowest percentage among the five years was in 2018-19 and it was 73%. Predominantly the works are related to traditional waterbodies in all five years in all four years except 2018-19; in which water conservation was the major works under NRM in 2018-19; few afforestation activities undertaken during 2016-17, 2017-18 and 2018-19 (Table.4.2). The detailed list of works undertaken in the GP during 2018-19 is given in table 4. 3 and Map 1.1.

Fig 1.1: No. of Registered Households and Persons under MGNREGS in Adiannamalai GP, Tiruvannamalai Block

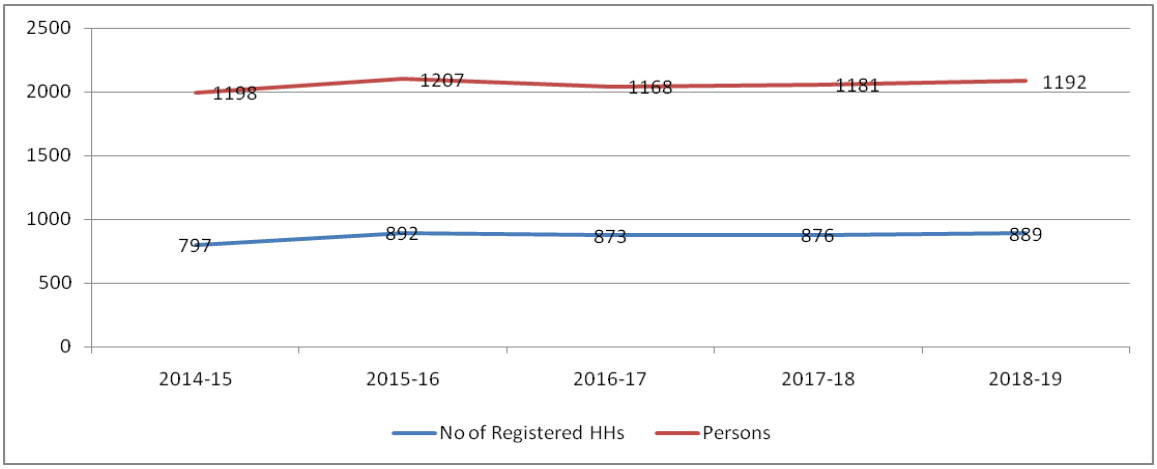


Table 4.1: Details of MGNREGS participation in Adiannamalai GP, Tiruvannamalai Block

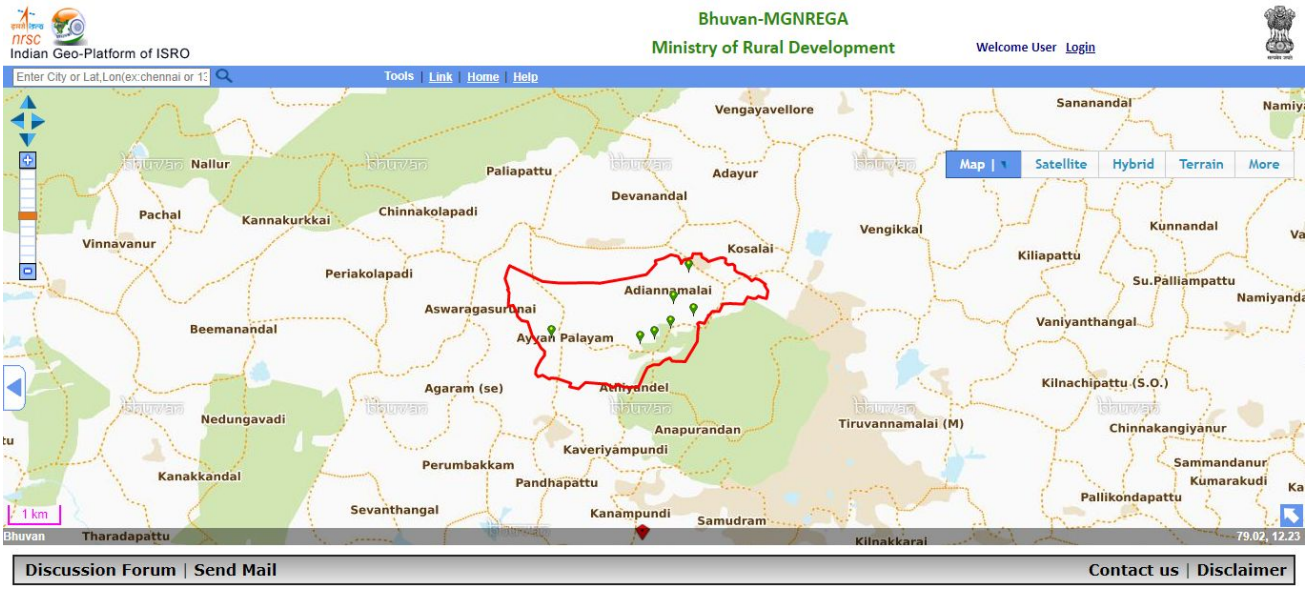
Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	91.6	0.1	10.4	0.5	97.3
2015-16	92.2	14.0	11.4	0.8	95.8
2016-17	96.4	2.6	11.2	0.7	96.0
2017-18	89.3	0.5	14.5	0.7	97.8
2018-19	86.2	0.0	8.6	0.7	96.7

Table 4.2: List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Adiannamalai GP, Tiruvannamalai Block

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	1	0	1	0.71	1	0	3	0.53	10	18.43
Watershed management	0	0	0	0	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0	0	0	1	5.04
Traditional water bodies	3	32.11	7	64.41	8	61.95	11	22.54	13	1.13
Afforestation	0	0	0	0	1	1.64	3	7.43	2	4.44
Land development	0	0	0	0	0	0	0	0	0	0
Total	**4**	**32.11**	**8**	**65.12**	**10**	**63.59**	**17**	**30.5**	**26**	**29.04**

Table 4.3. List of detailed water conservation works undertaken in Adiannamalai GP, Tiruvannamalai block during 2018-19

SNo.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. Of Units	Convergence
1	Construction of Percolation Pond	Construction of Mini Percolation Tank for Community	11.34	7090	3	
2	Raising of Nursery (Nochi Plants)	Raising of Nursery for Community	10.26	3661	1	No
3	Construction of New Dug Well	Construction of Irrigation Open Well for Community	9.97	400	1	No
4	Construction of Check Dam and Strengthening	Construction of Masonry/CC Anicut for Community	22.62	8017	3	No
5	Formation of Earthen Bunding in individual Land	Construction of Earthen peripheral bund for individual	1.16	344	1	No



Map 1.1. Adiannamalai Gram Panchayat MGNREGA Map for 2018-19

2. So.Nammiyanthal GP, Kilpenathur Block

The village is located in Kilpennathur block has a population of 1418 persons and 366 households. It has both SC and ST population to the tune of 17.8% SC and 18.9% ST. The total geographical area of the GP is 254 Ha. 79% of the total geographical area is under cultivation, of the total area 51% is under irrigation and 28% is under rainfed condition. Paddy, sugarcane, pulses, vegetables are commonly cultivated and ground water is the only source for irrigation. The village is under the over exploited category and soil type is loamy in texture and almost 100% of the soil is moderately alkaline. The distribution of rainfall in the season is most important for filling the water bodies which is essential for the groundwater recharge.

The number of persons registered under MGNREGS in So.Nammiyanthal GP in Kilpenathur block reported decline from 615 to 511 during 2014-15 to 2018-19, despite the number of households registered reported is nearly stagnant (Fig.2.1). The decline in persons was high in 2015-16, from 615 in previous year to 516. It further declined to 509, even though the number of households increased from 384 to 396 in 2016-17. Both persons and households remain more or less consistent in subsequent two years. This is the reason for increase in percentage of households demanded employment over the five years (Table 5.1).Very negligible percentage of households completed 100 years in all five years; it was highest at 2.2% in 2015-16, when both number of persons and households registered under MGNREGS had declined compare to previous year. Despite these changes, more than four-fifth of the worker under MGNREGS are women in So.Namiyanthal GP. Also, proportion of SC to total workers also very negligible.

Public works related to natural resources management constitutes major proportion in all five years; it was more than 90% in 2014-15 and 2018-19; it was even more than three-fourth in 2017-18. Even for 2015-16 & 2016-17, this category reported more than three-fourth of the total works (Table 2.2). Among the NRM works, traditional waterbodies related works and water conservation works are the two categories that reported major proportion in all five years. No other activities undertaken during the five years (Table 5.2). The detailed list of works undertaken in the GP during 2018-19 is given in table 5. 3 and Map 2.1.

Fig. 2.1: No. of Registered Households and Persons under MGNREGS in So.Namiyanthal GP, Kilpenathur Block

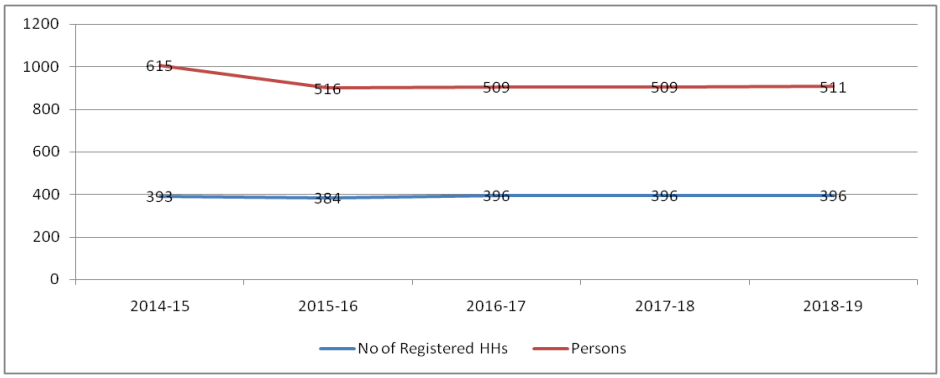


Table 5.1: Details of MGNREGS participation in So.Nammiyanthal GP, Kilpenathur Block

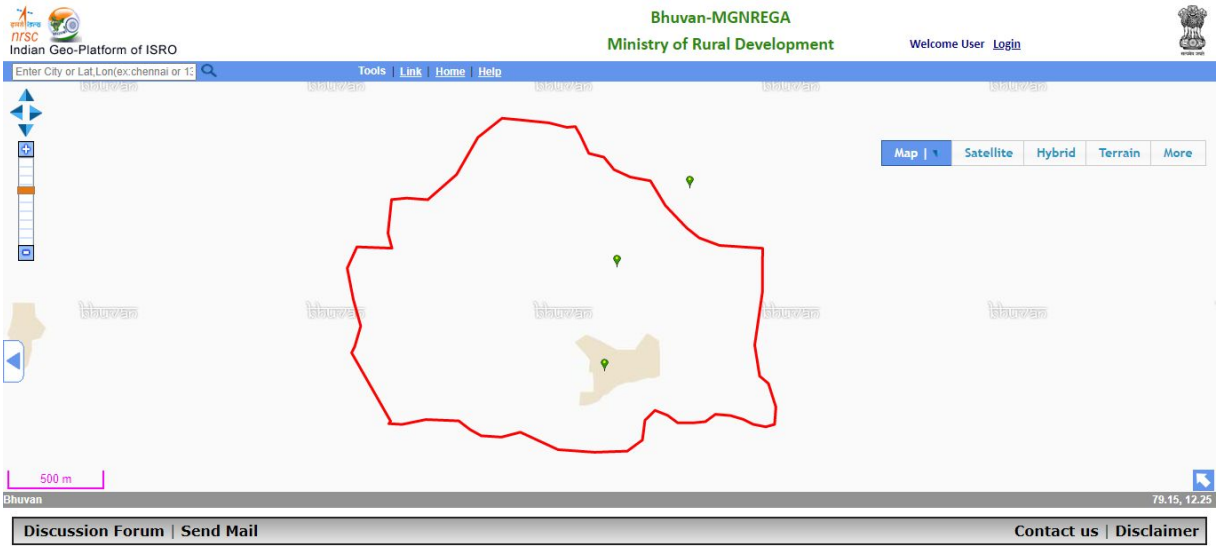
Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of Women
2014-15	80.2	0.0	0.5	82.0
2015-16	95.6	2.2	0.6	80.7
2016-17	95.2	0.8	0.9	82.9
2017-18	88.4	0.6	0.6	82.9
2018-19	90.4	0.0	0.8	81.2

Table 5.2: List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, So.Nammiyanthal GP, Kilpenathur Block

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	3	1.72	1	0.92	0	0.02	5	0	8	15.77
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	9.32	2	15.54	4	18.74	2	14.02	1	0.92
Afforestation	1	0.05	0	0	0	0	1	0.39	1	0.37
Land development	1	0.09	0	0	0	0	0	0	0	0
Total	**6**	**11.18**	**3**	**16.46**	**4**	**18.76**	**8**	**14.41**	**10**	**17.06**

Table 5.3. List of detailed water conservation works undertaken in So.Nammiyanthal GP, Kilpenathur Block during 2018-19

SNo.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. Of Units	Convergence
1	Formation of Percolation Ponds	Construction of Mini Percolation Tank for Community	10.18	7413	3	No
2	Massive tree plantation	Block Plantation of Forestry-in Fields-Community	1.51	767	1	NO



Map 2.1. So Nammianthal Gram Panchayat MGNREGA Map for 2018-19

3. Meppathurai GP, Thurunjapuram Block

Meppathurai gram panchayat in Thurunjapuram block It has 366 households and 1493 persons according to Census of India 2011. The total geographical area of the GP is 796 Ha, of which 26% is under irrigation and 10% under rainfed cultivation systems. The soil is fine loamy in texture with equal proportion of area under slightly acidic to moderately alkaline condition. Paddy is the main crop under irrigation, more than 97% is under wetland paddy and ground water is the only source of irrigation. The GP is already under over exploited in ground water status. With reference to the MGNREGA work, the GP has reported fluctuations in number of persons and households registered under MGNREGS during 2014-15 to 2018-19 (Fig.3.1). The number of households registered had increased from 378 in 2014-15 to 390 in 2015-16, then declined to 361 in 2016-17 and 343 in 2017-18; it increased to 367 in 2018-19; when comparing the five years data it reported decline from 2014-15 to 2018-19. Likewise, the number of persons registered also declined from 956 to 926 during the same period. The number of persons increased and peaked at 1019 in 2015-16 but declined after that.

The percentage of households demanded employment of the total registered households reported that despite the decline in registered households, more households demanded employment in 2018-19 then 2014-15 (Table 6.1). Less than three-fourth of the households demanded

employment in 2014-15, whereas more than four-fifth of the households demanded employment in 2018-19. This percentage was more than 80% during the last three years, such as, 2016-17, 2017-18 and 2018-19. However, the percentage of households completed 100 days are very negligible except 2015-16. Further the percentage of SC participation was more than one-third in 2014-15, but declined after that and it was 28% in 2018-19. However, the proportion of women to total workers had increased from 66.4% in 2014-15 to 81% in 2018-19. The women participation has increased every year in the GP.

Works on traditional waterbodies is the category that acquired all works for NRM in the first two years; whereas, afforestation and water conservation activities were also got some funds in last two years (Table 6.2). Individual assets for vulnerable sections also reported some figures for three years, but it was negligible. The detailed list of works undertaken in the GP during 2018-19 is given in table 6.3 and Map 3.1.

Fig 3.1: No. of Registered Households and Persons under MGNREGS in Meppathurai GP, Thurunjapuram Block

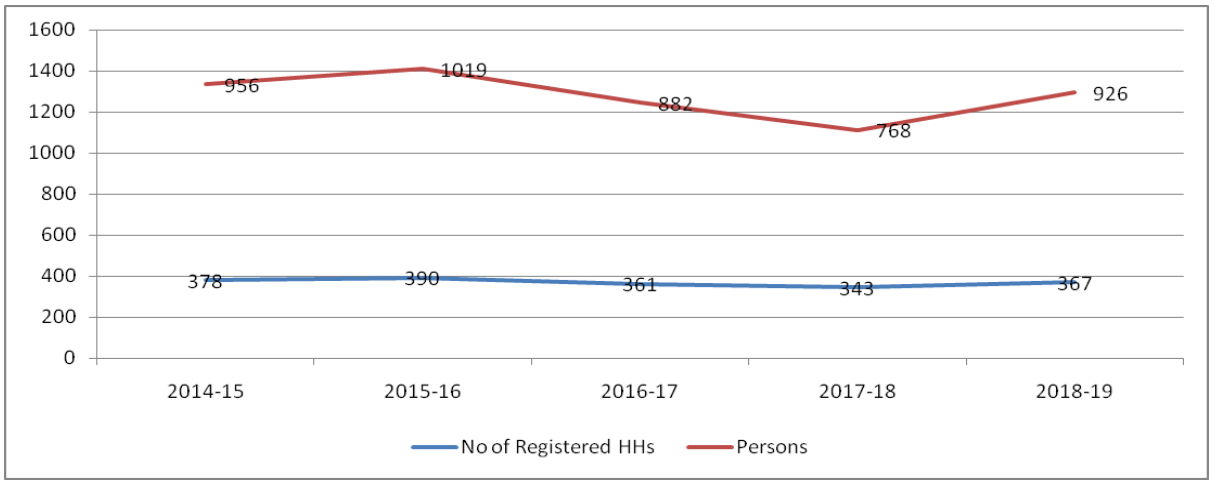
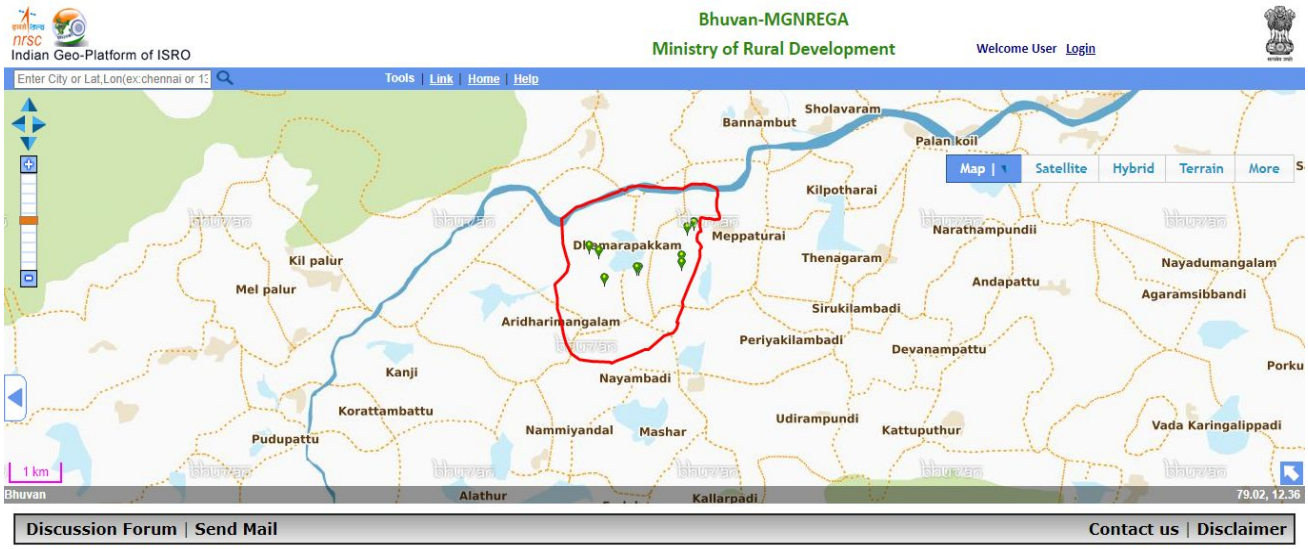


Table 6.1: Details of MGNREGS participation in Meppathurai GP, Thurunjapuram Block

Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC HHs	% of Women
2014-15	73.0	5.4	34.2	66.4
2015-16	75.1	17.1	32.7	69.6
2016-17	83.4	1.0	28.2	71.1
2017-18	81.3	1.4	29.3	71.9
2018-19	83.4	0.3	28.3	80.6

Table 6.2:List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Meppathurai GP, Thurunjapuram Block

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	8	26.59
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	11.98	7	20.46	4	10.77	3	4.32	2	0.01
Afforestation	0	0	0	0	1	0.04	2	2.15	2	1.28
Land development	0	0	0	0	0	0	0	0	0	0
Total	**5**	**11.98**	**7**	**20.46**	**5**	**10.81**	**7**	**6.47**	**12**	**27.88**



Map 3.1 Meppathurai Gram Panchayat MGNREGA Map for 2018-19

Table 6.3. List of of detailed water conservation works undertaken in Meppathurai GP, Thurunjapuram Block during 2018-19

SNo.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. Of Units	Convergence
1	Construction of Percolation Ponds	Construction of Mini Percolation ponds for Community	7.59	4151	4	No
2	Strengthening of chiteri supply channel check dam	Construction of Masonry/CC Anicut for Community	17.97	8240	1	No

4. Kuppam GP, Polur Block

Kuppam is located in Polur block and has 1121 households with 4194 persons. The total geographical area of the GP is 640 ha, of the total area only 18% under irrigated and 36% of the total area under rainfed condition. Paddy is the major crop cultivated in more than 60% of the total area under irrigation. The number of households and also persons registered under MGNREGS in this GP reported declined during 2014-15 to 2018-19 (Fig.4.1). The decline was high from 2014-15 to 2015-16. The total households declined from 926 to 799 during that years. Likewise, the number of persons declined from 1549 to 1057 in the same years. After that both households and persons recorded same or marginal increase. However, the number of households demanded employment, of the total registered households had increased in the five years period.

It was 68% in 2014-15, then increased to 79% in 2015-16, further increased to 82% in 2016-17, then declined to 78% and ended at 79% (Table 7.1). However, in all these years, the proportion of households completed 100 days were negligible. It was high at 4.5%in 2016-17. Most of these workers are women and it marginally declined in 2018-19 compared to 2014-15. Likewise, proportion of SC to total workers also marginally declined from 16% to 14% from 2014-15 to 2018-19.

In all five years under consideration, most of the works undertaken under MGNREGS were public works related to NRM, except 2017-18 (Fig.4.2). Even in 2017-18, more than two-thirds of workers were NRM related. For other years, NRM workers constituted more than 70% and it was even 84% in 2015-16 and 90% in 2018-19. Apart from NRM works, rural infrastructure is the next category that attracts more works; it was nearly or more than one-fourth of total workers for the years 2014-15, 2016-17 and 2017-18. Even it was second largest work category for the year 2015-16. Individual assets for vulnerable sections also undertaken and it was even one-fifth of the total works in 2017-18. Traditional waterbodies related works in NPM is the major category for first four out of five years, undertaken under MGNREGS (Table 7.2). It was more than 95% for first three years, 61 % in 2017-18. Irrigation related works occupied major portion in 2018-19. Afforestation related works also reported in five years and it was more than one-third of works in 2017-18 and nearly one-fifth in 2018-19. The detailed list of works undertaken in the GP during 2018-19 is given in table 7.3 and map 4.1.

Table 7.1: Details of MGNREGS participation in Kuppam GP, Polur Block

Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of Women
2014-15	67.6	0.6	16.1	87.6
2015-16	78.8	2.2	10.7	86.4
2016-17	81.6	4.5	11.5	85.9
2017-18	77.7	0.9	13.2	83.3
2018-19	79.2	0.3	14.0	84.6

Fig.4.1: No. of Registered Households and Persons under MGNREGS in Kuppam GP, Polur Block

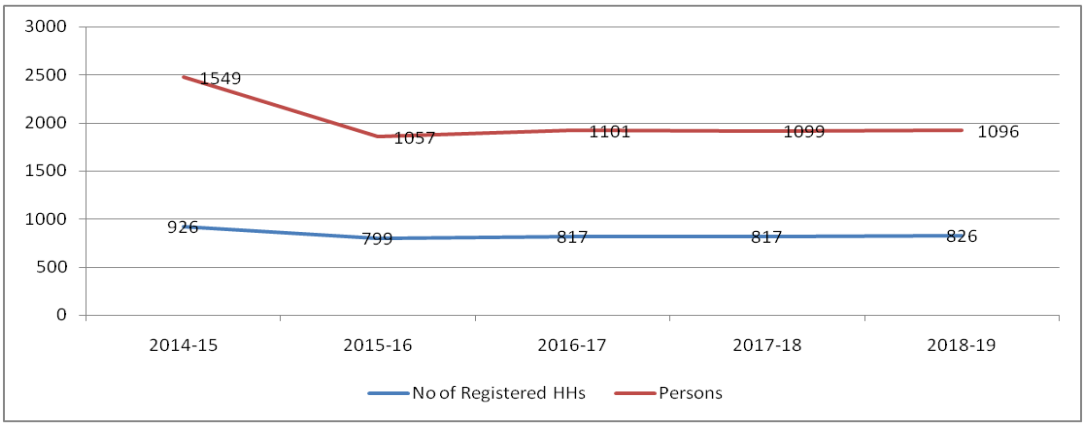
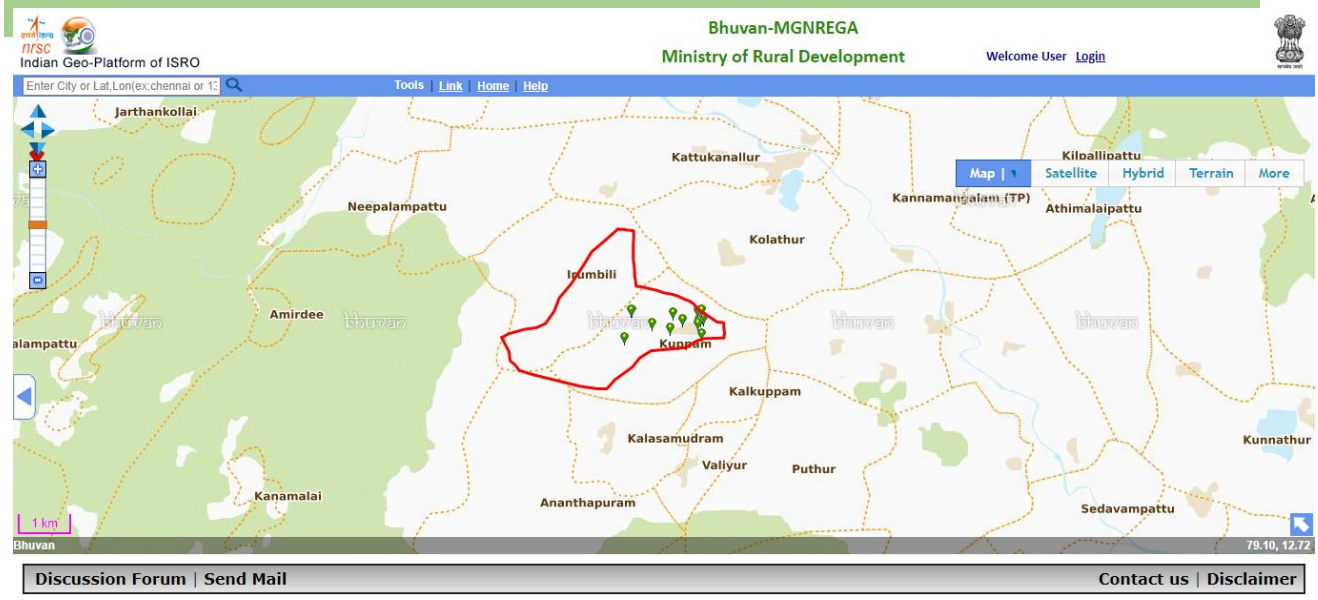


Table 7.2: List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Kuppam GP, Polur Block

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	3	1.04	10	9.87
Watershed management	0	0	0	0	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0	0	0	2	24.87
Traditional water bodies	8	26.04	6	26.57	10	29.54	9	13.51	9	2.82
Afforestation	1	1.36	1	0.51	3	0.72	4	7.65	9	8.46
Land development	0	0	0	0	0	0	0	0	0	0
Total	**9**	**27.4**	**7**	**27.08**	**13**	**30.26**	**16**	**22.2**	**30**	**46.02**

Table 7.3. List of of detailed water conservation works undertaken in Kuppam GP during 2018-19

SNo.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. Of Units	Convergence
1	Formation of Massive Tree Plantation	Block Plantation of Forestry-in Fields-Community	1.71	450	1	No
2	Produced of Nochi Tree Nursery Plantation	Block Plantation of Forestry-in Fields-Community	9.58	2219	1	No
3	Construction of Earthen Bunding	Construction of Earthen peripheral bund for individual	4.1818	1733	2	
4	Avenue Plantation	Road Line Plantation of Shelter Belt Trees-Community	1.39	387	1	No
5	Formation of Percolation Pond	Construction of Mini Percolation Tank for Community	5.82	3425	2	No
6	Strengthening of Kumbalkotta Supply Channel and Construction of flood Check Dam	Construction of minor Canal for Community	33	19832	2	No
7	Construction of Community Soak pit	Construction of Soak Pit for Community	0.1	7	1	No
8	Construction of CC Check Dam	Construction of Masonry/CC Anicut for Community	9.19	3095	2	No



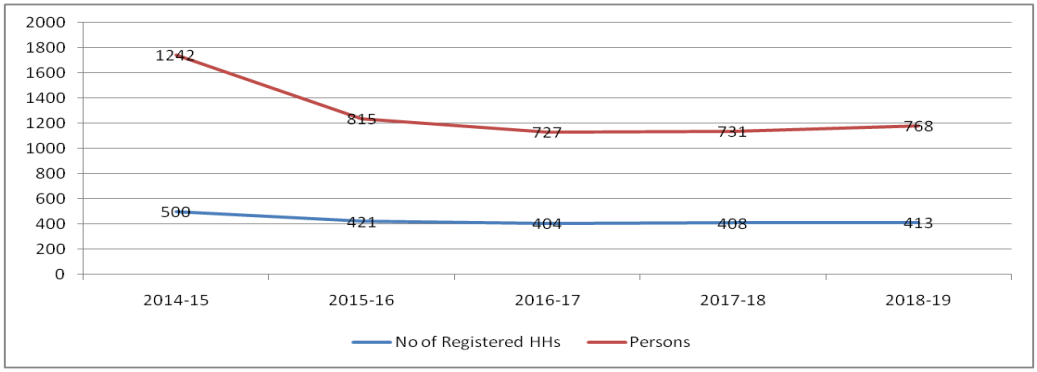
Map 4.1.Kuppam Gram Panchayat MGNREGA Map for 2018-19

5. Venkattampalayam GP, Kalasapakkam Block

Venkattampalayam GP has 328 households and 1305 persons. It has the total geographical area of 160.4 Ha, of which 64% of the total area under irrigated condition and only 2% is under rainfed system. The soil is fine in texture and all the soils are moderate alkaline in condition. more than 80% of the irrigated area is under Paddy cultivation. In MGNREGA works, it is reported about the decline in both number of households registered and also persons under MGNREGS during the five years, 2014-15 to 2018-19 (Fig.5.1). However, major decline in number of persons registered occurred in 2015-16 from 2014-15. The persons registered declined from 1242 to 815 in these years. Even then further declined and ended at 768 in 2018-19. At the meantime, households also declined but not as it was in persons. Households declined from 500 to 421 from 2014-15 to 2015-16; it

The table 8.1 depicted that the percentage of households demanded employment remain more or less same during the five years period. It is important to see that when the number of persons and households declined in 2015-16, the percentage of households demanded employment increased to 91%. It then declined but remain four-fifth of the total registered households. It is interesting to note that the percentage of households that completed 100 days of employment and even next year it was 36%. But then declined massively and almost nil for two years, 2016-17 and 2018-19; it was even negligible in 2017-18. Therefore, no consistency in the percentage of households completed 100 days in the GP. Among the total households, SC participation was more than one-fifth always and remain same at around 23-24 %. However, the percentage of women to total works reported increase in every year it was 64% in 2014-15 and increased to 77% in 2018-19. ended with 413 in 2018-19.

Fig.5.1: No. of Registered Households and Persons under MGNREGS in Venkattampalayam GP, Kalasapakkam Block



The works related to natural resources management is the major category of works undertaken under MGNREGS, it was almost cent percent in 2014-15 and 2015-16, then declined to next two years and then increased in 2018-19 at 88%. It was minimum in the year at 2017-18 at 55%, but still highest category of works. Rural infrastructure is the next category of works undertaken, mainly during 2016-17 to 2018-19. It was more than two-fifth in 2017-18 and more than one-fourth in 2016-17. No other works undertaken under MGNREGS during the five years in Venkattampalayam GP. According to Table 8.2, water conservation is the major activity undertaken under NRM category in the GP for five years under consideration. Water management and works in traditional waterbodies also other two important categories of works undertaken under MGNREGS. The detailed list of works undertaken in the GP during 2018-19 is given in table 8.3 and Map 5.1.

Table 8.1: Details of MGNREGS participation in Venkattampalayam GP, Kalasapakkam Block

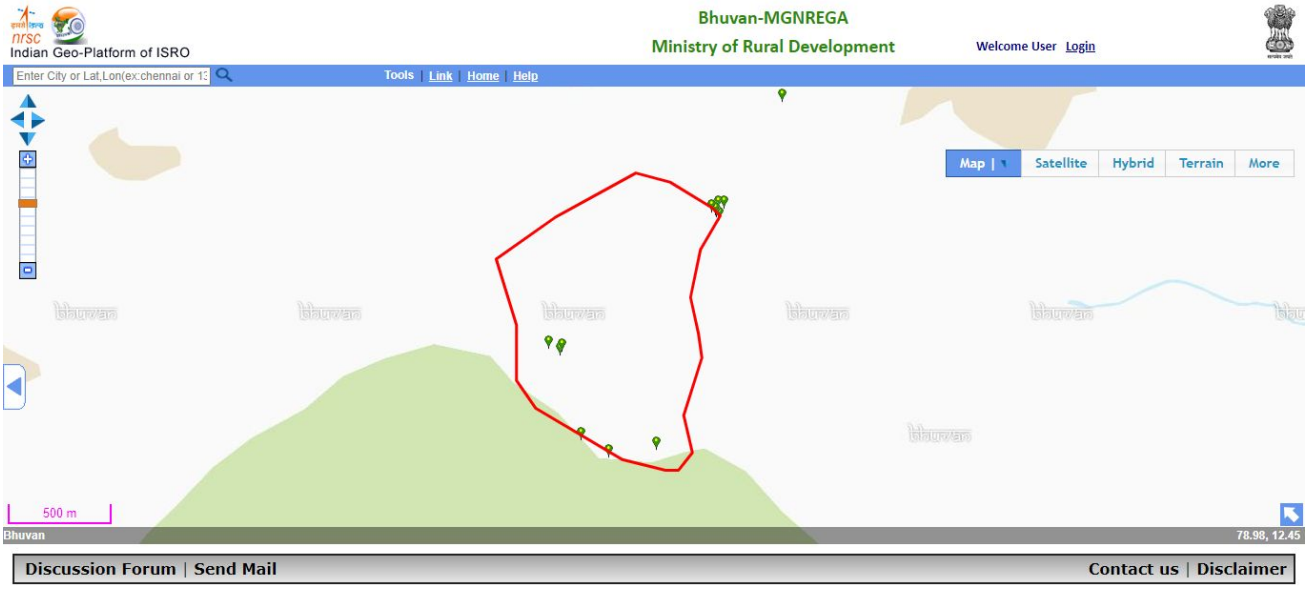
Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of Women
2014-15	79.2	49.5	23.7	64.1
2015-16	90.5	35.7	26.0	65.3
2016-17	82.4	0.0	21.4	67.7
2017-18	81.1	1.5	25.1	74.0
2018-19	79.9	0.0	22.7	77.4

Table 8.2: List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Venkattampalayam GP, Kalasapakkam Block

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	3	8.35	8	21.96	6	26.23	2	8.49	7	14.33
Watershed management	3	12.06	3	14.68	1	0	3	19.45	1	1.23
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	1	5.5	1	0.01	0	0	4	0	26	26.09
Afforestation	0	0	0	0	1	0.04	2	0.67	2	3.99
Land development	0	0	0	0	0	0	0	0	0	0
Total	**7**	**25.91**	**12**	**36.65**	**8**	**26.27**	**11**	**28.61**	**36**	**45.64**

Table 8.3. List of NRM works undertaken in Venkattampalayam GP during 2018-19

SNo.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. Of Units	Convergence
1	Construction of Earthen Bunding	Construction of Earthen peripheral bund for individual	23.2	13493	21	No
2	Construction of Percolation Pond	Construction of Mini Percolation Tank for Community	19.36	10127	6	No
3	Massive Tree Plantation	Block Plantation of Forestry-in Fields-Community	1.37	764	1	NO
4	Construction of Concrete Check dam	Construction of Masonry/CC Anicut for Community	5.36	1362	1	NO



Map 5.1. Venkittampalayam Gram Panchayat MGNREGA Map for 2018-

6. Karikkathur GP, Chetpet Block

Karikkathur Gram panchayat in Chetpet block reported that decline in both households and also persons registered under MGNREGS in five years under consideration (Fig.6.1). The decline was more from 2014-15 to 2015-16 and further to 2016-17. They were consistent after 2016-17. Overall persons registered declined from 1295 to 889 and household from 613 to 537 in the five years. The proportion of demanded employment are always more than four-fifth and even more than nine-tenth for two years (Table 9.1). The percentage of households completed 100 days was

one third of the households in 2014-15 and 2016-17; it was two-thirds in 2015-16; but it was not even one percent for last two years. Therefore, no consistency in households completing 100 days. The percentage of SC/ST is consistent at around 17-18%. However, the percentage of women's participation increased from 78% to 74% over the five years.

The NRM related works always constitute major portion of the works undertaken under MGNEGS. It was almost 100 percent in 2014-15 and 2016-17; the lowest proportion reported in 2018-19 at 65%. Individual assets for vulnerable sections reported nearly one-third in 2018-19 and considerable numbers in other years except 2016-17. Rural infrastructure reported 18% in 2015-16 and some numbers in 2017-18. No other categories reported any work under MGNREGS. Table 9.2 show that works in traditional waterbodies under NRM is the major sub-category that MGNREGS activities undertaken. In 2018-19, water conservation activities also undertaken. The detailed list of works undertaken in the GP during 2018-19 is given in table 9.3 and Map 6.1.

Fig.6.1: No. of Registered Households and Persons under MGNREGS in Karikkathur GP, Chetpet Block

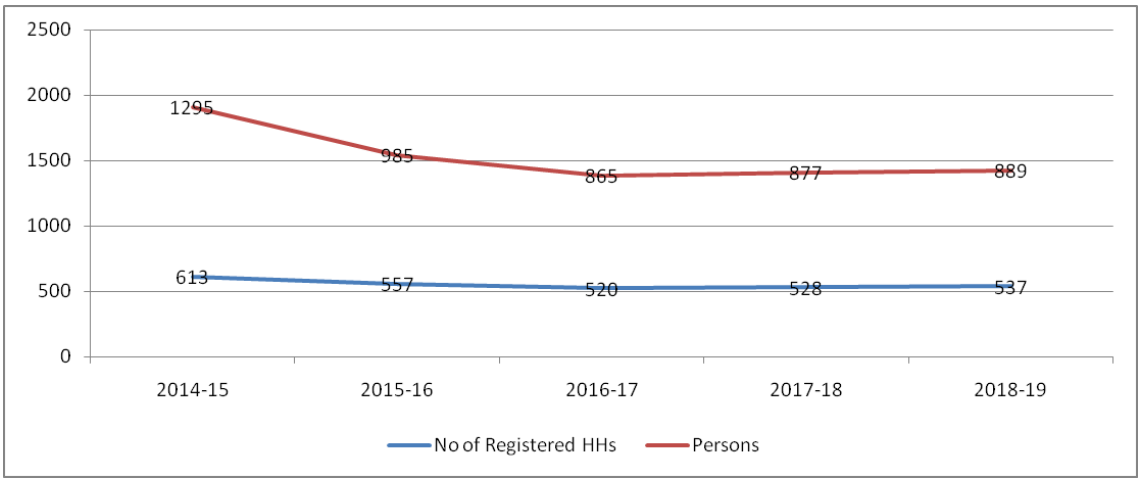


Table 9.1: Details of MGNREGS participation in Karikkathur GP, Chetpet Block

Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	86.5	32.5	6.3	11.0	77.5
2015-16	92.5	65.6	6.4	11.5	75.6

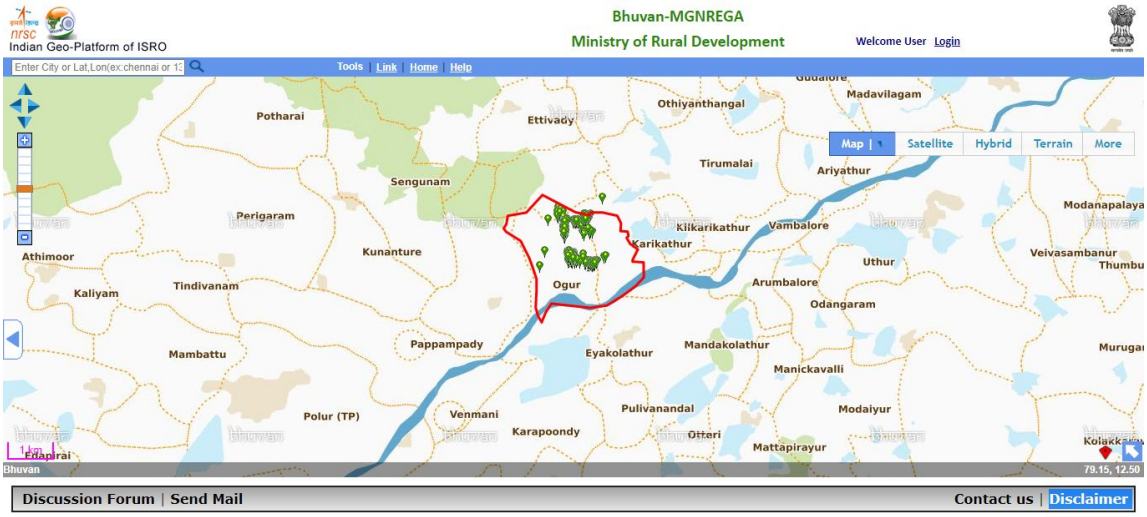
2016-17	96.0	33.3	6.5	12.6	81.3
2017-18	82.4	0.7	6.7	12.0	73.8
2018-19	88.8	0.4	6.4	11.4	83.9

Table 9.2: List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Karikkathur GP, Chetpet Block

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	1	0	0	0	0	0	2	0.28	8	22.32
Watershed management	0	0	0	0	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0	0	0	2	18.95
Traditional water bodies	8	48.82	5	61.9	8	53.94	5	28.72	4	0.88
Afforestation	0	0	0	0	1	3.47	2	1.4	1	0
Land development	0	0	0	0	0	0	0	0	0	0
Total	**9**	**48.82**	**5**	**61.9**	**9**	**57.41**	**9**	**30.4**	**15**	**42.15**

Table 9.3. List of NRM works undertaken in Karikathur GP - 2018-19

SNo.	Work Name	Work Type	Sanction Amount(lakh.)	Total labour days	No. Of Units	Convergence
1	Construction of Soak Pits	Construction of Soak Pit for Individual	2.59	222	37	No
2	Providing of New Percolation Pond in the tank	Construction of Mini Percolation Tank for Community	37.3	26669	6	No
3	Construction of Bed Level Causeway in tank	Construction of Culvert/cross drainage work for Community	15	582	1	No



Map 6.1. Karikathur Gram Panchayat MGNREGA Map for 2018-19

7. Anthanur GP, Chengam Block

Anthanur Gram panchayat in Chengam block reported that increase in both households and also persons registered under MGNREGS in five years under consideration (Fig.7.1). The rate of increase was consistent from 2014-15 to 2-18-19. Overall persons registered increased from 1333 to 1511 and household from 842 to 938 in the five years. The proportion of demanded employment are always more than four-fifth in five years (Table 10.1). However, the percentage of households that completed 100d days was always less than one-tenth and even less than one percent in last two years. The percentage of SC/ST was 46% in 2014-15 and nearly half of the total households in 2018-19. However, the percentage of women's participation declined from 76% to 72% over the five years. Fig 7.2 depicted that NRM related works always constitute major portion of the works undertaken under MGNEGS during 2014-15 to 2-18-19. It was 100 percent in 2014-15 and 93% in 2016-17; the lowest proportion reported in 2017-18 at 60%. Individual assets for vulnerable sections and rural infrastructure also reported considerable proportion during the five years, under MGNREGS.

Table 10.2 show that works in traditional waterbodies under NRM is the major sub-category that MGNREGS activities undertaken. Watershed management also undertaken during the five years.

Water conservation activities were major one in 2018-19. The detailed list of works undertaken in the GP during 2018-19 is given in table 10.3 and Map 7.1.

Fig 7.1. No. of Registered Households and Persons under MGNREGS in Anthanur GP, Chengam Block

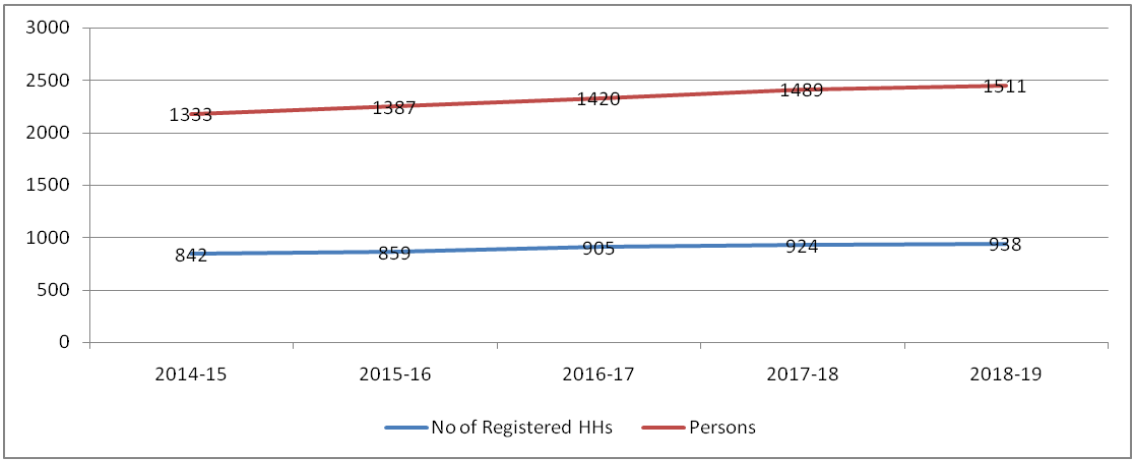


Table 10.1. Details of MGNREGS participation in Anthanur GP, Chengam Block

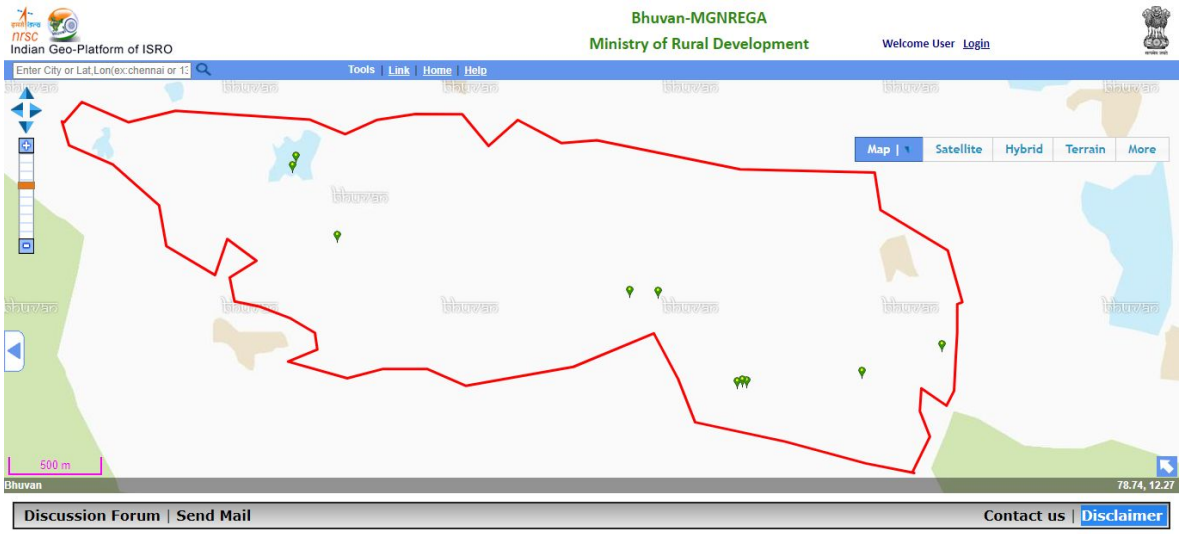
Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	88.0	2.6	45.8	0.0	75.5
2015-16	89.9	6.6	45.3	0.0	72.2
2016-17	88.3	6.1	44.8	0.0	69.6
2017-18	80.5	0.4	50.0	0.0	70.9
2018-19	87.6	0.5	48.9	0.0	71.6

Table 10.2. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Anthanur GP, Chengam Block

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	1	11.29	1	3.84	4	0.46	9	31.61
Watershed management	2	17.74	3	25.54	5	19.2	4	21.57	0	0
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	1	14.69	4	12.18	4	20.09	11	1.64	9	8.7
Afforestation	0	0	0	0	2	2.01	4	0.84	1	0.86
Land development	2	1.05	2	0	0	0	0	0	0	0
Total	**5**	**33.48**	**10**	**49.01**	**12**	**45.14**	**23**	**24.51**	**19**	**41.17**

Table 10. 3. List of NRM works undertaken in Anthanur GP during 2018-19

SNo.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. Of Units	Convergence
1	Cons. of Soak Pit for Community	Construction of Soak Pit for Community	0.1	18	1	No
2	Const. of Recharge Shaft	Construction of Sand filter-Borewell recharge for Community	0.52	36	2	No
3	Construction of percolation pond	construction of mini Percolation ponds	8.14	3686	3	No
4	Construction of Check Dam	Construction of Masonry/CC Anicut for Community	22.04	11320	1	No
5	Check Dam with Supply Channel	Renovation of Fisheries Ponds for Community	9.38	4552	1	No
6	Earthen Bunding	Construction of Earthen peripheral bund for individual	1.16	510	1	No
7	Farm Pond	Construction of Farm Ponds for Individuals	2.7	952	2	No



Map7.1. Anthanur Gram Panchayat MGNREGA Map for 2018-19

8. Unnamalaipalayam GP, Pudupalayam Block

Unnamalaipalayam Gram panchayat in Pudupalayam block reported that increase in both households and also persons registered under MGNREGS in five years under consideration

(Fig.8.1). The rate of increase was consistent from 2014-15 to 2018-19. Overall persons registered increased from 436 to 549 and household from 251 to 310 in the five years.

The proportion of demanded employment has increased from 85% to 92% during the five years under consideration (Table 11.1). However, the percentage of households that completed 100 days was inconsistent over the five years. It was even 71% in 2016-17 and nearly one-fourth in 2016-17; but for other years, it was less than 10%. The percentage of SC/ST was 28% in 2014-15. It was highest at 37% in 2017-18 and then declined to 30% in 2018-19. However, the percentage of women's participation declined from 76% to 68% over the five years.

The NRM related works always constitute major portion of the works undertaken under MGNEGS during 2014-15 to 2018-19. It was 100 percent in 2014-15 and 93% in 2016-17; the lowest proportion reported in 2017-18 at 60%. Individual assets for vulnerable sections and rural infrastructure also reported considerable proportion during the five years, under MGNREGS.

Table 11.2 show that works in traditional waterbodies and afforestation works under NRM are the major sub-category that MGNREGS activities undertaken. Water conservation activities were major one in 2018-19. The detailed list of works undertaken in the GP during 2018-19 is given in table 11.3 and Map 8.1.

Fig 8.1. No. of Registered Households and Persons under MGNREGS in Unnamalaipalayam GP, Pudupalayam Block

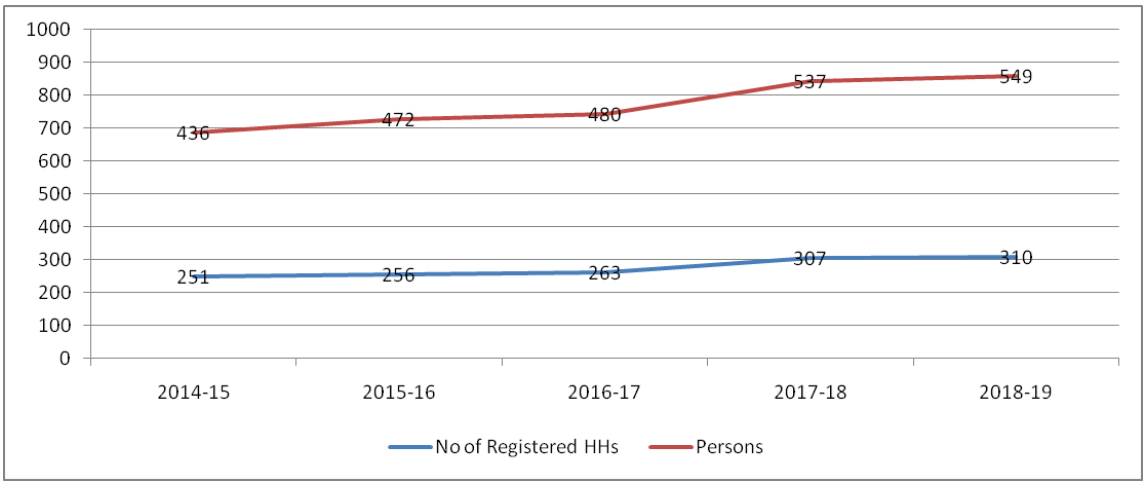


Table 11.1. Details of MGNREGS participation in Unnamalaipalayam GP, Pudupalayam Block

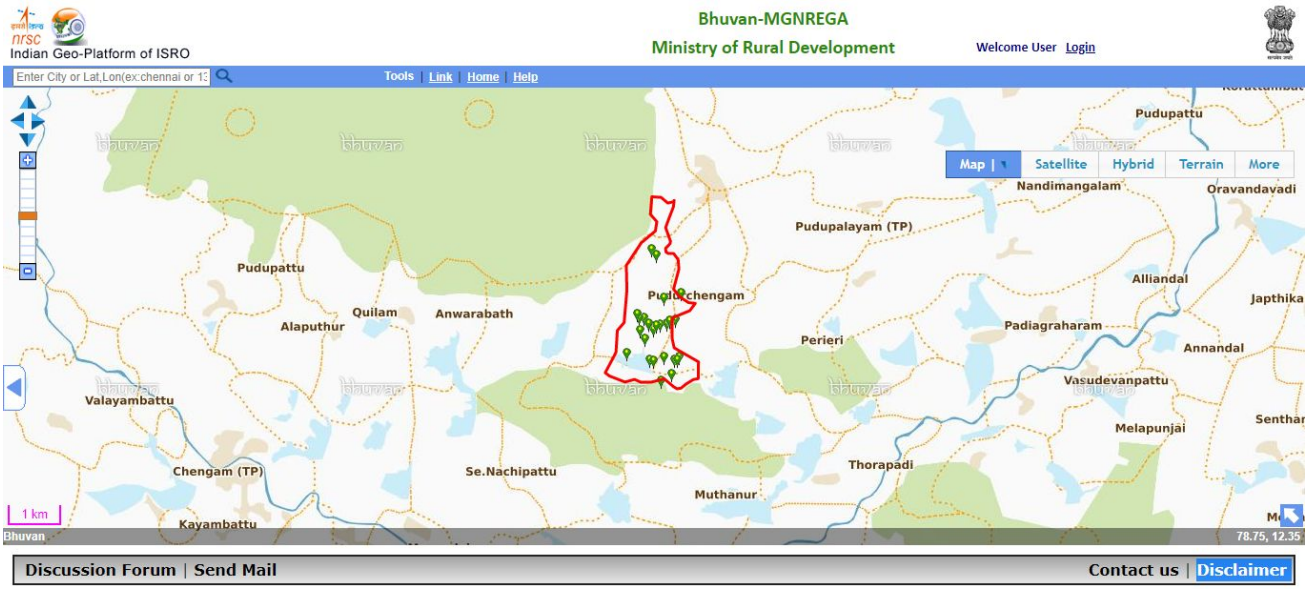
Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	85.3	1.4	28.1	0.2	76.4
2015-16	86.7	24.3	29.9	0.5	75.0
2016-17	90.5	71.0	30.2	0.4	73.8
2017-18	79.5	0.8	37.2	0.2	71.9
2018-19	92.3	7.7	30.4	0.3	67.6

Table 11.2. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Unnamalaipalayam GP, Pudupalayam Block

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	1	4.42	1	3.64	1	0	0	0	8	16.11
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	2.12	1	3.57	4	13.78	7	15.08	32	25.09
Afforestation	3	2.2	4	7.06	5	9.09	5	6.34	1	0
Land development	1	0.81	0	0	0	0	0	0	0	0
Total	**6**	**9.55**	**6**	**14.27**	**10**	**22.87**	**12**	**21.42**	**41**	**41.2**

Table 11.3. **List of NRM works undertaken in Unnamalaipalayam GP during 2018-19**

SNo.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. Of Units	Convergence
1	Unnamalaipaayam - Earthen Bunding	Construction of Earthen peripheral bund for individual	25.52	11387	22	No
2	Percolation ponds	Construction of Mini Percolation Tank for Community	15.46	9826	5	No
3	Community soak pits	construction of community soak pits	0.4	30	4	No
4	Avenue plantation	Road side plantation	1.62	560	1	No
5	Check dams	Construction of Masonry/CC Anicut for Community	3.49	183	1	No
6	Recharge Shaft	Recharge Pits	0.52	56	2	No



Map 8.1. Unnamalaipalayam Gram Panchayat MGNREGA Map for 2018-

9. Kilvanakkambadi GP, Thandrampet Block

Kilvanakkambadi gram panchayat in Thandrapet block showed an increase in households and persons registered under MGNREGS in five years under consideration (Fig.9.1). The increase was marginal in the five years. Overall persons registered increased from 1539 to 1573 and household from 972 to 1016 in the five years.

The proportion of demanded employment has declined from 88% to 81% during the five years under consideration (Table 12.1). The percentage of households that completed 100 days were also very less in all these five years. The percentage of SC/ST was two-fifth across the five years. However, the proportion of SC declined from 36 to 32 percent whereas, the ST proportion increased marginally from 4 to 6 percent from 2014-15 to 2018-19. However, the percentage of women's participation declined from 79% to 71% over the five years. The NRM related works always constitute major portion of the works undertaken under MGNREGS during 2014-15 to 2017-18. It was second largest component in 2018-19 with 34%. and for the year 2014-15, NRM only constitutes almost all expenditure.

Table 12.2 show that works in traditional waterbodies works under NRM is the major sub-category that MGNREGS activities undertaken during the five years. Water conservation activities were

also undertaken in first two years. The detailed list of works undertaken in the GP during 2018-19 under different categories are given in Table 12.3 and Map 9.1.

Fig 9.1. No. of Registered Households and Persons under MGNREGS in Kilvanakkambadi GP, Thandrampet Block

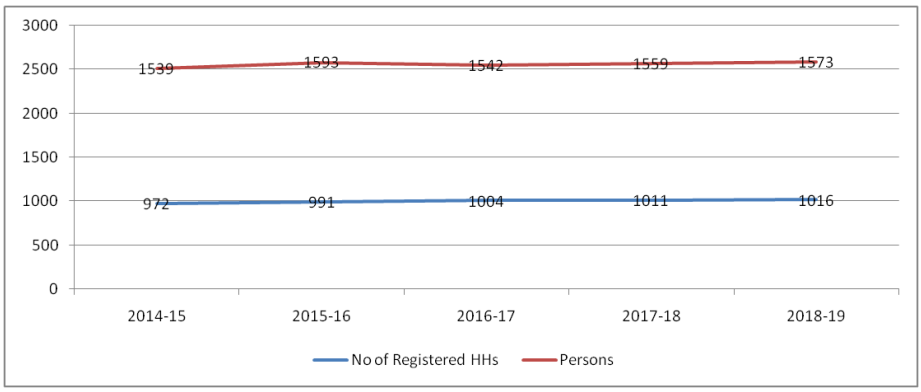


Table 12.1. Details of MGNREGS participation in Kilvanakkambadi GP, Thandrampet Block

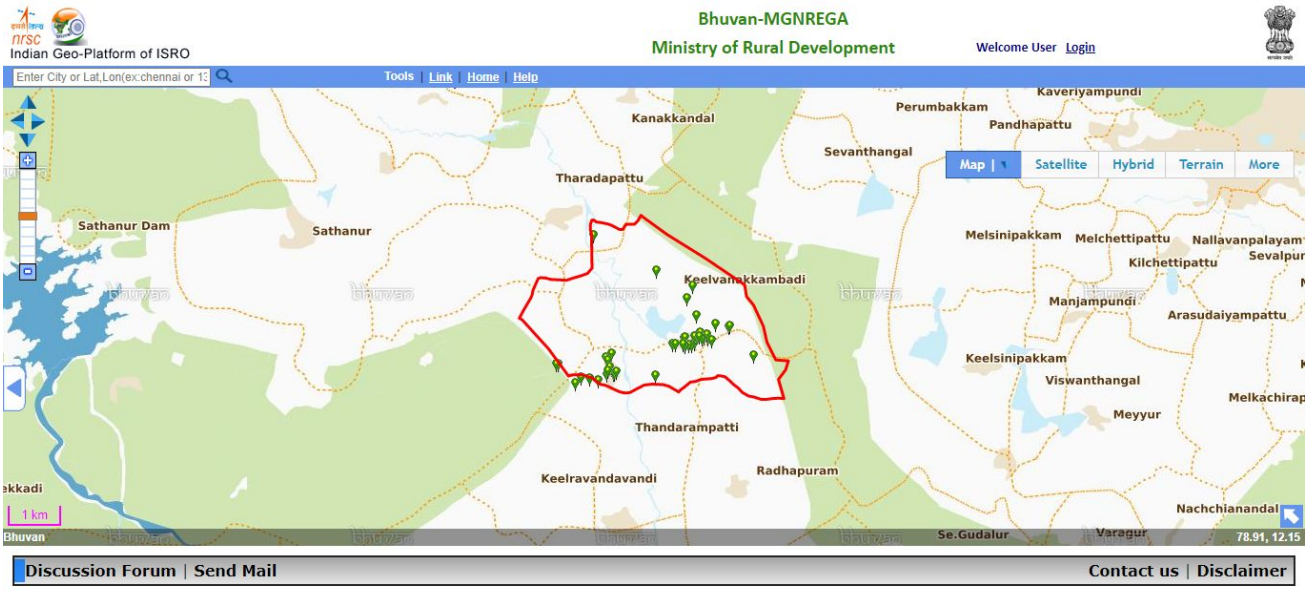
Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	88.0	0.0	36.0	3.5	78.7
2015-16	89.4	0.1	40.5	2.9	79.2
2016-17	88.8	1.9	38.5	3.1	76.6
2017-18	83.9	1.8	37.7	3.7	75.4
2018-19	81.3	0.0	32.0	5.9	70.5

Table 12.2. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Kilvanakkambadi GP, Thandrampet Block

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	4	4.36	2	2.41	0	0.01	0	0	3	6.12
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	10.3	11	24.81	12	19.2	11	28.24	12	3.39
Afforestation	0	0	0	0	1	0.04	1	0.63	3	1.61
Land development	1	0.27	1	1.4	0	0	0	0	0	0
Total	**9**	**14.93**	**14**	**28.62**	**13**	**19.25**	**12**	**28.87**	**18**	**11.12**

Table 12.3. List of works undertaken in Kilavanakkambadi GP, Thandrampet Block in 2018-19

No.	Work Name	Work Type	Sanction Amount in(lakh.)	Total Labour days	No. Of Units	Convergence
1	Percolation tanks	Construction of Flood/ Diversion Channel for Community	13.8	8000	4	No
2	Avenue Plantation	Block Plantation of Forestry-in Fields-Community	1.62	835	1	No
3	Construction of Earthen Bunding	Construction of Earthen peripheral bund for individual	0.812	264	1	No
4	Construction of Recharge Shaft	Construction of Recharge Pits for Community	0.26	28	1	No
5	Check dam construction	Renovation of Flood/ Diversion Channel for Community	5.64	1533	1	No



Map 9.1.Kilvanakkampadi Gram Panchayat MGNREGA Map for 2018-19

10. Nammiyampattu GP, Jawadhumalai Block

Nammiyampattu gram panchayat in Jawadhu malai block reported fluctuations in both number of households registered and also persons under MGNREGS during the five years, 2014-15 to 2018-19 (**Fig.10.1**). the fluctuation was more among persons than households. However, both were

declined from 4634 to 3704 during 2014-15 to 2018-19. At the meantime, households also declined 2242 to 2172 from 2014-15 to 2018-19.

Table 13.1 depicted that the percentage of households demanded employment also reported major fluctuations. It was marginally more than half of the registered households in 2014-15, then increased to nearly two-thirds and then cent percent. But it declined to less than half of the registered households in 2017-18 and then to more than four-fifty in 2018-19. It is interesting to note that the percentage of households that completed 100 days of employment was always negligible and even declined further over the years. It was almost all households are from Scheduled Tribe community in the GP. Women participation is more than two-thirds in under MGNREGS.

A scheduled tribal gram panchayat reported high fluctuations in both households and persons registered under MGNREGES with very negligible percent of households completing 100 days are the concern. Works related to natural resources management is the major category of works undertaken under MGNREGS for the years 2014-15, 2015-16 and 2016-17. However, NRM works reported significant in all five years. According to Table 13.2 water conservation, irrigation and works in traditional water bodies were the major categories under NRM works for first three years. The detailed work carried out in the GP during 2018-19 is given in table 13.3 and Map 10. 1.

Fig 10.1. No. of Registered Households and Persons under MGNREGS in Nammiyampattu GP, Jawadhumalai Block

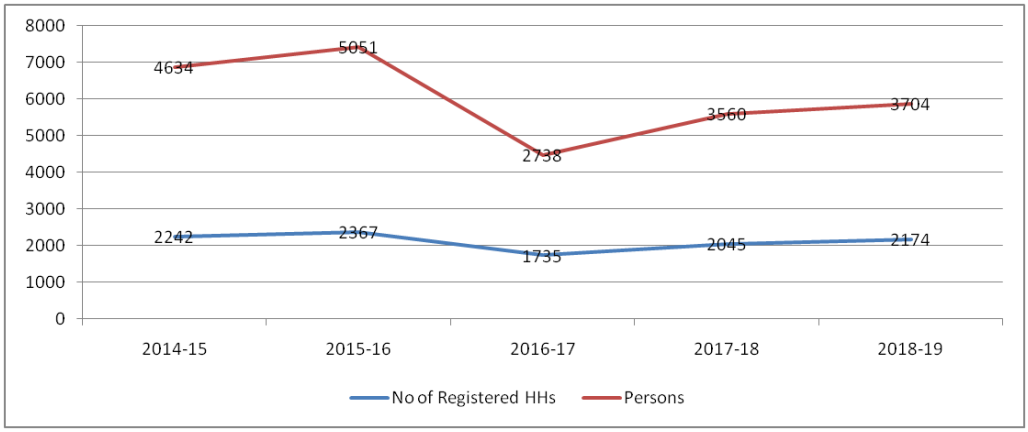


Table 13.1. Details of MGNREGS participation in Nammiyampattu GP, Jawadhumalai Block

Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	54.0	2.8	0.0	99.9	69.8
2015-16	65.3	8.2	0.1	99.9	68.4
2016-17	100.0	1.7	0.0	99.6	68.2
2017-18	47.0	0.3	0.0	99.5	68.4
2018-19	83.4	0.2	0.0	99.4	68.3

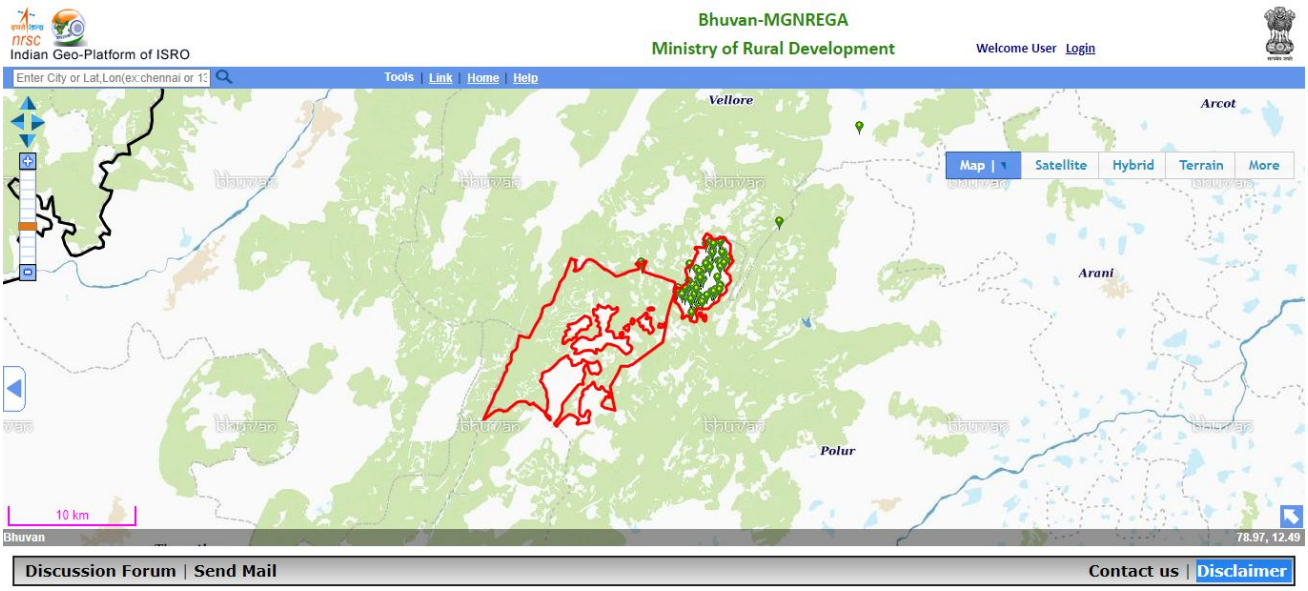
Table 13.2 List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Nammiyampattu GP, Jawadhumalai Block

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	6	0.35	4	2.51	3	0	6	15.34	228	94.66
Watershed management	0	0	0	0	0	0	1	0	3	10.42
Irrigation	7	20.36	6	51.46	6	31.32	0	0	0	0
Traditional water bodies	4	13.18	0	0.04	0	0	0	0	0	0
Afforestation	0	0	0	0	0	0.07	0	0	3	1.86
Land development	0	0	1	1.94	2	0	8	3.38	7	0.45
Total	**17**	**33.89**	**11**	**55.95**	**11**	**31.39**	**15**	**18.72**	**241**	**107.39**

Table 13.3 List of detailed works carried out in Nammiyampattu GP during 2018-19

Sl. No.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. Of Units	Is Convergence
1	Stone Bunding	Construction of Stone graded Bund for Individuals	96.05	23554	189	No
2	Farm Pond	Construction of Farm Ponds for Individuals	5.465	2222	5	No
3	Earthen Bunding	Construction of Earthen graded Bund for Individuals	2.9	1084	9	No
4	Cement Concrete Check Dam	Construction of Boulder Anicut Check Dam for Community	20.96	831	11	No
5	Tree Plantation/pepper cultivation	Block Plantation-Farm Forestry/Horti trees in fields for Individual	5.14	3015	12	No

6	Massive Tree Plantation	Block Plantation-Farm Forestry in fields for Community	1.99	758	2	No
7	Dug Well	Development of Waste Land	2.03	269	1	No
8	Avenue Plantation	Road Line Plantation of Forestry Trees for Community	1.395	651	1	No
9	Solid waste management	Maintenance of rural public assets	10.33	155	1	No
10	Construction of Vermi Compost Shed	Construction of Vermi Compost structure for Community	1	55	1	No



Map10.1.Nammiyampattu Gram Panchayat MGNREGA Map for 2018-19

11. Murukathapoondu GP, Cheyyur Block

Murukathapoondu gram panchayat in Cheyyur block showed a marginal increase in households and persons registered under MGNREGS in five years under consideration (Fig.11.1). The increase was marginal in the five years. Overall persons registered increased from 313 to 321 and household from 213 to 230 in the five years.

The proportion of demanded employment reported more than nine-tenth of the total registered households in all five years under consideration (Table 14.1). The percentage of households that completed 100 days were highly inconsistent. It was nil 2014-15, then reported skewed increase into 51% in following year and then further increased to 82%; but then reported steep decline into

just 0.5% and just 1% in 2018-19. The percentage of ST was not even 5 percent in any year. The percentage of women's participation declined reported somewhat consistent at 87% in the five years.

The NRM related works were the only category of work undertaken in MGNREGS during 2014-15 and 2015-16. And then it felt into three-fifth of the total works in 2016-17 and then increased in subsequent years. Table 14.2 show that land conservation activities and works in in traditional waterbodies under NRM are the major sub-categories that MGNREGS activities undertaken during the five years. Land developed activities also undertaken in the five years. The detailed works carried out in the GP during 2018-19 is given in Table 14.3and Map 11.1.

Fig 11.1. No. of Registered Households and Persons under MGNREGS in Murukathapoondu GP, Cheyyur Block

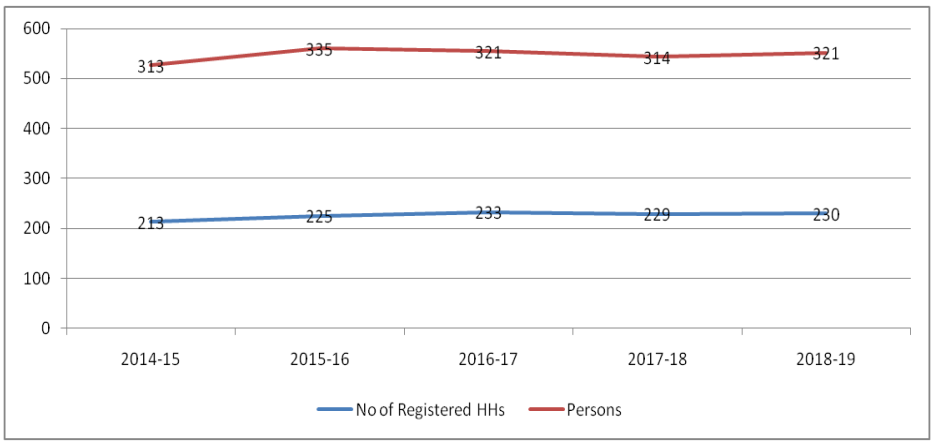


Table 14.1. Details of MGNREGS participation in Murukathapoondu GP, Cheyyur Block

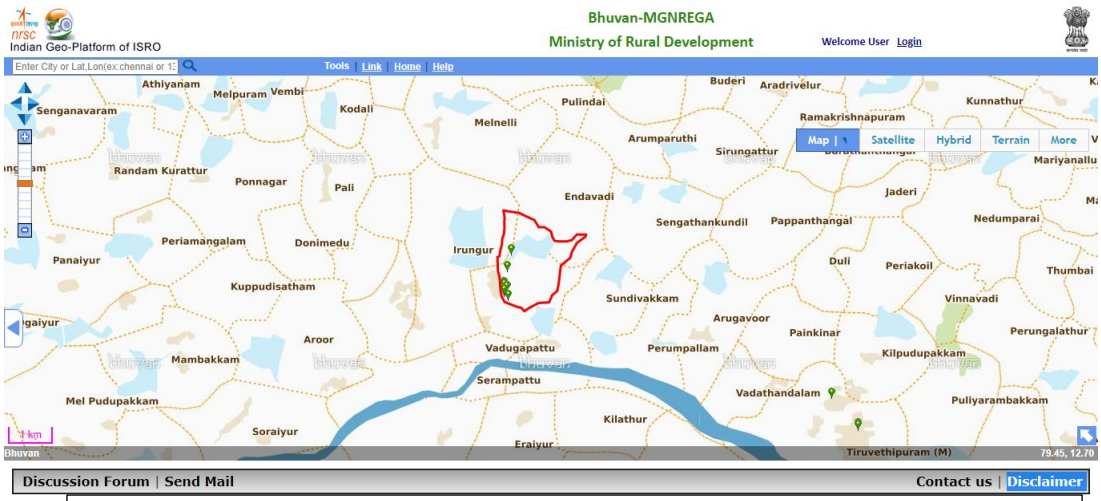
Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	91.1	0.0	0.0	3.7	87.1
2015-16	92.9	50.7	0.0	3.5	83.8
2016-17	92.3	82.3	0.0	3.2	84.4
2017-18	88.6	0.5	0.0	4.1	86.9
2018-19	90.9	1.0	0.0	3.1	86.9

Table 14.2. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Murukathapoondu GP, Cheyyur Block

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	3	2.05	1	0	2	23.72	4	14.46	6	24.07
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	10.98	3	23.85	1	0.83	2	0	2	2.05
Afforestation	0	0	0	0	0	0	0	0	1	0
Land development	2	0.27	2	0.17	2	0	1	0.39	1	0.04
Total	**8**	**13.3**	**6**	**24.02**	**5**	**24.55**	**7**	**14.85**	**10**	**26.16**

Table 14.3 List of detailed works carried out in Murukathapoondu GP, Cheyyur Block during 2018-19

SNo.	Work Name	Work Type	Sanction Amount in(lakh.)	Total Labour days	No. Of Units	Convergence
1	Individual NADEP Compost pit	Construction of NADEP Compost structure for Individual	0.714	41	6	No
2	Vermi compost Shed	Vermi Composting	1	50	1	No
3	Plantation	Land Leveling	5	206	1	No
4	Percolation pond	Construction of Mini Percolation Tank for Community	22.03	13439	3	No



Map11.1.Nammiyampattu Gram Panchayat MGNREGA Map for 2018-19

12. Soundayapuram GP, Anakkavoor Block

Soundayapuram gram panchayat in Anakkavoor block showed a marginal decline in households and persons registered under MGNREGS in five years under consideration (Fig.12.1). The increase was marginal in the five years. Overall persons registered increased from 482 to 442 and household from 286 to 279 in the five years. Both persons and households were marginally increased in 2015-16 and then declined in subsequent years.

The proportion of demanded employment reported more than four-fifth to total registered households in all five years under consideration (Table 15.1). The percentage of households that completed 100 days were highly inconsistent. It was only 2% 2014-15, then reported increase into 15% in following year and then further increased to 57%; but then reported steep decline into just 0.5% and just 5% in 2018-19. The percentage of ST was declined from 17% to 14% in the five years. The percentage of women's participation declined from 84% to 81%. reported somewhat consistent at 87% in the five years.

The NRM related works were major category of work the only category of work undertaken in MGNREGS during in four out of five years under consideration. Table 15.2 show that irrigation, traditional waterbodies and afforestation works under NRM were the major sub-categories that MGNREGS activities undertaken during the five years. Water conservation activities were undertaken in bigger scale in 2018-19. Land developed activities also undertaken in the five years. The detailed work carried out in the GP during 2018-19 is given in table 15.3 and Map 12. 1.

Fig 15.1. No. of Registered Households and Persons under MGNREGS in Soundayapuram GP, Anakkavoor Block

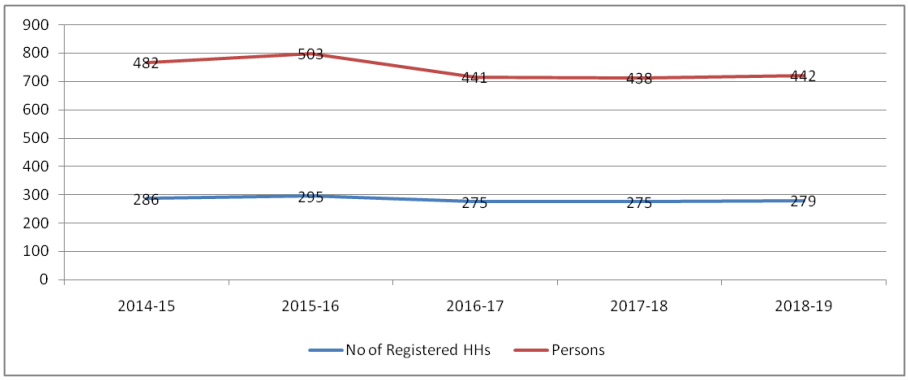
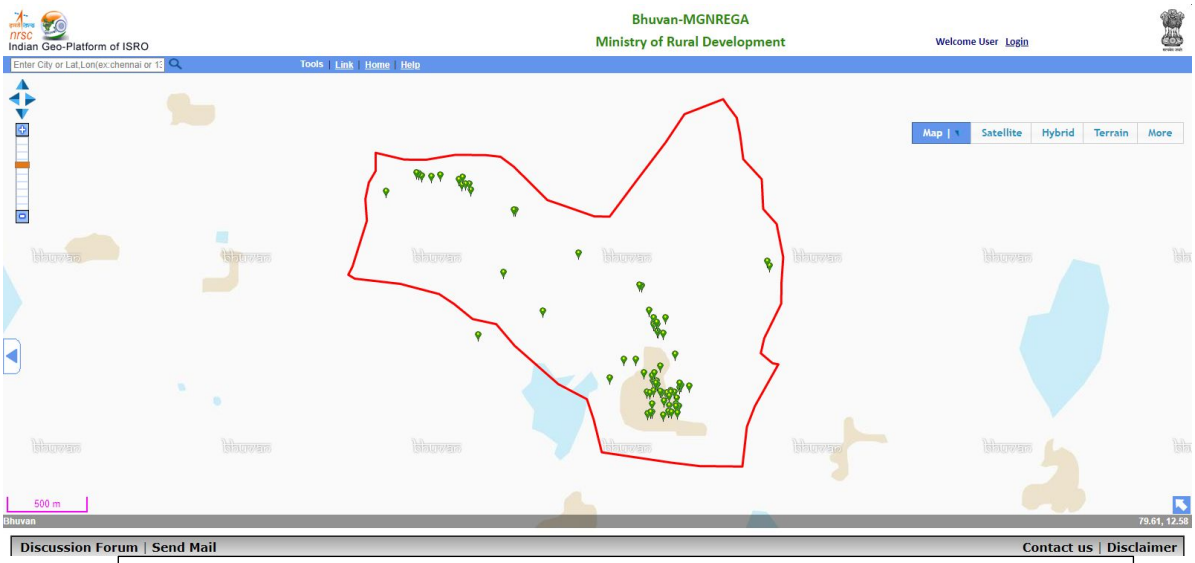


Table 15.1. Details of MGNREGS participation in Soundayapuram GP, Anakkavoor Block

Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	89.5	2.3	17.0	0.0	84.4
2015-16	84.7	15.2	17.0	0.0	82.9
2016-17	86.5	56.7	17.2	0.0	84.9
2017-18	78.9	0.5	15.0	0.0	79.1
2018-19	86.4	5.4	14.3	0.0	80.9

Table 15.2. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Soundayapuram GP, Anakkavoor Block

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	3	0.06	11	24.86
Watershed management	1	8.94	1	0.08	0	0	0	0	0	0
Irrigation	3	1.22	2	1.19	0	0.01	1	0.3	1	11.03
Traditional water bodies	3	8.35	3	12.62	6	21.18	7	16.43	8	2.45
Afforestation	0	0	1	0	1	0.43	2	0.84	3	0.1
Land development	1	3.1	1	0.01	1	0	1	0	1	0
Total	**8**	**21.61**	**8**	**13.9**	**8**	**21.62**	**14**	**17.63**	**24**	**38.44**



Map12.1. Soundayapuram Gram Panchayat MGNREGA Map for 2018-19

Table 15.3. List of detailed works undertaken in Soundayapuram in 2018-19

SNo.	Work Name	Work Type	Sanction Amount in(lakh.)	Total Labour days	No. Of Units	Convergence
1	Avenue Plantation	Road Line Plantation of Shelter Belt Trees-Community	1.86	0	1	NO
2	Massive Tree Plantation - Block plantation	Block Plantation of Forestry-in Fields-Community	1.37	0	1	NO
3	Soak pits for individual	Construction of Soak Pit for Individual	36.1	312	52	NO
4	Recharge Shaft	Construction of Recharge Pits for Community	0.52	72	2	NO
5	Percolation Pond	Construction of Mini Percolation Tank for Community	13.9	8532	2	NO
6	Check dam and anicut	Construction of Masonry/CC Anicut for Community	27.1	9067	4	NO
8	NADEP Compost	Construction of NADEP Compost structure for Individual	2.3	140	20	NO
9	Earthen Bunding	Construction of Earthen peripheral bund for individual	4.37	1481	2	NO

13. Paiyur GP, Arni Block

Paiyur gram panchayat in Arni block showed a marginal increase in households and persons registered under MGNREGS in five years under consideration (Fig.13.1). The increase was marginal in the five years. Overall persons registered increased from 1968 to 2041 and household from 1480 to 1668 in the five years.

The proportion of demanded employment were three-fourth 9n 2014-15 and then declined marginally into 58%in 2018-19 (Table 16.1). The percentage of households that completed 100 days were very negligible. The percentage of ST was declined from 22% to 15% in the five years. Of the total workers, nine out of ten workers are women in the five years.

The NRM related works were major category of work the only category of work undertaken in MGNREGS during in all five years under consideration. It was more than 90% in three years including 2018-19; 66% in 2016-17 and 83% in 2014-15. Table 16.2 show that water conservation, water management and land development works under NRM were the major sub-categories that MGNREGS activities undertaken during the five years. Water conservation activities were

undertaken in bigger scale in 2018-19. The detailed work carried out in the GP during 2018-19 is given in Map 13. 1 and there was no non NRM carried out in this GP.

Fig 13.1. No. of Registered Households and Persons under MGNREGS in Paiyur GP, Arni Block

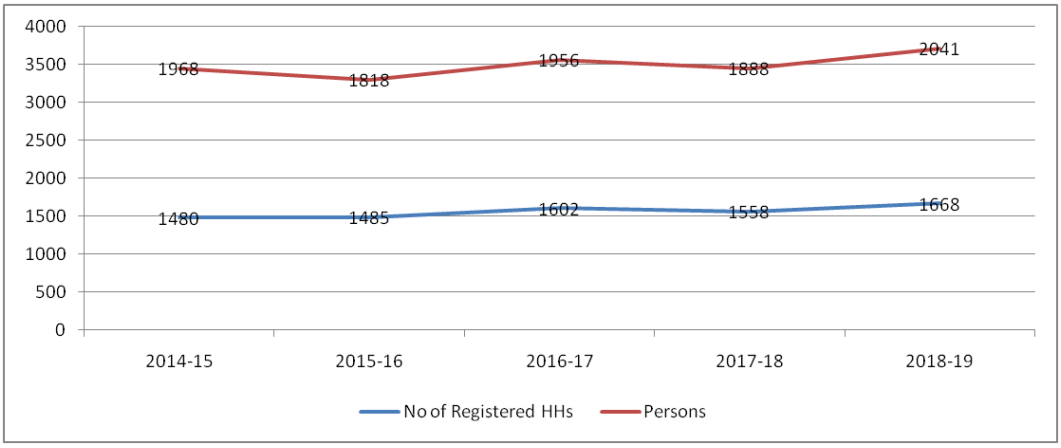


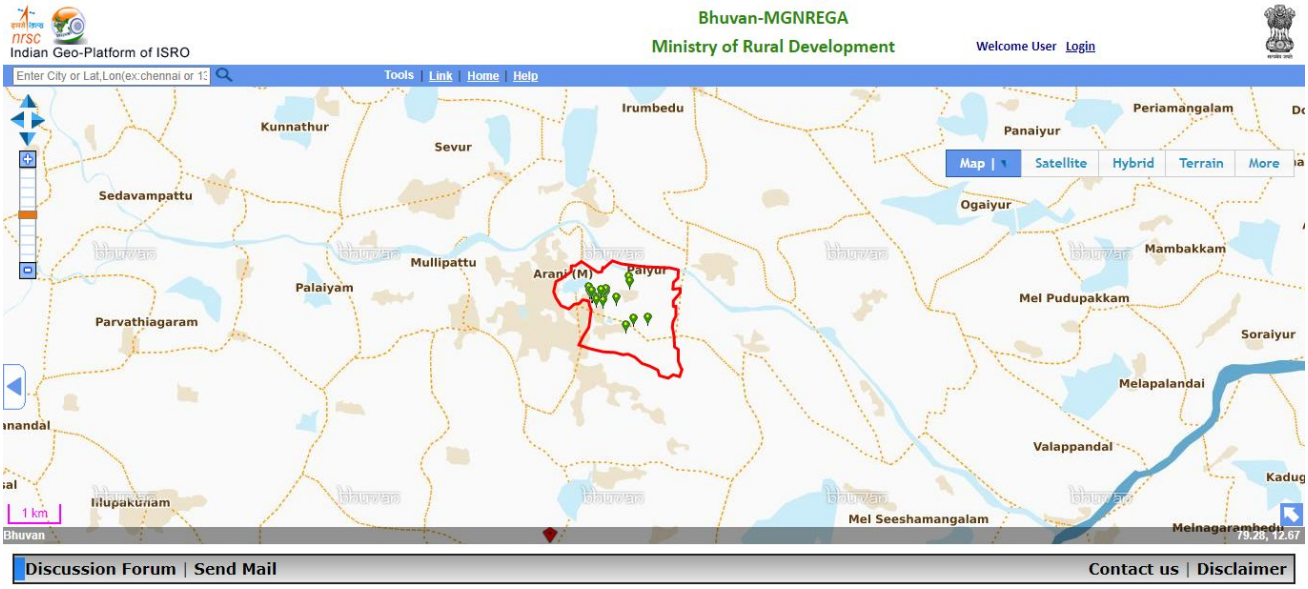
Table 16.1. Details of MGNREGS participation in Paiyur GP, Arni Block

Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	60.5	0.3	21.6	0.0	95.2
2015-16	64.5	4.2	20.6	0.0	95.0
2016-17	62.3	2.5	18.9	0.0	92.2
2017-18	55.3	0.2	14.2	0.0	90.8
2018-19	58.3	0.6	14.6	0.0	90.1

Table 16.2.List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Paiyur GP, Arni Block

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	2	0	7	51.6	7	32.18	9	1.54	10	55.48
Watershed management	8	39.85	1	12.07	3	13.17	2	11.02	0	0
Irrigation	0	0	0	0	1	3.01	2	2.87	1	0
Traditional water bodies	3	0	0	0	0	0	0	0	0	0
Afforestation	0	0	0	0	1	1.65	2	0.18	2	1.93

Land development	4	4.41	2	0.43	2	0	2	20.66	2	0.26
Total	**17**	**44.26**	**10**	**64.1**	**14**	**50.01**	**17**	**36.27**	**15**	**57.67**



Map13.1. Paiyur Gram Panchayat MGNREGA Map for 2018-19

14. Ukkamperumbakkam GP, Vembakkam Block

Ukkamperumbakkam gram panchayat in Vembakkam block showed different trend for households registered under MGNREGS and persons registered. While the households registered from 218 to 240 during 2014-15 to 2018-19, the persons registered under MGNREGS declined from 289 to 260 in the same period (Fig.14.1). it is also observed that per worker per household is more or less one worker only.

The proportion of demanded employment were always more than three-fourth during the years under consideration (Table 17.1). However, the percentage of households that completed 100 days were not same over the years. It was even more than 50% in 2015-16 and 2016-17, but nil for other three years. The percentage of ST was more than half of the total households in 2014015 and then declined in next two years, then increased into 58% but declined to 46% in 2018-19. Similarly, the proportion of female to total workers also fluctuated but always more than four-fifth of the total workers. The NRM related works were the only category in 2014-15 and then 97% in 2015-16. Even for other three years, it was more than 50% and even 70% in 2018-19. Table 17.2

& Fig 14.3 show that water conservation and traditional water bodies related works NRM were the major sub-categories that MGNREGS activities undertaken during the five years. Water conservation activities were undertaken in bigger scale in 2018-19. The detailed work carried out in year 2018-19 in the GP is in Table 17.3 and map 14.1.

Fig 14.1.No. of Registered Households and Persons under MGNREGS in Ukkamperumbakkam GP, Vembakkam Block

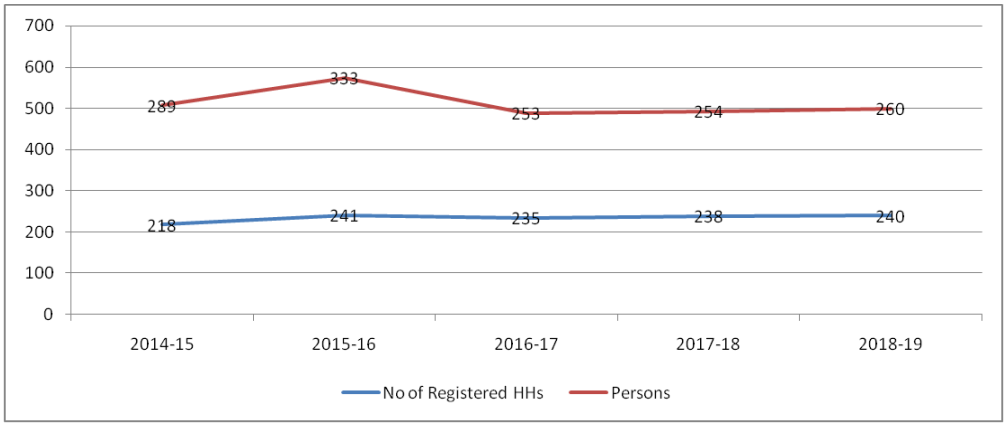


Table 17.1. MGNREGS participation in Ukkamperumbakkam GP, Vembakkam Block

Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	78.4	0.0	52.2	0.1	90.6
2015-16	80.1	58.5	46.1	0.4	87.3
2016-17	91.5	54.0	45.5	0.7	84.3
2017-18	76.1	0.0	58.0	0.5	71.8
2018-19	79.6	0.0	46.1	0.6	84.3

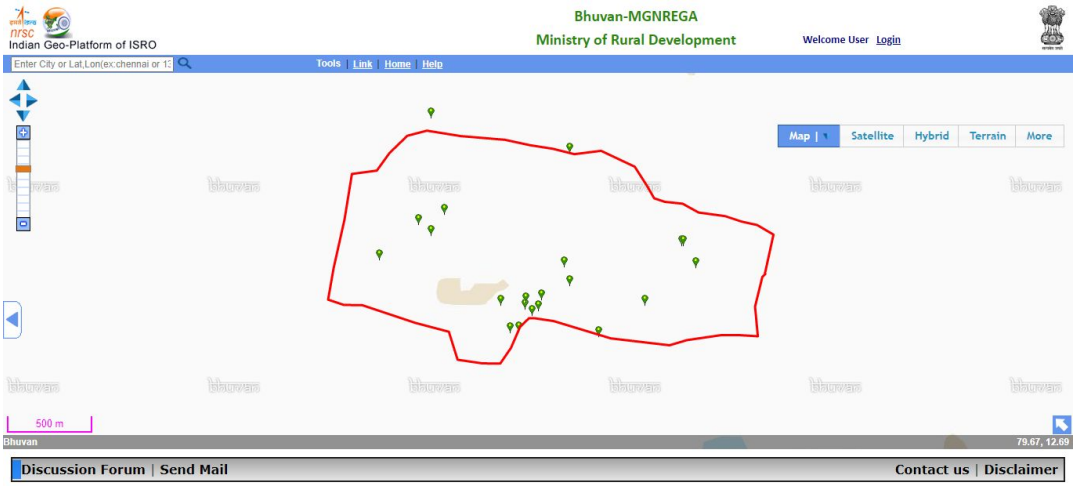
Table 17.2. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Ukkamperumbakkam GP, Vembakkam Block

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	1	0.86	2	0.22	3	16.94	2	8.2	8	10.43
Watershed management	0	0	0	0	0	0	1	0.29	1	0
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	2	12.28	3	18.17	1	0.29	0	0.93	9	9.62
Afforestation	0	0	0	0	0	0	2	0.15	2	1.01

Land development	0	0	0	0	0	0	0	0	3	0
Total	**3**	**13.14**	**5**	**18.39**	**4**	**17.23**	**5**	**9.57**	**23**	**21.06**

Table. 17.3. Detailed work carried out in the Ukkamperumbakkam GP, Vembakkam Block in 2018-19

Sl. No.	Work Name	Work Type	Sanction Amount in(lakh.)	Total Labour days	No. Of Units	Convergence
1	Construction of Earthen Bunding	Construction of Earthen peripheral bund for individual	12.18	6760	9	NO
2	Percolation ponds	Construction of Mini Percolation Tank for Community	20.45	12179	4	NO



Map14.1.Ukkamperumbakkam Gram Panchayat MGNREGA Map for 2018-

15. Vengundram GP, Vandavasi Block

Vengundram gram panchayat in Vandavasi block showed marginal decline in both households and persons registered under MGNREGS. While the households registered from 807 to 771 during 2014-15 to 2018-19, the persons registered under MGNREGS declined from 1083 to 1033 in the same period (Fig.15.1).

The proportion of demanded employment were always more than three-fourth during the years under consideration (Table 18.1). However, the percentage of households that completed 100 days were not same over the years. It was even more than 50% in 2016-17, but negligible in all other years. The percentage of ST was declined from 38% in 2014-15 to 29% in 2018-19. However,

the women participation was comparatively consistent in the five years. The NRM related works were maximum in all five years under consideration. Table 18.2 show that water conservation, works in traditional waterbodies and land development were the major NRM works undertaken in MGNREGS. Afforestation activities were also undertaken to some extent. Water conservation activities were undertaken in bigger scale in 2018-19. The detailed work carried out in 2018-19 in the GP is given in Table 18.3 and MGNREGA map in 15.1.

Fig 15.1.No. of Registered Households and Persons under MGNREGS in Vengundram GP, Vandavasi Block

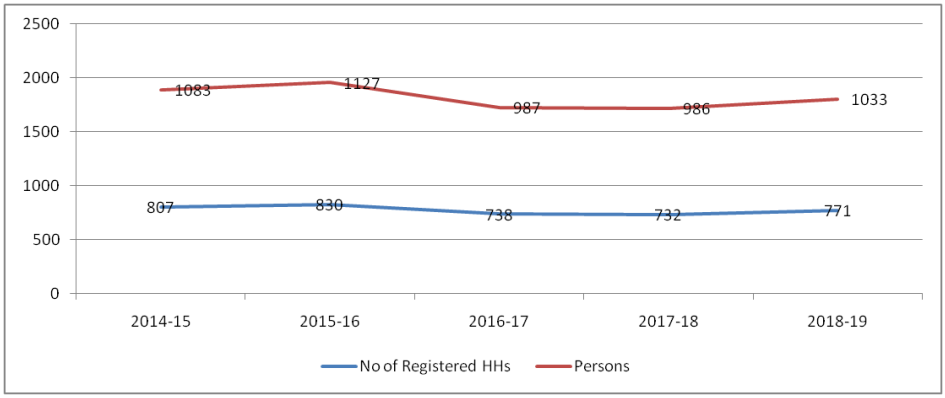


Table 18.1. Details of MGNREGS participation in Vengundram GP, Vandavasi Block

Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	84.9	0.7	38.3	0.1	86.6
2015-16	80.7	1.8	37.4	0.1	90.0
2016-17	90.9	57.8	34.0	0.0	90.4
2017-18	81.8	0.2	33.1	0.0	88.5
2018-19	83.0	10.3	29.3	0.0	89.2

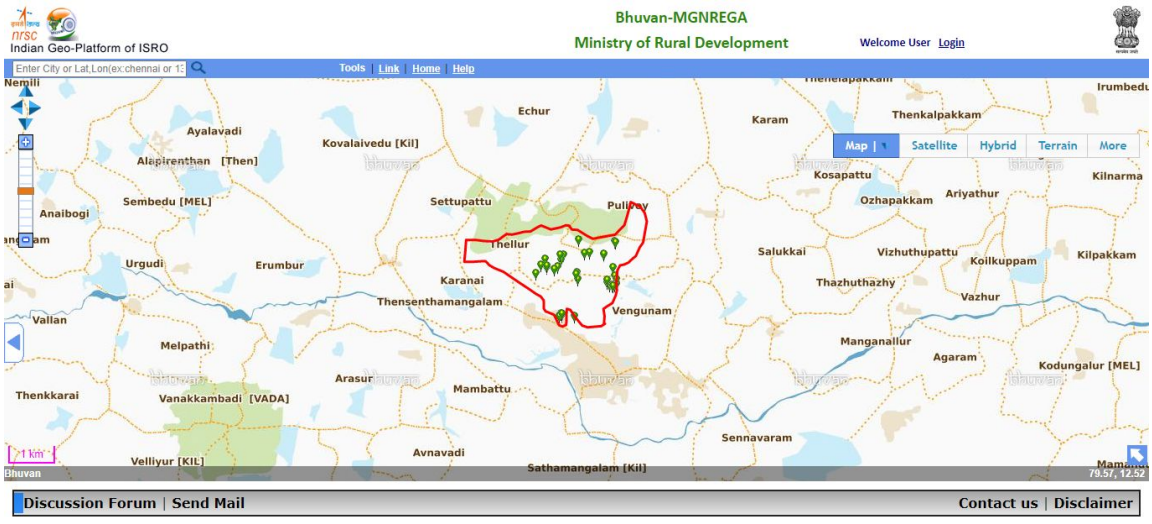
Table 18.2. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Vengundram GP, Vandavasi Block

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	7	1.42	8	8.75	9	2.16	12	5.56	33	68.49
Watershed management	0	0	2	13.13	2	2.31	0	0	0	0

Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	9	43.38	10	11.03	17	58.89	19	36.93	14	0
Afforestation	0	0	1	0.05	2	0.05	3	0	4	1.8
Land development	7	0.56	6	4.96	2	0	3	1.91	4	7.75
Total	**23**	**45.36**	**27**	**37.92**	**32**	**63.41**	**37**	**44.4**	**55**	**78.04**

Table 18.3. List of works undertaken in lakhs during 2018-19 in Vengundram GP, Vandavasi Block

SNo.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. Of Units	Convergence
1	Formation of Percolation ponds	Construction of Mini Percolation Tank for Community	91.87	56615	17	No
2	Construction of Recharge shaft	Construction of Recharge Pits for Community	0.58	38	2	No
3	Construction of Check dam	Construction of Masonry/CC Anicut for Community	21.815	9390	3	No
4	Tree plantation	Community work	1.07	364	1	NO
5	Providing Trench Cutting at massive tree Plantation site	Block Plantation of Forestry-in Fields-Community	1.255	637	1	NO
6	Cons of Community soak pit	Construction of Soak Pit for Community	0.115	9	1	NO
7	Construction of baby pond retaining wall inlet outlet - Pond	Renovation of Community Ponds for Community	2	84	1	NO



Map15.1.Venkundram Gram Panchayat MGNREGA Map for 2018-19

16. Madam GP, Thellar Block

Madam gram panchayat reported diverse pictures for number of households registered compared with number of workers registered during 2014-15 to 2018-19 (Fig.16.1). Number of persons declined was high in the period 2016-17 when compared to rest of the years. The total households declined from 614 to 546 during those years and the number of persons slightly increased from 325 to 335 in the same years.

However, the number of households demanded employment, of the total registered households had increased in the five years period. It was 87% in 2014-15, then increased to 88 % in 2015-16, further increased to 96% in 2017-18, then declined in the years 2016 -17and 2018-19 is 93% & 95 % (Table 19.1). However, in all these years, the proportion of households completed 100 days. It was high at 86 % in 2016-17. Most of these workers are women and it marginally declined in 2018-19 compared to 2014-15. Likewise, proportion of SC to total workers also marginally declined from 85% to 82% from 2014-15 to 2018-19. The type of works undertaken for the five years in Madam is predominantly natural resources related public works. NRM works proportion reported lowest percentage among the five years was in 2017-18 is 21%. It was traditional water bodies related works carried out in the year 2017 to 2019 ; water conservation was the done under NRM for all the five years; few land development activities undertaken during 2015-16 and 2018-19(Table 19.2). Among works other than NRM activities, Construction of households and improving productivity of lands are the two categories that attract more funds during the five years under consideration. The detailed list of works are listed in the table 19.3 and Map 16.1.

Fig 16.1.No. of Registered Households and Persons under MGNREGS in Madam GP, Thellar Block

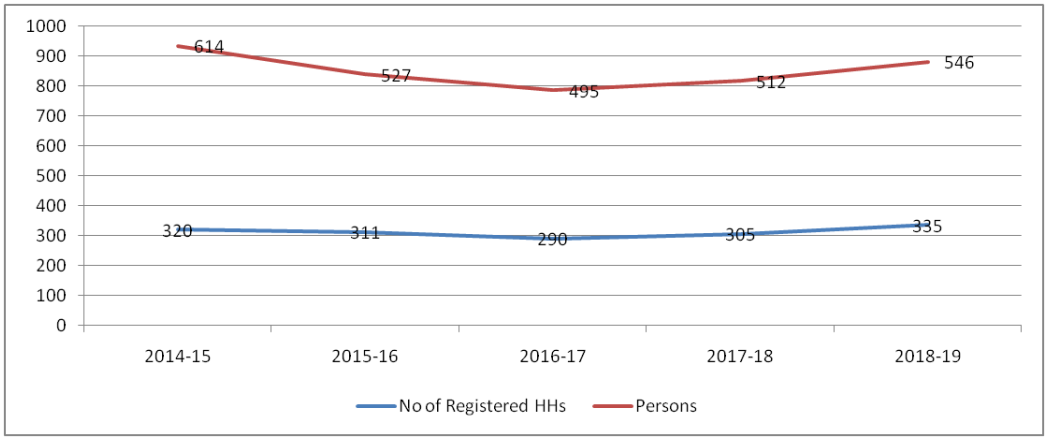


Table 19.1. Details of MGNREGS participation in Madam GP, Thellar Block

Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	87.2	4.3	12.4	0.8	85.6
2015-16	88.4	48.4	12.4	0.7	85.7
2016-17	93.4	86.3	12.3	0.3	83.2
2017-18	96.4	0.0	13.9	0.2	81.6
2018-19	95.5	7.5	10.2	0.3	82.8

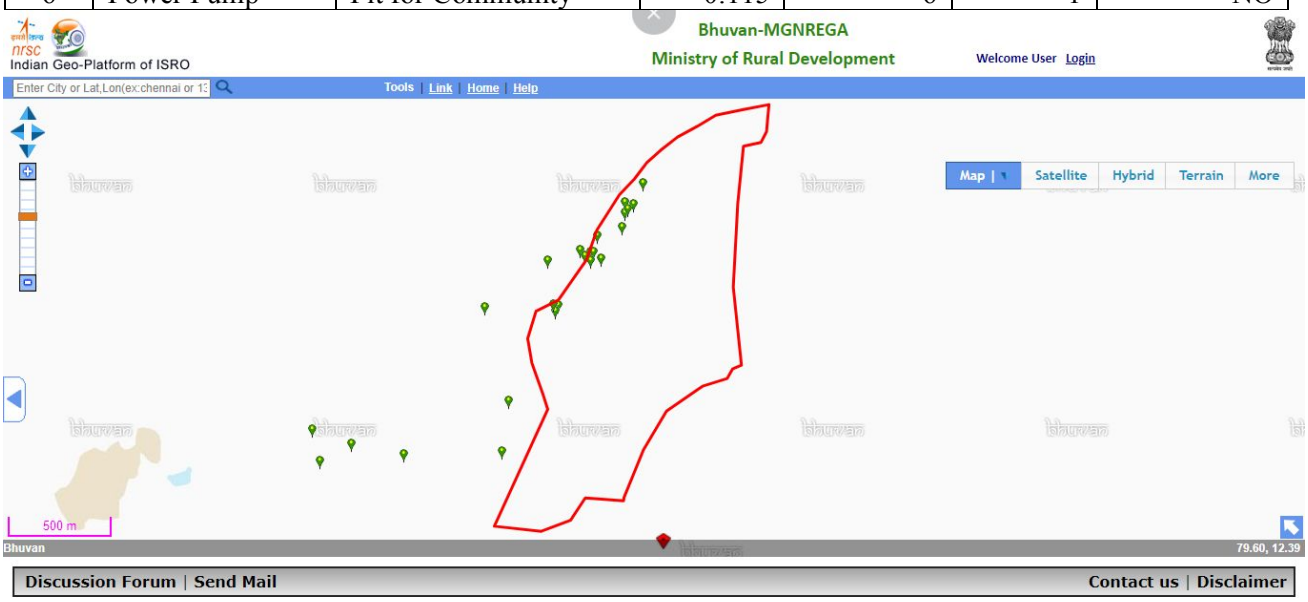
Table 19.2. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Madam GP, Thellar Block

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	2	14.93	1	8.82	2	13.75	11	6.82	11	35.78
Watershed management	2	0	1	5.99	0	0.03	0	0	0	0
Irrigation	0	0	0	0	0	0	0	0	2	0
Traditional water bodies	0	0	0	0	2	16.46	3	3.34	3	4.79
Afforestation	0	0	0	0	0	0	0	0	1	0
Land development	2	0	2	1.18	0	0	0	0	3	3.11
Total	**6**	**14.93**	**4**	**15.99**	**4**	**30.24**	**14**	**10.16**	**20**	**43.68**

Table 19.3. Detailed work carried out in Madam GP, Thellar block in 2018-19.

SNo.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. of Units	Convergence
1	Earthen Bunding work	Construction of Earthen peripheral Bund for Community	3.35	1402.00	3.00	NO
2	Percolation of Pond	Construction of Mini Percolation Tank for Community	7	4343	2	NO
3	New Ponds	Renovation of Community Ponds for Community	10	6001	2	NO
4	Cement Concrete check Dam	Construction of Masonry/CC Anicut for Community	41.49	17953	3	NO

5	Const. of Individual Soak Pit	Construction of Soak Pit for Individual	1.82	182	26	NO
6	Construction of Community Soak pit near Mini Power Pump	Construction of Soak Pit for Community	0.115	6	1	NO



Map16.1.Madam Gram Panchayat MGNREGA Map for 2018-19

17. Jagaathapuram GP, Peranamallur Block

Jagannathapuram gram panchayat reported diverse pictures for number of households registered compared with number of workers registered during 2014-15 to 2018-19 (Fig.17. 1). When total number of households registered declined from 192 to 188 during the five years reported, the number of persons registered under MGNREGS has also declined from 383 to 323(Table 20.1). Moreover, one-eighth of the households that demanded employment are from SC/ST. SC's participation reported fluctuation during the five years and decline in 2018-19. Regarding women's participation, almost all workers are women and it is remains constant for the years 2014-15;2016-17 & 2018-2019 and there is decline for the 2015-16 & 2017 – 18. The main observation is, despite the decline in percentage of households demanded employment, the women's participation remain same. However, the percentage of households that completed 100 days in the year 2016-17 is 72 % , 20% in 2015-16 and 8% in 2015- 16. During 2017 - 2019 are very negligible and not even one percent of households. Further, no household completed 100 days in 2017-18

(Table 20.2). The type of works undertaken for the five years in Jagannathapuram is predominantly natural resources related public works. NRM works proportion reported lowest percentage among the five years was in 2015-16 and 2018-19 and itself was 70%. It was traditional water bodies related works except 2018-19; water conservation was the done under NRM in the period of 2014-15, 2017-18 and 2018-19; few afforestation activities undertaken during 2017-18. The detailed work carried out in the GP during 2018-19 is given in table 20.3 and map 17.1.

Fig 17.1. No. of Registered Households and Persons under MGNREGS in Jagaathapuram GP, Peranamallur Block

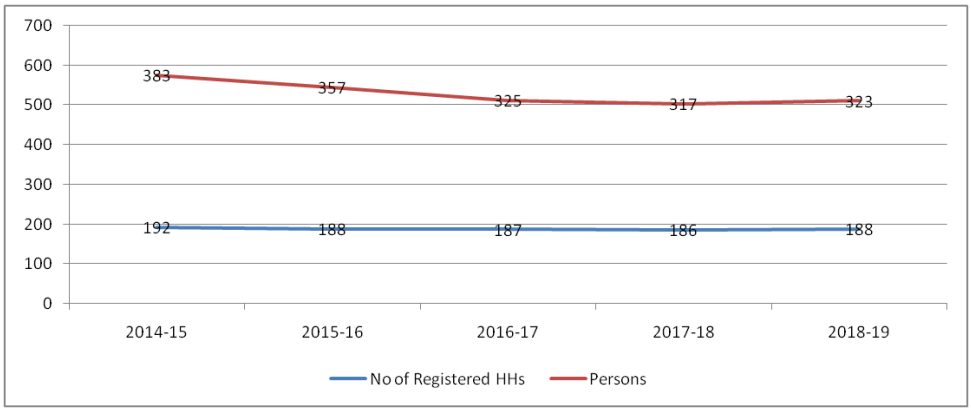


Table 20.1. Details of MGNREGS participation in Jagaathapuram GP, Peranamallur Block

Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	75.0	8.3	14.5	0.0	84.2
2015-16	84.6	20.1	14.4	0.0	82.5
2016-17	90.4	72.2	12.9	0.0	84.5
2017-18	86.6	0.0	14.3	0.0	78.3
2018-19	90.4	0.6	13.8	0.0	84.0

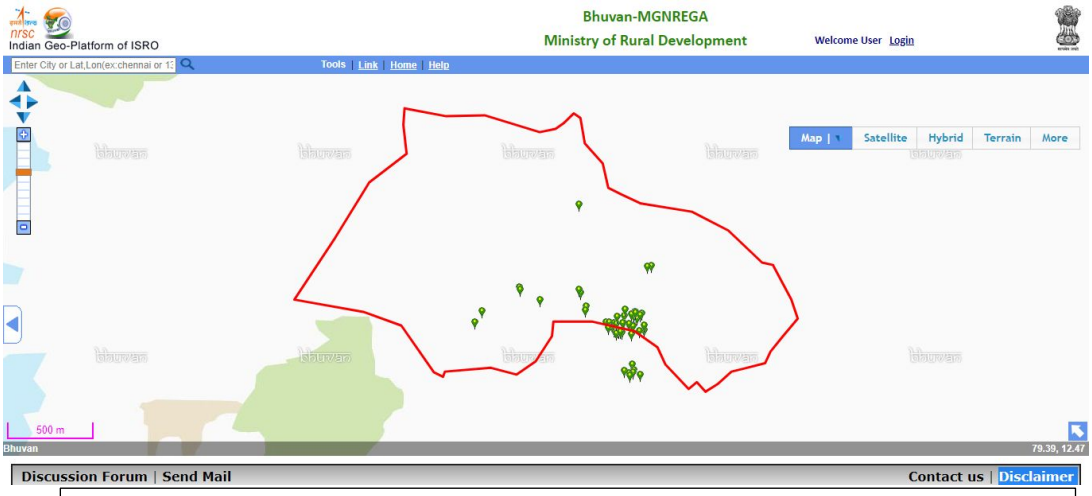
Table 20.2. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Jagaathapuram GP, Peranamallur Block

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	2	1.7	0	0	0	0	3	0.25	8	15.14

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	2	10.75	3	18.71	4	12.93	4	12.53	3	0
Afforestation	0	0	0	0	0	0	0	0.75	2	0
Land development	0	0	1	0.18	0	0	1	0	3	1.9
Total	**4**	**12.45**	**4**	**18.89**	**4**	**12.93**	**8**	**13.53**	**16**	**17.04**

Table 20.3. Detailed list of NRM activities carried out in Jagaathapuram GP, Peranamallur Block during 2018-19

No.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. Of Units	Convergence
1	Massive Tree Plantation	Plantation	12.25	488	1	NO
2	Construction of soak pits	Construction of Soak Pit for Individual	4.52	228	38	NO
3	Const. of Soak Pit for Community	Construction of Soak Pit for Community	0.1	6	1	NO
4	Providing of Earthen bunding	Construction of Earthen graded Bund for Community	1.15	638	1	NO
5	Construction of percolation pond	Construction of Mini Percolation Tank for Community	16.79	9786	4	NO
6	Farm ponds	Construction of Farm Ponds for Individuals	1	393	1	NO
7	Construction of NADEP	Construction of NADEP Compost structure for Individual	6.78	342	55	NO



Map17.1.Jeganathapuram Gram Panchayat MGNREGA Map for 2018-19

18. Vinnamanagalam GP, West Arani Block

Vinnamangalam gram panchayat reported different pictures for number of households registered compared with number of workers registered during 2014-15 to 2018-19 (Fig.18. 1). When total number of households registered increased from 674 to 804 during the five years reported, the number of persons registered under MGNREGS has increased gradually from 967 to 1092 (Table 21.1). Moreover, one-eighth of the households that demanded employment are from SC/ST. SC's participation reported fluctuation during the five years and decline in 2018-19. Regarding women's participation, almost all workers are women and it is increased slightly for the five years under consideration.

The main observation is, despite the decline in percentage of households demanded employment, the women's participation remain same. However, the percentage of households that completed 100 days, are very negligible and not even one percent for three out of five years. Further, no household completed 100 days in 2017-18 (table 21.2). The type of works undertaken for the five years in Vinnamangalam is predominantly natural resources related public works. NRM works proportion reported lowest percentage among the five years was in 2015-16 and itself was 69.32%. It was traditional water bodies related works in all five years; water conservation was the done under NRM in the period of 2017-18 and 2018-19; few Watershed Management and afforestation activities undertaken during 2016-17, 2-17-18 and 2018-19. The detailed work carried in the GP during 2018-19 is in table 21.3 and map 18.4.

Fig 18.1.No. of Registered Households and Persons under MGNREGS in Vinnamanagalam GP, West Arani Block

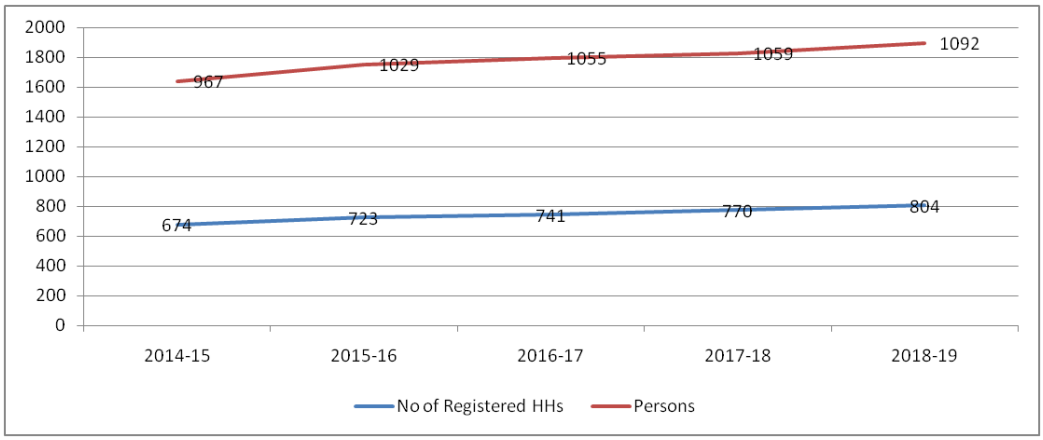


Table 21.1.Details of MGNREGS participation in Vinnamanagalam GP, West Arani Block

Year	Employment demanded & provided HHs (%)	% of HHs completed 100 days	% of SC	% of ST	% of Women
2014-15	91.2	0.5	8.5	0.0	88.8
2015-16	93.5	3.3	8.1	0.0	88.7
2016-17	93.5	1.4	7.8	0.0	89.2
2017-18	87.9	0.0	9.0	0.0	89.3
2018-19	89.7	0.1	7.6	0.0	91.1

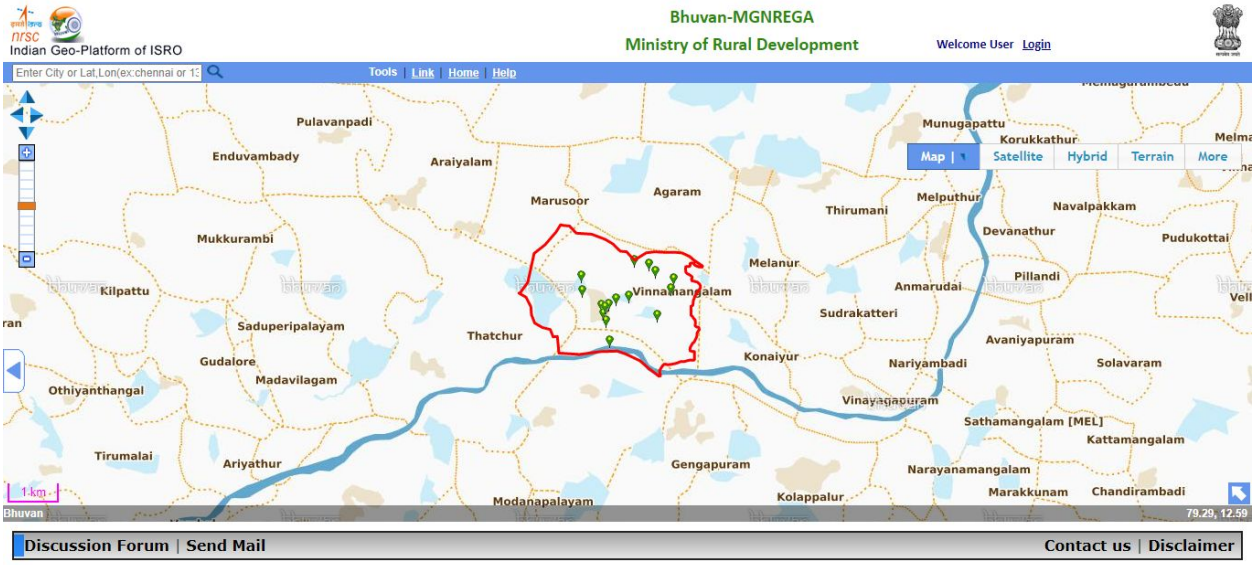
Table 21.2. List of Public Works Relating to Natural Resources Management undertaken in MGNREGS, Vinnamanagalam GP, West Arani Block

Work Category	2014-15		2015-16		2016-17		2017-18		2018-19	
	Total works	Expend iture	Total works	Expend iture	Total works	Expen diture	Total works	Expen diture	Total works	Expen diture
Water Conservation	0	0	0	0	0	0	4	10.74	15	48.51
Watershed management	0	0	1	0	1	6.03	4	8.54	3	0.9
Irrigation	0	0	0	0	0	0	0	0	0	0
Traditional water bodies	5	34.32	4	38.14	5	49.78	5	14.13	4	1.91
Afforestation	0	0	1	0.27	1	0	1	0.07	3	0.11
Land development	0	0	0	0	0	0	0	0	0	0
Total	**5**	**34.32**	**6**	**38.41**	**7**	**55.81**	**14**	**33.48**	**25**	**51.43**

Table 21.3. Detailed work carried out in Vinnamangalam GP in year 2018-19

No.	Work Name	Work Type	Sanction Amount in(lakh.)	Total labour days	No. Of Units	Convergence
1	Nadupattu Eri Supply Channel With Concrete Check dam	Construction of Boulder Anicut Check Dam for Community	41.68	22530	4	No
2	Periya Eri Supply Channel With Concrete Check dam					
3	NADEP Compost Pits	Construction of NADEP Compost structure for Individual	0.36	18	3	No
4	Construction of Earthen Bunding	Construction of Earthen peripheral bund for individual	4.21	1667	1	No
5	Individual Soak Pit	Construction of Soak Pit for Individual	4.17	314	58	No

6	Periya Eri Supply Channel	Earthen Dam	10.9	8901	1	No
7	Percolation Ponds	Construction of Mini Percolation Tank for Community	19.86	14747	1	No
8	Construction of Community soak pit	Construction of Soak Pit for Community	0.5	60	5	No
9	Recharge Shaft	Recharge Pits	0.26	0	1	No



Map18.1.Vinnamangalam Gram Panchayat MGNREGA Map for 2018-19

Output 3:	**Indicator 3.1:**	
The cooperation with the private sector on integrated, climate-adapted water resource management measures is strengthened at the state and local level.	cooperation model between rural user groups, communities and the private sector - Two models are in operation 1) NABARD - Civil Society - CSR and Community partnership - so far it has happened at the partnership model of Watershed development among NABARD - Civil Society Organization and CSR partners - but ut happened before 2016	Explored the CSR cooperation models in water augmentation. Here 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 primarily with three CSOs on mobilization of communities, facilitating the water actions along with institutionalizing the interventions.

	2) CSR - Civil society partnership - the support is to revive the water bodies in select locations	

With reference to the involvement and participation of the corporate partners, especially in 2018-19, CSR partners, namely TVS society have been working in the tribal regions in the management of water resources, LT constructions and Apollo Tyres in few areas. The discussion with the senior district officers revealed that in the recent past the district administration has taken keen interest and approached few agencies. However still such partnerships were not operationalized in the sample villages.

Discussion

Similar to the Ramanathapuram District details, here also on the indicators 1 and 2 there are potential opportunities to strengthen the convergence further seeing the local context. At present there are seven different schemes, of both state and national levels are being operational to promote integrated water management programmes in the district over the last five years (Tables 22 and 23). 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 22. Comparison of water augmentation, demand and quality management among the schemes in Tiruvannamalai 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. *Jal Shakthi Abiyan*	√	√	√
8. Jal Jeevan Mission	√	-	√

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 along with the climate change perspectives explicitly while designing and promoting the integrated water resource management measures.

Table 23. Schemes and the approaches adopted

Schemes	Participatory approach	Governance and institution building	Climate change perspectives	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. *Jal Shakthi Abiyan*	-	-	√	√
8. Jal Jeevan Mission	-	-	√	√

- *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. However, the district officials are in consultation with local panchayats and relevant institutions while implementing the tasks.
- *Decisions have been taken to consider the various use of water (population, agriculture, industry etc.):* In the drinking water sector the decisions are made considering the population to ensure safe drinking water to all households. In case of *Jal Sakthi Abiyan*, the water budgeting approach has been 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. Efforts had been taken to demonstrate efficient water use technologies and building awareness among farmers.

- *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 far away places – eg Palar river water supply. However such planning to ensure water supply for agriculture is limited in discourse (already big water storage structures are in place) 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 as well as village based water management systems.

Key Observations:

There is a good scope to increase the NRM works to augment the water resources and put measures for effective use by appropriate scientific planning. In addition to water management measures, attention is needed on the plantation actions to increase the vegetative cover to reduce the runoff, increase the ground water recharge along with other associated benefits. with regard to implementation of the available schemes, it has been implemented by different line departments

as nodal agencies, based on their level of technical competence to implement it. However at the ground level, adopting saturation approach through convergence mode there is an immense scope to complement the activities which has lasting impacts. Since the district has already prepared village level plans for water augmentation and this planning exercise helped them to use the hydrological and geographical tools to improve on it. In this context, efforts are needed to promote such platforms similar to the model of Rajasthan state (*Mukhyamantri Jal Swavlamban Abhiyan*). Six out of the seven 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.