MGNREGA Planning in Karnataka:
Assessment of Digital Tools and Capacity-Building for Natural Resources Management

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About WELL Labs

Water, Environment, Land and Livelihoods (WELL) Labs is a research and innovation centre driving social impact in the field of water sustainability. Based in Bengaluru, it is part of the Institute for Financial Management and Research (IFMR) Society. WELL Labs co-creates science-backed solutions that improve people's lives and livelihoods and sustain nature. It works closely with multiple stakeholders such as governments, businesses, multilateral institutions and civil society groups.

About EDF

A global nonprofit, Environmental Defense Fund collaborates with governments, NGOs, research and academic institutions, corporates, and others to support and advance India's vision of shared, sustainable prosperity.
EDF combines scientific and economic foundations, a broad network of partnerships and a pragmatic approach in support of India's ambitions. Its areas of interest include demonstrating the viability of sustainable livelihoods in agriculture,
ensuring sustainable groundwater supplies for agriculture, livestock and fisheries, establishing the shareholder value potential through responsible business, informing of the potential of market-based mechanisms, and catalysing the climate technology ecosystem in India.

About the Technical Consulting Programme at WELL Labs

The Technical Consulting programme enables better decision-making in the natural resources management sector through the use of data, models, and evidence-based approaches.
It focuses on systematising monitoring, evaluation, and learning (MEL) for the water sector while developing simple, accurate indicators to assess water security. Additionally, the team is building tools and frameworks to improve problem diagnosis in the sector.

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Arghyam is a public charitable foundation headquartered in Bengaluru, established in 2005 with an endowment from Rohini Nilekani. With a vision of "safe, sustainable water for all", Arghyam focuses on enabling water security at scale by strengthening the ecosystem through science and community participation. Its strategic direction involves co-creating and deploying digital public goods and infrastructure to accelerate progress towards water security for communities across the country in partnership with governments and civil society organisations.

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The Foundation for Ecological Security (FES) is an organisation committed to restoring ecological balance and enhancing the resilience of rural communities in India. It empowers local communities to sustainably manage and govern their natural resources, with a focus on land and water conservation. By integrating scientific insights with traditional practices, FES develops innovative, scalable models that promote both environmental sustainability and improved livelihoods.

About Socion

Socion is a strategic partner for development and aid agencies focused on addressing societal challenges at scale. It collaborates with organisations to reimagine traditional approaches, enabling them to leverage limited resources more effectively and accelerate collective efforts towards large-scale impact. Through initiatives like @Scale Missions, SOCION helps reorient the theory of change for large programs, redesigning implementation and governance models to deliver faster, high-quality results. Additionally, by enabling digital platforms, SOCION enhances collaboration across practitioners, programs, and organisations, amplifying both individual and collective impact in tackling complex global issues.

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List of Abbreviations

AAP	Annual Action Plan
BFT	Barefoot Technician
CGWB	Central Ground Water Board
CLART	Comprehensive Landscape Assessment and Restoration Tool
CSOs	Civil Society Organisations
DPR	Detailed Project Report
EDF	Environmental Defense Fund
FES	Foundation for Ecological Security
GIS	Geographic Information System
GKM	Gram Kayak Mitra
GP	Gram Panchayats
GPANS	Grama Parisara Mattada Abhivruddi Mattu Nirvahana Samithi
GPAS	Grama Parisara Abhivrudhi Samithi
GPS	Global Positioning System
IEC	Information, Education and Communication
IFMR	Institute for Financial Management and Research
IMD	India Meteorological Department
MEL	Monitoring, Evaluation and Learning
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MIS	Management Information System
MoES	Ministry of Earth Sciences
MoRD	Ministry of Rural Development
NRM	Natural Resources Management
PDA	Participatory Digital Attestation
PDO	Panchayat Development Officer
PRA	Participatory Rural Appraisal
SECURE	Software for Estimate Calculation Using Rural Rates for Employment
SHGs	Self-help Groups
WELL Labs	Water, Environment, Land and Livelihoods Labs
WMT	Water Monitoring Tool

Executive Summary

The state of Karnataka in southern India faces a severe groundwater crisis. Farmers are increasingly shifting from shallow to deeper wells (Fisher, 2022, Hora et al. 2019).

The 2002 State Water Policy, revised in 2022, stresses water conservation and encourages community participation in water management. Despite efforts to improve groundwater recharge and irrigation efficiency, the state still struggles with low groundwater levels in summers (Goswami & Sekhar, 2022). Most of the state is underlain with low-storage hard rock aquifers, exacerbating the water stress (Central Groundwater Board, 2024).

The Mahatma Gandhi National Rural Employment Guarantee (MGNREGA) is the largest individual source of spending on natural resource management (NRM) in India. MGNREGA can play a major part in minimising the impacts of climate change and water stress (Moudgil, 2021). The scheme was amended in 2014 to additionally focus on water and soil conservation (Water Conservation Under MGNREGS, 2019).

Experts cite several challenges that hinder effective natural resource management planning in MGNREGA (Tiwari. R et al., 2011; Maske S. 2015). Field staff face challenges in providing technical inputs and supervision, which can impact the effectiveness and lifespan of constructed natural resource management structures. Additionally, gaps in community involvement during the planning process can impact the effectiveness and longevity of these assets and shared responsibility for their upkeep.

In 2021, the Government of Karnataka launched the **Jala Sanjeevini** programme for the community-led scientific planning and implementation of NRM projects[1] executed under MGNREGA. The programme involved the use of various digital planning and monitoring tools, such as the Bhuvan Portal, Google Earth Pro, and **Composite Landscape Assessment & Restoration Tool (CLART)**, a decision-aid tool providing information on water recharge potential of a particular location, which helps decide the appropriate structure for that location.

To improve the implementation of Jala Sanjeevini, the Government of Karnataka collaborated with the Foundation for Ecological Security (FES), Arghyam, and Socion. Together, the collaboration aims to strengthen the technical capacity of first mile actors of MGNREGS in better natural resource planning and community participation. This includes facilitating the adoption of geographic information system (GIS)-based digital tools for natural resource management planning, with application of CLART.

[1] *The common terminology for structures or projects under MGNREGS is 'works'. This study uses the term 'structures' or 'projects' to refer to different types of 'works'.*

A key element of the programme is to 'design for scale', with the aim to address critical gaps in planning and capacity-building for maximum impact. FES deployed staff at the district level in eight drought-prone districts to support year-round capacity building and planning at the the district and lower administrative levels.

The objective of this study is to assess the extent to which the technical support programme has been successful in accomplishing its objectives.

We tested eight hypotheses to systematise the analysis and establish causality. Our sample size for the fieldwork was 24 gram panchayats (GP) in eight districts: four districts where FES intervened (treatment districts) and four districts without FES intervention (control districts). The study uses the comparative case study method with matching pairs of treatment and control areas possessing similar agro-ecological characteristics.

We adopted a mixed-methods approach for the evaluation study, including in-depth interviews with key MGNREGS planning stakeholders at various administrative levels. Secondary data from the CLART dashboard, MGNREGA management information system dashboard, Jaldoot, and other datasets were used for the analysis. The insights gained can inform future improvements for GIS-based planning within MGNREGS.

Findings and Recommendations

The overarching finding from the study was that the technical support programme has made a difference in improving outputs such as knowledge improvement of field functionaries, CLART tool adoption, site selection for structures, and community-led holistic natural resource management planning. However, the study reveals that the effort of involving the community from respective gram panchayats needs to be improved. It did not provide definitive inference about changes in groundwater levels because of the intervention.

Key Learnings and Recommendations:

Capacity building

- The functionaries in the treatment group were found to have better knowledge in terms of community-led planning, watershed management concepts, and application of CLART when compared to their counterparts in the control group under the Jala Sanjeevini programme.

- For sustained impact, the government should continue these efforts by developing in-house capacity-building programmes to strengthen participatory MGNREGS planning. Leveraging a design-for-scale approach while integrating the community in the process will ensure both effectiveness and local buy-in.

CLART use

- The treatment group showed better adoption of CLART. Compliance with CLART's recommendations of site suitability was also better in selected structures. Some respondents found that CLART added value to site suitability assessment and deciding appropriate structures. Few others treated it more like a procedural tool and didn't base their site suitability decisions on its use due to their lack of adequate knowledge on the CLART tool.

- To improve on-ground usage of CLART, a checklist should be provided to barefoot technicians (BFTs)[2] to contextualise local conditions like land ownership, water catchment and soil while using CLART , and BFTs should be guided by the respective Technical Assistants. These would help in 1) better site feasibility assessment on the ground, 2) providing data for the approving agency (block-level technical coordinator), and 3) gathering data to improve CLART in the long run.

- The total spending on natural resource management increased more in the treatment group than in the control group. In treatment areas, there has been a noticeable shift in budget allocation towards ridge area interventions like trenches and bunds rather than drainage line interventions like check dams. Drainage line structures like tanks in this context have been shown to be less effective than ridge area treatments (Brauns et al, 2022).

Community engagement and commons management under MGNREGA

- There was no significant difference in community engagement and participation attendance between treatment and control groups. But Participatory Rural Appraisal (PRA) tools like resource mapping and transect walk were reportedly utilised in treatment groups as part of the community engagement exercise and identifying common lands.

- Grama Parisara Abhivrudhi Mathu Nirvahana Samithi (GPANS) is envisioned as a statutory village-level institution focused on conserving and managing common property resources such as 'gomalas'[3] and other types of common lands, like burial land and temple land. During our field visits, we found that these committees were recently formed by the gram panchayats and were not very active in most of the visited panchayats, and there is an urgent requirement to enhance their functionality by strengthening them. To encourage meaningful community participation, GPANS could be given more explicit functions, like being responsible for leading the MGNREGA planning process.

- Gram sabhas must be the final authority to pass the finalised plans as outlined in the Karnataka Grama Swaraj and Panchayat Raj Act, 1993. But the gram sabha meetings are often held in the initial stages of planning in both treatment and control groups for blanket approval of structures. The gram panchayat may propose the prioritisation of the shelf of works but the final prioritised plan must be passed in the gram sabha.

[2]A barefoot technician works with/assists the Technical Assistants to provide technical support for the planning and building of structures under MGNREGA. They are akin to field engineers.

[3]Gomala refers to government land reserved for pasturing.

Jala Sanjeevini process improvement

- MGNREGA planning documents like Annual Action Plans (AAPs) and Detailed Project Reports (DPRs) are currently not easily accessible online. This leads to decreased transparency in the selection of structures and impedes the systematic review of their implementation. These documents should be digitised and made available publicly on the MGNREGA dashboard. These documents are planned to be made available to the larger public on Panchatantra 2.0 platform. Their implementation must also be regularly reviewed by senior officials.

Groundwater recharge and monitoring

- The groundwater recharge estimates in treatment and control districts are not significantly different or show no clear trend. Also, in hard rock areas, it is inaccurate to use groundwater level data for district-level comparison for the impact of the project, primarily because of other important factors like high heterogeneity and differences in groundwater extraction.

The use of digital tools for better planning in MGNREGA has a lot of potential. There is a clear use case for apps like CLART, which help in the assessment of site feasibility for water conservation structures. The efforts of this technical support programme are commendable and show good outputs. Investing in improving these tools to increase community participation and focus on improved groundwater management will result in further holistic community and watershed benefits.

Chapter One

Evaluation Context

1.1 Groundwater Crisis in Karnataka

More than 60% of Karnataka is drought-prone, a situation exacerbated by increasingly erratic monsoon patterns (Karnataka Water Policy, 2022).

While rainfall patterns vary across Karnataka, it is one of the most water-stressed states in India and has seen 16 drought years between 2001 and 2023 (Mohammed, 2023). Further, the state's 2022 water policy warns that climate change, particularly shifting temperatures and rainfall patterns, is likely to intensify drought conditions across Karnataka. In the kharif cropping season (roughly July to October), most northern districts are projected to have a 10-80% increase in the frequency of droughts. The figure is over 200% for some districts.

Figure 1: Map of India showing the state of Karnataka.

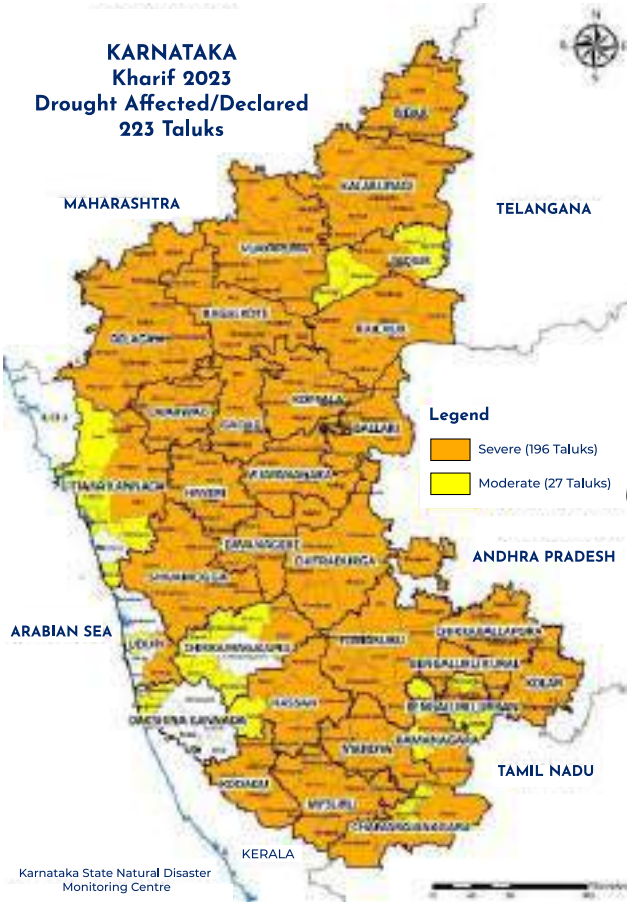

Figure 2: Drought-affected taluks of Karnataka during the kharif season in 2023. Source: Karnataka State Natural Disaster Monitoring Centre.

Given that many districts throughout Karnataka are prone to droughts, irrigation is important to sustain agriculture. However, groundwater, which supports 56% of the state's irrigation, is increasingly at risk (Nagaraj et al., 2020).

Over 30% of the state's groundwater assessment units (blocks) are overexploited (Ramesh et al., 2018). Karnataka largely comprises crystalline hard-rock aquifers, of which large swathes are over-exploited (Dynamic Ground Water Resources of Karnataka, 2023). Crystalline hard rock aquifers often have much less space compared to alluvial aquifers, and a few consecutive low-rainfall years can lead to the exhaustion of groundwater (Lachassagne, 2021).

To ensure sufficient water for agriculture, the government and civil society organisations have initiated several efforts to improve groundwater recharge.

1.2 Initiatives to Improve Groundwater Recharge

In 2019, the Government of Karnataka's Rural Development and Panchayat Raj[4] Department launched the 'Antarjala Chetana Yojana' to improve groundwater levels across the state (Deccan Herald, 2020). This programme sought to build water-conservation structures under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). After two years, the department consolidated learnings from the initiative and renamed the Antarjala Chethana programme as the Jala Sanjeevini programme.

Jala Sanjeevini leverages MGNREGA to holistically plan and execute natural resource management projects.

The programme aims to increase surface storage and groundwater level, reduce soil erosion, and increase green cover. This is executed by building water and soil conservation structures and better management of commons[5], including water bodies and community land.

The programme is rooted in watershed management principles and the ridge-to-valley approach. The ridge-to-valley approach involves starting at the top of a hill and treating the land gradually moving down to the valley bottom. The goal is to conserve water by slowing down water flow and harvesting it. This helps in reducing runoff and soil erosion from upstream and reducing siltation in water conservation structures downstream.

To implement Jala Sanjeevini, the RD&PR department engaged with civil society organisations to support gram panchayats.

[4]Panchayati Raj institutions support local self-governance in India. The Constitution (73rd Amendment) Act, 1992 and Constitution (74th Amendment) Act, 1992 devolved powers and functions to Panchayati Raj, which consists of a three-tier system: gram panchayat at the village level; taluk panchayat at the taluk (an administrative unit comprising many villages) level; and zilla panchayat or zilla parishad at the district level.

[5]In this report, commons refers to community-owned land. They are also known as common land or public land.

1.3 MGNREGA and Natural Resource Management

MGNREGA, enacted in 2005, is the world's largest employment programme. It aims to enhance the livelihood security of people in rural areas by guaranteeing at least 100 days of wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work.

The programme allows for 260 different types of projects under four categories, of which the first two pertain to natural resource management:

- Public projects relating to natural resource management (Category A).
- Individual assets for vulnerable sections (Category B).
- Common infrastructure for Deendayal Antyodaya Yojana-National Rural Livelihoods Mission (DAY-NRLM)[6]-compliant self-help groups (Category C).
- Rural Infrastructure (Category D).

In 2014, an amendment was made to MGNREGA, mandating that 60% of its spending focus should be on agriculture and allied activities (Ministry of Rural Development, 2019). This shift significantly increased investments in natural resource management projects, including check dams, ponds, water body renovation, land development, embankments, field bunds, plantations, and contour trenches. Today, MGNREGA allocates over $5 billion (₹42,000 crore) annually to building, repairing, and renovating rural water conservation assets (Nalgire & Chinnasamy, 2022), making it the country's most influential national water management programme.

Although originally designed as a social protection initiative, MGNREGA has evolved to address 'pro-poor climate assistance objectives', as noted by Fischer (2020). This evolution is underpinned by three critical elements:

- Social protection through guaranteed minimum-wage employment.
- Development of small-scale infrastructure for natural resource management.
- Decentralised, community-based planning.

Sustainable water management within MGNREGA extends its benefits beyond social protection. It enhances livelihood resilience, improves agricultural productivity, conserves biodiversity, and strengthens resilience to water-security risks (Ministry of Rural Development, 2012). Initiatives like CLART can further bolster MGNREGA's impact by integrating data-driven conservation planning, thereby amplifying both social protection and climate resilience efforts.

With climate change expected to increase the frequency and severity of floods and droughts across India (Krishnan et al., 2020), strategically planned and located water conservation structures are crucial. Supporting informed and targeted conservation approaches and tools like CLART can play a vital role in addressing these challenges and advancing national climate resilience.

[6]*DAY-NLRM seeks to reduce poverty by enabling poor households to access gainful self-employment and skilled wage employment opportunities.*

1.4 Geospatial Tools for Natural Resource Management

As natural resource management became central to MGNREGA, there was an emphasis on integrating geospatial technologies in the planning and implementation of structures (Pujar et al. 2018).

Geospatial tools such as remote sensing, geographic information system (GIS), and global positioning system (GPS) can improve monitoring, decision-making, and transparency with respect to natural resource management.

However, the use of GIS-based planning tools poses considerable challenges. The GIS data is generally available in raw form and requires cleaning or processing to be used in decision support systems. Frontline workers often lack the capacity to effectively use these sophisticated tools (McCord & Paul, 2019). Thus, capacity-building is required to ensure that officials planning and implementing natural resource management projects can effectively incorporate geospatial tools into their workflow.

1.4.1 Comprehensive Landscape Assessment and Restoration Tool (CLART)

The Jala Sanjeevini programme uses the Comprehensive Landscape Assessment and Restoration Tool (CLART), a GIS-based Android tool to plan soil and water conservation initiatives.

CLART is a tool developed by the Foundation for Ecological Security (FES). CLART analyses publicly available datasets on lithology, geomorphology, lineament, watershed, drainage, slope, land use, and land cover. Enabled to work without an internet connection, the tool recommends soil and water conservation measures for a specific site using the in-built GPS on phones. Such recommendations are aligned with the activities allowed under MGNREGA. The GIS-based plan for each gram panchayat area (referred as the 'tabletop plan') was developed by the Technical Assistant utilising the Google Earth platform. The structures proposed in the tabletop plan need to confirm on-site feasibility by using CLART.

CLART can help optimise the design of NRM structures by:

- Generating colour-coded site suitability maps that can be easily understood by users, even those with limited literacy skills.
- Preparing the design and budget estimate of proposed structures without the help of technical staff.
- Providing visualisations of data and plans through a dashboard.

The four colour codes in CLART are as follows:

Green: Areas with good groundwater recharge potential
(Recommended structures include contour trenches, trench-cum-bunds, recharge pits and percolation tanks.)

Yellow: Areas with moderate recharge potential
(Recommended structures include loose boulder check dams, vented dams and gully plugs.)

Red: Areas with low recharge potential
(These are more conducive for surface storage. Recommended structures include farm bunds, irrigation farm ponds and irrigation channels.)

Violet: Areas of high slope (greater than 25-30%) with forest land, barren land, wasteland and scrubland
(Recommended structures include grass seeding, plantations, stone bunding and bench terracing.)

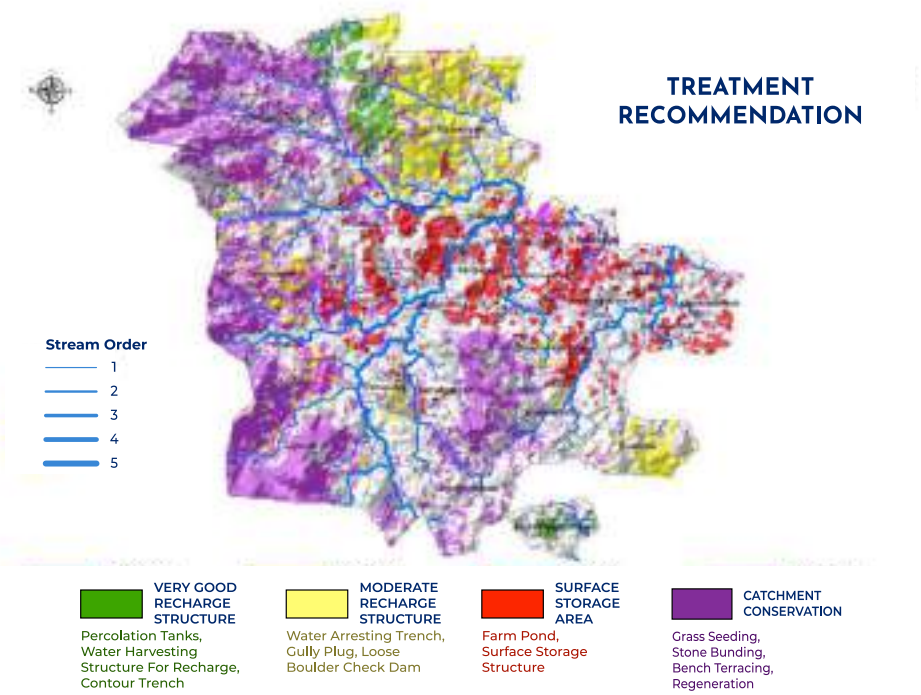

Figure 3: CLART's colour-coded recommendations as per a site's groundwater recharge efficacy.

CLART Use Under the Jala Sanjeevini Programme

Under Jala Sanjeevini, barefoot technicians have to use CLART involving community members to determine suitable locations for proposed natural resource management structures during the preparation of the detailed project report (DPR) and Annual Action Plan (AAP) (See Section 1.6.1 and 1.6.2). The Government of Karnataka's Department of Rural Development and Panchayat Raj has recommended its application across all districts of the state and mandated the use of CLART to identify the appropriate sites under MGNREGA.

CLART has the technical capacity to provide site recommendations, estimates and design for a total of 71 different types of structures.

1.5 Community Engagement under Jala Sanjeevini

Strengthening community participation can play a significant role in groundwater improvement (Shiferaw, 2021).

Engaging local communities in water management fosters a sense of ownership and responsibility. When communities are actively involved, they are more likely to contribute to the maintenance of water conservation structures. (Damodaran & Mahapatra, 2023). This ensures the longevity and effectiveness of assets (Petty, 2003; Ostrom 1990). Community engagement is particularly significant for managing commons as shared resources, which play a central role in rural livelihoods (Jodha, 1986).

The Jala Sanjeevini programme aims to foster community engagement through participatory rural appraisal (PRA) exercises[7]. PRA tools such as resource mapping and transect walks were conducted to initiate community participation. They were followed by other activities such as door-to-door collection of households' demands for work under MGNREGA, ward sabhas, and gram sabhas (see Section 1.6.1 and 1.6.2 for details regarding these). This can provide opportunities for communities to engage in discussions, set priorities about the type of NRM structures to be built on commons lands, and identify locations for these structures.

However, ensuring sustained community participation requires the establishment of robust institutional frameworks. Village-level institutions, such as gram panchayats or user groups, are pivotal for governing commons effectively and facilitating collective action.

[7]Participatory rural appraisal comprises a family of tools and approaches that aim to empower communities by engaging them in problem identification, implementing solutions, monitoring, and evaluation.

In Karnataka, the Grama Parisara Abhivrudhi Mathu Nirvahana Samithi (GPANS) (literally 'village commons development and management committee')[8], a subcommittee of the gram panchayat as per section 61(A) of KGS&PR Act, 1993, is responsible for identifying, demarcating, and mapping commons, and documenting them in the gram panchayat asset register. While these efforts are essential for the sustainable management and use of commons, there is a gap between planning and implementation (see Section 3.8 for more details).

1.6 Jala Sanjeevini Workflow

The Jala Sanjeevini programme consists of two distinct workflows and timelines: a detailed project report (DPR) prepared once in three years and an annual action plan (AAP) prepared every year.

The DPR is a longer list of proposed projects that identifies suitable natural resource management interventions for the entire landscape based on the upper, middle and lower reaches of the gram panchayat's watershed, including common lands and waterbodies, that can be implemented over three years.

The AAPs serve as the final output of the annual MGNREGA planning process. The AAP preparation involves matching the demand for labour under MGNREGA to the amount of work that can be done that year. Interventions proposed under the DPR are integrated year-wise into AAPs.

1.6.1 Detailed Project Report (DPR) Preparation

The preparation of the three-year DPR follows a nine-step process (See summary in Figure 4 and details below. See Figure 9 to view the differences between the intended and actual process of the annual action preparation).

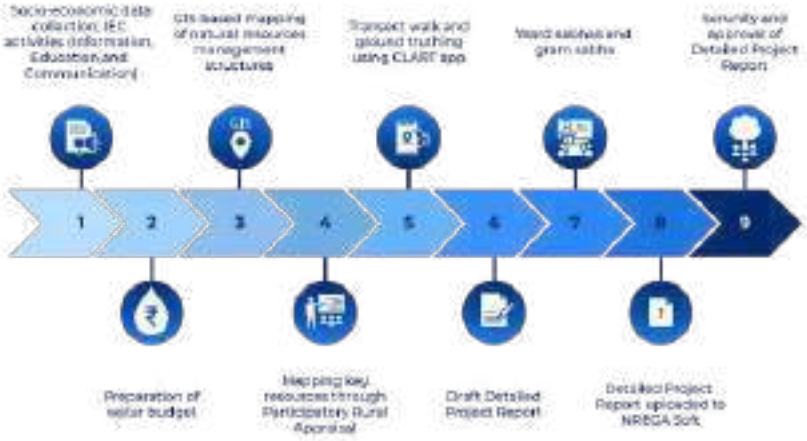

Figure 4: DPR preparation under Jala Sanjeevini.

[8] *The gram panchayat must submit an official letter to the Panchayat Development Officer regarding the objectives, composition, member roles, and by-laws of the Grama Parisara Abhivrudhi Mathu Nirvahana Samithi. The Panchayat Development Officer's approval leads to the formal recognition of the GPANS as a sub-committee*

Step 1

- The Technical Assistant Engineer and the Data Entry Operator **collate socio-economic data** of the gram panchayat.

- The Gram Kayak Mitra (GKM)[9], with the support of the barefoot technicians and other gram panchayat functionaries, **conducts Information, Education and Communication (IEC) activities** to raise awareness about MGNREGA and communities' entitlements.

Step 2

The Technical Assistant Engineer **prepares the water budget for the gram panchayat** using the collected socio-economic data. Gram panchayats with water deficits plan for storage structures, and those with surplus focus on recharge structures to boost groundwater.

Step 3

The Technical Assistant Engineer **prepares GIS-based plans** for the gram panchayat to map natural resource management structures. The plans integrate thematic layers, such as drainage and land use, with cadastral maps[10].

Step 4

Mapping is done for key resources such as water bodies, forests, farmland, infrastructure, and settlement areas using participatory rural appraisal (PRA) techniques. Participants identify problems and propose new structures or improvements to existing ones to be taken up under MGNREGA. Community members create a rough sketch of the map (not drawn to scale) during the PRA meetings.

Step 5

The barefoot technicians conduct a **transect walk and do site feasibility assessment of proposed structures** using the CLART app. During the transect walk, communities can propose additional projects.

Step 6

The Technical Assistant Engineer develops a **draft of the DPR**, which includes budgetary estimates for the selected structures along with an updated Keyhole Markup Language file.

Step 7

The Panchayat Development Officer, along with other gram panchayat officials, **organises ward sabhas and a gram sabha** to discuss the structures included in the DPR with communities.

Step 8

The Panchayat Development Office uploads the draft DPR on NREGAsoft, a digital database of MGNREGA activities at different administrative levels.

Step 9

The Project Officer **reviews the draft report**, and the District Programme Coordinator **approves it.**

[9] *Gram Kayak Mitra, literally 'Village Jobs Supporter', is a community outreach official who mobilises communities and registers them for work under MGNREGA.*

[10] *Cadastral maps are detailed representations of land parcels that provide comprehensive insights into property boundaries, land ownership details, and the physical characteristics of a specific area.*

1.6.2 Annual Action Plan (AAP) Preparation

The preparation of the AAP involves the following steps (See Figure 9 to view the differences between the intended and actual process of the AAP preparation):

Step 1

Work demand generation

1a. Develop IEC materials to enhance awareness of MGNREGA within communities[11].

1b. Share MGNREGA guidelines, eligibility criteria, and benefits through door-to-door visits, pamphlet distribution, etc.

Step 2

Work demand consolidation

2a. Collate individual work demands received through multiple channels, such as
- Households during door-to-door visits.
- Demand boxes where written submissions can be dropped.
- Submissions by visiting the gram panchayat office.

2b. Conduct a ward sabha (community forum) to facilitate the process of collecting village residents' demand for work and new projects in their respective villages within their ward.

2c. Tally projects in the DPR with the demand list and incorporate them into the AAP.

2d. Incorporate additional projects proposed by line departments[12] into the list of projects under the AAP.

[11] The numbers here correspond to the numbers (in blue) in the hypothesised journey map in Figure 12.

[12] Line departments are government departments with mandates related to specific thematic sectors.

Step 3

Shortlisting of projects and AAP preparation

3a. Check eligibility and estimate budget for the list of structures: The eligibility of proposed structures is verified. Preliminary cost estimates are prepared to ensure alignment with MGNREGA guidelines. Site visits are also conducted[13].

3b. Conduct site feasibility assessment of proposed structures to validate the suitability of site locations for proposed NRM projects.

3c. Approve on CLART Dashboard: The proposed NRM projects are reviewed and approved by the Technical Coordinator (TC) based on the insights from the CLART assessment.

3d. The list of demands for NRM individual and community works are matched against the target person-days for the year, determined based on the previous year's achievements and the number of active job cards. This list undergoes a shortlisting process. A draft plan is then prepared as per the standard template, incorporating the proposed labour budget and key ratios such as labour-to-material, NRM-to-non-NRM ratios and water budget.

Step 4

Annual Action Plan (AAP) finalisation and approval

4a. The gram sabha approves the draft AAP.

4b. The gram panchayat reviews the draft plan to ensure it aligns with communities' needs and priorities, and then approves it accordingly.

4c. AAP scrutiny by taluk panchayat: The gram panchayat submits the plan to the taluk panchayat. The taluk panchayat then reviews the approved AAP and makes necessary adjustments in line with updated guidelines and circulars issued by higher authorities.

4d. AAP revision: If required, the gram panchayat revises the AAP based on the scrutiny process to ensure compliance with the latest guidelines and to address any discrepancies.

4e. AAPs consolidation: After collecting and scrutinising the AAPs received from all gram panchayats in the taluk, the taluk panchayat (see Table 1) sends them to the district office for approval.

4f. AAPs state approval: The final AAPs from each gram panchayat, after district-level approval, are submitted to the state authorities for formal approval.

[13] *The site visit is for non-natural resources management structures and those natural resources management structures that do not require ground truthing with CLART. See CLART Use under the Jal Sanjeevini Programme for more details regarding structures that must be ground truthed with CLART.*

1.6.3 Responsibilities of Officials Working on Jala Sanjeevini and MGNREGA

The table below shows the administrative levels and responsibilities of different officials implementing the above workflows. For more information about their roles and responsibilities, see Annexure A1.

Table 1: Government functionaries and their responsibilities[14].

Official	Level	Responsibilities
Gram Kayak Mitra[15]	Gram panchayat	1. Conduct IEC activities for MGNREGA and community mobilisation. 2. Create and update job cards[16]. 3. Consolidate the demand for work from individuals. 4. Maintain a work demand register[17].
Barefoot technician	Gram panchayat	1. Work with the Technical Assistant Engineer (see below). 2. Site feasibility assessment of projects. 3. Geo-tagging. 4. Measure progress.
Panchayat Development Officer	Gram panchayat	Oversee all MGNREGA planning and implementation activities, including conducting ward and gram sabhas and finalising the AAP in consultation with gram panchayat members.
Data Entry Operator	Gram Panchayat	1. Collate a list of projects received from different channels (demand box, ward sabha, gram sabha, individual requests) 2. Verify beneficiary eligibility as per the criteria 3. Prepare a draft AAP as per the template 4. Update the MGNREGA portal after PDO approval

[14] *This is an indicative list; it does not include all officials involved in planning and implementing Jala Sanjeevini and MGNREGA, and does not exhaustively cover all their responsibilities.*

[15] *The Gram Kayak Mitra is a community outreach functionary who mobilises communities and registers them for work under MGNREGA.*

[16] *A job card is a legal document that enables a household to demand employment under MGNREGA.*

[17] *The work demand register, also known as Register III, is a manually maintained record that serves as a backup of the digital NREGASoft system. It ensures that key information about workers and their employment is securely documented in case of system failures. It captures essential data related to worker attendance, job allocation, and payments. Its manual nature ensures continued operations and transparency even in contexts with limited digital access or technical issues.*

Official	Level	Responsibilities
Mate[18]	Gram panchayat	1. Mobilise wage-seekers from the village interested in MGNREGA work 2. Collect their work demand form. 3. Ensure wage-seekers' presence and record their attendance at the work site.
Technical Coordinator (TC)	Taluk/Block	1. Review and consolidate AAPs submitted by gram panchayats across the taluk. 2. Approve submitted structures.
Technical Assistant Engineer	Taluk/Block	1. Prepare water budgets and a watershed management plan for gram panchayats. 2. Identify potential projects. 3. Prepare budgetary estimates. 4. Oversee the execution of projects.
Assistant District Programme Coordinator (ADPC)	District	1. Coordination with taluk level MGNREGS officials for implementation of MGNREGS 2. Prepare progress report 3. Assist DS and CEO
IEC Coordinator	District	1. Coordinate with taluk IEC Coordinator 2. Develop IEC material and implement IEC activities 3. Document success stories
Deputy Secretary (DS)	District	1. Assist CEO in implementation 2. Field-level monitoring 3. Review implementation 4. Support for capacity building of taluk level officials of MGNREGS
Chief Executive Officer (CEO)	District	1. Oversee and coordinate all MGNREGA activities within the district 2. Work with various stakeholders like block panchayats, implementing agencies, and other relevant departments 3. Timely release and proper utilisation of funds allocated for MGNREGA works in the district 4. Grievance redressal, review and monitoring of MGNREGS

[18] *A 'mate' oversees the day-to-day operations of a structure being built under MGNREGA. A mate is similar to a construction site manager or crew supervisor.*

1.7 FES's Technical Support to Jala Sanjeevini

To ensure scientific planning and boost community participation in Jala Sanjeevini, the Government of Karnataka signed a non-financial Memorandum of Understanding (MoU) with the FES in 2021.

FES worked on the capacity-building of officials overseeing different aspects of MGNREGA in eight drought-prone districts of the state: Raichur, Davangere, Koppal, Tumakuru, Chikkaballapur, Kolar, Mandya, and Chitradurga.

A key element of the technical support programme is to 'design for scale'. Often, such programmes work well at pilot scale, but scaling them up becomes a challenge. With this programme there was a conscious effort in choosing the right mix of inputs to maximise the outputs across geographies. This approach focused on fostering data-driven governance, ensuring clarity regarding officials' role and responsibilities, and striking a balance between top-down and bottom-up approaches of planning.

To achieve scalability, FES incorporated the following into the programme design:

1 **Role clarity for first-mile actors**	2 **Capacity-building of functionaries**	3 **Adoption of digital tools**
a. Identifying first-mile actors central to the planning process under Jala Sanjeevini, such as Gram Kayak Mitras and barefoot technicians. b. Assigning well-defined roles and responsibilities to all functionaries involved in the programme.	a. Developing stakeholder-focused, modular training content tailored to the roles of various actors. b. Conducting field demonstrations to provide practical, hands-on learning experiences. c. Enabling first-mile actors for the formation and strengthening of the Grama Parisara Abhivrudhi Mathu Nirvahana Samithi (GPANS) as a village-level committee focused on conserving and managing common property resources.	a. Introducing digital tools, such as CLART and Participatory Digital Attestation (See Section 1.7.1 for more details) to democratise knowledge and improve transparency, monitoring, and decision-making. b. Equipping first-mile actors to use these tools.

This programme design integrates access to information and continuous monitoring with real-time data insights, thereby enabling adaptability and supporting the scalability of interventions across diverse operational contexts.

FES conducted over 884 training sessions across eight districts from March 2021 to March 2023. These included role-specific training sessions (both online and in-person) as well as refresher training sessions for over 3,500 functionaries involved in MGNREGA planning across eight districts. The trainees included:

1. First-mile actors (Gram Kayak Mitras, barefoot technicians, data entry operators, technical assistant engineers, etc.)
2. Gram panchayat functionaries (Panchayat Development Officer and Panchayat Secretary, elected gram panchayat members)
3. Taluk, district and state-level officials (Technical Coordinators, resource persons, Assistant District Programme Coordinator, District Coordinators, etc.)

FES also provided continued guidance and support to these officials from the financial year 2021 to 2023[19]. The district coordinators of FES were a key resource in implementing the work.

1.7.1 Participatory Digital Attestation Tool

Participatory Digital Attestation (PDA) is a tool developed by the social-impact organisation Socion. It is a project management tool tailored to the development sector. FES introduced the tool in the eight intervention districts and trained first-mile actors to use it.

The PDA mobile app allows participants (or trainees) to get digital attestations for their attendance in capacity-building sessions. It also provides access to digital training content and enables users to complete follow-up tasks after training sessions. These tasks, both practical and theoretical, help ensure effective learning of training content. The web portal provides managers with data on the capacity-building sessions and tasks performed, along with dashboards to help make decisions. The PDA platform also serves as a repository for the AAPs in the treatment group. Technical Assistant Engineers are responsible for uploading these plans onto the PDA web portal. This enhances the accessibility and visibility of critical planning documents.

[19] *In India, the financial year begins on 1 April and ends on 31 March.*

1.8 Problem Statement: Root Cause Analysis

FES's intervention followed a root-cause analysis. They hypothesised that two factors hinder the scientific planning and building of natural resource management structures:

1

First-mile actors lack the technical skills to scientifically plan NRM structures.

This leads to unproductive assets and a diminished focus on the management of commons (Shah & Rao, 2020).

2

Inadequate community engagement in the planning process leads to a failure in capturing the community's demands and needs.

This leads to a lack of ownership among community members and poor maintenance of assets. Without meaningful engagement, the traditional knowledge about how water moves and can be managed is not harnessed.

As a result, the assets created under MGNREGA do not contribute optimally to groundwater recharge and soil conservation. This perpetuates a cycle of unproductive outcomes and environmental decline.

1.9 Solution Statement: Means-End Analysis

To address the root causes of the challenges in planning scientific natural resource management structures under MGNREGA, FES adopted the following approach:

1

Build the technical capacity of MGNREGA officials.

FES sought to enhance their technical skills and capabilities, especially with respect to the use of digital tools like CLART and Participatory Digital Attestation(PDA). If used as specified, the hypothesis is that the use of digital tools would impart transparency in the planning process by generating data at the source. CLART can reduce the time and effort needed for scientific planning and choosing the appropriate locations for natural resource management structures.

2

Enhance community engagement in the planning process to ensure that planned structures capture communities' demands.

FES envisaged that the use of digital tools in a participatory manner would foster a sense of ownership among the community with respect to natural resource management structures. The improved planning processes sought to ensure the uptake of participatory rural appraisal (PRA) techniques such as resource mapping and transect walks.

Chapter Two

Evaluation Design

This study evaluates FES's intervention aimed at capacity building and use of different tools (CLART, PDA, etc) for improved natural resources planning in MGNREGA.

The objective of the programme is to evaluate changes as described in the theory of change. This includes assessing output-level changes, such as improvements in knowledge and adopting tools like CLART, and outcome-level shifts, such as natural resource management planning practices towards more water conservation work. Further, the study aims to examine the broader impact of these changes on groundwater level improvements.

This study utilises a hypothesis-based approach for the different components of the theory of change, using the following four-step process:

1
Componentise:
Lay out the theory of change and its components (Section 1.10).

2
Hypothesise:
Break up the theory of change into hypotheses (Section 2.1).

3
Test:
Develop frameworks to test each hypothesis (Chapter 3).

4
Systematise:
Assemble the components to develop learnings and recommendations (Chapter 4)

2.1 Theory of Change

Figure 5 below depicts FES technical support programme's theory of change, that is, the sequence of steps leading to the desired impact.

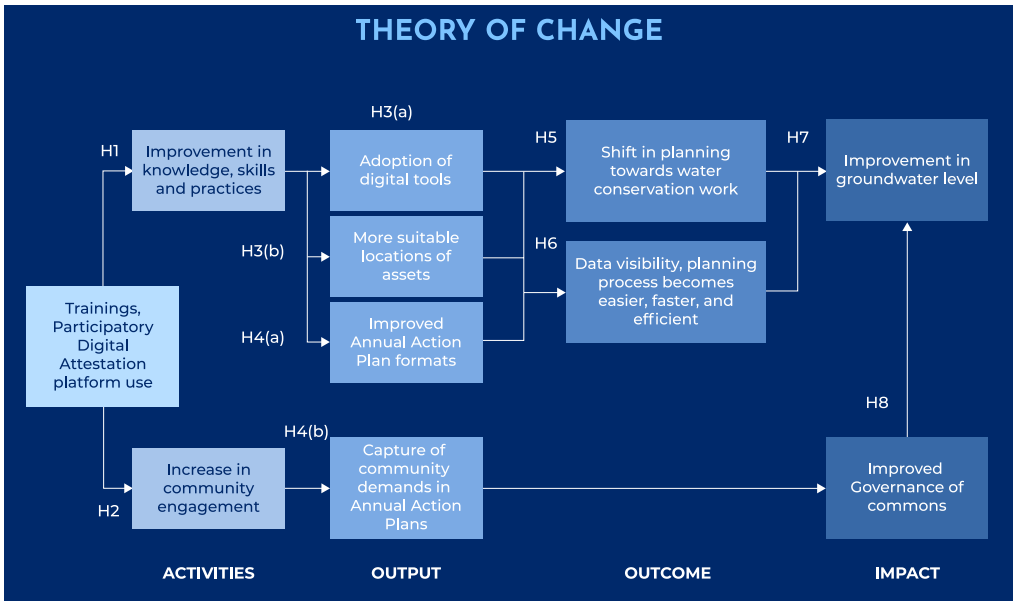

Figure 5: FES's technical support programme's theory of change.

The activities under the programme result in the following tangible outputs:

1. Adoption of digital tools to locate structures.
2. More suitable locations for natural resource management structures.
3. More comprehensive and precise long-term Detailed Project Report (DPR)
4. Community demands are captured in DPR

The programme hypothesised that these outputs would generate outcomes like:

1. Shift in planning toward soil and water conservation works
2. Reduction in the time and cost of natural resource management planning

These outcomes are expected to result in a positive impact on groundwater resources, soil and, green cover. Capturing community interest will lead to improved governance of commons through village-level institutions such as the Grama Parisara Abhivrudhi Mathu Nirvahana Samithi (GPANS).

The relationships between Activity-Output, Output-Outcome, and Outcome-Impact are formulated as distinct hypotheses (See Table 4). Given the programme's complexity, this evaluation dissects each component of the causal chain.

2.1.1 Assumptions in the Theory of Change

1. The assumption is that improving community engagement will improve the demand for the 'right type' of natural resource management structures. However, this is debatable, as community members often request structures on private lands (Laha, 2021). Thus, they might not prioritise appropriate structures for community-owned land.

2. There is an assumption that CLART is able to accurately assess all important hydrologic parameters and provide the best possible site for structures. This assumption is debatable as CLART primarily focuses on infiltration characteristics of a location and does not take into account whether the given location receives adequate water or not. Also, there is no peer-reviewed hydrologic assessment of the efficacy of CLART.

3. It is assumed that once communities demand and construct appropriate natural resource management structures, it will lead to improved groundwater levels. This is debatable on two grounds:
    a. We have no assessment of construction quality and maintenance of the projects (especially with regard to siltation). Groundwater recharge depends on these structures' construction quality.

    b. Improvements in groundwater levels do not only occur due to the introduction of water-conservation structures. Abstraction can have a strong impact on groundwater levels (Wendt et al., 2020). Many of these areas are over-exploited, and any additional recharge may be negated by the high groundwater extraction prevalent in these areas.

2.2 Hypotheses, Indicators, and Data Sources

We evaluated the changes resulting from the interventions by systematically testing the proposed hypotheses under the theory of change. Each hypothesis is associated with a set of indicators. If the indicators show significant improvement, the hypothesis can be assumed to be valid.

Hypothesis	Indicators	Data Source	Analysis
Outputs: Improved knowledge of functionaries; Community engagement; Adoption of CLART tool; Quality of planning (AAP) documents.			
Hypothesis 1: Knowledge improvement There has been an improvement in the knowledge, skills, and practices of MGNREGA functionaries through FES's training programmes.	1. Understanding of watershed management concepts and Jala Sanjeevini process. 2. Knowledge and use of CLART for site selection.	Field interviews	Coding of field interviews to assess and compare the competencies developed among functionaries for Jala Sanjeevini process, watershed concepts, the ridge-to-valley approach and use of CLART.
Hypothesis 2: Improved community engagement There has been a significant improvement in community engagement in MGNREGA planning.	1. Proportion of job card holders actively participating in planning processes (ward sabha, gram sabha. 2. Attendance in participatory rural appraisal — resource mapping and transect walks.	1. Participatory Digital Attestation Dashboard 2. Pancha-tantra 2.0[20] 3. Registered job cards (MGNREGA Management Information System).	1. Coding of field interviews to understand the perception of functionaries on community engagement. 2. Comparing community attendance data in gram sabha, ward sabha and participatory rural appraisal with the registered number of job cards under MGNREGA.

[20] *Panchatantra 2.0 is a government platform for gram panchayats to digitise and centralise all the key panchayat functions and operations on one platform for end-end operations and reporting.*

Hypothesis	Indicators	Data Source	Analysis
Hypothesis 3: CLART tool adoption There is a significant increase in the usage of CLART by first-mile actors for MGNREGA planning.	1. Submission of forms using CLART. 2. Compliance with CLART recommendations. 3. Mandatory NRM structures approval on CLART. 4. CLART approval workflow. 5. Intended versus actual usage of CLART in the planning process.	1. CLART database 2. Field interviews	Descriptive statistical analysis to compare: 1. Number of submitted forms in the CLART database. 2. Percentage of total approved structures that adhere to CLART recommendations. 3. Percentage of approved forms for mandatory NRM structures. 4. Percentage of forms pending for approval on CLART. 5. Journey maps.
Hypothesis 4: AAP completeness The quality of the AAPs (formats, data accuracy, visibility of the process followed) has improved.	AAPs completeness score	AAPs	Time-series analysis and comparison of completeness scores available across multiple years (pre-intervention and post-intervention).
Outcome: MGNREGA NRM planning and acceleration in planning process.			

Hypothesis	Indicators	Data Source	Analysis
Hypothesis 5: Shift in the NRM planning process There is a meaningful shift in the planning and implementation of NRM projects under MGNREGA. The projects being planned and implemented are more holistic and focused on groundwater improvement.	1. MGNREGA Management Information System dashboard. 2. Budget sanctioned for NRM projects vis-a-vis for others. 3. Types of planned NRM projects (Category A or Category B). 4. Budget sanctioned for NRM projects on community-owned and private lands.	MGNREGA Management Information System	Time series analysis: 1. Analysis of the percentage of the budget allocated to the NRM category over time. 2. Analysis of changes in budgetary trends for different categories of NRM works to evaluate priority shifts. 3. Assess the budgetary proportion of Category A (public/commons) and Category B (individual/ private-focused) projects to understand the shift in planning priorities.
Hypothesis 6: Digitisation ease and efficiency The adoption of digital technology and increased data visibility have made the planning process easier and faster for the functionaries.	MGNREGA staff's perceptions and value assessments of CLART and Participatory Digital Attestation tools.	Field interviews	Analysis of timeline of planning process and journey maps to understand where efficiencies have been created.
Impact: Improved groundwater level and management of commons.			

Hypothesis	Indicators	Data Source	Analysis
Hypothesis 7: Groundwater level improvement There is a significant increase in the groundwater levels in the intervention districts.	Estimation of groundwater recharge.	1. FES's Water Monitoring Tool. 2. Jaldoot dataset.	Recharge from the water table fluctuation method using secondary data from the Central Ground Water Board.
Hypothesis 8: Improved commons governance The Grama Parisara Abhivrudhi Mathu Nirvahana Samithi is well-established and have resulted in improvement, recognition and management commons.	1. Number of GPANS formed and that got recognition from Gram Panchayat as a sub-committee. 2. Number of gram panchayats with fully operational GPANS committees. 3. Number of active GPANS committees holding regular meetings (e.g., at least quarterly) 4. Number of commons with officially recognised boundaries (via GPS mapping or government records) overseen by GPANS.	Field interviews and evidences for formation and recognition of GPANS	NA

Table 2: Hypotheses, indicators, data sources, and analysis tools.

This evaluation uses a mixed-methods approach, and a comparative case study method to assess the intervention's outputs, outcomes, and impacts.

The method allows an in-depth analysis of similarities and differences between selected treatment and control group cases. This comparison provides insights into what worked in the treatment group by evaluating the changes made and attributing them to the interventions. Examining the control group helps isolate the impact of these interventions by highlighting areas where no external changes were applied.

2.3 Sampling Design

We used a multi-stage sampling technique to ensure a comprehensive and representative evaluation that facilitates comparisons between treatment and control areas. The technique is a more complex form of cluster sampling, which contains two or more stages in sample selection—large clusters of a population are divided into smaller clusters in multiple stages.

We divided Karnataka's districts into two clusters:

1. Eight districts where FES implemented its interventions
2. 23 districts without FES interventions.

We selected four representative districts from the FES intervention group of eight districts using the following criteria:

1. Percentage of land area under commons[21]
2. Percentage of groundwater exploitation[22]

FES used the above indicators to select the eight districts for their intervention. In our sampling exercise, we also added the following two criteria to account for the variations in biophysical conditions.

1. Percentage of population engaged in agriculture (Census 2011)
2. Percentage of rainfed area (Census 2011)
3. Inclusion /exclusion in Atal Bhujal Yojana[23]

Based on these five criteria, we selected the districts by manually checking the variability in the eight districts and ensuring the representation of that variability in the sampled districts.

Then, we identified representative taluks within each sampled district and representative gram panchayats within each taluk, using the same five criteria.

The unit of analysis was the gram panchayat, given its critical role in planning and implementing natural resource management interventions at the grassroots. Each treatment district, taluk, and gram panchayat was paired with one in control. The control selection was based on two levels:

- Proximity to the treatment area, as it is a strong determinant of similar biophysical and socio-economic conditions, and
- Similarity in the five criteria mentioned above.

These matched pairs enabled reliable comparisons between similar units.

[21] *Source: Karnataka State Remote Sensing Applications Centre*

[22] *Source: Central Ground Water Board*

[23] *Source: Atal Bhujal Yojana, Karnataka*

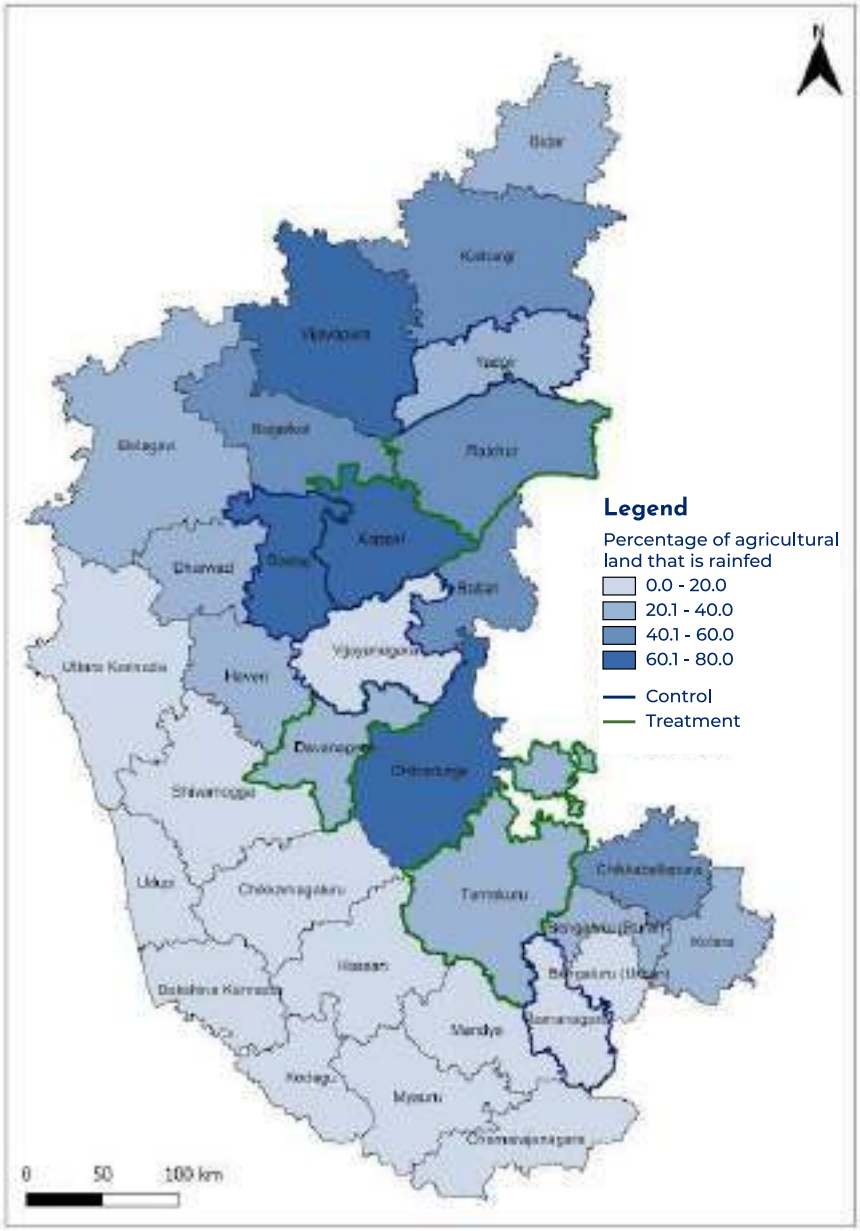

Figure 6: Districts sampled for the study.

Matching Pairs	District	Taluks	Gram Panchayat
Matching Pair 1	Davangere	Jagalur	Devikere
			Hanumantapura
			Pallagate
	Vijayanagara	Hadagalli	Sogi
			Hirehadagalli
			Mahajanadahalli
Matching Pair 2	Raichur	Raichur	Chandrabanda
			Kamlapur
			Bijangera
	Yadgir	Yadgir	Halgera
			Balichakra
			Belagundi
Matching Pair 3	Tumkur	Koratagere	Thovinakere
			Kyamenahalli
			Mavathuru
			Doddasagger
	Ramanagra	Magadi	Mathikere
			Thaggikuppe
			Agalakote
			Kalya
Matching Pair 4	Koppal	Yelbarga	Chikkamyageri
			Hire Aralihalli
	Gadag	Ron	Hirehala
			Kotabal

Table 3: List of sampled districts, taluks, and gram panchayats from the treatment (green) and control (blue) groups.

2.4 Data Sources and Analysis Approaches

2.4.1 Field Data

In-depth interviews: We conducted in-depth interviews with 83 respondents across the sampled districts, encompassing various levels of administrative hierarchy. The respondents included field-level functionaries, as well as officials operating at the taluk and state levels (Refer to Annexure A8 for the detailed list of respondents). We used structured questionnaires tailored to each category of respondent to collect field data (Details in Annexure A11.1)

Scoring of in-depth interviews: We systematically coded and analysed the in-depth interviews conducted with Gram Kayak Mitras, barefoot technicians, Panchayat Development Officers, gram panchayat members, gram panchayat presidents, Technical Assistant Engineers and technical coordinators at both the gram panchayat and taluk levels. The findings were used to compute a cumulative knowledge score for functionaries in each gram panchayat (refer to Annexure A10 for details regarding the scoring criteria for the in-depth interviews). Subsequently, we compared the average knowledge scores between the treatment and control groups to assess variations.

Programme data: We used programme datasets from CLART, Participatory Digital Attestation, Water Monitoring Tool, and Jaldoot dashboards for analysis (discussed in detail in Table 3). In addition, we conducted an analysis of the AAPs to evaluate the quality and format using a completeness score. We assessed five key components: basic information, readability, accuracy, authenticity, and completeness. (For detailed scoring criteria, refer to Annexure A7).

Secondary data: We used the MGNREGA Management Information System (MIS) Dashboard for secondary data for budget allocations across different categories of works and work types from financial years 2020 to 2024.

2.4.2 Triangulation between Field Interviews and Secondary Datasets

This study's qualitative research tools include in-depth interviews with key MGNREGA planning stakeholders at the gram panchayat, taluk, and district levels. To corroborate the field findings, we also analysed datasets from CLART, Participatory Digital Attestation, Water Monitoring Tool, Jaldoot, Annual Action Plans, and MGNREGA MIS dashboards. Data triangulation is vital to validate findings. In the context of this study, it provided evidence to address potential recall bias in interviews. Using secondary data to verify field findings improved the evaluation and added credibility and depth.

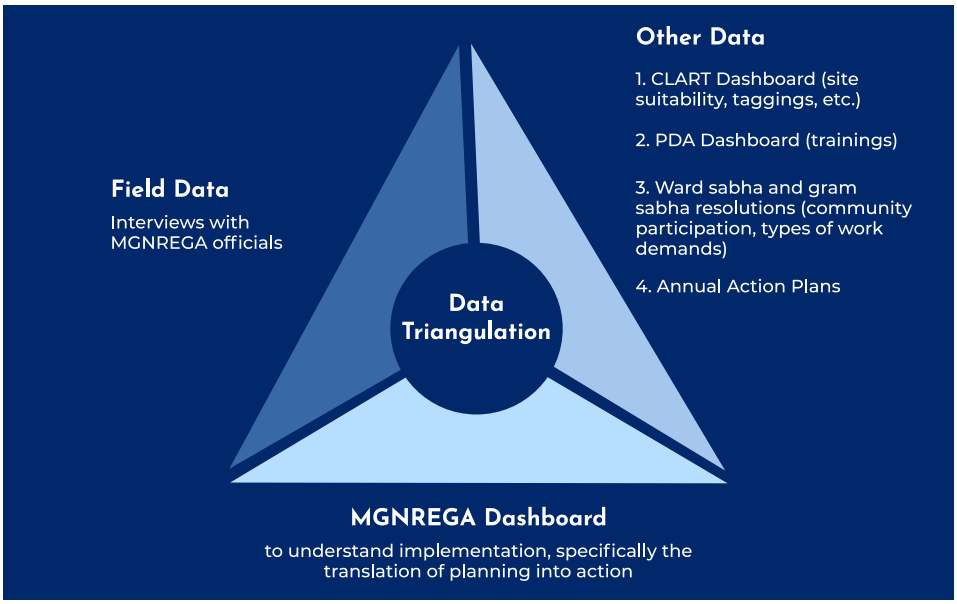

Figure 7: Data triangulation to corroborate field findings.

2.4.3 Mapping Functionary's[24] Journey

Journey mapping is a visualisation tool used to understand and analyse the experiences an individual goes through when interacting with a product or service. It helps identify the challenges in interacting with a product or service and is used to improve the user experience.

Mapping the journeys of the multiple actors involved in the MGNREGA planning process helped us document how they develop detailed project reports and annual action plans (See Figure 12 for more details).

2.4.4 Changes in Groundwater Level

Observing groundwater level changes typically requires long-term data. Several studies have shown that patterns in groundwater level changes are often slow to manifest and require robust long-term monitoring and data analysis to draw meaningful conclusions (Narain 2012).

Further, in hard rock areas, it is difficult to use groundwater level data at the district level to assess the impact of the project for the following reasons:

Many confounding factors lead to a problem of attribution. Changes in groundwater levels is a result of many different factors (crop prices, rainfall levels, watershed characteristics, etc). Hence, it is incorrect to attribute the changes in groundwater levels to one input without accounting for all the other important factors, especially changes in extraction in different areas.

[24] *The word functionary is used as a common term for the different permanent and contractual employees and other stakeholders implementing MGNREGA. It includes barefoot technicians, engineers, gram panchayat officials etc.*

Low storage leads to water levels being sensitive to rainfall. In hard rock areas, the total available storage for groundwater is low. As a result, two good years of rainfall can fully fill the aquifers irrespective of good or bad recharge structures, and two bad years with low rainfall and high extraction can fully exhaust an aquifer. This is why the assessment of 'water level decline' makes more sense in alluvial aquifers, and the assessment of 'time of seasonal drying' makes more sense in such hard rock areas. This is not to say that recharge structures are not important, but rather that their utility is limited by the natural endowment of aquifer space.

Also, groundwater recharge and depletion are influenced by both climatic and anthropogenic factors. Thus, groundwater changes might occur due to factors beyond the scope of an intervention.

Given these complexities, the current analysis is confined to directional trends that might suggest influence. While it is difficult to isolate the programme's impact due to confounding variables, the analysis aims to compare groundwater levels pre-intervention and post-intervention across control and treatment districts.

For the current evaluation study, we used the water table fluctuation method[25], which provides the total groundwater recharge across the monsoon by measurements of average pre-monsoon and post-monsoon water levels. The Central Ground Water Board (CGWB)'s Groundwater Resource Estimation Committee, India (2015) has also endorsed this method.

2.5 Scope of Evaluation

This evaluation study does not include the following:

- Assessment of the implementation of MGNREGA in terms of construction, payments, and other issues related to MGNREGA implementation.

- Broader changes at a district scale (while the available data on groundwater levels are being analysed to see if there is a pattern of additional increase in groundwater levels, it is not reasonable to attribute changes in groundwater levels at the district scale to MGNREGA works as there are many other changes in parallel, like changes in groundwater extraction).

[25] *For calculating the recharge from the water table fluctuation method, the following equation has been used:*

$$Recharge\ (R) = \Delta h * Sy$$

Where Δh is the change in water level between pre-monsoon (May) and post-monsoon (October/November) months and Sy is the specific yield (in %) of the hydrogeological provinces. This method is based on the assumption that a rise in the water table is caused by groundwater recharge and a dip is caused by water extraction. In this study, the specific yield used for recharge calculation was obtained after going through GEC-97 (Central Ground Water Board 1997).

• Comprehensive GIS analysis of whether the MGNREGA planning is resulting in the saturation of watershed structures.

• Hydrologic assessment of CLART-suggested structures (this may be taken up in a later phase).

2.6 Limitations of the Study

• The non-availability of AAPs for both pre- and post-intervention periods (FY 2019-20 to FY 2024-25) limits the assessment of changes in completeness scores.

• The lack of community attendance data for gram sabhas, ward sabhas, or participatory rural appraisal sessions impeded a thorough analysis of community engagement. Additionally, the absence of current-year data for the control group hindered a comparative analysis.

• Analysing changes in water levels and attributing them to recharge efforts was constrained by the following data limitations:

- **Granularity issues:** Groundwater data often lacks the resolution necessary to accurately map the water table.

- **Locational bias:** Measurement points, often located in valleys, may reflect higher recharge rates, potentially leading to overestimation.

- **Borewell vs. open well data:** Data often does not differentiate between borewells and open wells. Borewells, being in fractured zones, may exhibit exaggerated spikes in water levels, further complicating attribution.

- **Aquifer-specific yield:** The absence of data on aquifer-specific yield affects interpretations, as yield varies significantly across locations and depths.

• Groundwater dataset constraints:

- **Water Management Tool Data:** Collected by MGNREGA functionaries and civil society organisations (CSOs) in partnership with the FES, this dataset has been collated twice yearly since 2021 but is available only for treatment villages.

- **Jaldoot data:** This dataset, compiled by the Government of India, offers district-level coverage but has been available only since 2023.

Chapter Three

Findings & Learnings

Summary of Findings

Hypothesis	Key Findings
Outputs	
Improvement in knowledge	The functionaries in the treatment group have better knowledge of the Jala Sanjeevini process, concepts of watershed management, and skills for CLART usage when compared to the control group.
Improvement in community engagement	There is no significant difference in community engagement and participation attendance between treatment and control groups. However, it's important to recognise that fostering behaviour change, such as engaging the community in the planning process, is typically a gradual endeavour. Its effects may take time to become evident and could influence outcomes over the longer term.
CLART tool adoption	The treatment group shows better adoption of CLART. The compliance with its recommendations of site suitability is also visible in selected locations of structures. While some respondents found that CLART added good value for site suitability assessment, many others treated it like a procedural tool and did not base their site suitability decisions on its use.
Outcomes	
Shift in the planning process	The total spending on natural resource management projects increased more in the treatment group than in the control group. In terms of types of structures, there has been a noticeable shift in treatment areas in budget allocation towards aerial interventions like tanks, check dams, earthen dams, and gully plugs. Drainage line structures like tanks in this context have been shown to be less effective than ridge area interventions (Brauns et al, 2022). This shift is much more pronounced in treatment areas than in control areas.
AAP completeness	Due to limited availability of Annual Action Plans, the study cannot confirm that the plan format has improved over time.
Digitisation-led to ease and efficiency of planning process	The planning seems to occur closer to intended timelines in the treatment group compared to the control group. However, it is difficult to establish a direct linkage between the use of digital tools and improved efficiency in the planning process.

Impact	
Groundwater level increase	The groundwater recharge estimates in treatment and control districts are not significantly different or show no clear trend. Also, in hard rock areas, it is inaccurate to use groundwater level data for district-level comparison for the impact of the project, primarily because other important factors like groundwater extraction and aquifer characteristics may be different and cannot be controlled for.
Commons management	In both treatment and control districts, the Grama Parisara Abhivrudhi Mathu Nirvahana Samithi were mostly absent. In a few gram panchayats where the committees were set up, they seemed to exist only on paper.

Table 4: Hypotheses and findings.

3.1 Hypothesis 1: Knowledge Improvement

MGNREGA functionaries in the treatment group demonstrated significantly better knowledge of the Jala Sanjeevini process, watershed concepts, ridge-to-valley approach and CLART use, compared to those in the control group.

This demonstrates the effective translation of capacity-building and support efforts.

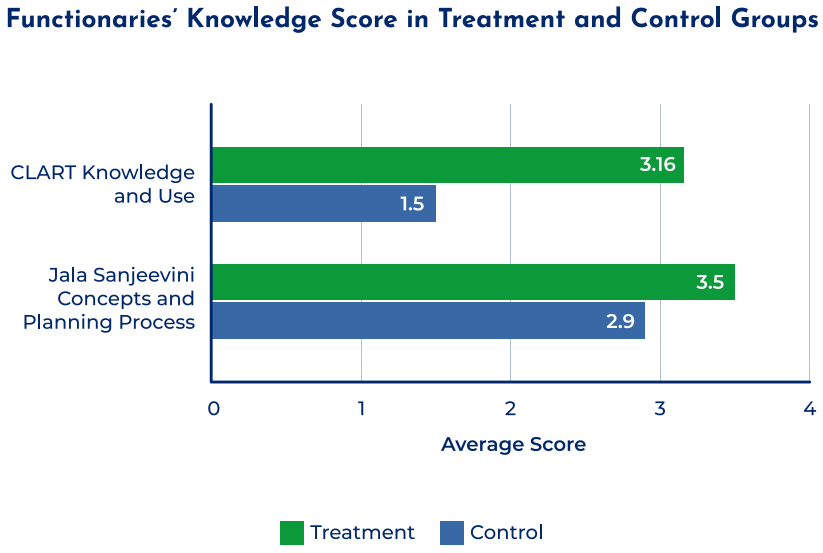

Figure 8: Knowledge score for Jala Sanjeevini concepts and planning processes, and CLART knowledge and use.

(Note: For the detailed gram panchayat-wise score, refer to Annexure A2).

CLART knowledge and usage among functionaries

- On average, the treatment group scored '3.16' on CLART knowledge and use, compared to '1.5' in the control group.

- In the **treatment group**, barefoot technicians and TAEs demonstrated a good knowledge of CLART functionality. Treatment group functionaries were able to interpret CLART colour codes and successfully identified structures suitable for specific locations. They also demonstrated good knowledge of watershed management concepts and used CLART for ground truthing. Technical coordinators used CLART for vetting structures. However, a large number of forms submitted to Technical Coordinators(TCs) were not responded to.

  In the **control group**, functionaries had limited knowledge of CLART and relied primarily on peer-to-peer learning to use it. In Ramanagara and Gadag districts, functionaries received no CLART training and did not use it. In Vijayanagara and Yadgir districts, barefoot technicians and TAEs use CLART as a decision-aiding tool. However, the workflow for vetting structures was not followed even after providing login credentials for TCs to approve structures.

Jala Sanjeevini concepts and planning process knowledge

The assessment of functionaries' knowledge is focused on understanding of concepts of watershed principles, ridge-to-valley approach, and Jala Sanjeevani planning processes. They are also tested on their recollection of detailed project report planning steps and their associated roles and responsibilities.

On average, the treatment group scored '3.5' and the control group scored '2.9'. Chikka Myageri Gram Panchayat achieved a score of '5', attributed to the Panchayat Development Officer (PDO) exemplary knowledge. In both treatment and control groups, gram panchayats scoring less than '2' often had the PDO absent, with the gram panchayat secretary stepping in to fill the role.

- In the **treatment group**, the first-mile actors (Gram Kayika Mitras or barefoot technicians) demonstrated a good knowledge of watershed concepts and ridge-to-valley approach.

- In the **control group**, the first-mile actors (GKMs or barefoot technicians) demonstrated limited understanding of watershed concepts and the ridge-to-valley approach.

In both treatment and control groups, there was no notable difference in the knowledge of key gram panchayat functionaries i.e., PDO and Panchayat Secretary, who are responsible for anchoring the planning process. However, the first-mile actors (GKMs and barefoot technicians) in both groups struggled to recognise Jala Sanjeevini as a distinct programme.

We also evaluated the knowledge levels of gram panchayat members, recognising their critical role in community engagement and MGNREGA planning, even though they were not part of

the intervention. We observed a significant knowledge gap between the experienced and first-term elected gram panchayat members across treatment and control groups. **Experienced members demonstrated a solid understanding of the MGNREGA programme. Given that gram panchayat members are actively involved in the planning process, they should be prioritised for inclusion in future capacity-building efforts.**

Knowledge-building through training was one of the primary input activities in the intervention. The design-for-scale model for the knowledge-building component is effective. This knowledge must however be converted into application through improved planning which is evaluated in the further sections.

3.2 Hypothesis 2: Community Engagement

Direct community engagement in the MGNREGA planning process is intended to take place during participatory rural appraisal exercises, ward sabhas, and gram sabhas. More indirect community participation is expected through the elected representatives of the gram panchayat, who finalise the plans.

3.2.1 Community Participation in Gram and Ward Sabha

The Participatory Digital Attestation dashboard is a digital tool that is an integral component of the programme design. The dashboard is meant to capture and provide data on community participation in gram sabha, ward sabha, and participatory rural appraisal activity for gram panchayats in the treatment group.

However, the data is inconsistently available (Table 4). The variability in data availability on PDA presents challenges for a complete and detailed analysis. For the control group, data on community participation was difficult to gather. The Panchatantra 2.0, the government platform is designed for gram panchayats to capture and digitise data on people's participation in ward sabhas and gram sabhas. But we were able to retrieve data for only three out of the 24 sampled gram panchayats, as the remaining panchayats' data was not captured. The table below consolidates the retrieved data from both PDA and Panchatantra.

District	Gram Panchayat	Participation as a percentage of persons with job card	Registered workers in gram Panchayat	Ward Sabha	Gram Sabha	PRA Exercise*
				Total Participants (PDA)	Total Participants	Total Participants
Davangere	Devikere*	2%	5,628	35	83*	NA
	Pallgate*	1.4%	6,362	42	52	NA
	Hanumantapura	-	6,553	NA	NA	41
Raichur	Chandrabanda**	3.74%	7,375	276	NA	72
	Kamlapur*	5.5%	4,289	239	NA	6
	Bijangera**	5.6%	8,712	218	270	48
Koppal	Chikkamyageri*	0.5%	5,791	30	NA	30
	Hirearalihalli*	0.6%	11,104	28	45	35
Gadag	Kotabal**	5.9%	3,549	NA	211	NA

Table 5: Average community participation[26] in gram panchayats.

*Source: * PDA Dashboard, ** Gram Panchayat meeting proceedings available on Panchatantra 2.0, Job card information from MGNREGA portal.*

Note: There has been disparity in the participants for gram sabhas and ward sabha on PDA and Panchatantra portal. This necessitates for better data management on community participation.

As shown in the table above, an average of only around 5% of job card holders attended the gram sabhas. This turnout suggests that a large majority of job card holders don't participate in discussions held during gram sabhas.

3.2.2 Perceptions of Community Engagement

Since the quantitative data on attendance in planning events was infrequent, we assessed changes in community engagement by examining the perceptions of functionaries who interact directly with the community.

Perceptions of community engagement were generally positive. However, they did not vary much across the control and treatment districts[27].

Field interviews revealed that women's self-help groups (SHGs) and youth groups play a significant role in bolstering community engagement, particularly for women's participation in the planning process. The level of engagement within these groups varied across gram panchayats in both treatment and control groups. Notably, in Raichur, Koppal and Yadgir, Gram Panchayats where SHGs held regular monthly meetings and actively promoted women's involvement in the

[26] *Average Community Participation = Sum of participants in each ward/ Total number of wards.*

[27] *The score of the treatment group is skewed by extremely low participation in Hanumanthapura Gram Panchayat where a recent set of transfers meant no PDO was there beyond a few months.*

MGNREGA programme were perceived more positively by functionaries. The gram panchayats in such districts were allocated higher scores.

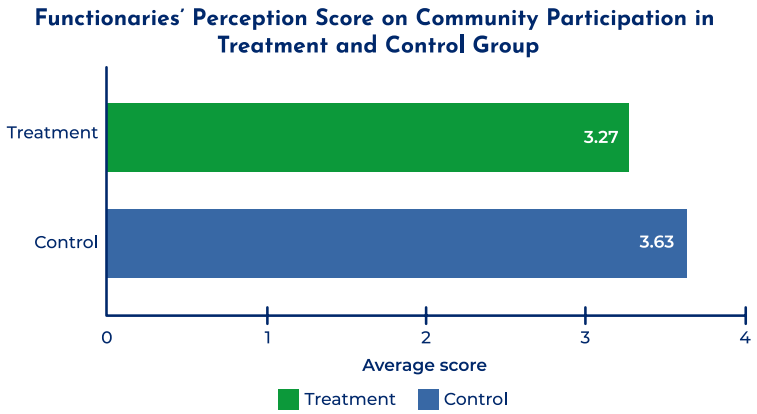

Figure 9: Functionaries' perception of community participation in treatment and control groups

Note: For detailed scores by gram panchayat, refer to Annexure A5.

- In the **treatment group**, the community engagement followed the tabletop planning with a participatory rural appraisal exercise conducted at the ward level. Participatory rural appraisal activities, such as resource mapping, were conducted between the months of February and March as part of the detailed project report preparation process. During field interviews, participatory rural appraisal was often described as a 'rangoli map'[28] that was prepared by the community with the facilitation of functionaries.

In the field interviews, functionaries perceived that village residents were not interested in participating in participatory rural appraisal exercises and transect walks (See Table 5 for attendance during the participatory rural appraisal exercise). Based on community-level attendance in the participatory rural appraisal exercise, it was unclear if community members are aware of their connection with the overall detailed project report process. In fact, while it may have functioned as an additional IEC activity, there is an opportunity to improve communication with the community. Providing clearer explanations about the purpose and value of the participatory rural appraisal exercise in relation to the overall detailed project report process could help enhance their engagement.

- In the **control group**, the PRA was conducted, however there was no evidence to indicate that the PRA exercise incorporated site feasability assessment using the CLART tool. The timeline and usage patterns of CLART tagging did not indicate that the tool was utilised for ground-truthing during transect walks, a key component of the participatory rural appraisal process for community engagement in the control group.

[28] *A 'rangoli map' is a village resource map created on the ground as a participatory exercise using colored powders, similar to traditional rangoli art. Community members visually represent local resources such as water bodies, farmlands, forests, and infrastructure. This helps in identifying areas for development and guides the planning of works under MGNREGA.*

3.2.3 Communities Prefer MGNREGA Spending on Private Land Rather than Common Lands

In both treatment and control groups, field interviews with local functionaries revealed that villagers attended ward sabhas to submit requests, mostly for work on their individual lands, and occasionally for common village infrastructure, such as drains, to seek private benefits. Requests for structures on commons lands are often aimed to secure private benefits (e.g. desilting a check dam close to a farmer's borewell) or avoid private disbenefits (e.g. flooding of farmland by a structure).

A review of ward sabha and gram sabha resolutions collected during field visits indicates high demand for cattle and goat sheds, suggesting these as a priority for the community. When we analysed data from the MGNREGA dashboard, we observed a similar trend, showing an increase in the number of structures on individual lands within the NRM category. In the treatment group, the share of individual projects rose from 51.94% in FY 2019-2020 to 60.79% in FY 2023-2024. Similarly, in the control group, the proportion increased from 31.35% to 43.44% over the same period. **This trend underscores the community's growing preference for individual works.**

This observation aligns with insights from interviews with the Rural Development and Panchayat Raj (RD & PR) state team, who noted that projects on commons have reached saturation in some areas. In some districts, to rekindle the interest of the communities in MGNREGA, the district administrations also promoted activities on private lands in the past. Structures like cow and goat sheds have become universally popular requests. This trend was particularly noticeable in areas closer to urban centres, where communities actively pursue individual projects on their private lands through MGNREGA.

Therefore, there seems to be no significant difference in community engagement between treatment and control groups, and the community often intends to seek individual benefit from the MGNREGA spending rather than better management of commons.

3.3 Hypothesis 3: Adoption of CLART

The adoption of CLART in this evaluation study is ascertained using four indicators at the sampled district and gram panchayat level. We also used a journey map to compare the actual versus intended timing of usage of CLART in the MGNREGA planning process.

- Total number of submitted forms through CLART (district level).
- Conformity with CLART recommendations (gram panchayat level).
- Total number of forms for approval on CLART (district level).
- CLART usage for mandated natural resource management structures (gram panchayat level).
- Journey map for intended vs actual usage of CLART (gram panchayat level).

3.3.1 Forms Submitted on CLART

In the treatment districts, there is a significantly higher number of forms submitted on CLART compared to the control districts.

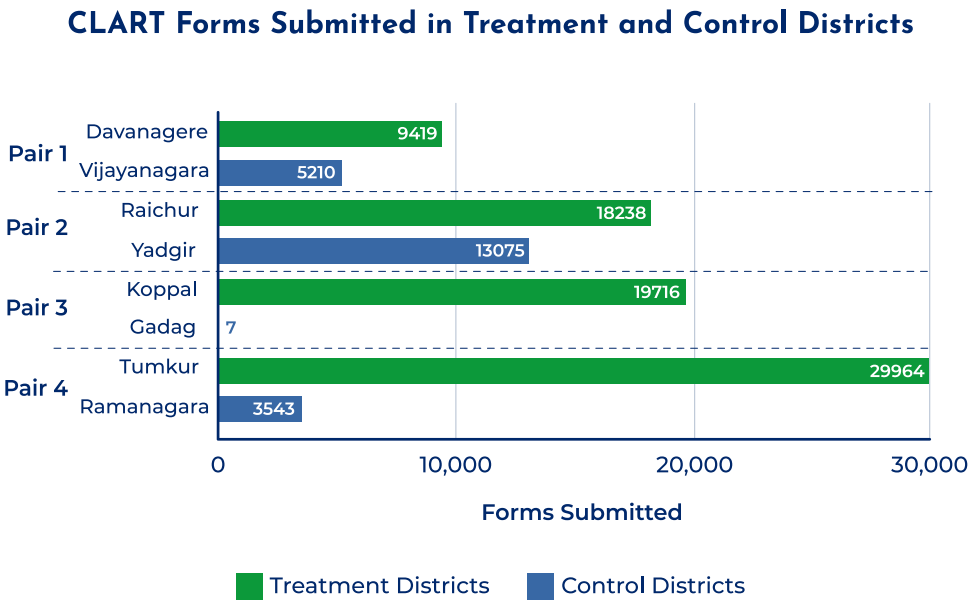

Figure 10: Number of forms submitted in treatment and control districts (pair wise).

Note: For a breakdown of submitted forms (pending for approval, approved, and rejected), refer to Annexure Section A5.

3.3.2 Conformity with CLART Recommendations

To determine whether the approved structures align with CLART recommendations, we conducted a conformity assessment testing whether the recharge structures are actually located in the CLART-recommended recharge zones.

The process involved extracting geo-location files from the CLART dashboard for the vetted/ approved structures from FY 2022-23 to FY 2024-25[29]. We cross-referenced these locations with the colour-coded recommendations provided by CLART using the raster layers[30]. We evaluated 760 structures: 525 structures in treatment gram panchayats and 235 structures in control ones.

The treatment group demonstrates a higher compliance with CLART recommendations compared to the control group.

[29] Due to the unavailability of geo-location data for the planned structures from the DPR, we relied on geo-location files retrieved from CLART to obtain the necessary spatial information.

[30] For this analysis, we examined structures tagged within both Treatment and Control gram panchayats. However, as discussed in Section 3.4, the adoption of CLART was significantly lower in control districts. This analysis includes a total of 15 sampled gram panchayats of which 12 GPs are in the treatment group and 3 in the control group.

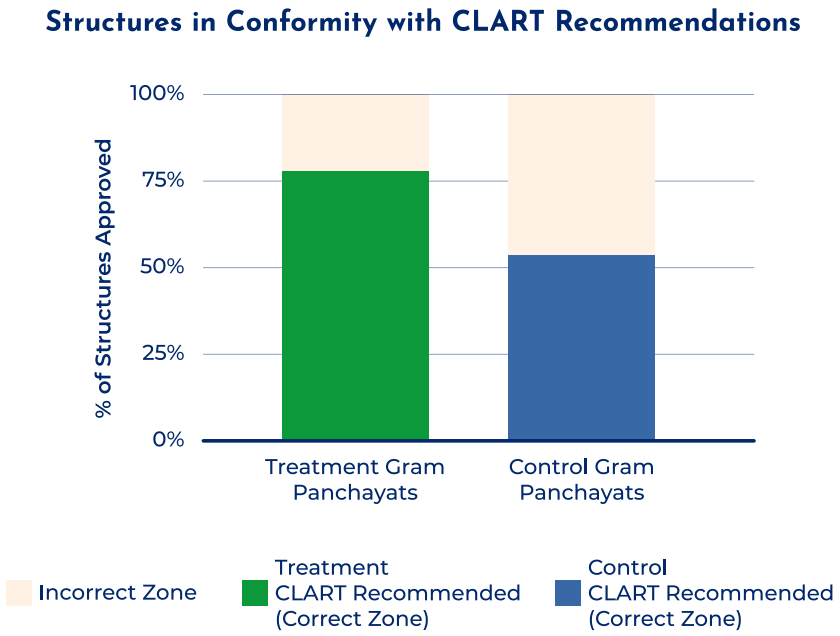

Figure 11: Conformity assessment of approved structure as per CLART recommendations.

3.3.3 Forms Pending for Approval on CLART

In CLART, after an intervention is proposed by the frontline functionary, CLART app requires a block level functionary to approve it. However, in practice there is no compulsion to approve the forms and often the approval is not done. Hence, there are numerous forms that are submitted with no response from the approver as the approval process has no direct consequences.

CLART is a GIS-based decision-aiding tool and requires site feasibility assessment by the functionaries to check whether the CLART recommendations for structures make sense in the real world. Sometimes, the panchayat functionaries may not have the expertise to do this. Therefore, the proposals added to CLART by the panchayat functionaries are expected to be approved by the technical coordinator at the block level.

- In the **treatment group**, the CLART approval process, which involves validation by the taluk-level technical coordinator, was largely bypassed (there were around 48.5% of forms pending approval than approved). In the control group, technical coordinators did not use the CLART dashboard to approve the structures as per the workflow process.

- In the **control group**, administrative challenges and the absence of login credentials for the CLART dashboard were cited as reasons for not using CLART, even though credentials were provided to technical coordinators of all districts.

3.3.4 CLART for Mandated Natural Resource Management Structures

The state government has mandated the use of CLART for five types of recharge structures. The adherence to the rule of CLART tagging is much better in treatment areas compared to control areas.

In the **treatment group**, 100% of mandatory structures are approved through CLART, demonstrating strict adherence to government guidelines for the five NRM structures.

In the **control group**, none (0%) of these structures were approved on CLART. As noted in Section 1.4, these mandatory structures include check dams, farm ponds, recharge pits, vented dams, and percolation tanks.

CLART also provides engineering design estimates for structures after basic dimensional inputs. This functionality is also provided by the SECURE[31] (Software for Estimate Calculation Using Rural Rates for Employment) platform, which provides more accurate estimates, likely because it stays current with the schedule of rates[32]. It is used during the technical sanction process for a work structure once the annual action plan is approved, often taking precedence over CLART estimates. While CLART provides rough estimates for drafting the annual action plan, users must repeat the process for precise costing. In contrast, using SECURE for accurate costing is a mandatory step in the implementation workflow. For these reasons, functionaries prefer using the SECURE platform rather than CLART.

While SECURE platform is accessible only to government functionaries, CLART may be used by the community as well to do basic design estimation and therefore increase community awareness, encouraging better participation and effective planning.

[31] SECURE (Software for Estimate Calculation Using Rural Rates for Employment) app built by the Ministry of Rural Development. https://secure.nic.in/secure/uttar_pradesh

[32] Schedule of Rates is a document which details the labour, material and conveyance rates that are approved by the state and to be adopted during estimate preparation.

Indicators for CLART Adoption	Treatment	Control
Total number of forms submitted on CLART.	The total number of forms submitted was higher (77,337) during the intervention period from March 2021 to March 2024. Tumkur district reported the highest submissions (29,964), while Davangere district had the lowest submissions of form (9,419).	The total number of forms submitted was comparatively low (21,835). Gadag district reported the lowest submissions (7), while Yadgir district reported the highest submission of forms (13,075)
Percentage of approved structures in compliance with CLART recommendations.	77% of approved structures are in alignment with CLART recommendations.	54% of approved structures are in alignment with CLART recommendations.
Percentage share of usage of CLART to approve mandatory NRM structures.	CLART was used in 100% of the mandatory structures (275/275).	CLART was not used in any of the 667 mandatory structures.
Percentage of forms pending for approval on CLART.	Almost 49.5% of the forms in the sampled gram panchayats remain pending for approval.	Almost 99% of the forms submitted remain pending for approval on CLART.

Table 6: Indicators for CLART adoption in treatment and control groups.

3.3.5 Journey Map

We used journey mapping as a technique to compare the intended CLART usage (as recommended under the Jala Sanjeevini programme), versus the actual usage (Figure 9).

The journey mapping technique essentially involves interviewing the functionaries about their perspectives on the processes they followed during the planning. It is a common technique in qualitative research to explore differences in experiences and perspectives.

First, the planning process steps outlined in the Jala Sanjeevini programme guidelines were used to construct the intended journey map for the detailed project report preparation process. At the beginning of the yearly planning cycle, the Union Ministry of Rural Development issues a circular directing states to prepare a labour budget within a prescribed timeline. This is then circulated by the state to each district level, directing gram panchayats within their district to prepare AAPs. This forms the basis for the ‘intended journey’ of the AAP process.

The actual journey maps were constructed through interviews with field functionaries to understand whether the steps in the process were carried out, the extent to which they were completed, and their timelines. These were cross-corroborated with evidence from the PDA portal and documents such as AAPs.

The journey maps presented below offer a generalised representation of the process as described by the functionaries in interviews within the sampled gram panchayat. There could be minor variations in how the process was followed, though the overall approach remains consistent. In contrast, the control group shows minimal use of CLART, as reflected in the data points above.

The journey map is organised as follows:

- On the **horizontal axis**, we depict the stages of planning. The 3-year DPR planning phase is followed by the four steps of the AAP.
- On the **vertical axis**, we present the various functionaries. We also show groups of functionaries like the ward sabha and the gram sabha.
- The **solid brown blue line arrow** represents the intended journey and process under the Jala Sanjeevini programme.
- The **solid blue line arrow** shows the actual journey and process followed on the ground.

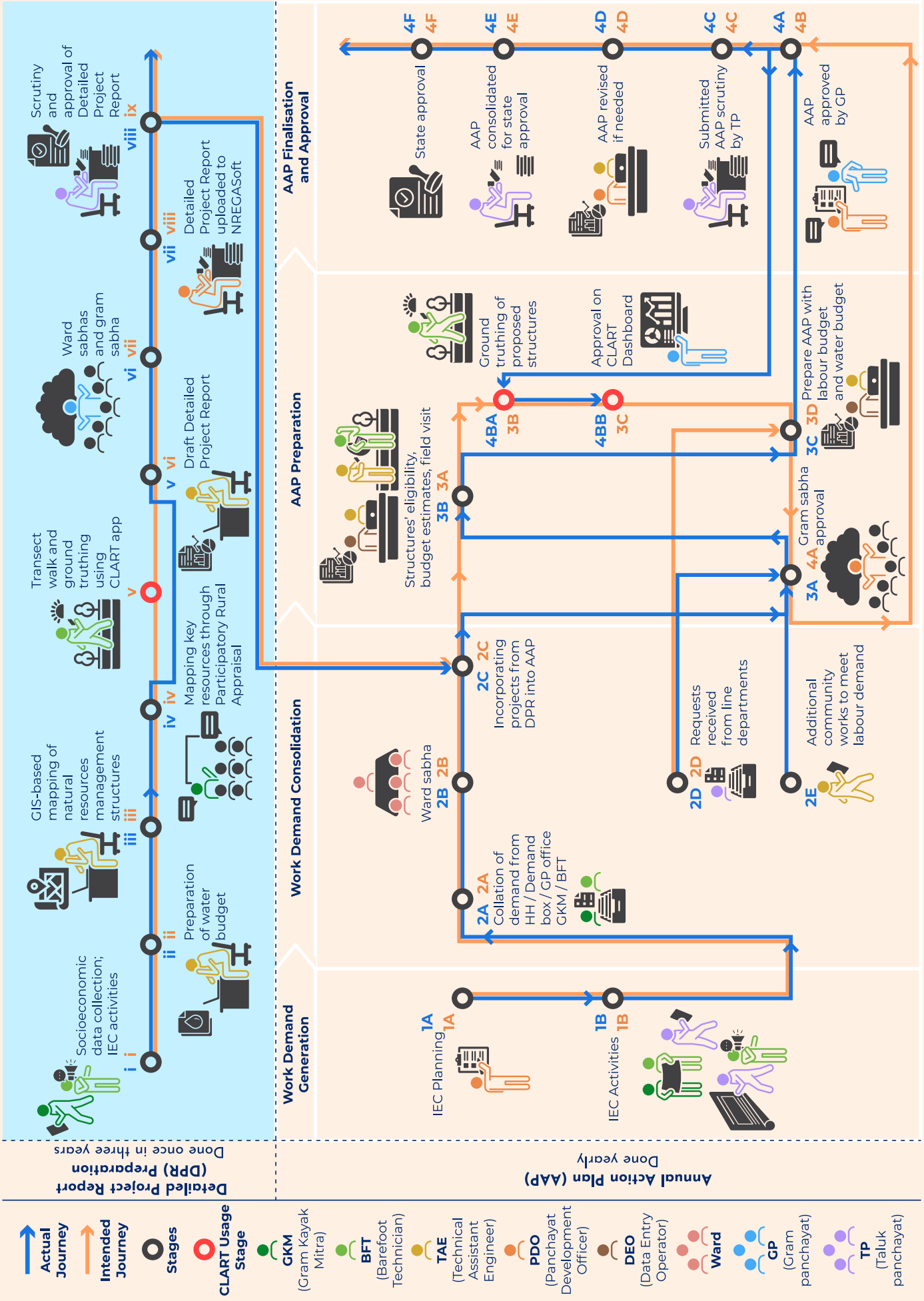

Figure 12: Actual and intended journey maps of the detailed project report and annual action plan preparation processes.

Planning	Intended use of CLART	Actual use of CLART
Detailed project report (DPR) preparation phase (once in 3 years)	Under the Jala Sanjeevini programme, CLART is recommended to be used during the transect walk to review the site suitability of structures recommended during GIS-based planning.	**In the treatment group, CLART is used in the DPR preparation phase during the transect walk.** However, reportedly this exercise is often conducted only for the projects planned in the first year, even though the DPR is supposed to be done for all works to be completed in the three-year planning horizon of the DPR. This process is merged with the annual planning cycle for the same year.[33] **In the control group, CLART is generally not used during site feasibility assessment in the DPR preparation phase,** with some exceptions observed in select gram panchayats of Yadgir and Vijayanagara district.
Annual planning phase (every year)	To ensure a more scientific approach to the project selection, it is recommended that CLART be used after the work demands have been collected in ward sabhas and from the DPR. The selected projects are then matched to the labour demand and passed through the gram sabha and gram panchayat.	Generally, there are two deviations from the intended use: • Gram sabhas should be the last step before the list of projects goes to the panchayat. However, the gram sabha is often done before the site visits and the use of CLART. • The use of CLART is quite late. In the treatment group, 92 % of forms approved on CLART (774/836) occurred between February and March 2023, around the submission of the AAPs, rather than November to January.

Table 7: Intended versus actual use of CLART.

In the current process, CLART is used in the final stages of AAP finalisation. Therefore, it's uncertain whether functionaries use CLART for substantive decision-making for site suitability of NRM works.

It is also important to note the perception of functionaries toward the usability of CLART as a decision-aiding tool. The functionaries who are native to the region and know the local geography rely on their familiarity with the terrain when proposing structures, which may lead them to find limited value in CLART. In certain instances, CLART has assisted the officials/functionaries in resolving conflicts with the community when they request structures based on unscientific grounds.

[33] *The CLART tagging for January to March 2023 corresponds to the first-year DPR process for the FY 2023-2026 cycle. These taggings were done during this period, aligning with the AAP cycle for 2023-2024 (April to March).*

"We know which structures are suitable and where to place them, but the estimations we get from CLART for structures are inaccurate at times. We use CLART in villages where we don't know the area well."

– Technical Assistant Engineer, Vijayanagara district

CLART was mandated to be used in all districts of Karnataka. However, its adoption ended up being much better in the districts where FES worked.

Overall, the usage of CLART is much better in the treatment districts and this demonstrates that the availability of technology must be accompanied by continuous handholding for first-mile actors.

3.4 Hypothesis 4: Shift in Natural Resource Management Planning

The current evaluation explores changes in NRM planning at three levels. First, we analysed trends in the fraction of budget sanctions for NRM works[34] from FY 2019-20 to FY 2023-24. Second, we assessed changes in budget allocations between public and individual NRM work. Third, we assessed changes in budget allocations for different types of NRM work[35].

NRM Budget Allocations

There was a marked **increase in the allocation of budgets towards NRM work** category in both the treatment and control groups following the introduction of the Jala Sanjeevini programme in Karnataka in the year 2021.

- In the **treatment group**, all four districts consistently showed a rising trend in NRM budget allocation. Koppal district showed a remarkable increase from 24% to 76%, primarily due to an increase in allocation towards bunds on community lands, indicating compliance with the 65:35 budget allocation for NRM work. This also represented a strong shift in focus towards NRM works.

- In the **control group**, there was an overall increase from 72% to 79% budget allocation towards NRM works. However, district-wise allocation showed lesser consistency. Gadag District saw a notable decline in budget allocation towards NRM work (from 85% to 74%).

*[34] The term '**NRM Work**' is an umbrella term encompassing all types of projects classified under the NRM category in the consolidated MGNREGA work list. This is used in the context to explain the fraction of budget allocation.*

*[35] The term '**NRM work types**' refers to the various types of works carried out under the NRM work category in the consolidated MGNREGA work list, such as plantation, check dams, trenches, bunds etc.*

The comparison showed that interventions in the treatment group had more consistent and targeted increases towards NRM budget allocation, while the control group experienced both increases and decreases, reflecting varying priorities across districts.

Individual and public NRM budget allocation

- In the **treatment group**, Koppal and Raichur had an increase in budget allocations for public NRM works. In contrast, in Tumkur there was a decline in budget allocation for public NRM works from 58% to 46%, potentially influenced by programmes such as GPS 500 and proximity to urban centres. Davangere also had a modest reduction in the budget allocation for public works, declining from 94% to 89%.

- In the **control group**, Gadag and Vijayanagara districts experienced a slight increase in budget allocations for public NRM works, rising from 92% to 95% and 93% to 95%, respectively. Conversely, Ramanagara and Yadgir witnessed a modest decline in allocations for public NRM works, decreasing from 84% to 72% and 95% to 92%, respectively.

Indicators	Treatment Group	Control Group
Budget allocations for NRM category works	The average proportion of the sanctioned budget allocated to 'NRM work' in sampled treatment districts increased from **52% to ~70%** of the total budget. District-wise: Pair 1: Davangere District: From 65% to 78% Pair 2: Raichur District: From 63% to 69% Pair 3: Koppal District: From 24% to 76% Pair 4: Tumkur District: From 50% to 65% (Further details in Annexure A12.)	The average proportion of the sanctioned budget allocated to 'NRM work' in sampled control districts increased from **72% to 79%** of the total budget. District-wise: Pair 1: Vijayanagara District: From 77% to 83% Pair 2: Yadgir District: From 65% to 87% Pair 3: Gadag District: From 85% to 74% Pair 4: Ramanagara District: From 64% to 71% (Further details in Annexure A13.)
Budget allocations for individual and public NRM work	The average proportion of the **budget allocated to 'individual NRM works' increased** from ~19% to ~23% of the total NRM budget. Conversely, the budget for public works has exhibited a marginal decline, decreasing from ~80% to ~77%	The **allocation of the budget for individual and public NRM works was stable** over the years, consistently averaging around 9% and 90%, respectively.
Budget allocation for types of structures within public (commons) NRM Works	There was a drastic **increase in structures like trenches and plantations** after intervention.	The majority of the budget was consistently allocated for pond works. The budget allocation of works **remained relatively stable** over the years.
Budget allocation for types of works within individual NRM works	In both treatment and control groups, the budget allocation and types of works on individual lands followed a similar trend. **Horticulture plantations and bunds made up ~ 75% of the total works on individual lands.** Also, there was a reduction in budget towards pond works over a period of five years.	

Table 8: MGNREGA budget allocations for NRM structures.

Types of works within the commons land NRM category

In the **treatment** group, in the public natural resource management work category (works on common land) there was a notable increase in the percentage of budget allocation towards trenches (illustrated in Figure 13). It increased from 3.2% to 35.4% in the FY 2023-24. This is an

increase of almost eleven-fold.

Horticulture and other plantation works on community lands also increased during the intervention period (FY 2022-2023), at the expense of budget allocation to flood management and check dam projects. The pattern of allocation of budget aligns with FES's larger focus on improved management of commons through plantation and trenches works on public land. Most of the common lands in Karnataka are located in upland areas, while valleys are dominated by individually-owned land.

An isotope-based study in Karnataka led by the British Geological Survey shows that the relative contribution of tanks to the overall recharge is minor compared to the remaining natural recharge (Brauns et.al, 2022). This finding was in consonance with the fact that much of the CLART recommendations categorise valleys as low recharge areas and uplands as good recharge areas. In watershed implementation parlance, conservation structures along the streams are called drainage line treatment, and those outside the drainage and across the catchment area are called ridge area treatment.

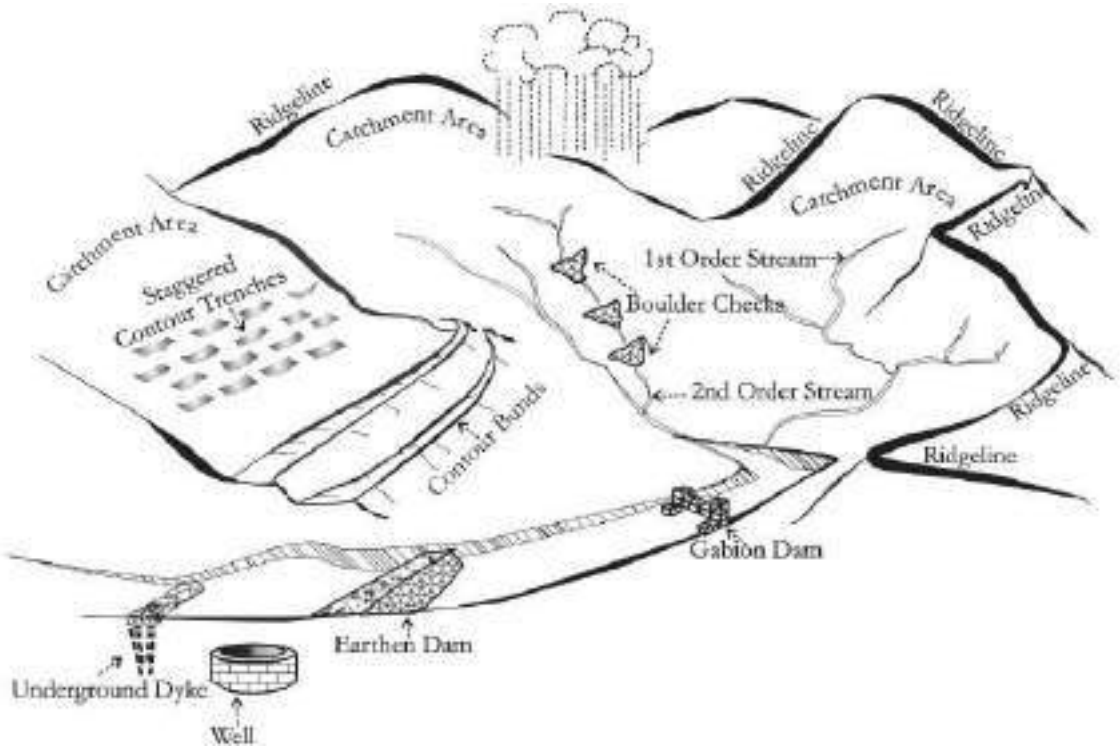

Figure 13: The ridge line separates one watershed from another. In different parts of the watershed, interventions are carried out on the principle of location specificity. Source: National Rural Employment Guarantee Act, Watershed Works Manual (2007).

Based on these findings, **the increased focus on watershed interventions in the upstream community lands is a welcome shift in the selection of works under MGNREGA.** The government may take the onus of creating a focused plan on building trenches and plantations in the upland areas with community participation, possibly via the Grama Parisara Abhivrudhi Mathu Nirvahana Samithi.

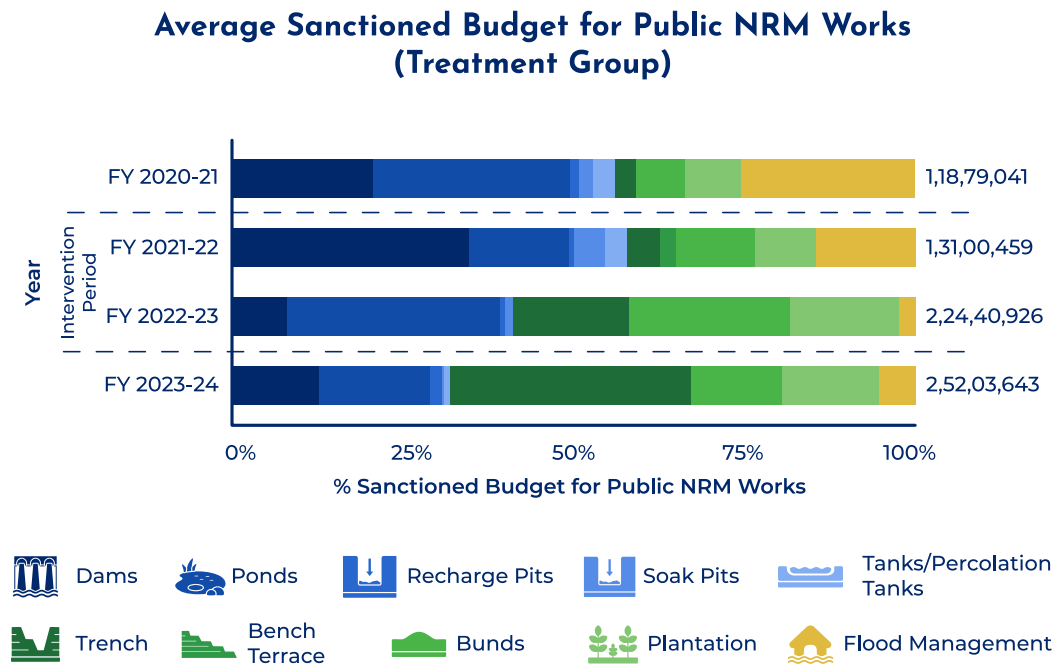

Figure 14: Sanctioned budget (total in ₹) for different public natural resource management structures (treatment group).

- In the **control group**, pond structures have consistently made up a significant portion of the budget within the common lands over the years, as shown in Figure 14. The increase in the budget for trenches in the control group was modest, without any significant shift. The composition of works over the years remained relatively stable, with no drastic changes.

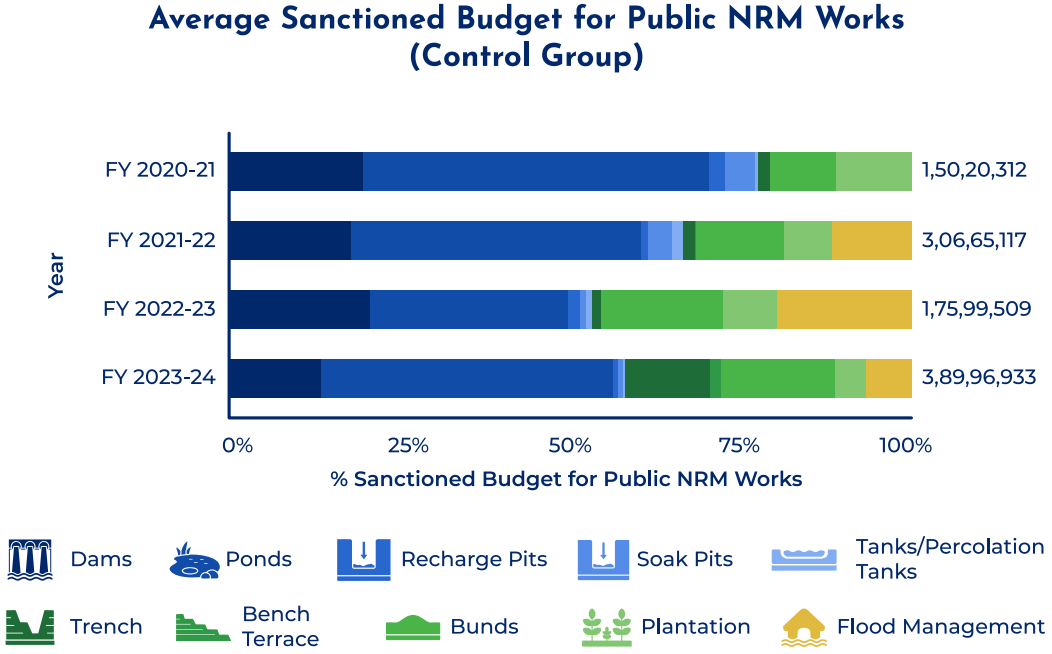

Figure 15: Sanctioned budget (total in ₹) for different kinds of public natural resource management projects (control group).

Another perspective is that smaller structures like trenches and bunds percolate water in smaller quantities and primarily add to the 'green water' component (water in the soil and vegetation). Traditionally, the focus has been on 'blue water' (water in lakes, rivers, and reservoirs), but green water also forms a major component of the total water cycle and is very important for agriculture and ecology. Therefore, an increasing focus on structures contributing green water bodes well for better NRM.

Overall, given the findings of Brauns et al (2022), a focus on ridge-area interventions like trenches and bunds is more beneficial for the groundwater recharge objectives of the programme. **As compared to control areas, treatment areas have a healthier mix of aerial interventions like trenches and drainage line interventions like tanks.**

Types of works within the individual NRM category

There is generally a strong demand for work on individual lands, as this directly helps the farmers.

Horticulture plantation and farm bunds work collectively accounted for approximately 75% of the total budget in both groups. In both treatment and control groups, the budget allocation and types of works on individual lands followed a similar trend.

- In the **treatment group**, the budget for plantation works on individual lands increased at the expense of a reduction in the budget for pond structures on individual lands. Tumkur seemed to have very low MGNREGA spending in the previous years. In the past year, it had increased the spending on plantations and trench-cum-bunds on individual lands through its GP 500 programme which gives a target of 500 such structures in each gram panchayat.

- In the **control group**, there was continuous growth in budget allocation for bunds and plantation work on individual lands.

There was a reduction in the budget for pond works on individual lands in both treatment and control groups. During field interviews with state RD & PR officials, we learned that an internal government audit[36] revealed that many farm ponds were no longer serving their intended purpose. As a result, the approval of pond works on individual lands was reduced across the state.

[36] *Audit report not in public domain*

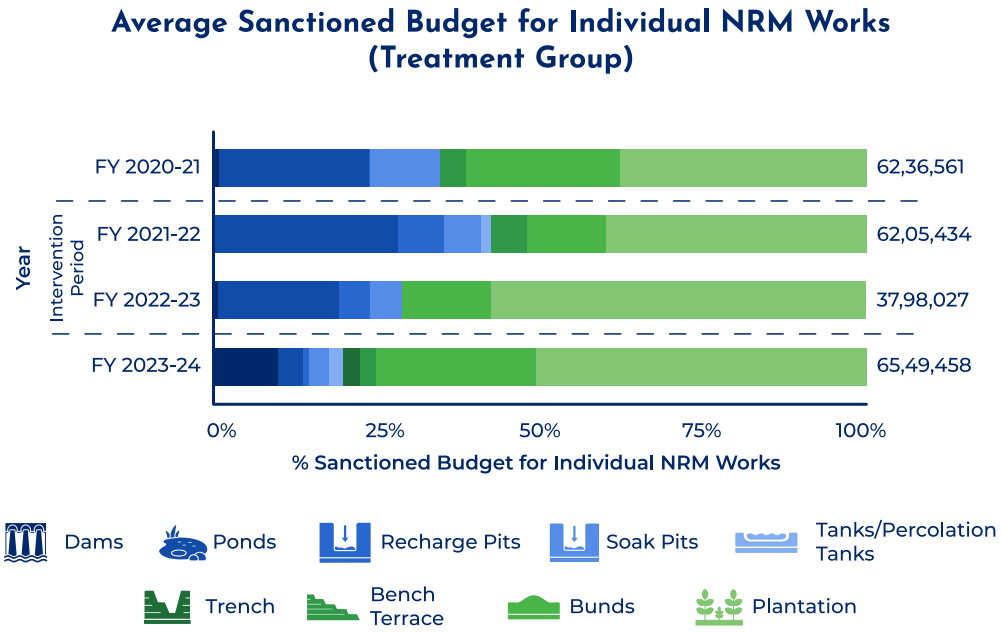

Figure 16: Sanctioned budget for different individual NRM work types (treatment Group).

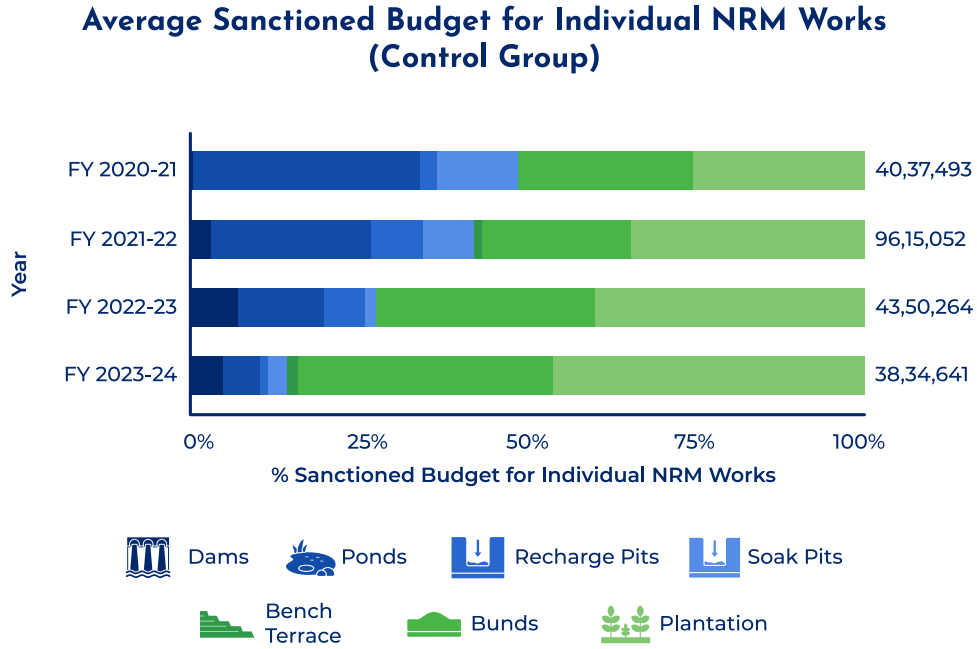

Figure 17: Sanctioned budget for different individual NRM work types (control group).

The change in NRM planning for the treatment group aligned with the broader goals of Jala Sanjeevini, as discussed in Section 1.2. There was a noticeable shift in budget allocation towards aerial treatment initiatives, such as bunds and plantations. Additionally, the treatment group effectively combined aerial treatment and drainage line treatment works. This included bunds and plantations to enhance green cover, as well as dams, ponds and recharge pits for groundwater recharge. **This holistic planning approach supports the broader goals of the Jala Sanjeevini programme and improves both land and water resources.**

The targeted capacity-building efforts by FES have contributed to the shift in the planning process. These efforts, which emphasise watershed principles, a ridge-to-valley approach, and training in GIS-based tools like CLART, have played a key role. The shift towards aerial treatment is also symptomatic of FES's long-standing work on better common land management, and CLART's outputs having good recharge areas in upland areas. These interventions in the gram panchayats have empowered MGNREGA functionaries and first-mile actors to align their planning with the programme's overarching objectives.

3.5 Hypothesis 5: Improved AAP Completeness

The AAPs serve as the final output of the annual MGNREGA planning process, detailing the list of works, budget allocations, and expected person-days to be generated in response to work demand and target outcomes.

- In the **treatment group**, 30 out of 48 AAPs were accessible for analysis over the past four years (FY 2021-22 to FY 2024-25). The completeness scores for treatment gram panchayats, including Kamlapur, Bijangera, Agalakote, and Hanumanthapura, **showed noticeable improvement over three years.**

- In the **control group**, only 22 out of 48 AAPs were accessible for analysis over the past four years (FY 2021-22 to FY 2024-25). The absence of a digital platform like PDA made **accessing these planning documents significantly more challenging.**

Digitising these critical documents on platforms such as PDA or MGNREGA portals would greatly enhance accessibility to the planning documents. Due to the limited availability of AAPs across multiple years in the control group, it cannot be conclusively stated that the format and completeness have improved over time. However, the availability of data on the PDA platform significantly improved access to these planning documents. **This digital tool helped overcome the significant lack of public availability of these important documents.**

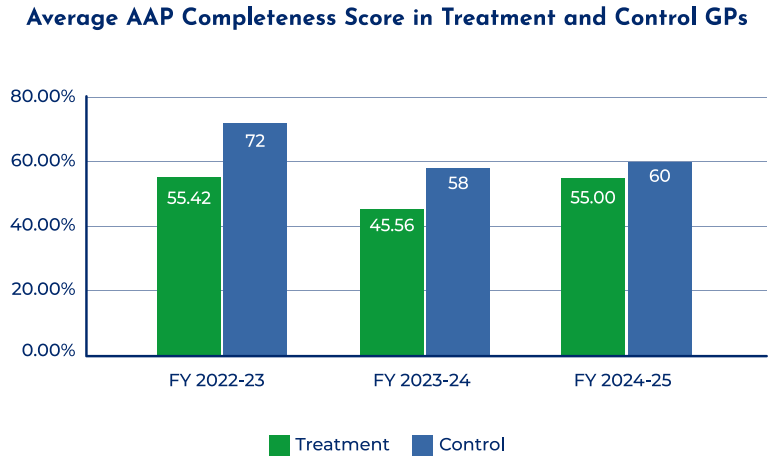

Figure 18: Average AAP completeness score for the treatment and control groups from FY 2022-23 to FY 2024-25.

3.6 Hypothesis 6: Digitisation has Accelerated the Planning Process

The technical support programme included the use of digital tools like CLART (across all districts under the Jala Sanjeevini programme) and PDA (only in treatment groups) to improve the efficiency of the planning process. During the fieldwork, we tried to capture the planning timelines for the sampled areas and the possible factors contributing to planning efficiency.

The state government issues circulars that prescribe timelines for different activities in the planning cycle for a year. The timelines are also influenced by other events such as local elections. Figure 17 illustrates the timelines for various planning processes conducted in the sampled areas for the FY 2024-25 planning cycle. However, only partial data was available regarding the scheduling of ward sabhas, gram sabhas, gram panchayat meetings, and AAP submissions across the districts.

- In the **treatment group**, the **planning process appeared to commence** earlier compared to the control group. There was no clear difference in the time taken for different activities.

  The PDA application was used to track the progress of capacity-building activities, including carrying out tasks associated with training topics. These trainings contributed to improved knowledge (See more in Annexure A2).

  However, it was difficult to establish a direct link between knowledge and improved efficiency in carrying out planning tasks, given the broad range of activities conducted (IEC, conducting gram sabhas, selection and site feasibility assessment of works, and formulation of AAPs).

- The use of CLART's site suitability function has already been covered under Hypothesis 3. Since CLART was used towards the end of the planning cycle for 2023-24 between January and March 2024, there was insufficient evidence to suggest that it has improved the efficiency in carrying out the vetting of the proposed structure.

  The design estimation functionality of CLART could also have contributed to accelerating the planning process. But as noted in Hypothesis 3, functionaries preferred to use the design estimation tool from the government's SECURE platform.

  Another functionality of CLART is the dashboard designed to provide visibility into its usage patterns. However, functionaries reported that they were not using the dashboard feature for monitoring at the taluk or other levels.

- In the **control group**, the **planning process was significantly longer** in Vijayanagara district compared to its treatment pair Davangere. In the absence of a dedicated platform like PDA and continuous planning support, it becomes challenging to effectively track and monitor progress for capacity-building activities carried out in the control group.

The CLART dashboard, designed to facilitate monitoring, has not been effectively utilised by Technical Coordinators (TCs) for vetting of submitted forms in the control group.

- **In both treatment and control groups, the use of registers for record-keeping was more common**, especially to document ward sabha and gram sabha proceedings and the list of approved works. Ward and gram sabha proceedings were not available for all sampled gram panchayats on Panchatantra 2.0 portal. For those where proceedings were available, they only briefly mention agenda items and seldom go into further detail. There appears to be a **reluctance to transition to digital tools.**

- **In both treatment and control groups**, the use of **templates (tables) in the preparation of annual action plans is prevalent.** This was evaluated under Hypothesis 5 as a completeness scoring. The digitised template format helps structure and categorise works in the AAPs, allowing for adjustments, making them comparable over years and, thereby, useful for making entries into the MGNREGA portal once approved. The detailed project reports also have a similar template for works proposed under different categories for a three year period.

The digitisation of training activities through the PDA platform has significantly improved data visibility and accessibility for these initiatives, and participatory processes in the treatment group. However, inconsistencies and variations in data quality across treatment gram panchayats remain a challenge.

Access to planning documents like detailed project reports and annual action plans is limited, as they are not available in the public domain. In the treatment group, the PDA platform provides access to AAPs, enhancing transparency and availability of information.

Behaviour change and other intangible outcomes of capacity building and knowledge building—such as improvements in the efficiency of planning processes as in the case in this evaluation study—are notoriously difficult to measure. This is particularly challenging on a large scale, where such outcomes are often elusive and hard to quantify. In our study, we encountered similar challenges in capturing these changes, highlighting the complexities of evaluating the outcomes in the absence of clear and direct metrics.

Overall, the planning process's date of initiation is slightly earlier in treatment areas compared to control ones. There was limited evidence to suggest that digital tools or platforms have contributed towards making planning easier or faster.

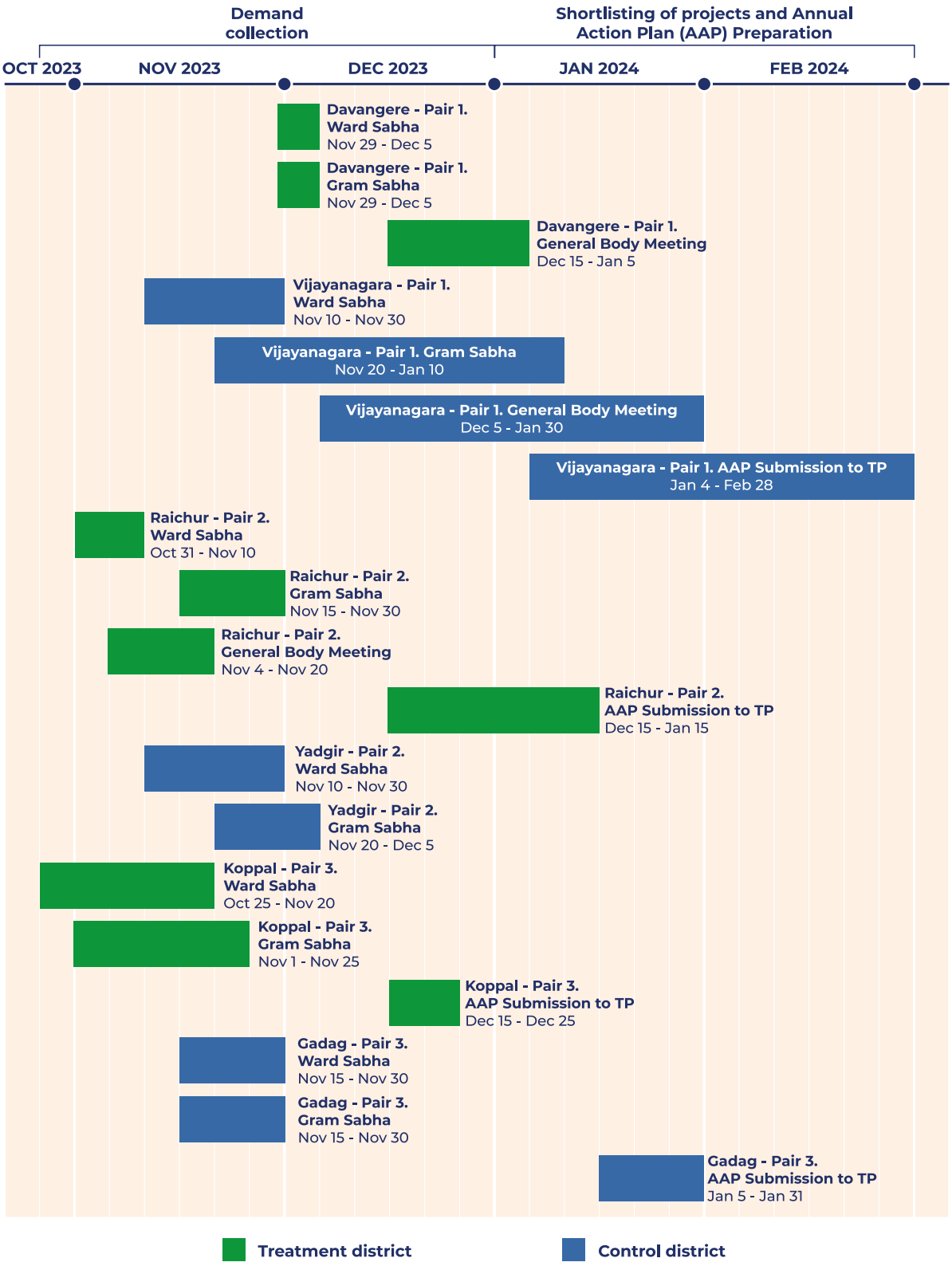

Figure 19: Timeline showing major activities across planning stages.

3.7 Hypothesis 7: Groundwater Level Improvement

Using the water table fluctuation method described in Section 2.4.4, groundwater recharge was estimated for the area. This recharge (measured in mm of water added to the water table) must be normalised to the rainfall for that particular year. The average rainfall across the intervention

districts for the three years was: 1,090 mm in 2021, 1,155 mm in 2022, and 596 mm in 2023, as per the India Meteorological Department (IMD) data.

Using the Water Monitoring Tool (WMT) dataset: The percentage of rainfall that seeped into the water table was plotted on a graph[37]. WMT data was collected only in the intervention districts, so a comparison with the control is not available. Figure 20 below indicates that there was no clear pattern to the change in recharge to rainfall percentage.

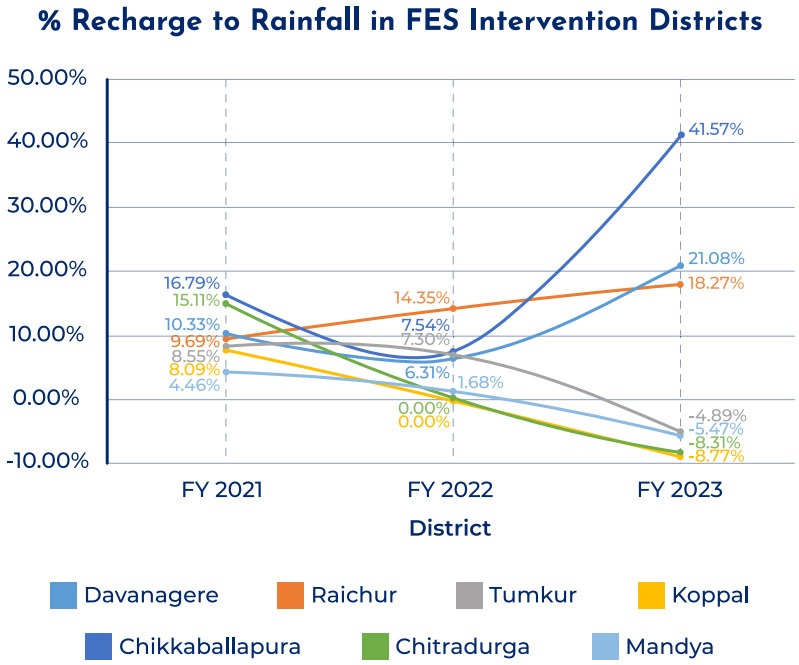

Figure 20: Estimated percentage of rainfall that is converted to groundwater recharge. Data from Water Monitoring Tool data only available for treatment districts.

2023 was a relatively dry year, and some districts on average saw a decline in water levels and therefore showed negative recharge. Davangere and Raichur districts have significant canal command areas, which might have led to sustained higher water levels in the wells.

Using the Jaldoot dataset: In 2022, the Ministry of Rural Development started the Jaldoot initiative under which MGNREGA functionaries record water levels in pre-monsoon and post-monsoon in 2-3 wells in each village. The water level fluctuation for the intervention and control districts is presented in the figure below.[38]

[37] The analysis assumes a specific yield of 0.03 as per CGWB recommendations as. There is no primary data available for this important metric, therefore, we do not recommend using these recharge estimations without adequate context. The average water level fluctuation noted for most of these districts was around 3-4 metres for the wet years of 2021 and 2022.

[38]This comparison looks at district-level data rather than the gram panchayat since the latter is too small a geography to draw meaningful conclusions. FES's intervention was across the district and secondary data is available for the entire district.

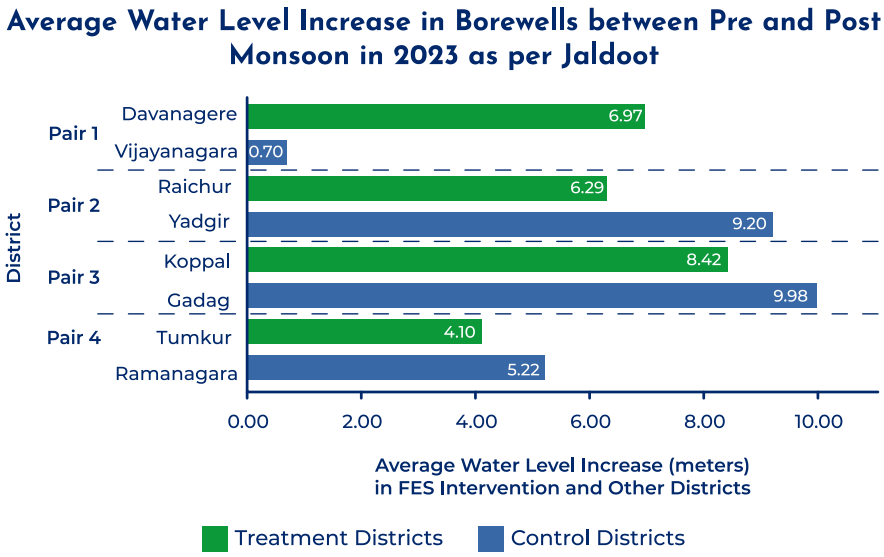

Figure 21: Average water level increase in borewells across the monsoon in 2023. Green bars are for treatment districts and blue bars are for control districts.

The average fluctuation for the wells across the state was around 6 metres for a relatively dry year (600 mm). This is on the higher side, and could be due to the following reasons:

- **Prevalence of wells in valleys**
  Valleys tend to see higher recharge compared to upland areas, as water from uplands tends to accumulate in valleys. More villages and wells also tend to be in valleys.

- **Dry well omission bias**
  When wells go dry, they are often omitted from datasets (Hora et al. 2019).

Similar to the Water Monitoring Tool dataset comparison for 2021-23, **the Jaldoot data for 2023 did not give any clear differentiation between the treatment and control districts.**

The Jaldoot dataset is new but promising as it is expected to be collected across the country. However, its data quality must be reviewed in detail and the methodology must be available online. This dataset may be used for evaluating similar interventions as a time-series comparison starting next year.

Attributing changes in water levels to one specific intervention needs a much more in-depth study, which was out of scope for this analysis. A paired watershed approach may be taken for future studies where a baseline may be established in terms of what are the inherent watershed and water demand differences in the two watersheds. Then, the change from baseline could be attributed to such an intervention.

3.8 Hypothesis 8: Improved Governance of Commons

The Grama Parisara Abhivrudhi Mathu Nirvahana Samithi (GPANS), which translates into 'village commons development and management committee' were formed but there was limited evidence that they were active, in both treatment and control groups.

The gram panchayats in the treatment group were reported to have been formed GPANS, which are acknowledged as sub-committees of the gram panchayats.

In Tumakuru district (treatment), the sampled gram panchayats had formed committees for which records are maintained. However, they require further capacity building as part of strengthening from the concerned gram panchayats. Of these, only Mathavur gram panchayat had documentation of a few committee meetings. However, during field visits, the existing committees were found to be at a largely primitive stage with regard to functioning across the state. Few of the gram panchayat staff referred to the GPANS formation order during interviews, suggesting a lack of awareness or implementation.

S No	Hypothesis/ Sub-Hypothesis	
1	Improvement in skills, mindset and knowledge for MGNREGA Functionaries	✔
2	Increase in community engagement	-
3	CLART tool adoption	✔
4	Improvement in annual action plans formats	-
5	Shift in planning toward water conservation work	✔
6	Digitisation leading to the planning process becoming easier, faster and efficient	-
7	Improved governance of commons through GPAS	✘
8	Improvement in groundwater level	-

Table 9: Evaluation overview: what worked and what didn't.

Chapter Four

Recommendations

The key takeaway from this evaluation was that FES's technical support made a difference to outputs such as MGNREGA functionaries' knowledge, CLART use, and the selection of appropriate structures. However, the study could not find perceptible improvements in community participation and could not draw definitive conclusions about changes in groundwater levels.

Karnataka is one of the pioneering states to design a programme like Jala Sanjeevini and use tools like CLART for community-based scientific planning.

Multiple state governments across India are using apps like CLART to improve the planning of structures under MGNREGA. Thus, the learnings from Jala Sanjeevini and the technical support programme can help other states. The recommendations below should be read in the broader context of how the natural resource management objectives of MGNREGA can be better achieved.

Capacity-building for MGNREGA officials

1. Develop in-house capacity-building mechanisms within the state government to use digital tools, and improve MGNREGA planning by leveraging a design-for-scale approach.

2. Ensure an adequate number of MGNREGA planning and implementation personnel at the panchayat levels. Our study found that the barefoot technicians, GKMs and other functionaries were often in charge of multiple panchayats, which made it difficult for them to plan intensively.

3. Focus on deepening understanding of scientific watershed principles along with CLART use within MGNREGA planning. The evaluation suggests intensive capacity-building programmes improved the knowledge of functionaries and decision-making on the selection of structures to be built.

4. Include elected panchayat members and self-help group members in training programmes. While core technical training may be given to other staff, more involvement of GPANS leaders and panchayat leaders may lead to improved community engagement and communication of important natural resource management strategies.

Community engagement and commons management under MGNREGA

5. Broaden the functionality of CLART by utilising it as a decision making and communication tool during field transect and gram sabhas. Currently, CLART is primarily used by barefoot technicians, GKMs and Technical Assistant Engineers (TAEs) during transect walks with the community. The stakeholders should consider if the community can use it directly. Introducing CLART analytics and widget in gram sabhas, particularly for discussions regarding structures on community-owned land, can help increase community buy-in. This can be done by displaying CLART outputs to the community and encouraging them to use the tool on their own phones. This could empower them to independently assess their natural resources and build awareness.

6. Enhance data visibility and consistency to effectively monitor community participation in ward sabhas and gram sabhas. Data on people's participation is essential for assessing community engagement and supporting informed decision-making. However, Panchatantra, the RD&PR department's digital platform for panchayat governance, currently provides participation data for only four out of the 24 sampled gram panchayats, highlighting the need for improved data coverage.

7. Develop Grama Parisara Abhivrudhi Mathu Nirvahana Samithi (GPANS) as a sub-committee of the gram panchayat which leads the MGNREGA planning process. GPANS is envisioned as the village-level institution looking after the development and management of natural resources. To ensure operationalisation and meaningful participation, it needs more explicit functions and powers. The recommendations of GPANS can be finalised by the gram panchayat. Currently, Gram Kayaka Mitras, barefoot technicians and Panchayat Development Officers do it. GPANS must be actively engaged in the planning process to strengthen community participation and ensure that local needs are effectively articulated within MGNREGA planning.

CLART Use

8. Provide a checklist to the barefoot technician/Gram Kayak Mitra to contextualise local conditions like land ownership, water catchment and soil, while using CLART. This would help in 1) better feasibility assessment of site and appropriate structure, 2) providing data for the approving agency (technical coordinator) and 3) gathering data on improving CLART in the long run. CLART currently does not include data on land ownership and water catchment or accumulation tendency at a point, so these must be assessed on the ground.

9. Expand the usage of the CLART tool to all the structures as mandated in the beginning of the Jala Sanjeevini programme instead of only five structures specified in the recent circular. It could enhance site suitability assessments and improve the overall effectiveness of natural resource management efforts.

10. Issue a clear directive to streamline the MGNREGA planning process by mandating the use of CLART during the detailed project report preparation once every three years. The use of CLART during the annual planning cycle should be only when a new structure is proposed outside the existing detailed project report work list. The comprehensive scientific and participatory planning is essential, and keeping it to once every three years is realistic.

11. Redesign the MGNREGA approval process to mandate the inclusion of the entry of CLART ID in work description to improve the approval process. This would help with better integration with MGNREGA planning, ensuring accountability, streamlining processes, and enhancing responsiveness.

Technical features of CLART

12. **Integrate tools with overlapping functions to enhance efficiency and improve uptake.** For example, CLART and SECURE have some overlaps. Given that SECURE is more closely integrated with MGNREGA systems, it is generally prioritised over the CLART estimations feature.

13. **Include tracking of AAPs into the CLART dashboard after they are vetted through CLART.** Adding this feature will improve transparency, enable better oversight, and ensure that vetted works are systematically integrated into the planning process for more efficient implementation.

14. **Better understanding on CLART colours and their intervention recommendations.** For example, recharge activities may be taken up in areas designated as 'recharge areas - green' as well as 'regenerative activity - purple' as both are in upland areas. This is not generally known by users and should be made clear to users.

15. **Conduct more comprehensive hydrologic assessments on CLART recommendations** and whether they actually show similar characteristics during recharge tests and slug tests on the ground. This may also lead to the improvement of CLART's technical proficiency. While FES has conducted some studies on CLART recommendations, there is room for more detailed studies.

16. **Conduct more focussed hydrologic studies on what type of structures are best at groundwater recharge in the context of Karnataka**, their performance in comparison to the investment, their desiltation requirements, and what could be a healthy mix of different types of structures.

Jala Sanjeevini process improvement

17. **Establish a structured system for the custody management and online accessibility of key planning documents,** including detailed project reports and annual action plans on the MGNREGA portal for visibility.

18. **Standardise the format and template for work type categorisation** across all the planning documents (DPR and AAPs) and the MGNREGA MIS dashboard for effective monitoring and reporting. The work categorisation on the dashboard is not mutually exclusive and collectively exhaustive.

19. **Establish a robust mechanism to monitor the implementation of DPRs and their inclusion in AAPs**. While DPRs are prepared every three years through a rigorous GIS-based process, their effectiveness is undermined by the lack of a systematic review mechanism to track their implementation and integration into AAPs. Communities may have passed

resolutions to include certain structures in DPRs, but reviews at a higher level are needed to check whether they are built or excluded.

20. Develop a government-led focused plan for the creation of trenches and plantations in upland ridge areas, with community participation via GPANS. A targeted approach in these areas would enhance recharge potential and foster collective resource management. Research from Karnataka (Brauns et al., 2022) shows that ridge areas contribute significantly more to groundwater recharge than tanks and check dams on drainage lines.

Groundwater monitoring and Jaldoot dataset

21. The nodal Ministry of Rural Development has to conduct a systematic review of the data collection protocol to ensure its accuracy and reliability. The Jaldoot dataset, which tracks water levels in each village, is valuable for assessing long-term impact. However, the observed increase in water levels appears disproportionately high, possibly due to the selection of sampling locations. Reviewing the methodology thoroughly and sharing it publicly will help improve the integrity of the data and enhance its utility for monitoring groundwater recharge.

22. The government should track multi-dimensional water security indicators at the local level. This approach will help quantify the programme's contributions to water security and climate adaptation benefits under MGNREGA. The assessment of the Jala Sanjeevani programme should not be limited to groundwater levels and must be holistically viewed in terms of other aspects of water security like water budget, irrigation access, and drinking water.

Annexures related to this report are available in a separate document here. (Link to: https://bit.ly/4dSBSde)

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Glossary

Annual Action Plan (AAP)	An annual action plan has details regarding the yearly activities under the Jala Sanjeevini programme. It draws from the detailed project report, which is developed every three years.
Barefoot technician (BFT)	A barefoot technician works with senior engineers to provide technical support for the planning and building of structures under MGNREGA. They are akin to field engineers.
CLART	The Comprehensive Landscape Assessment and Restoration Tool (CLART) is a GIS-based Android tool that recommends soil and water conservation measures for a specific site using the in-built GPS on phones.
Commons	In this report, commons refers to community-owned land. They are also known as common land or public land.
Detailed Project Report (DPR)	A plan prepared every three years with details of suitable natural resources management interventions.
Gram Kayak Mitra	The Gram Kayak Mitra is a community outreach official who mobilises communities through Information, Education, and Communication activities; creates and updates job cards; consolidates the demand for work from individuals; and maintains a work register.
Gram panchayat	A gram panchayat is a village or a group of villages divided into smaller units called wards.
Grama Parisara Abhivrudhi Mathu Nirvahana Samithi (GPANS)	It literally translates to village commons development committee. In the state of Karnataka, gram panchayat residents are supposed to form these committees to oversee the management of commons. However, they often do not exist or exist only on paper. They are also known as Grama Parisara Abhivrudhi Nirvahana Samithi.
Gram sabha	A gram sabha is the general assembly of all the people of a gram panchayat who have attained the age of 18 years and are enrolled in the voter list.
Job card	A job card is a legal document that enables a household to demand employment under MGNREGA.
Ward sabha	A ward sabha comprises all the people registered in the electoral rolls in a ward (a subdivision of gram panchayat).

Jala Sanjeevini	A Government of Karnataka programme that leverages MGNREGA funds to optimally plan and execute natural resources management projects.
Jaldoot app	The Jaldoot app captures the water level of selected wells in a village across the country twice a year pre-monsoon and post-monsoon to enable groundwater monitoring, water budgeting, and planning for water harvesting and conservation-related projects.
Kharif	The cropping season that extends from roughly July to October and coincides with the southwest monsoon in India
Mate	A mate oversees the day-to-day operations of a structure being built under MGNREGA. A mate is similar to a construction site manager or crew supervisor.
MGNREGA	Enacted in 2005, the Mahatma Gandhi National Rural Employment Guarantee Act is the world's largest employment programme. It aims to enhance the livelihood security of people in rural areas by guaranteeing at least 100 days of wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work.
Panchatantra 2.0	Panchatantra 2.0 is Government of Karnataka's digital platform to strengthen, digitise, and centralise key functions, operations, and documentation of gram panchayats.
Panchayati Raj institutions	The Constitution (73rd Amendment) Act, 1992 and Constitution (74th Amendment) Act, 1992 devolved powers and functions to Panchayati Raj institutions to promote local self-governance in India. It consists of a three-tier system: gram panchayat at the village level; taluk panchayat at the taluk (an administrative unit comprising many villages) level; and zilla panchayat or zilla parishad at the district level.
Taluk	A taluk or taluka is an administrative subdivision of a district comprising many villages. In some regions, blocks overlap with taluks, but generally, the rural development department oversees the former, while the land and revenue department oversees the latter.
Works	The common terminology for projects implemented under MGNREGA is 'works'. However, we have used the term 'projects' to refer to 'works' throughout this report to avoid confusion arising from the verb 'works' and the noun 'works'.

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