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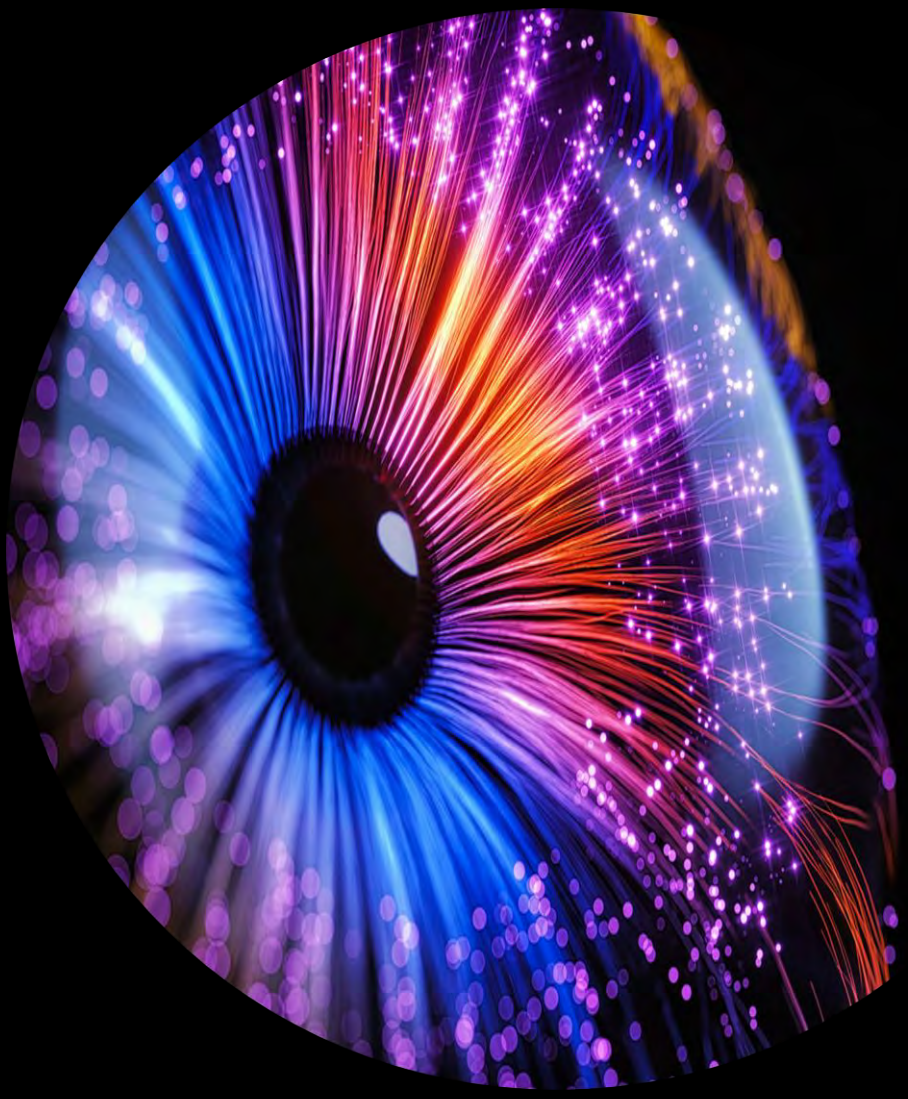

Impact Assessment Study

Aarogyatara

Project funded by Tata Capital Limited and Tata Capital Housing Finance Limited (FY 2023 – 2024 Grant)

Eye camp conducted by Sankara Eye Hospital in Krishnagiri, Tamil Nadu | ***Source: Deloitte***

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Table of contents

Contents

Executive Summary

Note: (About TCL and CSR activities section to be updated in consultation with TCL TCHFL post-review)

Tata Capital Limited (TCL) is a prominent financial services company offering a wide range of solutions to cater to the diverse needs of its customers, including retail, corporate, and institutional clients. Tata Capital focuses on providing innovative financial products and services in areas like loans, asset management, wealth management, and insurance.

Tata Capital's Corporate Social Responsibility (CSR) initiatives are built around a collaborative approach involving non-profit organizations, government agencies, and local communities. The company aims to address pressing social issues and contribute positively to society by supporting initiatives in education, healthcare, rural development, and the environment.

TCL's wholly owned subsidiary - Tata Capital Housing Finance Limited (TCHFL) is registered with the National Housing Bank as a Housing Finance Company, offering long term funds for housing purposes.

Project Aarogyatara, a collaborative effort supported by Tata Capital Limited and Tata Capital Housing Finance Ltd., has provided life-changing eye care services to underserved rural and tribal communities in Maharashtra (Thane and Palghar districts), and Uttar Pradesh (Barsana and Vrindavan of Mathura district). Implemented by two leading healthcare organizations, **Bhaktivedanta Hospital (BVH) and Sankara Eye Foundation India (SEFI),** the project addresses the critical need for accessible and affordable eye care for marginalized populations.

Scope and Objective of the impact assessment

As a part of the engagement with Tata Capital Limited and Tata Capital Housing Finance Limited, Deloitte conducted the Impact assessment of the **"Aarogyatara" programme** funded from CSR grants for the financial year 2023 – 2024.

The high-level objectives of this impact assessment are as follows:

- To study the project proposal, MoU extracts, project programmatic and financial reports and other relevant documents and conduct an intervention and stakeholder mapping.
- To design the study methodology, tools and guidelines for data collection based on the parameters of impact identified through the document review and initial structured interactions with key stakeholders of Tata Capital Limited, Tata Capital Housing Finance Limited and the Implementation Partner.
- To conduct a planned field level data collection and documentation of observations and case stories through facility visits and stakeholder interactions.
- Data collation and analysis of the inputs, processes, outputs, outcomes, impact parameters and model of implementation, as well as determining the strengths and weaknesses of the CSR initiatives.
- Determining the direct/indirect impact of the CSR initiatives on the lives of the target beneficiaries and communities, pertaining to the project
- Suggesting potential way forward to fine tune and improve the CSR initiatives.

Approach and Methodology:

Deloitte's approach to evaluating the impact of TCL/TCHFL's CSR involved a mixed-method design, emphasizing primary data collection through in-person interactions and telephone interviews, which were then cross-verified with secondary data and insights. The assessment was guided by frameworks from the OECD's Development

Assistance Committee (DAC) and UNDP's Results-Based Management (RBM), which were adapted to address the research questions, Common Results Framework, and key performance indicators (KPIs) specific to the project.

Stakeholder Analysis

Sampling and Data Collection

423 primary stakeholders were covered through surveys and focus group discussions in Barsana (Uttar Pradesh), Palghar (Maharashtra), Krishnagiri (Tamil Nadu)

The sample size included a mix of male and female patient groups of 40 years upto 90 years of age. Over 25% respondents hailed from Barsana, 23% from Palghar and 52% from Krishnagiri.

Beneficiaries (Patient groups)	Healthcare professionals	Community mobilizers & Camp staff	Program Team at Implementation Partner	Program team at TCL and TCHFL	Total
378 (In-person)	14	17	12	2	423

The data collection was followed by a phase of analysis and documentation of observations and findings.

Summary of findings:

The below process captures the journey of a patient from initial outreach, registration assistance to the course of treatment. This process is further detailed out in the report as part of the Chapter 1: Introduction section.

Step 1 Community Outreach and Mobilization	Step 2 Setting up of eye care camps & patient registration	Step 3 Screening and Diagnosis
Step 4 Cataract surgery	**Step 5 Post operative care**	**Step 6 Follow up after 1 month**

The current report presents a detailed documentation of Deloitte's observations and findings of the impact assessment of the Aarogyatara programme implemented by Bhaktivedanta in Maharashtra & Uttar Pradesh and

Sankara Eye Foundation India in Tamil Nadu. A summary of the findings is presented in the table below, while the elaborated details are available in Approach and Methodology & Programmatic Findings

TCL & TCHFL project	Grant and Project overview	Outreach
Aarogyatara *Locations: Maharashtra, Uttar Pradesh, Rajasthan, Tamil Nadu, Karnataka & Andhra Pradesh*	Project grant for the period June 2023 to March 2024 Bhaktivedanta – INR 1,64,86,015 Sankara Eye Hospital – INR 5,81,61,000 Aarogyatara Project, in partnership with Sankara Eye Foundation and Bhaktivedanta Hospital, aimed to bridge the gap in eye care services for underserved rural and tribal communities. By focusing on cataract surgeries and vision correction, it sought to reduce preventable blindness while offering free or low-cost treatments. The project aimed to ease financial burdens and ensure equitable access to quality eye care, enhancing the quality of life for economically disadvantaged groups. The project was focused on reaching high-risk, vulnerable communities, particularly the elderly, through a combination of mobile clinics and eye care camps.	• No of camps conducted: 788 • Screening over 2,65,905 individuals • Total No. of volunteers/local resources trained: 124. • 24,716 patients from economically backward communities provided with free cataract surgery across 6 states. • 7,725 refractive error glasses distributed to patients by Bhaktivedanta hospital. • The table below represents the implementation partner wise outcome numbers.

	BV	SEFI	Total
No. of Camps conducted	374	414	788
No. of community mobilisers trained	24	100	124
No. of training sessions conducted	4	2	6
No. of screenings conducted	36,105	2,29,800	2,65,905
No. of Surgeries	2,155	22,561	24,716
Refractive error glasses distributed	7,725	0	7,725

Relevance

- [1]In India, an estimated 8 million people suffer from blindness, with cataracts being a leading cause (62.6% of all blindness cases), particularly among the elderly population (National Programme for Control of Blindness, 2022). Maharashtra and Uttar Pradesh are among the states with the highest prevalence of cataract-related blindness. [2] The project targets rural and tribal populations in Maharashtra (Thane and Palghar) and Uttar Pradesh (Barsana and Vrindavan) specifically in regions with limited access to quality eye care services. Based on the interactions with Bhaktivedanta & Sankara Eye hospital program team, it was indicated that these areas are primarily home to elderly populations who face a higher risk of vision impairment, making the intervention vital.
- Addressing Health Gaps: [3]According to the National Blindness and Visual Impairment Survey India 2015-19, cataract remain the principal cause of avoidable blindness in India among individuals aged 50 and above. Project Aarogyatara's focus on providing free cataract surgeries and screenings addresses this critical issue, particularly in underserved areas. The outreach through mobile clinics and door-to-door screening is an effective method that has significantly increased the program's reach. In fact, mobile clinics ensure that individuals who might not attend traditional health camps are still able to access timely care, leading to a higher number of beneficiaries receiving treatment.
- [4]According to recent estimates, approximately 60-70% of cataract cases in rural India remain untreated due to lack of awareness and accessibility (Indian Journal of Ophthalmology, 2023). By offering free or

[1] National Programme for Control of Blindness, 2022/https://npcbvi.mohfw.gov.in/writeReadData/mainlinkFile/File341.pdf - Accessed on 18th Dec 2024
[2] National Programme for Control of Blindness, 2022/https://npcbvi.mohfw.gov.in/writeReadData/mainlinkFile/File341.pdf - Accessed on 18th Dec 2024
[3] National Programme for Control of Blindness, 2022/https://npcbvi.mohfw.gov.in/writeReadData/mainlinkFile/File341.pdf - Accessed on 31st Dec 2024
[4] Indian Journal of Ophthalmology, 2023/https://pubmed.ncbi.nlm.nih.gov/17613845/ - Accessed on 18th Dec 2024

	low-cost cataract surgeries and focusing on community mobilization, the program helps bridge the gap of limited awareness and unavailability of low-cost eye care service. For many villages near Mathura district, Bhaktivedanta Eye Hospital is the closest facility in the vicinity offering free treatment, as indicated by project beneficiaries and the implementing partner during field interactions. Sankara Eye Foundation's also sets up eye care camps in remote and rural areas, while providing free of cost commute facilities thereby bridging the gap of inaccessible healthcare. Through this initiative, the program aims for early diagnosis to avoid prolonged vision loss among patient groups.
Program Effectiveness 	• **High Volume of Screenings and Surgeries:** Bhaktivedanta Hospital conducted over 36,105 screenings and 2,155 surgeries covering Mathura district in Uttar Pradesh and Palghar and Thane districts in Maharashtra and SEFI's outreach covered 27 districts across four states—Tamil Nadu, Andhra Pradesh, Karnataka, and Rajasthan—conducting 2,29,800 screenings and performing 22,561 free cataract surgeries. • **Positive Beneficiary Feedback:** 97% of BV beneficiaries and 100% of SEFI beneficiaries cite enhanced daily functioning post the surgical treatment. This was also validated in findings from focus group discussions which revealed improved vision, empowerment, and quality of life among beneficiaries. • **Prevention of curable blindness and building a sensitized community:** The intervention successfully addressed curable conditions like cataracts, with 99% of survey respondents reporting significant improvement in vision. Over 43% of respondents indicate that the community mobilization efforts have increased the awareness on eye health and eye care facilities available in the vicinity. This contributed to reduced untreated eye conditions, promoting early diagnosis and treatment. Additionally, word of mouth and awareness through informative posters helped increase outreach.
Efficiency & Convergence 	• **Cost-Effective Services:** By offering free surgeries and affordable or no-cost corrective glasses, the project ensured that financial barriers did not prevent access to eye care services. BV hospital offers free corrective and recovery aids (dark glasses) used post cataract surgery, while SEFI offers free recovery aids and charges a nominal fee of INR 100 for vision correction spectacles. There is a network of hospitals in the intervention districts offering eye care support on a chargeable basis. A cataract surgery at these hospitals would range between INR 6,000 to INR 10,000. • **Frequency of eye care camps**: SEFI organises eye care camps monthly while the other private hospital in the vicinity organises eye care camps bi-annually. With high frequency of camps, the outreach numbers reached through the program are significantly high. • **Convergence:** While the project is exclusively implemented through the CSR grant provided by TCL and TCHFL, the Aarogyatara project aligns with a key objective of [5]India's National Health Mission (NHM) and the [6]National Programme for Control of Blindness (NPCBVI), which aims to reduce blindness to 0.25% by 2025. • **Participation of Local Health Networks**: The ASHA workers, Anganwadi workers, and local leaders, support and participate in camps ensuring that the outreach is well-integrated with local healthcare systems and governance structures.
Impact 	• **Accessibility:** Aarogyatara project improved access to eye care in rural and urban areas through mobile clinics and strategically organised eye care camps and vision centres. 51% of BV beneficiaries travelled 1-10 km, while 47% of SEFI beneficiaries travelled 5-10 km to visit the eye care camps. The camps and vision centres are located strategically with easy access to public transport which adds to convenience of patient groups. • **Availability:** The project ensured access to high-quality eye care services, with all beneficiaries receiving post-operative care, including medicines and corrective aids like dark glasses. Mobile van units and vision centres within 10 km of 47% of beneficiaries increased access to underserved areas. Regular follow-up visits ensured continued care, improving service availability in communities that previously had limited access. SEFI's vision centre located in Krishnagiri also offers teleconsultation services, enabling patients to access care without traveling far. In case of emergencies, patients are advised to visit the base hospital, either on their own or via SEFI buses. Based on previous feedback, beneficiaries are willing to travel independently since the surgeries and other services are free. • **Reduced financial burdens:** The Aarogyatara project reduced the financial burden on economically vulnerable groups by offering free eye surgeries and subsidized corrective aids and medicines (eye drops & pain killers). The socio-economic background of the beneficiaries predominantly reflects low-

[5] India's National Health Mission (NHM) -https://nhm.gov.in/New_Update-2021-22/Presentation/PS-MD-Orientation-workshop-26-08-2021/AS&MD.pdf - Accessed on 20th Dec 2024
[6] National Programme for Control of Blindness (NPCBVI)/https://npcbvi.mohfw.gov.in/Home - Access on 20th Dec 2024

	income households, with a significant portion engaged in daily wage labor, farming, and other informal occupations. The study findings indicate that 77% of SEFI beneficiaries have an annual household income below INR 25,000 and couldn't afford the eye care treatment which typically estimate to cost between INR 6,000 to INR 10,000 per eye at a private hospital. Additionally, respondents mentioned that the cost of post-operative care and corrective aids would have been unaffordable without the project's support.
Sustainability 	• The implementing partners through their credible work has established trust within communities, with families seeking eye care across generations. This generational loyalty strengthens the project's foothold in the community, ensuring a long-term demand for services. • Beneficiaries acting as "community advocates," help spread awareness about the importance of cataract surgeries and regular eye care. This word-of-mouth referral system ensures that new patients continually seek treatment, building a cycle of sustained service usage. Strengthening follow-up, especially in rural areas, will help maintain these gains in the long term. • Increased awareness about regular eye check-ups and preventive measures has contributed to a culture of proactive eye health. This helps reduce the incidence of avoidable blindness, fostering long-term health benefits.
Recommendations	• Include glaucoma and diabetic retinopathy treatment alongside cataract surgeries for a more comprehensive eye care approach. • Transition to phacoemulsification for faster recovery and improved surgical outcomes. • Provide financial education to beneficiaries to help manage healthcare costs and improve overall financial planning.

Chapter 1: Introduction

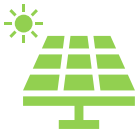
About Tata Capital Limited

Tata Capital Limited is a premier financial services company, part of the prestigious Tata Group, offering a wide range of financial solutions to individuals, businesses, and institutions. Established in 2007, the company provides services across diverse sectors including retail loans, wealth management, corporate finance, investment banking, and asset management. With a strong focus on customer-centric solutions, Tata Capital is committed to helping clients achieve their financial goals through innovative and personalized products. Leveraging the values of trust, transparency, and ethical business practices, Tata Capital continues to drive financial inclusion and sustainable growth across India.

Tata Capital Limited – CSR activities

The company's CSR mission is to improve the well-being of communities, especially marginalized social and economic groups, by creating a lasting, measurable, and positive impact through initiatives focused on Climate Action, Healthcare, Education, and Skill Development. Additionally, the company is committed to encouraging its employees, partners, and customers to cultivate a strong sense of responsibility towards social and environmental causes.

Jaladhar:
The program aims to achieve water security in water-stressed communities by implementing integrated watershed management, promoting groundwater replenishment, efficient water use in agriculture, and enhancing livelihoods



Green Switch:
The Green Switch project aims to ensure energy security for unelectrified communities by implementing a solar micro off-grid model that provides sustainable power to the entire community.

Vanaropan for Neutrality:
Vanararopan for Neutrality is focused on creating urban forests using the Miyawaki technique in cities through the VN (वन) program.

Aarogyatara:
Aaroyatara focuses on eradicating curable blindness in underserved rural areas of Bihar, Tamil Nadu, and Maharashtra by conducting screening camps, followed by eye surgeries and post-surgery care in partnership with hospitals

Tata Pankh:
The Tata Pankh Scholarship Programme provides financial support to academically talented students from economically disadvantaged backgrounds, enabling them to pursue higher education.

Flagship CSR Initiatives of Tata Capital Limited

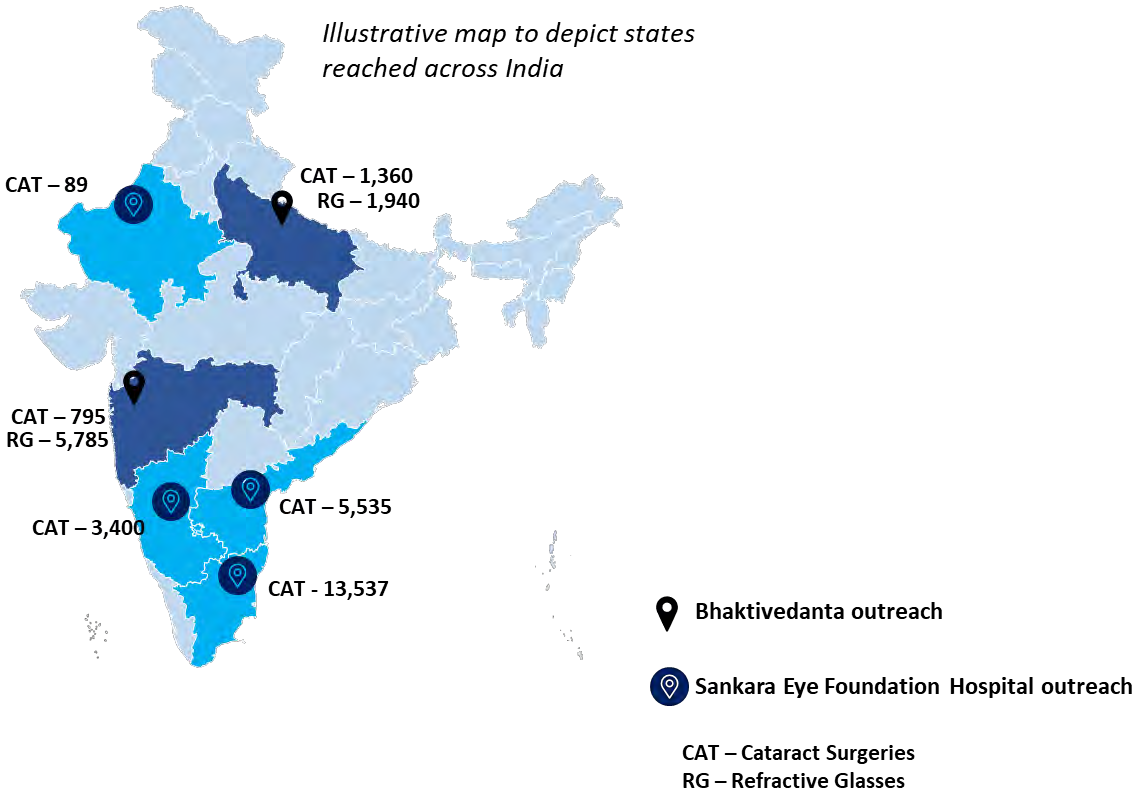
Project title	Aarogyatara	
Project overview	Aarogyatara project, supported by Tata Capital and Tata Capital Housing Finance Limited, and implemented by Bhaktivedanta Hospital & Research Institute and Sankara Eye Foundation, India, is a comprehensive initiative aimed at addressing the eye care needs of underserved communities in India. With a focus on reducing avoidable blindness, the project provides free and affordable eye care services, including screenings, surgeries, and the distribution of corrective glasses, to individuals in rural and tribal areas. Through Aarogyatara, Tata Capital's support has enabled eye care services benefiting 50,000 individuals by restoring vision and improving their quality of life.	
Review period	June 2023 to March 2024	
	Bhaktivedanta Hospital	Sankara Eye Foundation
Client grant	INR 1,64,86,015	INR 5,81,61,000
Project location	Uttar Pradesh and Maharashtra	Tamil Nadu, Andhra Pradesh, Karnataka, and Rajasthan
About the implementing agency/partner	Established in 1998, Bhaktivedanta Hospital, located in Mira Road, Thane district, is a NABH-accredited, 300-bed multi-specialty facility offering high-quality, affordable healthcare. Renowned for its eye care services, the hospital provides free and low-cost treatments, including cataract surgeries and vision correction, ensuring access to advanced eye care for underserved and economically disadvantaged communities while maintaining a commitment to compassionate care and medical excellence.	Sankara Eye Foundation India (Sri Kanchi Kamakoti Medical Trust): Founded in 1977, Sankara Eye Foundation India (SEFI) operates 13 hospitals across 10 states, offering affordable eye care to underserved communities. Its unique Community Outreach Model has transformed over 10 million lives, with 80% of services provided free of cost. Gift of Vision Programme: Since 1990, through the Gift of Vision program SEFI has performed over 2.5 million free cataract surgeries. It identifies rural patients through outreach camps, providing free treatment, transportation, and post-surgery care, ensuring access to eye care for economically vulnerable populations.
Rationale of the project	Enabling access to affordable eye care services among underprivileged populations in India is the primary focus of the project. Treatment for cataract and glaucoma is often cost-prohibitive, with cataract surgery in private hospitals ranging from INR 15,000 to INR 1,00,000 per eye, while in government facilities, it costs around INR 3,000 to INR 7,000. Glaucoma treatment can cost between INR 20,000 to INR 1,50,000 in private hospitals and approximately INR 10,000 to INR 30,000 in government hospitals. These high costs often deter individuals from seeking timely care, leading to untreated vision impairments that affect their quality of life and their families' economic stability. The project helps restore independence and productivity by providing life-changing support to individuals in need.	

Project reach

Implementing partner outreach

	Bhaktivedanta Hospital	Sankara Eye Foundation Hospital
Total states covered	2	4
Total eye care camp conducted	374	414
Total population screened	36,105	2,29,800
Total free cataract surgeries performed	2,155	22,561
Total refractive error glasses provided	7,725	-

State Wise Outreach

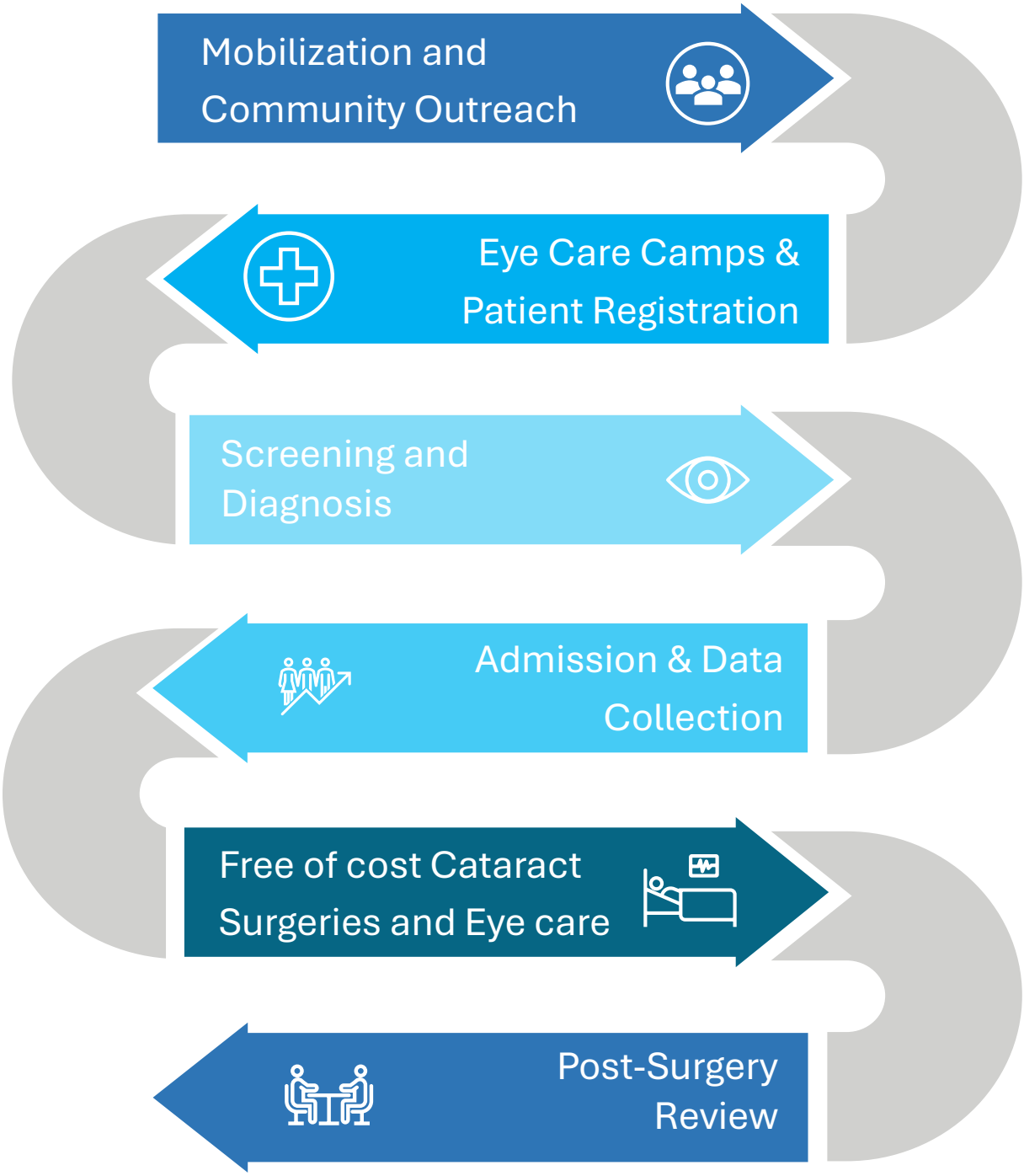


	Bhaktivedanta Hospital		Sankara Eye Foundation Hospital			
	Maharashtra	Uttar Pradesh	Tamil Nadu	Andhra Pradesh	Karnataka	Rajasthan
Total screening	24,244	11,861	1,66,887	37,030	25,310	573
Total Free Cataract Surgeries Performed	795	1,360	13,537	5,535	3,400	89
Refractive Glasses distributed	5,785	1,940	-	-	-	-

Intervention Model and Process flow

It was observed that both Bhaktivedanta and SEFI follow a similar implementation model as illustrated below.

Process Flow



Core Area		Details
Mobilization and community outreach	Bhaktivedanta Hospital (BV)	Community mobilisers are key stakeholders responsible to drive the outreach at Bhaktivedanta. There are no formal selection criteria or educational requirements for this role, however a strong desire to serve the community is essential. 24 community mobilizers across locations of Palghar and Mathura are trained by Bhaktivedanta Hospital in basic health checks, including blood pressure and sugar tests, and in identifying cataracts at a surface level, under the guidance of optometrists. They play a key role in raising awareness about upcoming screening camps through door-to-door visits and other outreach methods. Additionally, post-surgery, mobilizers conduct follow-up visits to ensure beneficiaries regularly use their corrective aids and monitor recovery progress, emphasizing the importance of continued care.
	SEFI	At Sankara Eye Foundation, community mobilizers, selected based on interest and willingness to serve, are trained to conduct basic check-ups, identify cataracts, and do door-to-door screenings. They also inform the community about upcoming camps through auto-rickshaw loudspeakers, posters, and pamphlet distribution. Post-surgery, mobilizers play a critical role in follow-up visits, ensuring beneficiaries use their corrective aids regularly and monitor recovery progress. Many mobilizers have been part of Sankara for over 10 years, with some being involved since the hospital's inception in their districts, contributing significantly to the project's success.
	Both IPs	Community participation was key to the project's success at both implementation partner locations. After experiencing the benefits of the Aarogyatara project, many beneficiaries actively encouraged other members of their community to seek eye care services, further expanding the project's reach. These initiatives equipped the community with knowledge on preventive eye care, creating a lasting impact and fostering continued eye health awareness even after the project's conclusion. Local mobilizers played a vital role in raising awareness about eye care through the door-to-door visits, organizing screening camps, and health workers guiding beneficiaries through the treatment process. Their involvement ensured high turnout for free surgeries and screenings, while also facilitating post-operative follow-ups at camps and nearby.
Eye care camps & patient registration	Both IPs	The eye care camps are conducted monthly with a team of more than 5 healthcare staff, including ophthalmologists, nurses, and support personnel. Patient registration forms are collected and maintained by the nurses. Data collection is systematically done on-site in respective registration forms, relevant patient documents, such as medical history and government identification proof are collected, to ensure beneficiary authentication.
	Bhaktivedanta Hospital (BV)	BV eye care camps are conducted at community centres, panchayat offices, schools, and temples, while mobile vans with optometrists reach remote areas. Counsellors provide information on diagnoses, treatment options, and obtain consent for surgeries, ensuring patients are fully informed and prepared for post-operative care.
	SEFI	SEFI eye care camps are conducted in local schools where individuals are screened and diagnosed on-site.
Screening and Diagnosis	Both IPs	The screening process utilizes equipment like an ophthalmoscope and slit lamp to detect various vision issues, such as cataracts, refractive errors, and other eye conditions. Nurses and optometrists carry out the screenings, with consultations provided by doctors. Each individual screening takes approximately one hour, including the waiting time for eye drops to take effect.

		Referral System: Individuals in need of surgery or advanced treatments are referred by the implementation partners to their respective base hospitals (Bhaktivedanta Hospital at Thane and Barsana, and Sankara Eye Hospital at Coimbatore), which are equipped with the necessary medical facilities for performing surgeries. In addition to offering free services, the transportation costs to these hospitals are also covered by the partners.
Admission & Data collection	Bhaktivedanta Hospital	The data entry operator or office assistant at the camp registration desk captures basic demographic details from beneficiaries. Each beneficiary is given a registration slip containing their screening data (basic vital checks), which is submitted to camp team after the screening is complete. All data is centrally consolidated in Microsoft excel, with the collation process typically taking 4 to 5 days. The records include beneficiaries' basic information, medical details such as pre-vision status, surgery schedules, and post-vision status, ensuring a comprehensive treatment record.
	SEFI	The beneficiary data is collected at the registration stage, where basic demographic details are recorded. At the screening camp, further information is gathered, including test results. For those selected for surgery, their demographic details, test results, and a photocopy of their government ID are collected. Three copies of the finalized beneficiary list are prepared: one for the camp team, one for the transportation team, and one for the hospital. The hospital team then updates and collates the data in the Medics software for real-time tracking and management.
Free Cataract Surgeries	Both IPs	Once patients are admitted to the respective base hospitals of both implementation partners, basic health checks are conducted before surgery. Patients are then prepped and taken for the procedure, with only one eye surgery performed at a time using SICS (Small Incision Cataract Surgery). The second eye surgery is scheduled after a 1–2-month interval. Typically, patients are admitted for up to two days post-surgery, but in case of complications, hospitals provide extended post-operative care for 5-8 days at no additional cost. Beneficiaries also benefit financially, saving approximately INR 6,000 to INR 10,000 by the availing these free surgeries, as identified through beneficiary interactions.
Post surgery review	Both IPs	Follow-up check-ups are conducted by doctors at screening camps, hospitals, or the nearest vision centres managed by implementation partners, strategically located at central village points for convenient access. Beneficiaries who have completed one-month post-surgery can attend their follow-up appointments at any of these locations.
	Bhaktivedanta Hospital	Corrective Glasses are provided free of cost to individuals with refractive errors
	SEFI	Although the treatment is provided free of charge, corrective glasses are offered at a nominal cost of INR 100 to the beneficiaries.

Programme promotion

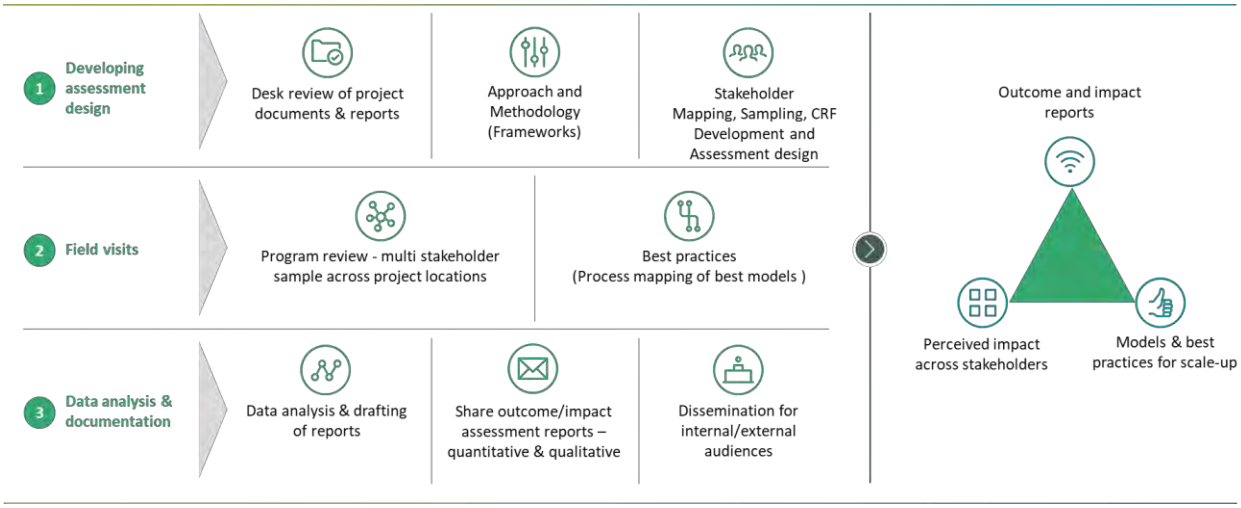
The team at Bhaktivedanta Hospital and Sankara Eye Foundation leverages digital media to promote the programme especially during events of health care camps. Posters and banners are used during the camps highlighting the TCL logo to bring awareness on the initiative. In this endeavor, articles are also published highlighting the hospital's role in delivering free eye care services. An article on these lines was published on a digital platform on February 2024 by Bhaktivedanta team - https://www.freepressjournal.in/india/aarogyatara-project-tata-capitals-initiative-aims-to-combat-cataract-crisis-among-poor-needy-villagers-of-barsana

Banners used during health camp organized by SEFI | ***Source: Deloitte***

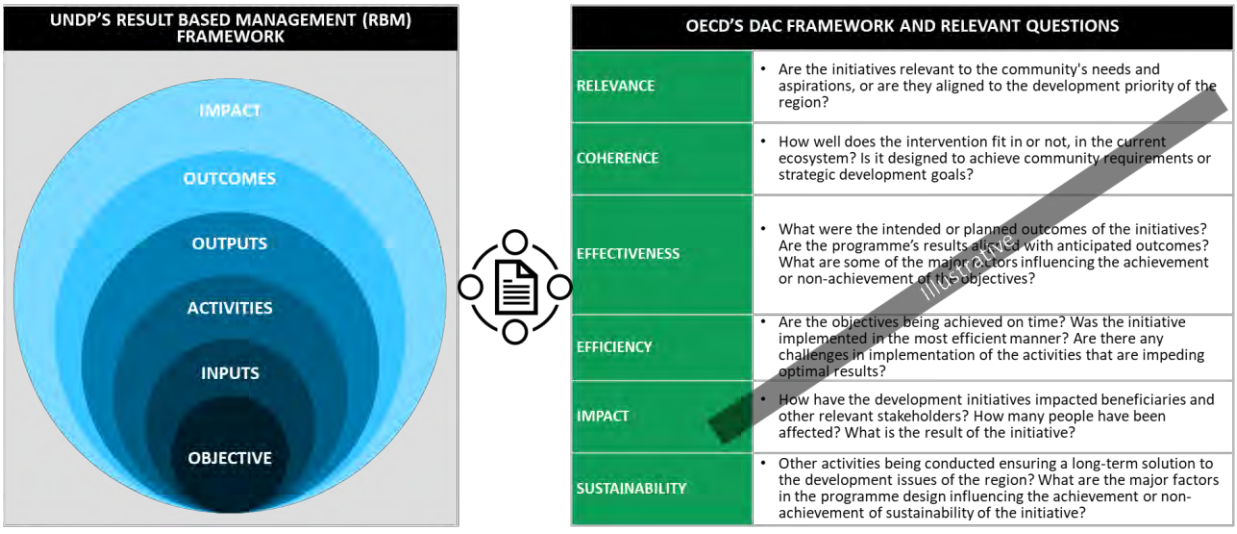
Posters leveraged during health camp at Barsana, Mathura | ***Source: Free press journal India***

Chapter 2: Approach and Methodology

Deloitte's customized approach for evaluating the impact of TCL & TCHFL's funded CSR projects and identifying potential areas for future intervention was built on extensive experience in conducting similar evaluations. A mixed-method assessment design was utilized, primarily focusing on primary data collection through in-person interactions and telephone interviews, which was further complemented and cross-verified with relevant secondary data and available insights.



The evaluation design based on OECD's Development Assistance Committee (DAC) and UNDP's Result Based Management (RBM) frameworks has been adapted to assess the project and obtain information on the research questions, Common Results Framework and KPIs framed based on the same.



Key Enquiry Areas

DAC Framework Criteria	Key Enquiry Areas
Relevance	• What is the geographical outreach and coverage in rural areas? • What were the prevailing socio-economic conditions of the people in the targeted locations?

	• How has the project raised awareness about common eye conditions and preventive care in the target communities? • How has the project addressed gender disparities in accessing healthcare, particularly in rural areas? • What percentage of the beneficiaries were women, and how has their participation impacted the overall health outcomes of the community?
Effectiveness	• What role did community mobilizers play in educating beneficiaries about available services and early intervention? • How effective are the mobile clinics and community-based camps in reaching underserved and remote populations? How effective are the post-operative follow-up and guidance services in ensuring sustained recovery and preventing recurrence of vision issues? • What is the follow-up mechanism for ensuring continued care for beneficiaries after surgery or treatment?
Efficiency	• How many steps are involved in the project process? • Who are the key stakeholders involved, their role and how do they contribute to deliver the project efficiently? • Is there any time saved due to proximity and availability of services?
Impact	• How much financial burden has been alleviated for beneficiaries through free or low-cost treatments like cataract surgeries and vision correction aids? • What is the long-term impact of the intervention on beneficiaries' health and quality of life? • How has restoring vision affected the socio-economic inclusion of beneficiaries, particularly in terms of work productivity and social engagement? • What changes in household dynamics and dependency levels have been observed post-treatment?
Sustainability	• How does the project ensure the long-term sustainability of eye care improvements in the community? • What aspects of the project support the ease of mobilization of beneficiaries in the future? • Has the project instilled trust in the community regarding the project and funder?

KPIs along UNDP's Results Based Management (RBM) framework for monitoring were developed and used as the basis for the programmatic review.

INPUTS

- Grant received from TCL and TCHFL.
- Implementation team at Bhaktivedanta & Sankara
- Finance team at Bhaktivedanta & Sankara

PROCESSES

- Mobilization
- Frequency and number of community-based eye care camps, mobile screenings, and outreach clinics
- Surgery and duration of stay at the hospital.
- Number of follow-up visits conducted after cataract surgeries and other treatments.
- Monitoring and reporting

OUTPUTS

- Total number of people registered and screened during the eye care camps and mobile clinics.
- Total number of cataract surgeries and other corrective treatments conducted.
- Number of eyeglasses or vision correction aids distributed to beneficiaries.
- Number of awareness and educational sessions held to inform the community about eye health and available

OUTCOMES AND IMPACT

- Percentage reduction in cases of vision impairment and preventable blindness among beneficiaries' post-intervention.
- Percentage of the target population demonstrating improved knowledge of eye care and the importance of early detection and treatment.
- Percentage beneficiaries expressing satisfaction with the services provided, including quality of care and follow-up.
- Affordability
- Accessibility
- Availability

Desk Review

A thorough review of the documents made available by the implementing partners and the funder was conducted, including the information available on the project in the public domain to build a comprehensive understanding of the process and design the assessment tools accordingly. The following documents were reviewed as a part of the desk review process for both IPs:

- Memorandum of Understanding (MoU) signed for the FY 2023-24
- Annual project progress report submitted to funder.
- Fund utilisation report.
- Patient medical data and profiling on the centralised MIS
- Patient registration forms

Stakeholder Mapping and Sample Covered

Based on the desk review and initial interactions with the project teams at both BV and SEFI, the following stakeholders were mapped as part of the study

Sampling Plan

The Deloitte team employed a convenience sampling approach to select respondents for the primary data collection process. A total of 191 beneficiaries participated in the survey, and 187 beneficiaries were covered through focused group discussions (FGDs) which were held across the target communities in Barsana (Uttar Pradesh), Palghar (Maharashtra) and Krishnagiri (Tamil Nadu).

In addition to engaging beneficiaries, one-on-one interviews were conducted with secondary stakeholders, such as community mobilisers, awareness camp team, healthcare professionals. Interactions with the project team from Bhaktivedanta and Sankara Eye Foundation India. A stakeholder wise sample coverage is mentioned in the table below.

Stakeholder group	Bhaktivedanta Hospital				Sankara Eye Foundation India		Total	
	Barsana		Palghar		Krishnagiri			
	FGD	Survey	FGD	Survey	FGD	Survey	FGD	Survey
Beneficiaries	45	50	42	45	100	96	**187**	**191**
Community Mobilizers & Camp staff	5		10		2		**17**	
Healthcare professionals – Doctors and nurses	2		5		7		**14**	
Program team/Implementation team	6		2		4		**12**	
Tata capital	2						**2**	
							423	

Chapter 3: Programmatic Findings

Deloitte conducted a service benchmarking from available secondary and primary data to determine the relevance of the project in terms of the Accessibility, Affordability and Availability of these services (Screening, diagnostics, cataract surgery & post operative care) for the beneficiaries.

This data is presented below implementation partner and location wise.

Bhaktivedanta Hospital – Palghar & Thane

The below table provides an overview of five healthcare service providers in Thane and Palghar districts, detailing their eye care services, distance travelled by beneficiaries to access eye care support, transport options, and costs involved for surgery and treatment. Bhakti Vedanta Hospital offers free screening, diagnostics, cataract surgeries, and post-operative care, with beneficiaries traveling an average of 23 to 70 km. Other hospitals, like Vasai Blind Hospital and Tara Netralaya, charge for screenings (INR 1,200-1,500) and cataract surgeries (INR 10,000 onwards), with beneficiaries traveling similar distances. Bhakti Vedanta Hospital stands out for its 24/7 service and free bus transport, providing accessible and affordable eye care.

Name of the service provider	Bhaktivedanta Hospital, Mira Road, Thane	Vasai Blind hospital, Vasai West, Thane	Tara Netralaya, Mira-Bhayandar, Thane	Shree Bhagwan Mahadev Sambre Hospital, Dolhari, Palghar	Jeevan Jyot, Palghar
Services provided/ Types	Screening, diagnostics, cataract surgery & post operative care				
Average distance travelled by beneficiary to the base hospital	23 kms from Thane district/70kms from Palghar district	41 kms from Thane district/60 kms from Palghar district	22 kms from Thane district/68kms from Palghar district	100 kms from Thane district/47kms from Palghar district	94 kms from Thane district/19kms from Palghar district
Available means of transport	Bus (Free service available by BV)	Bus, Auto	Bus, Auto	Bus, Auto	Bus, Auto
Overall cost of screening and diagnostics	Free	INR 1,200- INR 1,500			
Overall cost of cataract surgery	Free	INR 10,000 onwards			
Hospital timings	24/7	10am to 6pm	10am to 6pm	24/7	09:30am-1pm

Bhaktivedanta Hospital – Mathura

Most beneficiaries visiting the Bhaktivedanta Hospital in Mathura come from Barsana and Vrindavan villages, indicating the hospital's vital role in serving these nearby communities.

The below table compares five healthcare service providers in the Barsana and Vrindavan regions, focusing on their eye care services, proximity to Mathura, transport options, costs, and operating hours. Bhakti Vedanta Hospital, located less than 1 km from Mathura, offers free screening, diagnostics, cataract surgeries, and post-operative care, making it highly accessible for beneficiaries. Other hospitals, like Kripalu Maharaj Hospital and Braj Health Care, offer both free and paid services (INR 750-1,000 for screenings and INR 6,000+ for cataract surgeries), with beneficiaries traveling slightly further. Most hospitals offer bus transportation and operate during regular business hours, with R.K Mission Hospital being open 24/7. Bhakti Vedanta remains a cost-effective option, providing essential services free of charge.

Name of the service provider	Bhaktivedanta, Barsana	Kripalu Maharaj Hospital, Barsana	Braj Health Care Dr Shroff eye hospital, Vrindavan	R.K Mission Hospital, Vrindavan	Vatsalya Hospital, Vrindavan
Services provided/ Types	Screening, diagnostics, cataract surgery & post operative care				
Average distance travelled by beneficiary to the base hospital	Less than 1 km	1.5 kms	2 kms	3 kms	5 kms
Available means of transport	Self, Bus	Bus	Bus	Bus	Bus
Overall cost of screening and diagnostics	Free	Free & paid (INR 750-1000)	Free & paid (INR 750-1000)	Free & paid (INR 750-1000)	Free & paid (INR 750-1000)
Overall cost of cataract surgery	Free	Free, subsidized & paid (INR 6000 onwards)	Free, subsidized & paid (INR 6000 onwards)	Free, subsidized & paid (INR 6000 onwards)	INR 6000 onwards
Hospital timings	9:30am-5pm	8am-12pm/2pm-4pm	24*7	24/7	NA

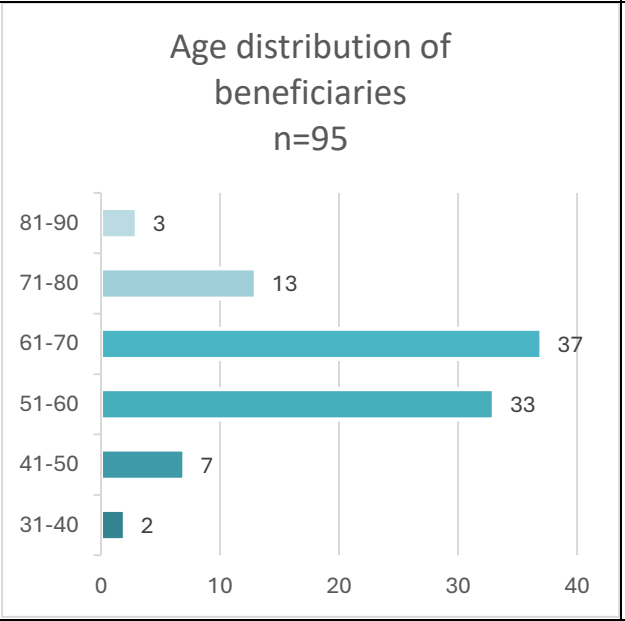
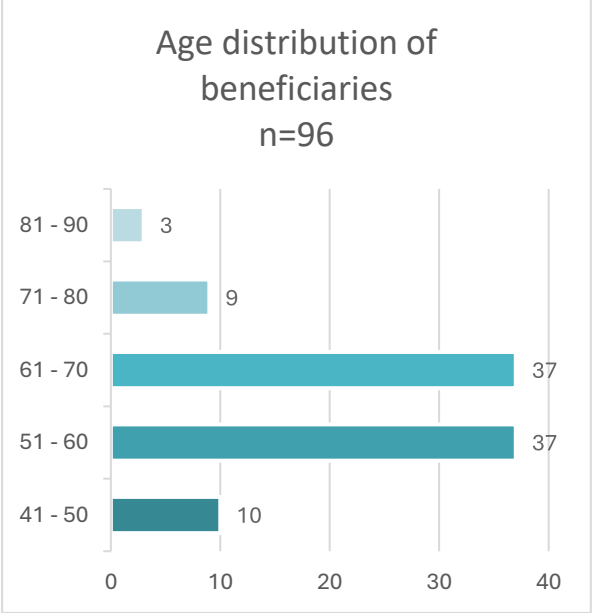
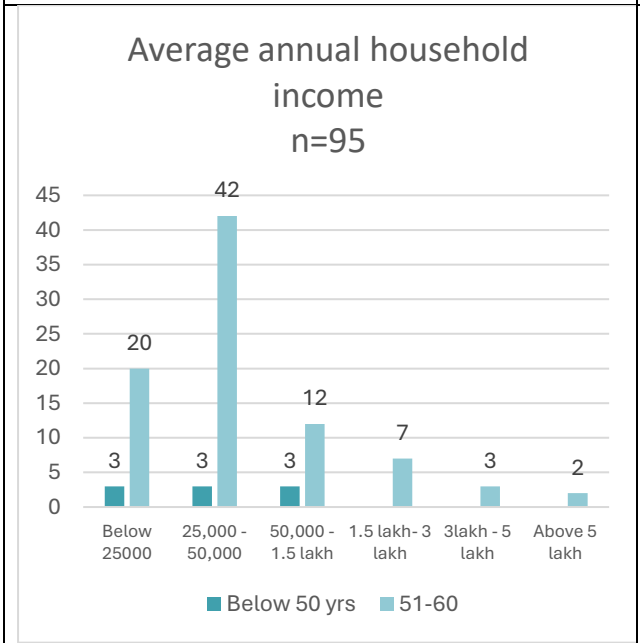
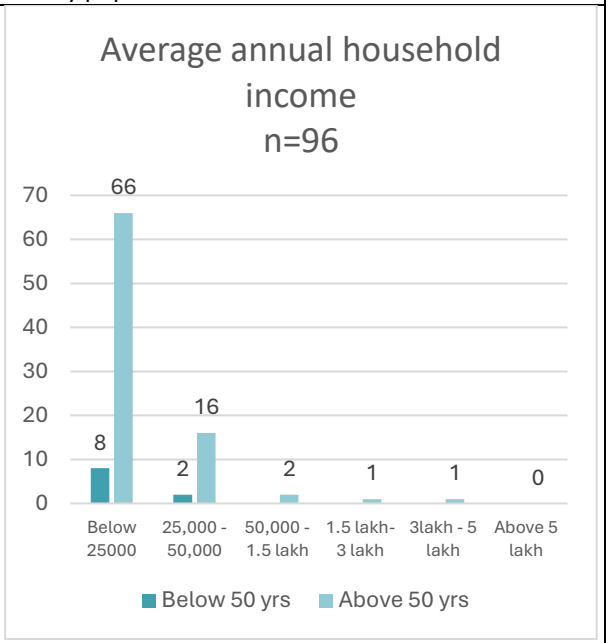
SEFI Krishnagiri

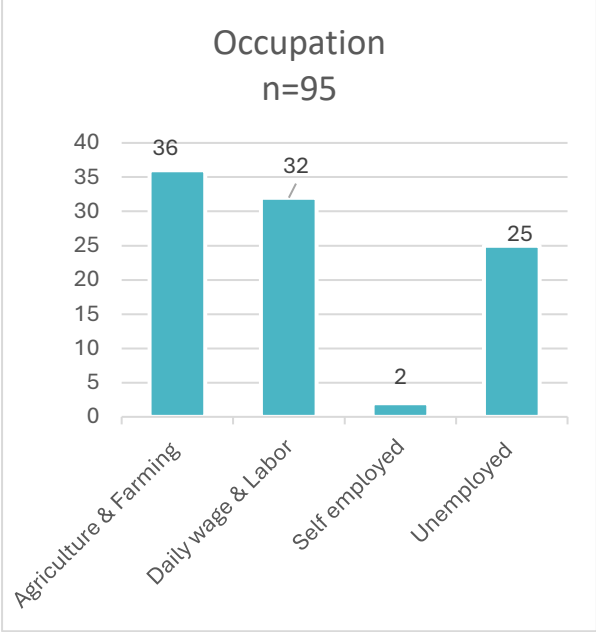
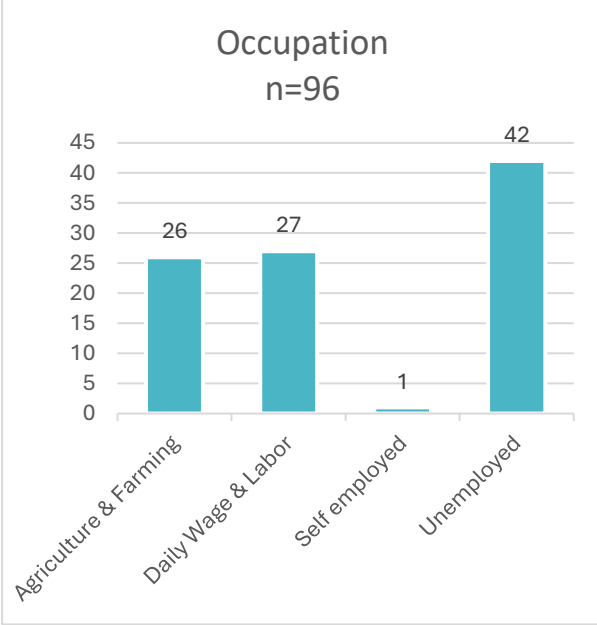
Most beneficiaries visiting Sankara Hospital in Coimbatore come from Krishnagiri, reflecting the hospital's vital role in services provided to these communities.

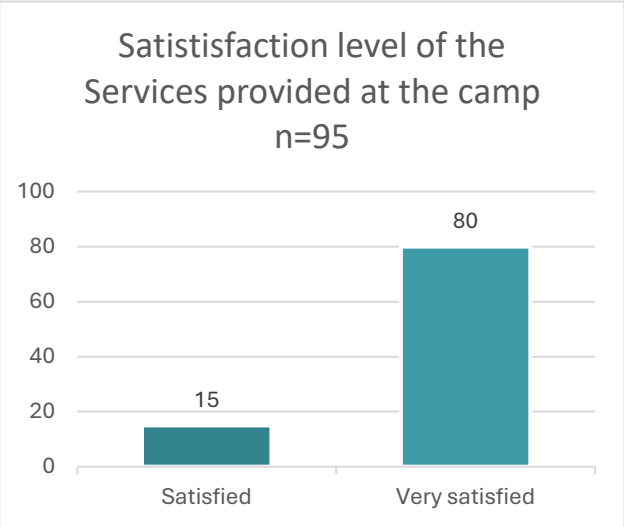
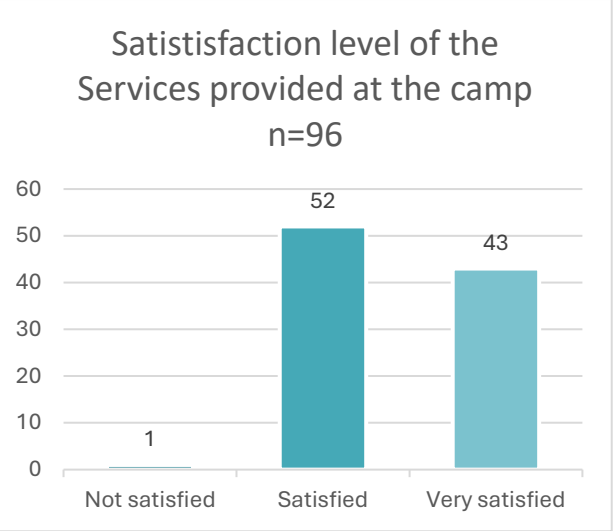
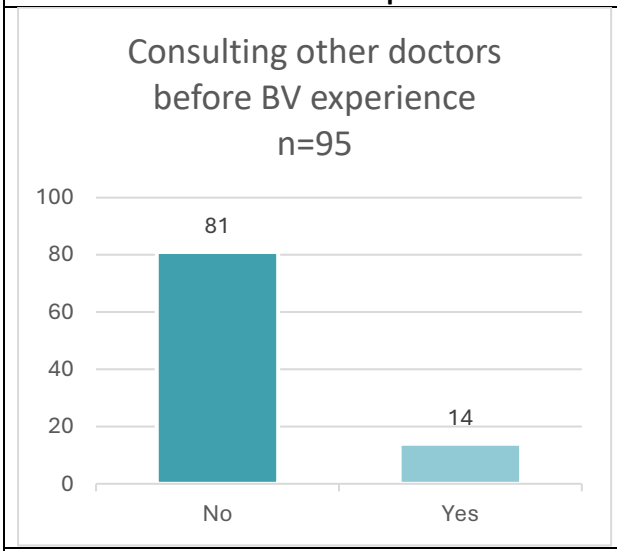
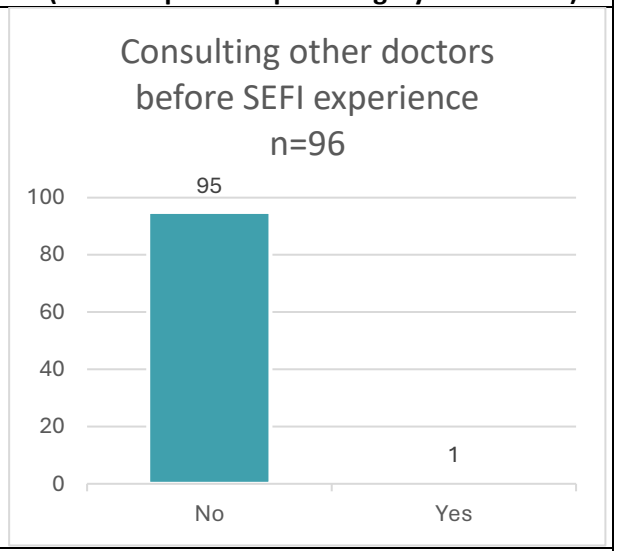
The below table compares three eye care service providers—SEFI in Coimbatore, Aravind Eye Hospital in Dindigul, and the Government Hospital in Krishnagiri—based on their distance from Krishnagiri, services, costs, and availability. SEFI, which is located 276 km from Krishnagiri, offers free screenings, diagnostics, cataract surgeries, and post-operative care, with monthly eye care camps in the area and a nearby vision center in Krishnagiri town. Aravind Eye Hospital, 120 km away, conducts eye care camps less frequently (every 6 months to a year), with a vision center 30 km from Krishnagiri. Both SEFI and Aravind offer 24/7 services. The Government Hospital in Krishnagiri, located less than 15 km from the project location, provides free cataract surgeries and screenings with OP services but does not hold eye care camps. This makes SEFI more accessible to the beneficiary group through frequent outreach services in the region.

Name of the service provider	SEFI, Coimbatore	Aravind eye hospital, Dindigul	Government Hospital, Krishnagiri
Services provided/ Types	Screening, diagnostics, cataract surgery & post operative care		
Average distance travelled by beneficiary to the base hospital	276 kms	120 kms	Less than 15 kms
Available means of transport	Own, Bus	Hire a Govt run bus	Bus
Overall cost of screening and diagnostics	Free	Free	Free
Overall cost of cataract surgery	Free	Free	Free
Hospital timings	24/7	24/7	8am to 5pm/ emergency services 24/7
Other differentiators	1. Frequency: Eye care Camps are held monthly once 2. Presence: Vision center is at the Krishnagiri town	1. Frequency: 6 months/yearly once eye care camps are conducted in Krishnagiri district 2. Presence: Vision center ins present in Poochampali, Krishnagiri district (30kms) from town	No eye care camps Only direct OPs who are diagnosed for cataract

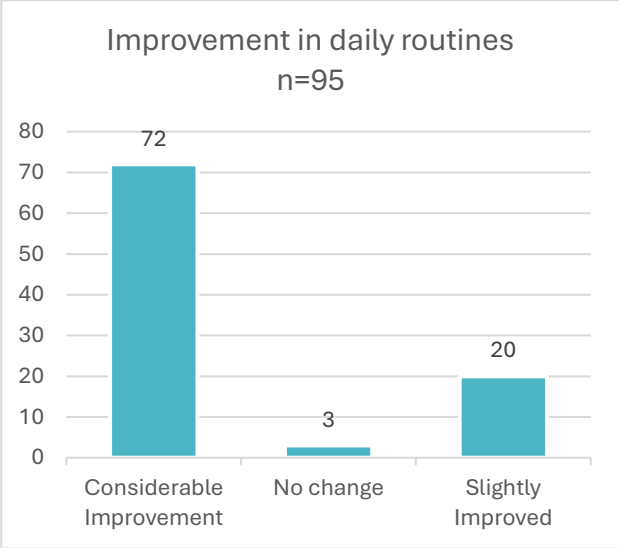
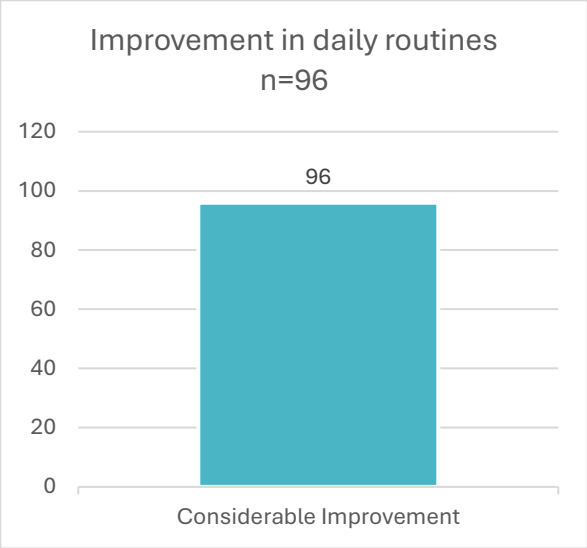
Deloitte team conducted a review of the survey and FGD data, compiling key findings and analysis under this section for both the implementing partners.

<table>
<tr><th colspan="2">Beneficiary profile</th></tr>
<tr><th>BV</th><th>SEFI</th></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Based on the survey findings, 90% of beneficiaries were aged 50 and above, with the majority falling within the 51-70 age range, highlighting the project's emphasis on addressing vision issues among the elderly population.</td><td>Based on the survey findings, 89% of beneficiaries were aged 50 and above, with the majority falling within the 51-70 age range, highlighting the project's emphasis on addressing vision issues among the elderly population.</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>47% beneficiaries (45 out of 95) fall within the INR 25,000 to INR 50,000 annual household income range, highlighting the project's significant outreach to low-</td><td>77% of beneficiaries (74 out of 96) fall under the annual income category of below INR 25,000 & 19% beneficiaries (18 out of 96) fall under the INR 25,000-</td></tr>
</table>

income families who often face barriers in accessing quality healthcare services.	INR 50,000 annual income category as identified in the survey findings. This underscores the project's role in reaching the most economically disadvantaged populations, ensuring access to free eye care services for those who are least able to afford them.
	
The survey identified a diverse range of occupations among the beneficiaries, with the largest groups (38%) engaged in Agriculture & farming related works, 34% as daily wage labors and 26% were unemployed. These findings highlight the project's focus on reaching vulnerable and economically inactive groups.	Survey findings show a diverse range of occupations among beneficiaries, with the largest group (44%) unemployed and 28% daily wage laborers, followed by 27% in Agriculture & Farming related works. This highlights the project's focus on economically vulnerable and rural populations.
Effectiveness of community mobilization and awareness	
45 respondents (47%) confirmed that community mobilizers visited their homes to inform them about the eye care camps. FGDs also highlighted the importance of word of mouth, with medical shops regularly informed about the monthly camps, further spreading awareness. Additionally, all beneficiaries confirmed that mobilizers visited their homes for post-surgery follow-ups, ensuring comprehensive care. This multifaceted outreach approach ensured that 100% of the beneficiaries were informed about the services.	38 respondents (40%) confirmed that community mobilizers visited their homes to inform them about the eye care camps. FGDs also emphasized the role of word of mouth, with medical shops regularly informed about monthly camps, boosting community awareness. All beneficiaries confirmed that mobilizers conducted home visits for post-surgery follow-ups, reflecting the effectiveness of the implementation partner's outreach efforts in ensuring widespread awareness and continued care.

<table>
<tr><th colspan="2">Satisfaction level of services provided at the camp</th></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Out of the 95 surveyed beneficiaries, 100% expressed that they were satisfied with the services, of which 84% expressed high satisfaction. This indicates a strong positive response to the camp's services, highlighting the effectiveness and impact of the initiative in meeting the community's eye care needs.</td><td>Out of the 96 surveyed beneficiaries, 99% expressed that they were satisfied with the services provided at the eye care camp, of which 45% responded as being very satisfied. Only 1% reported dissatisfaction, citing the waiting period of 1-2 hours as the reason, highlighting the need for potential improvements in camp efficiency. Despite this, the overall feedback reflects the effectiveness and positive impact of the camp in meeting community eye care needs.</td></tr>
<tr><th colspan="2">Satisfaction level of services provided at the hospital (includes pre- and post-surgery treatments)</th></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Before seeking treatment at Bhaktivedanta Hospital, 85% beneficiaries had never visited any other medical facilities for their eye condition, while 15% reported having sought treatment elsewhere. Despite these varied experiences, all 100% beneficiaries confirmed that their experience at Bhaktivedanta Hospital was</td><td>Before seeking treatment at Sankara Eye Foundation, 99% beneficiaries had never visited any other medical facilities for their eye condition, while only 1% reported visiting other medical facilities. 100% survey participants confirmed having a positive overall experience at SEFI, highlighting the care and smoother process they encountered at SEFI.</td></tr>
</table>

positive, praising the quality of care and overall service they received compared to other facilities.	
Provision of recovery aids	
The survey findings reveal that 100% of the respondents confirmed receiving dark glasses as recovery aids and eye drops, following their eye surgery. Additionally, 17 (18%) out of 95 beneficiaries were provided refractive glasses.	100% of the respondents confirmed receiving dark glasses and medicines following their eye surgery. In the case of eye drops, the beneficiaries highlighted during the FGD interactions that a nominal fee of INR 50 was collected from the patients for the provision of additional eye drops as they were not easily available near their villages. This ensured that patients have sufficient recovery aids, thereby enhancing the overall post-surgery care experience.

Post-treatment impact on daily life & activities	
	
The survey findings for Bhakti Vedanta Hospital revealed that 76% beneficiaries experienced considerable improvement in their ability to perform daily activities post-treatment, while 21% reported slight improvement. Only 3 out of 95 beneficiaries reported no improvement, as they required additional procedures such as retina correction surgery, with cataract surgery serving as an intermediate step for their overall treatment. This underscores the overall success of the intervention in enhancing daily functioning and reducing dependency among most patients.	The survey revealed 100% of the respondents had significant improvement in their ability to carry out daily activities independently following treatment at Sankara Eye Foundation Hospital. As mentioned in the FGDs, many beneficiaries previously facing challenges at work due to vision problems, have been able to resume their activities. This highlights the positive impact of the treatment on both their personal and economic well-being.

Chapter 4: Stories from the field

"Restoring Sight, Relieving Burden: The Jaiswals' Journey to Better Vision"

Mukesh Jaiswal, aged 32 son of Shriram Jaiswal 60 from Vasai, are carpenters, Mukesh has been battling multiple health issues, including kidney failure and diabetes. On top of these challenges, he suffered from poor vision, but had never sought treatment due to the overwhelming costs of his medical care. During one of his regular dialysis sessions, he was advised to get an eye checkup at Swami Shraddhanand Hospital, a unit of the Bhaktivedanta Trust, due to his worsening vision.

Since the hospital offered free eye checkups, Mukesh decided to visit. He was diagnosed with cataracts in both eyes. Accompanying him was his father, Shriram Jaiswal, who also had vision problems but had never pursued treatment. Since the checkup was free, Shriram also opted to get his eyes tested and was similarly diagnosed with cataracts in both eyes. Thanks to the free eye surgeries offered by Bhaktivedanta Trust, both Mukesh and Shriram were able to undergo cataract surgeries in both eyes. The surgeries have lifted a significant financial burden off their shoulders, given their heavy healthcare expenses. Since the surgeries, both father and son have reported significant improvements in their ability to work, enhancing their quality of life.

"A Journey of Hope"

Akhtar, a 60-year-old widow from Barsana, has lived with her brother's family, relying on them in the absence of children of her own. Financial hardship has long been a challenge, worsened by her poor eyesight, which left her feeling increasingly dependent. For two years, her poor vision prevented her from contributing to the household chores, causing her to feel helpless and burdened.

One day, she heard about Bhaktivedanta Hospital through one of the community mobilizer and, in the hope of finding a solution, decided to visit for an eye screening. She was diagnosed with cataracts and underwent surgery March 2024. Akhtar recalls the surgery as a turning point in her life. Her vision improved significantly in the months that followed, allowing her to participate in household tasks once again. For the first time in years, she felt a renewed sense of independence and purpose, even taking up stitching her own clothes.

Recently, Akhtar was diagnosed with glaucoma, which is now affecting her vision once again. While the return of her sight issues has been challenging, Akhtar is now well-sensitized and aware of the support available from the eye care facility. With this newfound knowledge, she is determined to seek regular check-ups and follow-up treatment for her glaucoma, ensuring she maintains her vision and independence in the long run.

"A New Vision, A New Life: Kusum's Journey from Darkness to Joy"

Kusum Palla, a 71-year-old woman from Punjab, now resides at the Krishna Kutir Seva Ashram in Vrindavan. Separated from her family, Kusum struggled with deep feelings of sadness and loneliness, which eventually led to depression and trauma. Her difficulties worsened as her vision began to deteriorate, making daily tasks increasingly challenging and leaving her feeling even more helpless.

During a check-up, Kusum was diagnosed with Stevens-Johnson Syndrome, a serious condition that impacted her overall health. Her life took a positive turn when a medical camp was organized by Bhaktivedanta Hospital at her ashram. Encouraged by the staff, Kusum attended the camp, where doctors discovered that her worsening vision was due to cataracts. They explained that a simple surgery could restore her sight.

Kusum agreed to undergo cataract surgery, and it was a success. Her vision was fully restored. Following the surgery, Kusum carefully followed the doctors' advice and focused on maintaining her health. With her eyesight regained, she became more independent, participating in ashram activities and reconnecting with those around her. The ability to engage with others once again brought her happiness and a sense of belonging.

Maniyammal - A Catalyst for Change in Krishnagiri

Maniyammal, a 60-year-old resident of Krishnagiri, has undergone two cataract surgeries that have not only restored her vision but also empowered her to be a change agent in her community. Her first cataract surgery was performed in 2018 under the Gift of Vision program of SEFI, and more recently, on February 7, 2024, she received her second surgery through the Aarogyatara program, funded by Tata Capital and implemented by Sankara Eye Foundation.

These surgeries have been transformative for Maniyammal and her family, allowing her to regain independence and actively participate in daily activities. Grateful for the care and support she received; she is now an advocate for her community. She has encouraged and brought over 30 people from her neighborhood to benefit from the *Aarogyatara* program, furthering its reach.

Maniyammal expresses her heartfelt thanks to Tata Capital and Sankara Eye Foundation for their invaluable support, not only for herself but for her entire community. Her story reflects the strong sense of community participation and ownership fostered by these initiatives, demonstrating how individual beneficiaries can help amplify healthcare efforts and transform the lives of many.

Chapter 5: Conclusion and Way Forward

Strengths

- **Access to Underserved Communities:** The project directly addresses the eye care needs of marginalized and rural populations across multiple states, ensuring high outreach through mobile clinics, community-based camps, and local partnerships.
- **Free or Low-Cost Services:** Providing cataract surgeries, corrective glasses, and follow-up care for free or at minimal cost removes financial barriers for economically vulnerable groups.
- **Comprehensive Eye Care Model:** The project not only focuses on treatment (surgeries and glasses) but also emphasizes awareness, preventive care, and long-term follow-up, ensuring sustainable health outcomes.
- **Community Mobilization and Trust:** Engagement with local mobilizers and health workers ensures strong community trust, leading to high participation and better adherence to post-operative care.

Areas of improvement

- **Data Management Challenges:** The task of data consolidation from manual registers to MS excel or a software at both hospitals is time intensive, has error potential, delays real-time tracking and timely analysis of program performance. Streamlining data management through automated or more efficient data collection systems could enhance the speed and accuracy of data processing. Additionally, there is scope to improve data collection by systematically capturing beneficiary demographics, such as gender and age, which would allow for more detailed analysis and targeted interventions.

Opportunities

- **Expansion to More Regions:** The project could be scaled up to other underserved regions across India, reaching more beneficiaries and contributing to the national efforts of reducing preventable blindness.
- **Stronger Collaborations:** By partnering with other healthcare organizations, potential linkages with govt programs & NGOs, the project could enhance its reach and impact.
- **Limited Scope of Services:** While cataract surgeries and corrective eyewear are prioritized, there may be a need to expand to other eye care such as glaucoma and diabetic retinopathy treatments or address other healthcare issues in the same communities

Threats

- No apparent threats

Recommendations

1. **Expand project scope:** Although cataracts remain a primary concern, some beneficiaries suggested broadening the project to help address other vision-related issues such as glaucoma and diabetic retinopathy. Incorporating glaucoma counseling, medications, and diagnostic services for diabetic retinopathy could offer a more holistic approach to eye care and improve long-term health outcomes.
2. **Strengthen data collection and management:** Since both hospitals manage multitude of beneficiary data at the registration stage, it is imperative to ensure data authenticity. Currently, the data collection and capturing process is manual which may lead to errors and duplication. It is recommended to transition to an automated or digital form of data collection reducing the potential threat of data loss.
3. **Transition to phacoemulsification technology:** Based on discussions with the hospital doctors, it was suggested to fully adopt phacoemulsification technology, as it offers greater efficiency and quicker recovery times i.e. 1-2 days to resume normal activities and 1-2 weeks for full recovery whereas SICS requires 1-2 weeks for daily activities and 4-6 weeks for full recovery. This shift could improve the number of successful surgeries and increase patient satisfaction.
4. **Strengthen financial literacy support:** Beyond providing eye care, financial education could be expanded to help beneficiaries manage any costs related to long-term eye care or other health issues. This could also encourage better financial planning for healthcare needs in general.

Pictures from the visit





Interactions with beneficiaries from Palghar, Barsana & Krishnagiri Districts | ***Source: Deloitte***




Interactions with beneficiaries from Palghar, Barsana & Krishnagiri Districts | ***Source: Deloitte***

Eye camp at Krishnagiri District | ***Source: Deloitte***

*FGD conducted in the SEFI Krishnagiri vision center | **Source: Deloitte***

*Sankara Eye Hospital implementation team at Vision center | **Source: Deloitte***

*Interaction with doctors at the eye care camp in Krishnagiri | **Source: Deloitte***

*Eye drops distributed to beneficiaries after surgery | **Source: Deloitte***

*Discharge summary of beneficiary | **Source: Deloitte***

Snapshot of the programme in digital media | ***Source: Bhaktivedanta Hospital***

Annexures

Annexure 1 - Survey and Interview respondent list

Group A – Beneficiary at Bhaktivedanta hospital

	Beneficiary name	Gender	Occupation	Home locality
1	Damodar Singh	Male	Unemployed	Barsana
2	Sugadh Singh	Male	Farmer	Barsana
3	Soran Singh	Male	Farmer	Barsana
4	Shyama	Female	Farmer	Barsana
5	Omvati	Female	Farmer	Barsana
6	Oma	Female	Farmer	Barsana
7	Murari Lal	Male	Labour	Barsana
8	Babu Lal	Male	Labour	Barsana
9	Vijay Singh	Male	Business	Barsana
10	Babu Singh	Male	Unemployed	Barsana
11	Geeta	Female	Household	Barsana
12	Kammo	Male	Household	Barsana
13	Shyam Yadav	Male	Unemployed	Barsana
14	Bhagat Singh	Male	Labour	Barsana
15	Sheila	Female	Farmer	Barsana
16	Nango	Male	Unemployed	Barsana
17	Mithilesh	Female	Farmer	Barsana
18	Bhugli	Female	Farmer	Barsana
19	Bhullo	Male	Unemployed	Barsana
20	Vati	Female	Household	Barsana
21	Ajay Singh	Male	Farmer	Barsana
22	Dhuli Chand	Male	Farmer	Barsana
23	Ramprasad Singh	Male	Farmer	Barsana
24	Radhe Singh	Male	Farmer	Barsana
25	Devi Singh	Male	Farmer	Barsana
26	Kushma	Female	Household	Barsana
27	Leela	Male	Household	Barsana
28	Vimlabai	Female	Household	Barsana
29	Bijjo	Female	Household	Barsana
30	Satyavati	Female	Household	Barsana
31	Shakuntala	Female	Household	Barsana
32	Ramesh Baba	Male	Pandit	Barsana
33	Jogendra	Male	Labour	Barsana
34	Dhama	Male	Farmer	Barsana

	Beneficiary name	Gender	Occupation	Home locality
35	Rajrani	Female	Household	Barsana
36	Premvati	Female	Household	Barsana
37	Akhtar	Female	Household	Barsana
38	Shantidevi Jadav	Female	Farmer	Barsana
39	Kera Gujjar	Female	Household	Barsana
40	Droupadi Prajapati	Female	Household	Barsana
41	Prem Koli	Male	Farmer	Barsana
42	Nibbo	Female	Farmer	Barsana
43	Shivcharan	Male	Labour	Barsana
44	Rajpal	Male	Unemployed	Barsana
45	Shanta	Female	Farmer	Barsana
46	Dharamvati	Female	Farmer	Barsana
47	Ramki lal	Male	Farmer	Barsana
48	Aman Singh	Female	Farmer	Barsana
49	Kallari Devi	Female	Household	Barsana
50	Mukho Devi	Female	Household	Barsana
51	Hari	Male	Unemployed	Kamai
52	Bhupendra Meher	Male	Driver	Satpati
53	Rajni Tarachand Patil	Female	Unemployed	Satpati
54	Shakuntala Vasudev Pandhre	Female	Unemployed	Satpati
55	Gulab Ashok Patil	Female	Unemployed	Satpati
56	Bharat Patil	Male	Fisherman	Satpati
57	Sugandha Chandrakant Patil	Female	Fisherwoman	Satpati
58	Maniram Jagan Keni	Male	Fisherman	Satpati
59	Umacharan	Male	Security Guard	Boisar
60	Harshila Bendekar	Female	Gardening	Boisar
61	Sumanben Yashwantbhai Dotare	Female	Business	Boisar
62	Lalbahadur Yadav	Male	Dairy Farmer	Boisar
63	Anant More	Male	Gardening	Boisar
64	Jaya Premraj Ike	Female	Flower Vendor	Boisar
65	Subhash Jawle	Male	Factory worker	Boisar
66	Moreshwar Bhaskar Tamore	Male	Fisherman	Boisar
67	Moish Fakhruddin Mansoorwala	Male	Hardware Business	Boisar
68	Mohammad Sheikh	Male	Unemployed	Boisar

	Beneficiary name	Gender	Occupation	Home locality
69	Dattu Gorkhana	Male	Farming	Chinchane
70	Motilal Chaganlal Jain	Male	Factory worker	Nawapur
71	Gulab Madhu Vartha	Female	Farming	Boisar
72	Shakuntala Madhukar Natekar	Female	Househelp	Murbe
73	Gauribai Bansode	Female	Unemployed	Bahipada
74	Bhumika More	Female	Unemployed	Tarapur
75	Vidya Bane	Female	Unemployed	Tembhode
76	Baban Vadekar	Male	Unemployed	Chitralaya
77	Pandiyan Reddy	Male	Construction Worker	Rawalpada
78	Sheikh Idris	Male	Factory Supervisor	Dandipada
79	Rekha yadav	Female	Unemployed	Azad Nagar
80	Rampyare Prajapati	Male	Unemployed	Safale
81	Mohan Madwe	Male	Farming	Chinchane
82	Nisar Ahmed	Male	Factory Supervisor	Tarapur
83	Mira Ramesh Thorath	Female	Unemployed	Boisar
84	Ramesh Rambhau Thorath	Male	Gym Mantainance	Boisar
85	Kamal Sahebrao Ahire	Female	Gardening	Umelman
86	Lalita Prabhu Satnami	Female	Unemployed	Nalasopara East
87	Meena Rajak Dehria	Female	No Fixed Income	Wagheshwari
88	Panduranga Mukund Mhatre	Male	Farming	Kalamb
89	Kusum Panduranga Mhatre	Female	Farming	Kalamb
90	Pradeep Vasantrao Raut	Male	Unemployed	Vasai Gaon
91	Prabhakar Shankar Patade	Male	Retired from Tax Dept.	Manvel Pada
92	Dilip Shankar Patade	Male	Unemployed	Santoshbhawan
93	Atmaram Ramchandra Jagade	Male	Unemployed	Nalasopara
94	Lakshmi Shivgan	Female	Unemployed	Virar East
95	Dada Chavan	Male	Rickshaw	Ambernath

Group B – Beneficiary at Sankara Eye Foundation India (SEFI)

	Beneficiary name	Gender	Occupation	Home locality
1	Lakshmi	Female	Daily wage	Krishnagiri
2	Theemaraja	Male	Ex-Army	Krishnagiri
3	Chinnapappa	Female	Daily wage	Krishnagiri
4	Vijaya	Female	Unemployed	Krishnagiri
5	Mala	Female	Daily wage	Krishnagiri
6	Salammal	Female	Unemployed	Krishnagiri
7	Soluchi	Female	Unemployed	Krishnagiri
8	Rajeshwari	Female	Unemployed	Krishnagiri
9	Kuppusami	Male	Daily wage	Krishnagiri
10	Ramakkal	Female	Unemployed	Krishnagiri
11	Devaraj Naduthambi	Male	Farmer	Krishnagiri
12	Chinnasammy	Male	Farmer	Krishnagiri
13	Chinnasammy Perumal	Male	Farmer	Krishnagiri
14	Raja	Male	Farmer	Krishnagiri
15	Subramani	Male	Farmer	Krishnagiri
16	Govindammal Chinnasamy	Female	Unemployed	Krishnagiri
17	Chinnavan	Male	Unemployed	Krishnagiri
18	Govindaswamy V	Male	Unemployed	Krishnagiri
19	Raja P	Male	Farmer	Krishnagiri
20	Manickam	Male	Farmer	Krishnagiri
21	Manya	Female	Unemployed	Krishnagiri
22	Kaveriamma	Female	Unemployed	Krishnagiri
23	Rani Chinnapaiyan	Female	Unemployed	Krishnagiri
24	Saroja	Female	Unemployed	Krishnagiri
25	Pushpa	Female	Unemployed	Krishnagiri
26	Lakshmi Gopal	Female	Unemployed	Krishnagiri
27	Chinnaraj	Male	Unemployed	Krishnagiri
28	Geeta	Female	Daily wage	Krishnagiri
29	Rajamma	Female	Unemployed	Krishnagiri
30	Pachammal	Female	Unemployed	Krishnagiri
31	Vasanthi Mani	Female	Unemployed	Krishnagiri
32	Maliga Vedi	Female	Daily wage	Krishnagiri
33	Santhamunusamy	Female	Unemployed	Krishnagiri
34	Sulochana	Female	Unemployed	Krishnagiri

	Beneficiary name	Gender	Occupation	Home locality
35	Chinnapaiyan Kaveri	Male	Unemployed	Krishnagiri
36	Nagaraj Aiyaswamy	Male	Unemployed	Krishnagiri
37	Muthammal	Female	Unemployed	Krishnagiri
38	Nallammaal	Female	Retired government worker	Krishnagiri
39	Govindhammal	Female	Daily wage	Krishnagiri
40	Palaniappan	Male	Daily wage	Krishnagiri
41	Chanmundeshwari	Female	Agriculture	Krishnagiri
42	Muthammal Kaveri	Female	Unemployed	Krishnagiri
43	Sevatha	Female	Daily wage	Krishnagiri
44	Chinnaswamy	Male	Agriculture	Krishnagiri
45	Parasuraman	Male	Daily wage	Krishnagiri
46	Chinnayyan	Male	Agriculture	Krishnagiri
47	Muniyammal Chinnaswamy	Male	Daily wage	Krishnagiri
48	Manga	Male	Petty shop	Krishnagiri
49	Ganeshan	Male	Agriculture	Krishnagiri
50	Amara	Male	Agriculture	Krishnagiri
51	Govindhamma	Female	Unemployed	Krishnagiri
52	Lakshmanan	Male	Agriculture	Krishnagiri
53	Lakshmanan K	Male	Agriculture	Krishnagiri
54	Rajammaal	Female	Daily wage	Krishnagiri
55	Chennammal	Female	Daily wage	Krishnagiri
56	Miniyammal	Female	Agriculture	Krishnagiri
57	Panjali	Female	Daily wage	Krishnagiri
58	Madhu	Female	Unemployed	Krishnagiri
59	Kaliammal	Female	Daily wage	Krishnagiri
60	Samathal Settu	Female	Unemployed	Krishnagiri
61	Kasammal	Female	Unemployed	Krishnagiri
62	Muniammal	Female	Daily wage	Krishnagiri
63	Perumaaka	Female	Daily wage	Krishnagiri
64	Thirupathi	Male	Daily wage	Krishnagiri
65	Tulasiammal	Female	Daily wage	Krishnagiri
66	Akkammal	Female	Daily wage	Krishnagiri
67	Yashodha	Female	Daily wage	Krishnagiri
68	Settamal	Female	Cattle,Farming	Krishnagiri

	Beneficiary name	Gender	Occupation	Home locality
69	Kannan	Male	Farmer	Krishnagiri
70	Nagarani	Female	Picking Flowers	Krishnagiri
71	KuppuKannan	Male	Daily wages, Flower Picking	Krishnagiri
72	Nagammai	Female	Daily wages, Flower Picking	Krishnagiri
73	Chinnakannu	Male	Daily wages, Flower Picking	Krishnagiri
74	Govindhi	Female	Daily wages, Flower Picking	Krishnagiri
75	Kavery	Male	Unemployed	Krishnagiri
76	Ramasamy	Male	Cattle	Krishnagiri
77	Muthuvedi	Female	Unemployed	Krishnagiri
78	Periyakkal	Female	Unemployed	Krishnagiri
79	Rathnam	Male	Unemployed	Krishnagiri
80	Rajendar	Male	Picking Flowers	Krishnagiri
81	Perumal	Male	Unemployed	Krishnagiri
82	Muniammal	Female	Unemployed	Krishnagiri
83	Gopal	Male	Unemployed	Krishnagiri
84	Tirupati	Male	Unemployed	Krishnagiri
85	Govindhi	Female	Unemployed	Krishnagiri
86	Nasan	Male	Unemployed	Krishnagiri
87	Vijaya	Female	100 Days Government work	Krishnagiri
88	Palaniammal	Female	Unemployed	Krishnagiri
89	Chinnasamy	Male	Farmer and Daily Wages	Krishnagiri
90	Annamalai	Male	Farmer	Krishnagiri
91	Arjun	Male	Farmer	Krishnagiri
92	Manga	Female	Farming	Krishnagiri
93	Rajamma	Female	Unemployed	Krishnagiri
94	Govindasamy	Male	Farmer, Flower Picking	Krishnagiri
95	Veera	Female	Picking Flowers	Krishnagiri
96	Rajamma	Female	Daily wages, Flower Picking	Krishnagiri

Group C – Healthcare team at Bhaktivedanta Hospital and Sankara Eye Foundation India

	Stakeholder name	Healthcare facility
1	Dr. Sachin Amre	Bhaktivedanta Hospital
2	Dr. Ranjit Wagle	
3	Abhishek Agarwal	
4	Dr.Jugal Shah	
5	Dr.Swati	
6	Dr.Vishaka	
7	Dr.Manjula	
1	Ms.Indhu	SEFI
2	Ms.Udhya	
3	Ms.Kanchana	
4	Ms.Nithya	
5	Ms.Sindhiya	
6	Dr.Gaurauv	
7	Dr.Pratheek	

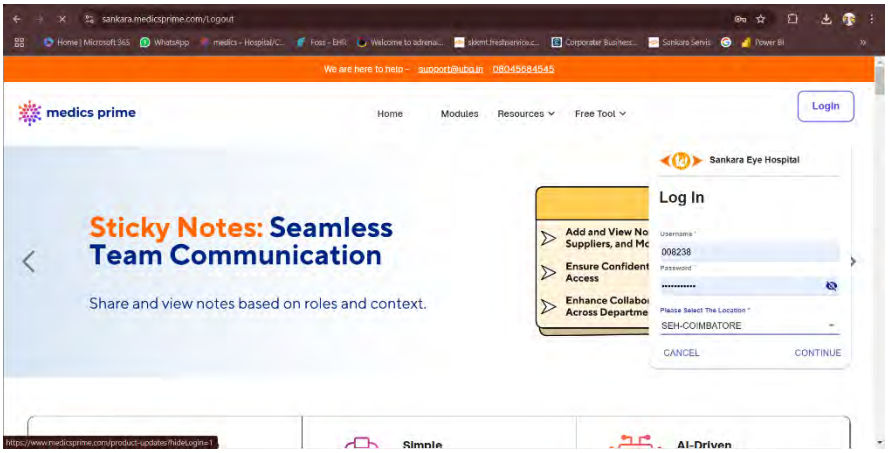
Group D – Camp mobilization team at Bhaktivedanta Hospital and Sankara Eye Foundation India

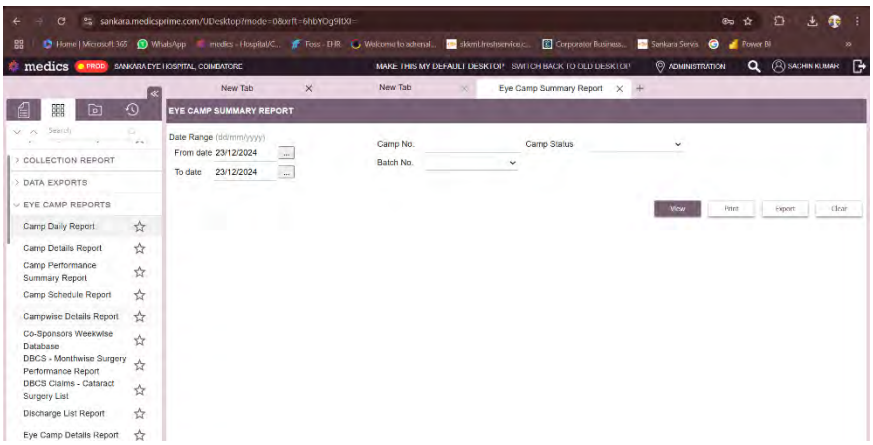
	Stakeholder name	Healthcare facility
1	Mr.Rakesh Kanojia	Bhaktivedanta Hospital
2	Mr.Priyesh Chougule	
3	Mr.Mangesh	
4	Mr.Amol Patil	
5	Mr.Aniket	
6	Mr.Anand	
7	Ms.Rasika	
8	Mr.Manoj	
9	Mr.Pundalik	
10	Mr.Sagar	
11	Mr.Krishna	
12	Ms.Poonam	
13	Ms.Khushboo	
14	Mr.Shyam Bihari	
15	Mr.Balram	
1	Mr. Ravi RB	SEFI
2	Mrs.Gayathri	

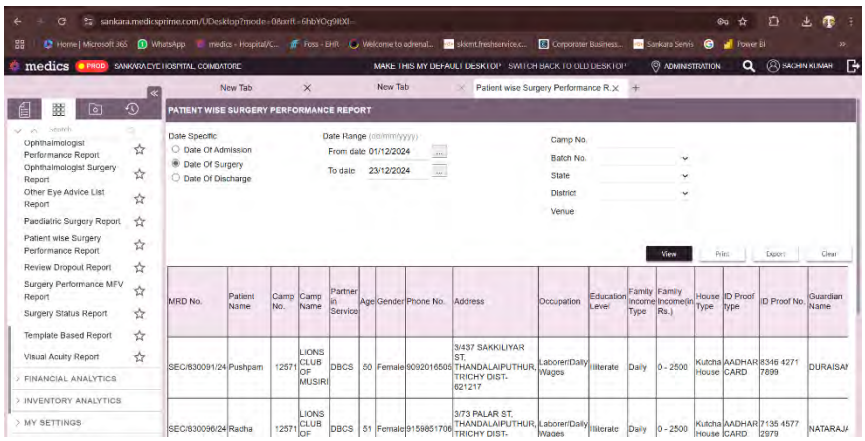
Group E – Program team at Bhaktivedanta Hospital and Sankara Eye Foundation India

	Stakeholder name	**Healthcare facility**
1	Ripu Daman	Bhaktivedanta Hospital
2	Mangal Kamat	
3	Vidhi Chauhan	
4	Sitaram Sharma	
5	Seetaram Sharma	
6	Mangal	
7	Yashu Choudhari	
8	Radhe	
1	Mrs.Shanthi	SEFI
2	Mr. Koushik	
3	Mr. Vignesh G	
4	Mr. Kumar N	

Annexure 2 - Snapshots of the Medics software used by SEFI as Management information system







Annexure 3 - Research tool (Survey, FGDs, KII)

Survey questionnaire

All information provided in this survey will be kept strictly confidential and used solely for the purpose of evaluating the impact of the project. Your responses will remain anonymous, and no personally identifiable information will be shared with any third parties. Participation in this survey is voluntary, and you may choose to skip any questions or withdraw at any time.

Note: These guidelines will be translated in local dialect using local resources, basis requirement during the field visit

Project Aarogyatara, launched by Tata Capital, is a preventive healthcare initiative aimed at combating curable blindness in underserved communities. The project organizes eye care camps, providing screenings, cataract surgeries, and vision correction services to those in need. With overwhelming support from the local communities, the initiative has made a significant impact by improving eye health and accessibility to care.

Objectives for this assessment:

1. *To measure improvements in the eye health of beneficiaries after receiving treatment, including the resolution of curable blindness and improvement in vision-related daily activities.*
2. *To understand the broader social and economic benefits of the project, including the financial relief provided by free or subsidized treatment and the ability to return to work or resume daily responsibilities.*
3. *To evaluate the effectiveness of community mobilization, awareness campaigns, and communication regarding services offered by Bhakti Vedanta Hospital.*
4. *To compare the beneficiaries' experience at Bhakti Vedanta Hospital with other health camps or private medical providers, assessing the quality of care, cost-effectiveness, and satisfaction.*
5. *To assess the overall satisfaction of beneficiaries with the services provided and their likelihood to recommend the hospital to others in their community.*

Name of Surveyor: _____

Place of data collection: _____

<table>
<tr><td>1. Beneficiary name</td><td colspan="6"></td></tr>
<tr><td>Male / Female</td><td colspan="6"></td></tr>
<tr><td>Occupation -</td><td colspan="3"></td><td colspan="2">Age</td><td></td></tr>
<tr><td rowspan="2">No. of family members</td><td>Adults</td><td>Children</td><td>Elderly</td><td colspan="2" rowspan="2">APL/BPL/Antyodaya</td><td rowspan="2"></td></tr>
<tr><td>M: F:</td><td>M: F:</td><td>M: F:</td></tr>
<tr><td>Average annual household income</td><td>INR 25,000 - INR 50,000</td><td>INR 50,000- INR 1,50,000</td><td>INR 1,50,000- INR 3,00,000</td><td>3,00,000- 5,00,000</td><td>Above 5,00,000</td></tr>
<tr><td>How far away from the nearest eyecare facilities do you reside?</td><td colspan="3">Outreach/Diagnostic/consultation

Distance in Kms:</td><td colspan="3">Hospital for eye surgeries

Distance in Kms:</td></tr>
<tr><td>Home locality</td><td colspan="6"></td></tr>
</table>

1. **Mobilization**

	Interaction with the community mobiliser		
1.1	Did the community mobilizer visit your home to inform you about the eye care camp?	Yes	No
1.2	Were you informed about the specific eye care services provided by the hospital or camp (e.g., cataract surgery, vision correction) by the community mobiliser?	Yes	No
1.3	Did the community mobilizer or anyone from the camp follow up with you after your visit?	Yes	No

2. **Health awareness and checkup camps**

2.1	What specific information or guidance where you given during the awareness camps about eye care and the services offered?					
2.2	Did you receive the treatment or care that was recommended for your condition?	Yes		No		
2.3	Have you attended any other health or eye care camps organized by hospitals or charitable organizations before Bhakti Vedanta?	Yes		No		
2.4	Is there any vision center clinic in your community? If yes, have you visited it for a check-up?	Yes		No		
2.5		Yes		No		
2.6	How satisfied are you with the overall services provided at the camp?					
2.7	What was the doctor's recommendation? (Multiple choice)	Prescribed medicines	Recommended spectacles	Referred to laboratory for further tests	Recommended surgery	Others: specify

3. **Visit to the Bhakti Vedanta facility/SEFI**

3.1	Before seeking treatment at Bhakti Vedanta, did you consult a private doctor for your eye condition?	Yes	No
3.2	Were you referred to the Bhakti Vedanta Hospital for surgery?	Yes	No
3.3	How did you travel to the Bhakti Vedanta Hospital?		

3.4	Were you offered free travel arrangements by Bhakti Vedanta Hospital? If no, how much did you pay?	Yes		No	
3.5	What type of surgery was recommended?				
3.6	Did you get admitted to the hospital for the surgery/post operative?	Yes		No	
3.7	If yes, how much time did you spend in the hospital?				
3.8	Were you informed about the Dos & Don'ts on the recovery, Post surgery?	Yes		No	
3.9	Did you have to pay for the surgery sought?	Yes		No	
3.10	If yes, how much?	**INR**			
3.11	How did receiving treatment at Bhakti Vedanta Hospital help in addressing or curing your eye condition?	Considerable Improvement	Slightly Improved	No change	Worsened
3.12	Would you recommend Bhakti Vedanta Hospital's services to others in your family, community, or network?	Yes		No	
3.13	If yes, how was your experience at Bhakti Vedanta Hospital different from other medical facilities in the area?	Good	Average	Poor	
3.14	**Overall satisfaction level with the Bhakti Vedanta facility/SEFI**				
	Very satisfied	Satisfied		Dissatisfied	

4. Post Surgery - Medicines

4.1	Where did you get the medicines from?	BV/SEFI pharmacy	Pvt pharmacy	Others
4.2	Did the BV/SEFI pharmacist explain:	Regular dosage	Side effects	
4.3	How much money did you pay for the medicines?	INR		
4.4	Did you have any side effects of the treatment or medicines?			

5. Post Surgery - Corrective Aids

5.1	Were you provided any corrective aids?	Dark glasses		Spectacles	Others
5.2	If yes, then where were these dispensed	BV/SEFI optical store		Pvt. Optical store	Others
5.3	How much money did you pay for these aids?	INR			
5.4	How has the aid helped your vision?	Considerable Improvement	Slightly improved	No change	Worsened

6. Impact on Daily Life and Financial Relief:

6.1	How has the treatment from Bhakti Vedanta Hospital/SEFI improved your ability to carry out daily activities (work, household tasks, etc.)?	Considerable Improvement	Slightly improved	No change	Worsened
6.2	Did receiving free or low-cost treatment at Bhakti Vedanta Hospital/SEFI relieve you of financial burdens related to your eye care?	Yes		No	
6.3	If yes, how much money do you estimate you saved by receiving treatment through the camp?				
6.4	Has the free treatment allowed you to save money for other essential household needs (e.g., food, education, housing)?	Yes		No	
6.5	Has your awareness of eyecare improved due to the BV/SEFI intervention?	Considerable Improvement	Slightly improved	No change	Worsened

7. Were any challenges faced while accessing care through the Bhakti Vedanta Hospital/SEFI ?

8. How was your overall experience of the eye care provided by Bhakti Vedanta/ SEFI?

9. Any other comments/recommendations/suggested improvements for the future

Key informant interview guideline

1. **Beneficiary family members**
    - How did you learn about the Bhakti Vedanta Hospital, and what prompted your family member to attend?
    - What changes have you observed in your family member's health or daily activities since they received treatment for their eye condition?
    - How has the treatment impacted your family's financial situation, particularly regarding costs associated with eye care?
    - Did you feel adequately informed and supported throughout the process by the community mobilizer and hospital staff?
    - Based on your family member's experience, would you recommend the eye care services to others in your community? What improvements would you suggest?
2. **Community Mobilisers**
    - What are some of the other existing eye care facilities available in the locality and how is the intervention of Bhakti Vedanta different from or beneficial to the community members? – Discuss across Accessibility and Affordability?
    - How do you identify and reach out to potential beneficiaries in the community to inform them about the eye care camps and services?
    - Has Bhakti Vedanta provided you with any training or awareness materials?
    - How many households or villages have you covered through your mobilization?
    - What challenges do you face while mobilizing people, especially from remote or underserved areas, to attend the camps?
    - How do you ensure beneficiaries understand the services provided and encourage them to attend the camp?
    - What percentage of households that you visit end up attending the camps,
    - Are you provided any remuneration from Bhakti Vedanta for the services provided?
    - Have you received any feedback from beneficiaries about their experience at the camps?
    - What recommendations do you have for improving the mobilization process or increasing attendance at future camps?
    - What is the overall change in prevalence of eye defects/disorders before and after the intervention by Bhakti Vedanta?
3. **Healthcare professionals - Support Staff at Camps & Clinics**
    - Can you describe your responsibilities at the eye care camp or mobile clinic, and how you help ensure smooth operations?
    - What logistical challenges or resource limitations do you face in delivering eye care in rural or underserved areas?
    - How do you ensure that patients are comfortable and well-informed throughout the process, from registration to post-operative care?
    - Have you observed any behaviors or practices among patients that affect their eye health? How do you address these during interactions?
    - What kind of feedback have you received from patients, and how does this feedback help improve the way you operate the camps or clinics?
    - What resources or support would help you better serve patients during these eye care camps or clinics?
4. **Healthcare professionals - Doctors and Surgeons (Providing Direct Medical Care)**
    - Can you describe your role in the eye care camp or mobile clinic and the procedures you typically perform?
    - What challenges do you face in delivering high-quality eye care in a temporary camp setting or mobile clinic, particularly during surgeries?
    - How do you ensure that the standard of care is maintained, particularly in terms of patient safety and the success of surgical outcomes?

- What are the most common eye conditions you treat at the camps, and do you notice any recurring patterns in patient health that could be addressed through preventive measures?
- Have patients provided feedback on their experiences with the surgery or treatment? How has this feedback influenced your medical approach or bedside manner?
- In your opinion, how has this initiative impacted patients' understanding of eye health and their approach to seeking care?
- What recommendations do you have for improving the delivery of medical services, particularly surgical care, in future camps or mobile clinics?

5. **Bhakti Vedanta/SEFI project team**
    - What was the primary motivation behind initiating the eye care project, and what specific goals do you aim to achieve?
    - How do you coordinate with community mobilizers and healthcare professionals to ensure effective service delivery at the eye care camps?
    - What challenges have you faced in implementing the project, and how have you addressed them?
    - How do you measure the impact of the eye care services on the beneficiaries and the community at large?
    - What feedback have you received from beneficiaries and community members about the eye care camps, and how has it shaped your approach?
    - Based on your experiences with this project, what recommendations do you have for future initiatives aimed at improving eye care services in the community?

Focused Group Discussion guideline

Beneficiary Demographics

1. Beneficiary names:	
2. Total no. of participants:	
3. No. of males:	4. No. of females:
5. Age range of the group:	

FGD questions

1. How did you get to know about Bhakti Vedanta Hospital? *Options – Outreach camp, you reached out directly.*
2. Who is the community mobilizer here? How are they?
3. helping the community?
4. What are the other eye care facilities in the vicinity and what were the challenges in accessing or affording these services before Bhakti Vedanta?
5. Can you describe the experience of the awareness camp? How did you get to know about the camp? What specific information or guidance where provided, and how did that help you understand the services available?
6. Additionally, what steps did you take after attending the camp to access the eye care services, and how smooth was the overall process?
7. How and why did you approach the Bhakti Vedanta facility?
8. How far away from Bhakti Vedanta centres/hospital do the participants reside? - to capture radius of outreach.
9. Can you describe the process from the moment you learned about the eye care camp to the time you received treatment? How smooth or challenging was it for you?

10. How were the facilities at the hospital during your surgery and recovery? Were the arrangements comfortable and satisfactory?
11. How would you describe the doctors and staff who treated you at the hospital? Did you feel well cared for and supported throughout the treatment?
12. Did you face any hurdles during your treatment time at Bhakti Vedanta Hospital? Explore further across loss of daily wage income or transportation, etc.
13. What did you like the most about the services provided?
14. How has the treatment you received impacted your daily life, such as your ability to work, perform household tasks, or engage with your community? How do you think this project has benefited you and others in your community? What would you like to see improved in the future?
15. Do you currently have any form of healthcare insurance? If yes, were you able to use it for the treatment provided at Bhakti Vedanta? How was your experience with the insurance process during your treatment?
16. Have you received treatment for any other illness, apart from cataract, at Bhakti Vedanta? If yes, what was the nature of the treatment, and how did it benefit you?

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Impact Assessment Study

JalAadhar - Integrated Watershed Development (IWD)

Satara, Maharashtra and Thiruvannamalai, Tamil Nadu

Project funded by Tata Capital Housing Finance Limited

March 2025

JalAadhar Project Location, Satara| ***Source: Deloitte***

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Tata Capital Housing Finance Limited (TCHFL) is Tata Capital Limited's (TCL) wholly owned subsidiary registered with the National Housing Bank as a Housing Finance Company, offering long term funds for housing purposes.[1] It's Corporate Social Responsibility (CSR) vision is to establish a collaborative and inclusive approach for social and environmental development initiatives, fostering shared value for the broader community, aligned with the core purpose of the Tata Group.

The **JalAadhar project** is the flagship CSR program of TCHFL, and it comprises the following 3 sub-interventions:

Water Access	**Water Rejuvenation**	**Integrated Watershed Development (IWD)**
Activities focused on improving accessibility, sustainability, and community empowerment. The infrastructure setup includes a solar-powered submersible pump at a river source, a pipeline network to supply the river water to the village, and strategically placed water storage tanks for ease of access by the households. A Water User Association is formed to ensure effective management, while training on water conservation and sustainable farming is also provided. By combining renewable energy, efficient infrastructure, and community governance, the project aims to enhance livelihoods, boost agricultural productivity, and support ecological sustainability.	Activities focused on revitalizing water bodies such as lakes and ponds to ensure sustainable water management and agricultural benefits. The initiative primarily involves the **de-siltation of lakes**, where accumulated silt is removed to restore the water-holding and percolation capacity of the lakes. The fertile silt is distributed to local farmers, enhancing soil fertility and agricultural productivity, while the unfertile silt is responsibly managed by Gram Panchayats (GPs) and other stakeholders. This collaborative approach aims to improve water availability and strengthen community participation and environmental stewardship.	A structured approach to restore and rejuvenate large water bodies through desilting and harvesting water, using a comprehensive ridge-to-valley approach. This method ensures that water is captured, stored, and utilized effectively, leading to the enhancement of groundwater levels both downstream and within the command area of the water bodies. By focusing on both structural and community-driven interventions, the project aims to create sustainable water resources, boost ground water levels and agricultural productivity, and improve the resilience of the ecosystem and local communities towards water scarcity.
Implementing partners		
Diganta Swaraj Foundation (DSF), in Palghar, Maharashtra	**ATE Chandra Foundation (ATECF)**, alongside NGO partners **Dhara Sansthan** and **Karunalaya Social Welfare Foundation (KSWF)**, in Jaipur and Jodhpur respectively in Rajasthan; **National Agro Foundation** (**NAF)** in Tamil Nadu	**BAIF Institute for Sustainable Livelihoods and Development (BISLD)**, in Satara, Maharashtra and **National Agro Foundation** (**NAF)** in Tamil Nadu

Objective of this impact assessment study: As a part of the engagement with Tata Capital Housing Finance Limited (TCHFL), Deloitte conducted an Impact assessment of the **"JalAadhar - IWD" project** funded from CSR grants for the following period:

Project intervention	**Time period referred**
Integrated Watershed Development	Karanjkhop, Satara: December 2019- March 2022 Bhadale, Satara: January 2021-March 2023 Thiruvannamalai, Tamil Nadu: January 2019-March 2022

The high-level objectives of this impact assessment are as follows:

- To study the project proposal, MoU extracts, project programmatic and technical reports to understand the program intervention and conduct stakeholder mapping.
- To design the study methodology, tools and guidelines for data collection based on the parameters of impact identified through the document review and initiate structured interactions with key stakeholders of Tata Capital Limited, Tata Capital Housing Finance Limited and the Implementation Partner.
- To conduct a planned field level data collection and documentation of observations and case stories through facility visits and stakeholder interactions.
- Data collation and analysis of the inputs, processes, outputs, outcomes, impact parameters and model of implementation, as well as determining the strengths and weaknesses of the CSR initiatives.

[1] Tata Capital Housing Finance Website I Accessed on 18th December 2024 | https://www.tatacapital.com/tchfl/about-us.html

- Determining the direct/indirect impact of the CSR initiatives on the lives of the target beneficiaries and communities, pertaining to the project.
- Suggesting potential way forward to strengthen the CSR initiative.

Sampling and Data collection:
A structured stakeholder mapping identified primary and secondary stakeholders, guiding a targeted engagement plan. Primary data collection combined on-field surveys (50%) and structured FGDs (50%) to capture both individual and collective insights. Additionally, KIIs with secondary stakeholders provided expert and institutional perspectives. A purposive sampling method ensured diverse representation and comprehensive assessment of project implementation, beneficiary impact, and outreach.
Detailed stakeholder coverage is presented in Chapter 2 Approach and Methodology of this report.

Primary stakeholders	191
Secondary stakeholders	10

Summary of findings:
The current report presents a detailed documentation of Deloitte's observations and findings of the impact assessment study. A summary of the is presented in the table below, while the elaborate documentation is available in Chapter 3.
Project Fund: INR 5.76 Cr (as per MoU)

Project Location: Maharashtra and Tamil Nadu

Maharashtra	Koregaon (Satara)	Bhadale village
	Koregaon (Satara)	Karanjkhop, Morbend village
Tamil Nadu	Vandavasi (Thiruvanamalai)	Velliyampakkam, Ammanambakkam, Anaikunnam Gunankaranai, Vandavasi-Thiruvanamalai

Relevance/Need of the Project:
The IWD related initiatives were carried out in project locations which experienced frequent droughts due to low rainfall, inefficient water harvesting and storage mechanisms. Details of the same are provided in the location wise technical review sections within the report. The IWD program takes a holistic, landscape-level approach. By focusing on the entire watershed, from ridge to valley, it maximizes water harvesting and groundwater recharge. This comprehensive strategy ensures long-term water security, improves ecosystem resilience, and mitigates the impacts of water scarcity, benefiting both current and future generations.
Key Impact Highlights (for intervention period)

Over **400 water conservation structures** created	**20-30 feet** increase in ground water levels	**~25,000** population positively impacted	**Over 6,000 HHs** impacted	Water availability has **increased by 2-3 months annually**	Water quality within drinking water standards

Soil Organic Carbon	**Normalized Difference Vegetation Index**	**Normalized Difference Moisture Index**	**Normalized Difference Moisture Index**	**Land Use Land Cover**	**Water area coverage**	**Barren land reduction**
SOC (Indicating soil health) showed +ve outcomes across watersheds	NDVI (Indicating vegetation presence) showed +ve outcomes across watersheds	NDWI (Indicating changes in water bodies and presence) showed +ve outcomes across watersheds	NDVI (Indicating water stress in vegetation) showed +ve outcomes across watersheds	LULC (indicating changes in the profile of land use) showed +ve outcomes towards water bodies and green cover	**~280 hectares** increase in waterbody areas post intervention	**~230 hectares** decrease in barren land post intervention

Note - NDVI, NDWI and NDMI are representative of changes over the entire watershed region and hence do not have absolute value differences but can only be read through the visual representation. These are presented in detail in the report.

Impact Created

- The project interventions focused on the local challenges of soil and water management based on the existing topography. This ensured that the interventions were need based and relevant.
- The structures and interventions were effective in mitigating soil erosion and significantly enhanced groundwater recharge. Survey results indicate an increase in groundwater levels, with reported rises ranging from 20 to 30 feet.
- The project effectively enhanced the surface water storage capacity through strategic interventions such as the construction of Gabions, lined ponds and farm ponds. These initiatives have not only improved water retention but also contributed to better water management, ensuring a more reliable water supply for both agricultural and community use.
- The project encouraged active participation from local communities, fostering a sense of ownership and collective responsibility. This was facilitated through regular Village Development Committee (VDC) meetings and community-based resource management practices, ensuring long-term impact.
- By aligning with existing government schemes related to water conservation, agriculture, and rural development, like Drip Irrigation subsidy scheme and Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), the project helped build government convergences and leveraged additional support for infrastructure development and capacity building.
- The project enabled collaboration between local panchayats and community organizations to align efforts. However, interactions with the implementing team indicated that a stronger district-level coordination could have further optimized scalability and minimized the risk of beneficiary duplication (such as in the case of the bio-gas units being double funded through TCHFL as well as the state government and panchayat scheme), ensuring more efficient resource distribution and broader impact
- Shift Towards Sustainable Irrigation Systems: The adoption of drip and sprinkler irrigation systems increased significantly, with Satara seeing an increase from 15% to 68% and 0 to 100% in Chengalpattu. This shift reflects improved water efficiency and reduced reliance on outdated irrigation techniques like flood irrigation.
- The introduction of mixed and triple cropping practices in regions like Satara (65% adoption) resulted in diversified crops and an average income increase of INR 48,000/year in Satara
- Soil Organic Carbon (SOC), a key indicator of soil health, improved across all watersheds post-intervention. Bhadale and Karanjkhop showed marginal gains, likely due to the short evaluation timeframe.
- All other technical review findings such as LULC, NDVI, NDWI, NDMI showed positive outcomes in terms of water availability, accessibility as well as vegetation. These are detailed out as before after maps in this report as part of the technical findings.

Location wise Impact findings of the Technical Review

Vandavasi, Tamil Nadu

- The **NDVI and NDMI analyses** demonstrate the positive impacts of the water access interventions in the study area. The successful restoration of surface water bodies, reduction in barren land, and significant improvements in moisture levels highlight the effectiveness of the project in enhancing environmental sustainability.
- Following the intervention, the **NDWI analysis** for March 2024 indicates a positive shift, with the number of surface water bodies increasing from six to seven. While this suggests an improvement in water availability, it is noteworthy that the extent of vegetation under water stress has also significantly increased. This implies that despite the increased water bodies, the available water resources may not be sufficient to fully mitigate the stress experienced by vegetation, pointing to a need for further investigation into the adequacy of water supply for supporting sustained vegetation growth across the entire area.
- **Water Quality:** The integrated watershed project has had a mixed impact on water quality. Significant reductions in TDS, chloride, and total hardness levels indicate improved water quality due to enhanced groundwater recharge and better water management practices. However, increases in fluoride and sulphate levels, particularly in deep and open wells suggests the need for timely monitoring of the water quality for identifying certain contaminants.
- Significant changes in the region were observed from the **LULC analysis** depicted in the table below:

LULC Class	2018	2024
	Area_Ha	Area_Ha
Agriculture	1359.64	1018.34
Barren	825.179	1051.88
Forest/ Trees	566.699	406.628
Water	7.64859	282.324
Settlements	18	18

Bhadale, Satara, Maharashtra

- The water conservation interventions implemented in this region—such as recharge pits, de-siltation works, and storage earthen tanks—have contributed to improving water availability for agricultural use, particularly during the monsoon season. The strategic placement of open wells along natural streams and the use of water diversion and storage techniques have helped farmers manage their water resources effectively. However, challenges

remain due to the region's difficult geology, which limits the potential for deep aquifer recharge and water retention.

- The topographic modifications and soil conservation measures introduced by the BAIF organization have had a positive impact on slowing surface runoff, reducing soil erosion, and enhancing the retention of water in the local aquifers.
- **NDVI** - Post-intervention, vegetation extended further into the northern region, exhibiting higher NDVI values. Additionally, the water body in the eastern part of the study area showed increased water volume. The moisture levels in the area were comparatively higher than before the intervention.
- **NDWI -** Post-intervention, several small water bodies were identified in the NDWI analysis, which can be attributed to lined ponds constructed during the intervention. These small water bodies are not natural surface water bodies but rather storage structures fed by groundwater pumped through borewells. These structures serve primarily for water storage during dry seasons. Following the intervention, the vegetation that was previously under water stress has shown improvement, and the barren land, which was also under stress, has begun to show some recovery. Overall, the intervention has led to a moderate improvement in the vegetation and land conditions, albeit with the reliance on groundwater to support the new water storage structures.
- **Water Quality:** The watershed project has had a mixed impact on the water quality of open wells. Overall, the water quality appears to have some fluctuations in specific parameters, but it remains within safe limits for the most part. Regular monitoring and further investigation into the sources of contamination will be essential. The positive outcomes include: 1) Reduced Total Hardness: A significant decrease from 647.42 mg/L to 232 mg/L indicates improved water softening. 2) Stable Fluoride Levels: Fluoride levels remained within acceptable limits, showing no adverse effects. 3) Improved pH: The pH moved closer to neutral, suggesting better water quality. However, challenges remain, such as: Increased Sulphate and Chloride Levels: Sulphate levels rose from 10.78 mg/L to 18.5 mg/L, and chloride levels increased from 21.65 mg/L to 33.35 mg/L, indicating rising salinity and potential contamination.
- Minor changes in the region were observed from the **LULC analysis** depicted in the table below:

LULC Class		2020	2025
		Area_Ha	Area_Ha
	Barren	1284.54	1371.78
	Forest/ Trees	434.37	336.151
	Agriculture	182.02	194.218
	Water	51.49	50.2669
	settlements	8.50	8.50

Karanjkhop, Maharashtra

- **NDVI -** Remote sensing imagery for January 2025 (post-intervention) indicated the continued presence of surface water within the study area. Despite a reduction in rainfall in 2024 compared to 2021 (before intervention), the area maintained robust vegetation levels and spatial distribution, without compromising surface water availability.
- The hydrogeological interventions in Karanjkhop, including the construction of recharge pits, de-siltation works, and the implementation of drainage structures, have significantly improved the water availability in the region, particularly during the summer months. The water level in open wells has remained stable, even under continuous extraction, indicating the effectiveness of the recharge measures. However, the region still faces challenges related to seasonal water shortages, particularly during the dry months.
- **NDWI -** Due to a 400mm reduction in monsoon input in 2023 compared to 2021, the area lacked surface water in March 2024 as per the NDWI analysis. However, the number of recharge and storage structures has increased, contributing to water conservation efforts. The presence of water in the recharge ponds indicates that these conservation practices are actively functioning and positively influencing groundwater availability in the region.
- **Water Quality:** The watershed project has had a highly positive impact on the water quality of open wells. Positive outcomes include: 1) Reduced Fluoride Levels: Fluoride concentrations decreased significantly, improving water quality. 2) Lower Chloride Levels: Chloride levels dropped by 24%, indicating reduced salinity. 3) Stable pH Levels: The pH remained nearly neutral, showing no adverse changes in water acidity or alkalinity. 4) Dramatic Reduction in Total Hardness: Total hardness decreased by 77.7%, indicating improved water softening and reduced mineral content. However, challenges remain, such as: 1) Sulphate and Chloride Levels: Sulphate levels rose from 10.78 mg/L to 18.5 mg/L, and 2) chloride levels increased from 21.65 mg/L to 33.35 mg/L, indicating rising salinity and potential contamination.

- Changes in the region were observed from the **LULC analysis** depicted in the table below:

LULC Class		2019	2025
		Area_Ha	Area_Ha
	Barren	843.00	614.53
	Forest/ Trees	424.70	492.23
	Agriculture	356.98	511.10
	Water	1.50	9.27
	settlements	11.00	11.00

Recommendations and Way forward

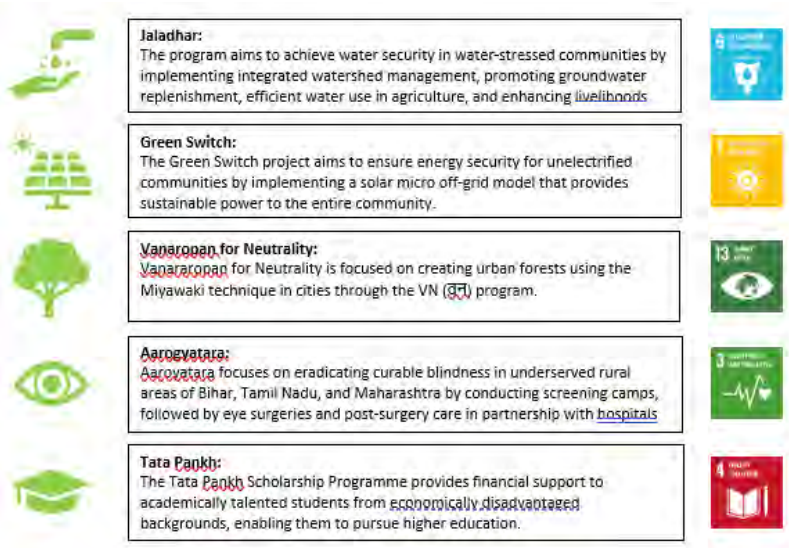
- While the VDC members are provided with basic training on maintenance of structures as well as the roles and responsibilities of each stakeholder, it is recommended as a best practice to document the same in the form of a Standard Operating Procedure (SOP) to ensure that the objectives behind the training and roles defined are sustained in the future despite an exit from the region
- Interventions such as soil traps, loose boulder structures, and naala deepening have been successful in slowing surface runoff and promoting groundwater recharge in Bhadale's tough geological conditions (hard basaltic rock). These should be continued and expanded to other regions with similar challenges. Further explore possibilities of water harvesting and recharge structures in areas of the watershed still experiencing water stress.
- Continue promoting water - efficient agricultural practices: Given the reliance on surface water for irrigation in Thiruvannamalai, introducing more water-efficient irrigation practices such as drip irrigation or rainwater harvesting can help manage water resources more effectively. This would reduce the pressure on surface water bodies and ensure a more sustainable use of water for agriculture.
- While the local Panchayat is involved in the overall planning and administration of the program, it is prudent to also disseminate information of the interventions to the block and district level administration. This would help a) to build stronger local oversight b) Enable stronger convergence with other programs or efforts c) Prevent any duplication of efforts/funding
- While the project provides opportunities for convergence with government schemes by making beneficiaries aware of the same or linking beneficiaries to these schemes, it is recommended to track the outcomes resulting from this enhanced awareness. This will ensure the full realization of benefits and provide measurable impact from these awareness building initiatives
- Organize awareness programs on the long-term risks of water-intensive crops like sugarcane and wheat. Collaborate with more farmers to promote drought-resistant crops through practical demonstrations
- Facilitate partnerships with private and government bodies to establish robust market linkages for non-traditional crops, encouraging farmers to diversify and adopt sustainable cropping patterns

About Tata Capital Limited and Tata Capital Housing Finance Limited

Tata Capital Limited ("TCL"), is the TATA Group's flagship Non-Banking Financial Company (NBFC) company engaged in providing/supplying a wide array of services/products in the financial services sector and operates across various areas of business: Commercial Finance, Consumer Loans, Wealth Services and distribution and marketing of Tata Cards.

TCL's wholly owned subsidiary - Tata Capital Housing Finance Limited (TCHFL) is registered with the National Housing Bank as a Housing Finance Company, offering long term funds for housing purposes.

In the true lineage of the Tata Group of Companies and aligned to its vision of establishing a collaborative and inclusive approach for social and environmental development initiatives, fostering shared value for the broader community; Tata Capital continues to generate long-term, measurable, and positive impact through projects within the thematic areas mentioned below.



Tata Capital's CSR focus areas with key flagship projects aligned with Sustainable Development Goals

About JalAadhar Programme

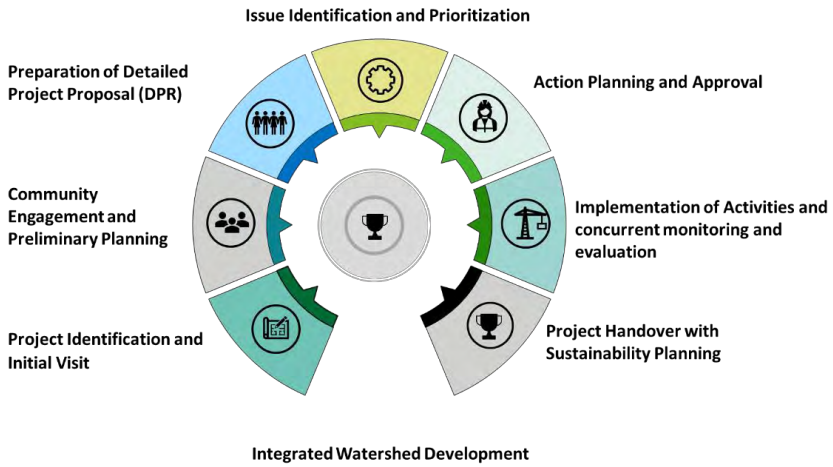
Project title	JalAadhar
Project overview	JalAadhar, a comprehensive water management project focusing on accessibility, conservation, and sustainable practices, has positively impacted about 2 lakh individual over the years. The project encompasses three verticals namely **Water Access, Water Rejuvenation and Integrated Watershed Development**
Scope of this IA and Review period	**Jalaadhar - Integrated Watershed Development:** Karanjkhop, Satara: December 2019- March 2022 Bhadale, Satara: January 2021-March 2023 Thiruvannamalai, Tamil Nadu: January 2019-March 2022
Client grant	INR 5.76 Crore (as per MoU)
Project location	Maharashtra and Tamil Nadu
About the implementing agency/partner	The project is implemented across multiple regions through dedicated partners: **BAIF Institute for Sustainable Livelihoods and Development (BISLD)**, in Satara, Maharashtra; **National Agro Foundation** (**NAF)**, in Thiruvannamalai, Tamil Nadu **BISLD** is a non-profit company having skills and experience in the fields of Watershed Management, Cattle Breeding with community participation and working towards building self-reliant rural societies. **NAF** is a non-profit working towards comprehensive rural development initiatives through multi-pronged approach to agriculture and allied sector development, watershed and natural resource management.

TCHFL's CSR Support to JalAadhar Programme

Support Description	Implementing partner	Grant (INR)
Integrated Watershed Development	Total	**5.76 Cr**
	BISLD	2.64 Cr
	NAF	3.12 Cr

Intervention Model and Process Mapping

A comprehensive process map of each of the interventions - **IWD** project is presented below, highlighting and detailing each step in the process.

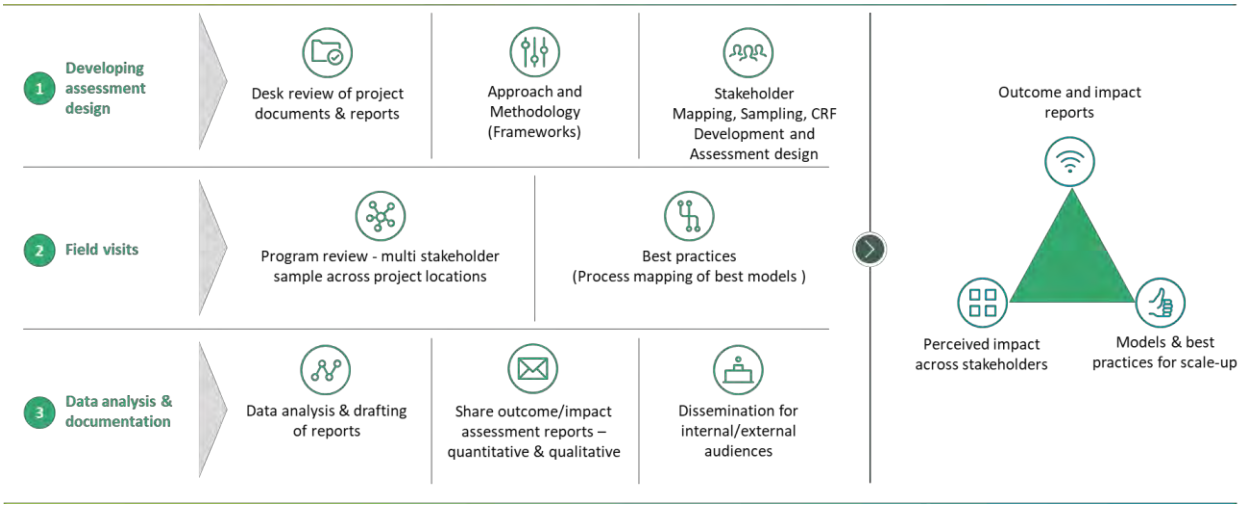


Process Steps	Details
Project Identification and Initial Visit	• Identify potential project areas through consultations with stakeholders, including local authorities, community leaders, and relevant organizations. • Conduct an initial visit to understand the area's context, challenges, and opportunities. • Assess the needs and feasibility of the project, ensuring alignment with the community's priorities and project goals.
Community Engagement and Preliminary Planning	• Engage the community through meetings, workshops, and discussions to build trust and gather insights. • Identify key community members, stakeholders, and groups actively involved in the project. • Develop a preliminary outline of the project based on community inputs and available resources.
Preparation of Detailed Project Proposal (DPR)	• Develop a comprehensive project proposal that outlines objectives, timelines, budgets, and resource requirements. • Include technical, financial, and social components of the project. • Ensure the proposal is aligned with local and governmental policies and submit it for necessary approvals.
Issue Identification and Prioritization	• Conduct surveys, focus group discussions, and data collection to identify pressing issues in the community. • Collaborate with stakeholders to prioritize issues based on urgency, feasibility, and potential impact. • Document the prioritized issues to guide action planning.
Action Planning and Approval	• Formulate a detailed action plan specifying roles, responsibilities, timelines, and key performance indicators (KPIs). • Review the plan with stakeholders and seek feedback to refine it. • Obtain necessary approvals from relevant authorities or funding organizations before implementation.
Implementation of Activities and concurrent monitoring and evaluation	• Execute the planned activities while maintaining open communication with the community and stakeholders. • Establish a monitoring framework to track progress, ensure accountability, and address challenges in real-time. • Conduct periodic evaluations to measure the project's impact and identify areas for improvement.
Project handover with sustainability planning	• Transfer ownership and responsibility of the project outcomes to the VDC. • Provide training and resources to ensure the long-term sustainability of the project. • Develop a follow-up plan for periodic assessments and future support if required.

Approach and methodology

Deloitte's customized approach for evaluating the impact of TCHFL's funded CSR projects and identifying potential areas for future intervention was built on extensive experience in conducting similar evaluations. A mixed-method assessment design was utilized, primarily focusing on primary data collection through in-person interactions and telephone interviews, which was further complemented and cross-verified with relevant secondary data and available insights.

Methodology adopted for programme study

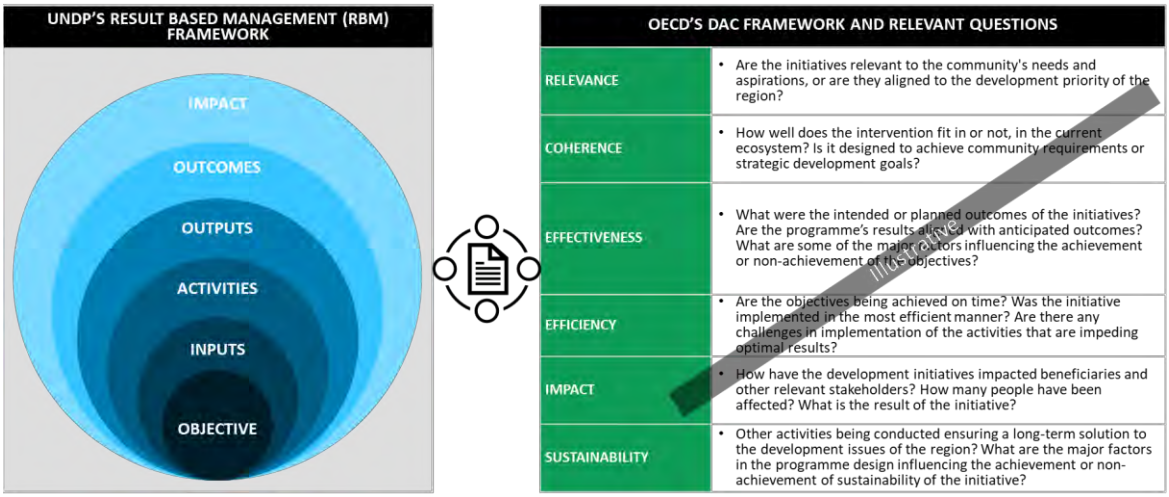


The evaluation design based on OECD's Development Assistance Committee (DAC) and UNDP's Result Based Management (RBM) frameworks has been adapted to assess the project and obtain information on the research questions, Common Results Framework and KPIs framed based on the same.

Additionally, a technical review was undertaken as per the applicability to each intervention to assess the following:

a. Environmental Impact- To evaluate changes in vegetation cover and health, soil erosion rates, and water quality within the watershed areas and to determine the effectiveness of watershed management practices in restoring and enhancing the ecosystem's health
b. Agricultural Impact-To assess the changes in cropping cover expansion or reclamation of wasteland, resilience to climate variations resulting from watershed interventions and determine the adoption and impact of sustainable farming practices
c. Water Resource Impact- To evaluate the efficiency of water harvesting and management systems in augmenting water availability for agriculture and other uses as a result of watershed management efforts

OECD's Development Assistance Committee framework leveraged to design the methodology



Key Enquiry Areas

Based on the program design, following indicative areas of enquiry were identified and data collection tools were developed in accordance:

Relevance

- Assess how well the program addresses the region's water scarcity, soil degradation, and agricultural challenges.
- Evaluate the program's alignment with the priorities and needs of local communities, including marginalized and vulnerable groups.
- Examine the relevance of specific interventions, such as water body rejuvenation, silt repurposing, and soil management practices, in meeting long-term water and agricultural needs.
- Determine whether the program design considers region-specific environmental, social, and cultural factors.
- Assess the alignment of the program with national and state-level policies on water management, agriculture, and rural development.
- Evaluate how the program complements existing infrastructure and initiatives aimed at improving water security and soil conservation.

Coherence

- Analyze the integration of the program's activities with government schemes, such as watershed development programs or agricultural subsidies.
- Evaluate the role of partnerships with local governance bodies (e.g., Gram Panchayats), NGOs, and private sector entities in achieving the program's objectives.
- Assess the consistency and alignment of training sessions, workshops, and awareness campaigns with the community's capacity and knowledge levels.
- Examine how the program integrates with broader climate resilience and sustainability initiatives in the region.
- Investigate whether community-driven interventions align with structural initiatives (e.g., construction of check dams, recharge wells).
- Explore how the program promotes inclusivity and gender equity in decision-making and implementation.

Effectiveness

- Evaluate the effectiveness of structural interventions like check dams, recharge wells, contour bunds, and trenches in restoring and maintaining water resources.
- Measure the improvements in water availability for agricultural and domestic purposes due to the program's interventions.
- Assess the impact of silt repurposing on irrigation efficiency and its role in improving soil fertility.
- Evaluate how water body rejuvenation has affected the groundwater recharge levels in the area.
- Assess the adoption and effectiveness of sustainable farming practices (e.g., crop diversification, water-efficient irrigation) promoted through training and awareness programs.
- Analyze the level of community participation and ownership in maintaining restored water bodies and implementing water management practices.
- Evaluate the success of water supply networks in providing consistent, equitable access to water across all segments of the population.
- Examine the extent to which the program has promoted better hygiene and sanitation practices through the distribution of water filters and related interventions.
- Measure the effectiveness of the program in raising community awareness about water conservation and ecosystem management.

Efficiency

- Assess the timeliness of the program's activities, from planning and procurement to execution and monitoring.
- Evaluate the cost-effectiveness of interventions such as water body rejuvenation, silt repurposing, and soil conservation measures.
- Measure the efficiency of resource allocation in terms of manpower, materials, and financial resources.
- Identify bottlenecks and delays at various stages of program implementation, such as construction timelines or community mobilization.
- Analyze the efficiency of monitoring and evaluation processes in tracking progress and ensuring accountability.
- Evaluate the level of efficiency in training delivery, including the retention and application of knowledge by participants.

Impact

- Determine the cost savings achieved by stakeholders through access to enhanced water resources and sustainable farming practices.
- Measure the program's overall impact on agricultural productivity, including changes in crop yields and the adoption of sustainable farming practices.
- Assess the socio-economic benefits for community members, such as increased incomes, reduced migration, and improved quality of life.
- Evaluate the ecological impact of the program, including improvements in biodiversity, groundwater recharge, and soil health.
- Analyze the program's contribution to ecosystem resilience, specifically the community's ability to cope with water scarcity and climate variability.
- Investigate how the program has influenced long-term water use behaviors and conservation practices among community members.
- Assess the impact of hygiene and sanitation interventions, such as water filter distribution, on public health outcomes.
- Measure the program's role in empowering women and marginalized groups through improved water access and participation in decision-making processes.

Sustainability

- Assess the long-term viability of restored water bodies and soil conservation structures, including community-led maintenance efforts.
- Evaluate the institutional mechanisms established to ensure the sustainability of program interventions, such as local water user committees or farmer groups.
- Identify challenges and opportunities for strengthening the program's sustainability, including technical, financial, and governance aspects.
- Explore the potential for scaling up successful interventions to other regions facing similar challenges.
- Examine the degree to which the program has fostered a sense of ownership and accountability among stakeholders, ensuring long-term impact.
- Assess the alignment of the program with future climate resilience and water management goals, including its adaptability to changing environmental conditions.
- Identify capacity-building needs to strengthen community involvement in watershed development and water resource management.
- Evaluate opportunities for leveraging additional funding or partnerships to expand and sustain the program's impact.

Technical & Environmental Review

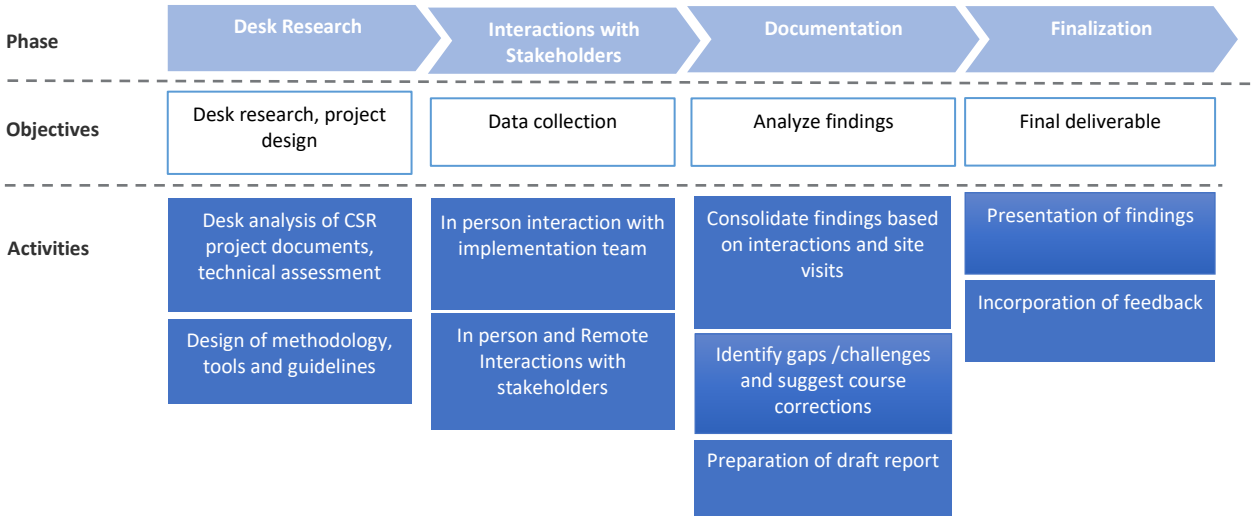
A combination of **primary research** (field surveys, stakeholder interviews) and **secondary research** (project reports, historical data) was used to evaluate the project's environmental and agricultural impact.
The technical evaluation involved the following:

Desk Research	Hydrogeological assessment Rainfall data
Field Visit	Sampled locations as per programmatic review
Remote Sensing	Geospatial mapping, NDVI, zero-rainfall assessment, NDMI, NDWI, LULC, Water testing

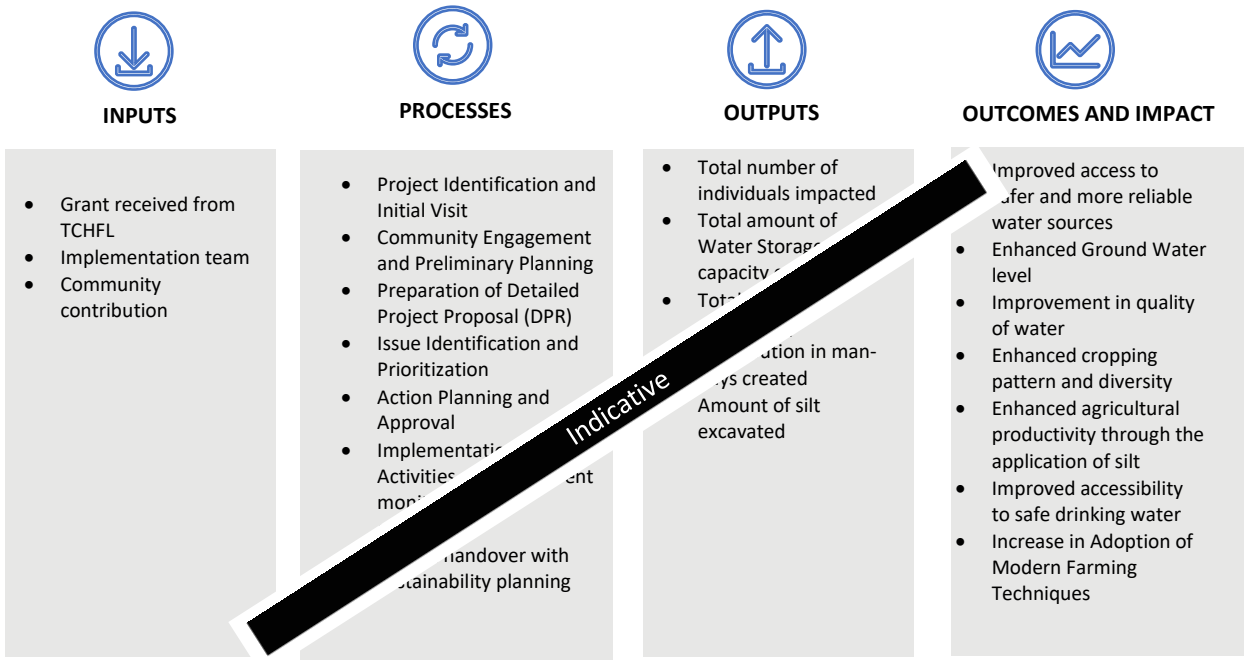
- **Land Use & Water Resource Mapping:**
  - Remote sensing techniques were utilized to analyze land use changes, vegetation cover (NDVI), and water retention levels.
  - Satellite imagery comparisons (pre- and post-intervention) helped assess changes in green cover and water recharge capacity.
- **Water Resource Impact & Quality Assessment:**
  - Historical data on groundwater recharge and surface water retention was analyzed.
  - Water quality reports were reviewed to assess improvements in drinking water and irrigation potential.
  - Seasonal turbidity trends were examined to measure soil erosion control.
- **Data Processing & Interpretation**
  - Collected data was compiled, cleaned, and structured for robust analysis.
  - GIS and statistical tools were used for comparative analysis of pre- and post-intervention scenarios.
  - Key insights were drawn on water conservation efficiency, agricultural benefits, and socio-economic impact.

Programmatic review

The programmatic review and impact assessment of the CSR intervention was executed in a phased manner. The four main phases are outlined below:



KPIs along UNDP's Results Based Management (RBM) framework for monitoring were developed and used as the basis for the programmatic review. Both primary and secondary project related data was reviewed to gain a holistic understanding of the implementation model and outcomes.



Illustrative: Common Results Framework for JalAadhar Project

(Detailed further in Chapter 3 Programmatic Findings)

Desk Review

A thorough review of the documents made available by the implementing partner and the funder was conducted, including the information available on the project in the public domain to build a comprehensive understanding of the process and design the assessment tools accordingly. Following documents were reviewed as a part of the desk review process:

- Memorandum of Understanding (MoU) signed
- Annual project progress report submitted to funder
- Technical and Geohydrological reports
- Baseline reports
- Fund utilisation report

Stakeholder mapping

The impact study identified the various stakeholders for the project as follows

Primary stakeholders	Secondary Stakeholders
Farmers	Implementation partner staffs/officers/managers
Local community	Local government authority
Villager leaders	Tata Capital team

Sampling plan and Tools used for the study

A comprehensive stakeholder mapping was conducted to identify both primary and secondary stakeholders relevant to the project. Based on this analysis, a structured engagement plan was developed to facilitate targeted interactions with each stakeholder group.

For primary data collection, direct beneficiaries were engaged using a dual approach—50% of the data was gathered through on-field pre-designed survey forms, while the remaining 50% was collected via structured FGD. This mixed-method approach ensured a balanced representation of individual and collective perspectives. Additionally, KII were conducted with secondary stakeholders using a pre-designed questionnaire to capture insights from institutional representatives, subject matter experts, and local governance bodies.

To maximize the coverage of interventions and ensure diverse representation, a purposive sampling method was employed to identify key intervention areas for field visits. A structured methodology was implemented to prioritize geographies requiring the highest level of intervention, focusing on the number of structures developed, the scale of outreach, and the diversity of structures covered. In the **IWD initiative**, prioritization was driven by the number of structures, the variety of interventions, and overall population coverage. This strategic selection ensured a more insightful evaluation of impact and sustainability. A comprehensive field assessment, combining in-person stakeholder interactions and a technical site visit, was conducted by a team of **Deloitte team professionals** spanning the month **of December 2024 and January 2025.**

Project name	State	Location	
Integrated Watershed	Maharashtra	Koregaon (Satara)	Bhadale village
Integrated Watershed	Maharashtra	Koregaon (Satara)	Karanjkhop, Morbend village
Integrated Watershed	Tamil Nadu	Vandavasi (Thiruvanamalai)	Velliyampakkam, Ammanambakkam, Anaikunnam Gunankaranai, Vandavasi-Thiruvanamalai

Sampling plan

Sub-project	Stakeholder	Sample covered	Type of sampling	Interview mode	Tools used
IWD	Villagers	**191 beneficiaries** Survey: 81 FGD: 110	Purposive	On-field	Survey tool FGD guidelines
	Implementation team	**10 project staffs**	Purposive	On-field	KII

Limitation of the Technical study:

General Limitations

It is important to note that the findings and conclusions drawn from this hydrogeological assessment are subject to several limitations:

- The study does not account for concurrent initiatives implemented by other entities/stakeholders in the same geography, which may have contributed to the outcomes.
- **Data Availability**: The available data from farmers regarding the water level fluctuations, groundwater measurements, and surface water flow patterns are limited in scope and temporal resolution. Seasonal variations and local climate factors could influence water availability and hydrological processes on a real time basis and may not be captured in this assessment.
- **Field Observations**: Direct field observations regarding the local groundwater levels, infiltration rates, and vegetation characteristics are limited in scope compared to the project outreach. More comprehensive field studies covering the entire project locations are required to fully understand the impact of vegetation and hydrological features on water movement and groundwater recharge.
- **Local Variability**: The hydrogeological conditions can vary significantly across different areas within the watershed, and local factors such as soil permeability, slope, and subsurface geology may affect water movement and retention. On account of this, the findings from one location may not be fully representative of other areas within the catchment.
- **Hydraulic Modeling Limitations**: The absence of detailed hydraulic models or geophysical surveys means that some assumptions had to be made regarding subsurface flow and surface water connectivity. These assumptions could lead to inaccuracies in understanding the full dynamics of the water system.
- **Soil Testing**:
  For IWD projects the field visits were planned in December. In mid-December, agricultural fields undergo the application of manure and other crop-enhancing additives, which interferes with obtaining baseline soil data. The crop schedule, therefore, did not support soil testing activities during this period.
  Alternative Approach: Secondary Data Analysis
  Following the field visit, secondary data sources were reviewed to assess soil impact. Soil health cards (SHCs) from the implementation areas were obtained from the IP and examined.
  Findings from Secondary Sources:
  SHCs contained data on macro- and micronutrient levels for each village. However, records were only available for the years 2023 and 2024. The central data server did not provide detailed soil health card reports but only included aggregated statistics on sample collection percentages.
  Findings from Implementing Partner (IP) Teams
  Bhadale and Karanjkhop Watersheds: Pre-intervention soil health cards were not collected, and post-intervention SHC collection was not mandated.
  Tamil Nadu Team: Inquiry with the state government confirmed the availability of soil health cards for intervention areas. However, reports from the National Agriculture Foundation (NAF) have not yet been received.
  Conclusion for Soil testing: Due to the limitations mentioned above the soil testing has been conducted through remote sensing data only.

Water quality assessment limitations

The water quality data used for the impact assessment of the Integrated Watershed Program has been sourced from various secondary sources, including the Central Ground Water Board (CGWB), Jal Jeevan Mission (JJM), and field surveys. While these data provide valuable insights into the water quality conditions prior to the implementation of the watershed interventions, the following factors may affect the accuracy and comparability of the results:

1. **Geographical Limitations:**
    - The water quality data from CGWB stations was limited to locations within a 10 km radius, and thus may not fully represent the entire watershed area. The data may not account for localized variations in water quality outside of this radius.
2. **Differences in Water Testing Laboratories:**
    - The water testing laboratories employed by different agencies (CGWB, JJM, and field surveys) may have used different testing methodologies, equipment, and calibration standards, which could lead to variations in results. These differences may introduce inconsistencies in the accuracy of the data.
3. **Varying Sample Sources:**
    - The water quality data was collected from a variety of water sources, including open wells, deep wells, infiltration wells, and handpumps. The water quality can vary significantly depending on the source type, depth, and extraction method, which may introduce inconsistencies in the data.
4. **Different Timing of Data Capture:**
    - The data points were collected at different times of the year, with varying seasonal and climatic conditions influencing water quality. These temporal variations could lead to discrepancies when comparing data from different months, as water quality parameters such as turbidity, nitrates, and hardness may fluctuate based on rainfall, agricultural activities, and other factors.
5. **Geological Variations and Abutting Areas:**
    - The local geology and the characteristics of the abutting areas may influence the water quality results. Variations in soil composition, rock formations, and groundwater flow paths can lead to spatial differences in water quality, which may not be fully captured by the data from the selected testing sites.
6. **Differences in Sample Size and Averaging Methods:**
    - The number of samples collected across different data sources may vary, which could affect the representativeness of the data. In cases where fewer samples were collected, the average values may not accurately reflect the overall water quality for the entire watershed area.

Given these concerns, it is important to recognize that the data used for this impact assessment may not be perfectly aligned or representative of the current water quality conditions across all areas affected by the Integrated Watershed Program. While every effort has been made to analyze the available data and draw meaningful conclusions, the variability in sampling methods, laboratory practices, and data collection parameters may introduce some level of uncertainty in the results. Therefore, the findings and recommendations presented in this report should be considered in the context of these limitations, and further data collection and analysis may be necessary for a more comprehensive evaluation of the project's impact on water quality.

Remote Sensing Data Limitations

While remote sensing data is a powerful tool for evaluating large-scale environmental changes and water resource management projects, there are several limitations that must be considered when using it to assess the technical impacts of a water-related interventions. These limitations can lead to discrepancies between remote sensing data and ground-truth measurements, affecting the overall accuracy and reliability of the analysis. Below are key limitations related to the use of remote sensing data for assessing the technical impact of the water access project:

Description of limitation and impact
Spatial Resolution Remote sensing data often comes with spatial resolution limitations, especially when using satellite imagery. While higher resolution data is available from some sources, such as commercial satellites (e.g., WorldView or GeoIQ), the public domain data like Sentinel-1 or Landsat may have lower resolution, making it difficult to accurately capture fine-scale features such as small water bodies, detailed vegetation cover, or infrastructure like pipelines and storage tanks. **Impact**: The inability to capture small-scale features or localized water fluctuations can lead to inaccurate assessments of water levels or changes in the water supply system in specific areas. For example, the evaluation of shallow groundwater recharge or changes in local surface water storage may not be fully resolved in the imagery.

Temporal Resolution

Remote sensing data is collected at specific time intervals, which may not align with the exact timing of project interventions or seasonal variations. For example, water levels in ponds may fluctuate due to seasonal rainfall or evapotranspiration, but remote sensing data might not capture these fluctuations at the precise times needed for accurate assessment.

Impact: If the satellite or sensor passes infrequently over the target area, important changes that occur between the satellite overpasses could be missed. For instance, post-intervention water levels or vegetation changes may be recorded outside the optimal monitoring period, resulting in gaps in the temporal data that could lead to incomplete assessments.

Spectral Saturation or Misinterpretation of Water Bodies

The interpretation of water bodies using remote sensing data can be limited by spectral saturation, especially when using satellite imagery that relies on visible, near infrared, or thermal infrared bands. Water bodies, especially those with high turbidity, dense vegetation around them, or those at a low elevation (such as shallow ponds), may not always be distinguishable from surrounding areas or other land cover types.

Impact: Misinterpretation of water bodies, especially in cases where surface water has low contrast or is surrounded by dense vegetation, could lead to incorrect conclusions about the extent and change in water levels. This is especially important in de-siltation projects where the focus is on changes in water volume or surface area.

Limited Ground Truthing

Remote sensing data alone may not provide sufficient ground truthing to validate or calibrate the satellite-derived data, particularly for water levels, groundwater recharge, or subsidence/uplift. While remote sensing can provide valuable insights, ground-based measurements are necessary to calibrate and validate these data.

Impact: Without accurate ground measurements for comparison, the remote sensing data might be inaccurate or misinterpreted. For example, if the satellite data shows an increase in water volume in a pond but there is no ground truth to confirm the water level or other factors, the assessment might overestimate the true water storage capacity post-rejuvenation

SAR Data Limitations (for Sentinel-1)

While Sentinel-1 provides valuable data using Synthetic Aperture Radar (SAR), the interpretation of SAR data can be more complex compared to optical imagery. The radar signal can be affected by surface roughness, moisture content, and vegetation structure, which can lead to misinterpretation of surface water extent or land displacement.

Impact: In the case of surface water or vegetation analysis, SAR data might not always accurately represent changes in water levels or land displacement, especially in areas where soil moisture or vegetation density significantly impacts the radar signal. This could result in an inaccurate assessment of the success of the rejuvenation project

Lack of High-Resolution Groundwater Data

Remote sensing primarily focuses on surface water bodies and land features, and it often lacks the ability to provide detailed groundwater data. For a more comprehensive hydrogeological assessment, ground-based measurements of groundwater levels and quality are essential, but these are not always available through remote sensing.

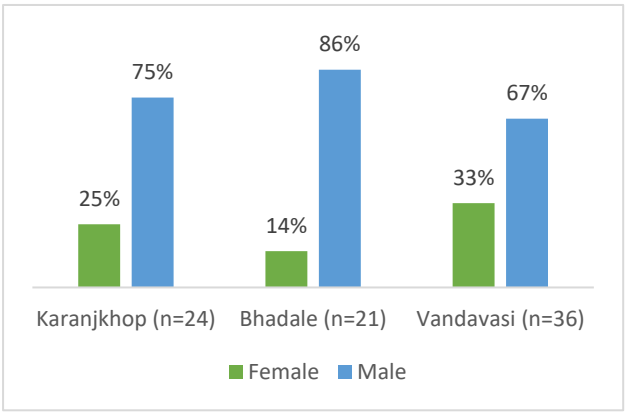
Impact: Without accurate groundwater measurements, it is difficult to assess the full impact of the rejuvenation project on local aquifers and groundwater recharge. The project may have contributed to groundwater replenishment, but remote sensing data alone cannot fully quantify this effect.

Given these limitations, the results of this assessment should be interpreted with caution, and further studies, including field investigations, geophysical surveys, and long-term monitoring, are recommended to refine the findings and ensure a more accurate and comprehensive understanding of the hydrogeological conditions in the area.

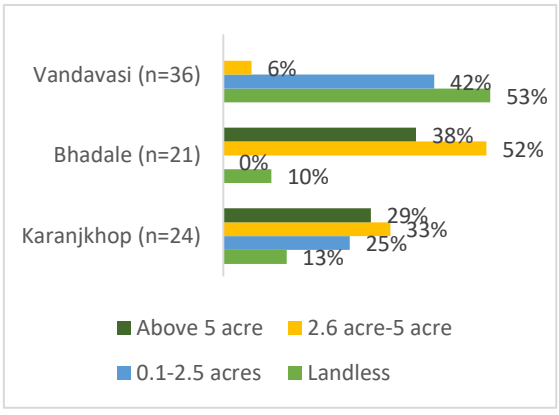
Profile of interview respondents

Integrated Watershed Development

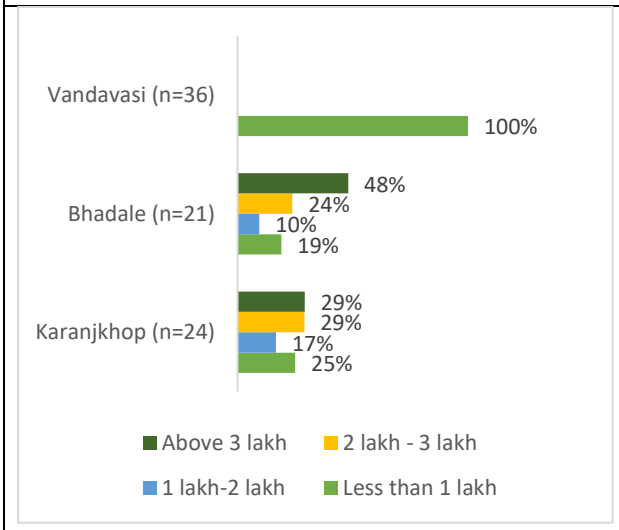
Gender Split (N=81)



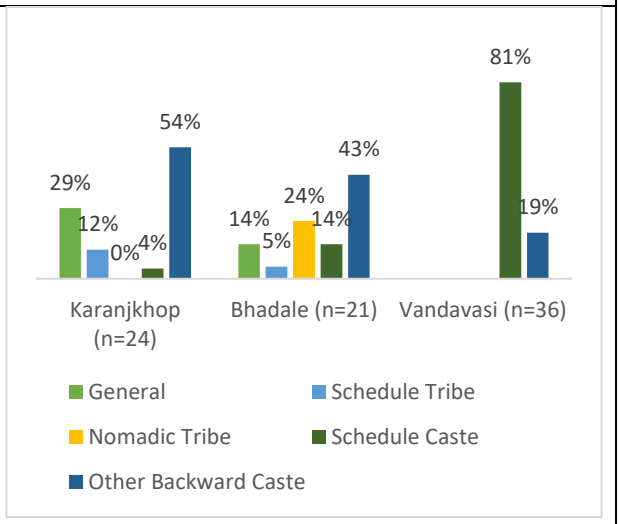
Farm size (N=81)



Annual family income (N=81)



Social profile (N=81)



Water Conservation and Recharge Interventions under IWD were carried out in Vandavasi in Thiruvannamalai in Tamil Nadu and Bhadale, Karanjkhop in Satara, Maharashtra.

Watershed Name	Watershed Code (covering atleast 50% of intervention area) *	Villages covered	State
Vandavasi	4C1D5c1c, 4C1D5b3c1, 4C1D5b3c2, 4C2A1a2d4, 4C2A1a2c4, 4C2A1a2c3, 4C2A1a2c2	Ammananpakkam, Velliyambakkam, Seeyalam, Rajapalayam, Eyipakkam, Badur, Anaikunnam, kunankaranai, Kil Sembedu	Tiruvannamalai, Tamil Nadu
Bhadale	4D7H8b4a, 4D7H8b4b, 4D7H8b4c, 4D7H8b4d, 4D7H8b4e	Bhadale	Satara, Maharashtra
Karanjkhop	4D7H8d1a, 4D7H8d2a, 4D7H8d1b, 4D7H8d1c	Karanjkhop, Morbend	Satara, Maharashtra

*(*Note: These watershed codes are triangulated from multiple secondary sources like National Resource Information System (NRIS), Microwatershed Atlas of India Soila and Land use Survey of India (SLUSI), IWMP Watersheds, Department of Land Resources, National Resource Information System- Watershed Codes, NRSC and Vandavasi-MoU document and Tamil Nadu Watershed Development Agency (TAWDEVA))*

The activities analyzed in this report, including de-siltation of ponds, construction of check dams, and the use of shallow and deep aquifers, and other soil and water management structures and activities aimed at improving water availability for both domestic and agricultural use.

Overall

Impact findings for Integrated Watershed Development programme.

Parameters	Findings
	INPUT
Grant from Tata Capital Housing Finance Limited (TCHFL)	**The total grant of INR 5,76,08,885 was provided to BISLD and NAF as per MoU** The CSR grant breakup are as follows as per MoU– **BISLD** • Satara (Bhadale)-INR 1,11,90,775 • Satara (Karanjkhop)-INR 1,52,27,000 **NAF** • Thiruvannamalai (Vandavasi)-INR 3,11,91,110
Implementation team	• The project benefited from a robust and well-structured implementation team across locations, comprising project staff, community mobilizers, technical engineers, and a dedicated monitoring and evaluation team. • This multidisciplinary approach ensured effective on-ground execution, technical precision, and continuous performance tracking. • **Project Staff:** Led overall execution, ensuring alignment with project objectives, timelines, and stakeholder coordination. • **Community Mobilizers:** Played a critical role in engaging and sensitizing local communities, fostering participation, and ensuring smooth on-ground implementation. • **Technical Engineers:** Provided expertise in infrastructure development, water conservation techniques, and overall technical precision in project execution. • **Monitoring & Evaluation (M&E) Team:** Ensured real-time data collection, performance tracking, and impact assessment, allowing for adaptive management and course corrections where necessary.
Community contribution	• The project demonstrated strong community participation, with beneficiaries contributing approximately **15% of the total project cost** for individual components. This financial commitment reflects the **sense of ownership and accountability** among community members, ensuring long-term sustainability of the interventions.

	• The contribution was structured in multiple ways, including **monetary investments, in-kind support (such as labor for construction and maintenance), and resource mobilization through local governance bodies (Panchayats and self-help groups).** This model not only reduced dependency on external funding but also strengthened **community engagement in asset creation and management**
	PROCESS
Project Identification and Initial Visit	• The project site was identified through a joint visit by representatives of the CSR wing of TATA Capital Housing Finance Ltd, the IPs, and the Gram Panchayats. • The need for integrated watershed development to address issues such as soil erosion, water scarcity, and limited agricultural productivity were identified through the visit.
Community Engagement and Preliminary Planning	• Community engagement was strong, with multiple FGDs and village meetings conducted by implementation team to identify local needs and priorities through PRA, transect walks, seasonal calendars, resource mapping etc. • A Village Development Committee (VDC) was formed, consisting of a diverse mix of women, landless beneficiaries, and men. However, it was observed that women and landless beneficiaries were often overlapping groups. The inclusion of women's groups and marginalized community representatives reflects a deliberate effort to foster inclusivity in the planning process. • Despite this, it was indicated by the participants in the FGD that the engagement lacked targeted communication strategies to enhance awareness of long-term project benefits, leading to some scepticism among community members about sustained outcomes. • Community monetary and voluntary contributions were well-structured; however, greater clarity on roles and responsibilities for post-project maintenance was needed, as highlighted by the feedback received from the FGD participants.
Issue Identification and Prioritization	• Critical issues such as water scarcity, groundwater depletion, and soil erosion were identified and prioritized by the community members driven by VDC and the implementing partners based on their impact on agricultural productivity and livelihoods. • The process was data-driven, incorporating findings from soil and water tests. • Limited attention was given to identifying social barriers, such as unequal resource access within the community, which could affect project equity.
Action Planning and Approval	• The action plan was thorough and outlined a variety of activities aimed at improving water sustainability and land productivity, including water body rejuvenation, afforestation initiatives, and soil treatment measures. The plan provided detailed timelines for each activity, along with clear budget estimates and funding requirements to ensure successful execution. • Approval processes were streamlined, with strong coordination between local authorities, implementing agencies, and community leaders. • Key focus areas in the action plan included treatment of the **watershed area, drainage line interventions, capacity building of community institutions, and promoting sustainable practices in agriculture and livestock management.** These elements were designed to work in harmony to enhance the resilience of the local ecosystem and improve agricultural productivity.
Implementation of Activities	• Activities such as CCT construction, bunding, farm ponds, percolation well, repair of check dams, nalla deepening were carried out with active participation from the local community, ensuring the interventions were tailored to meet their specific needs and circumstances. • Ongoing monitoring by the IPs internal teams provided real-time feedback, enabling timely adjustments for smooth project execution. • The project implemented tailored livelihood initiatives for landless beneficiaries, focusing on enterprise development in sectors such as food processing, tailoring, and metalworking. Key interventions included Agricultural Input Sprayer Pumps for enhanced farming efficiency, Sewing Machines and Heavy-Duty Sewing Machines for garment production, and Refrigerators for Refreshment Centers to improve storage. Support for food enterprises was strengthened through Flour Mills, Marshal Machines, Vermicelli Machines, and Papad Making Machines. • Community contributions were gathered following the approval of individual structures and deposited into a centralized VDC bank account, designated for the maintenance of the project's constructed structures. This account was managed jointly by two VDC members and one representative from BISLD.
Monitoring and Feedback	• A robust monitoring framework was established, with periodic evaluations conducted to assess progress against key performance indicators (KPIs).

	• Feedback loops were implemented, with regular reporting by field teams and community representatives. • While a monitoring system was in place, data collection on the total amount of renewable energy generated by biogas units and groundwater recharge rates was occasionally inconsistent. (for Satara) • The project had a grievance redressal mechanism in place, but there were challenges in ensuring that all community members were fully aware of it or effectively utilized it during the project lifecycle • All requisite project documentation, encompassing baseline studies, technical assessments, annual reports, and project completion reports, has been duly shared, with the exception of the Vandavasi project, which lacks the final completion report.
Project Handover and Sustainability Planning	• The handover process was well-structured, with a VDC formed to manage the rejuvenated structures. • Sustainability planning included basic training on maintenance and governance of water resources. • A clear plan for generating community funds for long-term maintenance was shared, but its implementation was at an early stage.

Implementing Partner Wise

Impact findings for Integrated Watershed Development programme.

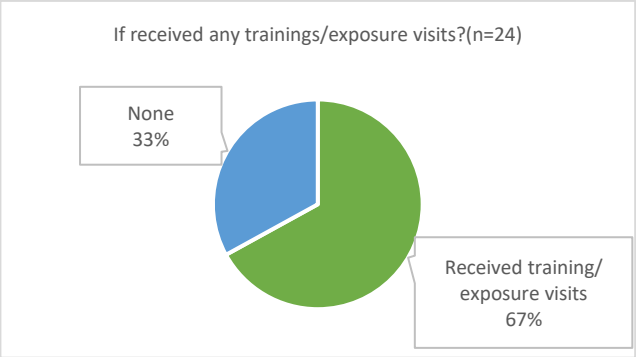
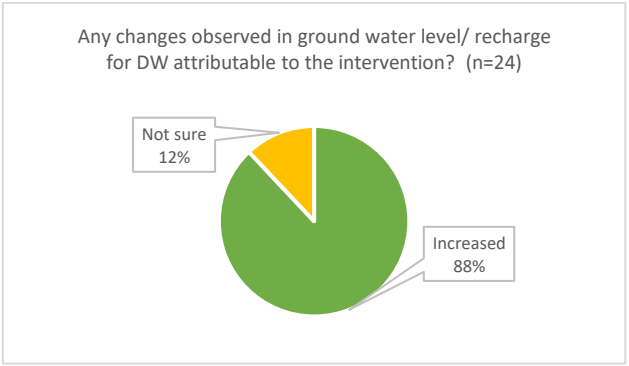
BISLD in Satara

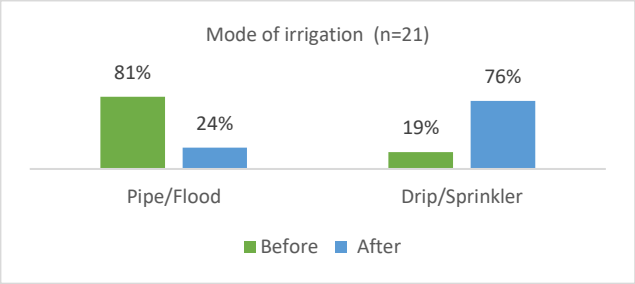
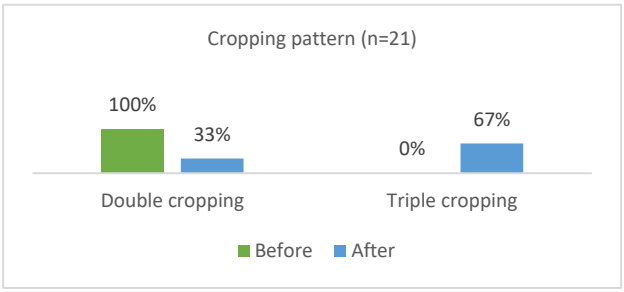
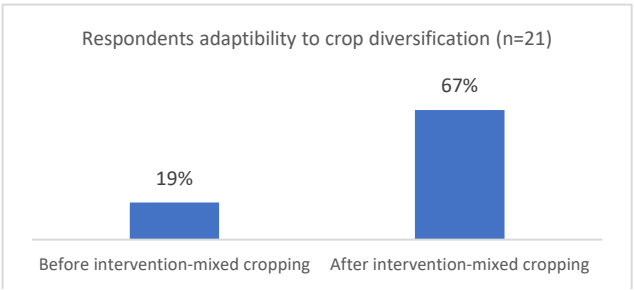
Intervention Location 1: Karanjkhop

Outreach	*Total population*	*3,125*
Area Treatment (Farm bunding/outlets/WAT/CCT)	*Total work done*	*37,998 CuM*
	Area covered	*452 Ha*
	Water recharged in single filling	*389 lakh litre*
Recharge pit	*Total work done*	*15,200 CuM*
	Area covered	*374 Ha*
	Water recharged in single filling	*152 lakh litre*
Grass seedling	*Total work done*	*400 Ha*
Drainage line treatment	*Loose Boulder Structure*	*169*
Gabion	*Total work done*	*10*
Recharge farm ponds	*Count*	*16*
Nalla deepening	*Total work done*	*15.423 CuM*
Well Recharge	*Total work done*	*10*
Line farm pond		*4*
Repair of old/check dams and percolation tank	*Capacity created*	*50,000 CuM*
Desiltation of percolation tank	*Additional storage capacity created*	*145 lakh litre*
Engagement with landless beneficiaries		*25*
Water use efficiency measures (Drip/Sprinkler/Drum kit)		*100*

Biogas unit		*10*
Sillage machine	-	*310 families benefitted*
WADI (Horticulture development)		*50*
Integrated pest management		*67*
Crop diversification	*Area diversified*	*183 acre*
Training/exposure visits/capacity building support	*Numbers*	*12*

OUTCOME AND IMPACT

Impact on knowledge and farming techniques	Increase in knowledge attributable to exposure visits and trainings	 • 67% of survey respondents reported having participated in training programs or exposure visits. The majority of these participants were involved in capacity-building activities focused on biogas units, drum kit systems, kitchen gardening, dryland horticulture, micro-irrigation techniques, vermicomposting, and leadership development. Exposure visits complemented this learning by demonstrating successful implementations in similar contexts.
Impact on water resource	Increase in Groundwater Levels	 • In Karanjkhop about 88% of the survey respondents reported an increase in groundwater levels following the interventions, with an average rise of about 22 feet. These results indicate a significant improvement in groundwater recharge, attributed to interventions such as farm bunding, recharge pits, and nala deepening.
	Increase in Groundwater availability for potable and irrigation use	• In Karanjkhop, according to responses from 21 survey participants, groundwater availability increased by three months—rising from eight months prior to the intervention to eleven months post-intervention

Impact on agriculture and irrigation practices	Increase in Adoption of Modern Farming Techniques	 • The adoption of drip and sprinkler irrigation systems rose significantly from 19% before the intervention to 76% after in Karanjkhop. This reflects a strong uptake of modern farming techniques driven by increased awareness and accessibility through project initiatives.
	Increase in Crop Diversification seasonally and dry-land horticulture	 • As per survey respondents the project brought significant changes to their cropping practices in Karanjkhop. Before the intervention, only 19% practiced mixed cropping which increased to 67% post the intervention. • After the intervention, 67% of respondents adopted triple cropping (three crop per year), compared to 0% before the intervention. • Seasonal diversification and planting of dryland horticulture crops, like fruits and vegetables, have been widely adopted. • However, the respondents have reported of wide adoption of water intensive crops like sugarcane and wheat due to availability of water. 
Economic and livelihood impact	Increase in Household Savings due to alternative source of cooking fuel	• Among the **5 beneficiaries interviewed in Karanjkhop,** each reported an average savings of about **250 INR per month on cooking fuel costs for a family of five**, totaling an **annual savings of 3,000 INR per household**, Additionally, due to the use of cow dung manure in place of chemical fertilizers, households reported approximate savings of ₹1,200-1,500 per acre annually on fertilizer costs. • Additionally, the participants noted a more predictable household budget, enabling them to allocate resources more effectively towards essential areas such as education, healthcare, and agricultural investments.

	Increase in economic gains by landless beneficiaries	• Survey interactions with 3 landless beneficiaries in Karankhop revealed an **average seasonal income increase of approximately INR 7,000** across various enterprises, including tailoring and refreshment centers.
	Increase in economic gains due to crop diversification and enhanced crop yield	• The transition to diversified cropping practices has significantly improved farmers' economic resilience and resource efficiency. In Karanjkhop, average annual farm income has increased by approximately INR 45,000.
	Elevated aspirations	• During the FGD interactions, participants expressed a clear shift in their aspirations, highlighting how the project has inspired them to aim higher in their farming practices and overall livelihoods. • Farmers in Karanjhkop, shared that the interventions have not only improved their agricultural productivity but also expanded their vision for the future. Many farmers spoke of their newfound confidence in adopting **advanced farming techniques, such as mixed cropping and dryland horticulture**, and their desire to further enhance their income through diversified crops. • Several participants in Karanjkhop**,** enthusiastically expressed their interest in exploring the cultivation of exotic fruits such as **dragon fruit, strawberries, and passion fruit** as part of their future planning on a major scale to elevate their income. • The exposure to new ideas through training, exposure visits, and community interactions has motivated them to look beyond immediate challenges and envision long-term improvements in their farms and communities.
Impact on environment	Improved sustainable livelihood practices	• Five survey participants using biogas technology in Karanjkhop reported **a notable 30% reduction in their dependence on chemical fertilizers**, attributed to the use of organic manure generated through their biogas plants. This reduction results in estimated cost savings of **approximately ₹1,200-1,500 per acre annually**. The shift not only eases input costs for farmers but also underscores the positive impact of sustainable livelihood practices on both agricultural productivity and environmental sustainability.
	Biodiversity Gains through soil and water conservation interventions	• During the FGD interactions, **over 85% participants in Karanjkhop** reported a noticeable increase in wildlife fauna in the vicinity as a result of the project's interventions. • Participants specifically mentioned more frequent sightings of animals such as wild hares, Indian foxes, and mongooses, along with increased activity of birds like peacocks, partridges, and mynas in and around their fields.
Impact on community engagement and empowerment	Increase in Community Cohesion and Collaboration	• During the FGD interactions, participants emphasized that the project significantly strengthened community cohesion and collaboration across all locations. Activities such as PRA and regular Village Development Committee (VDC) meetings were seen as vital in fostering a sense of collective responsibility. • These platforms allowed farmers to share knowledge, discuss challenges, and collaborate on adopting practices like mixed cropping and dryland horticulture. • The active participation of GPs was also recognized, as they facilitated coordination and helped ensure that all community members were engaged in the project.


Deloitte team interacting with implementation team during field visit

Technical Review Findings

Karanjkhop, Satara, Maharashtra

Introduction and Objective of the Project

The Karanjkhop watershed covers approx. 16.41 sq. kms. and includes 2 villages – Karanjkhop and Morbend. This watershed located in the Maharashtra region with significant agricultural activity. The region is characterized by a mix of mid-range and low-lying areas, with a reliance on groundwater sources such as open wells and borewells for irrigation. The area experiences seasonal water shortages, particularly during the summer months, which has led to the implementation of various water conservation and recharge interventions.

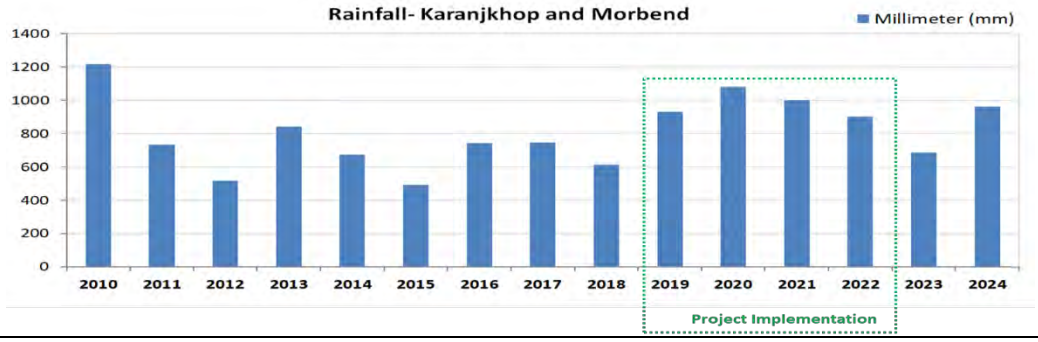
Climate and Rainfall

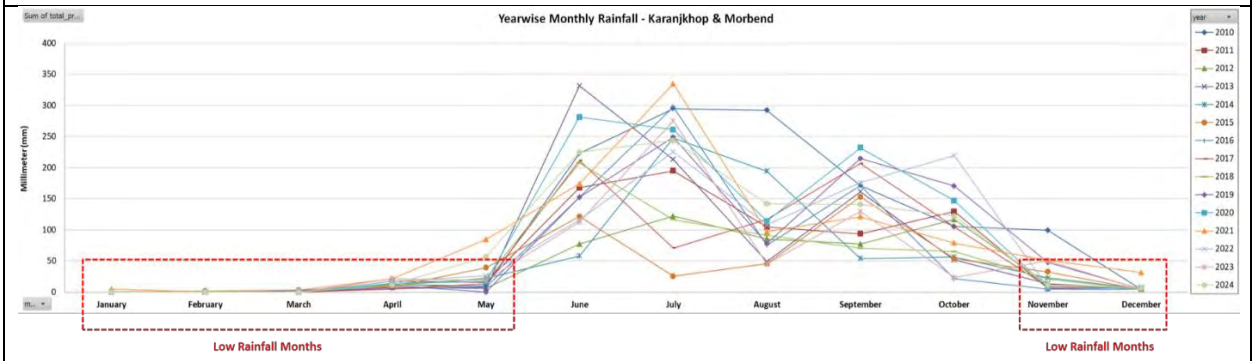
- **Rainfall**: The region experiences seasonal rainfall, with a marked difference in water availability during the monsoon and dry seasons. The annual rainfall varies based on the intensity of the monsoon.
- **Temperature**: There is a significant variation between day and night temperatures, which affects evaporation rates and water retention in the soil.

Agricultural Practices

- **Major Crops**: The region's primary crops include fodder, jowar (sorghum), bajra (pearl millet), and vegetables, with crop intensity generally spanning two cycles per year. Summer crops depend heavily on available water, and farmers struggle to irrigate during the dry season.
- **Crop Water Demand**: In summer, when water is scarce, farmers rely on water sources from open wells and borewells, often supplemented by water tankers.

Rainfall trends of Karanjkhop

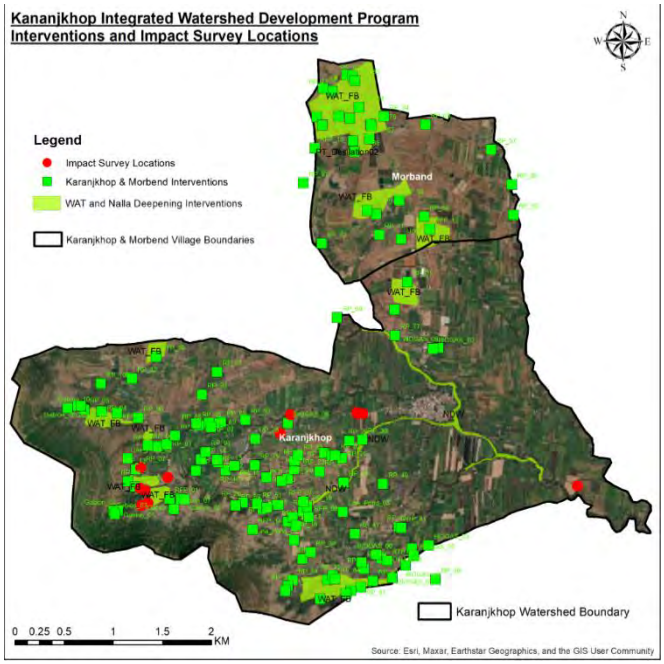




Overview and technical assessment of Sampled intervention areas

1. Borewell

- **Location**: Mid-region of Karanjkhop.
- **Drill Depth**: 100 ft.
- **Current Water Level**: 27.42 ft (without casing), with a 2 ft casing.
- **Water Availability**: The borewell can support up to two crops per year, depending on water availability. During the summer, the water level may be low, but the borewell is still functional due to ongoing recharge interventions in the region.
- **Water Level Fluctuations**: The water level is stable, with minimal fluctuations during the dry season when the water is continuously extracted over 3 days. This indicates good groundwater retention due to recharge activities.



2. Open Well 2 (Mid-Range)

- **Location**: Connected with a natural drain at a junction point.
- **Total Depth**: 60 ft.
- **Water Availability**: Before the intervention, the open well would dry up in summer, and farmers had to rely on tankers for water supply. However, due to the interventions upstream in the ridge area, water is now available even in the summer months.
- **Water Level**: In the summer, the well maintains a minimum of 6 ft of water, and after continuous extraction for 3 days, the well remains full, indicating a high level of groundwater recharge.
- **Monsoon Period**: During the monsoon, overflow is observed in the open well due to excess water being discharged through the connected drains.

3. Recharge Pit and Drainage Structures

- **Recharge Pit**: A recharge pit with a 10-meter diameter and 5-meter depth has been constructed on the 2nd-order drain. This pit is connected to outlets, contributing to groundwater recharge.
- **Drainage System**: The region features multiple drainage structures that connect natural drains to recharge pits, improving the infiltration of surface water into the groundwater system.

4. Ambedara Structure

- **Design**: The Ambedara structure is a plain bed with a concentric rectangular shape. The maximum height of the structure is 2.5 meters in the middle, with various outlet points.
- **Location**: The structure is built along a natural drain.
- **Irrigation Area**: The command area for the Ambedara structure spans 152 hectares, which significantly contributes to the irrigation supply in the region.
- **Water Availability in Summer**: The structure does not provide water for 1 to 1.5 months during the summer due to limited inflow from surrounding sources.

5. Gabion Structure

- **Design**: A Gaibon structure with a keywall has been constructed along the 2nd/3rd order stream. The structure helps in water storage and discharge control.
- **Water Availability**: This structure plays a key role in regulating water flow during the monsoon and provides controlled water retention during dry spells.

Water Discharge Test Results

1. Discharge Test Details

- **Borewell Depth**: 328 ft with the first water strike at 70 ft during installation.
- **Casing Water Level (CWL)**:
    - 92 ft (initial measurement),
    - 91.3 ft (15 minutes after test),
    - 88 ft (30 minutes after test).
    - This indicates that recuperation is happening during the testing period, demonstrating the borewell's ability to recover water levels after extraction.
- **Monsoon Water Levels**: The borewell exhibits water levels ranging from 5 ft to 25 ft during the monsoon season, indicating good water availability during wetter months.
- **Discharge Test Observations**: The discharge test indicates that the groundwater system is responsive to recharge and that the extraction rates are balanced with recuperation, ensuring sustainable water extraction for irrigation needs.

Challenges and Interventions

1. Challenges in Water Availability

- **Seasonal Water Shortages**: Despite various interventions, the region still faces water scarcity, particularly during the summer months, when the available water sources are strained.
- **Geological Constraints**: The region's geology, including the presence of hard basaltic rock and other impermeable layers, limits the infiltration capacity of surface water into the groundwater system. This has led to the construction of artificial recharge structures such as recharge pits and drainage systems to enhance water retention and infiltration.

2. Interventions for Water Recharge and Conservation

- **Recharge Pits and Structures**: Recharge pits, drainage systems, and embankments have been strategically constructed in the region to enhance groundwater recharge. These interventions help slow down the flow of surface water and increase the detention time, allowing for greater water infiltration into the aquifers.
- **De-siltation and Deepening**: De-siltation activities have been carried out in the biggest water bodies in the village, and the deepening of existing nallas (drains) has improved water retention in the region.
- **Government Restrictions on Borewell Depth**: Due to over-exploitation of groundwater, the government has imposed a restriction on the drilling depth of borewells, limiting them to a maximum depth of 150 ft. This measure is aimed at preventing further depletion of deep groundwater resources.

Hydrogeological Impacts of IWD

Normalized Difference Water Index (NDWI)

Precursor to NDWI – Identification of annual no-rainfall months before and after the intervention

	2015	2016	2017	2018	2019
January	0	0	0	0	0
February	2	0	0	2	0
March	4	0	0	0	0
April	9	5	5	11	11
May	39	8	13	22	0
November	33	5	9	21	48
December	4	4	7	4	5

L2 severity Months Chose for NDWI:

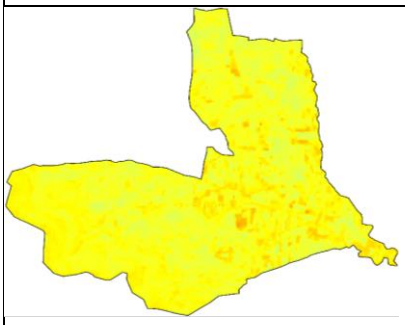
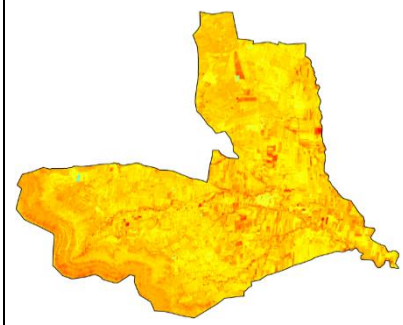
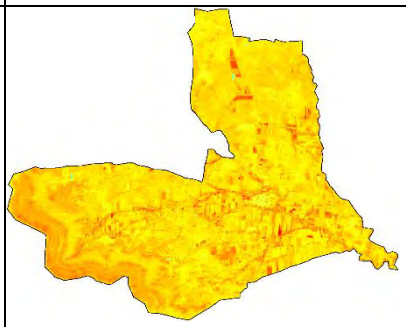
- 2016 March
- 2017 March
- 2019 March

	2022	2023	2024
January	0	0	0
February	0	0	0
March	0	3	0
April	18	22	11
May	26	19	57
November	7	51	12
December	4	4	7

L2 severity Months Chose for NDWI:

- 2022 March
- 2024 March

NDWI Before Intervention

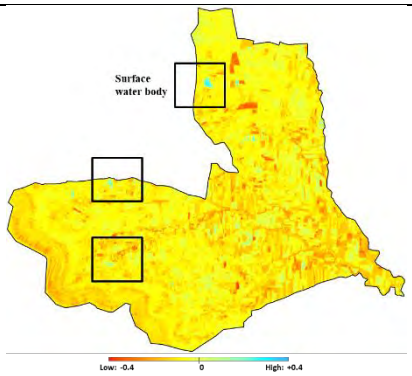
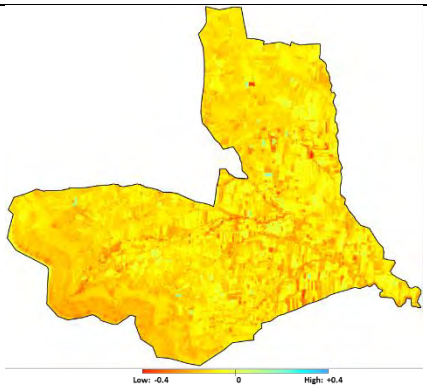
March 2016	February 2017	March 2019
		

In March 2016, the area appeared to be in a neutral phase, showing neither positive nor negative values. However, by March 2017, water masks were observed in the study area, which corresponded to artificial storage structures (lined farm ponds) that existed before the project timeline.

In both March 2017 and March 2019, the area exhibited negative values, and surface water had been completely lost. This was attributed to several factors:

- Poor rainfall during the 2018 and 2016 monsoon seasons.
- A continued period of no-rainfall severity.
- Lack of adequate storage for monsoon water.

NDWI After Intervention

March 2022	March 2024
	

March 2022 marked the final month of the project period, during which the area successfully regained its surface water. By this time, the watershed had established perennial water resources. This restoration was attributed not only to the high runoff from the 2021 monsoon but also to the watershed's enhanced capacity to retain and manage water effectively.	Due to a 400mm reduction in monsoon input in 2023 compared to 2021, the area lacked surface water in March 2024. However, the number of recharge and storage structures has increased, contributing to water conservation efforts. The presence of water in the recharge ponds indicates that these conservation practices are actively functioning and positively influencing groundwater availability in the region.

Ground water quality testing: The Integrated Watershed Program (IWP) was implemented in a targeted area to enhance water availability, improve soil health, and reduce water quality degradation. Various interventions, such as earthen farm bunds, recharge farm ponds, lined farm ponds, loose boulder structures, gabions, and WADI (Water Absorption Desilting and Irrigation), were introduced to achieve these objectives. Water quality testing was conducted before (2016) and after (2024) the implementation of the program to assess its impact on the water quality in the area. This report presents a comparative analysis of the water quality test results obtained in 2016 and 2024, focusing on key parameters such as fluoride, pH, chloride, turbidity, total dissolved solids (TDS), iron, total hardness, nitrates, and total alkalinity.

Parameter	Description	Before (2018)	After (2024)	Change & Interpretation
pH	Indicates acidity (low pH) or alkalinity (high pH); ideal range: 6.5–8.5	7.05	7.12	Slight increase; pH remained nearly neutral and within the acceptable range. Indicates watershed interventions did not significantly affect acidity/alkalinity.
Chloride (mg/L)	Indicator of contamination from saline/industrial sources; safe limit: ≤250 mg/L	39.22	29.8	Decreased by 24%; suggests reduced salinity and improved water quality, possibly due to better drainage and water management. Monitoring still recommended.
Fluoride (mg/L)	Beneficial in small amounts; toxic at high levels; safe range: 0.5–1.5 mg/L	0.1583	0.09	Decreased by 0.0683 mg/L; still well below the maximum limit. Indicates possible improvement in source or treatment processes.
Total Hardness (mg/L)	Caused by calcium/magnesium; affects taste and scaling; >300 mg/L = very hard	1697.45	378	Decreased by 77.7%; significant improvement. Indicates better water quality due to reduced calcium/magnesium—possibly from a new water source or treatment. Watch for possible corrosiveness at very low hardness.

Conclusion: The watershed project has had a highly positive impact on the water quality of open wells

Positive outcomes include:

1. Reduced Fluoride Levels: Fluoride concentrations decreased significantly, improving water quality.
2. Lower Chloride Levels: Chloride levels dropped by 24%, indicating reduced salinity.
3. Stable pH Levels: The pH remained nearly neutral, showing no adverse changes in water acidity or alkalinity.
4. Dramatic Reduction in Total Hardness: Total hardness decreased by 77.7%, indicating improved water softening and reduced mineral content

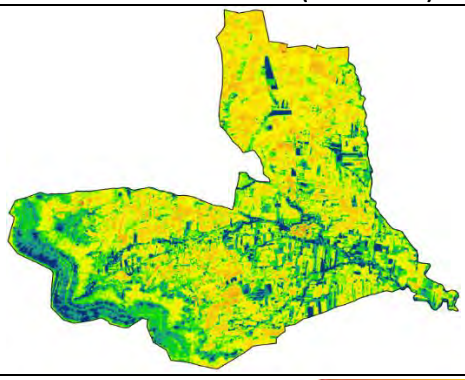
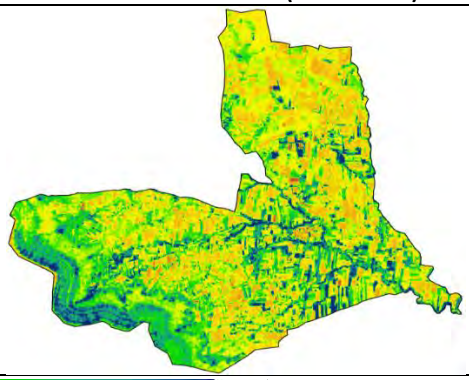
However, challenges remain, such as:

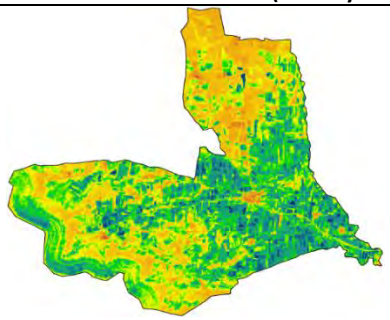
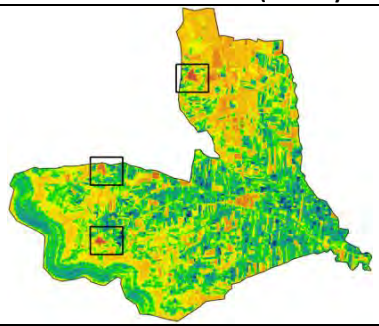
Increased Sulphate and Chloride Levels: Sulphate levels rose from 10.78 mg/L to 18.5 mg/L, and chloride levels increased from 21.65 mg/L to 33.35 mg/L, indicating rising salinity and potential contamination.

Recommendations

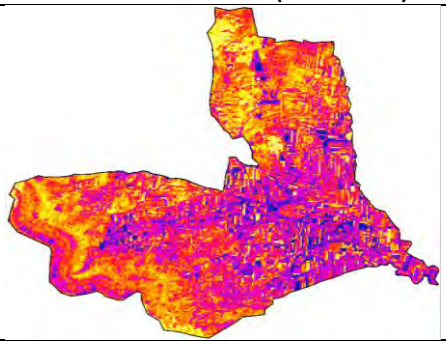
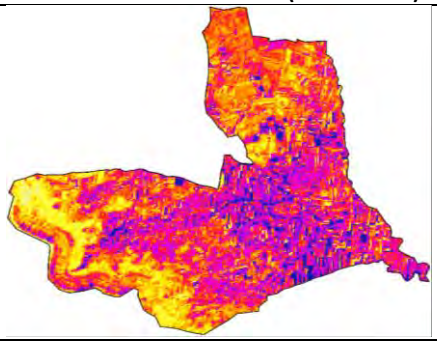
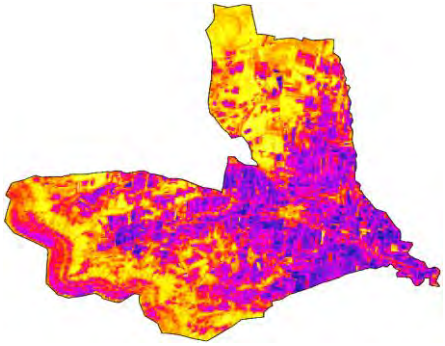
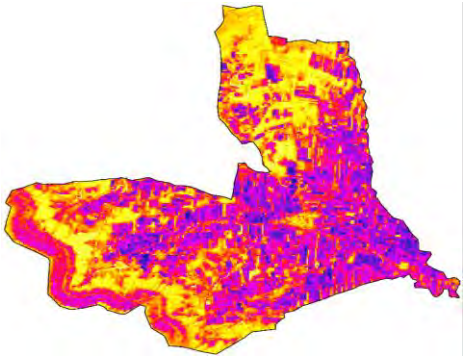
- Monitor Fluoride and Chloride: Continue to monitor fluoride and chloride levels. Although they are well within acceptable limits, any further drastic fluctuations should be investigated.
- Investigate Hardness Changes: The sharp decrease in hardness should be investigated further to determine if the water is becoming too "soft," as this could increase the risk of corrosion in pipes and water distribution systems.
- pH Monitoring: The slight increase in pH is minor and likely not a problem. However, it is important to continue monitoring the pH to ensure that the water does not become too alkaline over time.

- Further Research: Investigate the causes of the large decrease in hardness—whether it is due to natural factors, a change in the local groundwater source, or treatment practices. This will help understand whether the changes are sustainable or if they require adjustments in water management practices.

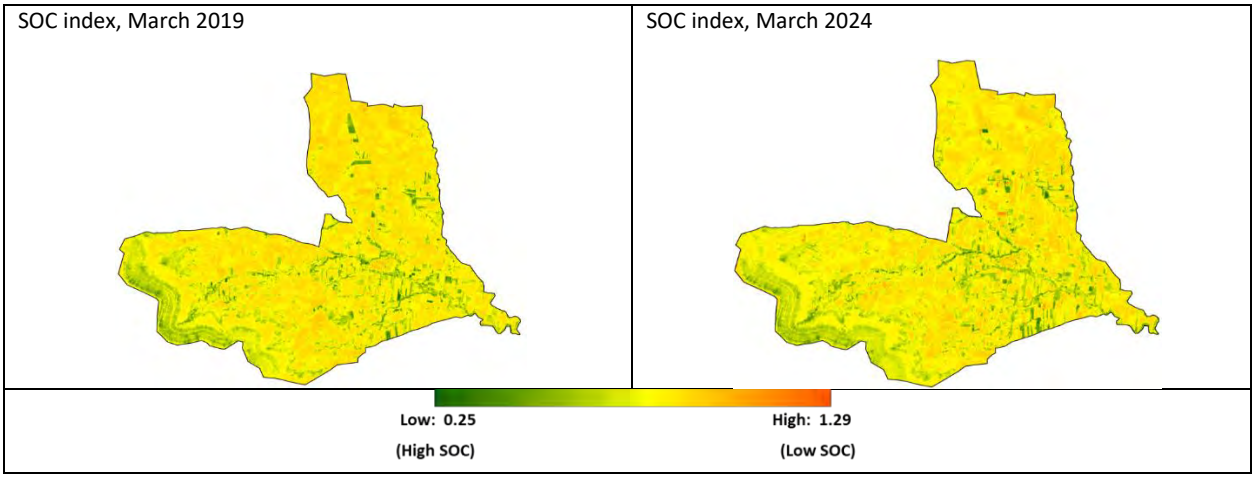
Normalized Difference Vegetation Index (NDVI)	
NDVI analysis Pre-monsoon	
NDVI Before Intervention (March 2019)	NDVI After Intervention (March 2024)
	
	
The NDVI results for March 2019 indicated the presence of either a second crop or long-term crops in the lower valley regions. The higher vegetation values were associated with irrigated plots, with groundwater serving as the primary irrigation source. Open wells were observed in and alongside the low-lying natural drains, highlighting the reliance on groundwater for crop irrigation during this period.	By March 2024, the region exhibited significantly reduced vegetation (second crops/long-term crops). This decrease can be attributed to the reduced rainfall during the 2023 monsoon season, which led to a lower availability of natural water sources. While groundwater likely remained a key source for irrigation, some agricultural plots—particularly in the northern parts of the area—had completely disappeared by March 2024, likely due to insufficient groundwater availability. This underscores the critical role of rainfall in determining the land cover and agricultural practices within the watershed. Despite the interventions aimed at capturing monsoon runoff and enhancing groundwater recharge through effective storage structures, the monsoon remains the primary driver of land cover changes in this region. To ensure agricultural sustainability, it is crucial to plan crop selection based on the available water resources each year. Short-term, drought-resistant crops should be prioritized for the Rabi season, and careful water budgeting should be implemented. Regular monitoring of groundwater extraction during the non-monsoon season is essential to ensure that it remains within sustainable limits, given the unpredictability of future monsoon inflows.

NDVI analysis post-monsoon	
NDVI Before Intervention (January 2019)	NDVI After Intervention (January 2025)
	
	

Typically, surface water formation occurs within the study area after the monsoon season. In January 2019, prior to the intervention, the area exhibited healthy green cover with abundant vegetation moisture. However, no water bodies were present. The primary water source for vegetation during this period was rainfall from the monsoon season, lasting until December, while groundwater contributed to irrigation in January.	Recent remote sensing imagery for January 2025 indicated the continued presence of surface water within the study area. Despite a reduction in rainfall in 2024 compared to 2021, the area maintained robust vegetation levels and spatial distribution, without compromising surface water availability. The NDVI results confirmed the ongoing progress towards achieving sustainability in the region.

Normalized Difference Moisture Index (NDMI)	
NDMI analysis Pre-monsoon	
NDMI Before Intervention (March 2019)	**NDMI After Intervention (March 2024)**
	
March 2019: NDMI values reflected adequate moisture levels in vegetation, correlating with healthy crop conditions supported by groundwater irrigation.	*March 2024:* A noticeable decline in NDMI values indicated significant water stress in vegetation. This stress is linked to poor rainfall in the 2023 monsoon season, leading to insufficient groundwater recharge and highlighting the vulnerability of vegetation to water scarcity.
NDMI analysis post-monsoon	
NDMI Before Intervention (January 2019)	**NDMI After Intervention (January 2024)**
	
January 2019: NDMI values suggested sufficient moisture content in vegetation, maintained by residual monsoon rainfall and groundwater source.	*January 2025:* NDMI values remained stable, indicating sustained vegetation moisture levels despite reduced rainfall in 2024. This stability points to successful interventions enhancing groundwater recharge and surface water retention, contributing to improved vegetation resilience.
	

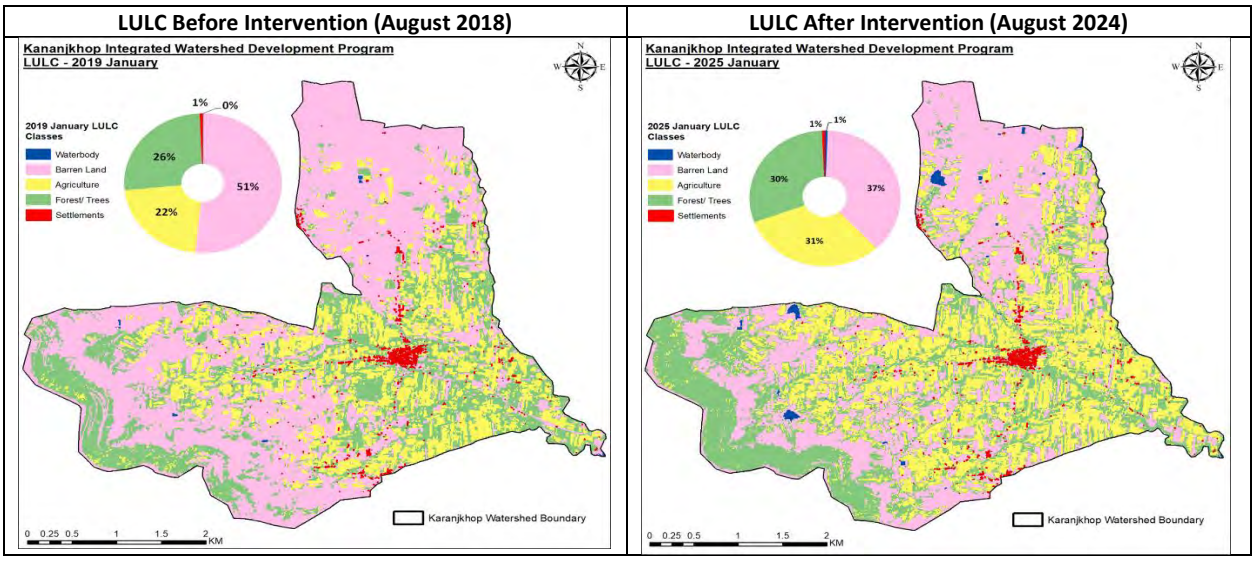
Soil Organic Carbon (SOC): The map representing the SOC index utilizes a color scale from green to orange. Areas with green indicate lower SOC index values, reflecting higher soil organic carbon content, while areas with orange represent higher SOC index values, indicating lower soil organic carbon content. Additionally, regions with the highest index values (depicted in orange) correspond to water bodies and extremely bare soils.



SOC Index Analysis: Karanjkhop IWD (March 2019 and March 2024).

- **March 2019 SOC Index Map:**
  The SOC index map for March 2019 shows the baseline organic carbon levels in the region. Notably, the lower valley region exhibited **moderate soil organic carbon content**, which was reflected in **higher index values** compared to other regions. The initial state of the soil indicated a need for improvement in organic matter content.
- **March 2024 SOC Index Map:**
  By March 2024, the SOC index map reveals a slight overall reduction in the index values. This indicates a minor improvement in soil organic carbon levels compared to 2019, but the change is not substantial. While the reduction in the index value may suggest a slight increase in organic carbon, the overall change is still relatively modest.

Project Impact: The comparison of SOC index values between March 2019 and March 2024 indicates that while no significant change has yet occurred, there has been a slight reduction in the index values across the region. Soil properties, including organic carbon content, typically require longer timeframes (usually more than five years) to show significant changes. The project has only been in progress for a short period, and more substantial improvements in soil health are expected over a longer duration. The observed reduction in SOC index levels signifies that the improvement process has begun to show positive effects on soil fertility and overall soil health, and it is anticipated that the organic carbon levels will continue to rise in the future as the project progresses.



LULC Class		2019	2025
		Area_Ha	Area_Ha
	Barren	843.00	614.53
	Agriculture	356.98	511.10
	Forest/ Trees	424.70	492.23
	Water	1.50	9.27
	Settlements	11.00	11.00

INSIGHTS ON CURRENT LULC CHANGE (2019 TO 2025):

The Land Use/Land Cover (LULC) analysis for the study area, comparing data from 2019 to 2025, demonstrates notable transformations in land cover patterns.

1. **Water**: The area classified as water increased from 1.50 hectares in 2019 to 9.27 hectares in 2025, representing a substantial expansion. This change is indicative of the successful implementation of water conservation and storage structures, which have enhanced surface water retention within the region.
2. **Barren**: The area of barren land decreased from 843.00 hectares in 2019 to 614.53 hectares in 2025, suggesting a reduction in land degradation or an improvement in land management practices. This reduction can be credited to the project's efforts in land reclamation, afforestation, and soil conservation, all of which have contributed to the rehabilitation of degraded areas and a reduction in land degradation.
3. **Agriculture**: Agricultural land increased from 356.98 hectares in 2019 to 511.10 hectares in 2025. This expansion indicates an intensification of agricultural activities, likely facilitated by enhanced water availability and improved irrigation infrastructure resulting from conservation measures.
4. **Forest/Trees**: Forested areas increased from 424.70 hectares in 2019 to 492.23 hectares in 2025. This growth is consistent with successful afforestation initiatives, natural regeneration, or a combination of both, contributing to the expansion of vegetative cover within the region.
5. **Settlements**: The area dedicated to settlements remained stable at 11.00 hectares between 2019 and 2025, indicating no significant changes in urban development or infrastructure expansion during this period.

In summary, the LULC analysis highlights positive changes in water resources, agricultural land, and forest cover, suggesting effective land management interventions and successful conservation practices in the region. These transformations reflect a move towards greater sustainability and improved environmental conditions after the project period

Overall conclusion of technical findings

The watershed intervention in Karanjkhop, Maharashtra, has had a profound and positive impact on the region's water resources, agricultural practices, and overall environmental sustainability. The combination of different physical interventions and conservation efforts has resulted in improved groundwater retention, and a more reliable water supply for the region. This has proven particularly beneficial during dry periods, ensuring water availability for irrigation and domestic use, despite fluctuating rainfall patterns. The **Land Use/Land Cover impact** witnessed significant improvements in water resources, agricultural land, and forest cover, indicating the success of the watershed project in promoting sustainable land management practices. Remote sensing imagery further confirmed that, despite reduced rainfall in recent years, surface water remained available, indicating the project's success in enhancing water retention and management.

Recommendations:

Continued Monitoring and regular Maintenance of the water management structures, particularly during dry seasons to ensure their long-term functionality.

Expansion of Recharge Structures especially in areas still experiencing water scarcity, will enhance the overall groundwater recharge capacity. Extending these interventions to other parts of the watershed will ensure more consistent and widespread water availability, reducing dependency on external water sources.

Diversification of Water Sources:

To safeguard against potential future water stress, it is recommended to explore additional water sources, such as rainwater harvesting systems and new water storage solutions. These strategies will enhance the region's resilience to climate variability, ensuring that agricultural and domestic water needs are met year-round.

Promotion of Sustainable Land-Use Practices:

To complement the watershed project's success, it is important to continue promoting sustainable land-use practices, including agroforestry, soil conservation, and water-efficient farming techniques. These practices will help reduce soil erosion, improve water retention, and ensure the long-term health of the watershed, supporting both environmental and agricultural sustainability.

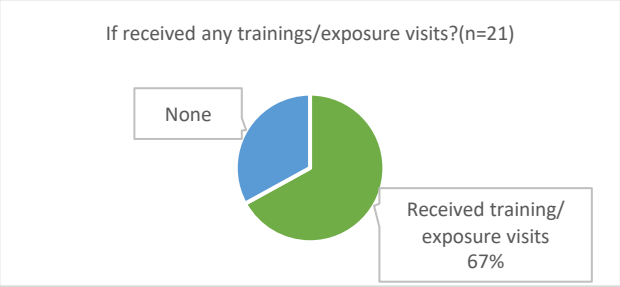
BISLD in Satara

Intervention Location 2: Bhadale

Outreach	*Total population*	*2,533*
Area Treatment (Farm bunding/outlets/WAT/CCT)	*Total work done*	*17,771 CuM*
	Area covered	*251 Ha*
	Water recharged in single filling	*177 lakh litre*
Drainage line treatment	*Loose Boulder Structure*	*101*
Gabion	*Total work done*	*15*
Recharge farm ponds	*Count*	*25*
	Water recharged in single filling	*219 lakh litre*
Nalla deepening	*Total work done*	*7,908 CuM*
Line farm pond		*7*
Desiltation of percolation tank	*Additional storage capacity created*	*78.5 lakh litre*
Engagement with landless beneficiaries		*25*
Water use efficiency measures (Drip/Sprinkler/Drum kit)		*200*
Biogas unit		*19*
WADI (Horticulture development)		*25*
Crop diversification	*Area diversified*	*120 acre*
Training/exposure visits/capacity building support	*Numbers*	*8*

OUTCOME AND IMPACT

Impact on knowledge and farming techniques	Increase in knowledge attributable to exposure visits and trainings



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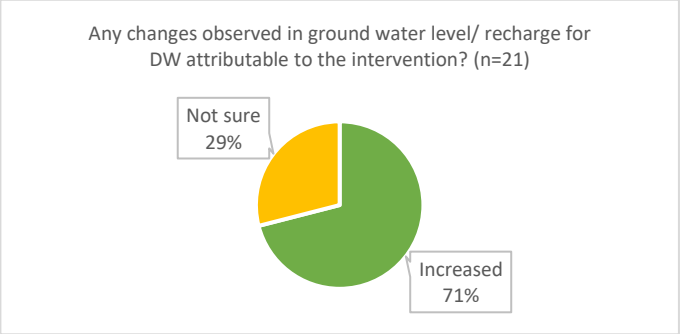
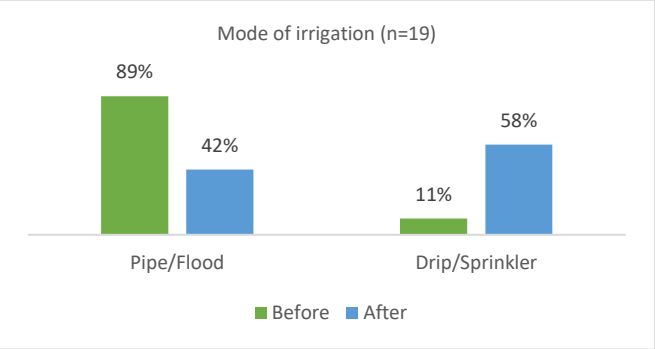
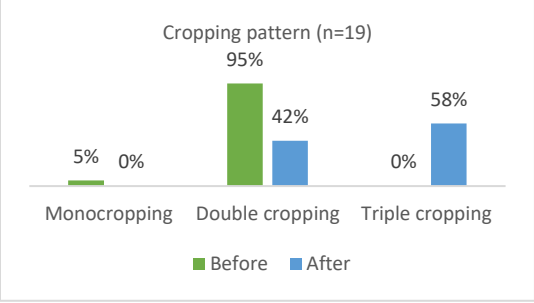
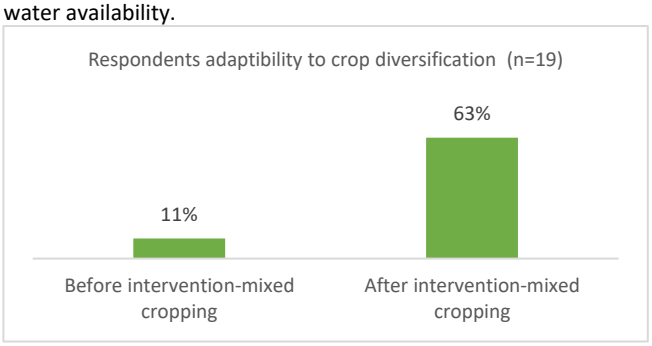
- In Bhadale, 67% of survey respondents reported having participated in training programs or exposure visits. The majority of these participants were involved in capacity-building activities focused on biogas units, drum kit systems, kitchen gardening, dryland horticulture, micro-irrigation techniques, vermicomposting, and leadership development. Exposure visits complemented this learning by demonstrating successful implementations in similar contexts.

Impact on water resource	Increase in Groundwater Levels	 • In Bhadale about 71% of the survey respondents reported an increase in groundwater levels following the interventions, with an average rise of about 13 feet.
	Increase in Groundwater availability for potable and irrigation use	• In Bhadale, according to responses from 19 survey participants, groundwater availability increased by two months—rising from nine months prior to the intervention to eleven months post-intervention
Impact on agriculture and irrigation practices	Increase in Adoption of Modern Farming Techniques	 • In Bhadale, the use of drip and sprinkler irrigation systems increased markedly from 11% before the intervention to 58% afterward, indicating a substantial shift toward modern farming practices facilitated by greater awareness and improved access through project efforts.
	Increase in Crop Diversification seasonally and dry-land horticulture	 • According to survey respondents, the project led to notable shifts in cropping practices in Bhadale. Prior to the intervention, only 11% practiced mixed cropping, which rose to 63% post-intervention. • Triple cropping (growing three crops per year) was adopted by 58% of respondents after the intervention, compared to none before. • Farmers widely embraced seasonal diversification and the cultivation of dryland horticulture crops such as fruits and vegetables. However, many also reported a growing preference for

		water-intensive crops like sugarcane and wheat, driven by improved water availability. 
Economic and livelihood impact	Increase in Household Savings due to alternative source of cooking fuel	• All three beneficiaries interviewed in Bhadale reported an average monthly saving of ₹250 on cooking fuel for a family of five, amounting to ₹3,000 annually per household. Additionally, by using cow dung manure instead of chemical fertilizers, households saved approximately ₹1,200 per acre each year on fertilizer expenses. • Participants also noted that these savings led to a more predictable household budget, allowing for better allocation of funds toward essential needs like education, healthcare, and agriculture. This has contributed to greater financial stability and improved overall well-being for their families.
	Increase in economic gains by landless beneficiaries	• Survey interactions with 2 landless beneficiaries in Satara revealed an **average seasonal income increase of approximately INR 7,000**
	Increase in economic gains due to crop diversification and enhanced crop yield	• The shift to diversified cropping practices across project locations has notably enhanced farmers' economic resilience and efficient use of resources. In Bhadale, this transition has led to an **average annual increase of approximately ₹55,000 in farm income**.
	Elevated aspirations	• During the FGD sessions, participants expressed a noticeable shift in their aspirations, emphasizing how the project has motivated them to pursue more ambitious goals in both farming and overall livelihood improvement. • Farmers in Bhadale shared that the interventions have not only boosted agricultural productivity but also broadened their outlook for the future. Many spoke of gaining confidence in adopting advanced practices like mixed cropping and dryland horticulture, along with a strong desire to further increase their income through crop diversification.
	Improved sustainable livelihood practices	• Three survey participants in Bhadale who adopted biogas technology reported a **significant 30% reduction in their reliance on chemical fertilizers**, thanks to the use of organic manure produced through their biogas units. This shift translates to **estimated savings of around ₹1,200 per acre annually**. Beyond lowering input costs, it highlights the dual benefits of sustainable livelihood practices—enhancing both agricultural productivity and environmental sustainability.
Impact on environment	Biodiversity Gains through soil and water conservation interventions	• During the FGD interactions, **over 80% participants in Bhadale** reported a noticeable increase in wildlife fauna in the vicinity as a result of the project's interventions.
Impact on community engagement and empowerment	Increase in Community Cohesion and Collaboration	• During FGD interactions, **80% participants** highlighted that the project significantly strengthened community cohesion and collective action through platforms like PRA exercises, VDC meetings, and active GP involvement—enabling knowledge-sharing, joint adoption of sustainable practices, and collaborative efforts in water conservation, which fostered a strong sense of shared purpose and ownership among farmers.

Deloitte team interacting with VDC members and villagers of Bhadale

Technical Findings
Bhadale, Satara, Maharashtra

Introduction and Objective of the Project

The region of interest is an agricultural area (about 24.1 sq km) facing challenges related to water availability for irrigation. The primary water sources for irrigation in the area have traditionally included tankers transporting borewell water. In recent years, a variety of water conservation interventions have been implemented, including the construction of recharge pits, de-siltation of ponds, and earthen tanks for water storage. The region's geological characteristics—specifically the presence of red soil, weathered basaltic soil, and black cotton soil—play a significant role in water retention and seepage rates.

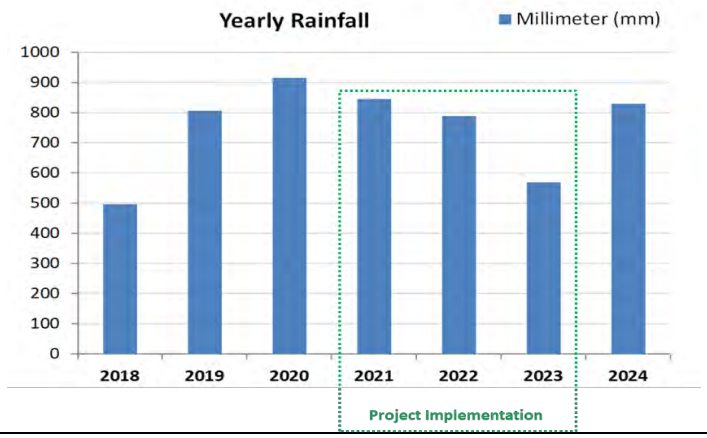
Climate and Rainfall

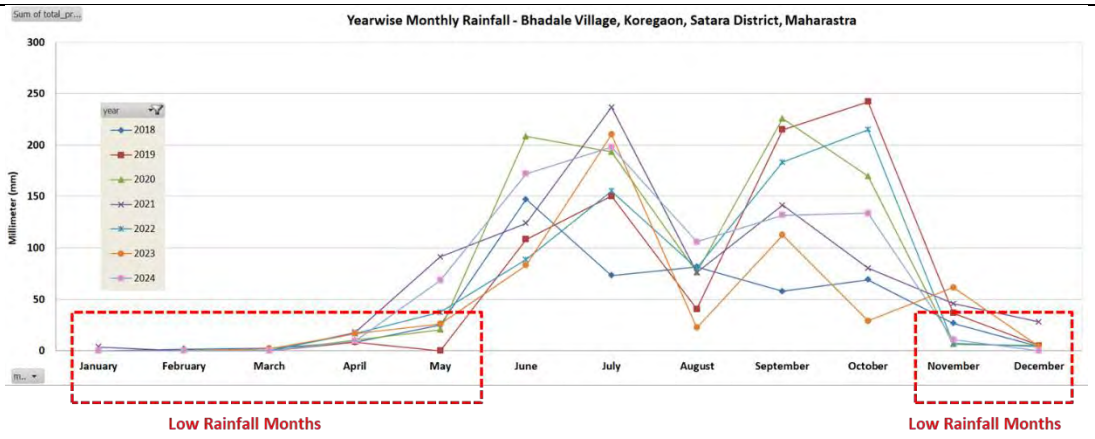
- **Rainfall**: The region experiences seasonal rainfall, predominantly from the southeast monsoon, with annual rainfall ranging between 600 to 1000 mm.
- **Temperature Variations**: A significant diurnal temperature difference is observed, which affects evaporation rates and surface water availability.

Soil and Aquifer Conditions

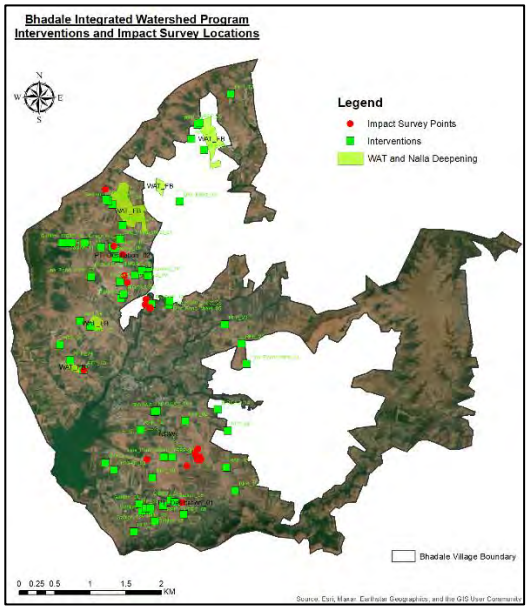
- **Shallow Aquifers**: There is a limited availability of shallow aquifers in the region, prompting farmers to seek alternative water sources.
- **Soil Composition**: The soils in the area include red soil, weathered basaltic soil, and black cotton soil, which exhibit high seepage rates. These soils contribute to challenges in water retention and create the need for water management interventions like recharge pits and earthen tanks.

Rainfall trends of Badale





Overview and technical assessment of Sampled intervention areas



1. Open Wells and Bore Wells

- **Open Wells**: Over 20 major open wells are observed in the region, particularly in the low to mid-elevation areas. These wells are strategically dug along natural streams, which indicates the farmers' historical knowledge of the area's topography and water availability.
- **Bore Wells**: Bore wells are less common, especially in the lower regions, and are generally found in the upper regions. Farmers rely on open wells more heavily for irrigation, with the water level in these wells reaching the natural ground level in December, indicating that the shallow aquifers are close to saturation during this time.
- **Water Level Dynamics**: The open wells in this area are connected to shallow aquifers, and the water levels in these wells fluctuate depending on the rainfall and recharge interventions. The local farmers rely on surface runoff, which is believed to aid in shallow aquifer rejuvenation, especially after rain events.
- **Recharge and Water Diversion**: Farmers also use borewell water, which is pumped into open wells for storage and future irrigation. This practice is indicative of the limited potential of deep aquifers in the area, as farmers tend to rely on readily available water from shallow sources and surface runoff rather than drilling deep bore wells. The use of water diversion and transmission systems has improved the water availability for agricultural use across the region.

2. Percolation Tank B

- **Structure and Function**: Percolation Tank B (PT B) is a key water conservation structure in the region. The tank is located at the intersection of two low-order streams and is designed to capture surface runoff during the monsoon season. The tank's embankment was constructed with approximately 500 to 600 cubic meters of earth, and a plastic membrane was placed along the sides to slow the percolation rate and enhance water retention.
- **Water Level and Seasonal Variability**: During the monsoon season, PT B fills to its full capacity, with water depths exceeding 15 feet. However, by January and February, the water level in the tank significantly drops to 4 to 5 feet, with water disappearing by the end of the dry season. The tank's command area provides vital water resources for agricultural use during the wet months.
- **Topographic Management**: The BAIF team has implemented topographic modifications, including soil traps and loose boulder structures (LBS) on the upstream slopes to slow down surface runoff, prevent soil erosion, and increase the detention time of water. These measures have contributed to longer water retention periods in the region, promoting groundwater recharge and improving the availability of water downstream for agricultural use.
- **Phreatic Zone Potential**: The presence of flowing streams at high elevations and the topographic modifications suggest that there may be potential for a phreatic zone (shallow groundwater reservoir) in the ridges, which could further enhance the local groundwater supply.

3. Government Check Dam and Naala Deepening

- **Check Dam**: A government-constructed check dam has been implemented in the area, but its effectiveness has been limited by the underlying geology, particularly the presence of hard basaltic rock strata. Despite the dam's construction, water retention has been poor due to the inability of the structure to withstand the geologic challenges posed by the basaltic layers.
- **Naala Deepening**: In addition to the check dam, the BAIF organization has carried out naala (stream) deepening in two locations downstream of the check dam to enhance water retention and storage. These efforts aim to increase the infiltration of surface water into the soil and prevent the water from running off too quickly.
- **Soil Conservation**: As part of the ongoing efforts to mitigate soil erosion, soil traps and continuous contour trenches have been excavated in strategic locations along the slopes of the region. These structures help moderate the speed of surface runoff and improve water retention in the local soil profile.

Hydrogeological Observations and Impacts

1. Shallow Aquifer Recharge

- The surface runoff from natural streams and rainfall contributes significantly to the recharge of the shallow aquifers in the region. The open wells strategically placed along these streams are vital for tapping into the shallow groundwater and storing water for agricultural use.
- The water levels in the open wells typically reach the natural ground level in December, reflecting the saturation of shallow aquifers after the monsoon season. However, the shallow aquifers are depleted during the dry months, necessitating external water sources like tankers for irrigation.

2. Water Diversion and Storage Practices

- Farmers are relying on a combination of water diversion techniques, such as pumping borewell water into open wells, and water storage in collection pits and earthen tanks to ensure year-round water availability. These practices help store water during the monsoon months and provide a water reserve for the dry season.
- The reliance on shallow aquifers and surface water storage highlights the limited potential of deep aquifers in the region. The practice of diverting water from borewells into open wells suggests that farmers prefer to manage available water resources efficiently rather than drilling additional borewells.

3. Geological Challenges and Solutions

- The region's geology, characterized by hard basaltic rock and black cotton soil, presents challenges for water retention and recharge. The massive basalt layers impede water infiltration and exacerbate the difficulties in building effective water storage structures, such as check dams.
- The BAIF team's use of topographic management techniques, such as soil traps, loose boulder structures, and naala deepening, has helped mitigate these challenges by slowing surface runoff and promoting groundwater recharge in the area.

- The interventions under the Integrated Watershed Programme have had significant hydrogeological impacts on the region. While challenges such as the hard basaltic geology remain, the strategic use of surface runoff, water storage practices, and topographic modifications have contributed to improved groundwater recharge, better water retention, and enhanced water availability for agriculture. The focus on shallow aquifer recharge and efficient water management practices has helped mitigate the impacts of seasonal fluctuations in water availability, ensuring more sustainable agricultural practices in the region.

Hydrogeological Impacts of IWD

Surface water availability and ground water recharge (NDWI analysis)

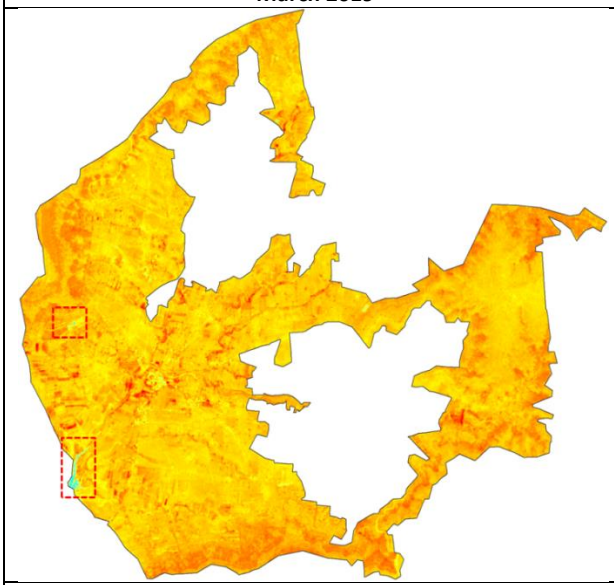
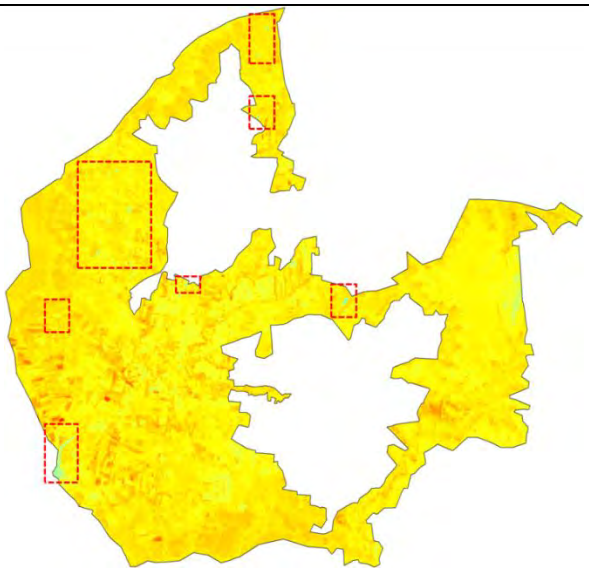
Normalized Difference Water Index (NDWI)

Precursor to NDWI – Identification of annual no-rainfall months before and after the intervention

	2018	2019	2020	2021	2022	2023	2024
January	0	0	0	4	0	0	0.0
February	2	0	1	0	0	0	0.0
March	2	0	0	0	0	2	0.0
April	8	9	10	18	17	17	9.4
May	25	0	20	91	38	26	68.6
November	27	37	6	46	7	61	10.8
December	4	5	5	28	4	4	0.0

Keeping the rainfall levels similar (2018, 2023), the pre monsoon critical months are identified and chosen for NDWI

— 2019 March & 2024 March. (2022 march is not considered as this timeline belong to project period)

NDWI Before Intervention	NDWI After Intervention
March 2019	March 2024
	
Before the intervention, the study area showed significant vegetation, with other areas experiencing water stress. There were only two primary water storage structures: one was a low-level reservoir, and the other was a small surface water storage structure located in the western part of the area.	Post-intervention, no new natural surface water bodies were created compared to the pre-intervention period. However, several small water bodies were identified in the NDWI analysis, which can be attributed to lined ponds constructed during the intervention. These small water bodies are not natural surface water bodies but rather storage structures fed by groundwater pumped through borewells. These structures serve primarily for water storage during dry seasons.

	Following the intervention, the vegetation that was previously under water stress has shown improvement, and the barren land, which was also under stress, has begun to show some recovery. Overall, the intervention has led to a moderate improvement in the vegetation and land conditions, albeit with the reliance on groundwater to support the new water storage structures.
Bhadale is a recently implemented project, and as with many watershed interventions, the progress typically accelerates over time, particularly after an incubation period following the intervention. This incubation phase allows the ecosystem to adapt and stabilize, especially if incoming rainfall remains consistent. During this period, the watershed gradually recovers, leading to improvements in vegetation, water retention, and overall ecosystem health. The rate of progress is expected to increase as the project matures, with positive outcomes becoming more apparent as the watershed system reaches equilibrium.	

Ground water quality testing

This report evaluates the impact of the project on the water quality of 2 open wells by analyzing key chemical parameters during (2018) and after (2024) the implementation of the project.

Parameter	Description	Before (2018)	After (2024)	Change & Interpretation
pH Value	Indicates water's acidity (low pH) or alkalinity (high pH). Ideal range: 6.5–8.5.	7.98	7.37	Decrease of 0.61, moving closer to neutral. Suggests reduced alkalinity, likely due to improved water management and dilution effects.
Chloride (mg/L)	Indicator of salinity or contamination from saline/industrial sources. Ideal: ≤250 mg/L.	21.65	33.35	Increase of 11.7 mg/L. Suggests rising salinity, possibly due to evaporation or agricultural runoff. Levels are still well within the safe range.
Fluoride (mg/L)	Beneficial in trace amounts; toxic at high levels. Ideal range: 0.5–1.5 mg/L.	0.0387	0.045	Slight increase of 0.0063 mg/L. Well below the permissible limit. No adverse impact on water quality.
Sulphate (mg/L)	High levels may affect taste and water quality. Ideal: ≤250 mg/L.	10.78	18.5	Increase of 7.72 mg/L. Still within safe limits, but rise may indicate pollution from agricultural or industrial sources. May affect taste if levels continue to rise.
Total Hardness (mg/L)	Caused by calcium and magnesium; affects taste and scaling. Ideal: 80–120 mg/L.	647.42	232	Significant decrease of 64.2%. Indicates improved water softening likely from filtration and watershed practices. Although still above ideal range, it's a major improvement; continued monitoring is recommended.

Conclusion: The watershed project has had a mixed impact on the water quality of open wells. Overall, the water quality appears to have some fluctuations in specific parameters, but it remains within safe limits for the most part. Regular monitoring and further investigation into the sources of contamination will be essential.

Positive outcomes include:

1. Reduced Total Hardness: A significant decrease from 647.42 mg/L to 232 mg/L indicates improved water softening.
2. Stable Fluoride Levels: Fluoride levels remained within acceptable limits, showing no adverse effects.
3. Improved pH: The pH moved closer to neutral, suggesting better water quality.

Challenges:

Increased Sulphate and Chloride Levels: Sulphate levels rose from 10.78 mg/L to 18.5 mg/L, and chloride levels increased from 21.65 mg/L to 33.35 mg/L, indicating rising salinity and potential contamination.

Recommendations

- Monitor Sulphate and Chloride: Continue to track the increasing trends in sulphate and chloride levels. If they continue to rise, identify potential sources of contamination.
- Investigate pH Decrease: Investigate potential causes of the pH decrease, such as industrial pollution or organic contamination, and take corrective measures if necessary.
- Hardness Management: While lower hardness is generally favorable, continue monitoring to ensure it doesn't create other challenges, such as water corrosiveness, which could damage infrastructure. Treatment Solutions: If high hardness continues to be an issue, water softening methods could be considered for domestic and agricultural use.
- Public Awareness: Raise awareness on sources of chloride and sulphate contamination, including the use of fertilizers and improper waste disposal.

Agricultural and Domestic Benefits (NDVI, NDMI, LULC)

Timeline Selection for Assessment: Since Bhadale has only one comparable year following implementation (2024 and January 2025), and both January 2024 and January 2025 experienced both lower and higher rainfall conditions, these months were selected for the timeline comparison of NDVI and NDMI.

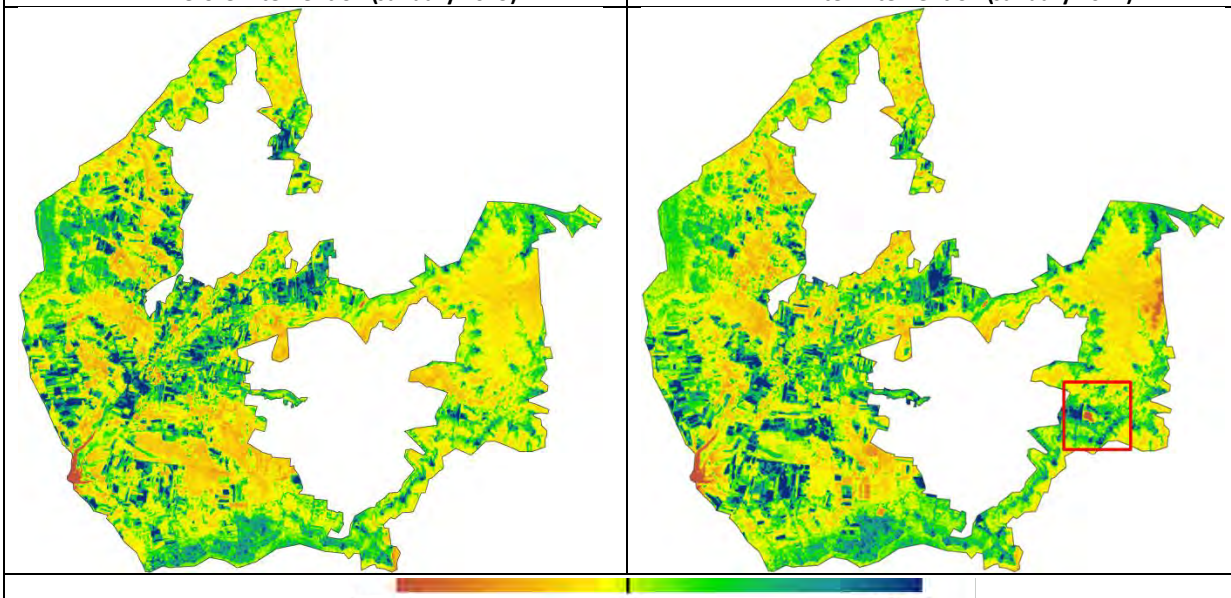
- 2018 & 2023 – Low rainfall - Effect on Jan 2019 & Jan 2024
- 2019, 2020, 2021 & 2024 - Good rainfall- Effect on Jan 2020, Jan 2021, Jan 2022, Jan 2025

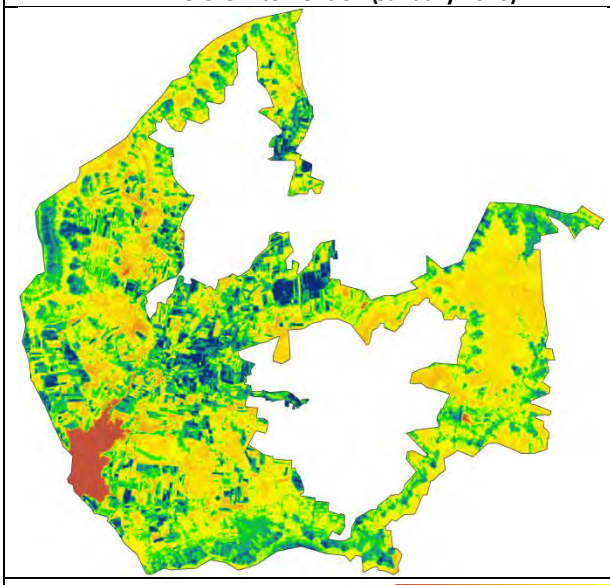
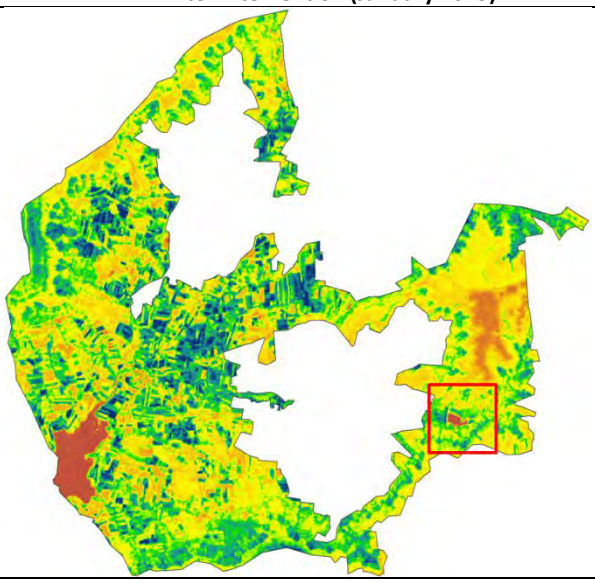
Comparison months – for NDVI

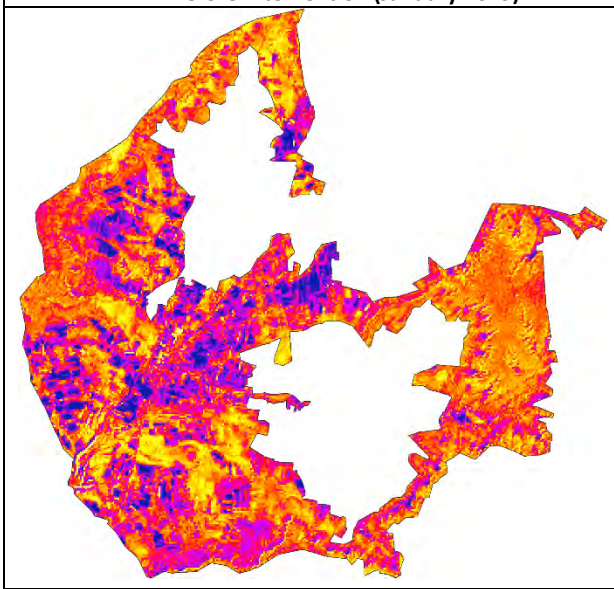
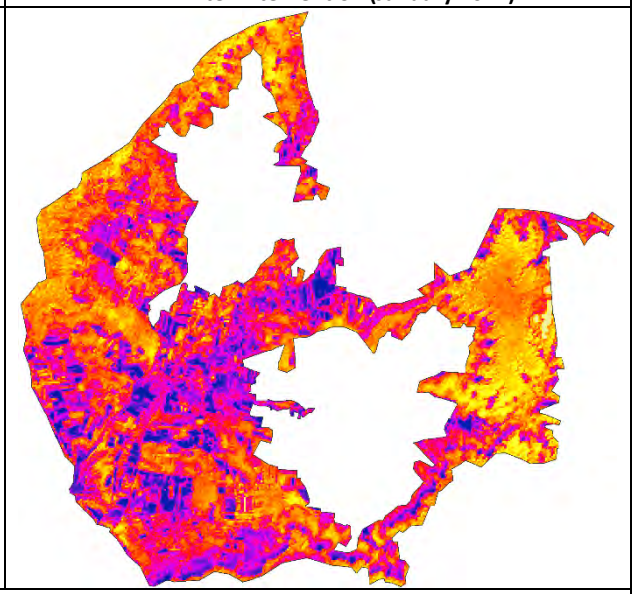
- Low rainfall - Jan 2019 and Jan 2024
- High rainfall – Jan 2020 and Jan 2025.

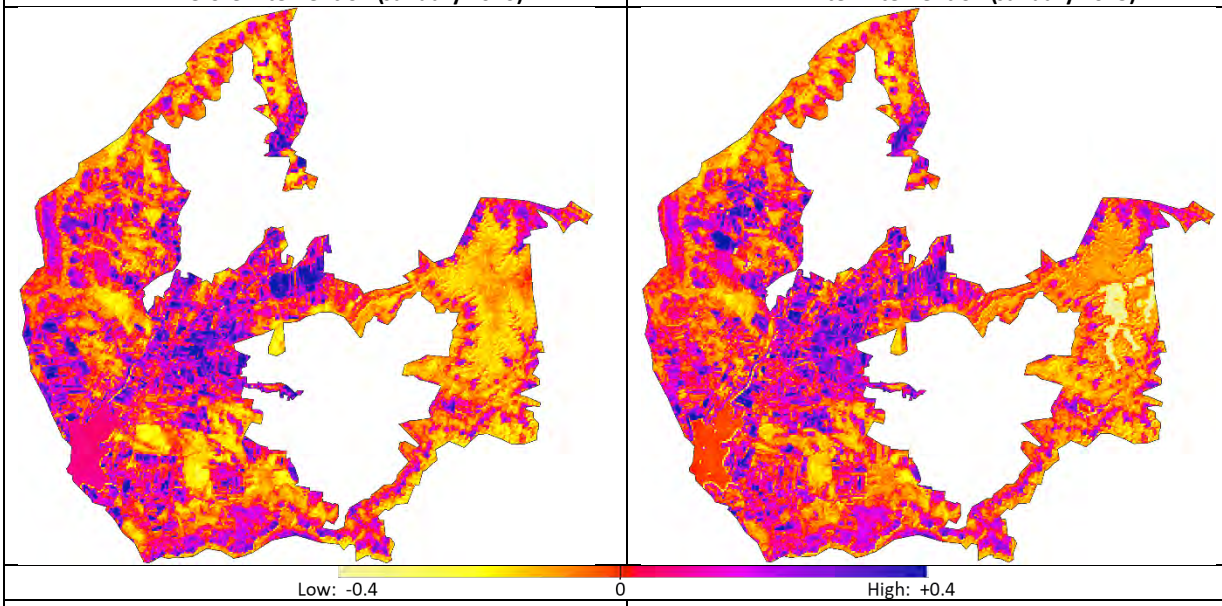
Watershed results are positively related to the input rainfall and the time span after interventions. This is a newly intervened project. The results are lensed accordingly.

NDVI analysis (After low rainfall year 2018 and 2023)

NDVI Before Intervention (January 2019)	NDVI After Intervention (January 2024)
	
	
In the pre-intervention phase, during low rainfall months, the area predominantly exhibited barren land, with vegetation concentrated mainly in the central valley region, which originated from the main storage tank, and to a extent in the northern part of the study area. The region contained only a single major water source located in the southwest.	Following the intervention, though it is a recently implemented project, there was an observable shift in the spatial distribution of vegetation, with an increase in vegetative coverage across the entire valley region originating from the storage tank. The barren land in the valley region showed a reduction, and a new surface waterbody was introduced in the eastern part of the area.

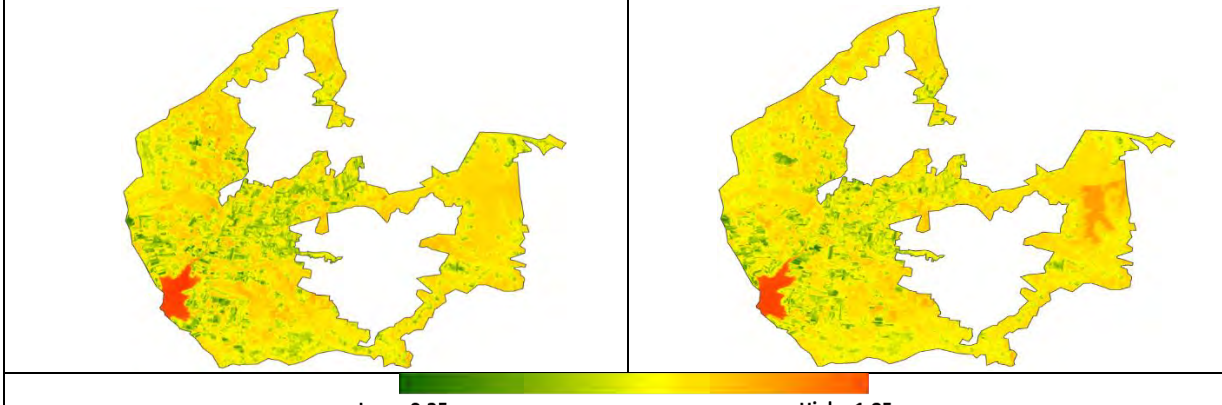
NDVI analysis (After High rainfall year 2019 and 2024)	
NDVI Before Intervention (January 2020)	**NDVI After Intervention (January 2025)**
	
	
In January 2020, **prior to the intervention**, the NDVI analysis indicated that vegetation was concentrated in the central region, originating from the storage tank, and also in the northern area. The surrounding land was predominantly barren, with vegetation intensity highest in the central part.	**Post-intervention**, vegetation extended further into the northern region, exhibiting higher NDVI values. Additionally, the newly introduced water body in the eastern part of the study area showed increased water volume.

NDMI Analysis (After low rainfall year 2018 and 2023)	
NDMI Before Intervention (January 2019)	**NDMI After Intervention (January 2024)**
	
	
The moisture levels were predominantly confined to the vegetated areas, with stark contrasts in moisture levels between the vegetation patches and barren land. Barren land was subject to high moisture stress, as surface water	The barren land in the valley region showed a reduction, and a new surface waterbody was introduced in the eastern part of the area. These changes significantly impacted the moisture distribution across the region. The vegetation now

availability was minimal, particularly during dry periods with limited rainfall.	extended further from the central area, and the moisture levels within the formerly barren land showed a notable improvement, with a reduction in moisture stress compared to the pre-intervention state.
NDMI analysis (After High rainfall year 2019 and 2024)	
NDMI Before Intervention (January 2020)	**NDMI After Intervention (January 2025)**
	
Larger presence of barren land and low moisture levels	The moisture levels in the area were comparatively higher than before the intervention. However, slight variations were observed in the water temperature and water content moisture, which may be attributed to changes in surface water dynamics and vegetation growth.

Soil Organic Carbon (SOC):

The map representing the SOC index utilizes a color scale from green to orange. Areas with green indicate lower SOC index values, reflecting higher soil organic carbon content, while areas with orange represent higher SOC index values, indicating lower soil organic carbon content. Additionally, regions with the highest index values (depicted in orange) correspond to water bodies and extremely bare soils.

SOC Index, March 2020	SOC Index, March 2025
	

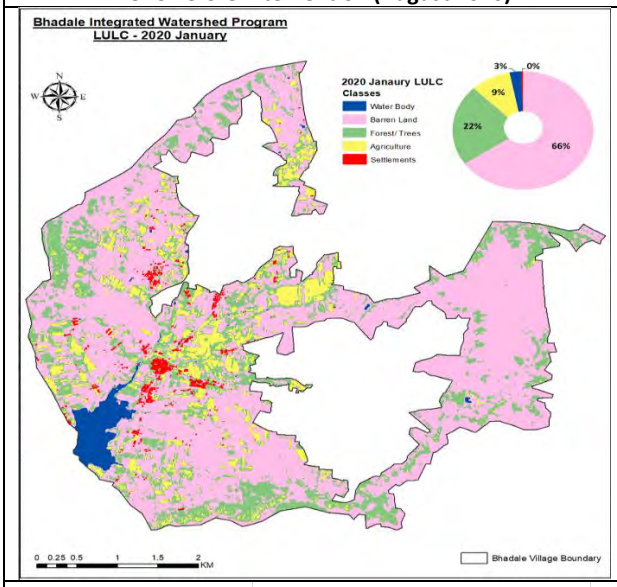
SOC Index Analysis:

- **March 2020 SOC Index Map:**
  The SOC index map for March 2020 shows that the central low valley portion of the Bhadale area exhibits higher SOC levels. This is typical of low-lying regions where organic matter tends to accumulate more due to slower drainage and better moisture retention. Overall, the SOC distribution in March 2020 indicates relatively stable organic carbon content across the region.
- **March 2025 SOC Index Map:**
  In March 2025, the SOC index map reveals that, the central low valley area still shows higher SOC levels, but slight reductions in organic carbon are observed in comparison to 2020.
- This index increase in the eastern part of the region is likely attributed to the installation of solar panels in the area.

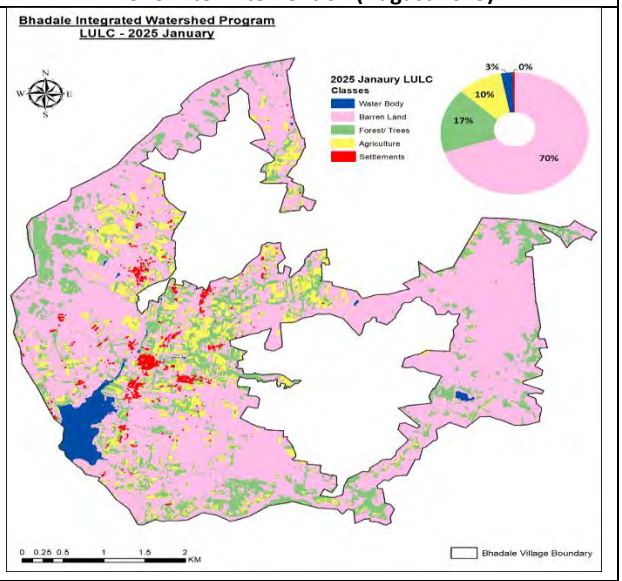
The comparison of SOC index values between March 2020 and March 2025 indicates that while there have been some minor improvements, overall, the changes in soil organic carbon content are minimal. While there are slight changes in certain regions, such as the increase in the eastern part of the area due to solar panel installation, the SOC levels across the entire region have remained relatively stable.

Land Use Land Cover (LULC)

LULC Before Intervention (August 2020)



LULC After Intervention (August 2025)



LULC Class		2020	2025
		Area_Ha	Area_Ha
	Barren	1284.54	1371.78
	Agriculture	182.02	194.218
	Forest/ Trees	434.37	336.151
	Water	51.49	50.2669
	Settlements	8.50	8.50

Insights on Current LULC Change (2020 to 2025):

The Land Use/Land Cover (LULC) dynamics of the semi-arid region under investigation, based on the comparison of data from 2020 and 2025, reveal distinct changes in the landscape composition. These alterations suggest both environmental and anthropogenic influences over the observed period.

1. **Barren Land**: The area classified as barren land exhibited a notable increase, from 1284.54 hectares in 2020 to 1371.78 hectares in 2025. This expansion could be attributed to various factors, including natural desertification

processes, agricultural fallowness, land degradation, or shifts in land management practices, which have resulted in a reduction of vegetative cover and soil productivity.

2. **Forest/Trees**: A decrease in the forest/trees cover was observed, with a reduction from 434.37 hectares in 2020 to 336.15 hectares in 2025. This decline suggests potential degradation of tree cover, likely driven by land conversion for agriculture, or climate-related stressors such as droughts, which are particularly impactful in semi-arid regions.
3. **Agricultural Land**: Agricultural areas experienced a slight increase, from 182.02 hectares in 2020 to 194.22 hectares in 2025. This modest expansion could be indicative of intensified agricultural practices, possibly linked to increasing demands for food production or a response to population growth in the region. This change may also reflect shifts in land use practices or the introduction of irrigation systems in previously non-agricultural areas.
4. **Water Bodies**: The area occupied by water bodies showed a marginal decrease, from 51.49 hectares in 2020 to 50.27 hectares in 2025. This slight reduction may reflect seasonal variations or changes in local hydrological conditions, such as evaporation rates or reduced inflow into water bodies, which are common in semi-arid environments.
5. **Settlements**: The settlement area remained unchanged at 8.50 hectares during the study period.

In conclusion, the LULC changes between 2020 and 2025 in this semi-arid region reflect a trend toward increasing barren land and agricultural expansion, coupled with a decline in forest cover. These shifts are indicative of broader environmental changes, such as land degradation and the pressures of agricultural development, which may have implications for the region's ecological balance and sustainability. Continuous monitoring and effective land management strategies will be essential for mitigating negative impacts on the landscape and promoting sustainable land use practices in the future.

As a result, the transformation of these previously barren or silted areas into functional water bodies led to a decrease in both agricultural and forested land, reflecting the project's success in restoring water resources but also contributing to changes in the land use distribution in the study area. The increase in water bodies has been achieved at the expense of agricultural and forest land, particularly in areas where ponds were desilted to allow for better surface water storage and management.

Overall conclusion

The watershed project intervention in Bhadale, Maharashtra, has resulted in significant improvements in water availability, land condition, and vegetation cover, addressing long-standing water scarcity issues in the region. The interventions, particularly in shallow aquifer recharge, water diversion, and storage practices, have helped stabilize water resources, particularly during the dry season. Despite hard basaltic rock challenges, interventions such as soil traps, loose boulder structures, and naala deepening have successfully mitigated the impact of the region's tough geological conditions, slowing surface runoff and promoting groundwater recharge. In terms of land use and vegetation, there has been a moderate improvement post-intervention. Areas that were previously barren and experiencing water stress have shown signs of recovery. The introduction of new water bodies, although not natural surface water bodies but lined ponds fed by groundwater, has contributed to a slight increase in water availability.

Recommendations:

Diversification of Water Sources: While the reliance on shallow aquifers and surface water storage has provided a temporary solution to the water scarcity issue, the region must explore alternative sources of water for agricultural irrigation, particularly during the dry months. Expanding the use of rainwater harvesting systems, improving storage capacity, and integrating deeper borewells where feasible could offer more sustainable solutions.

Sustainable Land Management: The project has led to the conversion of barren and forested land into water bodies, which has both positive and negative implications. While the creation of water bodies is crucial for groundwater recharge and water availability, it has reduced agricultural and forested land. There is a need to develop sustainable land management strategies that balance water conservation with the preservation of agricultural and forest land. Agroforestry practices, controlled grazing, and improved crop management techniques should be considered to prevent further land degradation.

Strengthening Monitoring and Evaluation: Continuous monitoring of the intervention's effectiveness in terms of vegetation growth, groundwater levels, and land use changes is essential. Using technologies such as Remote Sensing and Geographic Information System (GIS) can provide real-time data to assess the long-term sustainability of the project and allow for the adjustment of management practices as needed.

Enhancement of Community Participation: Encouraging active community involvement in water management practices can improve the effectiveness of the intervention. Training farmers on efficient water management techniques, soil conservation practices, and the sustainable use of water resources can increase the long-term success of the project. Farmers should also be encouraged to implement water-efficient crops and irrigation systems.

Increased Investment in Soil Conservation: Given the challenges posed by the region's hard basaltic geology, the emphasis on soil conservation measures, such as the use of soil traps, loose boulder structures, and naala deepening, should continue. These efforts can help enhance water retention, prevent soil erosion, and facilitate better groundwater recharge in the long term.

Integrated Approach to Water Management: The project should consider integrating water management with broader watershed and ecological conservation strategies. This would involve considering the entire watershed as a functional unit, taking into account factors such as vegetation cover, soil health, and biodiversity, to enhance overall ecosystem sustainability.

Impact findings for Integrated Watershed Development programme.

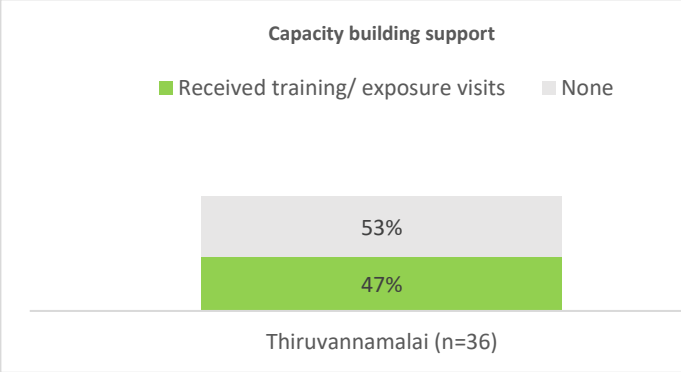
NAF in Thiruvannamalai

Intervention Location: Vandavasi

Demonstration	*Productivity improvement - Paddy*	*30*
	Productivity improvement - Pulses	*30*
	Productivity improvement - Vegetable	*30*
	Intere cropping-Ha.	*30*
	Sustainable agriculture production	*10*
	Organic farming	*10*
	Vermicompost	*25*
	Veterinary Camp	*36*
	Low cost micro irrgtaion	*4*
	Pasture development	*300*
	Diary / Cattle	*20*
	Back yard poultry	*120*
	Bee keeping	*25*
Trainings & Capacity building	*Watershed training and Exposure-40 participants per batch*	*3*
	VWC institution building	*9*
	Integrated nutrient management	*6*
	Integrated pest management	*6*
	Organic formulations	*6*
	Seed treatments	*6*
	Soil health management	*6*
	Water management	*6*
	Weed management	*6*
	Post harvest management	*6*
	Tree planting	*6*
Livelihood development for land less and women -Activity	*Nursery rising*	*2*
	Micro enterprises for marginal families	*10*
	Mushroom cultivation	*10*
Project activities	*Solar light*	*100*
	Syntex Tank (1000 Lit. Cap.)	*9*
	Threshing Yard New	*4*

	Sports equipments	*4*
	Projector with smart Board	*2*
	Green House (Shade net)	*2*
	Supply channel	*15,300 CuM*
	Check Dam	*3*
	Summer Plough	*255 Ha*
	Sunken pond	*1,075 CuM*
	Field Bund	*16,800 CuM*
	Clearance of Prosopis	*7.5 Ha*
	Cattle pond	*7,300 CuM*
	Plantation-AH	*5,700*
	Plantation- AF	*3,580*

OUTCOME AND IMPACT

Impact on knowledge and farming techniques	Increase in knowledge attributable to exposure visits and trainings	 • In Thiruvannamalai, 47% of the respondents who participated in training or exposure visits have received it in the area of improved cultivation methods, integrated pest management, organic farming, and cattle development. • Exposure visits played a critical role in broadening participants' perspectives and instilling confidence in adopting new methods. The knowledge gained has contributed to improved soil health, better livestock productivity, and enhanced resilience against climate variability.
Impact on water resource	Increase in Groundwater Levels	• All survey participants observed an increase in groundwater levels, though they could not specify the exact amount. However, implementing partners recorded and reported a rise of 8.85 feet in Tiruvannamalai.
	Increase in Groundwater availability for potable and irrigation use	• Tiruvannamalai showed the most notable improvements, with groundwater availability doubling by 100%, increasing from 6 to 12 months. These changes have significantly benefited farmers by supporting longer cropping cycles, reducing water stress, and ensuring sustained access to water for drinking and farming.

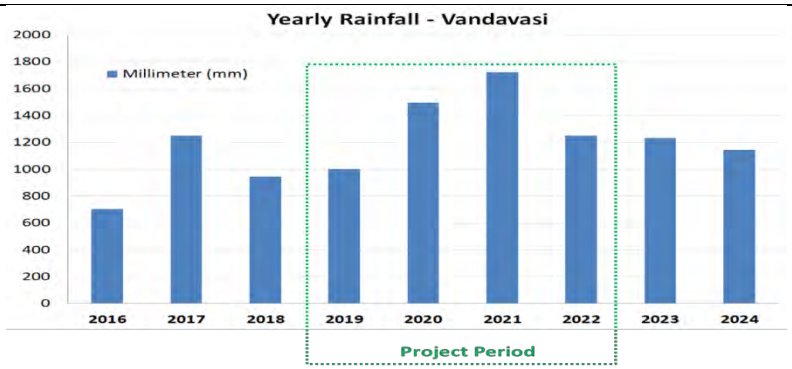
Impact on agriculture and irrigation practices	Increase in Adoption of Modern Farming Techniques	• No change was observed, with farmers continuing to use only pipe/flood irrigation both before and after the intervention.
	Increase in Crop Diversification seasonally and dry-land horticulture	• A complete transition from monocropping (100% before) to 100% practicing mixed cropping and triple cropping was observed.
Economic and livelihood impact	Increase in economic gains due to crop diversification and enhanced crop yield	• Farmers reported an increment of INR 8,000 per year. • As recorded during FGD interactions, the adoption of improved cropping patterns has played a crucial role in enhancing income stability, reducing seasonal vulnerabilities, and optimizing land and water resource utilization.
	Elevated aspirations	• Over 70% participants in the FGDs shared a noticeable shift in aspirations, driven by the project's impact on their farming and livelihoods. They reported improved productivity, growing confidence in adopting practices like mixed cropping, and a desire to diversify for higher income.
Impact on community engagement and empowerment	Increase in Community Cohesion and Collaboration	• More than 90% of FGD participants emphasized that the project enhanced community cohesion through activities such as PRA, VDC meetings, and active GP involvement. These platforms facilitated knowledge-sharing, problem-solving, and collaboration on practices like mixed cropping and dryland horticulture, promoting collective responsibility and ownership.

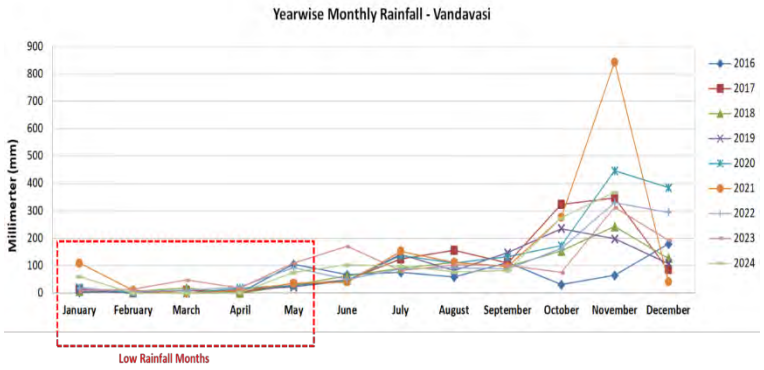
Technical Review Findings
Vandavasi, Thiruvannamalai, Tamil Nadu

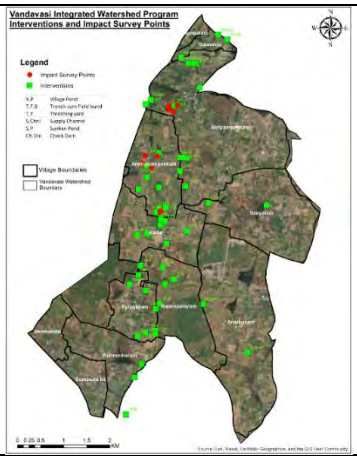
Introduction and Objective of the Project

The Vandavasi watershed covers approx. 27.74 sqkms, and includes 9 villages
The villages Ammananpakkam, Velliyambakkam, Seeyalam, Rajapalayam, Eyipakkam, Badur, Anaikunnam, kunankaranai, Kil Sembedu of Vadavasi Block, Tiruvannamalai District of Tamil Nadu, has faced challenges related to increased barren land, reduced soil moisture, water scarcity, particularly in the summer months. Groundwater depletion, reduced surface water availability, and inefficient irrigation practices have adversely affected agricultural productivity and local water access.

Rainfall trends of Vandavasi







Hydrogeological Impacts of IWD

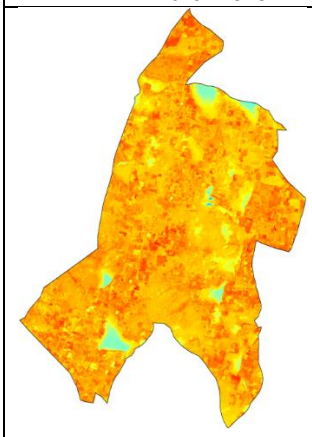
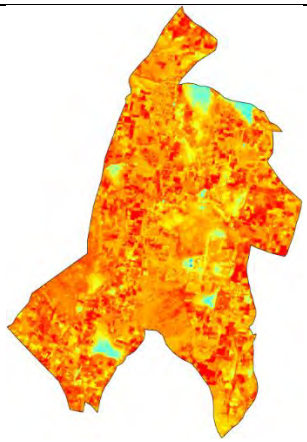
Surface water availability and ground water recharge (NDWI analysis)

Precursor to NDWI – Identification of annual no-rainfall months before and after the intervention

	2016	2017	2018
January	3	13	7
February	6	0	5
March	0	10	18
April	1	4	0
May	105	30	29
December	178	85	127

	2022	2023	2024
January	18	8	61
February	6	13	0
March	9	47	0
April	23	18	2
May	92	109	76
December	295	193	

Note: Due to cloud coverage in April 2018 and February 2024, the analysis excludes these months. Therefore, the comparison for NDWI is limited to the months of March 2016, February 2017, and March 2024. In this context, only the NDWI values for the selected months—March 2016, February 2017, and March 2024—are considered to assess the presence and changes in surface water availability and moisture levels.

NDWI Before Intervention		NDWI After Intervention
March 2016	**February 2017**	**March 2024**
		
Low: -0.4 **0** **High: +0.4**		
NDWI analysis conducted prior to the intervention in March 2016 revealed that the study area hosted six distinct water bodies. However, several areas of vegetation were exhibiting signs of water stress. In February 2017, a notable decline in the number of surface water bodies was observed, with only one small water body remaining in the region. This marked the onset of environmental degradation in the area. Concurrently, the extent of vegetation cover decreased, and a higher proportion of vegetation was found to be under significant water stress.		The number of surface water bodies increasing to seven. While this suggests an improvement in water availability, it is noteworthy that the extent of vegetation under water stress has also significantly increased. This implies that despite the increased water bodies, the available water resources may not be sufficient to fully mitigate the stress experienced by vegetation, pointing to a need for further investigation into the adequacy of water supply for supporting sustained vegetation growth across the entire area.

Water Quality: Triangulation of water quality from three sources: Deep Well – Velliampakkam, Ammanampakkam, Open Well – Velliampakkam, Surface Water – pond in Velliampakkam

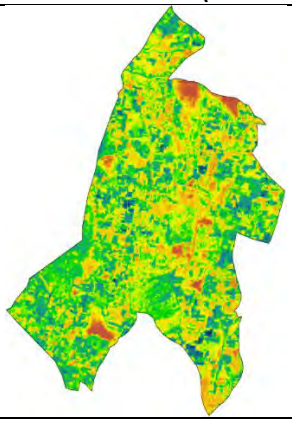
Parameter	Source	Before (2018)	After (2024)	Interpretation
pH	Deep Well	7.31	7.13	Slight decrease; still within acceptable range (6.5–8.5)
	Open Well	7.63	7.43	Slight decrease; within acceptable range
	Surface Water	-	7.29	Within acceptable range; slight acidity may be due to organic matter
Total Dissolved Solids (TDS) (mg/L)	Deep Well	921.79	819	Improvement; remains within acceptable limits (<1000 mg/L)
	Open Well	746.58	670	Improved water quality; likely due to better recharge
	Surface Water	-	272	Low TDS; indicates cleaner water
Chloride (mg/L)	Deep Well	186.93	181.5	Slight reduction; positive trend in salinity control
	Open Well	157.79	150.3	Decrease in salinity
	Surface Water	-	60.9	Low chloride; favorable for use
Fluoride (mg/L)	Deep Well	0.3	0.37	Slight increase; still within safe limits (0.5–1.5 mg/L)
	Open Well	0.63	0.78	Remains within acceptable limits

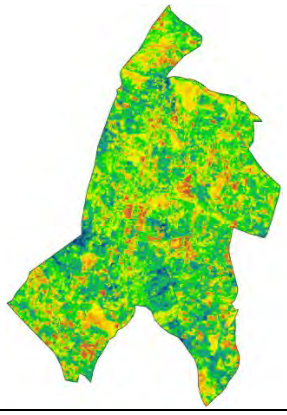
	Surface Water	-	0.03	Very low; no concern
Sulphate (mg/L)	Deep Well	15.57	55.5	Sharp increase; requires further investigation
	Open Well	15.81	55	Significant rise; potential source contamination
	Surface Water	-	0	No sulphate; likely unaffected by deep aquifer conditions
Total Hardness (mg/L)	Deep Well	750.42	465	Noticeable reduction; indicates improved water softness
	Open Well	593.8	368	Improved water softness; beneficial for domestic use
	Surface Water	-	172	Soft water; below threshold for "hard" classification

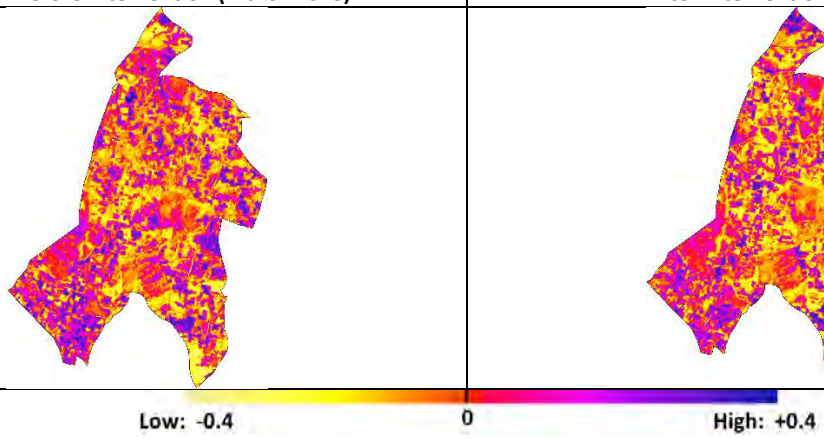
Recommendations from water testing

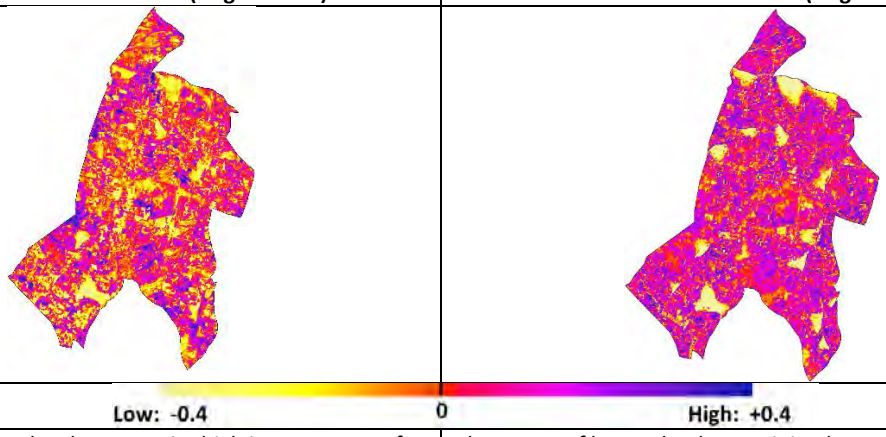
- **Revival of the Surface Water Body**: The presence of surface water after desiltation has **significantly improved groundwater recharge** and **dilution of mineral concentrations** in wells.
- **Better Water Quality**: Reduced **TDS, chloride, and hardness** in groundwater suggests **improved filtration and dilution**, making it more suitable for consumption.
- **Potential for Sustainable Water Management**: The low TDS and hardness in surface water indicate that it can serve as a **valuable freshwater source** for irrigation and drinking.
- The bore well water chemistry indicates prolonged subsurface interaction, resulting in mineral-rich water. Proper groundwater monitoring and controlled agricultural practices are recommended to maintain sustainable water quality.
- **Need for Monitoring Fluoride & Sulphate**: While fluoride and sulphate levels have increased slightly, **periodic monitoring** is recommended for **sustainable water usage practices** will help maintain these improvements.

Agricultural and Domestic Benefits (NDVI, NDMI, LULC)

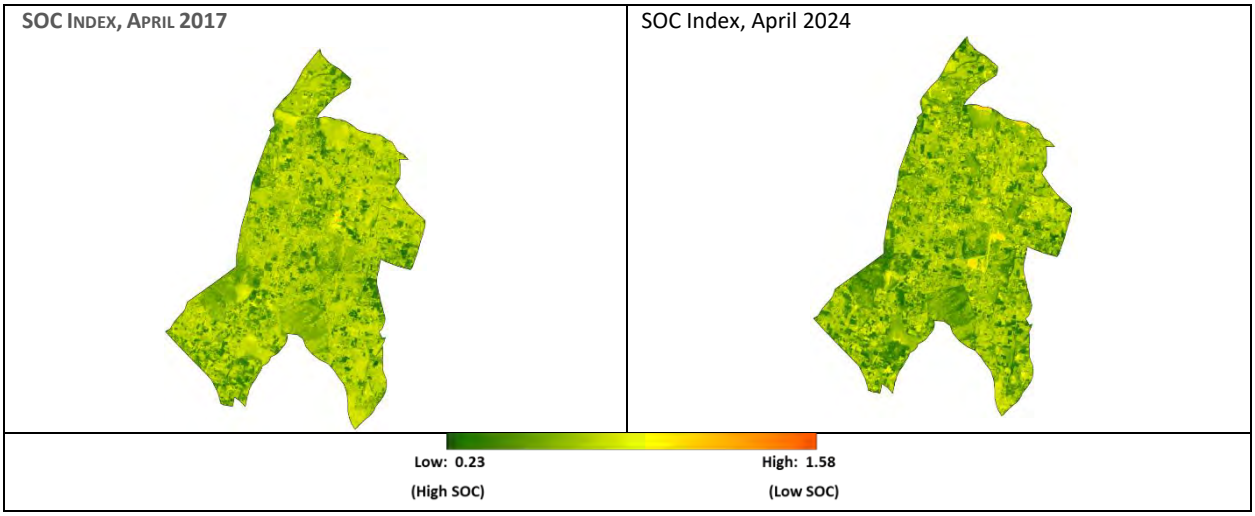
NDVI analysis Pre-monsoon	
NDVI Before Intervention (March 2018)	**NDVI After Intervention (March 2024)**
	
	
In March 2018, both vegetation moisture and water body moisture levels were relatively favorable. The study area contained six water bodies, all exhibiting healthy moisture levels, indicating adequate water availability and vegetation health at the time.	By March 2024, the study area experienced a reduction in water bodies, losing one of the previously identified water bodies. This loss may be attributed to increased surface water usage for agricultural purposes, higher evapotranspiration losses, and the natural infiltration of water during the dry month. Despite the presence of remaining water bodies, there was less noticeable improvement in the moisture retention capacity during this period, indicating that the intervention's impact was somewhat limited in addressing moisture retention during the dry season.

NDVI analysis post-monsoon	
NDVI Before Intervention (August 2018)	**NDVI After Intervention (August 2024)**
	
	
The study area had minimal barren land; however, the moisture stress levels in these barren areas were notably high. At this point, the region lacked any surface water bodies, and vegetation in the area exhibited significantly low moisture levels, reflecting a highly stressed ecosystem with limited water availability.	Surface water bodies were detected in the region, and the extent of barren land was minimal compared to previous years. Reduction in the barren land is also clearly observable

NDMI analysis Pre-monsoon	
NDVI Before Intervention (March 2018)	**NDVI After Intervention (March 2024)**
	
In March 2018, both vegetation moisture and water body moisture levels were relatively favorable.	There is significant improvement in the moisture retention capacity in some of the regions during this period indicated by higher number of blue zones

NDVI analysis post-monsoon	
NDVI Before Intervention (August 2016)	**NDVI After Intervention (August 2024)**
	
The Moisture stress levels were quite high in most parts of the region. At this point, the region lacked any surface water bodies, and vegetation in the area exhibited significantly low moisture levels, reflecting a highly stressed ecosystem with limited water availability.	The extent of barren land was minimal compared to previous years. The moisture levels in the area have shown significant recovery, surpassing the conditions observed in both pre- and post-intervention periods. This suggests that the interventions have had a lasting positive effect on the moisture retention capacity of the landscape, contributing to reduced moisture stress and the restoration of vital water resources. Furthermore, the reduction in barren land and the improved moisture levels indicate that the area has successfully coped with previous environmental stresses, with a more balanced ecosystem emerging. Despite the lower moisture levels observed in surface water bodies, this can be considered a temporary physical parameter, and improvements in these conditions are expected as the ecosystem stabilizes further.

Soil Organic Carbon (SOC): The map representing the SOC index utilizes a color scale from green to orange. Areas with green indicate lower SOC index values, reflecting higher soil organic carbon content, while areas with orange represent higher SOC index values, indicating lower soil organic carbon content. Additionally, regions with the highest index values (depicted in orange) correspond to water bodies and extremely bare soils.

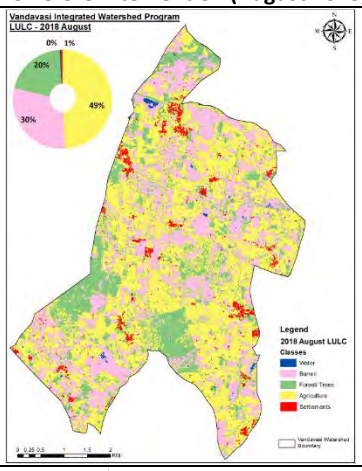
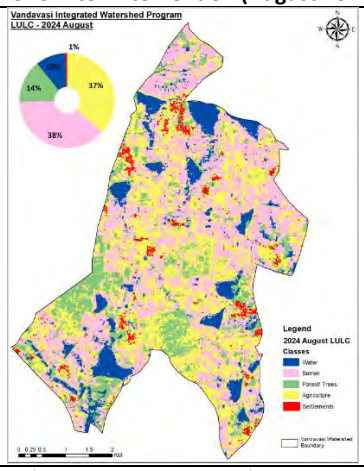


SOC Index Analysis: Vandavasi IWD (April 2017 and April 2024)

- **April 2017 SOC Index Map:**
  The SOC index map for April 2017 indicated relatively rich soil organic carbon in the Vandavasi area. However, the exposure of waterbeds during this dry month led to lower organic carbon concentrations in those areas, as the drying of water bodies often causes the exposed soil to lose organic matter content.
- **April 2024 SOC Index Map:**
  The SOC index map for April 2024 shows a clear improvement in soil organic carbon levels across the region, including the waterbed areas. Despite the fact that the waterbeds were also exposed during the dry month, the 2024 map indicates that these waterbed areas now contain significantly more organic matter compared to 2017. This suggests that the project has positively impacted the soil and waterbed areas by increasing the organic carbon content over the seven-year period.

Project Impact: The SOC index comparison between April 2017 and April 2024 confirms that the Vandavasi area has experienced an improvement in soil fertility. The project has contributed to higher organic matter levels across the region. Even areas that typically face organic matter depletion during dry months, such as waterbeds, have shown significant recovery and enrichment in organic carbon content. This improvement in waterbed soil quality suggests better retention of organic matter in these regions. These results indicate that the project has successfully enhanced soil health, promoting sustainable soil management practices and improving environmental resilience in the Vandavasi watershed.

Land Use Land Cover (LULC)

LULC Before Intervention (August 2018)	LULC After Intervention (August 2024)
	

LULC Class	2018	2024
	Area_Ha	Area_Ha
Barren	1051.88	825.179
Agriculture	1359.64	1018.34
Forest/ Trees	566.699	406.628
Water	7.64859	282.324
Settlements	18	18

Water Bodies:

A substantial increase in the area of water bodies has been observed, from just 7.65 ha in 2018 to 282.32 ha in 2024. This dramatic increase can be directly attributed to the success of the water conservation project, including pond rejuvenation, the creation of new water bodies, and improvements in the management of surface water. The increased availability of water has likely facilitated the restoration of ecosystems and agricultural productivity while also addressing local water scarcity issues.

Agriculture and Forest:

The observed reduction in agricultural land can be attributed to the transformation of previously barren or silted areas into water bodies as part of the project. Typically, one would expect a decrease in barren land and an increase in water bodies, with barren land being converted into water-holding areas. However, in this case, agricultural and forested areas have contributed to the increase in water bodies.

This phenomenon is primarily due to the fact that earlier, dried-up or silted pond beds, which were classified as barren or non-vegetated land, contained some form of vegetation cover. (Vegetation cover on dry pond beds shows that the area has good moisture holding capacity). During the project's intervention, these areas were cleared to facilitate the desilting process and to restore the ponds for better surface water retention. This cleared land, which was previously categorized as barren or vegetated land, was then classified as part of the newly restored water bodies. Therefore, the reduction in agricultural and forest areas is a result of these land areas being transformed into water bodies as part of the project's objectives of enhancing water storage and improving water availability. As a result, the transformation of these previously barren or silted areas into functional water bodies led to a decrease in both agricultural and forested land, reflecting the project's success in restoring water resources but also contributing to changes in the land use distribution in the study area. The increase in water bodies has been achieved at the expense of agricultural and forest land, particularly in areas where ponds were desilted to allow for better surface water storage and management. Hydrogeological potential was taken into account by the implementing partners while selecting intervention sites.

Conclusion: The LULC analysis between 2018 and 2024 reveals a positive impact of the project on water resources, with a significant increase in the area of water bodies. This suggests that the water access and conservation efforts have been successful in improving water availability across the region. The reduction in barren land and changes in agricultural and forest areas reflect the broader socio-economic and ecological shifts that have occurred due to the project's intervention. Overall, the project appears to have made a meaningful contribution to the restoration and improvement of the region's land use and water management systems. However, the continued monitoring of these land use trends will be essential to assess the long-term sustainability of these changes.

Overall conclusion:

The integrated watershed development (IWD) project in the Vandavasi study area has yielded positive outcomes, with significant improvements in water availability, groundwater recharge, and ecosystem restoration. The various interventions, including the desiltation of ponds, construction of checkdams, erosion control using gabions, and the establishment of community water systems, have collectively contributed to the rejuvenation of surface water bodies, enhanced groundwater recharge, and more sustainable water management practices. The project has also helped to restore agricultural productivity, particularly in previously barren areas, and has contributed to reducing the vulnerability of local agriculture to water scarcity. The reduction in barren land and the improved moisture levels point to the project's positive impact on moisture retention and ecosystem stability over time.

Recommendations

1. **Implement Water-Efficient Agricultural Practices:** Given the reliance on surface water for irrigation, introducing more water-efficient irrigation practices such as drip irrigation or rainwater harvesting can help manage water resources more effectively. This would reduce the pressure on surface water bodies and ensure a more sustainable use of water for agriculture.
2. **Improve Vegetation and Soil Moisture Management:** Enhancing soil moisture retention through the use of organic mulches, agroforestry, and other soil conservation methods can help improve the resilience of vegetation, particularly during dry periods. Promoting practices that reduce evapotranspiration can also contribute to better moisture management

Deloitte team interacting with the beneficiaries during an FGD

Stories from ground

Identifiers in the case stories have been modified to maintain confidentiality.

Case story 1:

Sunita Pawar, a 48-year-old farmer from Bhadale village in Satara district, manages her agricultural livelihood while supporting a large family of 11 members. With a farm size of 3 acres and 8 livestock, she works tirelessly to sustain her household on an annual income of INR 80,000.

Through TCHFL's intervention, Anita installed a biogas unit at her home, generating 2 cubic meters of gas. She was trained effectively on its usage, learning to mix 45 kg of cow dung with 45 liters of water in a 1:1 ratio to ensure a consistent supply of biogas. While the gas is sufficient to sustain a family of five, her large household has still seen significant benefits. Her LPG cylinder consumption reduced from 12 to 8 cylinders per year, resulting in an annual savings of INR 4,000. She also highlighted the safety of the unit, which includes a built-in safety valve, eliminating risks.

Anita contributed INR 8,000, covering 15% of the total unit cost, and believes the benefits extend beyond her kitchen. The biogas waste has become a valuable resource for her farm, leading to a 25% reduction in the use of chemical fertilizers like DAP. This intervention has not only improved her family's financial stability but has also promoted sustainable agricultural practices.

Case story 2:

Abhishek Neose, a resident of **Karanjkhop village, Satara district**, belongs to the **OBC category** and lives in a **six-member household**. With an **annual income of INR 5,00,000**, he cultivates **2 acres of productive farmland** and has significantly benefited from multiple agricultural and water conservation initiatives.

His family has received both **biogas unit support and a drum kit**, enhancing his household savings and agricultural efficiency. The **biogas unit has reduced his dependence on LPG cylinders to almost zero**, saving him **INR 3,500 per year**. Meanwhile, the **drum kit has fueled his agricultural aspirations**, enabling him to **successfully experiment with high-value crops** such as **strawberries, passion fruit, and dragon fruit**. Looking ahead, he envisions expanding his cultivation to include other premium fruits and linking them to a **Farmer Producer Organization (FPO)** for large-scale market access.

His farm, located at the **middle ridge**, has directly benefited from **groundwater recharge initiatives**, including **nala deepening and contour trenching along the top ridge**. These efforts have **increased water availability by two months** and led to a **15-foot rise in groundwater levels**, significantly improving irrigation prospects. This has allowed him to move beyond **traditional monocropping of jowar and vatana** to a more diverse and lucrative farming model. As a result, **he has been able to increase his annual income by INR 2.5 lakh**, reinforcing the impact of sustainable water management and agricultural interventions in his village.

Case story 3:

Suresh Pore is a 65-year old man residing in Karanjkhop. He is landless, and lives with his wife. His sons migrated long ago to nearby cities in search of work. Suresh and his wife used to work as agricultural labour in their younger years. But with age, their mobility has reduced, and they have not pursued labour work for the last 10-15 years. To make ends meet, both Suresh and his wife take up small jobs such as stitching tarpaulin, making mats and covers made from fertilizer bags. This was done with the use of a manual sewing machine, which, also hampered by their age, led to a paltry income averaging around INR 50-100 per day.

As a part of the Jaladhaar programme of Tata Capital and BAIF for landless in the village, Suresh applied for subsidy on an electric sewing machine in 2020. Out of the INR 23,000 cost, he contributed INR 5,000 which he was able to source from his sons and the rest was contributed by the project and the procurement also facilitated by BAIF. The upgrade from a manual to automatic sewing machine significantly improved their output – apart from both being able to work simultaneously, the machine helped with taking on more work, especially during the COVID period. Today, Suresh happily reports their daily income increasing almost three-folds and now, they average around INR 300 per day from the sewing work. As per him, the increment, even though small in absolute numbers, has helped them manage their daily expenses and live their lives with dignity in old age by not being too dependent on their children.

Chapter 5

Conclusion and way forward

The **IWD project** aimed to enhance water conservation, agricultural productivity, and community sustainability. The project sought to ensure long-term resource management while improving livelihoods and environmental health. A summary of our findings in a SWOT form and potential recommendations to enhance the effectiveness of the project going forward is presented in this section of the report.

Strengths:

- The program's ridge-to-valley approach effectively addresses water conservation and management by ensuring systematic treatment of the watershed from the highest to the lowest points. This comprehensive strategy has significantly improved water availability and soil fertility, fostering long-term sustainability
- The active engagement of the community, combined with strategic integration of local village administration and government schemes in planning and implementation, has enhanced ownership and accountability, ensuring the long-term sustainability of the interventions
- The program has comprehensively addressed all key components of Natural Resource Management, including water resources (Jal), forests (Jangal), land (Jameen), and livestock (Janwar), ensuring a holistic and sustainable approach to resource utilization and conservation.
- A high-performing technical implementation team, underpinned by robust, SOP-driven implementation and monitoring processes.

Weakness

- None observed or reported.

Opportunity

- While the local Panchayat is involved in the overall planning and administration of the program, it is prudent to also disseminate information of the interventions to the block and district level administration. This would help a) to build stronger local oversight b) Enable stronger convergence with other programs or efforts c) Prevent any duplication of efforts/funding
- There is an opportunity to customize the program to better accommodate the needs of marginal farmers who may not be able to contribute financially but can offer valuable support through voluntary efforts, such as shramdaan or other non-monetary contributions. This would enhance inclusivity and foster broader community engagement.

Threat

- The observed shift to water-intensive crops such as sugarcane and wheat in Bhadale and Karanjkhop could deplete water resources in the long term, potentially leading to unsustainable agricultural practices if not carefully managed

Recommendations and way forward

- While the VDC members are provided with basic training on maintenance of structures as well as the roles and responsibilities of each stakeholder, it is recommended as a best practice to document the same in the form of a Standard Operating Procedure (SOP) to ensure that the objectives behind the training and roles defined are sustained in the future despite an exit from the region
- Explore possibilities of water harvesting and recharge structures in areas of the watershed still experiencing water stress.
- Interventions such as soil traps, loose boulder structures, and naala deepening have been successful in slowing surface runoff and promoting groundwater recharge in Bhadale's tough geological conditions (hard basaltic rock). These should be continued and expanded to other regions with similar challenges. Further explore possibilities of water harvesting and recharge structures in areas of the watershed still experiencing water stress.
- Continue promoting water - efficient agricultural practices: Given the reliance on surface water for irrigation in Thiruvannamalai, introducing more water-efficient irrigation practices such as drip irrigation or rainwater harvesting can help manage water resources more effectively. This would reduce the pressure on surface water bodies and ensure a more sustainable use of water for agriculture.
- While the local Panchayat is involved in the overall planning and administration of the program, it is prudent to also disseminate information of the interventions to the block and district level administration. This would help a) to build stronger local oversight b) Enable stronger convergence with other programs or efforts c) Prevent any duplication of efforts/funding
- While the project provides opportunities for convergence with government schemes by making beneficiaries aware of the same or linking beneficiaries to these schemes, it is recommended to track the outcomes resulting from this enhanced awareness. This will ensure the full realization of benefits and provide measurable impact from these awareness building initiatives
- Organize awareness programs on the long-term risks of water-intensive crops like sugarcane and wheat. Collaborate with more farmers to promote drought-resistant crops through practical demonstrations

- Facilitate partnerships with private and government bodies to establish robust market linkages for non-traditional crops, encouraging farmers to diversify and adopt sustainable cropping patterns

Glossary:

Normalized Difference Vegetation Index (NDVI)

NDVI: NDVI is a key indicator of vegetation presence. Higher NDVI values correspond to increased vegetation density, whereas lower values indicate barren land. NDVI values below zero (represented in yellow to orange) signify non-vegetated surfaces, such as barren land. The lowest possible NDVI value (-1) is indicative of water bodies, which serve as a water mask in the analysis.

Normalized Difference Moisture Index (NDMI)

NDMI values in the study area range from -0.4 to +0.4, with higher values indicating elevated moisture levels. Since water bodies and crops that require significant water tend to reflect higher NDMI values, these can be used as proxies for assessing moisture content. Water bodies and high-water-demand crops are often associated with positive NDMI values, whereas negative NDMI values typically correspond to drier areas.

Normalized Difference Water Index (NDWI)

NDWI is a remote sensing index used to highlight water detection in satellite imagery. It is a commonly used indicator for detecting and monitoring changes in water bodies, particularly in terms of surface water content. To ensure that the NDWI reflects the most accurate reading of surface water availability, it is tested during little to no-rain months for the region.

Soil Organic Carbon (SOC)

SOC: SOC is a crucial component of Soil Organic Matter (SOM), representing the amount of organic carbon present in the soil. The SOC index serves as a vital indicator of soil health and fertility, influencing various ecological processes such as nutrient cycling, soil structure, and carbon sequestration. The technique of estimating SOC index represents a significant stride in the field of soil science. The SOC Analysis helps in providing valuable insights for agricultural planning and environmental monitoring. The SOC index is inversely related to the soil organic carbon content, where higher index values correspond to lower levels of soil organic carbon, and vice versa.

Annexure 1: Tools and Guidelines

JalAadhar IWD Tool

Annexure 2: Pictures from field

IWD-Karanjkhop

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Rejuvenated pond</td><td>Water sample collection from handpump for water quality testing</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Loose Boulder Structure (LBS)</td><td>Borewell check for water level analysis</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>CCT structure</td><td>Water sample collection for water quality testing</td></tr>
</table>

	
Recharge Pit	FGD interaction with Farmers and VDC members

IWD-Bhadale	
	
Contour Trenches	Farmer interaction at mid-region
	
Farmer interaction with Bio-gas beneficiaries showcasing their drip adapted farm	Open Well at valley region

	
Borewell water level gauging	Borewell water level gauging
	
Rejuvenated pond inspection	Borewell water level gauging
	
FGD with farmers/villagers at Velliyampakkam	Check dam at Ammanapakkam

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Impact Assessment Study

JalAadhar - Water Access

Project funded by Tata Capital Housing Finance Limited

April 2025

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Tata Capital Housing Finance Limited (TCHFL) is TCL's wholly owned subsidiary registered with the National Housing Bank as a Housing Finance Company, offering long term funds for housing purposes.[1] It's Corporate Social Responsibility (CSR) vision is to establish a collaborative and inclusive approach for social and environmental development initiatives, fostering shared value for the broader community, aligned with the core purpose of the Tata Group.

The **JalAadhar project** is the flagship CSR program of TCHFL and it comprises the following 3 sub-interventions:

Water Access	**Water Rejuvenation**	**Integrated Watershed Development (IWD)**
Activities focused on improving accessibility, sustainability, and community empowerment. The infrastructure setup includes a solar-powered submersible pump at a river source, a pipeline network to supply the river water to the village, and strategically placed water storage tanks for ease of access by the households. A Water User Association is formed to ensure effective management, while training on water conservation and sustainable farming is also provided. By combining renewable energy, efficient infrastructure, and community governance, the project aims to enhance livelihoods, boost agricultural productivity, and support ecological sustainability.	Activities focused on revitalizing water bodies such as lakes and ponds to ensure sustainable water management and agricultural benefits. The initiative primarily involves the **de-siltation of lakes**, where accumulated silt is removed to restore the water-holding and percolation capacity of the lakes. The fertile silt is distributed to local farmers, enhancing soil fertility and agricultural productivity, while the unfertile silt is responsibly managed by Gram Panchayats (GPs) and other stakeholders. This collaborative approach aims to improve water availability and strengthen community participation and environmental stewardship.	A structured approach to restore and rejuvenate large water bodies through desilting and harvesting water, using a comprehensive ridge-to-valley approach. This method ensures that water is captured, stored, and utilized effectively, leading to the enhancement of groundwater levels both downstream and within the command area of the water bodies. By focusing on both structural and community-driven interventions, the project aims to create sustainable water resources, boost ground water levels and agricultural productivity, and improve the resilience of the ecosystem and local communities towards water scarcity.
Implementing partners		
Diganta Swaraj Foundation (DSF), in Palghar, Maharashtra	**ATE Chandra Foundation (ATECF)**, alongside NGO partners **Dhara Sansthan** and **Karunalaya Social Welfare Foundation (KSWF)**, in Jaipur and Jodhpur respectively in Rajasthan **National Agro Foundation (**N**AF)**, in Tamil Nadu	**BAIF Institute for Sustainable Livelihoods and Development (BISLD)**, in Satara and Ahmednagar districts of Maharashtra and **National Agro Foundation (**N**AF)**, in Tamil Nadu

Objective of the impact assessment:

As a part of the engagement with Tata Capital Housing Finance Limited (TCHFL), Deloitte conducted an Impact assessment of the **"JalAadhar-Water Acess" project** funded from CSR grants for the following period:

Project intervention	**Time period referred**
Water Access	Aase, Mokhada, Palghar: December 2022 to 31st March 2023

The high-level objectives of this impact assessment are as follows:

- To study the project proposal, MoU extracts, project programmatic and technical reports to understand the program intervention and conduct stakeholder mapping.
- To design the study methodology, tools and guidelines for data collection based on the parameters of impact identified through the document review and initiate structured interactions with key stakeholders of Tata Capital Limited, Tata Capital Housing Finance Limited and the Implementation Partner.

[1] Tata Capital Housing Finance Website I Accessed on 18th December 2024 | https://www.tatacapital.com/tchfl/about-us.html

- To conduct a planned field level data collection and documentation of observations and case stories through facility visits and stakeholder interactions.
- Data collation and analysis of the inputs, processes, outputs, outcomes, impact parameters and model of implementation, as well as determining the strengths and weaknesses of the CSR initiatives.
- Determining the direct/indirect impact of the CSR initiatives on the lives of the target beneficiaries and communities, pertaining to the project.
- Suggesting potential way forward to strengthen the CSR initiative.

Sampling and Data collection:

A structured stakeholder mapping identified primary and secondary stakeholders, guiding a targeted engagement plan. Primary data collection combined on-field surveys (50%) and structured FGDs (50%) to capture both individual and collective insights. Additionally, KIIs with secondary stakeholders provided expert and institutional perspectives. A purposive sampling method ensured diverse representation and comprehensive assessment of project implementation, beneficiary impact, and outreach.

Primary stakeholders	133
Secondary stakeholders	6

Detailed stakeholder coverage is presented in Chapter 2 Approach and Methodology of this report.

Summary of findings:

The current report presents a detailed documentation of Deloitte's observations and findings of the impact assessment study. A summary of the findings is presented below, while the elaborate documentation is available in Chapter 3.

Project Fund: INR 1.5 Cr

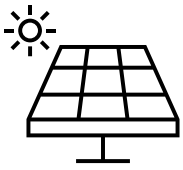
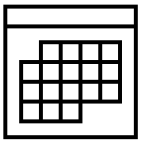
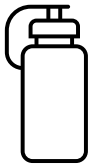
Project Location: Palghar, Maharashtra

Implementing Partner: Diganta Swaraj Foundation (DSF)

Relevance/Need of the Project:

The Water Access program specifically addresses accessibility constraints in a challenging geographical context of Aase Gram Panchayat, Mokhada in Palghar, Maharashtra. The region, with an average elevation of 486 meters, experiences high seasonal rainfall (2500 mm annually), but the steep terrain hinders effective runoff capture and storage. Consequently, the local population has faced persistent water access issues. The lack of nearby water sources forced women and children to travel long distances to fetch water, affecting education, livelihoods, and overall well-being. The objective of this project was to design a sustainable water supply system that utilizes a perennial water source, the Wagh River, to improve water access for the residents of the Gram Panchayat's 6 hamlets.

Key Impact Highlights (for intervention period)

					
Installation of Solar powered 30 Hp Pump at Wagh River	**10 water tanks (haud) constructed with 10,000 litre each capacity**	**5000+ Direct Beneficiaries In 6 Hamlets**	**4+ Hours/day of time saved in water sourcing**	**Year Round Water availability (Villages made tanker free) INR 300/Month saved per household**	**Water quality Improved and now within drinking water standards**

Impact Created

- The installation of a 30 HP pump, powered by solar panels, was used to lift water from the Wagh River to the mid-range storage tank at 320 meters elevation. This mid-range and an additional high-altitude storage tank, coupled with an extensive pipeline network and 10 local water tanks (hauds) and 12 water outlets, ensures that water is efficiently stored and distributed across the 6 hamlet settlements. This system has drastically reduced the time spent collecting water and increased water availability for agricultural and domestic purposes.
- Reliable Water Access: The project effectively shifted the primary water source from distant, unreliable community wells and poor-quality and expensive tanker water to conveniently located water tanks (hauds) providing safe drinking water and meeting household needs. This eliminated the previous reliance on inconsistent tanker deliveries (2-3 times/week). The program has successfully made the village tanker-free, thereby alleviating the government's burden of water supply.
- Reduced Financial Burden: Elimination of the need to purchase water from private tankers has saved households an average of INR 300 per month.
- Elimination of Water Scarcity: The project has completely eradicated the recurring 8-month water crises experienced during non-monsoon periods. Consistent and equitable water supply now meets the needs of all households.
- The program effectively improved coordination with multiple stakeholders, including local government authorities, the forest department, the water department, and river management agencies, to ensure the successful delivery of water to the village.
- Community Ownership: The project has fostered a strong sense of community ownership through active participation in construction (labor contribution) and ongoing management (monthly maintenance fee of INR 50 per household).
- Diversified Income Streams: The tree plantation initiative (mango, bamboo, cashew) offers the potential for long-term sustainable income generation for participating households. 67% of farmers received saplings (mango, bamboo, cashew) for plantation. They expect sustainable income from the plantations in 2-3 years.
- Time Savings: The project has drastically reduced water fetching time from an average of 4.5 hours per person per day to just 6 minutes.
- Improved Well-being: Saved time is now being used for rest (65%), income-generating activities (33%), farming (22%), education (16%), and childcare (12%), significantly improving personal and family well-being.
- 100% of respondents reported an improvement in self-esteem and mental well-being. Women regained autonomy over their time and increased confidence.
- The project has **reduced the reliance on open wells**, which while mostly compliant, had higher concentrations of minerals like calcium, magnesium, chloride, and iron, all of which are undesirable for drinking water. The **lifted surface water** from the perennial stream has lower levels of TDS, hardness, chloride, iron, and sulphate compared to the open well water, making it a better and more palatable source for drinking and household use. 10 water quality parameters tested were within the standards (IS 10500:2012) of drinking water usage.
- The **filtered water** through candle filters in Swami Nagar is of high quality, showing results similar to those of the lifted surface water. The filtration process effectively removes impurities, including iron, making it the safest option. Lifted Surface Water also meets all standards, with slightly higher iron content (0.2 mg/L) but still within permissible limits.
- Economic Impact: 33% of the respondents mentioned that they now participate more in income-generating activities, boosting household income. The youth highlighted that improved access to water has significantly enhanced their availability for work. This has enabled them to be more proactive in their job search, a process that was previously constrained. They reported being able to engage in manual labor 5-6 days a week, compared to just 2-3 days a week before the intervention.

Recommendations and Way forward

- Immediate Water Quality Monitoring: Ensure regular monitoring of water quality and engage experts to guide the installation of simple filtration solutions where needed
- Promote Sustainable Practices: Provide short training sessions on sustainable agricultural practices, including simple methods like crop rotation and organic farming can be considered
- Expand water availability for agricultural needs by constructing dedicated hauds to ensure consistent and reliable water supply for irrigation and farming activities
- Develop a plan to engage women and villagers, who have gained time from reduced water-fetching tasks, in vocational training programme and other income-generating activities such as processing cashew and mango by-products or other relevant activities with the Mokhada Livelihood Centre that may provide skill development, market access, and resources, enabling sustainable economic empowerment for the community

- Lifted Surface Water is safe for drinking and household use, but periodic testing is recommended to monitor iron levels. The open Well Water requires treatment (e.g., iron removal filters) before use for drinking. Regular monitoring of iron and other parameters is essential.
- Pilot Individual Filters: Test household-level filtration systems or smaller community filters that align with the community's preferences and build trust. Engage the community in choosing and maintaining these systems
- Track Electricity: Establish a basic system for tracking renewable electricity production
- Implement a piped water connection for the ZP school to address safety concerns, as the existing water tank requires students to cross a pucca road, to access water basis requirement, posing a potential risk
- Continued training and capacity building within the community to ensure long-term maintenance and operation of the infrastructure.
- Future expansion of water storage capacities to accommodate future demands during peak dry seasons

JalAadhar-Water Access intervention site-Mokhada | *Source: Deloitte*

About Tata Capital Limited and Tata Capital Housing Finance Limited

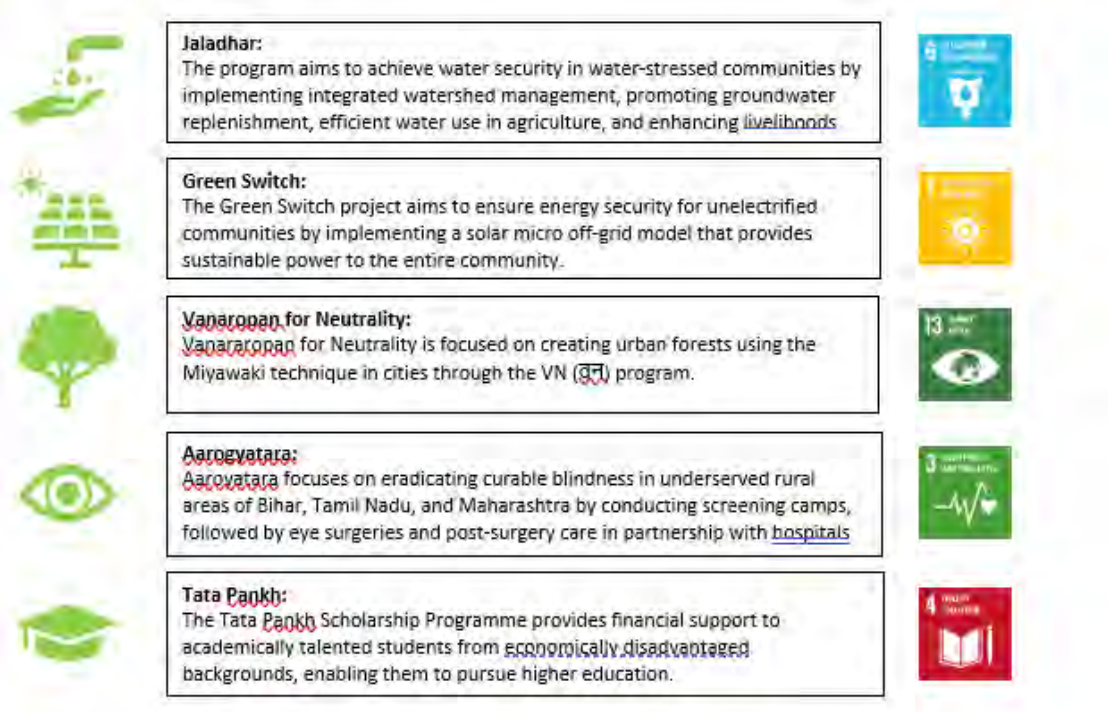
About Tata Capital Limited

Tata Capital Limited is a premier financial services company, part of the prestigious Tata Group, offering a wide range of financial solutions to individuals, businesses, and institutions. Established in 2007, the company provides services across diverse sectors including retail loans, wealth management, corporate finance, investment banking, and asset management. With a strong focus on customer-centric solutions, Tata Capital is committed to helping clients achieve their financial goals through innovative and personalized products. Leveraging the values of trust, transparency, and ethical business practices, Tata Capital continues to drive financial inclusion and sustainable growth across India.

Tata Capital Housing Finance Limited (TCHFL) is TCL's wholly owned subsidiary registered with the National Housing Bank as a Housing Finance Company, offering long term funds for housing purposes.[2] It's Corporate Social Responsibility (CSR) vision is to establish a collaborative and inclusive approach for social and environmental development initiatives, fostering shared value for the broader community, aligned with the core purpose of the Tata Group.

TATA CAPITAL LIMITED – CSR ACTIVITIES

The company's CSR mission is to improve the well-being of communities, especially marginalized social and economic groups, by creating a lasting, measurable, and positive impact through initiatives focused on Climate Action, Healthcare, Education, and Skill Development. Additionally, the company is committed to encouraging its employees, partners, and customers to cultivate a strong sense of responsibility towards social and environmental causes.



Tata Capital's CSR focus areas with key flagship projects aligned with Sustainable Development Goals

[2] Tata Capital Housing Finance Website I Accessed on 18th December 2024 | https://www.tatacapital.com/tchfl/about-us.html

About JalAadhar Programme

About the programme

Program overview	JalAadhar, a comprehensive water management project focusing on accessibility, conservation, and sustainable practices, has positively impacted over 2 lakh individual over the years. The project encompasses three verticals namely **Water Access, Water Rejuvenation and Integrated Watershed Development**

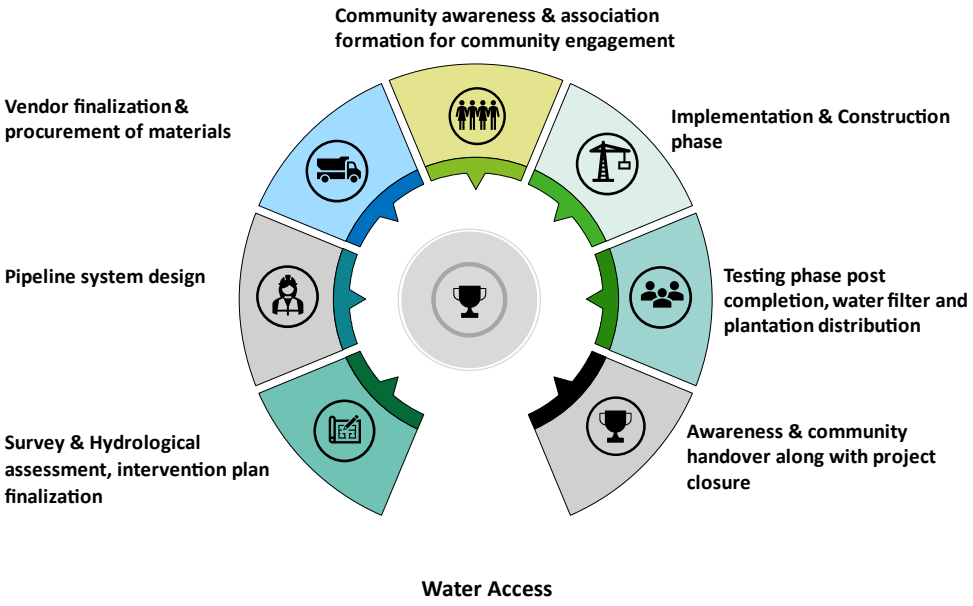
Project under review	**Water Access:** December 2022 to 31st March 2023
Client grant	INR 1.5 Crore (as per MoU)
Project location	Palghar, Maharashtra
About the implementing agency/partner	The project is implemented by **Diganta Swaraj Foundation (DSF).** DSF is a non-profit organization dedicated to empowering rural communities through sustainable development initiatives. It focuses on an integrated development approach – can resolve the deep-rooted issues of poverty, forced migration, water scarcity and social justice in rural Maharashtra.

Scope of the Study:
The Aase project is implemented in two phases, with this study focusing specifically on Phase 2. As part of Phase 2, support was also extended to Phase 1 villages by upgrading the pumping infrastructure—replacing the 15 HP pump installed in Phase 1 with a higher-capacity 30 HP pump.

Intervention Model and Process Mapping

A comprehensive process map of the intervention - **Water Access Project** is presented below, highlighting and detailing each step.

Intervention model adopted for implementing **Water Access** project



Process Steps	Details
Survey & Hydrological assessment, intervention plan finalization	• Drafted intervention strategies, including water retention structures, pipeline networks, and solar-powered systems. • Evaluated technical feasibility and cost-effectiveness of proposed solutions. Conducted stakeholder consultations to align interventions with community needs. • Finalized engineering designs and implementation timelines.
Pipeline system design	• Mapped out pipeline routes considering topography and water demand zones. Selected High Density High-Density Polyethylene (HDPE) pipes for durability and cost efficiency. • Designed layouts to minimize water loss and ensure equitable distribution. Integrated provisions for future scalability and maintenance accessibility. • Conducted hydraulic simulations to optimize pipeline diameter and pressure flow. • Reviewed the design with engineers and project stakeholders.
Vendor finalization & procurement of materials	• Released tenders and invited bids for the supply of HDPE pipes, solar panels, and construction materials. • Evaluated vendors based on quality, cost, and delivery timelines. Negotiated terms to ensure compliance with project specifications. • Procured materials, ensuring alignment with design requirements. Inspected materials upon delivery for quality assurance. Coordinated logistics for timely delivery to project sites.
Community awareness & association formation for community engagement	• Created informative materials on water conservation and sustainable usage practices. • Developed workshop content focused on project objectives and community roles. Designed visuals and multimedia content for easy understanding by diverse audiences. • Facilitated discussions to address community concerns and gather feedback. Identified and formed Water User Associations (WUAs) for system management.

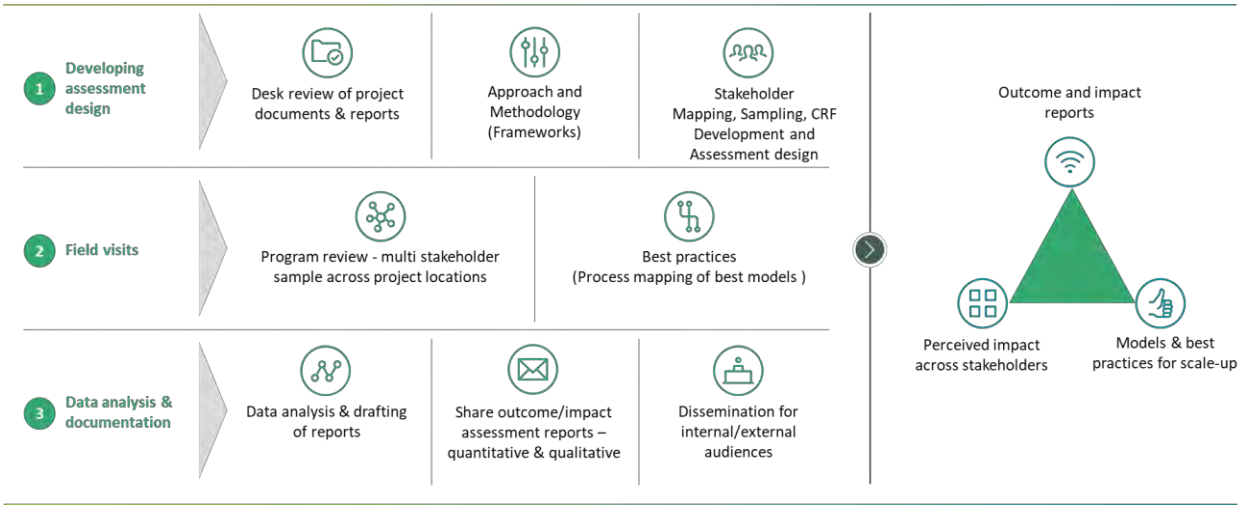
	• Trained association members on operational, financial, and conflict-resolution aspects.
Implementation & Construction phase	• Designed plumbing systems for individual households and agricultural fields. • Installed distribution points called water storage tanks for easy access to water. • Constructed water retention structures such as check dams and bunds in project locations of Alibaug and Ramgad. • Installed solar-powered submersible pumps near water source of Wagh River in Raigad. • Executed trenching and laid HDPE pipelines along planned routes. • Connected pipelines to water tanks, agricultural fields, and community distribution points. • Performed regular site inspections during construction to ensure adherence to designs.
Testing phase post completion, water filter and sapling distribution	• Monitored water flow and retention performance of constructed structures. • Evaluated structural integrity and water-holding capacity. • Tested pipelines for leakages and pressure consistency. • Conducted end-to-end checks for water flow from the source to the distribution points. • Ensured proper functioning of plumbing systems for homes and agricultural fields. • Distributed water filters to households to ensure access to safe drinking water. • Distributed fruit saplings to select households • Conducted demonstrations on the proper use and maintenance of filters.
Awareness & community handover along with project closure	• Organized final awareness sessions on water system maintenance and conservation. • Shared project outcomes and success stories to encourage community ownership. • Formally handed over the water supply system to the Water User Association. • Established mechanism to sustain the intervention by formalizing a monthly water fee of INR 50 per household. • Provided documentation and operational guidelines to association members. • Established channels for reporting issues and ensuring accountability.

Chapter 2

Approach and methodology

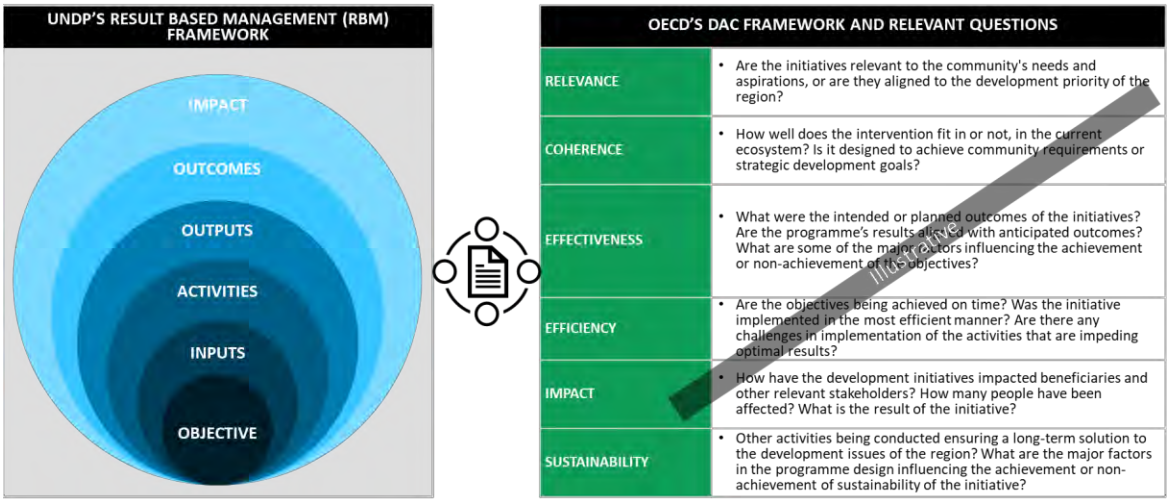
Deloitte's customized approach for evaluating the impact of TCHFL's funded CSR projects and identifying potential areas for future intervention was built on extensive experience in conducting similar evaluations. A mixed-method assessment design was utilized, primarily focusing on primary data collection through in-person interactions and telephone interviews, which was further complemented and cross-verified with relevant secondary data and available insights.

Methodology adopted for programme study



The evaluation design based on OECD's Development Assistance Committee (DAC) and UNDP's Result Based Management (RBM) frameworks has been adapted to assess the project and obtain information on the research questions, Common Results Framework and KPIs framed based on the same.

OECD's Development Assistance Committee framework leveraged to design the methodology



Key Enquiry Areas

Based on the program design, following indicative areas of enquiry were identified and data collection tools were developed in accordance:

Relevance

- Assess how well the program addresses the region's water scarcity and other household challenges related to water accessibility
- Evaluate the program's alignment with the priorities and needs of local communities, including marginalized and vulnerable groups.
- Examine the relevance of specific interventions
- Determine whether the program design considers region-specific environmental, social, and cultural factors.
- Assess the alignment of the program with national and state-level policies on water management, agriculture, and rural development.
- Evaluate how the program complements existing infrastructure and initiatives aimed at improving water security.

Coherence

- Analyze the integration of the program's activities with government schemes
- Evaluate the role of partnerships with local governance bodies (e.g., Gram Panchayats), NGOs, and private sector entities in achieving the program's objectives.
- Explore how the program promotes inclusivity and gender equity in decision-making and implementation.

Effectiveness

- Evaluate the effectiveness of structural interventions in restoring and maintaining water resources.
- Measure the improvements in water availability for agricultural and domestic purposes due to the program's interventions.
- Analyze the level of community participation and ownership in maintaining structures
- Evaluate the success of water supply networks in providing consistent, equitable access to water across all segments of the population.
- Examine the extent to which the program has promoted better hygiene and sanitation practices through the distribution of water filters and related interventions.

Efficiency

- Assess the timeliness of the program's activities, from planning and procurement to execution and monitoring.
- Evaluate the cost-effectiveness of interventions such as water body rejuvenation, silt repurposing, and soil conservation measures.
- Measure the efficiency of resource allocation in terms of manpower, materials, and financial resources.
- Identify bottlenecks and delays at various stages of program implementation, such as construction timelines or community mobilization.
- Analyze the efficiency of monitoring and evaluation processes in tracking progress and ensuring accountability.

Impact

- Determine the cost savings achieved by stakeholders through access to enhanced water resources and sustainable farming practices.
- Assess the socio-economic benefits for community members, such as increased incomes, reduced migration, and improved quality of life.
- Analyze the program's contribution to ecosystem resilience, specifically the community's ability to cope with water scarcity and climate variability.
- Investigate how the program has influenced long-term water use behaviors and conservation practices among community members.
- Assess the impact of hygiene and sanitation interventions, such as water filter distribution, on public health outcomes.
- Measure the program's role in empowering women and marginalized groups through improved water access and participation in decision-making processes.

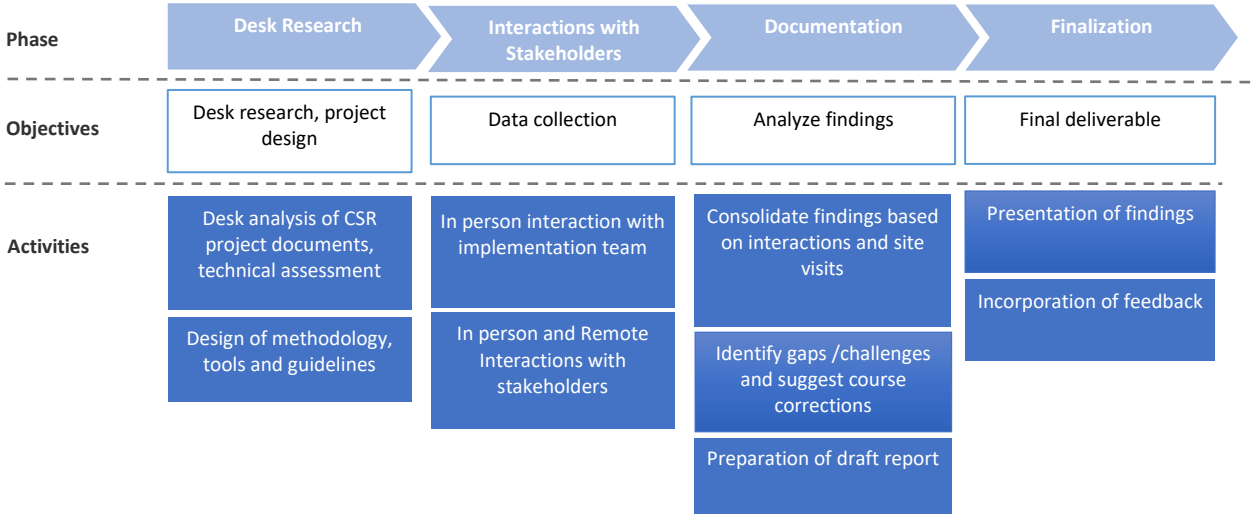
Sustainability

- Assess the long-term viability of structures, including community-led maintenance efforts.
- Evaluate the institutional mechanisms established to ensure the sustainability of program interventions, such as local water user committees or farmer groups.

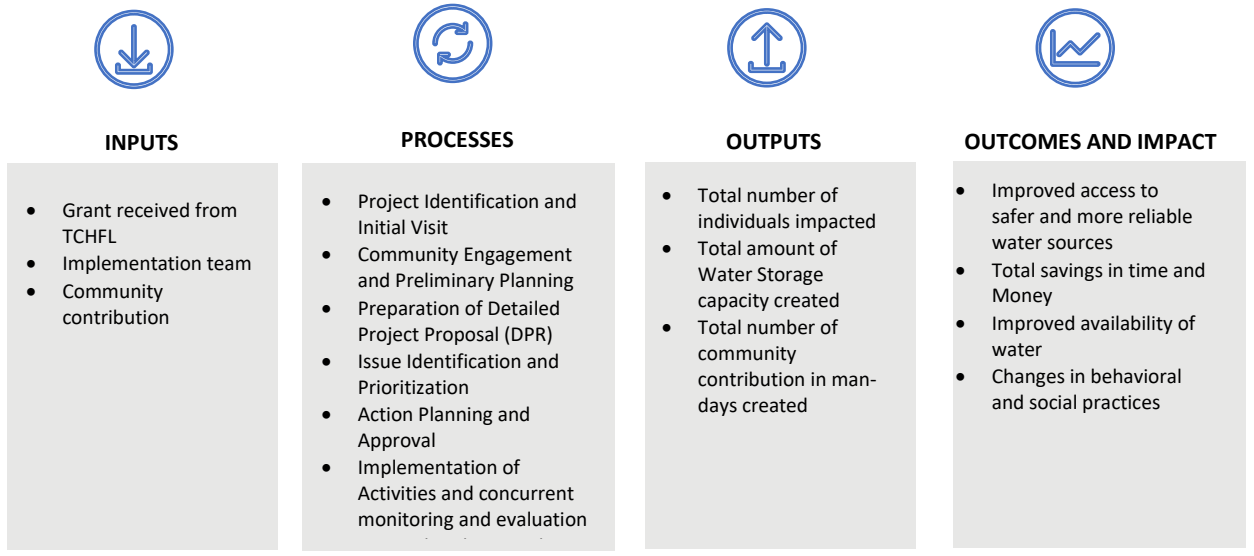
- Identify challenges and opportunities for strengthening the program's sustainability, including technical, financial, and governance aspects.
- Explore the potential for scaling up successful interventions to other regions facing similar challenges.
- Examine the degree to which the program has fostered a sense of ownership and accountability among stakeholders, ensuring long-term impact.

Programmatic review

The programmatic review and impact assessment of the CSR intervention was executed in a phased manner. The four main phases are outlined below:



KPIs along UNDP's Results Based Management (RBM) framework for monitoring were developed and used as the basis for the programmatic review. Both primary and secondary project related data was reviewed to gain a holistic understanding of the implementation model and outcomes.



Desk Review

A thorough review of the documents made available by the implementing partner and the funder was conducted, including the information available on the project in the public domain to build a comprehensive understanding of the process and design the assessment tools accordingly. Following documents were reviewed as a part of the desk review process:

- Memorandum of Understanding (MoU) signed
- Annual project progress report submitted to funder
- Fund utilisation report

Stakeholder mapping

The impact study identified the various stakeholders for the project as follows

Primary Stakeholders	Secondary Stakeholders
Villagers	Implementation partner staffs/officers/managers
Water samiti (WUG)	Local government authority
School students and teachers	

Sampling plan and Tools used for the study

A comprehensive stakeholder mapping was conducted to identify both primary and secondary stakeholders relevant to the project. Based on this analysis, a structured engagement plan was developed to facilitate targeted interactions with each stakeholder group.

For primary data collection, direct beneficiaries were engaged using a dual approach—50% of the data was gathered through on-field pre-designed survey forms, while the remaining 50% was collected via structured FGD. This mixed-method approach ensured a balanced representation of individual and collective perspectives. Additionally, KII were conducted with secondary stakeholders using a pre-designed questionnaire to capture insights from institutional representatives, subject matter experts, and local governance bodies.

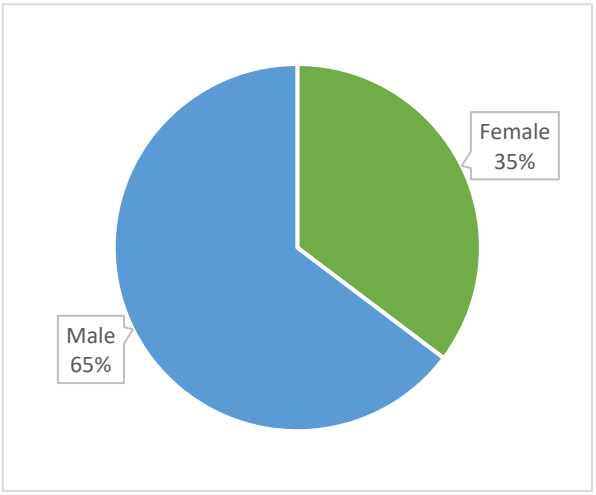
To maximize the coverage of interventions and ensure diverse representation, a purposive sampling method was employed to identify key intervention areas for field visits. For the **Water Access** project, given the geographical constraints, priority was assigned to two hamlets within Aase village, along with Ashram School and ZP School.

Sampling plan

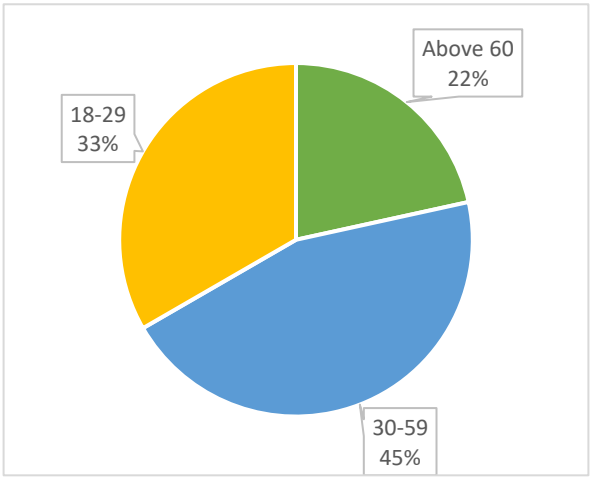
Stakeholder	Sample covered	Type of sampling	Interview mode	Tools used
Villagers	**110 beneficiaries** across 2 hamlets in Aase. Survey: 50 FGD: 60	Purposive	On-field	Survey tool FGD guidelines
School students	**18 students** in Ashram School	Purposive	On-field	FGD guidelines
Ashram and ZP school staff	3 teachers and 1 principal	Purposive	On-field	FGD guidelines
DSF implementation team	6	Purposive	On-field	KII
Village local administration	1 GP secretary	Purposive	On-field	KII

Profile of interview respondents

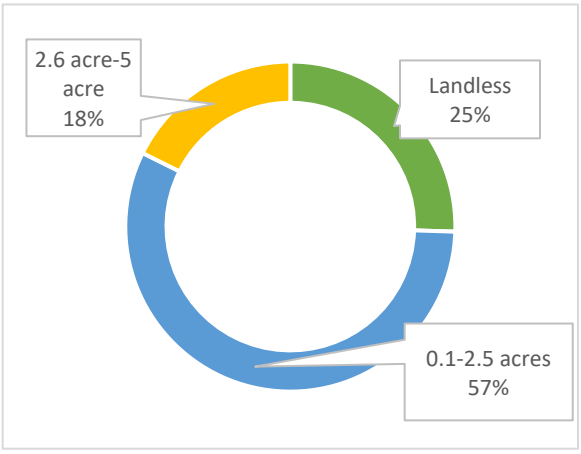
Gender Split (N=51)



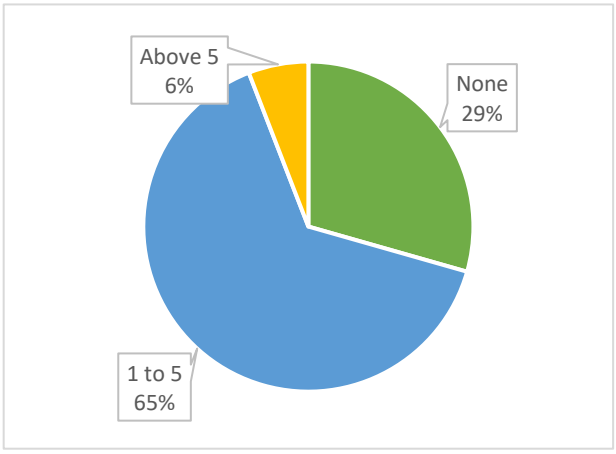
Age group (N=51)

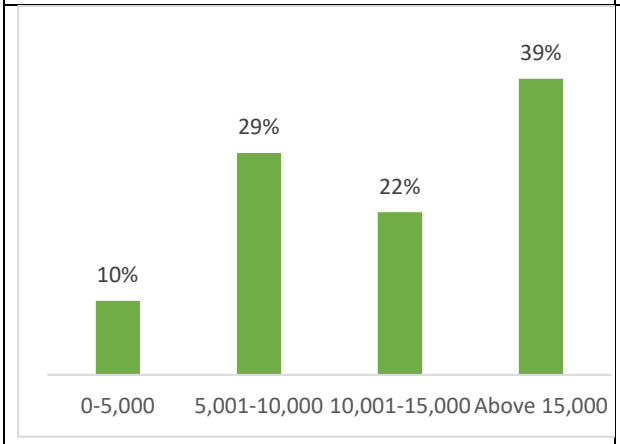


Farm size (N=51)



Livestock (N=51)



Annual family income (N=51)	Social profile (N=51)
	**100% of the sample population belong to the Scheduled Tribe**

Chapter 3

Programmatic and Technical findings

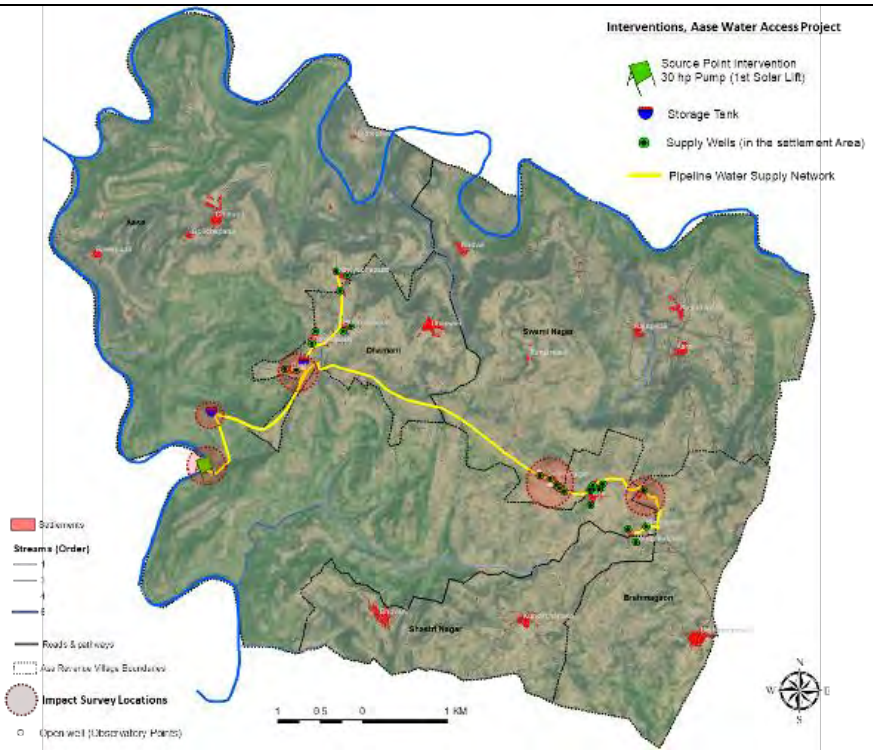
The objective of the JalAadhar programme at Aase location was to design a sustainable water supply system that utilizes a perennial water source, the Wagh River, to improve water access for the residents of the Gram Panchayat's 6 hamlets.

Regional geography and hydrogeological context

The Aase Water Access Project was implemented in Aase Gram Panchayat, located in Mokhada block of Palghar District, Maharashtra, to address chronic water scarcity resulting from geographical isolation, inadequate infrastructure, and challenging topography. The settlements in the region are segregated into five revenue villages: Aase, Dhamani, Brahmagaon, Shastri Nagar, and Swami Nagar. With an average elevation of 486 meters, the region experiences high seasonal rainfall (2500 mm annually), but the steep terrain hinders effective runoff capture and storage, The hydrogeological conditions include limited groundwater availability in shallow wells, which are heavily reliant on seasonal rainfall. The failure to capture runoff exacerbates the water scarcity, resulting in long daily walking distances (3 km) for water collection, leading to negative socio-economic impacts on health, hygiene, and migration patterns. The region's high elevation, combined with its remote location, further complicates the design and implementation of effective water supply systems.

Project Design and Intervention

The primary goal of the Aase Water Access Project was to establish a reliable water supply from the Wagh River, a perennial water source, to the various settlements in the Gram Panchayat. The project aimed to overcome topographical and logistical constraints by employing solar-powered lift irrigation technology, manual labor for infrastructure transport, and an integrated pipeline system for water distribution.



Intervention locations and water distribution network for Aase through Wagh river

The below table represents impact findings using the common results framework for Water Access programme.

<table>
<tr><th>Parameters</th><th>Findings</th></tr>
<tr><td colspan="2">INPUT</td></tr>
<tr><td>Grant from Tata Capital Housing Finance Limited (TCHFL)</td><td>

The total grant of INR 1,50,02,709 was provided to DSF (Aase, Raigad and Alibaug) to support water accessibility, during the period 01st April 2023 to 31st March 2024.
The CSR grant was disbursed in two tranches –

<table>
<tr><th>Tranche 1 (INR)</th><th>Tranche 2 (INR)</th><th>Tranche 3 (INR)</th></tr>
<tr><td>73,88,806</td><td>75,27,000</td><td>86,903</td></tr>
<tr><td>Disbursal on 27/09/2023</td><td>Disbursal on 28/12/2023</td><td>Disbursal on 29/02/2024</td></tr>
</table>

100% of the grant has been utilized as per the annual audited utilization certificate

</td></tr>
<tr><td>Implementation team</td><td>

The community mobilization for the Water Access Project in Mokhada was facilitated by two project-funded field staff, whose responsibilities included conducting Participatory Rural Appraisal (PRA) and related activities.
Additionally, three administrative staff were deployed in Aase, Mokhada, to oversee project coordination, logistical support, and monitoring to ensure smooth implementation of the initiative.
DSF played a pivotal role in providing end-to-end technical assistance throughout the project lifecycle.

</td></tr>
<tr><td>30,000 man-days of shramdaan/ voluntary labour created</td><td>

The community actively participated in the project through voluntary labor contributions which included included tasks such as site preparation, excavation, construction support, carrying materials to site location and other essential activities required for the successful implementation of the project.
The project mobilized the local community, generating over 30,000 man-days of voluntary labor (shramdaan).
Community members actively participated in tasks such as land leveling, pipeline installation, embankment strengthening, and tank construction. This engagement not only reduced project costs but also fostered a sense of ownership and accountability among the beneficiaries.

</td></tr>
<tr><td colspan="2">PROCESS</td></tr>
<tr><td>Survey and Hydrological assessment, intervention plan finalization</td><td>

Water demand patterns, consumption rates, and seasonal variations were analyzed for accurate forecasting. This included community, agricultural, and livestock water usage.
Participatory planning sessions were conducted with community members, local government authorities, and technical experts to align on intervention priorities.
Plans were finalized considering technical feasibility, community needs, and ecological factors. For instance, embankment strengthening, pipeline layouts, water tank construction, type of water filter to be distributed were adapted to the topography.
Necessary approvals from regulatory bodies, forest authorities were obtained, ensuring adherence to environmental and construction norms.

</td></tr>
<tr><td>Pipeline system design</td><td>

A GIS-based mapping system was utilized to design the pipeline network, considering topographical elevations, shortest routes, and key distribution points.
Pipe material and dimensions were selected to optimize durability and minimize maintenance. HDPE pipes were preferred for their cost-effectiveness and resistance to corrosion.
Flow and pressure simulations were performed to ensure consistent water delivery across the network.
A detailed pipeline design with technical drawings and specifications was finalized, ensuring efficiency, durability, and cost-effectiveness.

</td></tr>
<tr><td>Vendor finalization and procurement of materials</td><td>

A transparent procurement process was followed, issuing tenders with detailed technical requirements. Vendors were shortlisted based on compliance with specifications, cost competitiveness, and delivery timelines.

</td></tr>
</table>

Community awareness and association formation for community engagement	• Interactive sessions such as the use of IEC materials-brochures, pamphlets, in-person workshops, village meetings, awareness rallies, and demonstration activities were conducted to educate the community on the project's objectives and the importance of water resource management. • Water User Associations (WUAs) were established, with defined roles and responsibilities for operation, maintenance, and governance of the water systems.
Implementation and Construction phase	• Land was surveyed, cleared, and levelled to prepare for the construction of infrastructure such as pipelines and storage tanks. • On-site engineers monitored activities, ensuring adherence to technical designs and safety protocols. Embankment reinforcement, tank installations, and pipeline laying were executed as per specifications. • Voluntary labor from the community supported the construction phase, particularly for tasks like earth excavation and material handling.
Awareness and community handover	• Community members which include few youths were trained on the use and maintenance of the water systems, including troubleshooting common issues and managing water distribution schedules. • Training programs on financial management, repair techniques, and water conservation practices were provided to association members. • The infrastructure was formally handed over to the community, symbolizing their ownership and responsibility for its long-term sustainability. • Each **household contributes INR 50 per month** during the pump's operational period, with the **funds collected by an elected leader for each water tank** to ensure proper management and maintenance. • A dedicated WhatsApp group has been created, with at least one member from each household, to take care of the ongoing maintenance, communication, and management of the water distribution system, ensuring efficient problem-solving and sustained community engagement for the long-term success of the initiative. • The responsibility for cleaning the tank has been assigned to the beneficiaries on a rotational basis, ensuring shared accountability and regular maintenance.
	OUTPUT
Over 5,000 total number of individuals impacted	• The project has directly impacted over 5,000 individuals across six hamlets in Aase village, located at an elevation of approximately 1,500 meters. • Four hamlets benefited from the upgrade of the existing 15 HP pump to a 30 HP pump, significantly enhancing water access and reliability Although this upgrade was not initially outlined in the MoU, it is part of an ongoing project enhancement. • The remaining two hamlets, including the Ashram School and the Primary Health Center (PHC), were impacted by the installation of a new pipeline network spanning, supported by solar panels and a 30 HP pump, ensuring consistent water supply to these critical facilities.
Over 25,000 beneficiaries impacted through PHC	• The intervention has indirectly impacted over 25,000 people in 4 Gram Panchayat which the PHC directly caters
Setting up of solar-powered lift irrigation system and water storage tanks	• A 30 HP pump, powered by solar panels, was installed to lift water from the Wagh River to the mid-range storage tank at 320 meters elevation. This system ensures energy-efficient pumping and reduces dependence on non-renewable energy sources. • A concrete mid elevation storage reservoir, with a capacity of 50,000 liters and a depth of 10 feet, was installed at 320 meters elevation. This tank serves as the primary distribution point for water to higher altitude settlements. • A total of 10 water tanks, each with a capacity of 10,000 liters, were constructed at strategically identified locations to function as primary water collection and distribution points. • 2 more water outlet connection given to each at PHC and Ashram school tanks • Each tank serves 15-20 households, ensuring that all users are located within a 200-meter radius for convenient access. • The tanks are designed as open cement structures, allowing users to access water directly from the top without the provision of a tap outlet.
Building water distribution	• Two pumps were installed at the mid-range storage tank. The first pump serves Aase village, Swami Nagar, Ashram School, PHC, and Borichpada via an 8 km pipeline. The second pump feeds water into

network and installation of 8 KM pipeline for water supply	a secondary storage tank at 480 meters elevation, with a 2.5 km pipeline extending to Dhapti1, Dhapti2, Ekrichpada, Navynisipada, and other settlements (constructed in Aase phase 1) • A key challenge of the project was the installation of pipelines through dense forest areas, which involved manual labor for the transport and laying of infrastructure components. Special attention was given to minimize exposure to environmental risks, such as erosion and physical damage to pipes.
Over 1.5 lakh litre water storage capacity created	• The combined capacity of newly constructed water tanks and storage infrastructure connected to village storage tanks exceeds 1.5 lakh liters. This storage capacity ensures sufficient water availability throughout the year, even during peak summer months, building resilience against seasonal water scarcity and enhancing water security for the community.
Total amount of renewable energy generated	• The project incorporates renewable energy solution of solar-powered automated pumps, to operate the water lifting and distribution system. • This approach has minimized reliance on non-renewable energy sources, contributing to environmental sustainability while ensuring cost-effective and reliable water delivery.

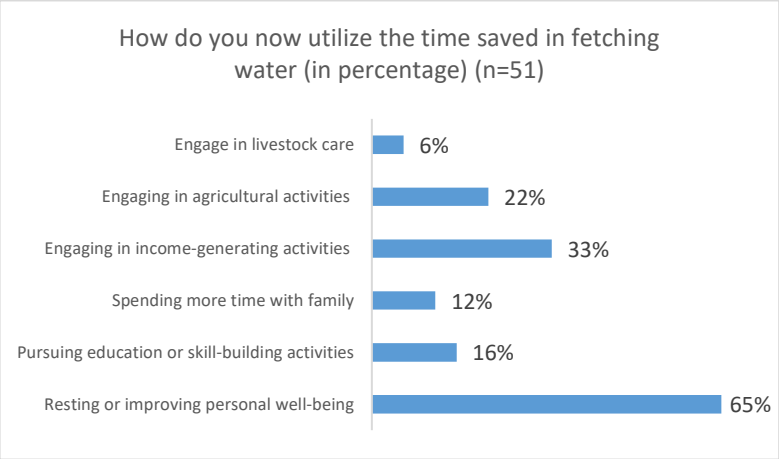
OUTCOME AND IMPACT

Impact on drinking water accessibility and household use	Enhanced safer access and reliable drinking water.	 

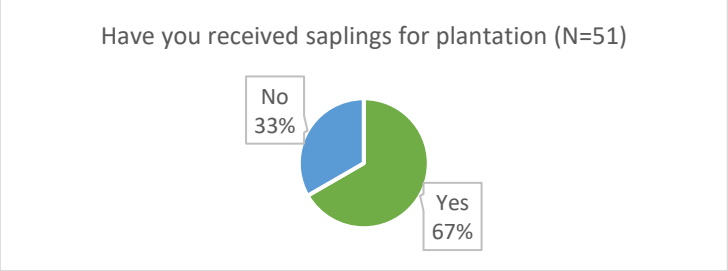
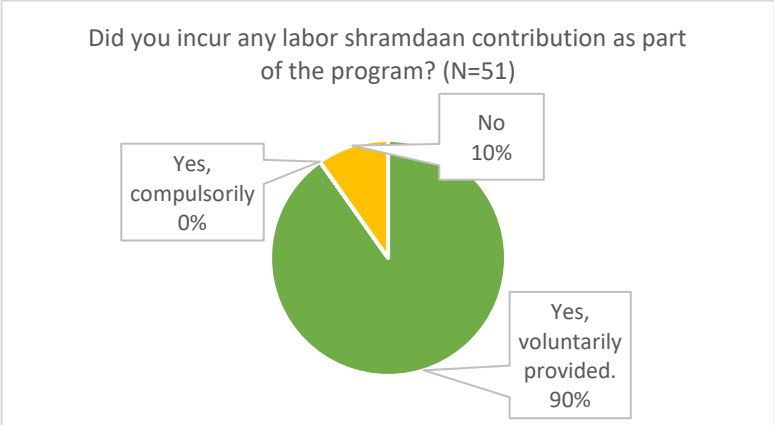
- By tapping into the perennial Wagh River, the project has provided a continuous and reliable water supply to the region, significantly improving water access during both wet and dry seasons.
- Survey and FGD respondents emphasized that the primary source of drinking water before the intervention was a community well located approximately **3 kilometer** from the village. The village tanker (supported by district administration) was used for other daily activities, such as washing utensils, clothes, bathing, sanitation and other use. They further explained that the tanker water facilitated by the district administration was restricted to non-drinking uses due to its poor quality.
- Six respondents specifically noted that, due to advanced age and limited mobility, they had to rely on tanker water for drinking purposes, even though its quality was suboptimal
- 100% of the surveyed respondents confirmed a significant shift in water reliance, with the project-constructed water tank (**haud**) now serving as the primary source for both safe drinking water and other daily household needs.
- According to survey respondents, the water tanks (haud) are conveniently located at an average distance of 30 meter

Reduction in Groundwater Dependence, water storage and distribution efficiency	• The technical assessment indicate that prior to the intervention, the region was heavily reliant on shallow open wells that were prone to drying up, especially during the dry season. With the introduction of a stable surface water supply, the demand for groundwater has decreased, ensuring the long-term sustainability of local aquifers. • The installation of mid-range and high-altitude storage tanks, coupled with an extensive pipeline network, ensures that water is efficiently stored and distributed across the settlements. This system has drastically reduced the time spent collecting water and increased water availability for agricultural and domestic purposes.

	Increased frequency and consistency of water availability	• The FGD respondents highlighted that the pre-intervention water supply was unreliable, as the district administration's water tanker service operated only two to three times a week, which was insufficient to meet the community's needs. They further noted that approximately once or twice a month, they were forced to rely on private tankers, incurring out-of-pocket expenses (OOPE) of around **INR 300 per month**. This amount fluctuated based on the frequency of family gatherings and visits from relatives. • Post-intervention, respondents reported a significant improvement, with water now consistently available on demand. The automated system ensures fresh water is supplied to the tanks every alternate day. A single 10,000-litre tank adequately provides water for 15-20 households for two days.
	Reduction in frequency of water crises	• Respondents described experiencing a severe water **accessibility crisis during non-monsoon months, lasting approximately eight months each year**. The sole community well, which served as the primary water source, faced immense pressure during peak periods. This necessitated restrictions on water extraction, limiting access to small containers (handas) to ensure equitable distribution among households. • The respondents further added that following the construction of 10 water tanks strategically placed across the village, the **frequency of such crises has dropped to zero**. The consistent and equitable water supply now meets the needs of all households, effectively eliminating the challenges of water scarcity during peak demand periods.
	Decrease in time spent fetching water	  • Respondents reported spending an average of **4.5 hours per person per day** fetching water before the intervention. Villagers explained that due to livelihood commitments during the day, they were compelled to undertake **arduous nighttime trips to the well between 9 PM and 9 AM**, often spending the entire night near the well with their families. Each family member queued up with their **handa** to secure water, ensuring they did not return empty-handed. On average, they carried back **2-3 handas per person** after these prolonged efforts. • **Post-intervention**, respondents highlighted a transformative impact, with the average time spent fetching water drastically reduced to just **6 minutes per day**. The new system has streamlined water access, providing a convenient, reliable, and efficient solution to their daily needs.
Impact on Local Hydrology:	Contribution to recovery of groundwater levels	• The introduction of surface water supply, while greatly enhancing water availability, has also contributed to changes in the local hydrological system. Reduced reliance on groundwater has lessened the risk of over-extraction and allowed for the recovery of groundwater levels in some areas.

Impact on standard of living and well-being	Increased opportunity to repurpose time saved for productive activities	 • The intervention has unlocked significant time savings of approximately 4.4 hours per day per person, which has been redirected to enhance personal well-being, livelihoods, and community development. • **65% of respondents** reported using the saved time to rest, focus on their personal well-being, and ensure adequate sleep—something they struggled to achieve earlier due to the constant pressure of securing water. Many in this group expressed optimism about being more prepared to engage in livelihood opportunities in the future. • **33% of respondents** indicated they are now actively participating in income-generating activities, including daily wage labor through private employers or under MGNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme). This increased frequency and punctuality in their work have directly enhanced their household income. • **22% of respondents**, including a significant number of women, stated they now devote more time to their farms. This additional focus has allowed them to improve farm care, and better support their families. • **16% of respondents**, primarily village youth, reported being able to focus more on their education—a critical step towards building future opportunities that were previously hindered by water-fetching duties. • **12% of respondents** mentioned they now spend more quality time caring for their children and loved ones, enhancing family well-being.
	Improved mental well-being through reduced psychological stress	• **All survey respondents (100%) strongly agreed** that the project has significantly **enhanced their self-esteem and mental well-being**. This improvement is particularly notable in the alleviation of the constant anxiety that families, especially women, previously experienced in securing water. • **65% of respondents** reported using the saved time to rest, focus on their personal well-being, and ensure adequate sleep—something they struggled to achieve earlier due to the constant pressure of securing water. • One respondent emotionally shared, ***"Poracha paajna sodun, paanya sathi padaycho"*** (translated: "I had to stop breastfeeding my child and rush whenever I heard the sound of the water tanker approaching")
	Enhanced Gender Equality and Empowerment	• By addressing the time-intensive and physically demanding task of water collection, the project has empowered women to reclaim valuable time and energy. This impact is evidenced by **65% of respondents, all women, reporting that they now have the opportunity to rest adequately and sleep better**, alleviating the previous double burden of water collection alongside household responsibilities. • As per the FGD interactions the initiative has also significantly enhanced the dignity of women by eliminating the need for unsafe and exhausting journeys to secure water. Reliable access to water has provided women with greater freedom

	and autonomy of their time, opportunity to repurpose their time, leading to increased confidence, self-worth. • During discussions with two women who lead the management of the water fee collection (INR 50 per household per month) for 2 of the water tanks, they expressed that this active participation has allowed them to contribute meaningfully to the development of their community, **fostering a sense of empowerment and ownership in the process.**
Improved hygiene, particularly benefiting school children, women, and the elderly.	• The Zilla Parishad school is approximately 30 meters from one of the water tank constructed. The KII with the teacher from Zilla Parishad School, as well as with the teachers and principal of Ashram School, alongside feedback from in-house students, revealed that the availability of water at these schools has had a profound impact on student attendance, hygiene attributed to water availability, and retention. Specifically, students are now able to stay at school for longer periods, engage in outdoor activities, and maintain better personal hygiene, thanks to the improved and reliable access to water. This has contributed to an overall enhancement in the school environment and student well-being. • The respondents during KII with few girl student in the ashram school further added that improved access to water has also led to better menstrual hygiene for adolescent girls and women, fostering both enhanced self-esteem and overall health.
Reduced school drop-out rates, contributing to better educational outcomes	• The FGD with 18 students at Ashram School revealed that, prior to the intervention, students were required to carry water from a well located approximately 200 meters from the campus, spending about one hour daily to meet their water needs. The time increased significantly during peak summer months due to drop in water level in the well, hence students would prefer to go back to their villages and at times not return back leading to an increased drop-out rate • As noted by the principal and school teachers, the school would arrange for water tankers, but this placed a considerable financial burden on the institution. Additionally, the lack of reliable water access and poor hygiene conditions led teachers to avoid staying on campus, further impacting the overall school environment and operations. • The introduction of pipeline connectivity has significantly enhanced conditions for both students and teachers. Students reported that they no longer need to return to their home villages due to water shortages at the school. Additionally, teachers, along with their families, have relocated to the campus, allowing them to focus more on student education without the need to allocate time for travel. This has **improved overall teaching effectiveness** and contributed to a more stable and productive learning environment. • Three students from Aase village, who study at Ashram School, shared that the situation was even more challenging for them prior to the intervention, as both their village and the school were affected by water scarcity, leaving them with no reliable source of water. These students emphasized that before the intervention, many were forced to miss school to collect water, often missing exams and prioritizing water-related responsibilities. However, with the advent of reliable water access, these students are now able to attend school regularly, leading to a marked reduction in dropout rates and offering them improved long-term educational and personal opportunities.
Enhanced personal safety and fewer water-fetching-related accidents	• The respondents in the FGD shared instances of having to source water from challenging terrain, with the risk factor escalating during the three summer months when the water level in the well would drop. During this period, women, or children from the family, due to their lighter weight, would climb a horizontally placed pole across the well's diameter to access the water. • While no specific instances of accidents were reported, the respondents acknowledged that this practice posed a significant risk and had the potential to lead to major accidents. • With the introduction of reliable water access, the participants added that the need for such dangerous practices has been eliminated, leading to enhanced personal safety and a reduction in chances of water-fetching-related accidents.

	Elevated social status within the community	• In the FGD, participants shared that the lack of water access not only disrupted daily life but also contributed to a perceived lower social status within the community. They collectively added that the absence of reliable water had previously hindered the marriage prospects of young men in the village, with relatives often reluctant to visit or stay overnight. • However, with the recent improvement in water availability, families have experienced a significant boost in their social standing, enhancing both their prospects and their overall reputation within the community.
Impact on livelihood	Enhanced economic prospects through improved water access	• In the FGD, the youth highlighted that improved access to water has significantly enhanced their availability for work. This has enabled them to be more proactive in their job search, a process that was previously constrained. They reported being able to engage in manual labor 5-6 days a week, compared to just 2-3 days a week prior to the intervention.
	Diversified income sources	 • **Approximately 67% of survey respondents reported participating in tree plantation activities** as part of the intervention, **receiving 50 mango, 50 bamboo, and 50 cashew saplings each**, which they planted near their land. While these farmers manually transport water from tanks to irrigate the saplings every 2-3 days, they anticipate that the plantations will become a sustainable income source within 2-3 years. • The remaining 33% of respondents did not receive saplings, either due to a lack of suitable land for planting or an inability to manage the upkeep of the trees. • Nevertheless, the initiative as indicated by the majority of the FGD participants has created an opportunity for diversifying income streams and fostering long-term economic benefits for participating households through agroforestry.
Impact on community bonding	Increase in community participation and collective participation in water management	 • The FGD underscored an increase in community participation and collaborative efforts in water management further iterated by 90% of the survey respondents who said that they had voluntarily provided labour contribution by undertaking tasks such as transporting construction materials, solar panels, and pipelines across difficult terrains. • On average, women contributed approximately 10 hours of labor, while men contributed around 15 hours. To promote inclusivity, elderly individuals and persons with disabilities were exempt from physical contributions.

		• Although no initial financial investment was required from the community for project implementation, households now collectively contribute a monthly maintenance fee of INR 50, reflecting their sustained engagement and commitment to the long-term success of the initiative.
	Reduction in resource-related conflicts	• **Over 60% of the FGD participants reported that the project has significantly strengthened community bonds** by addressing a key source of conflict: water scarcity. Previously, disputes over limited water resources often disrupted community harmony. • Women in the group recounted instances of stampedes at water tanker sites and tensions related to monitoring excessive water usage. The reliable access to water provided by the project has not only resolved these issues but has also fostered a more cooperative and united community environment.
	Strengthened sense of community ownership and self-reliance	• The FGD participants highlighted a strengthened sense of self-reliance brought by the project as they proudly showcased a letter submitted to the District Administration, affirming that the villagers no longer require tanker-supplied water, as they now have a sustainable and self-managed water solution thereby reflecting the community's confidence in their own resources and their ability to independently address their needs.

Technical inspection of the system

Key Design Features of the Solar-Powered Lift Irrigation System

Technical Specifications and Assessment:

- **Feasibility:**
  Solar energy is ideal for remote hilly areas with limited access to grid electricity. Solar power ensures energy independence and reduces dependence on non-renewable sources.
- **Energy Efficiency:**
  - **Pump Power:** 30 HP solar-powered pump.
  - **Water Source:** Wagh River.
  - **Vertical Lift (Head):** 200 meters.
  - **Pipeline Length:** 1000 meters
  - **Total Dynamic Head (TDH):** 200 meters (vertical lift) + friction losses in the 1,000-meter pipeline.
  - **Pipe Diameter:** 90 mm (0.09 meters).
  - **Pressure:** 10 kg/cm² (approximately 98.1 meters of head).
  - **Solar Panels:** 540 W panels, 56 panel in total, functioning for **6-8 hours a day**
  - **Daily Water Pumped:** 1,50,000 lit/day **lifted on daily basis**
- **Pump Performance:**
  - **Motor Power:** The 30 HP motor, is technically feasible for lifting water to 200 meters with 1000 meters pipeline. The pump requires 22.37 kW of power to operate at full capacity.
  - **Energy generation:** The solar array, currently generates 65 kWh/day, which is suitable for the daily energy requirement. Optimum generation account to 150-200 kWh/day. Solar power systems and varying sunlight conditions must account for inefficiencies.
  - **Solar Insolation:** In hilly terrain, the amount of solar energy available may vary due to shading from hills, trees, or other structures. To ensure maximum solar exposure, a solar tracking systems might be needed to adjust the panel position to follow the sun throughout the day.
  - The system will deliver a flow rate of 20-30 m³/hour, making it suitable for medium-scale irrigation or water supply projects. By optimizing the pipeline, enhancing the solar power system, and implementing monitoring and maintenance practices, the system can reliably meet water delivery needs in challenging terrains.

The below table highlights the water testing results from pre and post intervention water sources.

Pre-intervention water source
Open Well 1: Dhapti 1 • Depth: 15 feet • Condition: Dried up; only used during extreme water shortages. • Post-Intervention: Not actively used as surface water supply from the Wagh River now supports the settlements.

Open Well 2: Swami Nagar

- Depth: 30 feet
- Current Water Level: 14.3 feet
- Casing Height: 2.2 feet
- Condition: Dried up by December prior to intervention.
- Post-Intervention: Water levels have stabilized, and reliance on the well has reduced significantly due to the new water supply infrastructure.

Open Well 3: Swami Nagar

- Depth: 30 feet
- Current Water Level: 13.2 feet
- Casing Height: 5.05 feet
- Condition: Dried up by December prior to intervention.

Parameter	Acceptable Limit (IS 10500:2012)	Permissible Limit (in absence of alternate source)
pH	6.5–8.5	6.5–8.5
Total Dissolved Solids (TDS)	500 mg/L	2000 mg/L
Total Hardness (as $CaCO_3$)	200 mg/L	600 mg/L
Calcium (Ca)	75 mg/L	200 mg/L
Magnesium (Mg)	30 mg/L	100 mg/L
Chloride (Cl^-)	250 mg/L	1000 mg/L
Sulphate (SO_4^{2-})	200 mg/L	400 mg/L
Fluoride (F^-)	1.0 mg/L	1.5 mg/L
Iron (Fe)	0.3 mg/L	No relaxation
Sodium (Na)	200 mg/L	No relaxation

- Post-Intervention: The well is still in use by a few households but remains a backup source during water shortages.

Parameters and Standards

Water quality is assessed based on the following parameters, compared against the permissible limits set by the Bureau of Indian Standards (BIS) for safe drinking water:

The evaluation of the effectiveness and impact of the project is performed by comparing the water quality of three sources: (1) Filtered water from the Swami Nagar settlement, (2) Lifted surface water from the downstream to the constructed village storage wells in the settlements, and (3) Existing groundwater in the open wells of the settlement, against the standards of safe drinking water as prescribed by the Bureau of Indian Standards (BIS). The parameters tested include pH, Total Dissolved Solids (TDS), Total Hardness, calcium, magnesium, chloride, sulphate, fluoride, iron, and sodium.

Results Overview

The water samples were tested for various quality parameters, and the results are summarized below:

Parameter	**Filtered water,** Swami Nagar **settlement**	Village Storage well **- Lifted Surface water**	Existing Open Well - **Ground water**
pH	7.16	7.54	6.95
Total Dissolved Solids (TDS), mg/L	96	83	262
Total Hardness (as $CaCO_3$), mg/L	68	67	176

Calcium (Ca), mg/L	18.4	17.1	48.1
Magnesium (Mg), mg/L	5.5	6.1	14.1
Chloride (Cl^-), mg/L	9.9	8.5	39.7
Sulphate (SO_4^{2-}), mg/L	6	2	21
Fluoride (F^-), mg/L	0.18	0.22	0.13
Iron (Fe), mg/L	0.04	0.2	0.9
Sodium (Na), mg/L	14.5	9.1	18.2

Analysis and Impact of the Project

pH levels
All three sources fall within the BIS standard range of 6.5 to 8.5 for pH, making them suitable for consumption from a pH perspective. However, Filtered water (7.16) and lifted surface water (7.54) are slightly alkaline, while open well water (6.95) is near neutral.

Total Dissolved Solids (TDS)
According to bis standards, tds should not exceed 500 mg/l for drinking water. Both the swami nagar and village storage wells samples are well within the acceptable range. However, the open wells have a significantly higher tds (262 mg/l), due to dissolved minerals from groundwater which, although within the limit, may be considered poor water quality in terms of taste and overall suitability for consumption.

Total hardness
The bis guideline for total hardness is ≤ 200 mg/l, and both the filtered and lifted surface water samples are well within this limit. The open well water, however, has a hardness level of 176 mg/l, which is close to the upper limit, suggesting that it is harder water. This hardness could lead to scaling in pipes and reduce the water's aesthetic appeal. The project's impact is evident as the surface water from the perennial stream offers better-quality water with lower hardness, which benefits the residents.

Calcium and magnesium
Calcium and magnesium are responsible for the hardness of water. The elevated calcium and magnesium levels in the open well water indicate high hardness, which may require additional treatment, such as water softening. The surface water from the lifted system has considerably lower calcium and magnesium levels, making it more suitable for consumption and reducing the need for treatment.

Chloride
Chloride levels in all sources are within the bis limit of 250 mg/l. Comparatively, the open well water has a much higher chloride concentration compared to the filtered and surface water. The project's shift to surface water has resulted in a significant reduction in chloride concentration, which is beneficial for both taste and plumbing maintenance.

Sulphate
The permissible limit for sulphate is 200 mg/l. Although all three water sources fall well below this limit, the open well water has a relatively higher concentration of sulphate, which can cause a bitter taste. This highlights the positive impact of the water access project in providing a source with lower sulphate content.

Fluoride
Fluoride levels in all three water sources are well within the safe drinking water range of 0.6 - 1.0 mg/l. The fluoride levels are low in all sources, which is generally favorable as excessive fluoride in drinking water can cause dental and skeletal fluorosis.

Iron
The permissible limit for iron in drinking water is 0.3 mg/l, and the open well water exceeds this limit with a value of 0.9 mg/l, indicating potential contamination or natural iron leaching from the soil. High iron levels in groundwater can lead to staining and impart an undesirable taste. The project has had a positive effect in reducing iron content in the water, as the lifted surface water and filtered water both have iron concentrations well within the safe limit.

Sodium
Sodium levels in all three sources are within the BIS permissible limit of 200 mg/L, but the open well water has a slightly higher sodium concentration compared to the other two. Elevated sodium can be a concern for individuals on a low-sodium diet, but the values are not of immediate concern from a health perspective.

Stories from ground

Identifiers in the case stories have been modified to maintain confidentiality.

GP Secretary, Aase

"When the Tehsildaar inquired why there was no request for tankers this year, **I proudly shared that we are now a tanker-free village**. This achievement is a direct result of Tata Capital's support. In the past, government surveys, like those for the Har Ghar Nal Jal Yojana, often struggled due to budget limitations. But thanks to the project, the dedicated implementation team, and our village's unwavering determination, we have overcome that hurdle."

"For the first time since independence, we have received water peacefully. Our 3 generations have endured the task of collecting water from 3 am to 10am. I feel happy that our next generation can now think beyond

Today, **we truly feel independent."**

Shankar Balu Khutade, Swaminagar

Case Study 1:

(Note: The respondent's name has been changed to respect her privacy)

Geeta Kale is the oldest member sitting in our focus group discussion with the beneficiaries in Swaminagar. She is unsure of her age, and after some deliberation, it appears that she is in her 60s. She was married in the village around 45 years ago, and hence can give an extensive account of the village's extremely dire situation with regards to access to drinking water and highlight the ancillary social impact of the situation on the lives of the villagers.

GEETA KALE, SWAMINAGAR (AASE), MOKHADA

Leela recalls that ever since her marriage, last year was the first year when she did not have to wake up for fetching water early in the night at 1 or 2 AM. This is due to the intervention of Jaladhaar project, which has brought water all the way up from the valley to their vicinity. While the rest of her observations regarding the reduction in time and effort resonate to what the villagers also shared, she also mentions some social challenges of living in a water-starved village. Infamous for the hardships in sourcing water, girls did not want to marry into Aase village and Geeta had to face great stress in finding brides for her sons. She also narrates how even the kids in their families would always want to go to their maternal villages or relatives' places and were reluctant to return at the end of holidays, to avoid the hardship and struggle that the lack of water caused.

Since the last year, after the intervention, the situations have changed and Geeta is happy that even though she spent most of her active life fetching water and making round trips in the dark to community wells, her grandkids and other villagers now don't have to experience the same hardships.

Case Study 2:

(Note: The respondent's name has been changed to respect her privacy)

"*I used to wake up every morning dreading the long walk for water. Now, I wake up excited to learn, play, and dream of a future where I can become a teacher.* ***Water didn't just change my routine—it changed my life.***"

-Jyoti, student of Ashram School, Mokhada

Jyoti, a student at Ashram School and a resident of Swaminagar, Aase, previously experienced severe challenges due to water scarcity, both in her village and at school. On average, she had to walk **3-4 kilometers daily** to fetch water, a task that consumed **2–3 hours** of her day. Limited access to water significantly disrupted her daily routine, often requiring her to prioritize water-fetching duties over attending school. As a result, she frequently missed classes, impacting her education and overall well-being. The stress of balancing school and home responsibilities left her exhausted and anxious about falling behind in her education.

Beyond the challenges of water collection, Jyoti also struggled with maintaining personal hygiene and managing menstrual health due to the unavailability of clean water and proper sanitation facilities. During her menstrual cycle, the absence of water in school restrooms made it difficult for her to manage her hygiene comfortably, forcing her to stay home on several occasions. The stigma and discomfort associated with inadequate facilities further contributed to absenteeism and a sense of insecurity.

With the intervention improving water accessibility in both her village and school, Jyoti's daily struggles have significantly reduced. She no longer has to skip school to fetch water, allowing her to focus on her studies and personal development. Additionally, the availability of water in school restrooms has had a direct impact on her menstrual hygiene management, enabling her to attend school regularly and with confidence.

The intervention has also fostered a more supportive environment for girls by ensuring access to clean water, improving sanitation facilities, and increasing awareness of menstrual health management. This has empowered Jyoti and other girls in her community, ensuring they no longer have to choose between their education and their fundamental hygiene needs.

Deloitte team with students of Ashram School, Aase

Chapter 5

Conclusion and Way Forward

The aim of the **Water Access Program** is to provide reliable water access in rough terrain through solar-based lift irrigation systems. It focuses on training the community in the operation and maintenance of pumps, pipelines, filters, and tanks, ensuring sustainable water management and improved agricultural productivity in remote areas. A summary of our findings in a SWOT form and potential recommendations to enhance the effectiveness of the project going forward is presented in this section of the report.

Strengths:

- The project is based on a request generated by the community, ensuring alignment with local needs and a strong sense of ownership.
- Active community involvement, including labor and resources, strengthens engagement and commitment to project success.
- The project benefits from a robust technical team and thoughtful system design, enhancing its reliability and efficiency.
- A strong focus on sustainability showcased by training programs on operating and maintaining pumps, pipelines, filters, and tanks ensure long-term viability.
- The adoption of solar-based lift irrigation reduces operational costs and environmental impact, ensuring sustainable energy use.
- A dedicated and highly motivated implementation team, driving effective execution and fostering strong community relationships. Their on-the-ground presence and local expertise ensure project success in challenging environments.

Weakness

- The water filters have not yet been distributed to the community, delaying access to clean, safe water.
- Poor awareness regarding the importance of water filtration and its usage can lead to health risks and underutilization of distributed filters.
- FGD respondents highlighted that while solar-powered systems offer a sustainable solution, they may encounter challenges during periods of low sunlight or potential technical failures.
- The project has successfully addressed the community's drinking water needs; however, its intended support for agricultural water requirements is yet to be fully realized.

Opportunity

- Potential to introduce multi-cropping systems, enhancing food security, soil fertility, and income through increased water availability
- Developing livelihood generation activities (e.g., agro-processing, craft-making, or small-scale businesses) can enhance economic opportunities for villagers, particularly women. Potential to diversify income streams through value-added products such as cashew and mango by-products.
- Collaboration with the Mokhada Livelihood Centre can enhance skills, resources, and market access for the community.
- There is an opportunity to enhance the system by incorporating a mechanism to capture and monitor the amount of renewable energy generated. This would enable better measurement and demonstration of energy efficiency and environmental impact.

Threat

- Negative experiences with shared filtration systems in other villages pose a challenge to implementing a successful water filtration solution in the community.

Recommendations and way forward

- Immediate Water Quality Monitoring: Ensure regular monitoring of water quality and engage experts to guide the installation of simple filtration solutions where needed
- Promote Sustainable Practices: Provide short training sessions on sustainable agricultural practices, including simple methods like crop rotation and organic farming can be considered
- Expand water availability for agricultural needs by constructing dedicated hauds to ensure consistent and reliable water supply for irrigation and farming activities
- Develop a plan to engage women and villagers, who have gained time from reduced water-fetching tasks, in vocational training programme and other income-generating activities such as processing cashew and mango by-products or other relevant activities with the Mokhada Livelihood Centre that may provide skill development, market access, and resources, enabling sustainable economic empowerment for the community

- Lifted Surface Water is safe for drinking and household use, but periodic testing is recommended to monitor iron levels. The open Well Water requires treatment (e.g., iron removal filters) before use for drinking. Regular monitoring of iron and other parameters is essential.
- Pilot Individual Filters: Test household-level filtration systems or smaller community filters that align with the community's preferences and build trust. Engage the community in choosing and maintaining these systems
- Track Electricity: Establish a basic system for tracking renewable electricity production
- Implement a piped water connection for the ZP school to address safety concerns, as the existing water tank requires students to cross a pucca road, to access water basis requirement, posing a potential risk
- Continued training and capacity building within the community to ensure long-term maintenance and operation of the infrastructure.
- Future expansion of water storage capacities to accommodate future demands during peak dry seasons

Annexure 1: Tools and Guidelines (To be added)

JalAadhar-Water%20Access.docx

Annexure 2: Pictures from field

Solar system deployed at the perennial source - Wagh river

Aase Village model showcased

Mid-region infrastructure created at Aase (Solar plates and controller)

KII with Zilla Parishad school staff

Survey and FGD conducted at Swaminagar

Water 'Haud' at Swaminagar

FGD conducted at Dhapti

Note: Participant details from the survey and discussions have been withheld to maintain confidentiality and protect privacy.

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Impact Assessment Study

JalAadhar - Water Rejuvenation

Project funded by Tata Capital Housing Finance Limited

April 2025

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Tata Capital Housing Finance Limited (TCHFL) is TCL's wholly owned subsidiary registered with the National Housing Bank as a Housing Finance Company, offering long term funds for housing purposes.[1] It's Corporate Social Responsibility (CSR) vision is to establish a collaborative and inclusive approach for social and environmental development initiatives, fostering shared value for the broader community, aligned with the core purpose of the Tata Group.

The **JalAadhar project** is the flagship CSR program of TCHFL and it comprises the following 3 sub-interventions:

Water Access	**Water Rejuvenation**	**Integrated Watershed Development (IWD)**
Activities focused on improving accessibility, sustainability, and community empowerment. The infrastructure setup includes a solar-powered submersible pump at a river source, a pipeline network to supply the river water to the village, and strategically placed water storage tanks for ease of access by the households. A Water User Association is formed to ensure effective management, while training on water conservation and sustainable farming is also provided. By combining renewable energy, efficient infrastructure, and community governance, the project aims to enhance livelihoods, boost agricultural productivity, and support ecological sustainability.	Activities focused on revitalizing water bodies such as lakes and ponds to ensure sustainable water management and agricultural benefits. The initiative primarily involves the **de-siltation of lakes**, where accumulated silt is removed to restore the water-holding and percolation capacity of the lakes. The fertile silt is distributed to local farmers, enhancing soil fertility and agricultural productivity, while the unfertile silt is responsibly managed by Gram Panchayats (GPs) and other stakeholders. This collaborative approach aims to improve water availability and strengthen community participation and environmental stewardship.	A structured approach to restore and rejuvenate large water bodies through desilting and harvesting water, using a comprehensive ridge-to-valley approach. This method ensures that water is captured, stored, and utilized effectively, leading to the enhancement of groundwater levels both downstream and within the command area of the water bodies. By focusing on both structural and community-driven interventions, the project aims to create sustainable water resources, boost ground water levels and agricultural productivity, and improve the resilience of the ecosystem and local communities towards water scarcity.
Implementing partners		
Diganta Swaraj Foundation (DSF), in Palghar, Maharashtra	**ATE Chandra Foundation (ATECF)**, alongside NGO partners **Dhara Sansthan** and **Karunalaya Social Welfare Foundation (KSWF)**, in Jaipur and Jodhpur respectively in Rajasthan **National Agro Foundation (NAF)**, in Tamil Nadu	**BAIF Institute for Sustainable Livelihoods and Development (BISLD)**, in Satara and Ahmednagar districts of Maharashtra and **National Agro Foundation (NAF)**, in Tamil Nadu

Objective of the impact assessment:

As a part of the engagement with Tata Capital Housing Finance Limited (TCHFL), Deloitte conducted an Impact assessment of the **"JalAadhar-Water Rejuvenation" project** funded from CSR grants for the following period:

Project intervention	**Time period referred**
Water Rejuvenation	Jaipur, Rajasthan: June 2023- March 2024 Jodhpur, Rajasthan: May 2022-March 2023 Thiruvannamalai: December 2022-March 2023 and August 2023- March 24

The high-level objectives of this impact assessment are as follows:

- To study the project proposal, MoU extracts, project programmatic and technical reports to understand the program intervention and conduct stakeholder mapping.

[1] Tata Capital Housing Finance Website I Accessed on 18th December 2024 | https://www.tatacapital.com/tchfl/about-us.html

- To design the study methodology, tools and guidelines for data collection based on the parameters of impact identified through the document review and initiate structured interactions with key stakeholders of Tata Capital Limited, Tata Capital Housing Finance Limited and the Implementation Partner.
- To conduct a planned field level data collection and documentation of observations and case stories through facility visits and stakeholder interactions.
- Data collation and analysis of the inputs, processes, outputs, outcomes, impact parameters and model of implementation, as well as determining the strengths and weaknesses of the CSR initiatives.
- Determining the direct/indirect impact of the CSR initiatives on the lives of the target beneficiaries and communities, pertaining to the project.
- Suggesting potential way forward to strengthen the CSR initiative.

Sampling and Data collection:

A structured stakeholder mapping identified primary and secondary stakeholders, guiding a targeted engagement plan. Primary data collection combined on-field surveys (50%) and structured FGDs (50%) to capture both individual and collective insights. Additionally, KIIs with secondary stakeholders provided expert and institutional perspectives. A purposive sampling method ensured diverse representation and comprehensive assessment of project implementation, beneficiary impact, and outreach.

Primary stakeholders	347
Secondary stakeholders	12

Detailed stakeholder coverage is presented in Chapter 2 Approach and Methodology of this report.

Summary of findings:

The current report presents a detailed documentation of Deloitte's observations and findings of the impact assessment study. A summary of the findings is presented in the table below, while the elaborate documentation is available in Chapter 3.

Project Fund: INR 5.2 Cr

Project Location: Jaipur and Jodhpur, Rajasthan and Thiruvannamalai, Tamil Nadu

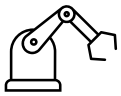
Implementing Partner: ATE Chandra Foundation (ATECF), alongside NGO partners Dhara Sansthan and Karunalaya Social Welfare Foundation (KSWF), in Jaipur and Jodhpur respectively in Rajasthan and **National Agro Foundation (NAF),** in Tamil Nadu

Relevance/Need of the Project:

The Water Rejuvenation Program emphasizes the critical role of existing water bodies in regions like Jodhpur and Jaipur in Rajasthan, which face persistent arid climate conditions, erratic rainfall, and chronic water scarcity. These areas have become increasingly dependent on groundwater to fulfill demands for drinking water, agriculture, and livestock. However, the over-exploitation of groundwater, along with contamination (particularly fluoride), has exacerbated water quality and quantity concerns. Over time, sediment build-up reduced the capacity of lakes and ponds to store water effectively. The inability to retain water during monsoon seasons exacerbated shortages during the summer.

The region of Mel kodangalur, Kodanallur Gram Panchayati, located in the Thiruvannamalai district of Tamil Nadu, has faced challenges related to water scarcity, particularly in the summer months. Groundwater depletion, reduced surface water availability, and inefficient irrigation practices have adversely affected agricultural productivity and local water access. Desilting lakes not only increases their storage capacity but also provides valuable silt for agriculture, creating a symbiotic relationship between water resource management and agricultural enhancement. This program fosters community involvement in environmental stewardship, ensuring long-term sustainability.

Key Impact Highlights (for intervention period)

				
	Ponds Rejuvenated	**Silt excavated**	**Storage Capacity created**	**Beneficiaries**
Overall	**149**	**12 Lakh (Cum)**	**128 Cr Litres**	**2,10,974**
Jaipur	**64**	**6,63,165 (CuM)**	**66,31,70,000 (Litres)**	**96,702**
Jodhpur	**30**	**3,15,664 (CuM)**	**31,56,64,000 (Litres)**	**70,012**
Thiruvannamalai	**55**	**3,09,953 (CuM)**	**30,99,53,000 (Litres)**	**44,260**

		
Average saving of INR 300/month per household	**Increase in water availability by 6 months in TN and 1-1 and ½ months in Rajasthan**	**Reported ground water increase by 28 feet in Jaipur, 10 feet in Jodhpur and 20 feet in Thiruvannamalai**

Impact Created

- **The project effectively rejuvenated 149 ponds, enhancing their storage capacity by over 128 crore liters.**
- **Improved Water Availability:** The survey responses indicated that the project significantly extended potable water availability, with a notable increase in water availability—up to 6 months in some locations like Thiruvannamalai. In Jodhpur and Jaipur, potable water availability increased by about one and a half months, addressing seasonal water shortages.
- **Groundwater and Water Quality Impact:** Survey and FGD respondents mentioned substantial improvement in ground water levels, with increases of up to 28 feet in Jaipur, 10 feet in Jodhpur and 20 feet in Thiruvannamalai, significantly boosting water security. Additionally, 75% of respondents in Jaipur and 67% in Jodhpur reported improved water quality, particularly in quality of surface water as was intended by the intervention, enhancing its usability for drinking and other daily needs.
- **Stakeholder engagement:** The program strategically engages support from a diverse range of stakeholders, including local government authorities, implementation partners, external monitoring agencies. Approvals from GP are sought before any work is carried out.
- **Efficient Resource utilization:** The project efficiently utilized local resources, such as silt, which, while primarily used for non-agricultural purposes like embankment strengthening and contributed to agricultural productivity in some areas of Jaipur.
- **Water Availability:** As per survey respondents potable water availability increased by up to 6 months. In Jodhpur, water availability was extended by 1.5 months, in Jaipur by 1.3 months, and in Thiruvannamalai by 6 months.
- **Water Quality:** 10 parameters tested from surface water in Jodhpur were found to be within permissible limits of safe drinking water (IS 10500:2012). Open wells and deep wells showed improvements in water quality indicators, however, there were increased nitrate and total hardness levels and surface water in Vimalpura showed elevated phosphate and RSC levels. Mild contamination levels of Phosphate, Iron and Flouride levels were observed in surface waters in Melkodangalur.
- **Agricultural Impact:** In Jaipur, 77% of respondents shifted from double cropping to triple cropping. In Thiruvannamalai, all respondents transitioned from monocropping to double cropping, diversifying crops such as urad, green grams, peanuts, and others.
- **Improved structural integrity of water bodies**, leading to better water retention and reduced overflow risks.
- **Time and Cost Savings:** In Jodhpur and Jaipur, households reported saving up to 2 hours per person per day on water collection. In Jaipur specifically, the time required for wells to recharge to a usable level reduced significantly—from 3 hours to just 15–30 minutes. Additionally, families that previously spent around INR 300 per month on water are now able to save this expense.
- **Community Ownership:** The project ensures the sustainability of its water rejuvenation efforts by leveraging local governance support. As highlighted by the community leaders, they took proactive steps to finance the community's share of silt transportation through the Panchayat fund, demonstrating strong local ownership and commitment to long-term success.

Recommendations and Way forward
• Further enhancing the water retention capacity of ponds and water bodies and ensuring water quality protection through regular cleaning and monitoring. • Continued monitoring of water quality parameters especially fluoride and turbidity in identified locations • Introduce organic farming practices to replace the use of chemical fertilizers and enhance the soil fertility in locations identified • In locations where the water from the rejuvenated ponds are used for farming, efficient irrigation techniques can be explored as well as scientific crop planning and cultivation practices. • Promotion of rainwater harvesting systems to complement storage capacity and ground water recharge • Empower local stakeholders through capacity-building initiatives to maintain and manage rejuvenated structures effectively • Continue to involve the community actively, ensuring that their needs and feedback remain central to the project's design and implementation. Promoting awareness among local communities regarding the importance of maintaining water bodies and preventing pollution.

About Tata Capital Limited and Tata Capital Housing Finance Limited

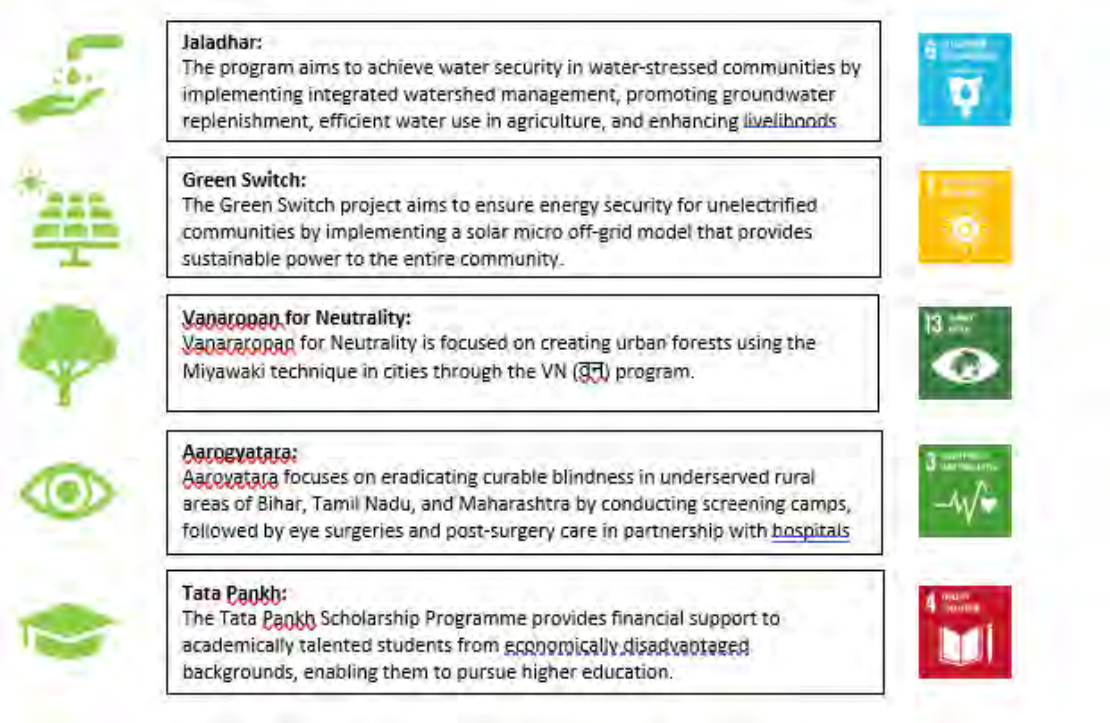
About Tata Capital Limited

Tata Capital Limited is a premier financial services company, part of the prestigious Tata Group, offering a wide range of financial solutions to individuals, businesses, and institutions. Established in 2007, the company provides services across diverse sectors including retail loans, wealth management, corporate finance, investment banking, and asset management. With a strong focus on customer-centric solutions, Tata Capital is committed to helping clients achieve their financial goals through innovative and personalized products. Leveraging the values of trust, transparency, and ethical business practices, Tata Capital continues to drive financial inclusion and sustainable growth across India.

Tata Capital Housing Finance Limited (TCHFL) is TCL's wholly owned subsidiary registered with the National Housing Bank as a Housing Finance Company, offering long term funds for housing purposes.[2] It's Corporate Social Responsibility (CSR) vision is to establish a collaborative and inclusive approach for social and environmental development initiatives, fostering shared value for the broader community, aligned with the core purpose of the Tata Group.

TATA CAPITAL LIMITED – CSR ACTIVITIES

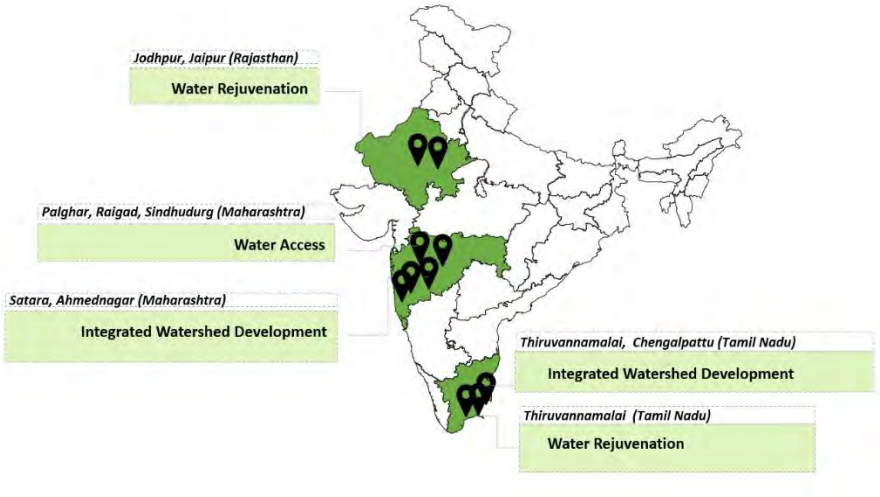
The company's CSR mission is to improve the well-being of communities, especially marginalized social and economic groups, by creating a lasting, measurable, and positive impact through initiatives focused on Climate Action, Healthcare, Education, and Skill Development. Additionally, the company is committed to encouraging its employees, partners, and customers to cultivate a strong sense of responsibility towards social and environmental causes.



Tata Capital's CSR focus areas with key flagship projects aligned with Sustainable Development Goals

[2] Tata Capital Housing Finance Website I Accessed on 18th December 2024 | https://www.tatacapital.com/tchfl/about-us.html

About JalAadhar Programme

Program title	JalAadhar
Program overview	JalAadhar, a comprehensive water management project focusing on accessibility, conservation, and sustainable practices, has positively impacted over 2 lakh individual over the years. The project encompasses three verticals namely **Water Access, Water Rejuvenation and Integrated Watershed Development** 
Review period of project	**Water Rejuvenation:** Jaipur, Rajasthan: June 2023- March 2024 Jodhpur, Rajasthan: May 2022-March 2023 Thiruvannamalai: December 2022-March 2023 and August 2023- March 24
Client grant	INR 5.2 Crore (as per MoU)
Project location	Rajasthan, Tamil Nadu
About the implementing agency/partner	The project is implemented across multiple regions through dedicated partners: **ATE Chandra Foundation (ATECF)**, alongside NGO partners **Dhara Sansthan** and **Karunalaya Social Welfare Foundation (KSWF)**, creating impact through rejuvenating water structures in Jaipur and Jodhpur respectively in Rajasthan and **National Agro Foundation (**N**AF)**, in Tamil Nadu. **ATECF:** ATECF is a philanthropic organization focused on driving sustainable development and social impact. It partners with grassroots initiatives to address critical issues such as education, healthcare, livelihoods, and environmental conservation, aiming to create long-term, meaningful change in underserved communities. **Dhara Sansthan**: Dhara Sansthan has been working in multitudinous sectors majorly on Health, Education, Child care and Water conservation. **KSWF:** KSWF focuses on addressing key challenges such as health, education, water security, and livelihood enhancement through impactful and community-centered initiatives. **NAF** is a non-profit working towards comprehensive rural development initiatives through multi-pronged approach to agriculture and allied sector development, watershed and natural resource management.

TCHFL's CSR Support to JalAadhar Programme

Implementing partner	Grant (INR)
KSWF	0.5 Cr
Dhara Sansthan	1 Cr
ATECF	Nil*
NAF	3.7 Cr
Total	**5.2 Cr**

* For the Water rejuvenation interventions, ATECF was a joint signatory in the MoUs between TCHFL and KSWF as well as TCHFL and Dhara Sansthan. The funds under these two MoUs, however, were directly transferred to KSWF and Dhara Sanstan and the UCs were provided by KSWF and Dhara Sanstan directly to TCHFL as per the terms in the MoU.

Grant from Tata Capital Housing Finance Limited (TCHFL)

- The **total grant of INR 5,20,00,000 was provided to ATECF (Dhara Sansthan and KSWF (indirectly) and NAF to implement the water rejuvenation project in Jodhpur, Jaipur and Thiruvannamalai**, during the period between **FY 21-24**
- The CSR grant was disbursed in two tranches –

Location	Tranche	Amount (INR)	Disbursal Date
Jodhpur	Tranche 1	35,50,799	30/09/2022
	Tranche 2	14,49,201	20/02/2023
Jaipur	Tranche 1	30,00,000	15/09/2023
	Tranche 2	40,00,000	4/12/2023
	Tranche 3	30,00,000	26/02/2024
Thiruvannamalai	Phase 1	2,00,00,000	Dec 2022 – Mar 2023
	Phase 2	1,70,00,000	Aug 2023 – Mar 2024

- **100% of the grant has been utilized as per the annual audited utilization certificate**

Implementation team

Monitoring support

- Implementation team included the ATECF team who have provided monitoring support.

Knowledge and Technical support

- The project received comprehensive support from multiple teams, including project staff, the project coordinator, and field personnel from Dhara Sansthan, KSWF, and the NAF team. These teams contributed expertise and technical assistance to ensure the successful execution of project activities and on-the-ground implementation.

JalAadhar-Water Rejuvenation intervention site-Jodhpur| *Source: Deloitte*

Intervention Model and Process Mapping

A comprehensive process map of the intervention is presented below, highlighting and detailing each step of the process.

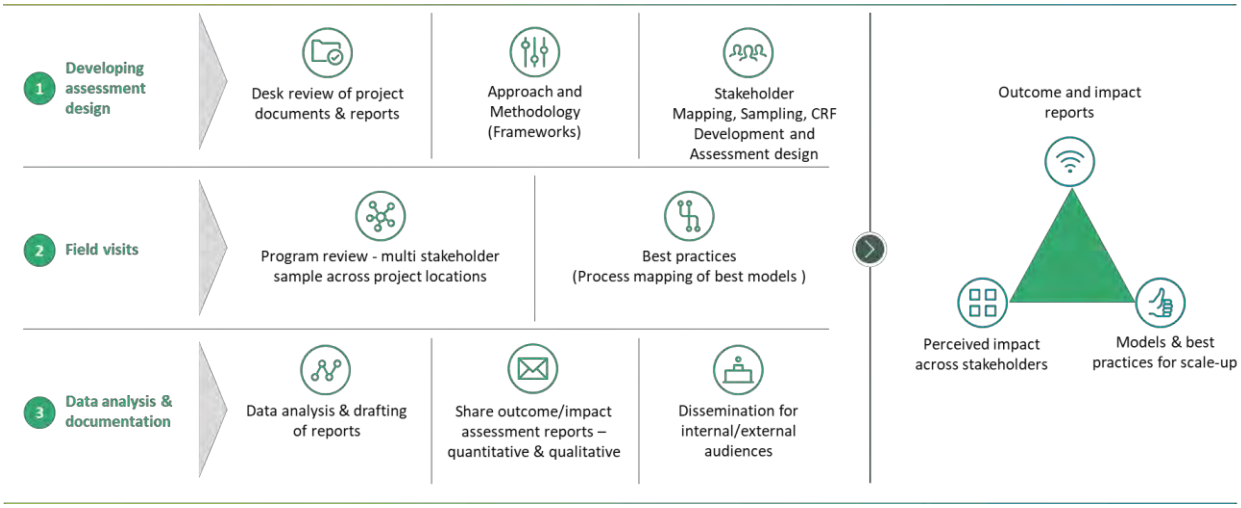
Intervention model adopted for implementing **Water Rejuvenation** project

Process Steps	Details
Baseline survey/Detailed feasibility assessment	• Conduct a thorough survey to assess the current situation, including water access, community needs, and socio-economic conditions. • Collect quantitative and qualitative data to establish a baseline for measuring impact. • Identify gaps and challenges that the intervention will address.
Identification of perspective sites	• Select potential sites for the intervention based on the findings of the baseline survey. • Consider factors such as population density, water scarcity, accessibility, and community demand.
Feasibility study	• Evaluate the technical, social, and environmental feasibility of implementing the project at the identified sites. • Analyze aspects such as resource availability, cost estimates, technical requirements, and potential risks. • Determine whether the intervention aligns with the needs and capacity of the community.
Community meeting with Gram Panchayat (GP) and villagers	• Engage with local stakeholders, including the Gram Panchayat and community members, to discuss the project plan. • Ensure active participation and gather feedback to align the intervention with community priorities. • Build trust and encourage ownership of the project among stakeholders.
Obtain approval and a NOC from GP	• Secure formal approval and an NOC from the Gram Panchayat to proceed with the project. • This step ensures compliance with local governance and establishes accountability.
Issue purchase orders and finalize vendors	• Identify and finalize reliable vendors for procuring materials and services required for the project. • Issue purchase orders based on competitive pricing and quality standards.
Work execution along with concurrent Monitoring and Evaluation	• Execute the planned intervention, ensuring adherence to the project timeline and quality standards. • Conduct concurrent monitoring to track progress, address challenges, and make adjustments as needed. • Implement evaluation measures to assess the effectiveness of the intervention and gather insights for future projects.

Approach and methodology

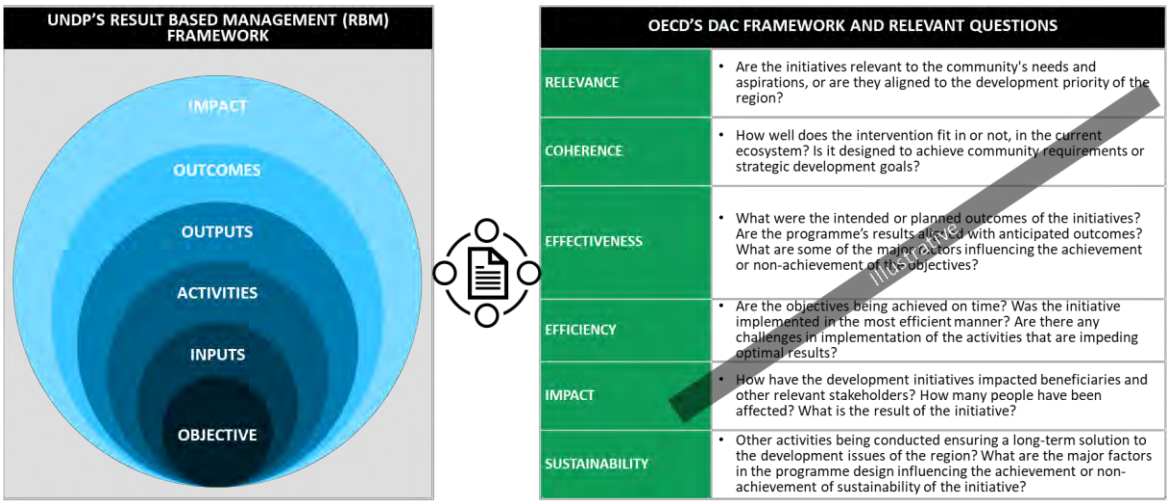
Deloitte's customized approach for evaluating the impact of TCHFL's funded CSR projects and identifying potential areas for future intervention was built on extensive experience in conducting similar evaluations. A mixed-method assessment design was utilized, primarily focusing on primary data collection through in-person interactions and telephone interviews, which was further complemented and cross-verified with relevant secondary data and available insights.

Methodology adopted for programme study



The evaluation design based on OECD's Development Assistance Committee (DAC) and UNDP's Result Based Management (RBM) frameworks has been adapted to assess the project and obtain information on the research questions, Common Results Framework and KPIs framed based on the same.

OECD's Development Assistance Committee framework leveraged to design the methodology



Key Enquiry Areas

Based on the program design, following indicative areas of enquiry were identified and data collection tools were developed in accordance:

Relevance

- Assess how well the program addresses the region's water scarcity and other household requirements.
- Evaluate the program's alignment with the priorities and needs of local communities, including marginalized and vulnerable groups.
- Examine the relevance of specific interventions, such as water body rejuvenation, silt repurposing, and soil management practices, in meeting long-term water and agricultural needs.
- Determine whether the program design considers region-specific environmental, social, and cultural factors.
- Assess the alignment of the program with national and state-level policies on water management, agriculture, and rural development.

Coherence

- Analyze the integration of the program's activities with government schemes, such as watershed development programs or agricultural subsidies.
- Evaluate the role of partnerships with local governance bodies (e.g., Gram Panchayats), NGOs, and private sector entities in achieving the program's objectives.
- Assess the consistency and alignment of training sessions, workshops, and awareness campaigns with the community's capacity and knowledge levels.
- Examine how the program integrates with broader climate resilience and sustainability initiatives in the region.
- Explore how the program promotes inclusivity and gender equity in decision-making and implementation.

Effectiveness

- Measure the improvements in water availability for agricultural and domestic purposes due to the program's interventions.
- Assess the impact of silt repurposing on irrigation efficiency and its role in improving soil fertility.
- Evaluate how water body rejuvenation has affected the groundwater recharge levels in the area.
- Analyze the level of community participation and ownership in maintaining restored water bodies and implementing water management practices.
- Measure the effectiveness of the program in raising community awareness about water conservation and ecosystem management.

Efficiency

- Assess the timeliness of the program's activities, from planning and procurement to execution and monitoring.
- Evaluate the cost-effectiveness of interventions such as water body rejuvenation and silt repurposing.
- Measure the efficiency of resource allocation in terms of manpower, materials, and financial resources.
- Identify bottlenecks and delays at various stages of program implementation.
- Analyze the efficiency of monitoring and evaluation processes in tracking progress and ensuring accountability.
- Evaluate the level of efficiency in training delivery, including the retention and application of knowledge by participants.

Impact

- Determine the cost savings achieved by stakeholders through access to enhanced water resources and sustainable farming practices.
- Measure the program's overall impact on agricultural productivity, including changes in crop yields and the adoption of sustainable farming practices.
- Assess the socio-economic benefits for community members, such as increased incomes, reduced migration, and improved quality of life.
- Evaluate the ecological impact of the program, including improvements in biodiversity, groundwater recharge, and soil health.
- Analyze the program's contribution to ecosystem resilience, specifically the community's ability to cope with water scarcity and climate variability.
- Investigate how the program has influenced long-term water use behaviors and conservation practices among community members.
- Measure the program's role in empowering women and marginalized groups through improved water access and participation in decision-making processes.

Sustainability

- Assess the long-term viability of restored water bodies, including community-led maintenance efforts.
- Evaluate the institutional mechanisms established to ensure the sustainability of program interventions, such as local water user committees or farmer groups.
- Identify challenges and opportunities for strengthening the program's sustainability, including technical, financial, and governance aspects.
- Explore the potential for scaling up successful interventions to other regions facing similar challenges.
- Examine the degree to which the program has fostered a sense of ownership and accountability among stakeholders, ensuring long-term impact.
- Assess the alignment of the program with future climate resilience and water management goals, including its adaptability to changing environmental conditions.

Technical & Environmental Review

A combination of **primary research** (field surveys, stakeholder interviews) and **secondary research** (project reports, historical data) was used to evaluate the project's environmental and agricultural impact.

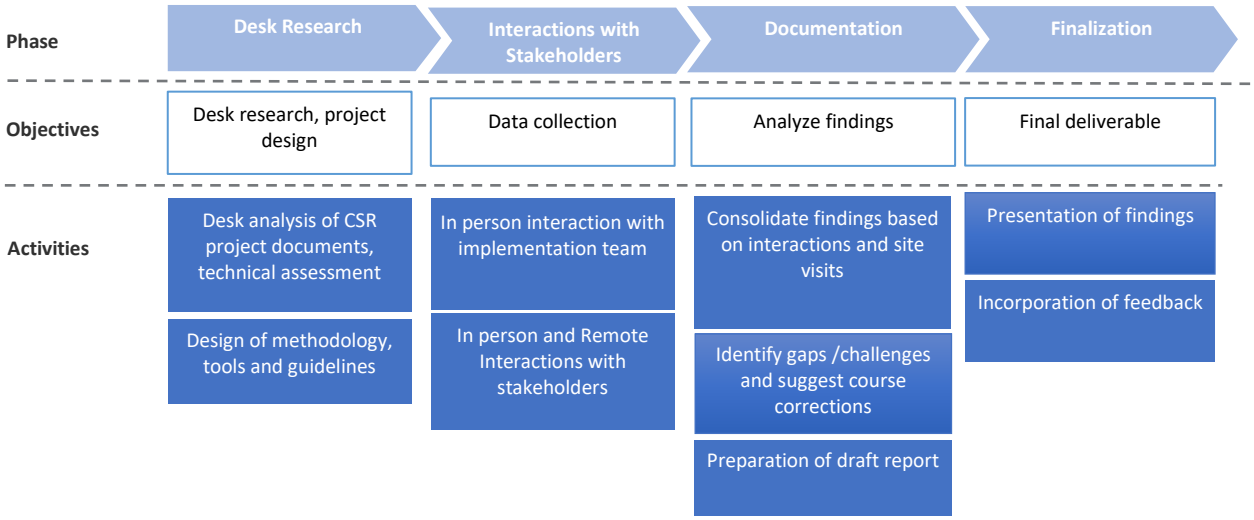
The technical evaluation involved the following:

Field Visit	Sampled locations as per programmatic review
Remote Sensing	Geospatial mapping, Land Displacement, Water testing

- **Land Use & Water Resource Mapping:**
  - Remote sensing techniques were utilized to analyze land use changes, vegetation cover (NDVI), and water retention levels.
  - Satellite imagery comparisons (pre- and post-intervention) helped assess changes in green cover and water recharge capacity.
- **Water Resource Impact & Quality Assessment:**
  - Historical data on groundwater recharge and surface water retention was analyzed.
  - Water quality reports were reviewed to assess improvements in drinking water and irrigation potential.
  - Seasonal turbidity trends were examined to measure soil erosion control.
- **Data Processing & Interpretation**
  - Collected data was compiled, cleaned, and structured for robust analysis.
  - GIS and statistical tools were used for comparative analysis of pre- and post-intervention scenarios.
  - Key insights were drawn on water conservation efficiency, agricultural benefits, and socio-economic impact.

Programmatic review

The programmatic review and impact assessment of the CSR intervention was executed in a phased manner. The four main phases are outlined below:



KPIs along UNDP's Results Based Management (RBM) framework for monitoring were developed and used as the basis for the programmatic review. Both primary and secondary project related data was reviewed to gain a holistic understanding of the implementation model and outcomes.

Desk Review

A thorough review of the documents made available by the implementing partner and the funder was conducted, including the information available on the project in the public domain to build a comprehensive understanding of the process and design the assessment tools accordingly. Following documents were reviewed as a part of the desk review process:

- Memorandum of Understanding (MoU) signed
- Annual project progress report submitted to funder
- Technical and Geohydrological reports
- Baseline reports
- Fund utilisation report

Stakeholder mapping

The impact study identified the various stakeholders for the project as follows

Primary Stakeholders	Secondary Stakeholders
Farmers	Implementation partner staffs/officers/managers
Local community	Local government authority
Villager leaders	Tata Capital team

Sampling plan and Tools used for the study

A comprehensive stakeholder mapping was conducted to identify both primary and secondary stakeholders relevant to the project. Based on this analysis, a structured engagement plan was developed to facilitate targeted interactions with each stakeholder group.

For primary data collection, direct beneficiaries were engaged using a dual approach—50% of the data was gathered through on-field pre-designed survey forms, while the remaining 50% was collected via structured FGD. This mixed-method approach ensured a balanced representation of individual and collective perspectives. Additionally, KII were conducted with secondary stakeholders using a pre-designed questionnaire to capture insights from institutional representatives, subject matter experts, and local governance bodies.

To maximize the coverage of interventions and ensure diverse representation, a purposive sampling method was employed to identify key intervention areas for field visits. A structured methodology was implemented to prioritize geographies requiring the highest level of intervention, focusing on the number of structures developed, the scale of outreach, and the diversity of structures covered. For the **Water Rejuvenation** project, a stratified sampling approach was adopted, considering both block-level coverage and villages with the highest number of rejuvenated ponds.

Project name	State	Location	
Water Rejuvenation	Rajasthan	Sanganer and Kothakwada (Jaipur)	5 waterbodies across Goner, Vidhani Sapala villages
Water Rejuvenation	Rajasthan	Pipad and Bhilara (Jodhpur)	5 water bodies in Ramasni, Olvi,Benan villages
Water Rejuvenation	Tamil Nadu	Vandavasi (Thiruvanamalai)	5 waterbodies (Mel Kodangalur, Kodanalur)

Sampling plan

Sub-project	Stakeholder	Sample covered	Type of sampling	Interview mode	Tools used
Water Rejuvenation	Villagers	**347 beneficiaries** Survey: 161 FGD: 186	Purposive	On-field	Survey tool FGD guidelines
	Implementation team	**12 project staffs**	Purposive	On-field	KII

Limitation of the Technical study:

General Limitations

It is important to note that the findings and conclusions drawn from this hydrogeological assessment are subject to several limitations:

- The study does not account for concurrent initiatives implemented by other entities/stakeholders in the same geography, which may have contributed to the outcomes.
- **Data Availability**: The available data from farmers regarding the water level fluctuations, groundwater measurements, and surface water flow patterns are limited in scope and temporal resolution. Seasonal variations and local climate factors could influence water availability and hydrological processes on a real time basis and may not be captured in this assessment.
- **Field Observations**: Direct field observations regarding the local groundwater levels, infiltration rates, and vegetation characteristics are limited in scope compared to the project outreach. More comprehensive field studies covering the entire project locations are required to fully understand the impact of vegetation and hydrological features on water movement and groundwater recharge.
- **Local Variability**: The hydrogeological conditions can vary significantly across different areas within the watershed, and local factors such as soil permeability, slope, and subsurface geology may affect water movement and retention. On account of this, the findings from one location may not be fully representative of other areas within the catchment.
- **Hydraulic Modeling Limitations**: The absence of detailed hydraulic models or geophysical surveys means that some assumptions had to be made regarding subsurface flow and surface water connectivity. These assumptions could lead to inaccuracies in understanding the full dynamics of the water system.
- **Soil Testing**: In April 2025, soil samples were collected from two agricultural fields in Sapla, Jaipur—one with silt application and the other without—to conduct a comparative study and gauge the impact of silt application on soil quality.

Water quality assessment limitations

The water quality data used for the impact assessment of the Integrated Watershed Program has been sourced from various secondary sources, including the Central Ground Water Board (CGWB), Jal Jeevan Mission (JJM), and field surveys. While these data provide valuable insights into the water quality conditions prior to the implementation of the watershed interventions, the following factors may affect the accuracy and comparability of the results:

1. **Geographical Limitations:**
    - The water quality data from CGWB stations was limited to locations within a 10 km radius, and thus may not fully represent the entire watershed area. The data may not account for localized variations in water quality outside of this radius.
2. **Differences in Water Testing Laboratories:**
    - The water testing laboratories employed by different agencies (CGWB, JJM, and field surveys) may have used different testing methodologies, equipment, and calibration standards, which could lead to variations in results. These differences may introduce inconsistencies in the accuracy of the data.
3. **Varying Sample Sources:**
    - The water quality data was collected from a variety of water sources, including open wells, deep wells, infiltration wells, and handpumps. The water quality can vary significantly depending on the source type, depth, and extraction method, which may introduce inconsistencies in the data.

4. **Different Timing of Data Capture:**
    - The data points were collected at different times of the year, with varying seasonal and climatic conditions influencing water quality. These temporal variations could lead to discrepancies when comparing data from different months, as water quality parameters such as turbidity, nitrates, and hardness may fluctuate based on rainfall, agricultural activities, and other factors.
5. **Geological Variations and Abutting Areas:**
    - The local geology and the characteristics of the abutting areas may influence the water quality results. Variations in soil composition, rock formations, and groundwater flow paths can lead to spatial differences in water quality, which may not be fully captured by the data from the selected testing sites.
6. **Differences in Sample Size and Averaging Methods:**
    - The number of samples collected across different data sources may vary, which could affect the representativeness of the data. In cases where fewer samples were collected, the average values may not accurately reflect the overall water quality for the entire watershed area.

Given these concerns, it is important to recognize that the data used for this impact assessment may not be perfectly aligned or representative of the current water quality conditions across all areas affected by the Integrated Watershed Program. While every effort has been made to analyze the available data and draw meaningful conclusions, the variability in sampling methods, laboratory practices, and data collection parameters may introduce some level of uncertainty in the results. Therefore, the findings and recommendations presented in this report should be considered in the context of these limitations, and further data collection and analysis may be necessary for a more comprehensive evaluation of the project's impact on water quality.

Remote Sensing Data Limitations

While remote sensing data is a powerful tool for evaluating large-scale environmental changes and water resource management projects, there are several limitations that must be considered when using it to assess the technical impacts of a water-related interventions. These limitations can lead to discrepancies between remote sensing data and ground-truth measurements, affecting the overall accuracy and reliability of the analysis. Below are key limitations related to the use of remote sensing data for assessing the technical impact of the water access project:

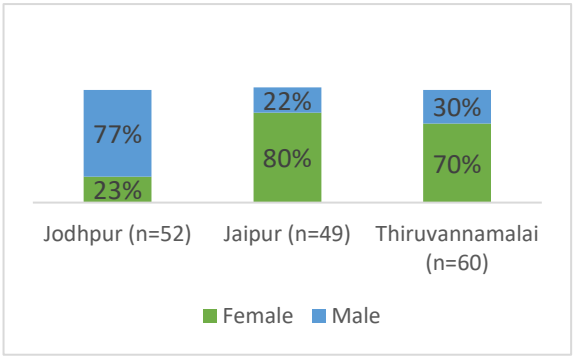
Description of limitation and impact
Spatial Resolution Remote sensing data often comes with spatial resolution limitations, especially when using satellite imagery. While higher resolution data is available from some sources, such as commercial satellites (e.g., WorldView or GeoIQ), the public domain data like Sentinel-1 or Landsat may have lower resolution, making it difficult to accurately capture fine-scale features such as small water bodies, detailed vegetation cover, or infrastructure like pipelines and storage tanks. **Impact**: The inability to capture small-scale features or localized water fluctuations can lead to inaccurate assessments of water levels or changes in the water supply system in specific areas. For example, the evaluation of shallow groundwater recharge or changes in local surface water storage may not be fully resolved in the imagery.
Temporal Resolution Remote sensing data is collected at specific time intervals, which may not align with the exact timing of project interventions or seasonal variations. For example, water levels in ponds may fluctuate due to seasonal rainfall or evapotranspiration, but remote sensing data might not capture these fluctuations at the precise times needed for accurate assessment. **Impact**: If the satellite or sensor passes infrequently over the target area, important changes that occur between the satellite overpasses could be missed. For instance, post-intervention water levels or vegetation changes may be recorded outside the optimal monitoring period, resulting in gaps in the temporal data that could lead to incomplete assessments.
Spectral Saturation or Misinterpretation of Water Bodies The interpretation of water bodies using remote sensing data can be limited by spectral saturation, especially when using satellite imagery that relies on visible, near infrared, or thermal infrared bands. Water bodies, especially those with high turbidity, dense vegetation around them, or those at a low elevation (such as shallow ponds), may not always be distinguishable from surrounding areas or other land cover types. **Impact**: Misinterpretation of water bodies, especially in cases where surface water has low contrast or is surrounded by dense vegetation, could lead to incorrect conclusions about the extent and change in water levels. This is especially important in de-siltation projects where the focus is on changes in water volume or surface area.
Limited Ground Truthing

Remote sensing data alone may not provide sufficient ground truthing to validate or calibrate the satellite-derived data, particularly for water levels, groundwater recharge, or subsidence/uplift. While remote sensing can provide valuable insights, ground-based measurements are necessary to calibrate and validate these data. **Impact:** Without accurate ground measurements for comparison, the remote sensing data might be inaccurate or misinterpreted. For example, if the satellite data shows an increase in water volume in a pond but there is no ground truth to confirm the water level or other factors, the assessment might overestimate the true water storage capacity post-rejuvenation
SAR Data Limitations (for Sentinel-1) While Sentinel-1 provides valuable data using Synthetic Aperture Radar (SAR), the interpretation of SAR data can be more complex compared to optical imagery. The radar signal can be affected by surface roughness, moisture content, and vegetation structure, which can lead to misinterpretation of surface water extent or land displacement. **Impact:** In the case of surface water or vegetation analysis, SAR data might not always accurately represent changes in water levels or land displacement, especially in areas where soil moisture or vegetation density significantly impacts the radar signal. This could result in an inaccurate assessment of the success of the rejuvenation project
Lack of High-Resolution Groundwater Data Remote sensing primarily focuses on surface water bodies and land features, and it often lacks the ability to provide detailed groundwater data. For a more comprehensive hydrogeological assessment, ground-based measurements of groundwater levels and quality are essential, but these are not always available through remote sensing. **Impact**: Without accurate groundwater measurements, it is difficult to assess the full impact of the rejuvenation project on local aquifers and groundwater recharge. The project may have contributed to groundwater replenishment, but remote sensing data alone cannot fully quantify this effect.

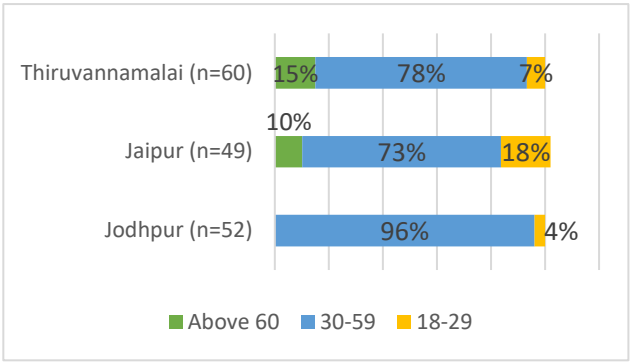
Given these limitations, the results of this assessment should be interpreted with caution, and further studies, including field investigations, geophysical surveys, and long-term monitoring, are recommended to refine the findings and ensure a more accurate and comprehensive understanding of the hydrogeological conditions in the area.

Profile of interview respondents

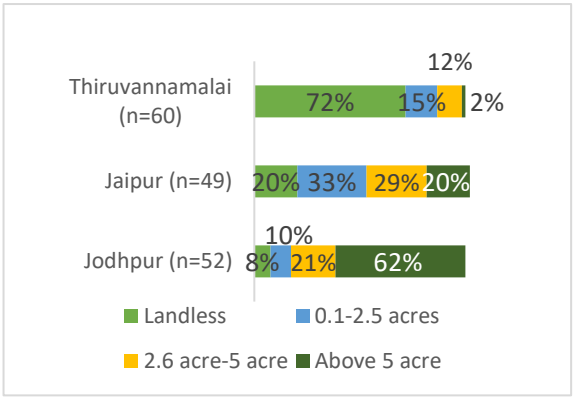
Gender Split (N=162)



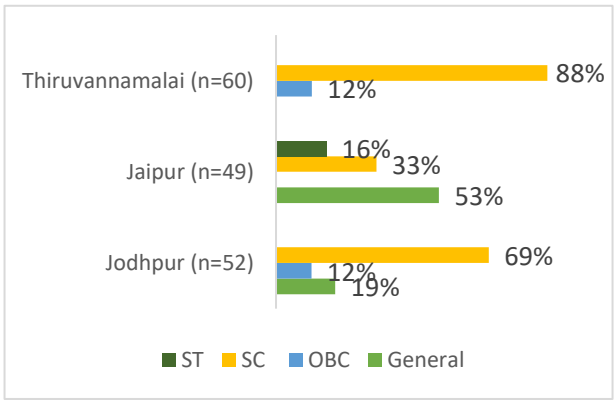
Age group (N=162)



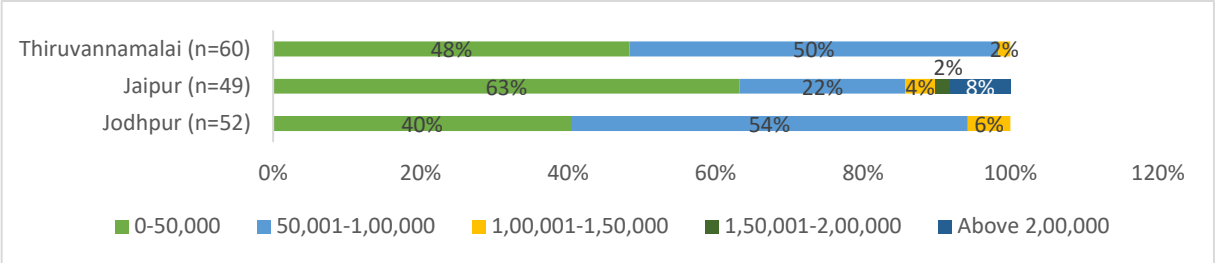
Farm size (N = 162)



Social profile (N=162)



Annual family income (N=162)



Intervention 1: Water Rejuvenation by ATECF and KSWF in Jaipur, Rajasthan

Regional geography and hydrogeological context

Jaipur, located in Rajasthan, is characterized by its arid climate, erratic rainfall, and severe water scarcity issues. The region has increasingly relied on groundwater resources to meet the growing demands for drinking water, agriculture, and livestock. However, the over-exploitation of groundwater, along with contamination (particularly fluoride), has exacerbated water quality and quantity concerns.

This report focuses on several water bodies in the Jaipur district, detailing interventions undertaken to desilt and enhance the capacity for groundwater recharge, as well as improvements in water quality and availability.

Objective of the intervention

To reduce dependency on polluted groundwater and provide a more reliable water source, primarily for drinking, household consumption, and agriculture.

Parameters	Findings
	INPUT
Community contribution	Gram Panchayat facilitated silt transportation; supported 100+ farmers in 5-6 villages with silt for agriculture.
Documentation Support	AVNI app for real-time monitoring, ensuring transparency and efficiency. • KPIs for project monitoring included trolleys used, silt transport details, farmer participation, area covered, diesel consumption, excavation hours, and volume excavated, verified via MB recordings. • Field staff logged daily updates, photos, and geo-tags. A documentation team maintained detailed records of milestones, community involvement, and resource use.
	PROCESS
Baseline survey/Detailed assessment	• A **comprehensive survey** was conducted for the identified water bodies to establish a baseline and assess their current status. • Evaluated the physical state of the water bodies, including sedimentation levels, silt deposition, and erosion of embankments. • Examined the overall structural integrity of existing infrastructure, such as embankments, inlets, and outlets. • Analyzed the surrounding land use, including agricultural activities, forest coverage, and urban encroachments, to understand the impact on water body sustainability. • Documented the flora and fauna dependent on the water body, highlighting any ecological significance.
Identification of perspective sites	• The **Composite Landscape Assessment and Restoration Tool (CLART)** maps, a GIS-based tool, were utilized to select the work locations. This tool helps identify areas with the highest groundwater recharge potential and regions where surface water storage capacity can be effectively augmented. • The process involved a multi-dimensional assessment to determine sites with the highest potential for impactful intervention. o Water bodies that serve as key ecological hubs, supporting biodiversity and contributing to the local environmental balance, were prioritized. o Regions experiencing acute water scarcity, particularly during peak summer months, were identified through hydrological assessments and baseline surveys. o Areas where water availability was insufficient to meet domestic, agricultural, or livestock needs received higher priority. o Water bodies that directly influenced the livelihoods of the local population, such as those supporting irrigation, fishing, or other water-dependent activities, were marked as critical. • Discussions with Gram Panchayats and community members helped identify water bodies that played a pivotal role in their daily lives.

	• Community feedback highlighted specific areas where rejuvenation would have the most significant impact on improving water access and reducing challenges like long travel distances for water collection.
Feasibility study	• The project team conducted a comprehensive feasibility study to evaluate the viability of the proposed water rejuvenation interventions. The study encompassed a multi-faceted analysis to ensure that the interventions would be technically sound, environmentally sustainable, socially inclusive, and economically viable. • A detailed assessment was conducted to evaluate the seasonal and annual availability of water in the targeted sources, including river inflow patterns, groundwater recharge potential, and current extraction levels. • Soil testing was performed to determine the suitability of the excavation and embankment strengthening activities. The study highlighted areas with high silt deposition, ideal for excavation and reuse in structural strengthening. • Locations with the highest potential for successful water rejuvenation were prioritized based on the study findings. • Tailored intervention strategies were recommended, factoring in technical requirements, environmental sustainability, and community preferences.
Community meeting with Gram Panchayat (GP) and villagers	• Community meetings were organized to engage key stakeholders, including GP members, villagers, local community leaders, and relevant government officials, in the water rejuvenation project. This process involved several key steps to ensure active participation, gather essential feedback, and secure community support for the initiative. • Through open discussions, common ground was established between stakeholders. This included finalizing the scope of the rejuvenation plan, agreeing on priority areas, and determining the roles of different stakeholders in the implementation phase. • The participation rate of GP members throughout the project location was very high.
Obtain approval and a NOC from GP	• Initial discussions were held with the Gram Panchayat members to explain the scope, objectives, and potential impact of the rejuvenation project on the local community. • The GP was briefed on the specific components of the project, such as water source identification, rejuvenation methods, infrastructure strengthening, and expected benefits. • After reviewing the project proposal and its alignment with the community's needs, the Gram Panchayat formally agreed to support the project. • The approval process included a review of the technical aspects of the project, ensuring that it adhered to local regulations and standards. • The NOC was issued by the Gram Panchayat after obtaining consensus from the local stakeholders, including the village residents and relevant authorities.
Issue purchase orders and finalize vendors	• A detailed vendor selection process was undertaken to identify reliable suppliers and service providers. Vendors were assessed based on their capability, past experience, quality of equipment, and financial stability. For services requiring specialized expertise (such as soil analysis or hydrological assessment), expert consultants were also sourced. • RFPs were issued to selected vendors based on the identified needs. Vendors were asked to submit bids, detailing their offered prices, delivery timelines, and terms of service. • Proposals were evaluated according to predefined criteria, such as cost-effectiveness, delivery time, and past project performance. One additional criteria followed in Jaipur was that the vendor must not be of the same village. The top vendors, who met the project's technical and financial requirements, were shortlisted for final selection. • Once the vendors were selected, formal purchase orders were issued to ensure that all equipment, materials, and services are procured in alignment with the project's requirements. • Contracts were signed with vendors to establish legal terms of engagement, including delivery schedules, payment terms, penalties for delays, and warranty or service clauses for equipment.
Work execution along with concurrent Monitoring and Evaluation	• The rejuvenation activities were executed in alignment with the pre-approved project plan and timeline, ensuring systematic and efficient implementation. • Silt was carefully extracted and sorted based on quality, with subsequent utilization for embankment strengthening, road levelling, and community structures. • Silt was distributed to beneficiaries based on individual farmer's demand, driven by its quality. This approach ensured effective utilization, such as enhancing soil fertility and improving moisture retention on farms, thereby supporting agricultural productivity and sustainability**.**

- A structured mechanism has been established for silt transportation and demand capture by farmers, initially recorded in the AVNI app. In cases of high demand, a **minimum cap** is set on the number of trolleys allocated per individual. However, in Jaipur, where silt availability exceeded demand, this criterion was not required.
- Community leaders, including Gram Panchayat representatives, were actively engaged throughout the implementation phase, from site preparation to progress monitoring, fostering transparency and accountability.
- The **AVNI app** enabled real-time monitoring, complementing regular meetings conducted by the ATECF team to ensure seamless and efficient project execution. Data with respect to farmers listing, area coverage, tractor logbook, videos of activities, details of farmers carting silt, amount of silt being carted, running hours of excavating machines, quantity of silt excavated based on Measurement Book (MB) recordings, geo-tagged photographs of site were being maintained
- In Jaipur, delays in adhering to the pre-monsoon timeline limited participation from some farmers in silt carting activities, as they had already completed preparations for their fields by the time the opportunity arose.
- A dedicated team of civil engineers, GIS specialists, and quality control experts was actively involved in overseeing the implementation of water conservation measures and the strategic planning of efficient water management techniques to optimize usage and minimize wastage.
- The KII interactions across location indicated that the work lasted for about 2-3 months across locations.

OUTPUT

64	6,63,165 (CuM)	66,31,70,000 (Litres)	96,702
Ponds Rejuvenated	**Silt excavated**	**Storage Capacity created**	**Beneficiaries**

OUTCOME AND IMPACT

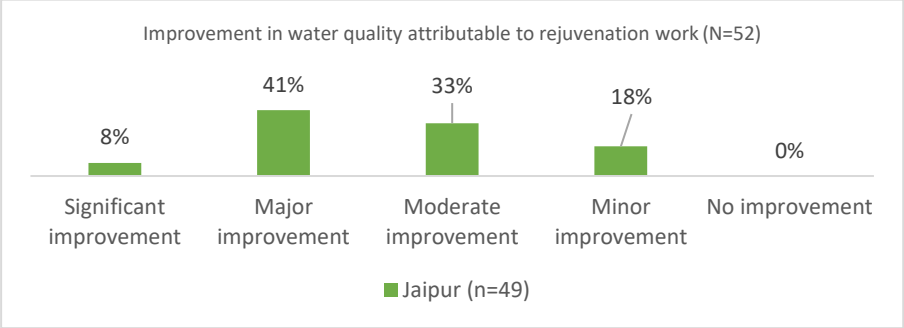
Impact on drinking and water for other HH use

Improved availability of potable water

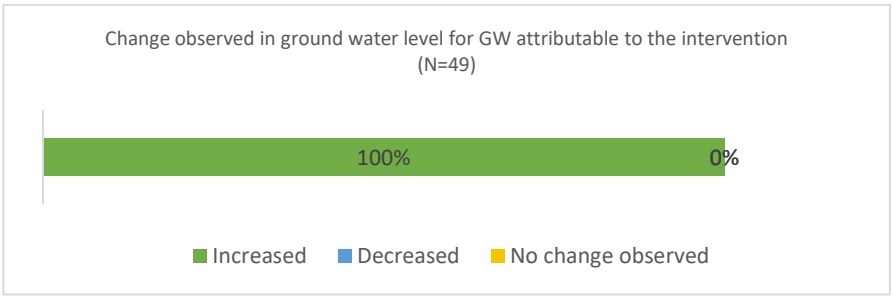
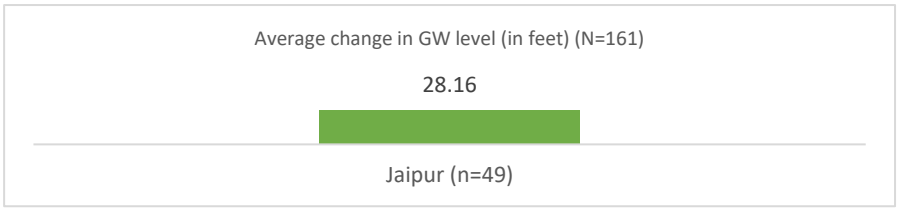
The survey findings from the respondents revealed that the intervention increased potable water availability **by 1.3 months**, extending it until April or May. While brief water scarcity remains, reliance on water tankers is reduced. Better groundwater quality in Jaipur, along with government initiatives like the Har Ghar Nal scheme in villages like Sapala, further eased water challenges, making the situation more favorable.

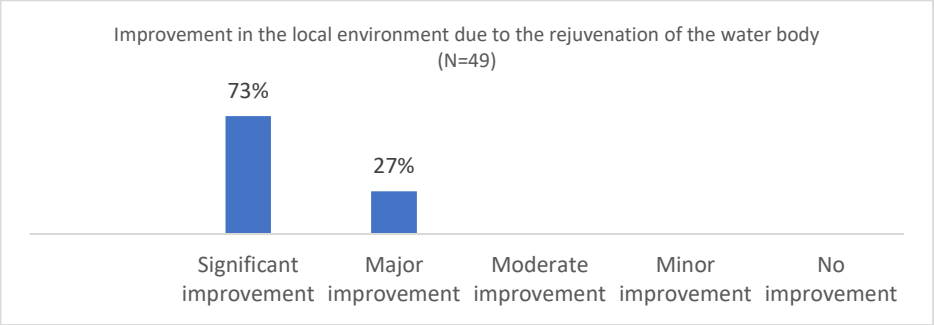
Survey respondents reported an average livestock size of **6.8 in Jaipur**, primarily consisting of cows and goats. The **FGD discussions** further highlighted that the improved availability of drinking water has significantly benefited livestock by providing a more stable and conducive environment. Consistent access to water has enhanced livestock health and productivity, reducing the incidence of dehydration-related ailments and improving overall well-being.

Improvement in quality of water



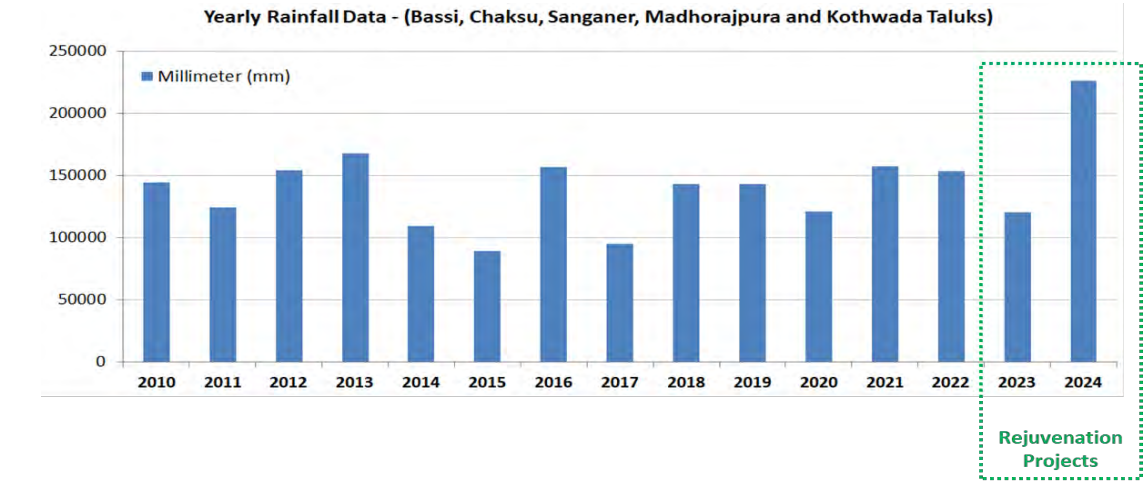
Approximately 75% of respondents reported noticeable improvements in groundwater quality, ranging from minor to significant improvements. Given that groundwater serves as a primary source of drinking water for the community, de-siltation efforts were strategically implemented to enhance groundwater percolation. This targeted approach has directly contributed to improving water quality, showcasing the intervention's effectiveness in addressing critical community needs.

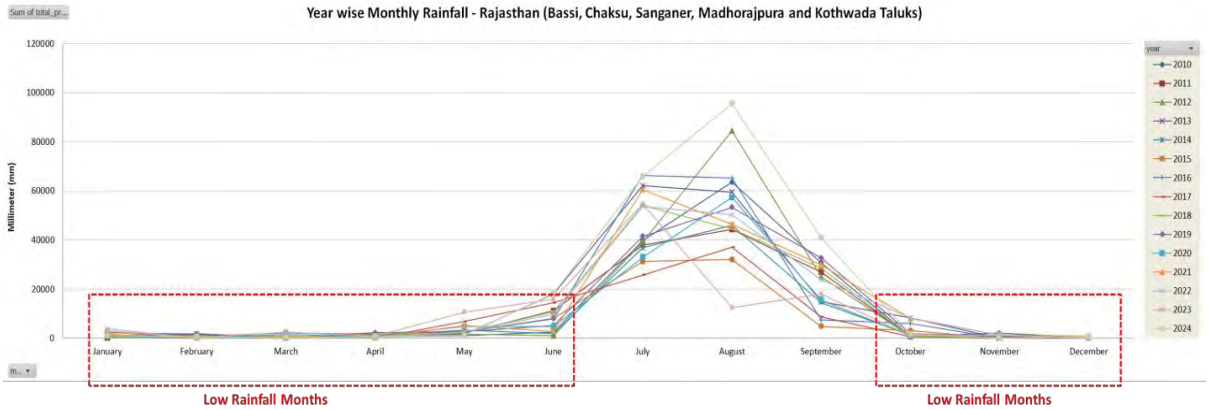
	Reduced household expenditures on water procurement	**Pre-Intervention (INR/month)**	**Duration**	**Post-Intervention Impact**
		₹300	~3 months	Reduced expenses; improved household financial stability
	Time-Saving for Households	All participants unanimously reported significant time savings in water-fetching activities due to improved groundwater level. Specifically, during peak summer months, the waiting time for wells to refill has drastically decreased, **reducing from approximately three hours to just 15-30 minutes**. This improvement has not only eased the burden of water collection of both women and men of the family.		
Impact on agriculture and allied activities	Enhanced GW level	  All survey respondents unanimously acknowledged a significant impact of the intervention on groundwater levels, reporting an average increase of approximately 28 feet compared to pre-intervention levels. This improvement highlights the effectiveness of water rejuvenation efforts, including desilting and embankment strengthening, which have enhanced water retention and recharge capabilities.		
	Enhanced cropping pattern and diversity	The intervention has significantly influenced agricultural practices, with approximately **77% of respondents transitioning from double cropping to triple cropping**. This shift was corroborated by FGD participants, who highlighted an intensified Rabi season and the introduction of a modest Zaid season. During the Zaid season, farmers have begun cultivating vegetables as a summer crop, primarily for self-consumption.		
	Enhanced income attributable to crop yield	All beneficiaries who utilized carted silt reported a 30% increase in agricultural yield, directly contributing to higher income levels. On average, farmers experienced a 20% rise in earnings due to improved soil fertility and enhanced productivity. Additionally, **about 70% of the beneficiaries have diversified their crops to include vegetables, resulting in cost savings of approximately INR 500 per month**, translating to an **annual saving of about INR 5,000.**		
Impact of silt used on farms	Enhanced agricultural productivity through the application of silt	As per the FGD participants majority of the excavated silt was repurposed for non-agricultural purpose, including embankment strengthening, approach road construction, road levelling, and other community infrastructure projects. However, in the Sapala village, a select group of survey participants reported using the silt on their farms. Specifically, five respondents shared that they **transported high-quality silt from the lake to their fields**, where it was utilized to level the land and **enhance soil fertility**. By covering barren areas with the topsoil, these farmers reported of **successfully transforming about 8.5 acre previously unproductive land into fertile land.**		
	Expanded coverage of	Five respondents reported using silt on their barren fields to level the land and enhance farm productivity. As a result, they successfully converted an average of **approximately 2 acres of previously infertile land into fertile**, productive farmland.		

	productive farmland	
	Reduction in fertilizer usage	Five respondents **reported a 50% reduction in urea usage** per acre on farmland where high-quality silt was applied, highlighting the silt's positive impact on soil fertility.
Impact of silt used for community purpose	Enhanced Lake Embankment Stability	During the FGD, **100% respondents** mentioned that the strengthened embankments have **significantly improved the structural integrity of water bodies**. This enhancement has led to **better water retention and reduced the risk of overflow or breaches** during heavy rainfall.
	Improved local environment	 **Approximately two-thirds of survey participants in Jaipur reported a significant improvement in the local environment** as a direct result of the rejuvenation efforts. They observed a noticeable increase in the region's flora and fauna. Additionally, the majority of FGD participants highlighted that these interventions have not only enhanced their preparedness for climatic events but have also contributed to the sustainable management of essential resources, such as water, thereby strengthening long-term resilience to environmental challenges.

Technical review - Water Rejuvenation Intervention 1
Jaipur, Rajasthan

Rainfall trends of Bassi, Chaksu, Sanganer, Madhorajpura and Kothwada Taluks





The primary aim of these interventions is to reduce dependency on polluted groundwater and provide a more reliable water source, primarily for drinking, household consumption, and agriculture.

Jaipur Water Rejuvenation Intervention sites and the Impact assessment survey points

Water Body & Location	Catchment Area & Depth	De-siltation Work	Water Usage	Groundwater Recharge & Quality	Additional Notes
Vimalpura Talab, Sanganer Block, Jaipur	Catchment area: 1.5 km; Max depth: 10 ft	10,000 Cu.M silt removed, primarily by local farmers	4000–5000 beneficiaries (households, cattle); 5–10 tankers daily (5500 liters each)	Groundwater levels in nearby well increased from dry to 120 ft post-monsoon. Borewell at 23.5 ft. Fluoride content decreased, improving water quality	Water remains available even in dry months, ensuring reliability

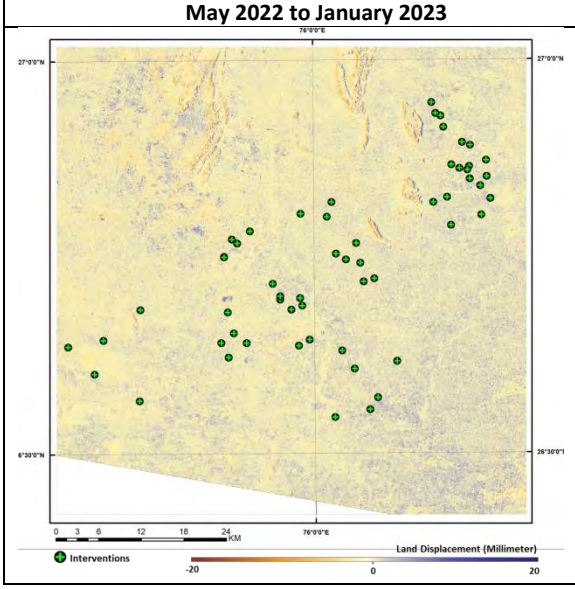
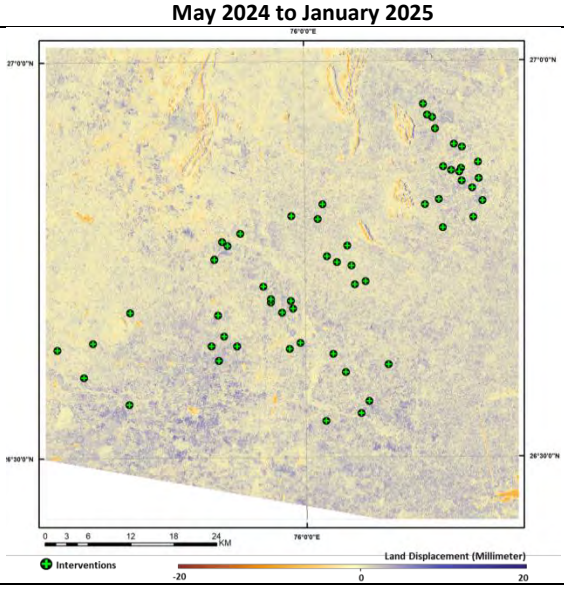
Saligrampura Village	Catchment area: 17 hectares; Depth: 15 ft	10,000 Cu.M silt removed for embankments	Primarily for agriculture & cattle; 2 km command area for farming	Reduced fluoride levels in nearby open wells; CWL of 9 ft in 60 ft well	Recharge improved rainwater influx and reduced dependency on saline groundwater
Goner Talab, Goner GP	Catchment area: 10 hectares; Depth: 25 ft (CWL 15–20 ft)	10,000 Cu.M silt removed for embankments and temple construction	Recharge supports drinking, household, and livestock needs	Improved groundwater recharge observed; varying water levels in open well (20 ft in monsoon, 30 ft in dry)	Improved water quality and fluoride levels post-intervention
Balaji Talab, Village Sapala	Depth: 12 ft; Current water level: 9 ft	20,000 Cu.M silt removed in Jan 2024	Irrigation (3 km command area); drinking and household use	Borewell at 10.9 ft; open well at 27.5 ft; reduced fluoride levels	Soil fertility decline reported; reliance on fertilizers increasing

Overview and technical assessment of Sampled intervention areas

Hydrogeological Impacts of De-siltation

Groundwater Recharge

The primary objective of the de-siltation interventions across the study areas was to enhance the storage and retention capacity of surface water bodies, ultimately leading to increased groundwater recharge. The removal of silt from water bodies such as Vimalpura Talab and Goner Talab has directly contributed to raising the groundwater levels in nearby wells and borewells. In most cases, water levels in wells have been observed to rise after the monsoon season, showing the effectiveness of the recharge process.

Land Displacement	
May 2022 to January 2023	**May 2024 to January 2025**
	

Prior to the interventions, land displacement and uplift were observed in a random pattern across the area. This variability may be attributed to the existing conditions of the pond, as the water quality was adequate, though a majority of the values were negative, with a few positive values observed. Following the desilting interventions at various locations across the site, a more defined pattern of land displacement emerged, particularly in the surrounding areas, indicating a positive impact in the study region. The analysis highlights a clear alignment between the intervention locations and the observed displacement patterns, suggesting a strong relationship between the subsurface layers and the intervention sites. This indicates that infiltration is occurring effectively, contributing to groundwater recharge.

Furthermore, certain site areas have transformed into perennial water bodies, which exhibit the highest uplift values compared to other regions. The shape and size of the rejuvenated ponds also appear to influence the extent of land uplift. The resultant displacement map demonstrates that the intervention sites show consistent positive displacement values, reinforcing the conclusion that the project successfully enhanced groundwater recharge and met its primary objectives. Additionally, the improvements in local hydrological conditions support better agricultural water availability and alleviate water scarcity during the dry season.

Water Quality

This technical report assesses the effectiveness of the rejuvenation project on the water quality of surface water bodies and groundwater in Vimalpura, Goner and Sapla villages. The assessment is based on water quality data collected post-project implementation in 2024, compared against secondary data from 2023, to evaluate the effectiveness of the intervention. The parameters analyzed include pH, chloride, fluoride, nitrate, total hardness, and other relevant indicators.

Parameter	Location	Value (2023)	Value (2024)	Change & Interpretation
pH	Vimalpura	7.72	7.8	Slight increase, remains within the acceptable drinking water range (6.5–8.5).
	Goner	7.44	7.55	Minor rise, values remain well within the permissible range.
Chloride (mg/L)	Vimalpura	265.91	130	Significant drop indicating dilution and improved recharge; now within the acceptable limit (<250 mg/L).
	Goner	837.62	395.57	Large decrease, but still above permissible limit; high chloride can cause plumbing corrosion.

Fluoride (mg/L)	Vimalpura	1.197	0.505	Reduction brings level below BIS guideline (1–1.5 mg/L); improved safety against dental fluorosis.
	Goner	1.656	0.81	Considerable drop, now within recommended range. Indicates reduced contamination.
Nitrate (mg/L)	Vimalpura	52.65	20	Decrease suggests positive impact of project; now within BIS limit (10–45 mg/L).
	Goner	176.47	54.5	Large reduction, though slightly above the upper limit; significant health benefit, especially for infants.
Total Hardness (mg/L)	Vimalpura	453.73	340	Decrease of 113.73 mg/L. Still "very hard" (>180 mg/L), but shows improvement in calcium and magnesium levels.
	Goner	777.47	517.33	Reduction of 260.14 mg/L. Water remains very hard, but hardness has lessened.

Open Well Water Quality Assessment (Sapla)

Parameter	Value (2023)	Value (2024)	Change & Interpretation
pH	8.398	8.35	Slight decrease; remains slightly above neutral. Still within the acceptable range (6.5–8.5), indicating stable water chemistry.
Chloride (mg/L)	222.19	209.8	Minor reduction; remains within the permissible limit (<250 mg/L), indicating mild improvement in salinity.
Fluoride (mg/L)	3.519	2.05	Significant reduction, but still exceeds the safe limit (1–1.5 mg/L). Elevated levels increase the risk of dental fluorosis.
Nitrate (mg/L)	17.548	19	Slight increase; remains within BIS permissible limit (10–45 mg/L). Needs continued monitoring to prevent future exceedance.
Total Hardness (mg/L)	219.24	312	Noticeable increase due to higher mineral dissolution; moves water further into the “very hard” category (>180 mg/L), affecting taste and usability.

Surface Water Quality at Vimalpura (2024):

Parameter	Value	Acceptable Range	Comments
Calcium	25.3 mg/L	-	Within acceptable limits.
Magnesium	10.2 mg/L	-	Within acceptable limits.
Calcium to Magnesium Ratio	-	-	Ratio within acceptable limits.
Carbonate (CO3)	174 mg/L	30-400 mg/L	Within the recommended range for drinking water.

Total Alkalinity (as CaCO3)	174 mg/L	30-400 mg/L	Within the recommended range for drinking water.
Fluoride	1.04 mg/L	1-1.5 mg/L	Within acceptable limits but should aim for further reduction.
Total Hardness (as CaCO3)	104 mg/L	0-300 mg/L	Classified as moderately hard.
Potassium	6.2 mg/L	-	Within acceptable limits for agriculture and other uses.
Sodium	135 mg/L	≤200 mg/L (aesthetic objective)	Below the aesthetic limit.
Phosphate	0.18 mg/L	≤0.05 mg/L	Slightly above recommended limit for lakes/reservoirs.
Total Dissolved Solids (TDS)	304 mg/L	-	Satisfactory level.
Chloride	110.6 mg/L	250-1000 mg/L	Within acceptable limits.
Electrical Conductivity	659 µS/cm	-	Indicates acceptable water quality.
Total Iron	0.2 mg/L	≤0.3 mg/L	Within acceptable limits.
pH		6.856.5-8.5	Within acceptable range.
Sodium Absorption Ratio (SAR)		8.09≤9	Indicates low sodicity hazard for irrigation.
Sulphate	17 mg/L	-	Within acceptable limits.
Residual Sodium Carbonate (RSC)		89.4-	High RSC value indicates potential issues for irrigation suitability.

Conclusion and Recommendations

The water body rejuvenation project shows promise in improving water quality in Jaipur villages. Deep wells show improvements in chloride, fluoride, nitrate, and total hardness levels, but nitrate levels still exceed recommended limits. Open well water quality shows a decrease in fluoride but an increase in total hardness. The Vimalpura surface water sample indicates acceptable levels for most parameters, but elevated phosphate and RSC levels require further monitoring and potential mitigation strategies.

However, continuous monitoring and targeted interventions are necessary to address remaining issues and ensure sustainable water resource management. By maintaining vigilance and adapting management strategies, the project can further enhance water quality, promoting both environmental health and community well-being. Other recommendations include:

- Agricultural Best Practices: Promoting controlled fertilizer use to prevent nitrate contamination.
- Implement strategies to further reduce nitrate levels in deep wells.
- Investigate the cause of increased total hardness in open wells and take corrective actions if needed.
- Monitor and mitigate phosphate and RSC levels in the Vimalpura surface water body to ensure suitability for irrigation.
- Consider implementing community education programs to inform residents about water quality and promote responsible water usage.

Water Availability

De-siltation has improved the retention of water in the surface water bodies, making them more reliable during the dry months. The Vimalpura Talab, for example, now retains water during May, a period when it typically would have dried up. Similarly, Goner Talab has become a perennial source in some cases, benefiting local communities who previously depended on tanker water or contaminated groundwater.

Agricultural Impact
The water bodies have enhanced the availability of irrigation water, benefitting agricultural activities in the region. However, soil fertility remains a challenge, as evidenced by farmers in the Balaji Talab area who continue to rely on chemical fertilizers to maintain crop yields. The continued monitoring of soil health and sustainable farming practices is necessary to complement the hydrological interventions.

Soil Testing:

Sapla Village in Kothakwada block of Jaipur, located in the semi-arid region of Rajasthan, exhibits challenging agro-ecological conditions that significantly affect soil productivity and crop sustainability. The area receives low annual rainfall ranging from 500 to 650 mm, coupled with high summer temperatures and limited vegetative cover. These conditions promote rapid evaporation, soil moisture loss, and erosion. The dominant soil texture is sandy to sandy loam, which, although well-draining, is poor in nutrient-holding capacity and prone to degradation. These soils typically lack structure and have low water retention, making them unsuitable for most crops without amendment. The native soils are often deficient in essential macro-nutrients, especially nitrogen (N) and phosphorus (P). These deficiencies limit plant growth and productivity, necessitating external inputs.

Silt Application Resultant Observations from the report:

Parameter (Unit)	Silt-Applied Soil	Non-Silted Soil	Standard Limit (ISBN 81-7137)	Remarks
pH (1:2)	8.47	7.96	7.5 – 8.5	Silt increased alkalinity; now at upper acceptable limit
Electrical Conductivity (EC, mS/cm)	3.77	4.54	0 – 1	Both soils are highly saline, silt reduced EC modestly
Organic Carbon (%)	0.53	0.56	0.5 – 0.75	Slight decline with silt; both within acceptable range
Nitrogen (% N_2)	0.10	0.094	NS	Slight improvement; typical of local nitrogen-deficient soils
Phosphorus (Kg/hect)	1.37	1.89	10 – 25	Very low in both; typical of arid Rajasthan soils
Potassium (Kg/hect)	299.6	309.7	100 – 250	Both soils contain excess potassium, which is common in rocky and mineral-rich terrains of Rajasthan; excess K may cause nutrient imbalance if unmanaged.

Although silt application can act as a supportive soil amendment, it is not sufficient on its own. To effectively restore and sustain soil health under the region's challenging climatic and edaphic conditions, it must be combined with nutrient management and organic inputs. Nevertheless, farmers have reported a reduction in chemical input costs following the application of silt.

Overall conclusion

The de-siltation interventions in the Jaipur district have yielded positive results in terms of both groundwater recharge and water quality improvement. The increase in water retention and the subsequent rise in groundwater levels have provided a reliable source of water for domestic consumption, livestock, and agriculture. Additionally, the reduction in fluoride content and turbidity levels has improved the potability of water from these sources.
However, challenges remain, particularly concerning soil fertility in agricultural areas and the long-term sustainability of water quality improvements. Future efforts should focus on promoting sustainable agricultural practices, enhancing water quality monitoring systems, and further increasing the storage capacity of surface water bodies to ensure year-round water availability for the communities of Jaipur.

Recommendations

- **Continuous monitoring** of water quality parameters, especially fluoride and turbidity, should be carried out to ensure safe drinking water.
- **Promotion of rainwater harvesting** systems at household levels to complement groundwater recharge.
- **Strengthening community awareness** and involvement in maintaining and protecting water bodies.

Intervention 2: Water Rejuvenation by ATECF and Dhara Sanstan in Jodhpur, Rajasthan

Regional geography and hydrogeological context

Jodhpur, a city in Rajasthan, faces critical water scarcity situation attributed to insufficient rainfall, contamination of groundwater, and a lack of surface water storage infrastructure. The region experiences extreme water shortages during dry periods, particularly in the summer.

Objective of the intervention

To enhance the water storage capacity of existing water bodies, improve the availability of clean water, and reduce dependency on contaminated groundwater sources.

Parameters	Findings
	INPUT
Community contribution	Provided guidance on utilizing excavated silt for reinforcing embankments, inlet/outlet structures, and approach roads.
Documentation Support	AVNI app for real-time monitoring, ensuring transparency and efficiency. • KPIs for project monitoring included trolleys used, silt transport details, farmer participation, area covered, diesel consumption, excavation hours, and volume excavated, verified via MB recordings. • Field staff logged daily updates, photos, and geo-tags. A documentation team maintained detailed records of milestones, community involvement, and resource use.
	PROCESS
Baseline survey/Detailed assessment	• A **comprehensive survey** was conducted for the identified water bodies to establish a baseline and assess their current status. • Evaluated the physical state of the water bodies, including sedimentation levels, silt deposition, and erosion of embankments. • Examined the overall structural integrity of existing infrastructure, such as embankments, inlets, and outlets. • Analyzed the surrounding land use, including agricultural activities, forest coverage, and urban encroachments, to understand the impact on water body sustainability. • Documented the flora and fauna dependent on the water body, highlighting any ecological significance.
Identification of perspective sites	• The **Composite Landscape Assessment and Restoration Tool (CLART)** maps, a GIS-based tool, were utilized to select the work locations. This tool helps identify areas with the highest groundwater recharge potential and regions where surface water storage capacity can be effectively augmented. • The process involved a multi-dimensional assessment to determine sites with the highest potential for impactful intervention. o Water bodies that serve as key ecological hubs, supporting biodiversity and contributing to the local environmental balance, were prioritized. o Regions experiencing acute water scarcity, particularly during peak summer months, were identified through hydrological assessments and baseline surveys. o Areas where water availability was insufficient to meet domestic, agricultural, or livestock needs received higher priority. o Water bodies that directly influenced the livelihoods of the local population, such as those supporting irrigation, fishing, or other water-dependent activities, were marked as critical. • Discussions with Gram Panchayats and community members helped identify water bodies that played a pivotal role in their daily lives. • Community feedback highlighted specific areas where rejuvenation would have the most significant impact on improving water access and reducing challenges like long travel distances for water collection.
Feasibility study	• The project team conducted a comprehensive feasibility study to evaluate the viability of the proposed water rejuvenation interventions. The study encompassed a multi-faceted analysis to ensure that the interventions would be technically sound, environmentally sustainable, socially inclusive, and economically viable.

	• A detailed assessment was conducted to evaluate the seasonal and annual availability of water in the targeted sources, including river inflow patterns, groundwater recharge potential, and current extraction levels. • Soil testing was performed to determine the suitability of the excavation and embankment strengthening activities. The study highlighted areas with high silt deposition, ideal for excavation and reuse in structural strengthening. • Locations with the highest potential for successful water rejuvenation were prioritized based on the study findings. • Tailored intervention strategies were recommended, factoring in technical requirements, environmental sustainability, and community preferences.
Community meeting with Gram Panchayat (GP) and villagers	• Community meetings were organized to engage key stakeholders, including GP members, villagers, local community leaders, and relevant government officials, in the water rejuvenation project. This process involved several key steps to ensure active participation, gather essential feedback, and secure community support for the initiative. • Through open discussions, common ground was established between stakeholders. This included finalizing the scope of the rejuvenation plan, agreeing on priority areas, and determining the roles of different stakeholders in the implementation phase. • The participation rate of GP members throughout the project location was very high.
Obtain approval and a NOC from GP	• Initial discussions were held with the Gram Panchayat members to explain the scope, objectives, and potential impact of the rejuvenation project on the local community. • The GP was briefed on the specific components of the project, such as water source identification, rejuvenation methods, infrastructure strengthening, and expected benefits. • After reviewing the project proposal and its alignment with the community's needs, the Gram Panchayat formally agreed to support the project. • The approval process included a review of the technical aspects of the project, ensuring that it adhered to local regulations and standards. • The NOC was issued by the Gram Panchayat after obtaining consensus from the local stakeholders, including the village residents and relevant authorities.
Issue purchase orders and finalize vendors	• A detailed vendor selection process was undertaken to identify reliable suppliers and service providers. Vendors were assessed based on their capability, past experience, quality of equipment, and financial stability. For services requiring specialized expertise (such as soil analysis or hydrological assessment), expert consultants were also sourced. • RFPs were issued to selected vendors based on the identified needs. Vendors were asked to submit bids, detailing their offered prices, delivery timelines, and terms of service. • Proposals were evaluated according to predefined criteria, such as cost-effectiveness, delivery time, and past project performance. One additional criteria followed in Jodhpur was that the vendor must not be of the same village. The top vendors, who met the project's technical and financial requirements, were shortlisted for final selection. • Once the vendors were selected, formal purchase orders were issued to ensure that all equipment, materials, and services are procured in alignment with the project's requirements. • Contracts were signed with vendors to establish legal terms of engagement, including delivery schedules, payment terms, penalties for delays, and warranty or service clauses for equipment.
Work execution along with concurrent Monitoring and Evaluation	• The rejuvenation activities were executed in alignment with the pre-approved project plan and timeline, ensuring systematic and efficient implementation. • Silt was carefully extracted and sorted based on quality, with subsequent utilization for embankment strengthening, road levelling, and community structures. • Silt was distributed to beneficiaries based on individual farmer's demand, driven by its quality. This approach ensured effective utilization, such as enhancing soil fertility and improving moisture retention on farms, thereby supporting agricultural productivity and sustainability**.** • A structured mechanism has been established for silt transportation and demand capture by farmers, initially recorded in the AVNI app. In cases of high demand, a **minimum cap** is set on the number of trolleys allocated per individual. However, in Jaipur, where silt availability exceeded demand, this criterion was not required. • Community leaders, including Gram Panchayat representatives, were actively engaged throughout the implementation phase, from site preparation to progress monitoring, fostering transparency and accountability. • The **AVNI app** enabled real-time monitoring, complementing regular meetings conducted by the ATECF team to ensure seamless and efficient project execution. Data with respect to farmers listing,

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- In Jaipur, delays in adhering to the pre-monsoon timeline limited participation from some farmers in silt carting activities, as they had already completed preparations for their fields by the time the opportunity arose.
- A dedicated team of civil engineers, GIS specialists, and quality control experts was actively involved in overseeing the implementation of water conservation measures and the strategic planning of efficient water management techniques to optimize usage and minimize wastage.
- The KII interactions across location indicated that the work lasted for about 2-3 months across locations.

OUTPUT

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Ponds Rejuvenated	**Silt excavated**	**Storage Capacity created**	**Beneficiaries**

OUTCOME AND IMPACT

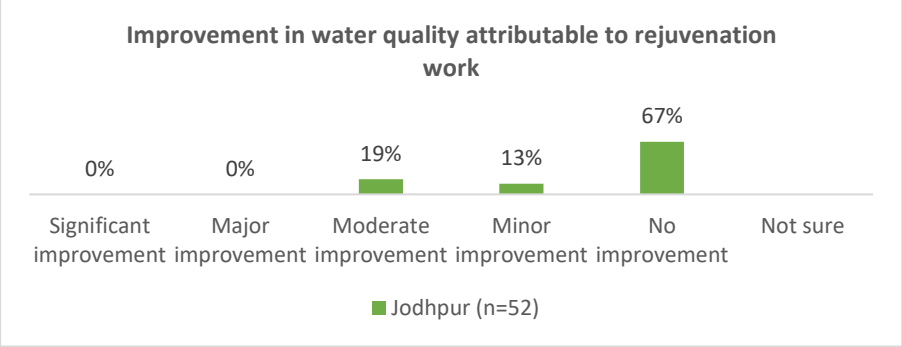
Impact on drinking and water for other HH use

Improved availability of potable water

All survey respondents, corroborated by FGD participants, confirmed that the pond rejuvenation has significantly improved their access to drinking water, as surface water serves as their primary source. The pond rejuvenation significantly improved drinking water access, reducing the travel distance **from 3-4 km and 3 hours daily during peak summers**. The average potable water availability increased, as tabulated above, extending availability until March or April. However, a one-month gap remains, requiring reliance on water tankers.

Survey respondents reported an average livestock size of **3.9 per household in Jodhpur**, primarily consisting of cows and goats in both regions. The **FGD discussions** further highlighted that the improved availability of drinking water has significantly benefited livestock by providing a more stable and conducive environment. Consistent access to water has enhanced livestock health and productivity, reducing the incidence of dehydration-related ailments and improving overall well-being.

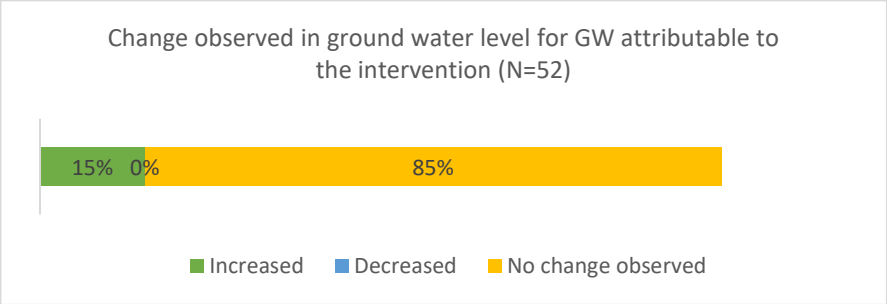
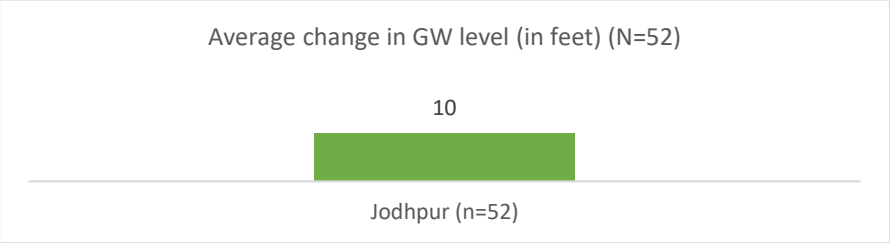
Improvement in quality of water

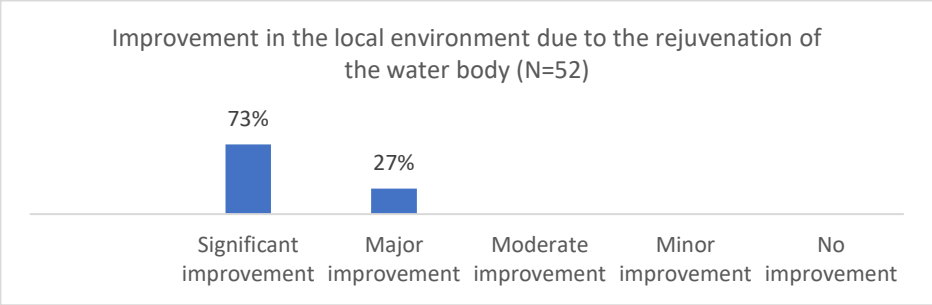


The impact of water rejuvenation on water quality varied among respondents. While 67% of survey participants reported no significant change in groundwater quality, they noted that groundwater in the region contains high fluoride levels, making it unsuitable for drinking. To address this, the desilting process was carefully executed to prevent intermixing of groundwater with surface water. On the other hand, the quality of surface water has notably improved due to the influx of fresh water, enhancing its usability. Among the respondents, 19% observed moderate improvement and 13% noted minor improvement in surface water quality, largely reflecting their partial reliance on groundwater for their needs.

Reduced household expenditures on

Pre-Intervention (INR/month)	Duration	Post-Intervention Impact

	water procurement	**₹300**	~3 months	Significant reduction; minimized need for external sourcing	
	Time-Saving for Households	The FGD participants reported significant time savings of approximately **two hours per person per day**, particularly during the peak summer months when their village *naadi* (lake) would typically run dry. Pre-intervention, they were compelled to travel to neighbouring villages to access water from other *naadis* or wells.			
Impact on agriculture and allied activities	Enhanced GW level	  While 85% of survey respondents reported no significant change, 15% observed an increase in groundwater levels. This limited improvement in groundwater recharge as validated by the FGD participants can be attributed to the region's high fluoride content, which discourages reliance on groundwater for drinking or any other use. To address this, the intervention focused on **desilting and maintaining the quality of surface water**, as recommended by the community, to prevent its intermixing with groundwater. This was achieved by **removing the top layer of soil**, which was less porous, and setting it aside. The underlying layers were then excavated to increase the pond's capacity. Finally, the less porous top layer was placed back on the base of the excavated site to minimize groundwater recharge and preserve the surface water quality. Despite the moderate increase in groundwater levels of about 10 feet, the intervention's broader focus on enhancing surface water availability and quality has been a more impactful driver of water security in the region.			
	Enhanced cropping pattern and diversity	As highlighted during the FGD interactions agricultural practices remain predominantly rainfed, with water resources already constrained to meet basic drinking water needs. As a result, the intervention had minimal impact on cropping patterns, with 100% of respondents continuing mono-cropping practices and cultivating the same crops both before and after the intervention. The limited availability of water and the focus on enhancing surface water storage for essential needs have meant that agricultural diversification remains a challenge in the region.			
Impact of silt used on farms	Enhanced agricultural productivity through the application of silt	According to feedback from FGD and KII, the application of excavated silt was primarily utilized for non-agricultural purposes, such as embankment strengthening, construction of approach roads, road levelling, and other community infrastructure projects. This was due to the poor quality of the silt, which rendered it unsuitable for agricultural use and, as a result, limited its potential to enhance agricultural productivity.			
Impact of silt used for community purpose	Enhanced Lake Embankment Stability	During the FGD, **over 80% of participants in Jodhpur** reported that the strengthened embankments have significantly improved the structural integrity of water bodies. This enhancement has led to better water retention and reduced the risk of overflow or breaches during heavy rainfall. However, 20% of participants in Jodhpur noted that the strengthening efforts could have been more effective, citing issues such as a damaged inlet that continued to affect the structure's water retention capacity (in Olvi village, Jodhpur)			

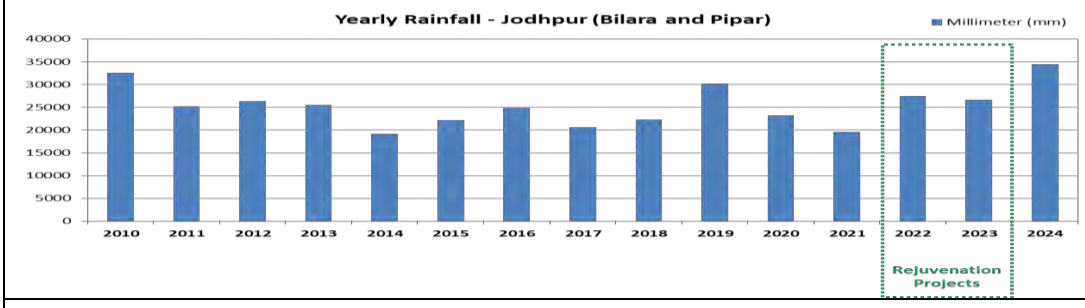
Improved local environment	 **Approximately two-thirds of survey participants in Jodhpur reported a significant improvement in the local environment** as a direct result of the rejuvenation efforts. They observed a noticeable increase in the region's flora and fauna. Additionally, the majority of FGD participants highlighted that these interventions have not only enhanced their preparedness for climatic events but have also contributed to the sustainable management of essential resources, such as water, thereby strengthening long-term resilience to environmental challenges.

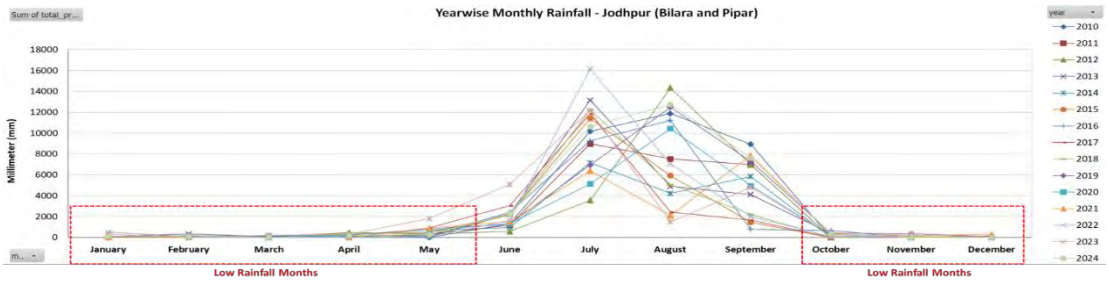
Technical Review - Water Rejuvenation Intervention 2
Jodhpur, Rajasthan

Introduction and Objective of the Project

Jodhpur, a city in Rajasthan, is facing a **critical water scarcity situation**. The region is also characterized by predominantly infertile, sandy soils that limit agricultural productivity and reduce natural water retention. This scarcity is attributed to insufficient rainfall, contamination of groundwater, and a lack of surface water storage infrastructure. As a result, the region experiences extreme water shortages during dry periods, particularly in the summer.

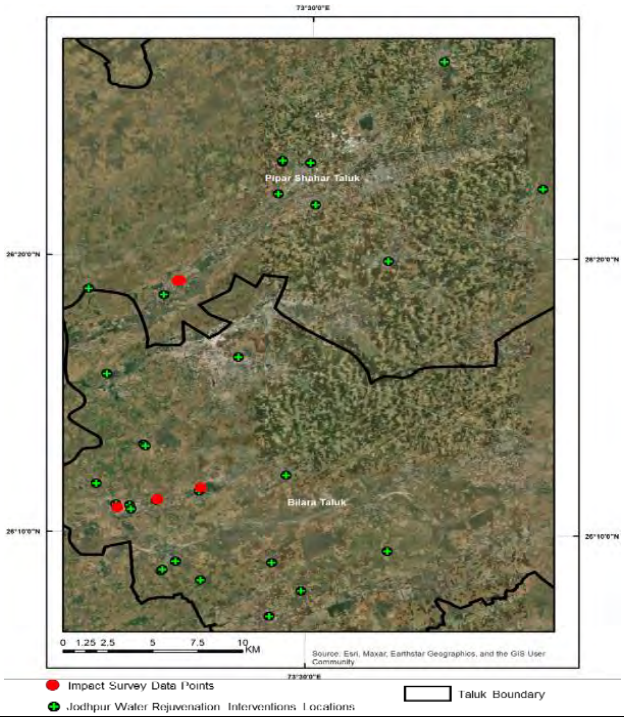
Rainfall trends of Pipar and Bilara Taluks





The objective of the interventions was to enhance the water storage capacity of existing water bodies, improve the availability of clean water, and reduce dependency on contaminated groundwater sources.

Jodhpur Water Rejuvenation Intervention sites and the Impact assessment survey points



Overview and technical assessment of Sampled intervention areas

Water Body & Village	Hydrological Features	De-siltation Work	Water Usage	Groundwater / Agriculture
Gavayi Talab, Benan	Connected to natural drain; undulating bed; max height 10 ft; now perennial post-intervention	1200 Cu.M silt removed; topsoil removed and replaced to enhance volume	Water availability is year-round **Purpose:** Drinking, household, cattle	Wells at 150 ft saline and fluoride-contaminated (1.5 mg/L); shallow well at 50 ft shows limited GW availability
Nenkinadi, Benan	Aim to increase retention; CWL: 10–12 ft	Storage capacity expanded; fertile soil not added; water source became perennial	Water availability is year-round **Purpose**: domestic & livestock use	Kharif-only agriculture (rainfed); minimal Rabi use
Rameshwar Talab, Ramasni	Slanted bed; 4 wells inside pond bed for recharge; max height 30 ft	8000 Cu.M silt removed; embankments and slope added for monsoon runoff control	Water availability is year-round **Purpose:** Household, livestock, occasional minimal irrigation	Recharge observed in shallow wells post-intervention
Pimpal Gavay Nadi, Rampuriya	8 open wells on inclined bed (height 40 ft); overflow rare; CWL at 35 ft	8000 Cu.M silt removed to improve storage; previously dried by May	Water availability is year-round **Purpose:** Household, livestock, tankers filling	Supports community water demands during peak usage
Olvi Gavayi Nadi, Olvi	Slanted bed; 80 ft depth; now perennial; monsoon-ready (2022)	16,000 Cu.M silt excavated; 2-ft monsoon rise; better storage capacity	Water availability is year-round **Purpose:** daily tanker filling for supply to households	–

Hydrogeological Impacts of De-siltation

Groundwater Recharge

The de-siltation interventions in the study areas are directly contributing to the recharge of shallow aquifers. For example, in Rameshwar Talab, the intervention has led to a rise in groundwater levels in surrounding wells, providing water for household consumption and livestock. However, the shallow groundwater in many of these regions remains saline and unsuitable for drinking. The recharge from surface water is essential for sustaining groundwater availability, but it will take longer to recharge deeper aquifers.

Land Displacement

Land Uplift and Subsidence Analysis focuses on the processes where land either rises (uplift) or sinks (subsidence) due to various geological, hydrological, and human factors. These phenomena can affect landscapes, infrastructure, and ecosystems over time.

Land Uplift (represented in the graph as +ve values or towards the blue scale):

Land uplift occurs when the Earth's surface rises due to natural processes like tectonic activity (e.g., mountain building), volcanic activity, or isostatic rebound (when the Earth's crust rises after the melting of glaciers). It can also be influenced by human activities such as the filling of reservoirs or the recharging of aquifers.

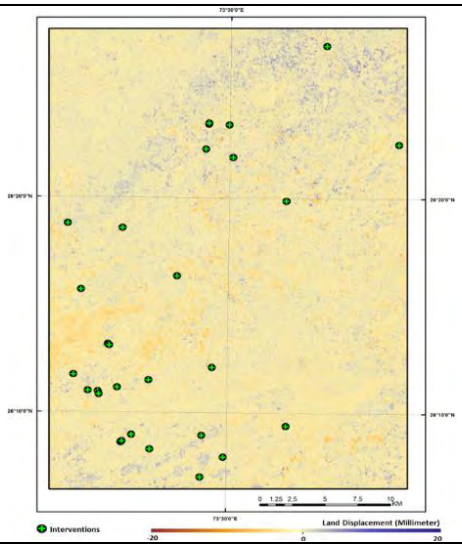
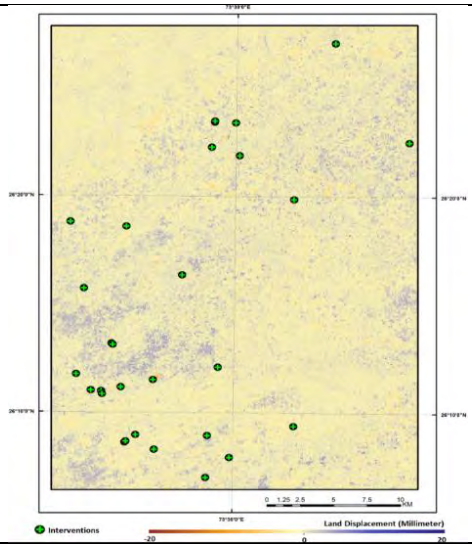
Land Subsidence: (represented in the graph as -ve values or towards the dark brown scale)

Land subsidence refers to the sinking or downward settling of the Earth's surface, typically caused by factors like the extraction of groundwater, oil, or natural gas, compaction of sediments, or the collapse of underground cavities. Natural processes, such as the settling of soft soil or the drainage of wetlands, can also contribute to subsidence.

Impact of De-siltation on Land Uplift and Subsidence as the Water Table Changes:

Desilting may also affect the water table levels. If sediment removal alters the natural water-holding capacity of the pond or reservoir, it can impact groundwater levels in the surrounding area.

The graphs below represent the Land Displacement Analytics of the region of intervention:

Jan 2021 to Jan 2022	Jan 2024 to Jan 2025
	

The analysis of the land displacement output reveals a significant +ve land displacement over time after the interventions especially near the de-siltation sites. This indicates that, over time, as surface water was properly managed and allowed to infiltrate, the groundwater absorption has increased.

Water Availability

The de-siltation of these water bodies has significantly improved the availability of surface water. Water bodies such as Gavayi Talab, Nenkinadi, and Rameshwar Talab have turned perennial, ensuring a consistent water supply even during dry seasons. This reduces the reliance on costly tanker water and provides a more sustainable solution to the water scarcity issues in the region.

Water Quality

While the interventions have enhanced the storage capacity, water quality remains a concern. In areas like Gavayi Talab in Olvi, a thin white lining at the edges suggests possible pollution from surrounding areas, highlighting the need for improved

protection measures. Furthermore, in some cases, surface water storage helps reduce dependence on contaminated groundwater sources, but filtration remains necessary for safe drinking water.

Surface water Testing – Gavayi talab, Benan Village, Jodhpur

Readings were not taken from Olvi as there was indication of pollution from external source. Sample from Rameshwar talab, Ramasni village was damaged during transportation, so the findings are only for Benan village. Before intervention data is not available.

The desiltation work conducted in Jodhpur primarily focuses on the management of surface water runoff. The key objective is to accumulate and store this runoff while ensuring minimal percolation into the groundwater, which is already contaminated with high fluoride levels. As a result, the assessment does not target groundwater quality but instead emphasizes the quality of the stored surface water, which is directly consumed by the local residents.

The study evaluates this surface water against established drinking water standards to ensure its safety and suitability for consumption. Evaluation of the water quality of rejuvenated waterbody in Benan Village for drinking is performed based on the Indian Standards for Safe Drinking Water (IS 10500:2012). The analysis compares pH, Total Dissolved Solids (TDS), Total Hardness, Calcium, Magnesium, Chloride, Sulphate, Fluoride, Iron, and Sodium parameters of the village's water supply with the acceptable and permissible limits set by the Bureau of Indian Standards (BIS) to determine if the water is safe for consumption.

Results and Comparison with Indian Standards

Parameter	Rejuvenated Water body, Benan	Acceptable Limit (IS 10500:2012)	Remarks
pH	7.57	6.5–8.5	Within acceptable range
Total Dissolved Solids (TDS)	118 mg/L	500 mg/L	Well within acceptable limit
Total Hardness (as $CaCO_3$)	48 mg/L	200 mg/L	Well within acceptable limit
Calcium (Ca)	14.7 mg/L	75 mg/L	Well within acceptable limit
Magnesium (Mg)	2.9 mg/L	30 mg/L	Well within acceptable limit
Chloride (Cl^-)	57 mg/L	250 mg/L	Well within acceptable limit
Sulphate (SO_4^{2-})	1 mg/L	200 mg/L	Well within acceptable limit
Fluoride (F^-)	0.73 mg/L	1.0 mg/L	Well within acceptable limit
Iron (Fe)	0.1 mg/L	0.3 mg/L	Well within acceptable limit
Sodium (Na)	5.9 mg/L	200 mg/L	Well within acceptable limit

The water quality in Benan Village meets all the Indian Standards for Safe Drinking Water (IS 10500:2012). All tested parameters are well within the acceptable limits, and none exceed the permissible limits. Therefore, the water in Benan Village is **safe for drinking** and poses no health risks related to the analyzed parameters.

Recommendations

1. **Regular Monitoring:** Continue periodic testing to ensure sustained water quality.
2. **Community Awareness:** Educate residents about the importance of clean drinking water and proper water storage practices.
3. **Infrastructure Maintenance:** Ensure proper maintenance of water supply systems to prevent contamination

Overall conclusion

The de-siltation interventions carried out in various water bodies in Jodhpur have shown promising results in improving surface water storage, supporting groundwater recharge, and providing a sustainable source of water for domestic and livestock use.

Recommendations

Future interventions should focus on:

- **Further enhancing the water retention capacity** of ponds and water bodies.
- **Promoting awareness** among local communities regarding the importance of maintaining water bodies and preventing pollution.

Intervention 3: Water Rejuvenation by NAF in Thiruvannamalai, Tamil Nadu

Regional geography and hydrogeological context

The region of Melkodangalur, Kodanallur Gram Panchayati, located in the district of Tamil Nadu, has faced challenges related to water scarcity, particularly in the summer months. Groundwater depletion, reduced surface water availability, and inefficient irrigation practices have adversely affected agricultural productivity and local water access.

Objective of the intervention

To improve water conservation, recharge shallow aquifers, and support agriculture. Through rejuvenation and desiltation activities in key water bodies, including ponds, wells, and borewells

The below table illustrates the impact findings using the common results framework for Water Rejuvenation programme

Parameters	Findings
	INPUT
Community contribution	Prioritized silt use for collective benefits, focusing on strengthening embankments of water structures.
Documentation Support	Manual logs, field visits, and photos for tracking progress • KPIs for project monitoring included trolleys used, silt transport details, farmer participation, area covered, diesel consumption, excavation hours, and volume excavated, verified via MB recordings. • Field staff logged daily updates, photos, and geo-tags. A documentation team maintained detailed records of milestones, community involvement, and resource use.
	PROCESS
Baseline survey/Detailed assessment	• A **comprehensive survey** was conducted for the identified water bodies to establish a baseline and assess their current status. • Evaluated the physical state of the water bodies, including sedimentation levels, silt deposition, and erosion of embankments. • Examined the overall structural integrity of existing infrastructure, such as embankments, inlets, and outlets. • Analyzed the surrounding land use, including agricultural activities, forest coverage, and urban encroachments, to understand the impact on water body sustainability. • Documented the flora and fauna dependent on the water body, highlighting any ecological significance.
Identification of perspective sites	• The **Composite Landscape Assessment and Restoration Tool (CLART)** maps, a GIS-based tool, were utilized to select the work locations. This tool helps identify areas with the highest groundwater recharge potential and regions where surface water storage capacity can be effectively augmented. • The process involved a multi-dimensional assessment to determine sites with the highest potential for impactful intervention. o Water bodies that serve as key ecological hubs, supporting biodiversity and contributing to the local environmental balance, were prioritized. o Regions experiencing acute water scarcity, particularly during peak summer months, were identified through hydrological assessments and baseline surveys. o Areas where water availability was insufficient to meet domestic, agricultural, or livestock needs received higher priority. o Water bodies that directly influenced the livelihoods of the local population, such as those supporting irrigation, fishing, or other water-dependent activities, were marked as critical. • Discussions with Gram Panchayats and community members helped identify water bodies that played a pivotal role in their daily lives. • Community feedback highlighted specific areas where rejuvenation would have the most significant impact on improving water access and reducing challenges like long travel distances for water collection.
Feasibility study	• The project team conducted a comprehensive feasibility study to evaluate the viability of the proposed water rejuvenation interventions. The study encompassed a multi-faceted analysis to ensure that the interventions would be technically sound, environmentally sustainable, socially inclusive, and economically viable.

	• A detailed assessment was conducted to evaluate the seasonal and annual availability of water in the targeted sources, including river inflow patterns, groundwater recharge potential, and current extraction levels. • Soil testing was performed to determine the suitability of the excavation and embankment strengthening activities. The study highlighted areas with high silt deposition, ideal for excavation and reuse in structural strengthening. • Locations with the highest potential for successful water rejuvenation were prioritized based on the study findings. • Tailored intervention strategies were recommended, factoring in technical requirements, environmental sustainability, and community preferences.
Community meeting with Gram Panchayat (GP) and villagers	• Community meetings were organized to engage key stakeholders, including GP members, villagers, local community leaders, and relevant government officials, in the water rejuvenation project. This process involved several key steps to ensure active participation, gather essential feedback, and secure community support for the initiative. • Through open discussions, common ground was established between stakeholders. This included finalizing the scope of the rejuvenation plan, agreeing on priority areas, and determining the roles of different stakeholders in the implementation phase. • The participation rate of GP members throughout the project location was very high.
Obtain approval and a NOC from GP	• Initial discussions were held with the Gram Panchayat members to explain the scope, objectives, and potential impact of the rejuvenation project on the local community. • The GP was briefed on the specific components of the project, such as water source identification, rejuvenation methods, infrastructure strengthening, and expected benefits. • After reviewing the project proposal and its alignment with the community's needs, the Gram Panchayat formally agreed to support the project. • The approval process included a review of the technical aspects of the project, ensuring that it adhered to local regulations and standards. • The NOC was issued by the Gram Panchayat after obtaining consensus from the local stakeholders, including the village residents and relevant authorities.
Issue purchase orders and finalize vendors	• A detailed vendor selection process was undertaken to identify reliable suppliers and service providers. Vendors were assessed based on their capability, past experience, quality of equipment, and financial stability. For services requiring specialized expertise (such as soil analysis or hydrological assessment), expert consultants were also sourced. • RFPs were issued to selected vendors based on the identified needs. Vendors were asked to submit bids, detailing their offered prices, delivery timelines, and terms of service. • Proposals were evaluated according to predefined criteria, such as cost-effectiveness, delivery time, and past project performance. The top vendors, who met the project's technical and financial requirements, were shortlisted for final selection. • Once the vendors were selected, formal purchase orders were issued to ensure that all equipment, materials, and services are procured in alignment with the project's requirements. • Contracts were signed with vendors to establish legal terms of engagement, including delivery schedules, payment terms, penalties for delays, and warranty or service clauses for equipment.
Work execution along with concurrent Monitoring and Evaluation	• The rejuvenation activities were executed in alignment with the pre-approved project plan and timeline, ensuring systematic and efficient implementation. • Silt was carefully extracted and sorted based on quality, with subsequent utilization for embankment strengthening, road levelling, and community structures. • Silt was distributed to beneficiaries based on individual farmer's demand, driven by its quality. This approach ensured effective utilization, such as enhancing soil fertility and improving moisture retention on farms, thereby supporting agricultural productivity and sustainability**.** • A structured mechanism has been established for silt transportation and demand capture by farmers, initially recorded in the AVNI app. In cases of high demand, a **minimum cap** is set on the number of trolleys allocated per individual. However, in Jaipur, where silt availability exceeded demand, this criterion was not required. • Community leaders, including Gram Panchayat representatives, were actively engaged throughout the implementation phase, from site preparation to progress monitoring, fostering transparency and accountability. • Field operations were carried out using over 15 excavators, 5 JCB-type vehicles, and 5 lorries for soil transportation to bunds. A dedicated team of civil engineers, GIS specialists, and quality control experts was actively involved in overseeing the implementation of water conservation measures

and the strategic planning of efficient water management techniques to optimize usage and minimize wastage.

- The KII interactions across location indicated that the work lasted for about 2-3 months across locations.

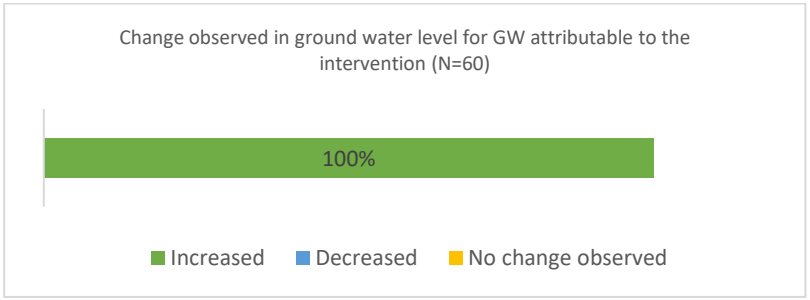
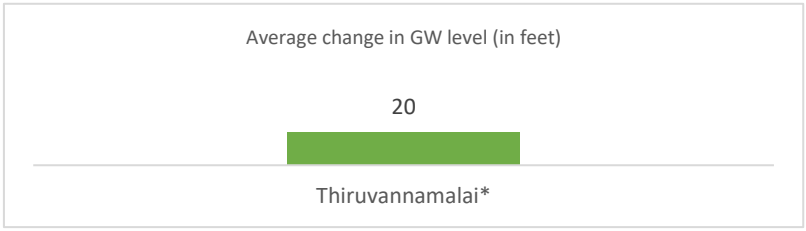
OUTPUT

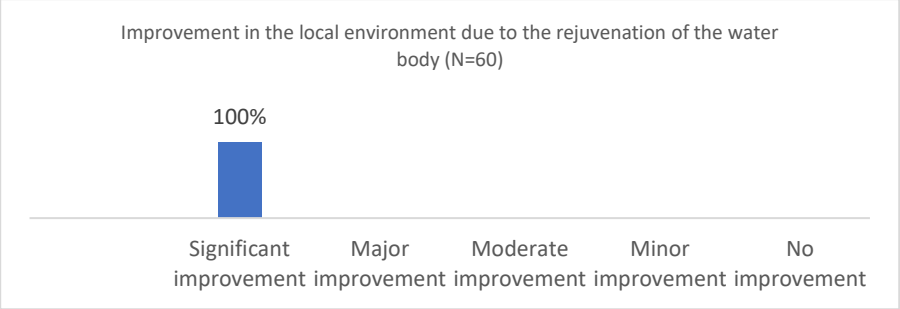
55	3,09,953 (CuM)	30,99,53,000 (Litres)	44,260
Ponds Rejuvenated	**Silt excavated**	**Storage Capacity created**	**Beneficiaries**

OUTCOME AND IMPACT

Impact on drinking and water for other HH use	Improved availability of potable water	Survey respondents indicated a notable improvement in potable water availability, with an increase of approximately **six months** following the intervention. This enhancement has significantly strengthened water security, alleviating seasonal challenges during dry periods. The community now benefits from a more reliable and consistent water supply, reducing the need for long-distance travel for drinking water, especially during peak summer months. Additionally, they have access to government-supplied drinking water, either through piped or tanker distribution.
	Improvement in quality of water	The findings from Thiruvannamalai indicated that respondents were not consciously monitoring the changes in water quality resulting from the project, as they primarily rely on government-supplied water for drinking purposes.
	Reduced household expenditures on water procurement	

Pre-Intervention (INR/month)	Duration	Post-Intervention Impact
Not monetized (govt. water supply)	N/A	Reduced reliance on long-distance water collection

Impact on agriculture and allied activities	Enhanced GW level	  *Note: Survey respondents from Thiruvannamalai were unable to quantify the groundwater level increase. Therefore, the data represented in the graph reflects estimates provided by 60 FGD participants. The water rejuvenation activity has demonstrably improved groundwater levels, with **100% of survey respondents** reporting an increase. The survey participants could not quantify the increase however the insights from the FGD participants and some KII interactions indicated an estimated rise of **approximately 20 feet**, while acknowledging that favourable rainfall may have also contributed to this positive outcome.
	Enhanced cropping pattern and diversity	**All survey respondents reported a notable shift from monocropping to double cropping**, marking a significant transformation in agricultural practices. This change has extended the cropping cycle to encompass both Kharif and Zaid seasons. As validated by the FGD

		participants, previously, rice was the sole crop cultivated during the Kharif season. However, following the intervention and the subsequent increase in water availability, farmers have diversified their crop selection. They now cultivate a broader range of crops, including urad, green grams, peanuts, watermelon, black-eyed beans, lady's finger, brinjal, chilli, and sugarcane.
	Enhanced income attributable to crop yield	**Over 80% of the FGD participants acknowledged** that the rejuvenation efforts significantly improved water accessibility, allowing for more consistent and efficient irrigation practices. This, in turn, led to enhanced agricultural productivity and higher crop yields. Farmers reported that improved soil moisture and water retention facilitated better crop growth, enabling them to cultivate more diverse and high-value crops. The resulting increase in output translated into greater marketable surplus contributing to an additional annual income of **about INR 6,000.**
Impact of silt used on farms	Enhanced agricultural productivity through the application of silt	The distribution of extracted silt was not part of the intervention, aligning with Tamil Nadu government regulations that prohibit its use for agricultural purposes. Consequently, no direct impact on agricultural productivity can be attributed to this activity.
Impact of silt used for community purpose	Enhanced Lake Embankment Stability	As indicated from the FGD, the extracted silt from water bodies was primarily utilized for strengthening pond and lake embankment. Farmers reported that the reinforced bunds have significantly improved the structural stability of these water sources, enhancing their capacity to retain water during the rainy season and contributing to more reliable water availability for various needs.
	Improved local environment	 **100% survey respondent in Thiruvannamalai reported a significant improvement in the local environment** as a direct result of the rejuvenation efforts. They observed a noticeable increase in the region's flora and fauna. Additionally, the majority of FGD participants highlighted that these interventions have not only enhanced their preparedness for climatic events but have also contributed to the sustainable management of essential resources, such as water, thereby strengthening long-term resilience to environmental challenges.

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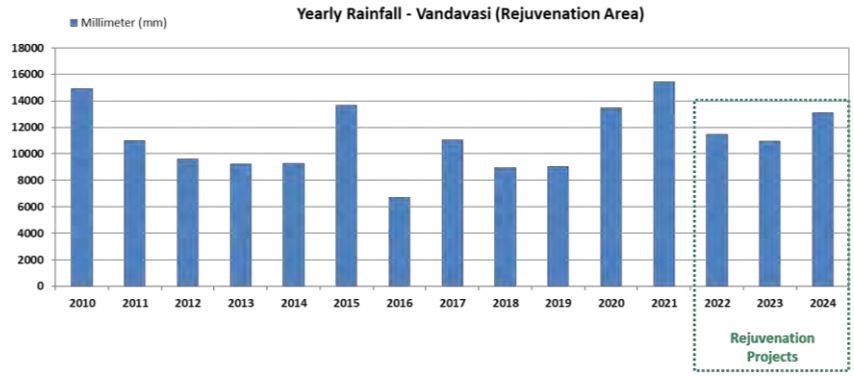
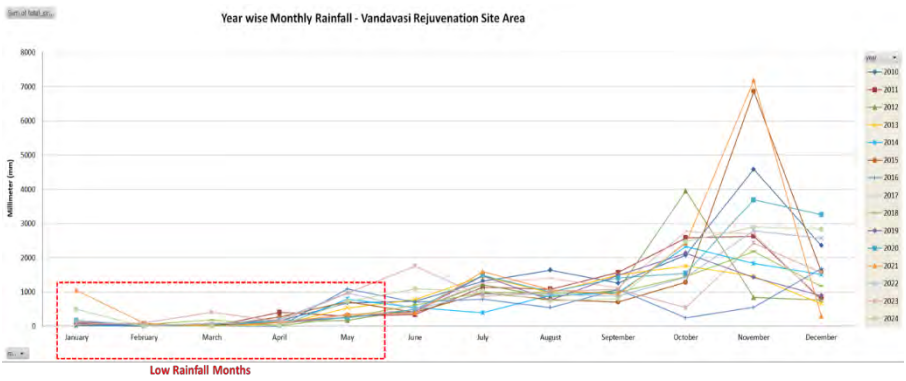
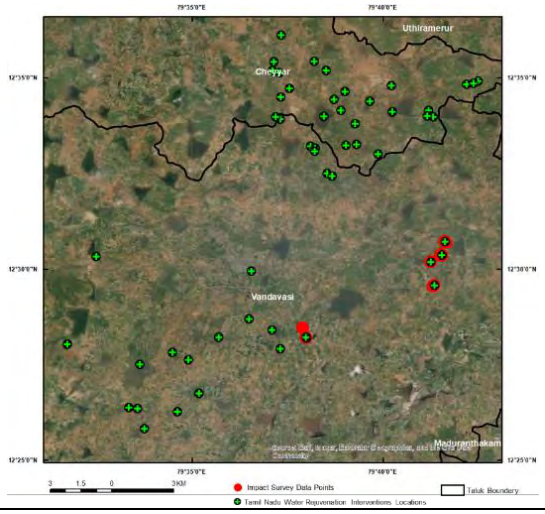
Rainfall trends of Spatial extent of the site area, Vandavasi Taluka





The rejuvenation and de-siltation activities in key water bodies have aimed to improve water conservation, recharge shallow aquifers, and support agriculture.

Vandavasi Water Rejuvenation Intervention sites and the Impact assessment survey points



Overview and technical assessment of Sampled intervention areas

Location	Structure Name	Features	Intervention	Water Depth (Post)	Impact
Melkodanglur, Kodanallur	Temple Pond and Adjacent Water Regime	Interconnected water systems; dug well (40 ft), 3 ft rick wall	De-siltation in adjacent pond	67 inches (~5.6 ft) + 3 ft wall + 40 ft well	Command area extended to 1 km; water at ground level
Melkodanglur, Kodanallur	Pond, Open Well, Borewell	Pond FTL: 15 ft, CWL: 10 ft; Open well 45 ft; Borewell SWL: 8.75 ft	Rejuvenated pond	Open well GWL increased by 2 m	Supports drinking, household use, and irrigation
Melkodanglur, Kodanallur	Additional Pond with Plain Bed	Roadside, plain bed pond	Deepening and retention enhancement	7 ft from bed (total depth 10 ft)	New well (30 ft) SWL: 3 ft; retains water in summer
Kodanallur GP	Kodanallur Lake	Inclined bed, high embankment	Rejuvenated large pond	FTL: 14 ft; CWL: 10 ft	Irrigates 200 acres for 2 years; supports 3 crop cycles
Melkodanglur	Trapezium-Shaped Pond	MSL: 234 ft; adjacent to road and large waterbody	Deepened to FTL 9 ft; removed silt and vegetation	Current: 5.25 ft; retains 3 ft in summer	Captures runoff; enhances groundwater recharge year-round

Hydrogeological Impacts of De-siltation

Groundwater Recharge and Quality

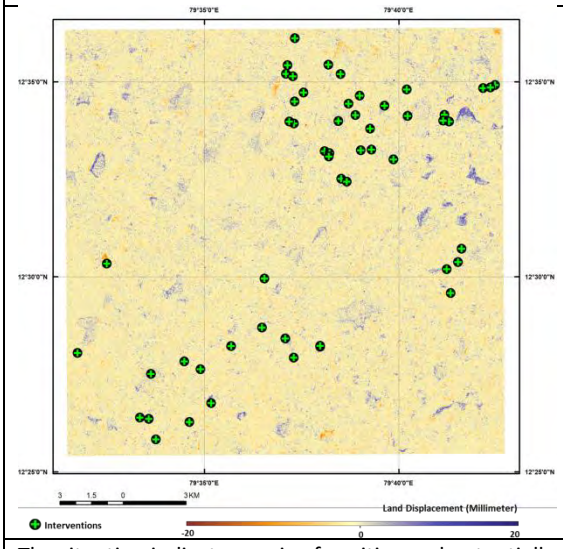
The interventions have successfully increased groundwater recharge in the region. De-siltation and rejuvenation of the ponds have enhanced the water retention capacity of the surface water bodies, which in turn supports the recharge of shallow aquifers. Water levels in open wells and borewells have risen significantly after the intervention, indicating effective infiltration of surface water into the groundwater system.

Key observations include:

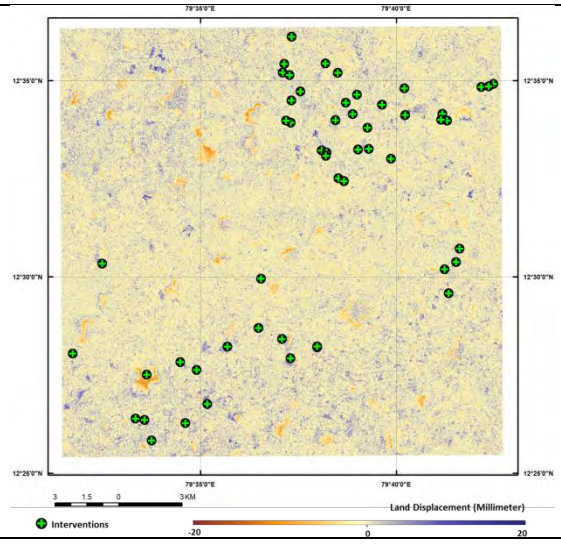
- The static water levels in the open well and borewell have increased by 2 meters after rejuvenation, with both wells showing similar water levels.
- New wells, including a 30-foot deep well, have also benefited from the recharge, with a noticeable increase in water levels.
- The command area for water usage has expanded to 1 km, providing improved access to water for both domestic and agricultural uses.

Land Displacement

March 2021 to March 2022



March 2024 to March 2025



The situation indicates a mix of positive and potentially concerning effects of the rejuvenation work. Here's a breakdown:

Positive Effects:

- More Even Groundwater Recharge – Before intervention, uplift was limited to a few areas though the area has even spread of waterbodies as LULC suggest, but post-intervention, groundwater levels have risen more uniformly. This suggests that the rejuvenation work has improved infiltration and distribution, which is beneficial for agriculture.
- Increased Groundwater Availability – The widespread uplift means more water is accessible for farming, reducing dependency on seasonal rainfall.

Other Effects:

- Subsidence in Water Bodies – This could indicate that water from lakes, ponds, or reservoirs is seeping into the surrounding groundwater system more than before. While this might contribute to groundwater recharge, it could also mean a reduction in surface water storage.
- Comparative Uplift – If the post-intervention uplift is lower than expected, it might suggest that the recharge system is not fully optimized, or that water is dispersing too quickly rather than accumulating in key areas.

Since this project is relatively new, with implementation completed in March 2024, and comparing with 2021, the high rainfall period, the expected results should be interpreted in this context. Given the project's early stage, it is not anticipated that significant improvements in groundwater levels will be immediately evident. However, as the rejuvenated ponds become more perennial, their ability to facilitate infiltration is expected to increase over time. Therefore, it is crucial to monitor the site continuously and on a timely basis to assess the project's progress and ensure efficient results.

Water Quality

The study evaluates the impact of water rejuvenation efforts, including desiltation of ponds and lakes, on both surface and groundwater quality. Water quality parameters from 2024 were analyzed for 5 surface water bodies (lakes and ponds), and comparative data from 2022 and 2024 were assessed for groundwater (deep wells and open wells). The key parameters considered include pH, Total Dissolved Solids (TDS), alkalinity, chloride, fluoride, nitrate, sulphate, total hardness, and residual chlorine.

Surface Water Quality Analysis (2024)

Surface water quality is influenced by local factors such as geology and land use. The surface water quality analysis focuses on five distinct water bodies within the study area, highlighting the variability in water characteristics across different types of water bodies. The data reveals the following:

Parameter	Acceptable Limit (IS 10500:2012)	Rejuvenated Pond- near open well	Additional Pond-Plain Bed	Large Lake	Trapezium-Shaped Rej. Pond	Temple Pond	Observation
Calcium (as Ca)	75 (desirable), 200 (max permissible)	55.5	10.6	8.1	35.1	30.2	Calcium levels vary significantly, with the highest concentration in the Rejuvenated Pond (55.5 mg/L) and the lowest in the Lake (8.1 mg/L), indicating differing geological influences or calcium inputs.
Fluoride	1.0 (desirable), 1.5 (max permissible)	0.04	0.99	0.05	0.03	0.04	Fluoride concentrations are within acceptable limits for all water bodies.
Total Hardness (as CaCO3)	200 (desirable), 600 (max permissible)	200	42	30	112	142	Total hardness ranges from 30 mg/L in the Lake (soft) to 200 mg/L in the Rejuvenated Pond (hard). High hardness levels likely due to calcium enrichment from sediment disturbance.
Potassium (K)	No defined limit	10.1	4.5	4.5	3.3	2.2	Potassium concentrations are relatively low across all sites.

Sodium (Na)	Less than 200	35.9	4.9	4.2	12.5	30.9	Sodium levels vary significantly, with the highest in the Rejuvenated Pond and lowest in the Large Lake.
Phosphate (as PO4)	Not specified, <0.1 (preferred)	0.07	0.11	0.19	0.08	0.02	Phosphate concentrations are low, but the highest level in the Large Lake (0.19 mg/L) is approaching the threshold for potential algal blooms. Long-term eutrophication is usually prevented below 0.05 ppm.
Total Dissolved Solids (TDS)	500 (desirable), 2000 (max permissible)	460	74	39	147	242	TDS levels vary widely, with the highest in the Rejuvenated Pond (460 mg/L) and the lowest in the Large Lake (39 mg/L).
Total Alkalinity (as CaCO3)	200 (desirable), 600 (max permissible)	130	76	32	98	120	Total alkalinity mirrors carbonate concentrations, contributing to buffering capacity.
Chloride (as Cl-)	250 (desirable), 1000 (max permissible)	79.4	7.1	4.2	18.4	56.7	Chloride concentrations are highest in the Rejuvenated Pond and Temple Pond, and lowest in the Additional Pond and Large Lake.
Electrical Conductivity (EC)	<1500 (general threshold for irrigation)	772	120.3	67.1	307	441	EC reflects the ionic content, with higher values in the Rejuvenated Pond (772 µS/cm).
Total Iron (as Fe)	0.3 (max permissible)	0	1.4	0.02	0.6	0	Total iron is detected only in the Plain Bed (1.4 mg/L) and Trapezium-Shaped Pond (0.6 mg/L), indicating the presence of iron-rich sediments or runoff.
Magnesium (as Mg)	30 (desirable), 100 (max permissible)	15.6	3.9	2.4	6.3	16.5	Magnesium levels are generally consistent, with slightly higher concentrations in the Rejuvenated Pond and Temple Pond.
pH	6.5 – 8.5 (Desirable), 6.0 - 9.0 (Permissible)	7.27	7.64	6.73	7.19	8.46	pH levels are generally neutral to slightly alkaline, with the Temple Pond exhibiting a more alkaline condition (pH 8.46), which may influence the solubility and bioavailability of other substances.
Sulphate (as SO4-)	200 (desirable), 400 (max permissible)	130	21	3	6	12	Sulphate concentrations are highest in the Rejuvenated Pond (130 mg/L) and relatively low in other water bodies, indicating spatial variation.

Remarks (for values highlighted in red)	Although possess Comparatively higher chemical levels, these levels lie within the permissible limit.	Though still within acceptable limits for drinking, it requires monitoring of Phosphate, fluoride and iron levels.	Locational and size parameters of the lake & pond attributes to potential and safe water quality. Phosphate (Lake) and Iron levels (Pond) to be monitored.	This pond possess safe and better water quality

Village level Ground Water Quality -Lab testing Data, JJM 2022 and 2024.

Parameter	Source	2022	2024	Detailed Observation
pH	Deep Wells	7.49	7.28	Slight decrease in pH indicates a marginal shift towards acidity. It still remains within the acceptable BIS range (6.5–8.5). This shift could be due to higher organic matter decomposition or changes in recharge quality.
	Open Wells	-	7.34	Nearly stable and within optimal range. No significant concern, though regular monitoring is advisable.
Total Dissolved Solids (TDS) (mg/L)	Deep Wells	770.19	1079.96	A substantial rise, exceeding the 1000 mg/L mark which is often considered the upper limit for palatability. This could indicate leaching of minerals from geological formations or contamination from anthropogenic sources.
	Open Wells	679.5	1093.29	A sharp increase pushing values beyond the desirable limit. Suggests increased dissolution due to water level fluctuation or potential pollution inputs.
Total Alkalinity (mg/L)	Deep Wells	255.25	218.15	Decrease suggests reduced buffering capacity, possibly due to dilution or changes in carbonate equilibrium. May influence how the water resists pH change.
	Open Wells	242	219.64	Minor decline. Indicates stable but slightly weakened buffering against acidification.
Nitrate (mg/L)	Deep Wells	20.38	18.51	Small but positive reduction. Possibly due to reduced nitrogen inputs or improved groundwater flushing.
	Open Wells	20.13	21.77	Mild increase, potentially from agricultural runoff or leakage from septic systems. Requires continued monitoring due to health concerns, especially for infants (Blue Baby Syndrome).
Chloride (mg/L)	Deep Wells	147.38	125.01	Moderate decrease may suggest reduced saline intrusion or improved recharge. Chloride remains below the permissible limit of 250 mg/L.
	Open Wells	120	111.31	A similar downward trend indicating potential benefits of rainwater recharge or decline in salt usage nearby.

Fluoride (mg/L)	Deep Wells	0.41	0.52	Slight increase but still well within safe limits (0.5–1.5 mg/L). May reflect natural geogenic sources or changing groundwater flow patterns.
	Open Wells	0.55	0.47	Decrease reflects a positive trend. Could be due to dilution or a shift in recharge source.
Total Hardness (mg/L)	Deep Wells	308.88	325.46	Increase suggests enhanced dissolution of calcium and magnesium-bearing minerals, leading to harder water. Still within the "very hard" category (>180 mg/L).
	Open Wells	264.25	305.44	Similar trend in open wells, possibly due to seasonal variations or geological interactions. Hard water may affect household appliances and soap effectiveness.
Sulphate (mg/L)	Deep Wells	64.13	170.68	A sharp increase, nearing or exceeding the desirable limit (200 mg/L). Could indicate oxidation of sulfide minerals or leaching from agricultural/industrial inputs. Investigation and preventive action are needed.
	Open Wells	42	160.97	Similar spike. This rise may lead to taste issues and potential laxative effects at high concentrations. Likely linked to anthropogenic or geogenic factors.
Free Residual Chlorine (mg/L)	Deep Wells	0.11	0.1	Slight reduction. May suggest increased organic load or changes in water treatment practices. Still meets disinfection requirement (>0.2 mg/L preferred for treated water).
	Open Wells	0.1	0.07	Continued decrease; may point to lower disinfection efficacy or higher chlorine demand. May warrant reassessment of chlorination protocols.

Conclusion

The rejuvenation project, including de-siltation of ponds and lakes, has had mixed impacts on water quality.

1. **Surface Water Samples:** The rejuvenated pond generally exhibits higher levels of calcium, carbonate, sodium, and total dissolved solids compared to the other surface water bodies. Kodangalur Lake shows the lowest levels of most parameters, while the Additional Pond has the highest fluoride concentration. These variations suggest differing environmental conditions and potential localized influences on water quality.
2. **Groundwater Quality Changes:**
    - The decrease in alkalinity and chloride indicates better water buffering and dilution effects. The significant rise in TDS and sulphate suggests leaching from disturbed sediments, likely due to rejuvenation works.
    - Increased hardness levels in groundwater suggest higher dissolution of calcium and magnesium post-desiltation.

Agricultural Impact

The increase in water availability has directly benefited agricultural activities in the region. The rejuvenated ponds provide a consistent water source for irrigation, supporting the cultivation of crops like paddy, groundnut, and vegetables. The improved irrigation range of 2 km (200 acres) has been a major benefit, allowing for the irrigation of a larger area and enabling multiple crop cycles per year. The ponds' capacity to retain water for extended periods has enabled farmers to grow water-intensive crops even during periods of low rainfall.
Farmers have adapted to the changing water availability by rotating crops and selecting drought-tolerant varieties. The intervention has facilitated sustainable farming practices and improved food security.

Overall conclusion

The water conservation and recharge efforts in Melkodangalur, Kodanallur Gram Panchayati, have been successful in improving both surface water retention and groundwater levels. The rejuvenation of ponds, de-siltation of water bodies, and the creation

of a connected water system have significantly enhanced water availability for domestic, agricultural, and livestock use. Water quality improvements and the expansion of irrigation coverage have benefited local farmers, who have adopted crop rotation and efficient water use practices. Continued monitoring and adaptive management will be essential to ensure the long-term sustainability of these interventions.

Recommendations

1. **Improve Filtration**: Enhance the filtration capacity of percolation tanks to reduce contamination from surface water.
2. **Monitor Surface Runoff**: Implement measures to control agricultural and industrial runoff entering water bodies.
3. **Fluoride Mitigation**: Install defluoridation units in areas with high fluoride levels.
4. **Continued Monitoring**: Regular monitoring of groundwater levels, water quality, and agricultural productivity should be conducted to assess the long-term effectiveness of the interventions.
5. **Water Efficiency**: Farmers should be encouraged to adopt water-efficient irrigation techniques such as drip irrigation and rainwater harvesting.
6. **Crop Planning**: Assistance should be provided to farmers for crop planning, focusing on water-efficient crops and better crop rotation practices.

Community Awareness: Promote awareness among local communities about the importance of water conservation and the sustainable use of water resources.

Identifiers in the case stories have been modified to maintain confidentiality.

Case story 1: Transforming Agriculture through the Rejuvenation of Melkodungalur Pond

Mr. Seenivasan, a 63-year-old resident of Kavadu village in the Thiruvannamalai district of Tamil Nadu, has spent his entire life farming his three-and-a-half acres of cultivable land. Like many farmers in the area, he relies heavily on the adjacent pond for irrigation. However, in all his years, the waterbody had never been desilted, and over time, its lack of maintenance severely impacted water availability. The shrinking water storage capacity meant that farmers like Mr. Seenivasan were forced to cultivate only low-water-requiring crops, such as groundnut, while limiting water-intensive crops like paddy to just one season a year.

In 2022-2023, Tata Capital Housing Finance Limited (TCHFL) launched a waterbody rejuvenation project in the village, implemented by the National Agro Foundation (NAF). The goal was to restore the pond to its original capacity, thereby increasing water availability for irrigation and household use, improving farmers' livelihoods, and promoting local biodiversity. This involved extensive desilting, deepening, and widening of the pond, along with the strengthening of its embankments.

Following the rejuvenation, the pond filled up for two consecutive years, with water now available year-round. This transformed the agricultural practices in the village, enabling farmers to cultivate paddy for two seasons and plant short-duration crops like groundnut during the third season. For Mr. Seenivasan, this meant cultivating paddy in the second season, yielding an impressive 19 quintals of paddy per acre. The increased water availability has significantly boosted the income of local farmers and improved their livelihoods.

The rejuvenation of the Melkodungalur pond has also had a wider environmental impact. Groundwater levels in the surrounding areas have risen, benefiting farmers who rely on wells and borewells for irrigation. More than 15 wells around the pond now have a steady supply of water, and 50 to 60 acres of previously uncultivable land are now fertile again, securing a sustainable future for over 20 farming households.

This initiative has not only increased agricultural productivity but also enhanced food security in the region. The project’s success stands as a testament to the importance of water conservation efforts in rural communities. The restoration of the Melkodungalur pond has revitalized the local ecosystem and provided a sustainable model for future water management initiatives. Farmers like Mr. Seenivasan now look forward to a more prosperous and resilient future, thanks to this transformative project.

Case story 2:

Guddi Vaishnav, a **25-year-old farmer from Sapla village in Kothakwada block, Jaipur**, has experienced a significant transformation in her agricultural practices through water rejuvenation efforts. Living with a family of **seven** and managing an annual income of **less than ₹1 lakh**.

The **water rejuvenation initiative** in her village provided her with **five carts of fertile silt**, which she effectively incorporated into her fields. The **village panchayat covered the carting cost**, making this support even more accessible. This intervention as she added has enhanced moisture retention and nutrient content of her otherwise barren land. Additionally, the **groundwater level rose by 20 feet**, ensuring better irrigation availability. These improvements led to about **30% increase in crop yield** and a **15% reduction in input costs per season**, as her reliance on chemical fertilizers decreased.

With healthier soil and improved water resources, Guddi has successfully **diversified her farming**. While she previously focused on traditional crops like **wheat and pearl millet**, she has now expanded into **vegetable farming**, growing **tomatoes, okra, and green chilies** on **1.5 acres** of her land. This shift has not only boosted her income but also improved her family's **nutritional intake**, ensuring access to fresh, homegrown vegetables.

Furthermore, the enhanced organic content in her soil has enabled her to **cut down urea usage by 50%**, leading to healthier crop production and further **reducing input costs by ₹3,000 per season**. This transition to sustainable farming has **increased her profits** while **minimizing environmental impact**, setting an example for other farmers in her community.

Chapter 5

Conclusion and Way Forward

The **Water Rejuvenation programme** aimed to enhance water sustainability and agricultural productivity through de-siltation and rejuvenation of water bodies. By increasing surface and groundwater levels, extending water availability, and improving soil quality, the program sought to ensure reliable access to water for drinking, irrigation, and livestock needs while fostering environmental and economic resilience in the community. A summary of our findings in a SWOT form and potential recommendations to enhance the effectiveness of the project going forward is presented in this section of the report.

Strengths:

- **Community-Centered Approach**: Addresses critical water and agricultural needs, directly benefiting drinking, irrigation, and livestock requirements.
- **Environmental Impact**: Enhances groundwater levels and improves soil quality, contributing to long-term environmental sustainability.
- **Holistic Focus**: Combines desiltation, water body rejuvenation, and sustainable practices to ensure multi-faceted outcomes.
- **Climate Resilience:** Strengthens the community's ability to withstand droughts and water scarcity due to climate change. The project is supported by a robust monitoring framework enabled by digital data collection through the AVNI app, ensuring effective oversight, tracking, and timely evaluation of progress and outcomes.

Weakness:

- The water body selection process in Jaipur could have been optimized to prioritize those with high-quality, fertile silt, maximizing agricultural benefits for farmers.
- Non-adherence to the pre-monsoon timeline impacted farmer participation in silt carting activities, as many had already completed field preparations before the activity could be initiated. (This remains relevant only to Jaipur since other locations didn't cart silt on farms)

Opportunity:

- **Scalability:** Successful implementation can serve as a model for other regions facing similar water and agricultural challenges.
- Stricter adherence to pre-monsoon timelines could have improved project efficiency and overall impact

.

Threat:

- None observed

Recommendations and way forward

- Further enhancing the water retention capacity of ponds and water bodies and ensuring water quality protection through regular cleaning and monitoring.
- Continued monitoring of water quality parameters especially fluoride and turbidity in identified locations
- Introduce organic farming practices to replace the use of chemical fertilizers and enhance the soil fertility in locations identified
- In locations where the water from the rejuvenated ponds are used for farming, efficient irrigation techniques can be explored as well as scientific crop planning and cultivation practices.
- Promotion of rainwater harvesting systems to complement storage capacity and ground water recharge
- Empower local stakeholders through capacity-building initiatives to maintain and manage rejuvenated structures effectively
- Continue to involve the community actively, ensuring that their needs and feedback remain central to the project's design and implementation. Promoting awareness among local communities regarding the importance of maintaining water bodies and preventing pollution.

Deloitte team in interaction with group of women beneficiaries from Jodhpur, Rajasthan

Deloitte team in interaction with group of women beneficiaries from Jaipur, Rajasthan

Annexure 1: Tools and Guidelines

JalAadhar WR tool

Annexure 2: Pictures from field

Jaipur

Rejuvenated Pond, at Sampla

Open well, at Sampla- for drinking and irrigation

FGD, at Sampla

Soil Collection in Sampla

Rejuvenated Pond, Shaligrampura

Open well near Rejuvenated Pond, Shaligrampura

FGD, Shaligrampura

Jodhpur

Gavayi Nadi, Benan

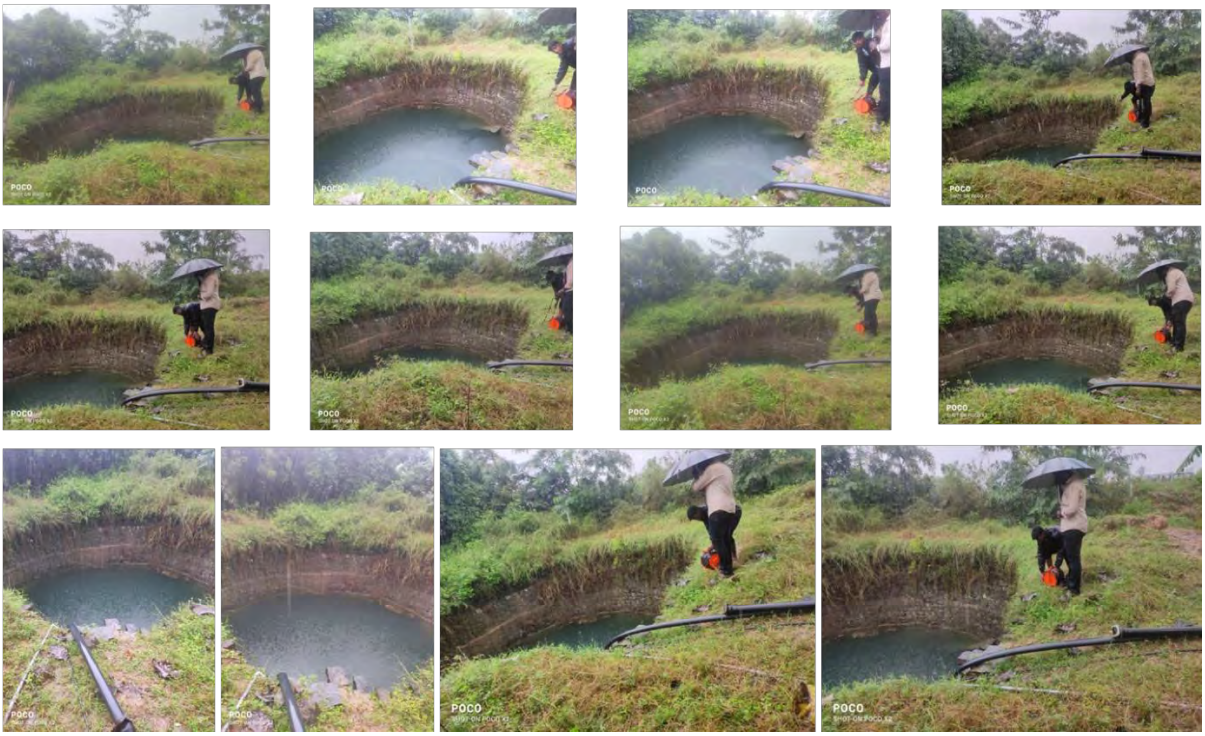
FGD, Gavayi Nadi, Benan

Pimpal Gavayi Nadi, Rampuriya

Rameshwar Talab, Ramasani

Rejuvenated Pond, Vimalpura

Openwell, Ammananpakkam



Kodanallur Lake -2km command area, Kodanallur.

Lake – measuring CWL on the ground reference

Lake – water sample collection

Lake – interacting with the beneficiary farmers, and the villagers

Note: Participant details from the survey and discussions have been withheld to maintain confidentiality and protect privacy.

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Impact Assessment Study

Cancer CELL (Care and Elixir for Life and Living)

Project funded by Tata Capital Housing Finance Limited (FY 2022 - 2023 Grant)

April 2025

Homi Bhabha Cancer Hospital, Sangrur (Punjab) | ***Source: Deloitte***

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Table of Contents

Executive Summary

Tata Capital Limited (TCL) is a prominent financial services company offering a wide range of solutions to cater to the diverse needs of its customers, including retail, corporate, and institutional clients. With a focus to provide innovative financial products and services in areas like loans, asset management, wealth management, and insurance; the company draws on a rich legacy of trust, ethics, and excellence to drive its business.

Thriving on the fundamental of giving in community building, Tata Capital's Corporate Social Responsibility (CSR) initiatives are built around a collaborative approach involving non-profit organizations, government agencies, and local communities. The company aims to address pressing social issues and contribute to society by supporting initiatives in education, healthcare, rural development, and environment.

TCL's wholly owned subsidiary - Tata Capital Housing Finance Limited (TCHFL) is registered with the National Housing Bank as a Housing Finance Company, offering long term funds for housing purposes.[1] It's Corporate Social Responsibility (CSR) vision is to establish a collaborative and inclusive approach for social and environmental development initiatives, fostering shared value for the broader community, aligned with the core purpose of the Tata Group.

The Cancer CELL (Care and Elixir for Life and Living) programme funded by TCHFL addresses the challenge of accessibility, affordability, and availability of quality healthcare treatment for Cancer through credible institutions on the ground. The programme was initiated in the year 2014 and has impacted the marginalised communities across states of Maharashtra, Uttar Pradesh, and Punjab.

Scope and Objective of the impact assessment:

As a part of the engagement with Tata Capital Housing Finance Limited (TCHFL), Deloitte conducted an Impact assessment of the **"Cancer CELL" programme** funded from CSR grants for the financial year 2022 – 2023. The programme is implemented through the partner **Homi Bhabha Cancer Hospital and Research Centre (HBCH and RC), A unit of Tata Memorial Centre (TMC) in Punjab.**

The HBCH and RC at Punjab runs 2 facilities in the cities of Sangrur and Mullanpur, New Chandigarh. However, the scope of this impact assessment is limited to the facility in Sangrur.

TCHFL enabled CSR financial support to HBCH and RC at Punjab in FY 2022-23 in two categories presented in the below table.

Table 1: Support enabled through TCHFL CSR grant

	Support Description	Grant (INR)
1)	**Cashless treatment** in the form of patient welfare fund to 203 patients	59,82,400
2)	**Medical and surgical equipment** for use at HBCH, Punjab including:	
	3D Vision Laparoscopic Cart for advanced surgeries – 01 Nos	74,50,000
	Semi Motorised Fowler Beds – 50 Nos	7,90,600
	Total	1,42,23,000

[1] Tata Capital Housing Finance Website I Accessed on 18th December 2024 | https://www.tatacapital.com/tchfl/about-us.html

The high-level objectives of this impact assessment are as follows:

- To study the project proposal, MoU extracts, project programmatic and financial reports to understand the program intervention and conduct stakeholder mapping.
- To design the study methodology, tools and guidelines for data collection based on the parameters of impact identified through the document review and initiate structured interactions with key stakeholders of Tata Capital Limited, Tata Capital Housing Finance Limited and the Implementation Partner.
- To conduct a planned field level data collection and documentation of observations and case stories through facility visits and stakeholder interactions.
- Data collation and analysis of the inputs, processes, outputs, outcomes, impact parameters and model of implementation, as well as determining the strengths and weaknesses of the CSR initiatives.
- Determining the direct/indirect impact of the CSR initiatives on the lives of the target beneficiaries and communities, pertaining to the project.
- Suggesting potential way forward to strengthen the CSR initiative.

Sampling and Data collection:

The primary beneficiaries of the Cancer CELL program at Sangrur were cancer patients, next of kin and staff at the HBCH and the secondary beneficiaries were the program teams at TCL, TCHFL and the implementation and finance team at HBCH. A purposive sampling methodology was used to cover all key stakeholders of the program and to enable data triangulation.

41 stakeholders were interviewed via in -person and virtual interactions during the research at Homi Bhabha Cancer Hospital, Sangrur. This includes the patients, next of kins who were provided access to cashless healthcare treatment through the TCHFL grant, few others who visited the facility for the first time, healthcare staff including doctors, nursing and administrative teams and, program teams at TCL/TCHFL were consulted during the study.

The sample size included a mix of male and female patient groups within the age group of 23 years up to 80 years of age. Over 40% respondents resided in Punjab followed by 20% from Haryana and the rest from other states in the north region.

Table 2: A snapshot of stakeholder groups interviewed during the research is presented below.

Primary Stakeholders (34)				
Patients part of the TCHFL grant		**Patients not part of the TCHFL grant**		**Hospital staff**
20		**5**		**9**
Patients interacted directly over the phone	Next of kin of patients	Patients interacted in-person	Next of kin of patient interacted in-person	Doctors, Nursing & Admin staff
2	18	2	3	9

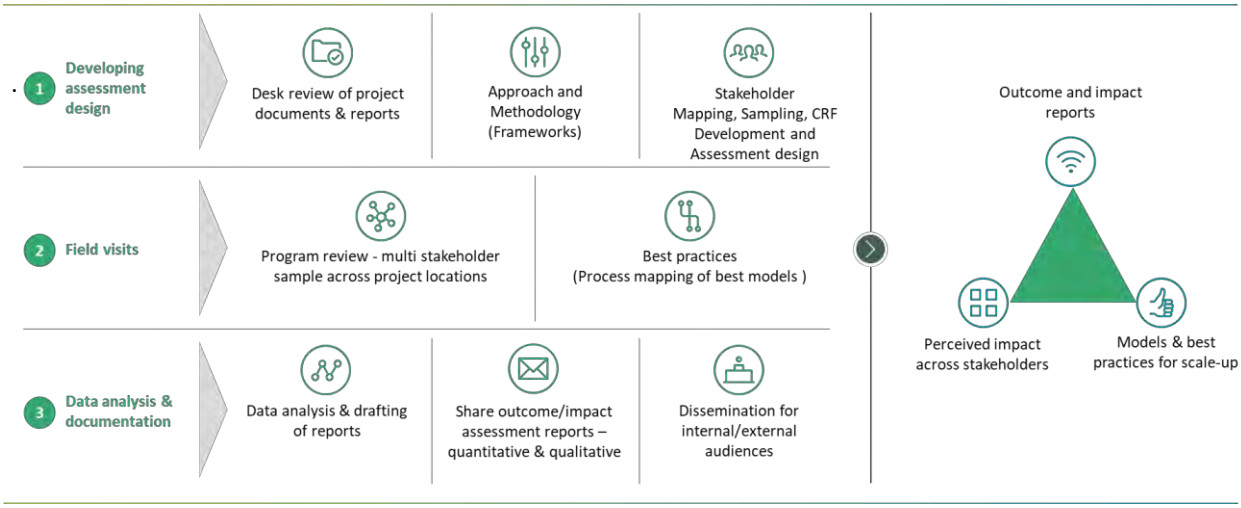
Secondary Stakeholders (7)	
TCL and TCHFL Project Team	
2	
Program Implementation and Grant Management (Head and accounts team)	
4	
HBCH Sangrur	HBCH New Chandigarh
Director	1

The data for the impact assessment was collected by using customised data collection tools and interactions with the patients, healthcare staff and implementation team. The data collection was followed by a phase of analysis and documentation of observations and findings.

Approach and Methodology:

Deloitte's customized approach for evaluating the impact of TCHFL's funded CSR projects was built on extensive experience in conducting similar evaluations. A mixed-method assessment design was utilized, primarily focusing on primary data collection through in-person interactions and telephone interviews, which was further complemented and cross-verified with relevant secondary data and available insights.

Illustration 1: Methodology adopted for the study.



The evaluation design based on OECD's Development Assistance Committee (DAC) and UNDP's Result Based Management (RBM) frameworks has been adapted to assess the project and obtain information on the research questions, Common Results Framework and KPIs framed based on the same (further elaborated in Chapter 2 – Approach and Methodology).

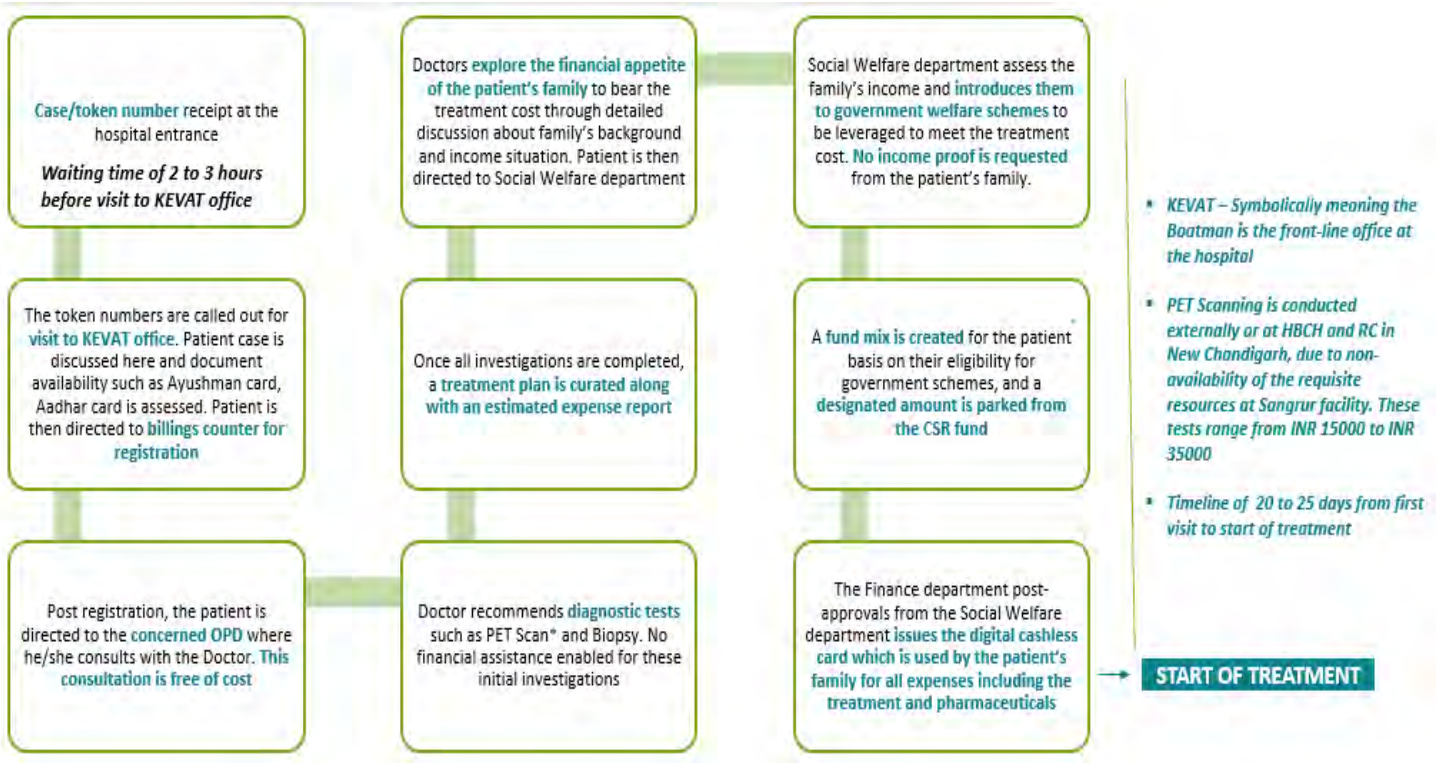
Summary of findings:

The below illustration captures the journey of a patient in the Cancer CELL project. The details of processes under each step are detailed out in the Intervention model and process review section under Chapter 1: Introduction in the below report.

Illustration 2: Intervention model adopted for provision of services to cancer cases at HBCH, Sangrur

Step 1 Patient outreach	Step 2 Patient registration	Step 3 Initial diagnostics investigations
Step 4 Treatment Plan	**Step 5 Financial assistance**	**Step 6 Start of Treatment**

Findings from the study also capture patient's journey at HBCH from the first day of visit to start of treatment, which is presented below.



The current report presents a detailed documentation of Deloitte's observations and findings of the impact assessment study of the Cancer CELL programme implemented by HBCH in Sangrur, Punjab**.** A summary of the findings is presented in table 3 below, while the elaborate documentation is available in Chapter 3.

Project	Investment and Project Overview	Outreach
Cancer CELL (Care and Elixir for Life and Living) **Locations:** Sangrur, Punjab	• Project investment of **INR 1.42 Cr** during FY 2022-23 • The project aimed at providing infrastructure/equipment support and financial assistance to patient groups with limited resources for treatment of Cancer, enabling access to state-of-the-art infrastructure and medical equipment for robust treatment	• 203 patients from economically marginalised sections of the country provided with cashless treatment support • 80 patient groups benefitted each day by leveraging the semi-motorised beds at the Day care ward • 200 patients underwent the surgical procedure for Cancer using the 3D vision laparoscopic machine each year since December 2022 • Patient groups majorly are residents of Punjab, followed by Haryana, Uttar Pradesh, and Delhi states
Relevance/need for project: 	• According to the report published by the National Cancer Registry Programme in India, the estimated number of cases of cancer in India in the year 2022 was found to be 1.46 Mn[2]. The incidence of cancer cases is expected to increase by 12.8% in 2025 as compared to 2020. With the continuing increase, it becomes imperative for the medical institutions to cater to the number of cases and provide robust cancer care. • The fear and trauma associated with the illness is coupled with a high-cost extensive treatment which may range from approximately INR 5 Lakh to INR 20 Lakh at a private run hospital. The similar treatment at a Government run facility shall be relatively lower in cost, however, comes with a set of infrastructural challenges. To bridge this gap and support the government infrastructure, TMC initiated the cancer care programme to enable financial support for marginalised sections. With its network of many hub and spoke cancer hospitals including the HBCH in Sangrur, the aim is to increase the outreach and provide comprehensive cancer care at affordable cost.	
Uptake and usage: 	• HBCH is strategically located at a tier II city with proximity to Bathinda (95 Kms) and Patiala (60 Kms) in Punjab. With good connectivity, the hospital sees a high footfall of patients coming from the entire northern region including states of Uttar Pradesh, Haryana, Himachal Pradesh, and Jammu & Kashmir. • Majority of the patient groups hail from rural to peri-urban regions including villages within 8 to 12 Kms from Sangrur, followed by nearby states. • The administration team at HBCH purposefully does not seek for income evidence certificates from patient groups, to arrive at their eligibility for financial support. This is done in an endeavour to ensure fair opportunity to avail treatment support. The financial appetite is gauged through interactions with patients. It is largely	

[2] Indian Journal of Medical Research | Accessed on 18th December 2024 | https://journals.lww.com/ijmr/fulltext/2022/10000/cancer_incidence_estimates_for_2022projection.6.aspx

	observed that income levels for the patient's family is in the range of INR 1,50,000 to 4,00,000 annually. • A digital cashless card, credited with a pre-decided amount is provided to all patient groups to incur medical expenses during the treatment time at HBCH. The study indicated that, in cases of over 15% of the interview respondents where the patient has passed away, there remains unspent values of up to INR 20,000 in their digital cashless cards. As per the finance team at HBCH, the consolidation for unspent amount takes place annually. However, with an aim to strengthen grant efficiency and use, it is required to consolidate the unspent fund lying idle in the cards at more regular intervals. This shall improve the grant utilisation for new set of patient groups or aid existing patient groups with added financial support. • Hospital resources such as medicine stock at the pharmacy, and adequate manpower at front line office are essential for effective implementation on ground. Review findings indicate procedural and infrastructural gaps at these focal points. Please refer Chapter 4 of the report for detailed findings.
Efficiency and Convergence 	• The implementation model for financial assistance at HBCH is well synergized with the government health welfare schemes – Ayushman Bharat and Mukh Mantri Cancer Rahat Scheme[3]. Over 80% of the interview respondents leveraged the government welfare scheme along with the support provided by TCHFL. • The grant did not observe any mid treatment abandonment case. This was observed during the review of the centralized patient management information system maintained at HBCH, Sangrur.
Impact created: 	• **Accessible and affordable comprehensive cancer care**: TMC operates on a mission to provide comprehensive Cancer care to one and all, emphasizing the need for equal access and opportunity. This fundamental translates to HBCH way of operations as well, resulting in a provision of cashless treatment for patients in need. • **Building a sensitized community**: With mechanisms for early diagnosis and timely treatment plan for patients, the programme is also contributing to building a community of individuals with adequate awareness and knowledge on the various aspects of the illness. This is required to ensure prompt actions and eradicating the fear associated with Cancer. • **Improved resource optimisation due to cost savings and reduced OOP (Out of pocket expenses):** The average cost savings of up to INR 30,000 is observed through support from TCHFL grant. These savings are ploughed back to sustain other needs of the family. Since the project beneficiaries hail from middle income to lower income backgrounds, the financial aid is an opportunity for improved resource optimisation and investing in other critical areas of life.
Sustainability: 	• The TCHFL grant provided to HBCH unfolds the potential for future grant avenues supporting the healthcare institution, and further enhance the scope for continued financial backing. • Reduced financial burdens for the patient's family enables them to invest their resources in other crucial areas of life such as education, securing future requirements. • 3D Vision laparoscopic machine provided as part of the grant assures precision surgery leading to improved outcomes of the treatment and enhanced quality of life for the patient groups.

[3] Ayushman Bharat Digital Mission | Accessed on 16th December 2024 | https://abdm.gov.in/
Mukh Mantri Punjab Cancer Rahat Kosh | Accessed on 16th December 2024 | https://mmpcrk.gov.in/

- Semi-motorized beds provided for everyday care of patient groups strengthens the physical infrastructure at HBCH. This infrastructure is maintained and utilized over span of years.
- While there exists a government welfare program for Cancer assistance, additional support in terms of financial assistance is critical for cancer patients with little to no income sources. The assistance is required to cover for the cost extensive treatment and medication expenses during the entire treatment journey, which may span beyond a year in many cases. Without continuous support, the program may not be able to fully sustain cashless procedures.

Recommendations for way forward:

- **Increase the number of manpower managing the KEVAT office operations and at Department of Social Welfare:** HBCH has been recommended to strengthen the manpower resources at these focal points since they are largely responsible for guiding the patient groups onto the right financial support. In absence of adequate guidance, patients are left with limited awareness on the subject and therefore may overlook the financial support.
- **Consolidating the unspent funds in digital cashless card:** During the review process, the central MIS indicated on unspent funds lying idle in the cashless cards. These funds are idle in a scenario where patients have completed treatment or passed away. The consolidation for all unspent fund happens at the end of the year post consultation with the doctors, assessing patient's condition and requisite approvals from the HBCH Director. It is recommended to do the consolidation at a quarterly or bi-annual level, which may create financial avenues for use by other patients.
- **Introduce requisite medical investigative equipment and medications at the pharmacy:** PET scan is one of the crucial initial investigations required for Cancer diagnosis. In lieu of non-availability of this facility at HBCH Sangrur, it often adds to the inconvenience of travel to other healthcare facilities to undergo the test. Similar instances observed for non-availability of all the required medications at the pharmacy. Introduction of all these facilities shall further strengthen the treatment process and minimise inefficiency.

Patient's attendants at the Ayushman Counter at HBCH, Sangrur for registration on the Government portal / ***Source: Deloitte***

CHAPTER 1

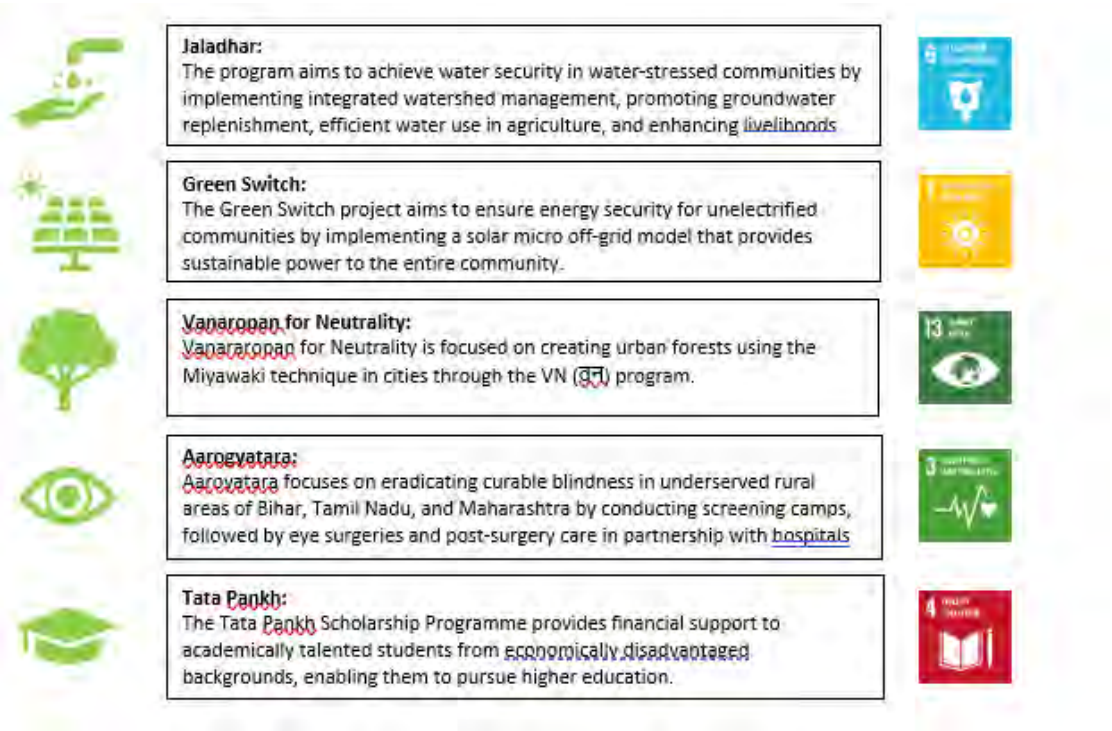
Introduction

1.1 About Tata Capital Limited and Tata Capital Housing Finance Limited

Tata Capital Limited ("TCL"), is the TATA Group's flagship Non-Banking Financial Company (NBFC) company engaged in providing/supplying a wide array of services/products in the financial services sector and operates across various areas of business: Commercial Finance, Consumer Loans, Wealth Services and distribution and marketing of Tata Cards.

TCL's wholly owned subsidiary - Tata Capital Housing Finance Limited (TCHFL) is registered with the National Housing Bank as a Housing Finance Company, offering long term funds for housing purposes.

In the true lineage of the Tata Group of Companies, and aligned to its vision of establishing a collaborative and inclusive approach for social and environmental development initiatives, fostering shared value for the broader community; Tata Capital continues to generate long-term, measurable, and positive impact through projects within the thematic areas mentioned below in Illustration 3:



Tata Capital's CSR focus areas with key flagship projects aligned with Sustainable Development Goals

1.2 About Cancer CELL Programme

Table 4: About the project

Project title	Cancer CELL (**Care and Elixir for Life and Living)**
Project overview	The project was launched with a greater purpose to reach the under privileged community who battle the illness of Cancer with limited or no access to quality care and support. This intervention aims to provide robust cancer care support through the network of Tata Memorial Centre in the form of patient welfare and medical infrastructure aid.
Review period	1st December 2022 to 31st March 2023
Client grant	INR 1,42,23,000
Project location	Punjab
About the implementing agency/partner	Tata Memorial Centre, a grant in aid institution under the guidance and support of the Department of Atomic Energy delivers evidence-based cancer care to all sections of society through its network hospitals PAN India. The implementing partner for the said project is **Homi Bhabha Cancer Hospital and Research Centre (HBCH/RC)** in Punjab. HBCH/RC is a comprehensive cancer hospital with 130 bedded infrastructure, houses Department of medical and surgical oncology, preventive oncology, radio diagnosis and imaging, physiotherapy, and rehabilitation services among other facilities. It has catered to over 50,000+ beneficiaries since its establishment in the year 2015.

TCHFL's CSR Support to Homi Bhabha Cancer Hospital and Research Centre (HBCH and RC), Punjab

Table 5: TCHFL enabled CSR support to HBCH and RC in FY 2022-23 in two categories –

	Support Description	Grant (INR)
1)	**Cashless treatment** in the form of patient welfare fund to 203 patients	59,82,400
2)	**Medical and surgical equipment** for use at HBCH, Punjab including:	
	3D Vision Laparoscopic Cart for advanced surgeries – 01 Nos	74,50,000
	Semi Motorised Fowler Beds – 50 Nos	7,90,600
	Total	1,42,23,000

Overall Project outreach

203 patient representations from 07 states & 3 UTs

203 patients supported with financial assistance at HBCH, Sangrur

200 patients supported every year through 3D vision laparoscopic surgery at HBCH & RC, Chandigarh

80 patients supported per day through semi-motorised beds installed at HBCH, Sangrur

42 medical practitioners, 15 researchers & 117 nursing staff leveraging the medical equipment for advanced surgical procedures.

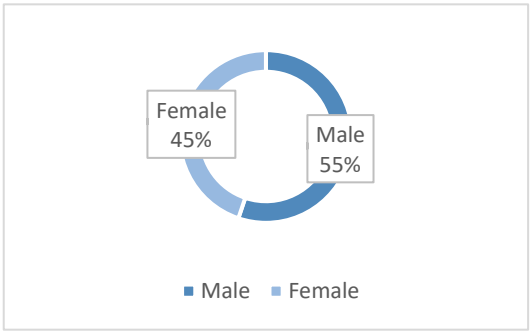
Beneficiary representation state wise

**Map not to scale*

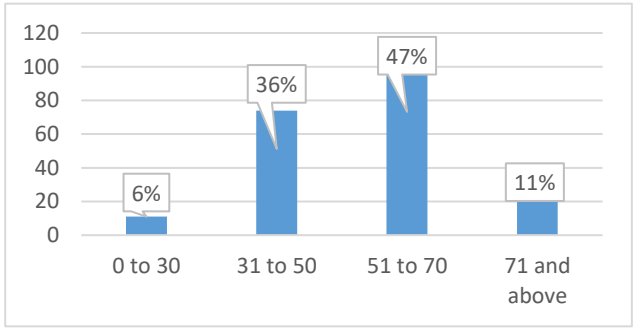
Overall Patient profile

Illustration 5: Analysis of patient profiling and demographics

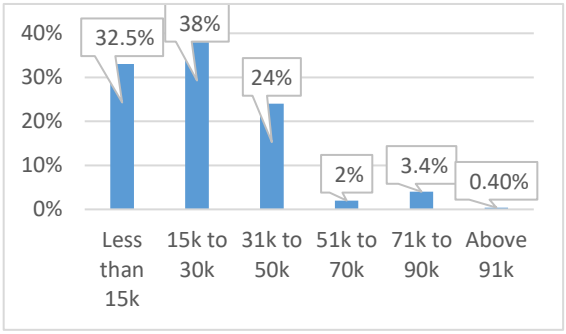
Gender Split (N=203)



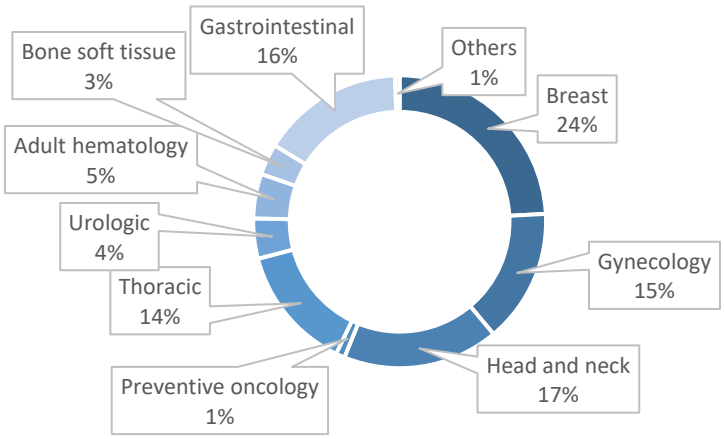
Age Group (N=203)



Number of patients received financial aid from TCHFL (N=203)



Disease Management Group (N=203)



Hospital profile

HBCH Sangrur is a 130 bedded facility spread across 5 acres offering the following set of key facilities.

Table 6: Departments and Facilities at HBCH Sangrur

1.	**Department of Surgical Oncology and Head & Neck Oncology**	**8.**	**Physiotherapy and Rehabilitation Services**
2.	**Department of Medical Oncology**	**9.**	**Department of Dietetics and Nutrition**
3.	**Department of Radiation Oncology**	**10.**	**Dispensary**
4.	**Department of Radio-Diagnosis and Imaging**	**11.**	**Department of Information Technology**
5.	**Department of Anaesthesiology, Pain & Critical care**	**12.**	**Administrative Departments (Admin, Accounts, Stores, Purchase, HRD)**
6.	**Department of Pathology and Laboratory Services**	**13.**	**Academics**
7.	**Department of Preventive Oncology**	**14.**	**Others**

Education

HBCH Sangrur is running various paramedical B. Sc. Degree and certificate courses in affiliation with Baba Farid University of Health Sciences, Faridkot (Punjab). These courses are listed below in Table 7:

1.	**B.Sc. Medical Lab Technology**	**6.**	**Six month certificate courses in Laboratory, Radiology and Pharmacy**
2.	**B.Sc. Radiotherapy Technology**	**7.**	**Training for Nursing students**
3.	**B.Sc. Anesthesia Technology**	**8.**	**M.Sc. Histpopathalogy**
4.	**B.Sc. Operation Theatre technology**	**9.**	**Regularly conducting CME, Patient contact programmes**
5.	**B.Sc. Medical Radiography & Imaging Technology**	**10.**	**Good Peripherally Inserted Central Catheter training for nurses**

Dharamshala

The administration at HBCH has set up a Dharamshala within the premise of the hospital for stay option for the patient family members.

Pharmacy

HBCH Sangrur houses a 24 x 7 pharmacy where all surgical, chemotherapeutic items and other consumables are available at subsidised rates.

Pharmacy at HBCH Sangrur | ***Source: Deloitte***

Intervention Model and Process Mapping

HBCH has established itself as a renowned and credible hospital offering a range of comprehensive facilities for cancer care to its beneficiaries. The average patient intake in a day at HBCH, Sangrur is 300 to 400 patients with complex illness stages. While the facility offers cashless support to the needy, there is also a provision of paid consultation for individuals who are capable to pay INR 900 and receive access to faster line of treatment. The below process captures the journey of a patient from initial outreach, registrations, financial assistance to the course of treatment.

Illustration 6: Intervention model adopted for provision of services to cancer cases at HBCH, Sangrur

Step 1 **Patient outreach**	**Step 2** **Patient registration**	**Step 3** **Initial investigations**
Step 4 **Treatment Plan**	**Step 5** **Financial assistance**	**Step 6** **Start of Treatment**

Table 8: Process mapping

Process Steps	Details
Step 1: Patient outreach	• Patient outreach at HBCH is done via the preventive oncology department which sets up awareness camps in nearby villages to assess early symptoms and sensitize the community. Another crucial outreach is through the positive word of mouth by previous year's patient groups
Step 2 & 3: Patient registration & Initial Investigations	• Patients come to HBCH, Sangrur and meet the security personnel who guides them to **initiate a case/token number receipt** at the entrance • Number by number, the tokens are called out and the concerned patient is called in at the KEVAT office. KEVAT – Symbolically meaning the Boatman is the **front-line office where the patient is guided to the next step in the treatment journey. Here the case is discussed, document availability such as Ayushman card, Aadhar card is explored** and accordingly, the patient is guided to the billings counter for patient registration • Post registration, the patient is **directed to the concerned OPD** where interactions with the Doctor begins. **This consultation is free of cost** • The Doctor recommends a few **initial diagnostic tests** such as PET Scan and Biopsy. PET Scanning is conducted externally or at HBCH and RC in Chandigarh, due to non-availability of the requisite resources at Sangrur facility. These tests range from INR 15,000 to INR 35,000. **There is no financial assistance enabled for these initial investigations**
Step 4: Treatment plan	• Once all investigations are completed, a **treatment plan is curated** for the patient by the Joint Clinic. This is the team of doctors who finalize the course of action and **communicates with the patient/next of kin** • At this point, the joint clinic prepares an **estimated expense report and explores the financial appetite of the patient's family to bear the treatment cost through detailed discussion about family's background and income situation.** Post discussion, the patient is directed to the Social Welfare department
Step 5: Financial assistance	• The team at **Social Welfare department** assess the family's income and **introduces them to multiple government schemes** to be potentially leveraged to meet the treatment cost. **No income proof is requested** from the patient's family. • **Ayushman Bharat and Mukh Mantri Cancer Rahat Scheme** are the two key supports along with CSR grants. The eligibility process for Ayushman Bharat schemed takes into

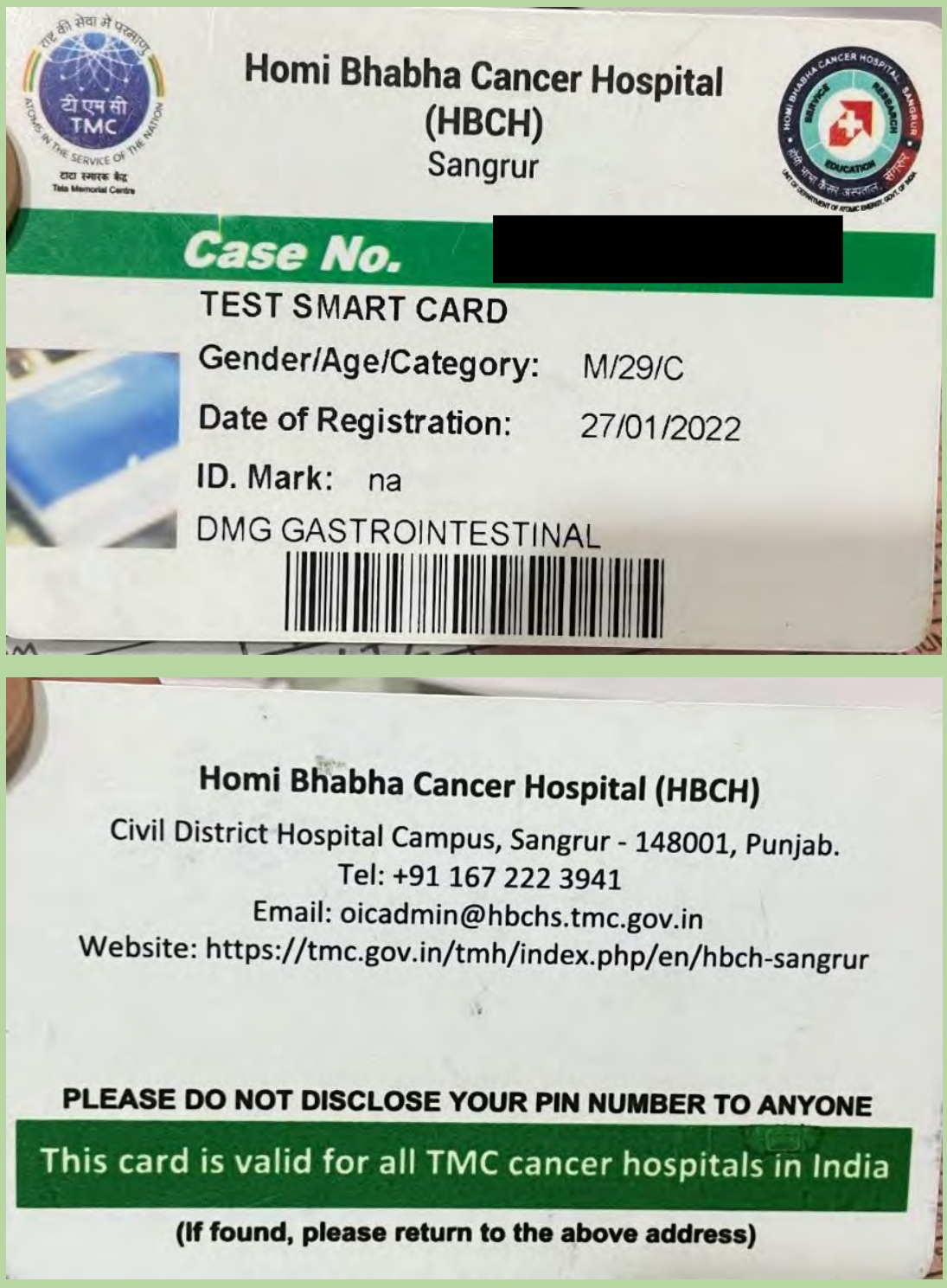
	consideration the deprivation criteria, while for the Mukh Mantri Cancer Rahat Scheme, no income proof documents are requested during application process[4] • There is a dedicated team managing the registrations of patients on the Ayushman Bharat portal and Mukh Mantri scheme. **A fund mix is created** for the patient basis on their eligibility, and a certain amount is parked to be provided from the CSR grant • The Finance department post-approvals from the Social Welfare department issues the **CASHLESS card** which can then be used by the patient's family for all **expenses including the treatment and pharmaceuticals**
Step 6: Start of treatment	• Patient starts to go undergo the treatment which may **last upto 10 months to 3 years basis the stage of illness**. Majorly, the **process for treatment is channeled through 3 routes which is Surgery for removal of the malignancy, followed by radiotherapy and chemotherapy sessions as required to cure the illness** • The number of **chemotherapy sittings may range from 8 to 16**, depending on the nature and stage of the illness of the patient. One chemotherapy session requires 3 to 4 hours at the day care ward, which is repeated in another 14 days • The advanced stage of the illness termed as **Stage 4** spreads faster than lower grade tumors. Patients battling this level of illness are often **treated under Palliative Care**. • Majority of patients who received support through the **TCHFL grant are under the curative care with rare cases in palliative care** • Once the patient starts to undergo treatment, their entire medical records are uploaded on an **internal MIS platform** designed by the HBCH team. This platform becomes the one point stop for tracking patient's health status, last visit to the hospital, grant used and follow up steps suggested by the doctors

Programme Branding

Being a government run facility, HBCH does not have a provision of marketing budget for advertisements and campaigning. However, they have in-house public relations team which is responsible for showcasing the body of work in media and other communication channels. Largely, print media is leveraged to communicate on hospital initiatives, awareness on outreach camps, introduction of welfare schemes and events organised. Snapshots of news pieces are presented in the annexure of the report.

Additionally, the CSR grants received at HBCH are branded internally by tagging donor logo along with capital assets provided as part of project. In case of TCHFL grant, the same has not been executed upon special request from the donor team.

[4] Ayushman Bharat Deprivation criteria | Accessed on 23rd December 2024 | https://nha.gov.in/PM-JAY



*Digital cashless card issued to patients at HBCH, Sangrur | **Source: Deloitte***

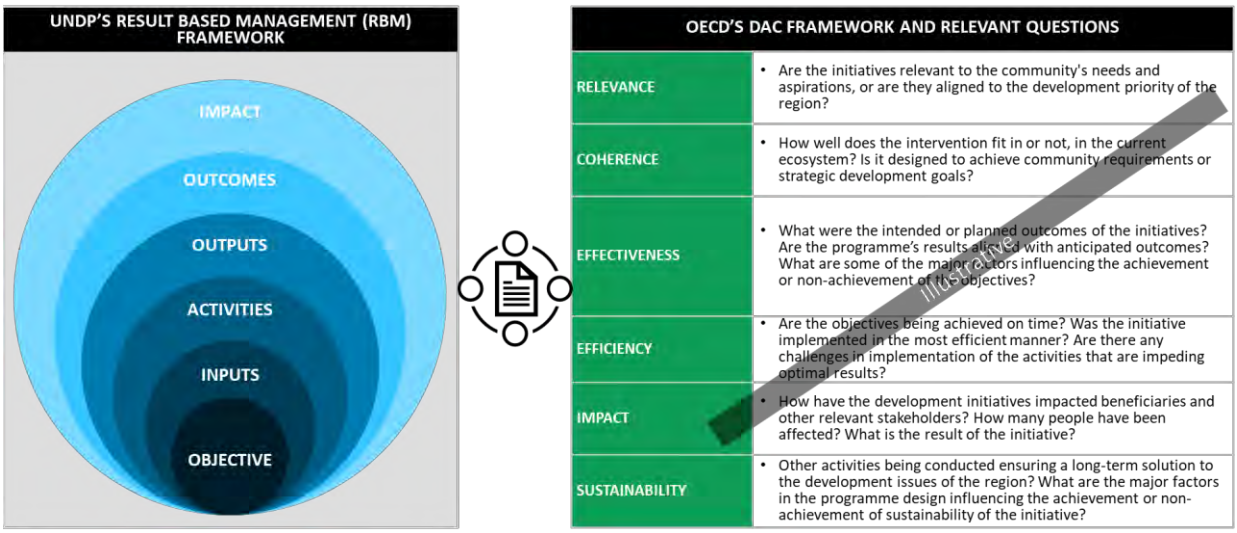
Approach and methodology

Deloitte's customized approach for evaluating the impact of TCHFL's funded CSR projects and identifying potential areas for future intervention was built on extensive experience in conducting similar evaluations. A mixed-method assessment design was utilized, primarily focusing on primary data collection through in-person interactions and telephone interviews, which was further complemented and cross-verified with relevant secondary data and available insights.

Illustration 7: Methodology adopted for programme study

The evaluation design based on OECD's Development Assistance Committee (DAC) and UNDP's Result Based Management (RBM) frameworks has been adapted to assess the project and obtain information on the research questions, Common Results Framework and KPIs framed based on the same.

Illustration 8: OECD's Development Assistance Committee framework leveraged to design the methodology



Key Enquiry Areas

Based on the program design, following indicative areas of enquiry were identified and data collection tools were developed in accordance:

Relevance

- What is the cancer incidence in the region? And what is the period of support to the implementing partner?
- What is the outreach mechanism followed by the implementing partner, and geography radius from Punjab and nearby states?
- Who are the key stakeholders responsible for ensuring robust cancer care to patient groups at HBCH?

Coherence

- What are the components of care and support extended to the patient beneficiary group at HBCH?
- How has the TCL support aided the vision of TMC and HBCH in providing accessible and affordable quality care to the beneficiaries?
- What is the typical timeline for the patient's treatment?
- What are the various government welfare schemes aligned the program vision? Explore synergies
- How much of financial assistance is provided to each patient and, what is the criteria for eligibility?
- How does the patient journey evolve at each step of the treatment?

Effectiveness

- What is the usage of the medical equipment provided for tertiary care of patients? How is the experience and does it add value to the patient care?
- How is the financial assistance helping reduce financial burdens?

Efficiency

- What is the waiting time involved at each step?
- What are indicative cost savings per patient through the support received from TCHFL grant?
- What are internal process and components involved for patient care and support?

Impact

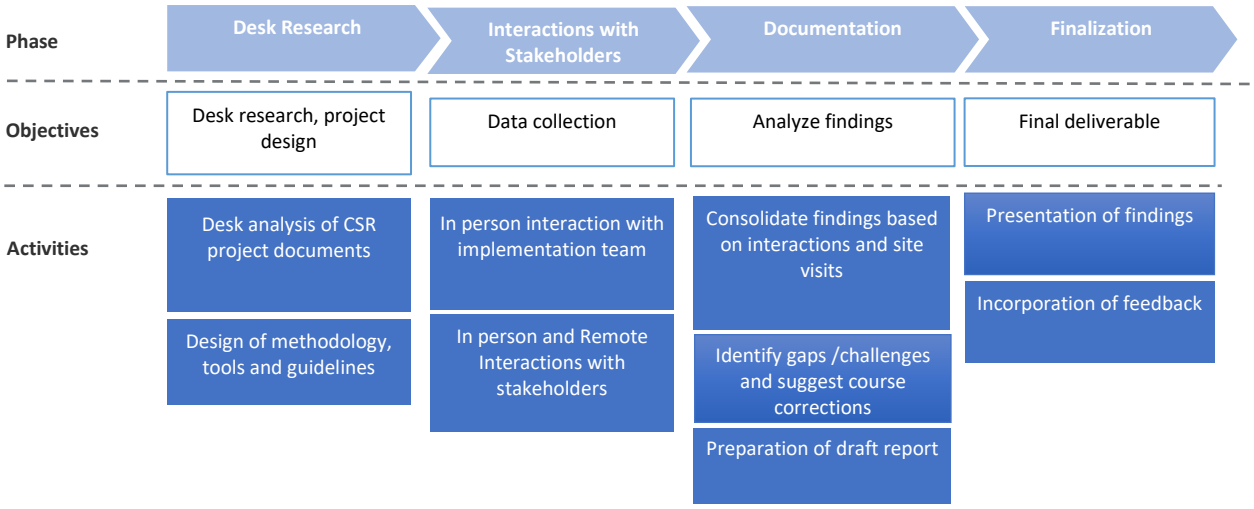
- What kind of an impact is observed in the lives of patients who are provided financial assistance? How has been their experience of the treatment at HBCH?
- How is the programme performing in terms of Accessibility, Affordability and Availability

Sustainability

- What is the significance for continued support to the patient groups?
- What are the potential opportunity areas to strengthen the program and improve patient experience at HBCH?

Programmatic review

The programmatic review and impact assessment of the CSR intervention was executed in a phased manner. The four main phases are outlined below in Illustration 9:



KPIs along UNDP's Results Based Management (RBM) framework for monitoring were developed and used as the basis for the programmatic review. Both primary and secondary project related data was reviewed to gain a holistic understanding of the implementation model and outcomes.

INPUTS

- Grant received from TCHFL
- Implementation team at HBCH, Sangrur
- Finance team at HBCH, Fund raising cell
- Central and State government welfare schemes

PROCESSES

- Outreach towards patients from socio-economically weaker sections of the society
- Patient registration process
- Initial Investigations/diagnostics
- Financial assistance and cashless treatment initiated
- Patient undergoes treatment
- Treatment completion and follow ups

OUTPUTS

- Number of patients supported through patient welfare fund
- Number of patients receive access to advanced medical treatment
- Number of healthcare staff receive access to advanced surgical equipment's for quality patient care

OUTCOMES AND IMPACT

- Increased access to well qualified and experienced medical practitioners leading to quality care and treatment
- Increase in number of patients receiving prompt and affordable cancer care across rural remote locations
- Increased family wellbeing and reduced financial burdens
- Building a community of sensitized individuals on the illness and its early diagnosis

Illustration 10: Common Results Framework for the Cancer CELL

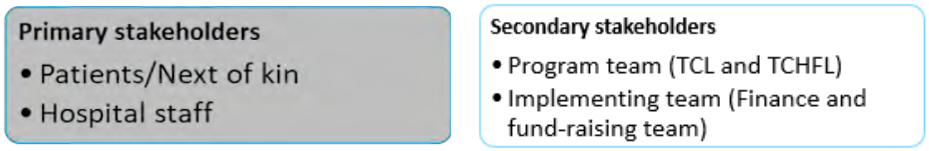
(Detailed further in Chapter 3 Programmatic Findings)

Desk Review

A thorough review of the documents made available by the implementing partner and the funder was conducted, including the information available on the project in the public domain to build a comprehensive understanding of the process and design the assessment tools accordingly. Following documents were reviewed as a part of the desk review process:

- Memorandum of Understanding (MoU) signed for the FY 2022-23
- Annual project progress report submitted to funder
- Fund utilisation report
- Patient medical data and profiling on the centralised HBCH MIS
- Patient registration forms

Stakeholder mapping



Sampling plan and Tools used for the study

The primary beneficiaries of the Cancer CELL program were cancer patients, next of kin and staff at the HBCH and the secondary beneficiaries were the program teams at Tata Capital Limited, Tata Capital housing Finance Limited and the program and finance team at HBCH. Considering the nature of the illness it was prudently decided that we would speak with beneficiaries who consented to being interviewed after being briefed on the objective of the study. Careful consideration was taken to ensure that the personal identifiers of the beneficiaries interacted with was kept anonymous throughout the study including this report. A purposive sampling methodology was used to cover all key stakeholders of the program and to enable data triangulation. A comprehensive research tool was curated for the study and leveraged for interactions with primary and secondary stakeholder groups. Data insights were largely captured via in-person visit to HBCH Sangrur and meetings with the project implementation team. A combination of in-person interviews and telephonic interactions were conducted with primary and secondary stakeholders to assess the outcomes and impact generated through the grant assistance.

Table 9: Sampling plan

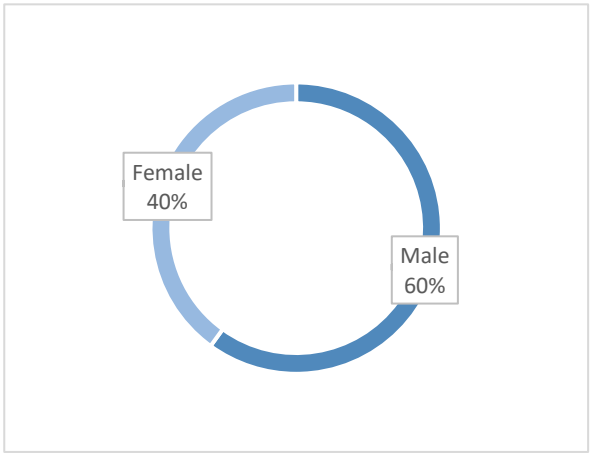
Stakeholder	Sample covered	Type of approach	Interview mode	Tools used
Patients/ Next of kin	**20**	Purposive	Telephonic Interaction	Key informant interview
	5	Random	In-person interaction	
Hospital staff	**9**			
~ Doctors	3	Purposive	In-person interaction	
~ Nursing staff	3	Random	In-person interaction	
~Administrative staff	3	Purposive	In-person interaction	
Implementing Team	**7**	Purposive	In-person interaction	

Profile of interview respondents

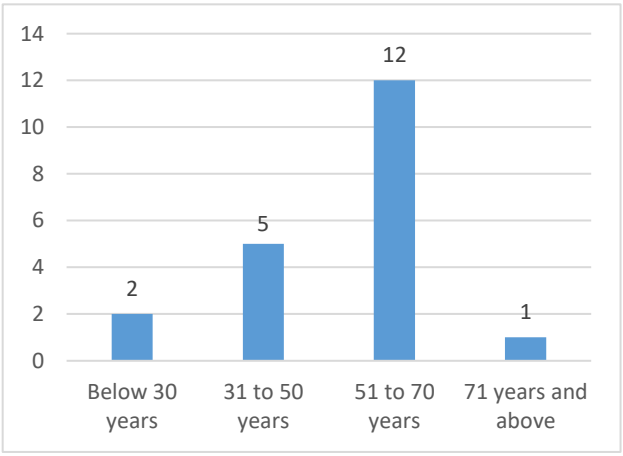
Illustration 11: Patient profiling and demographics

Group 1: Beneficiaries who received assistance from the patient welfare fund at HBCH: 20 patients/next of kin

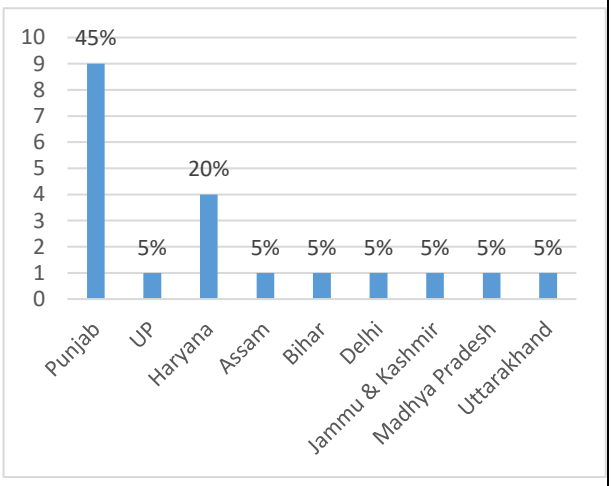
Gender Split (N=20)



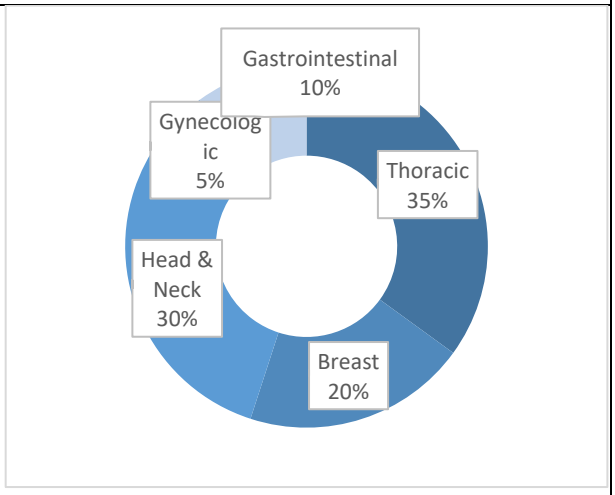
Age group (N=20)



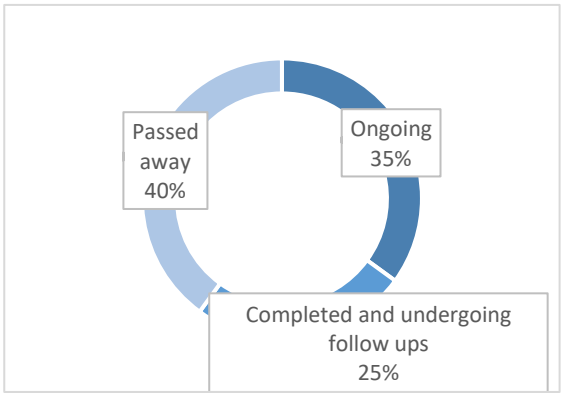
Geography spread (N = 20)



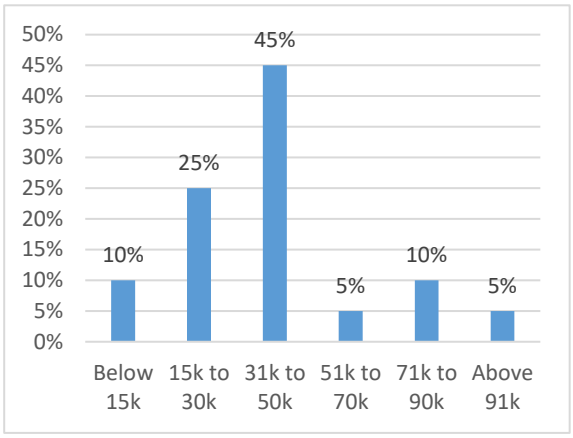
Disease management group – Type of Cancer (N=20)



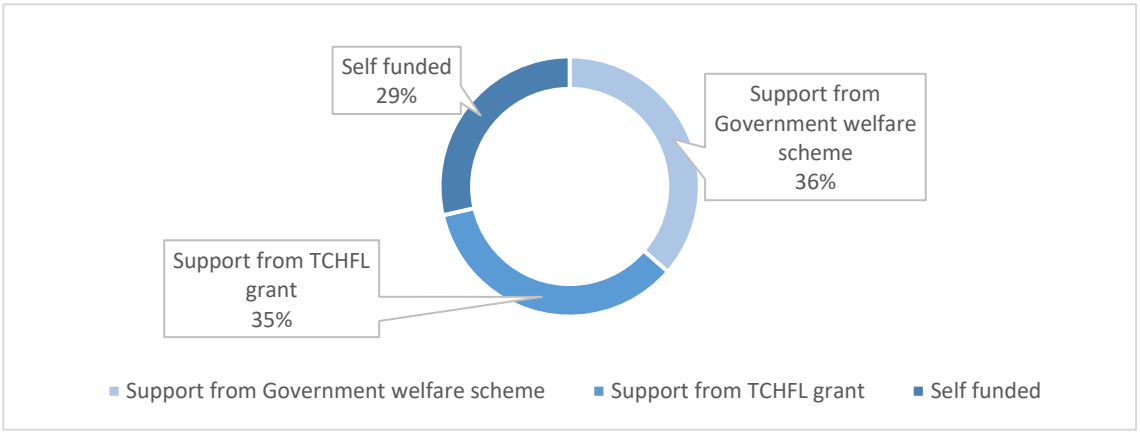
Treatment and Recovery Status (N=20)



Financial aid from TCHFL grant (N=20)

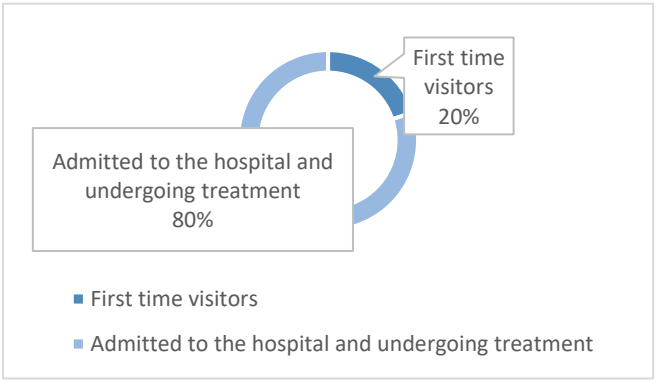


Average Fund mix bifurcation for the grant cohort (N=20)



Additionally, the study field team met with patients who were visiting the HBCH Sangrur for the first time (1, 20%) as well as patients undergoing treatment, but not part of the TCHFL grant (4, 80%)

Status (N=5)



Patient waiting area at HBCH, Sangrur | ***Source: Deloitte***

Programmatic findings

Deloitte's assessment of the Cancer CELL programme was enabled through the understanding of the detailed processes adopted at HBCH for robust treatment, facilities offered, and socio-economic impact indicators. The below findings are representative of the programmatic interventions and impact of the HBCH facility in Sangrur (Punjab)

Table 10: Impact findings using the Common Results Framework for Cancer CELL programme.

<table>
<tr><th>Pillar</th><th>Parameters</th><th>Findings</th></tr>
<tr><td colspan="3">INPUTS</td></tr>
<tr><td>Input</td><td>Grant from Tata Capital Housing Finance Limited (TCHFL)</td><td>

The total grant of INR 1,42,23,000 was provided to TMC (HBCH and RC, Punjab) to support purchase of medical equipment's and patient treatment, during the period 01st December 2022 to 31st March 2023.
The CSR grant was disbursed in two tranches –

<table>
<tr><th>Tranche 1 (INR)</th><th>Tranche 2 (INR)</th></tr>
<tr><td>1,41,32,000</td><td>91,000</td></tr>
<tr><td>Disbursal on 18/01/2023</td><td>Disbursal on 28/02/2023</td></tr>
</table>
The below table highlights the pattern of earmarking of funds for the different project components.
<table>
<tr><th>Line Item</th><th>Cost (INR)</th><th>Percentage (%)</th></tr>
<tr><td>3D Vision Laparoscopic machine</td><td>74,50,000</td><td>52.4%</td></tr>
<tr><td>Patient Welfare Fund</td><td>59,82,400</td><td>42%</td></tr>
<tr><td>50 semi-motorized fowler hospital beds</td><td>7,90,600</td><td>5.6%</td></tr>
</table>

100% of the grant has been utilized as per the annual audited utilization certificate issued as on 31st March 2023.

</td></tr>
<tr><td>Input</td><td>Implementation team (Healthcare staff)</td><td>

The on-ground implementing partner for the program is Homi Bhabha Cancer Hospital and Research Centre, Punjab, a unit of Department of Atomic Energy, Government of India. It runs two major facilities across Sangrur and Chandigarh and offers quality and affordable cancer care and treatment.
Set up under the Build Operate Transfer model (BOT), where the state government provides land, building and assets and centrally, TMC runs the operations.
The Sangrur facility established in 2015, is located within the premises of Civil Hospital in the city and is a spread over an area of 5 acres, while Chandigarh is a newly constructed facility in 2022 and spread over 52 acres. The medical practitioners and nursing staff move on rotation between these facilities.
Sangrur facility sees a daily footfall of 300 to 400 patients, and Chandigarh facility has a daily footfall of 200 patients.

</td></tr>
<tr><td>Input</td><td>Fund raising cell and Finance team</td><td>

The grant is managed by the finance team at HBCH, the team also ensures monitoring of the fund balances in cashless cards and does a yearly consolidation for any unspent values.

</td></tr>
</table>

		• The fund-raising cell and finance team is also responsible for addressing patient queries on the cashless card usage and technical glitches, if any.
Input	**Central and State government welfare schemes**	• The financial assistance at HBCH is provided to patient groups through a fund mix, which consists of government welfare schemes apart from the CSR support. These schemes are provided by central and state government respectively, and are elaborated below: 1) ***Ayushman Bharat Pradhan Mantri Jan Arogya Yojana*** is a national public health insurance scheme introduced by the Government of India that provides free access to health insurance coverage for low earners in the country. A cover of INR 5,00,000 is provided per family per year for medical treatment across public and private run hospitals across India. The beneficiaries are required to apply for the Ayushman Bharat Card for eligibility of disbursement. And the scheme is applicable for all Indian citizens. The patients at HBCH are supposed to furnish the Ayushman Bharat card and Aadhar card to avail the benefits. 2) *The* ***Mukh Mantri Punjab Cancer Rahat Kosh*** is a welfare scheme for the citizens of Punjab and offers financial assistance of up to INR 1,50,000 for the treatment in the state. For eligibility check, patients are required to furnish the following documents to the Finance department – *Patient Biopsy report, Aadhar card, Voter ID card and Patient file number.*
		PROCESSES
Process	**Patient outreach**	• The outreach at HBCH is executed by means of the preventive oncology department which sets up **health awareness and sensitisation camps** for village areas within 30 to 50 kms from the Sangrur facility. This initiative was started in 2019 and is supported by another funder. • Another robust form of outreach is **word of mouth** for the TMC facility. It was reported during interactions with patients that the **Tata brand name and goodwill is an appealing attribute for them to visit the facility**. This is also evident in the number of patients who **travel from far off states such as Jammu & Kashmir and Assam** as well for the treatment to Punjab. • Approximately **40% of the respondents interviewed were referred by their relatives or friends living in Punjab** to HBCH Sangrur. • **30% respondents also indicated visiting other healthcare facilities in their hometowns prior to coming to HBCH Sangrur**. In lieu of absence of due care, unhygienic facilities, long waiting hours, distance from hometowns and high treatment cost at other facilities, they choose to look out for other nearby options and were finally directed to HCBH.
Process	**Registration process**	• The registration process at HBCH is multistage and requires patients to undergo varied steps, starting from **getting the token number**, to **visit to KEVAT office followed by billings**. The process is detailed in Illustration 5. • The waiting area at the hospital is within the premises and covered with a shed roof with a sitting capacity of 100+ patients. Interactions with patients in the waiting area and, with interview respondents indicate **high waiting time** of approximately 2 to 3 hours before the registration happens. Since patients come from far off distances, they cite that they often reach back home late in the night owing the

		waiting time This is also coupled with a day of wage loss for patient's family members who are engaged in daily income generation activities. • However, **no patient or their kin reported they had to go back home without having registered** at HBCH on the same day.
Process	**Financial assistance**	• The financial aid is enabled for patient groups **post diagnosis only**. This **excludes all kinds of early investigations such as PET Scanning and Biopsy which is to be borne entirely by the patient.** • Post diagnosis, **a fund mix is created** and offered as financial aid to patients which includes – Access to Ayushman Bharat Pradhan Mantri Jan Arogya Yojana, Mukh Mantri Punjab Cancer Rahat Kosh and CSR grants by corporates. Apart from the TCHFL support, HBCH also receives aid from another donor which is utilized in the activities conducted by Department of Preventive Oncology. • Post discussions with the team of doctors and at the Department of social welfare, the financial appetite of a patient is arrived at. **Depending on the capability of a patient to bear the treatment cost, an adequate amount of fund mix is created to be utilised during the lifecycle of the treatment**. Each patient or their family member is provided with a digital cashless card which is topped up with the pre-decided amount. Interactions with patients also indicate that the amount loaded as part of fund mix is not always sufficient for the treatment and requires self-expense to be incurred as well. • Once the digital cashless cards are issued, the finance team can access data pertaining to usage and amount balance in the cards. During the review process, it was observed that **there remains unspent balance in the digital cards for few patients, especially in cases where the patient has passed away.** Currently, the finance team has a mechanism in place to consolidate the unspent balances on an annual basis and include them in a newly created fund which is again utilised for patient welfare cashless treatment. This consolidation is time extensive and requires permissions at the Director level. It is recommended to do this consolidation at a quarterly/half yearly level, so that timely re-allocations can be made, and the fund is utilised for the patient in need reducing their financial burdens. • There is also a cohort of **patients who possess valid health insurance policies and are eligible for cashless treatment through the insurers**. In such cases, patients are **recommended to not apply for any of the government schemes and take full benefit from the health insurance policy.** In another scenario, where patients choose to apply for financial aid using the central and state government welfare scheme, they are ineligible to take support from the health insurance policy. The hospital staff deliberately does not share any of the medical records for these patient groups to avail insurance, when requested for. As per the hospital staff, **this is a strategic step to ensure there are no duplications in the welfare support and each patient receives an equal and fair opportunity for financial assistance.** • Another respondent shared that the **financial aid does not cover for the initial diagnostic tests** and the patient is expected to bear the complete cost which is a financial burden right at the beginning of the treatment. • 5% of the respondents out of the cohort interviewed shared **they weren't provided the right guidance at the entry office which mislead them into believing that there is no possibility of financial**

		aid for the treatment. One of these respondents (Patient's relative) was at the waiting area of the hospital and wasn't aware of any support being provided while the patient was already registered at the hospital. • This was also validated during review, since the **number of resources available at KEVAT office and at Department of social welfare are not sufficient** in comparison to the daily footfall of patients at the OPDs. Currently, 2 hospital trainees have been assigned at both offices respectively along with 1 senior officer, and approximately 300- 400 patients visit the hospital each day. Being the frontline offices, **it is required for these offices to build manpower strength ensuring that every patient is communicated well and made aware of the financial assistance and availing process**. It is also recommended to **place information posters on financial assistance at the building entrance** in Hindi and Punjabi language for patients to easily access and understand.
Process	**Course of treatment and closure**	• The typical pathway for a patient's treatment begins with **a surgical procedure, followed by Radiation and Oncology.** Majority of the respondents underwent the above process or two of the above steps for the treatment. • The treatment duration for each patient differs based on the type of cancer diagnosed and its stage of illness. Majority patients interviewed during the interactions indicate **a timeline of minimum 10 - 12 month spanning to 2.5 - 3 years for the treatment.** This is followed by a cycle of follow ups for routine checks from every 3 months to 6 months, basis patient's health condition. • 20% of the interview respondents expressed the **need to introduce PET scanning at HBCH Sangrur, since it is a prime requirement for early diagnosis of the illness.** Patients end up travelling up to 20 to 30 kms to get the test done which adds to their inconvenience. • 25% the interview respondents shared their **respective doctors recommended them to finish their part treatment from HBCH Chandigarh facility, owing close distance from their hometowns**. • **100% of the interview respondents expressed gratitude to the team of doctors and other hospital staff for all the care and support extended during the treatment time**. Some of them quoted that the hospital offers a facility such as of a private run hospital maintaining cleanliness and hygiene standards, well qualified healthcare staff and a safe environment for recovery.
Process	**Hospital amenities**	• Interactions with respondents also indicated that the **required medicines prescribed by the doctors are not available in the pharmacy at the hospital**. This includes 34 surgical medications and 27 pharmacy medicines. Absence of requisite medications urges patient's family members to secure the medicines from pharmacies outside the hospital which charges a great amount of premium and adds to financial burden. This was validated with interactions conducted with the Director at HBCH. It was mentioned during interactions that provisions are being made to acquire all the necessary medications to avoid any inconvenience to the patients. • Patients also appreciate the **availability of a free of cost 24-hour langar (food seva) and a Dharamshala** (a temporary residential facility with all basic amenities) inside the hospital premises for the patient's family members for stay for few days.

	OUTPUTS	
Output	**203 patients supported through patient welfare fund and 200+ patients every year receive access to advanced medical equipment's and treatment at HBCH**	• **Financial aid starting from INR 3,000 to INR 1,10,000 was provided to the patients** post-evaluation of their financial capabilities and line of treatment. • Patients majorly hail from **middle to lower income backgrounds** with their families engaged in agriculture practices, blue collared jobs such as driver, hairdresser, and daily wagers. Average monthly income of the families range from INR 1,50,000 to INR 4,00,000.
Output	**302 healthcare staff receive access to advanced surgical equipment's for quality patient care**	• HBCH has a permanent staff size of 302 and temporary staff size of 1641 as of November 2024. These healthcare professionals receive access to advanced technology for precision surgical procedures through the 3D Laparoscopic machine. **This machine was transferred to HBCH Chandigarh in December 2023 and over 200+ such surgeries have been performed successfully each year.** • Interactions with the healthcare staff at Chandigarh facility indicated that **since HBCH Chandigarh is bigger in its size and scale and caters to large number patients, it was decided to move the machinery there. Since then, complex 3D surgeries have been performed at Chandigarh and patients at Sangrur are also advised to come to HBCH and RC Chandigarh for the procedure.** This requires patients to visit HBCH and RC in Chandigarh which is 150 Kms away from the Sangrur facility. As per discussion with HBCH staff, **the asset transfer is well documented internally, however not been communicated to TCHFL.**
Output	**80+ patients receive access to 40 bedded infrastructures at the Day Care ward every day and, 100+ nursing staff receive access to 3 bedded infrastructure at Nursing education department**	• As part of the TCHFL grant, 50 semi-motorised (manual) fowler beds were purchased for different purposes: • **40 of these beds are placed at the Day care wards** where patients come in for chemotherapy sessions, hydration procedures and blood transfusions. The day ward runs from 9 AM to 6 PM every day, and approximately 1 patient uses the bed for 4 to 5 hours, making it available for another patient during the rest of the day. • **Another 3 beds are placed at the Nursing education department** where mannequins are placed on the beds for clinical practice by nursing staff. • **Rest of 7 beds are currently in the stock** and shall be utilised in near future when additional departments are planned at HBCH Sangrur.
	OUTCOMES AND IMPACT	
Outcomes & Impact	**50,000+ lives benefitted through improved accessibility, affordability, and availability of robust cancer care support infrastructure**	• Over 50,000 lives including patient groups and healthcare staff have benefitted through the grant intervention since its inception in the year 2022. • **Providing access** of a robust cancer care facility to population size of over 1.8 Mn people in Sangrur has led to strengthening of the entire healthcare ecosystem in Punjab. Being a unit of TMC, it attracts patient groups from across the norther region of the country. • Reducing financial burdens on the patient's family by **offering cancer support at affordable cost** is the differentiating factor at HBCH. In a typical scenario, the trauma associated with the illness is coupled with the anxiety of a cost extensive treatment that lies ahead. Through this programme, TMC and HBCH continue to support the journey of a cancer patient through financial means by leveraging government health welfare schemes and through CSR support.

		• Accessibility at HBCH is further aided with **timely availability of resources** including qualified medical practitioners skilled in cancer care and support. And requisite medical infrastructure for readily treatment and sustained healthcare • 100% of the interview respondents add that the **team of doctors have been immensely supportive on all fronts both medically and on psychological level** by providing the requisite support to the patient and their family members. Depending on the illness, the patients were mindfully communicated on the line of treatment ensuring there is enough sensitivity in the interactions. This also enabled for patients to feel secured and in the right hands for their treatment.
Outcomes & Impact	**Improved resource optimisation due to cost savings**	• **The TCHFL grant has been instrumental in reducing the financial obligations of up to INR 25,000 to INR 30,000 on average per patient**. This cost saving is ploughed back to sustain other needs of the family. Since the project beneficiaries hail from middle income to lower income backgrounds, the financial aid is an opportunity for improved resource optimisation and investing in other critical areas of life.
Outcomes & Impact	**Building a sensitised community**	• Awareness about cancer and its early diagnosis is crucial in India where every one in nine person is anticipated to succumb to the illness as per the report by National Cancer Registry Programme.[5] Addressing the need, the team of doctors at HBCH along with preventive OPD facilitate and guide patients at all steps ensuring both physical and mental empowerment. This intervention is expected to build a community of individuals including the family members and patient groups who have either completed or undergoing the treatment to **sensitise people around them on the various aspects of the illness, treatment journey, significance of right medical care and curative measures**.
Alignment to the Sustainable Development Goal	**Goal 3: Good health and well being**	• The Cancer CELL programme supported by TCHFL grant is contributing to meet the sustainable development goal on good health and wellbeing by providing adequate care to patients and training specialized health professionals, develop comprehensive cancer control programmes, and establish nuclear medicine, radiation therapy and oncology and radiology facilities to tackle cancer.
	Goal 10: Reduced Inequalities	• Through unbiased financial assistance and equal access to treatment, the Cancer CELL programme is aligned to reduce inequalities of all kinds among the targeted beneficiary group. This has eliminated access and availability constraints leading to empowerment of individuals.

[5] Indian Journal of Medical Research | Accessed on 18th December 2024 | https://journals.lww.com/ijmr/fulltext/2022/10000/cancer_incidence_estimates_for_2022projection.6.aspx

Stories from ground

Identifiers in the case stories have been modified to maintain confidentiality.

Case story 1

Manvinder Singh, a 63-year-old resident from Chandigarh started treatment for Thoracic cancer in the year 2022, at a private hospital in Chandigarh. His last visit to TMC was in April 2024. Telephonic interaction with his brother, Kulvinder Singh indicated about his passing away in early 2024. He shares his family was referred to TMC facility in Chandigarh by a relative. Kulvinder is a driver by profession, and he used to make frequent visits to the hospital for his brother's treatment. He adds that the surgical procedure did go well, and the treatment provided was also of the best standards, however his brother still succumbed to the illness due to recurrent addictions. He adds that the total expense for the treatment was approximately INR 2,50,000 out of which self-borne expense was INR 32,000, another INR 1,50,000 was facilitated through Ayushman Bharat scheme, and the rest amount of INR 68,000 was enabled through TCHFL grant.

Kulvinder shares he had an opportunity to accompany 3 to 4 additional patients to TMC and, each of them has highly appreciated the hygiene and cleanliness standards at TMC facility, which is very unlike any other facility they have been to. The aesthetic at the facility is of a private run hospital providing quality care at affordable cost. Kulvinder adds that the community already has high regard for the brand TATA and the financial assistance is an added value.

Case story 2

Nirmal Singh, a resident of Bathinda in Punjab is 26-year-old and currently undergoing the treatment for Gastrointestinal Cancer at TMC Sangrur. He had consulted a private hospital in Bathinda where his illness was diagnosed, post which one of his relatives recommended him to visit TMC in Sangrur. Sharing his experience, he adds that one of the biggest differentiators between the hospital at Bathinda and TMC Sangrur is that of the doctor's support and guidance. He shares that the team of doctors at TMC were truthful and did not hide any medical details from the patient ensuring transparency which led to trust building in doctor and patient relationship.

He also adds that while the waiting time and unavailability of the requisite medicines did bother him, he is well satisfied with the line of treatment and his recovery status. Doctors have now recommended him to visit for follow-ups every 3 months. He sounds hale and healthy and expresses gratitude for the right team of medical guidance which is leading to timely recovery.

Case story 3

Karuna devi, a female from Haryana is undergoing the treatment for Breast Cancer. Her husband shares that their relatives in Punjab recommended them to visit TMC Sangrur when she was diagnosed. He adds that his entire family was immensely stressed when Karun devi was diagnosed with Stage 2 Cancer and it took a lot of strength to kick start her treatment journey.

He shares the TMC facility is relatively better than any Government run or a Private hospital. The team of doctors treating her were extremely supportive and took great care of her. He further adds that being such senior doctors, none of them were rude or impatient during the entire journey and handled his wife's case as if treating one's own family members.

While he agrees that the patient registration process is time extensive, the free of cost langar seva came to their rescue. In absence of Ayushman Bharat card, the family had to bear an expense of INR 70,000 and the rest of the treatment cost of INR 50,000 was supported through the TCHFL grant.

As a recommendation, he adds that the waiting time during file registration process and emergency services for patients is not optimal. In lieu of limited number of beds in the emergency department, some patients suffering with pain have no option but to sit in the waiting area until they are admitted to the TMC facility.

Case story 4

Harpreet Kaur a resident of Tohana in Haryana shared the experience of his mother's treatment at TMC, Sangrur with the Deloitte field team. His mother was diagnosed with Thoracic Cancer in 2022, and her treatment was started in November during the same year. He shares that due to non-availability of Pet Scanning facility at Sangrur, they had to go to Patiala for the investigation, and also procure few medications externally since they weren't available at the TMC pharmacy in Sangrur. All of this added to the financial burdens, and in lieu of non-availability of Ayushman Bharat Card, the family had to bear high amount of expense at the start of the treatment. In the middle of treatment cycle, Harpreet learned about the scope for financial assistance and approached the Finance department, post which an allocation of INR 42,000 was made to him. He adds that his family had to bear an initial cost of approximately INR 80,000 from out of pocket.

While he believes the treatment provided and the team of doctors is highly qualified at TMC, the procedure to avail financial assistance can be streamlined. This will aid in reducing the financial obligations on the patient's family.

Conclusion and way forward

The project aimed to provide financial assistance in the form of patient welfare fund and support for medical and surgical equipment in FY 2022 – 2023. Considering the cost of the treatment and societal inequalities which can further make the process cumbersome, the grant aimed to ensure equal access, affordability, and availability of robust healthcare to patient groups. A summary of our findings in a SWOT form and potential recommendations to enhance the effectiveness of the project going forward is presented in this section of the report.

Illustration 11: SWOT analysis

Strength

- HBCH infrastructure in Punjab is the backbone of the state's healthcare ecosystem for cancer care. Largely catering to rural population, it is a comprehensive hospital providing medical care to patients in need from different parts of the country.
- Being a unit under TMC network, HBCH provides a state of art infrastructure at affordable costs.
- Overall positive word of mouth from patients across on the treatment provided and healthcare.

Weakness

- Absence of requisite medications at the HBCH pharmacy in Sangrur and unavailability of provision for PET scanning test which is a prerequisite for cancer diagnosis often leads to patient inconvenience.
- In lieu of limited resources at the KEVAT or Department of Social Welfare, not all patients receive adequate guidance and support pertaining to financial assistance. This may be an opportunity lost for additional group of patients.

Opportunity

- Building the medical infrastructure in equal capacity at HBCH Sangrur and Chandigarh would aid to meet the increasing number of complex cases. For instance, the surgical procedures at HBCH Sangrur are conducted using the 2D laparoscopic machine since the 3D vision machine has been moved to Chandigarh facility. It is scientifically evident that a 3D vision for laparoscopic surgeries provides multiple benefits such as higher precision and better surgeon performance.
- The Ayushman Bharat scheme and Mukh Mantri Cancer Rahat Scheme are the major support system for patient groups to avail financial aid under the government welfare program for healthcare. However in lieu of absence of documents such as Aadhar Card or Voter Id Card, or due to any technical glitches while applying on the government servers; patients are either ineligible or devoid to avail any benefits. And the reliance is then on the CSR support, which is not fully adequate to meet the treatment cost for 100% patient inflow. It is required to build advocacy on the mandatory criteria and documentation required for eligibility of any government welfare scheme among the citizens. This shall increase the success rate of optimum utilisation of the government benefit.
- The eligibility of patients to avail financial benefit under the Ayushman Bharat Scheme and Mukh Mantri Cancer Rahat Yojna requires availability of biopsy and pet scan report as prerequisite medical records; post which the fund mix is curated. These initial investigations are non-reimbursable and add to the financial burden of up to INR 50,000 in few cases. The CSR grant can arrange to support the initial tests reimbursement which will significantly reduce the financial obligations for patient groups.

Threat

- No apparent threats.

Recommendations and way forward

1) Provision to cover initial diagnostics and investigative tests as part of the grant aid

Since Government health welfare schemes do not allow for reimbursements or cashless support for investigative tests, all cancer patients are subjected to incur self-expense for PET scanning or Biopsy. The estimated costs of these tests range from INR 15,000 to INR 35,000 and basis complexity of the illness it increases to INR 50,000 as well. This is an added financial burden to the families and can be covered for while planning the fund mix leveraging the CSR grants.

2) Increase the number of manpower managing the KEVAT office operations, and at Department of Social Welfare

There is evidently a need to strengthen the manpower resources at KEVAT and Department of Social Welfare, ensuring no patient leaves the hospital premise without receiving the right guidance on potential for financial assistance.

3) Consolidating the unspent funds in digital cashless card

Unspent funds can be reallocated on a quarter or bi-annual basis leading to grant efficiency. This move has the potential to increase the outreach and support to additional patient count.

4) Strengthen medical infrastructure at Sangrur

Ensuring all requisite investigative tests including PET scan is made available at the Sangrur facility which may add to convenience of time and resources for the patient and their families. Further, availability of all the prescribed medicines in the pharmacy section is an essential requirement to add to the patient experience at the hospital.

5) Intimation of asset transfer for better transparency and improved project governance

The 3D vision laparoscopic machine was transferred from Sangrur facility in December 2023, considering the infrastructural requirement, and increase in patient footfall at HBCH and RC in Chandigarh. It is recommended to keep the funder informed on movement of assets since it is a high value asset and enables improved project transparency.

It is recommended to sustain the annual financial aid for TMC unit in Punjab, considering the increase in number of cancer cases and overall positive feedback on the line of treatment and support from healthcare staff at Sangrur and Chandigarh. However, the study also reveals scope for bridging various structural gaps within the programme which may add to positively impact the patient experience in years to come.

Annexure 1: Tools and Guidelines

Interview guidelines for Patient/Next of kin

Objective of the Impact study –

1) To understand the components of care & support extended to the beneficiary group at HBCH
2) To document the operational process followed at HBCH
3) To physically verify and assess use of medical equipment provided to HBCH
4) To assess economic and social impact of TCL grant on the lives of beneficiaries

Beneficiary profile -

Name of the beneficiary:

Age:

Gender:

Home location:

Annual income range: Below 5 Lacs, Between 5 to 10 lacs, Above than 10 lacs

Diagnosis: Type of cancer, Stage, any other illness

Treatment start date with HBCH:

1. How did you get in touch with HBCH?
    a. Awareness camps
    b. Referrals
    c. Walk in
    d. Any other channel_____

    Remarks_____
2. Are there other similar facilities in the vicinity and what made you choose HBCH? Did you consult other healthcare practitioners or institutions before visiting HBCH?
    a. Yes
    b. No

    Remarks_____
3. Did HBCH staff walk you through the process for treatment and cashless facility? If yes, please elaborate your experience.
    Remarks _____
4. Was any paperwork or documentation requested by HBCH? Please elaborate on what was requested.
    Remarks _____
5. Do you possess a valid Ayushman Bharat card?
    a. 3.1 Yes
    b. 3.2 No
6. At what stage of illness did you get in touch with HBCH
    a. 3.1 Pre diagnosis/Symptomatic
    b. 3.2 Diagnosis
    c. 3.2 Stage 1
    d. 3.3 Stage 2
    e. 3.4 Stage 3 and above

    Remarks _____

7. Was there any logistics/transport support provided by HBCH?
    a. Yes
    b. No

   Remarks _____
8. Did you receive the necessary health infrastructure (tech and equipment) support from the hospital? How satisfied are you?
    a. Dissatisfied
    b. Neutral
    c. Satisfied

   Remarks _____
9. Was/Is the healthcare staff supportive? How satisfied are you?
    a. Dissatisfied
    b. Neutral
    c. Satisfied

   Remarks_____
10. Describe your treatment schedule and current status of recovery.

    _____
11. Did you have access to hygienic and nutritious meals during stay at HBCH?
    a. Yes
    b. No

   Remarks_____
12. Did you have to pay for any treatment or other services at HBCH? If yes, how much?
    a. Less than INR 1,00,000
    b. Between INR 1,00,000 to 3,00,000
    c. Between INR 3,00,000 to 5,00,000
    d. More than INR 5,00,000

   Remarks_____
13. What treatment or services were the payments for? And how did you pay for the same?
   Remarks_____
14. Did you have any other source of monetary support for the treatment? If yes, please mention
    a. Self
    b. Borrowed from family/friends
    c. Health insurance

   Remarks_____
15. Did the financial support from TMC help reduce financial burdens? Please elaborate
   Remarks_____
16. Was/Is there any form of emotional support and/or counselling provided to patients or to your kin? If yes, have you attended the session?
    a. Yes
    b. No

   Remarks_____
17. Did you find the counselling sessions helpful ? If yes, please share how many and at what frequency. Elaborate your experience from the sessions
   Remarks_____
18. Do you have feedback for HBCH to strengthen the care and support? Please elaborate
   Remarks_____
19. Is/Was there a dedicated SPOC from HBCH who assisted during the entire process?
    a. Yes
    b. No

   Remarks_____

Interview guidelines for Health care staff

Category: Doctor, Nursing, Administrative (Billings, Security, KEVAT, Department of Social Welfare)

1.	What is the patient outreach process?
2.	What is the patient background coming in for treatment at HBCH?
3.	What are step wise procedures for patient registration, billings, interactions at KEVAT office? What is the typical time taken for patient onboarding?
4.	How are the semi motorized beds provided as part of TCHFL grant put to use? What is the average number of patient groups leveraging the infrastructure?
5.	Why was the 3D vision cart moved to Chandigarh and what is it's use in treating patients?
6.	Are there any cases of patient dropout mid treatment?
7.	What is the follow up mechanism?
8.	What are additional amenities provided for patient care?

Interview guidelines for Implementation team

Category: Finance and Fund-raising team

1.	What is the grant size and duration for the programme?
2.	What is the staff size at HBCH? including count of medical and administrative staff.
3.	What are the reporting mechanisms in place for project progress to TCHFL?
4.	Is the grant audited at the end of the year?
5.	How is patient data maintained? Any use of software?
6.	What are other healthcare facilities in proximity to HBCH?
7.	Is there any helpline support available for patient groups? If yes, please elaborate.
8.	What is the use of digital cashless cards provided to patient groups?
9.	Is there a redressal system in place for grievances?
10.	What are potential ways to strengthen the treatment and improve patient experience at HBCH?

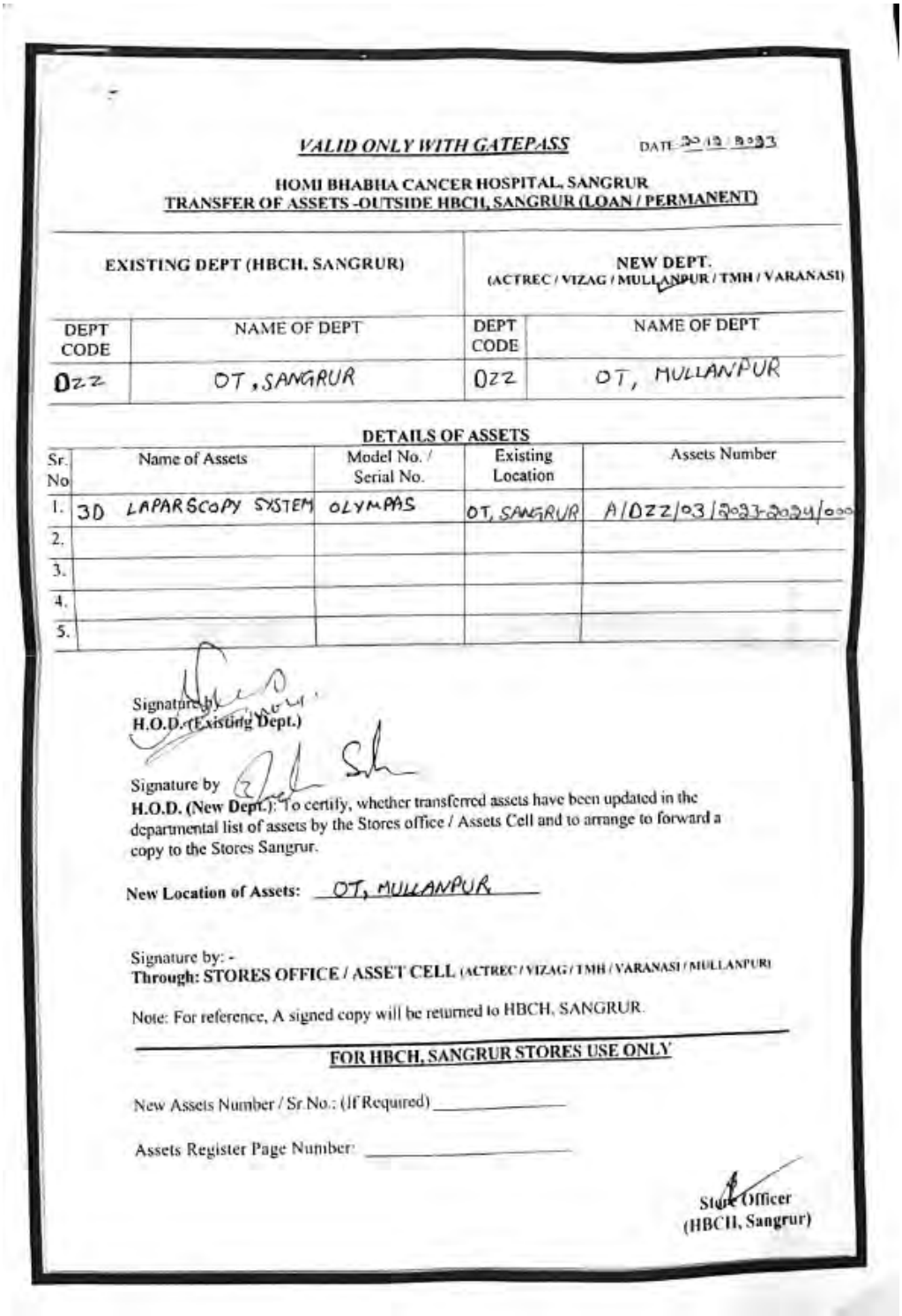
Annexure 2: List and names of stakeholders interacted with

Category	Count
Patient	4
Next to kin	21

Category	Name and Designation
Doctors	1) Dr. Vikram, HBCH and RC Chandigarh 2) Dr, Gulvinder, Department of Preventive Oncology 3) Dr Sahil Jain, Department of Palliative Care
Nursing staff	1) Simran Kaur, Nurse, Operation theatre 2) Manvinder, Nurse, Operation theatre 3) Roop, Nurse, Operation theatre
Administrative staff	1) Tanvi, Data entry operator 2) Jyoti, Staff at Department of Palliative Care 3) Amritpal Singh, Admin officer, KEVAT office

Category	Name and Designation
Implementation team	1) Dr Ashish Gulia, Director, HBCH and RC Punjab 2) Keshav Sharma, Deputy Controller of Accounts – HBCH and RC Punjab 3) Satnaam, Accounts officer 4) Pawan, Accounts team 5) Amandeep, Accounts team 6) TCHFL team members (2)

Annexure 3: Pictures from field



VALID ONLY WITH GATEPASS DATE 30/12/2023

HOMI BHABHA CANCER HOSPITAL, SANGRUR
TRANSFER OF ASSETS -OUTSIDE HBCH, SANGRUR (LOAN / PERMANENT)

EXISTING DEPT (HBCH, SANGRUR)		NEW DEPT. (ACTREC / VIZAG / MULLANPUR / TMH / VARANASI)	
DEPT CODE	NAME OF DEPT	DEPT CODE	NAME OF DEPT
022	OT, SANGRUR	022	OT, MULLANPUR

DETAILS OF ASSETS

Sr. No	Name of Assets	Model No. / Serial No.	Existing Location	Assets Number
1.	3D LAPARSCOPY SYSTEM	OLYMPAS	OT, SANGRUR	A/022/03/2023-2024/000
2.				
3.				
4.				
5.				

Signature by
H.O.D. (Existing Dept.)

Signature by
H.O.D. (New Dept.): To certify, whether transferred assets have been updated in the departmental list of assets by the Stores office / Assets Cell and to arrange to forward a copy to the Stores Sangrur.

New Location of Assets: OT, MULLANPUR

Signature by: -
Through: STORES OFFICE / ASSET CELL (ACTREC / VIZAG / TMH / VARANASI / MULLANPUR)

Note: For reference, A signed copy will be returned to HBCH, SANGRUR.

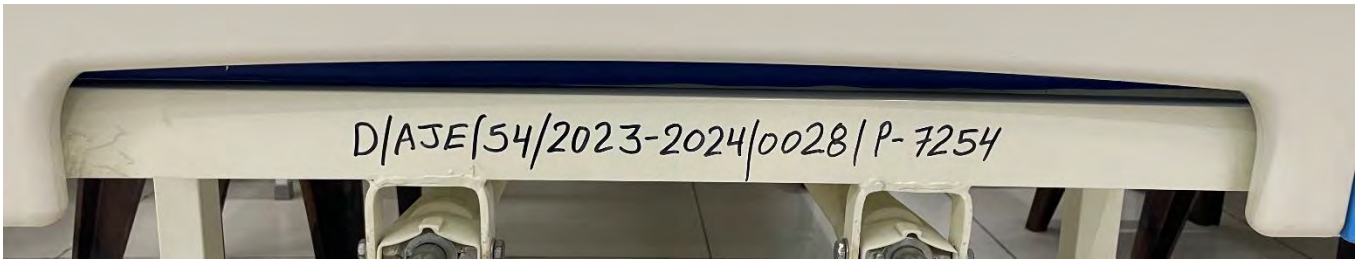
FOR HBCH, SANGRUR STORES USE ONLY

New Assets Number / Sr.No.: (If Required) _____

Assets Register Page Number: _____

Store Officer
(HBCH, Sangrur)

Asset transfer form for movement of 3D Laparoscopic machine from Sangrur to Mullanpur, Chandigarh | ***Source: Deloitte***

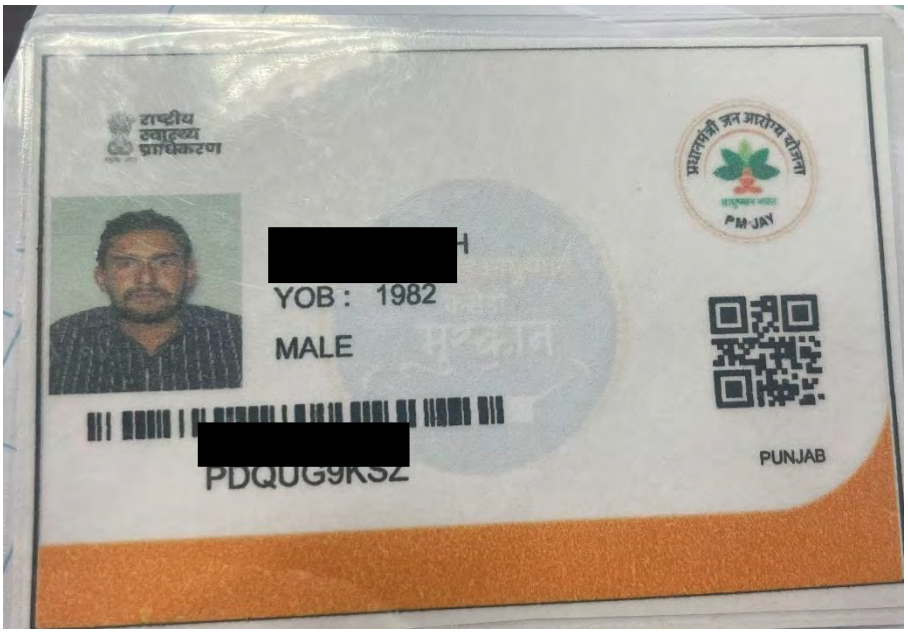


40 Nos beds are being used at the Day care ward at HBCH, Sangrur. Each bed is tagged with an asset number | ***Source: Deloitte***

03 Nos beds are being placed at the Nursing Education Department for research and academic use by nursing staff at HBCH, Sangrur| ***Source: Deloitte***

07 Nos beds are currently in stock at the old building at HBCH, Sangrur| ***Source: Deloitte***

3D Vision Laparoscopic machine at the operation theatre in HBCH, Chandigarh | ***Source: Deloitte***



*Sample Ayushman Bharat card | **Source: Deloitte***

मिल रही राहत | 52 प्रतिशत मरीज पंजाब और 48 प्रतिशत दूसरे राज्यों से आ रहे इलाज के लिए

कैंसर मरीजों के लिए नई उम्मीद बन रहा होमी भाभा हॉस्पिटल

चंडीगढ़, 3 नवम्बर (पाल): कैंसर का नाम सुनकर मरीज को लगता है कि उसकी जिंदगी खत्म हो गई। ज्यादातर एडवांस स्टेज पर ही इस बीमारी का पता लगता है। ऐसे में एडवांस टैक्नीक से इलाज, जोकि कुछ ही अस्पताल में दिया जाता है।

निदेशक डॉ. आशीष गुलिया

अभी तक पंजाब, हरियाणा, हिमाचल, समेत आसपास के एरिया के मरीज पी.जी.आई. ही रैफर किए जाते रहे हैं, लेकिन होमी भाभा कैंसर हॉस्पिटल एंड रिसर्च सैंटर कैंसर मरीजों के लिए एक नई उम्मीद बन रहा है। पिछले साल 2023 जुलाई में न्यू चडीगढ़ मुल्लांपुर में यह संस्थान शुरू हुआ था। रोजाना 400 के करीब कैंसर मरीज यहां ओ.पी.डी. में रहते हैं, जिसमे नए और फॉलोऑप मरीज शामिल होते हैं।

संस्थान के निदेशक डॉ. आशीष गुलिया की मानें तो संस्थान को शुरू करना ही अपने आप में एक चुनौती रही है ज्यादातर लोगों को लगता था कि यह प्राईवेट अस्पताल है जबकि ऐसा नहीं है। यह दूसरे सरकारी अस्पतालों जैसा ही सरकारी अस्पताल है जोकि सिर्फ कैंसर मरीजों को ही इलाज दे रहा है। संस्थान का मकसद पूरे उत्तर भारत में कैंसर देखभाल में सुधार लाना हैं।

यह संस्थान टाटा मैमोरियल सैंटर मुंबई की एक यूनिट है, जो भारत सरकार के परमाणु ऊर्जा विभाग के प्रशासनिक नियंत्रण के तहत एक ऑटोनोमस बॉडी है। लोगों को पता होना चाहिए कि यह कोई कॉर्पोरेट अस्पताल नहीं है। हमारे पास सभी स्तर के मरीज के इलाज के लिए आ रहे हैं, जिनमें वह लोग भी शामिल हैं जिनके पास पैसे नहीं हैं। सभी सरकारी योजनाओं और अलग-अलग रोगी कल्याण निधियों जैसे कि इम्पैक्ट फाऊंडेशन फंड, जकात फंड, महिला और बाल कैंसर फंड, भारतीय कैंसर सोसायटी की सहायता और कई निजी दानकर्ता भी रोगियों के कैंसर उपचार में योगदान देते हैं।

आत्मनिर्भरता मॉडल पर काम करते हैं

होमी बाबा कैंसर हॉस्पिटल संगरूर सैंटर जोकि हमारा ही हिस्सा है, वहां सबसे ज्यादा मरीज पंजाब से आते हैं, जिसका नंबर 75 से 80 प्रतिशत तक होता है, यहां की बात करें तो 52 प्रतिशत मरीज हमारे पास पंजाब से और 48 प्रतिशत दूसरे राज्यों से हैं, यहां तक कि बिहार और उड़ीसा से भी हमारे पास मरीज आ रहे हैं। डॉ गुलिया ने कैंसर को लेकर बताया कि इस क्षेत्र में, शराब और ज्यादा वसा वाले भोजन के ज्यादा इस्लेटम होने की वजह से महिलाओं में ब्रैस्ट और ओवरी के कैंसर और पुरुषों में पेट और फूड पाइप के कैंसर सबसे ज्यादा मामलें देखें जा रहे हैं। ओपीडी में रोजाना 400 मरीज आते हैं और 300 बिस्तरों की क्षमता हमारे पास है जिसमे से 80-85 प्रतिशत बेड्स भरे होते हैं। मुझे लग रहा है कि इस साल के अंत तक हमारे पास सभी बेड्स भर जाएंगी। संगरूर सैंटर में हमारे 150 बेड हैं। कुल 60 फैकेल्टी के साथ 1580

स्टाफ हैं। हम आत्मनिर्भरता मॉडल पर काम करते हैं, क्योंकि प्राइवेट और सेमी -प्राइवेट कमरे लेने वाले मरीजों से हमें जो पैसा आता है, हम उसका इस्तेमाल उन मरीजों को सब्सिडी देने के लिए करते हैं जो इलाज का खर्चा नहीं उठा सकते। हमारा मकसद पूरे उत्तर भारत में कैंसर की देखभाल को बेहतर बनाना है। इसे एक रिसर्च सैंटर के रूप में भी विकसित किया जाएगा। हम मेडिकल ऑन्कोलॉजी में डीएम और रेडियोलॉजी, एनेस्थीसिया और ऑन्को पैथोलॉजी में एमडी शुरू करेंगे। हमारे पास बड़े स्तर का एक ऑन्कोलॉजी सर्जरी विभाग है, और हमें उम्मीद है कि जल्द ही और अधिक ऑन्को सर्जनों की भर्ती होगी।

आम लोगों की कैंसर स्क्रीनिंग प्रोग्राम शुरू कर चुके हैं

डॉ गुलिया ने बताया कि जब हमने शुरूआत की थी, तो हमारी सबसे बड़ी चुनौती अपनी पहचान साबित करना था। हमारा उद्देश्य लोगों की सेवा करना, उनके दर्द को कम करना और कुल मिलाकर, कैंसर के इलाज की मांग करने वाले लोगों के खर्च को कम करना है। हम जी.एम.सी.एच.32, जी. एम. एस. एच. -16 के साथ सहयोग कर रहे हैं और चंडीगढ़ प्रशासन के साथ मिलकर कई योजनाओं पर काम कर रहे हैं। कई बड़े विभागों के साथ हमारे प्रोजेक्ट शुरू हो चुके हैं जिसमे हम चंडीगढ़ स्कूलों और आम लोगों की कैंसर स्क्रीनिंग प्रोग्राम शुरू कर चुके हैं। स्कूली बच्चों के लिए स्वस्थ जीवन जीने पर एक कार्यक्रम शामिल है। हम कैंसर के ट्रेंड को समझने के लिए चंडीगढ़ की पूरी आबादी पर एक बड़ी रिसर्च करने की योजना बना रहे हैं।

मीटिंग हरमिटेज सोसाइटी के | की मांग की। संवाद

महादान कहा जाता है। संवाद

संजीव आदि मौजूद रहे।

स्वास्थ्य होमी भाभा कैंसर अस्पताल में आयोजित कार्यक्रम में पहुंचे स्वास्थ्य एवं परिवार कल्याण प्रशासनिक सचिव

मुख्यमंत्री व आयुष्मान भारत योजना की बाधाएं करेंगे दूर

माई सिटी रिपोर्टर

मोहाली। कैंसर के मरीजों की बढ़ती संख्या को देखते हुए अब मुख्यमंत्री योजना और आयुष्मान भारत योजना के बीच की बाधाओं को दूर किया जाएगा और इस दिशा में जल्द ही काम किया जाएगा।

यह बात स्वास्थ्य एवं परिवार कल्याण पंजाब के प्रशासनिक सचिव राहुल कुमार ने कही। उन्होंने यह बात विश्व कैंसर दिवस-2025 के अवसर पर होमी भाभा कैंसर अस्पताल और अनुसंधान केंद्र में आयोजित कार्यक्रम के दौरान कही। उन्होंने कहा कि कैंसर एक ऐसी बीमारी है जो परिवारों को गहराई से प्रभावित करती है, खासतौर से पंजाब में। इसके लिए समर्पित देखभाल और ध्यान की आवश्यकता होती है। कार्यक्रम के दौरान कैंसर के प्रति जागरूकता फैलाने के लिए कई गतिविधियां की गईं।

होमी भाभा कैंसर अस्पताल में आयोजित कार्यक्रम में शिरकत करते राहुल कुमार। संवाद

शुरू होगी लॉकर सुविधा

अस्पताल ने सभी मरीजों और अभिभावकों के लिए लॉकर सुविधा शुरू करने की भी घोषणा की। जिससे इलाज के दौरान उनके कीमती सामान को सुरक्षित रखा जा सके। यह पहल मरीजों के समग्र अनुभव को बेहतर बनाने के लिए अस्पताल की प्रतिबद्धता को दर्शाती है।

*News articles highlighting the body of work at HBCH | **Source: HBCH***

Homi Bhabha hospital providing cancer care to 400 OPD patients daily

Robert Abraham
robert@hindustantimes.com

MOHALI: After 15 months of its opening, the Homi Bhabha Cancer Hospital and Research Centre (HBCHRC) in New Chandigarh has become a lifeline for many, with 400 patients visiting daily for cancer treatment and follow-ups.

Built to provide advanced cancer care across North India, the hospital is part of the Tata Memorial Centre, overseen by department of atomic energy, Government of India.

With 1,580 staff members, including 60 consultants, the centre operates on a self-sustaining model. Revenue from private and semi-private rooms helps cover the cost of treatment for those who are unable to afford it. Around 85% of patients receive heavy subsidy on treatment with some even getting entirely free treatment, thanks to funds like Impact Foundation, Zakat Fund, and other donor support funds.

The hospital sees patients from Punjab, Haryana, Himachal Pradesh, Jammu & Kashmir and even distant states like Bihar and Odisha.

HBCHRC director Dr Ashish Gulia shared that 52% of patients were from Punjab, and 48% from other states. Most common problems among women were breast and ovarian cancers, while stomach and oesophageal cancers were prevalent among men, often due to lifestyle factors like alcohol and fatty foods, he said.

Dr Gulia added that the hospital's 300 beds are nearly full, with occupancy expected to reach its capacity by the end of this year.

An on-site 75-bed dharamshala allows family members to stay close to patients. A special program is also available for young patients who need educational support during treatment.

The hospital complex comprises a main building with seven floors, organised into wings labelled A to D. Plans are underway to develop the facility further, including introducing specialised medical programs like DM in medical oncology and MD in radiology.

The hospital not only treats patients from north Indian states like Uttarakhand, but also trains doctors with the aim of opening new centres across the country.

The hospital operates on self-sustaining model, with revenue from private and semi-private rooms helping cover the cost of treatment for those who are unable to afford it. HT PHOTO

The hospital's 300 beds are nearly full, with occupancy expected to reach its capacity by the end of this year.

DR ASHISH GULIA, director, Homi Bhabha Cancer Hospital and Research Centre, New Chandigarh

WORLD CANCER DAY

In Punjab, women at nucleus of a preventive oncology project

PARUL
CHANDIGARH, FEBRUARY 3

A YEAR-AND-A HALF ago, Rajni Kumari was in shock — and denial — when she was diagnosed with breast cancer during a free screening camp by the Homi Bhabha Cancer Hospital and Research Centre, New Chandigarh, at Kiratpur Sahib, Punjab. The sole earning member of her family and mother of three, the 40-plus reluctantly signed up for a check-up as she had been experiencing some discomfort in her breast.

"My world came crashing down. After mammography, I was told I would need surgery. Now, after a year of chemotherapy, I am back on my feet and at work. Had it not been for that diagnosis, I wouldn't be here," she says.

Rajni is now a volunteer motivating women in her village to get regular health check-ups and cancer screenings at these camps.

"The fear that surrounds cancer makes many women reticent

CONTINUED ON PAGE 2

At a camp organised by Homi Bhabha Cancer Hospital and Research Centre. *Express*

Now, HP patients can get treatment at Homi Bhabha hosp in Chd

TIMES NEWS NETWORK

Shimla: As the number of cancer cases is on the rise in Himachal Pradesh, the state govt has empanelled Homi Bhabha Cancer Hospital and Research Centre, New Chandigarh, under the Mukhya Mantri Himachal Health Care (Himcare) scheme.

The initiative will provide comprehensive and cashless cancer treatment services to the residents of Himachal Pradesh.

Health and family welfare minister Dhani Ram Shandil during the assembly session on Sept 7 mentioned that as many as 32,909 cancer patients were under treatment in six medical colleges in the hill state.

Dr Ashish Gulia, director, Homi Bhabha Cancer Hospital and Research Centre, said: "The partnership will allow patients from Himachal Pradesh to avail cashless cancer treatment at our hospital, ensuring that no one is deprived of essential medical care due to financial constraints."

Himcare, a health insurance initiative under the Himachal Pradesh govt's department of health and family welfare, offers financial coverage of up to Rs 5 lakh per family per year for cashless treatment.

"The partnership will allow patients from Himachal Pradesh to avail cashless cancer treatment at our hospital, ensuring that no one is deprived of essential medical care due to financial constraints"

DR ASHISH GULIA
Director| Homi Bhabha Cancer Hospital & Research

News articles highlighting the body of work at HBCH | ***Source: HBCH***

Deloitte.