



IMPACT ASSESSMENT STUDY OF WATER CONSERVATION PROJECT

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Project Report

Project Title: Water Conservation Project (Impact Assessment Study)

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Sunil Sangwan

(Project Investigator)

Executive Summary

The Water Conservation Projects that are being implemented in Bhavnagar by GMDC-GVT as part of its Corporate Social Responsibility (CSR) initiatives, has brought transformative changes to rural communities. Focused on villages like Thordi, Bhuteshwar, and Bhumbhli, the project addresses critical challenges of water scarcity and sustainable rural development through infrastructure development and community engagement.

The projects have significantly enhanced water availability by implementing interventions such as lake deepening, pond construction, and check dams. In Thordi, two lakes provide year-round water availability, reducing dry spells to just one month, and enabling farmers to practice multicrop farming. In Bhumbhli and Bhuteshwar, similar efforts have extended the irrigation season, allowing for diverse crop cultivation, including grains, pulses, vegetables, and cash crops. Improved water retention has directly contributed to higher agricultural yields, greater food security, and increased household incomes. Farmers have also reported reduced dependency on monsoon rains and a decline in seasonal migration due to improved local livelihood opportunities.

Livestock development has been another significant outcome. Reliable water sources and enhanced fodder availability have supported larger herds, boosting milk production and creating supplementary income streams. For instance, Bhumbhli now sustains approximately 10,000 buffaloes and 3,500 cows, underscoring the scale of the project's impact on rural livelihoods.

Community involvement has been central to the projects' success. High level of awareness, as observed among the surveyed participants reflect the effective outreach facilitated by local leaders and Panchayat notifications. Excavated soil from water bodies has been creatively repurposed for community infrastructure, including roads, playgrounds, and farmland improvement, demonstrating the initiative's resource efficiency and holistic approach.

Despite the accomplishments, the projects face challenges such as soil salinity in areas near mining zones and seasonal variability in water availability. While temporary jobs were created during infrastructure development, the initiative's potential for long-term employment generation through schemes like MNREGA remains underutilized.

To further enhance the projects' impact, recommendations include expanding the depth and capacity of existing water conservation structures, extending coverage to underserved areas, and addressing soil degradation through sustainable farming practices. Incorporating advanced technologies such as micro-irrigation systems and real-time monitoring can optimize resource usage and operational efficiency. Strengthening efforts to involve marginalized groups in water management decisions and scaling successful models to other villages/regions are also essential.

The Water Conservation Project in Bhavnagar is a testament to the potential of integrated water resource management to drive rural development. Its success in improving agricultural productivity, enhancing water availability, and fostering socio-economic resilience demonstrates its value as a model for similar initiatives in other regions. With sustained support and strategic enhancements, the project has the potential to achieve long-term sustainability and greater impact across Gujarat.

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| BPL | Below Poverty Line |
|--------|--|
| CSR | Corporate Social Responsibility |
| FGDs | Focused Group Discussions |
| GMDC | Gujarat Mineral Development Corporation Limited |
| GVT | Gramya Vikas Trust |
| MNREGA | Mahatma Gandhi National Rural Employment Guarantee Act |
| SSIs | Semi-Structured Interviews |
| SSJSA | Sujalam Sufalam Jala Sanchay Abhiyan |

1.1 Background

Understanding the responsibility and accountability towards the sustainable development of communities where it extracts mineral wealth, GMDC has adopted a Corporate Social Responsibility (CSR) approach. To execute the CSR activities of GMDC, a specific public trust named GMDC-GVT was created under Sections 12A and 80G of the Income Tax Act, 1961. GMDC-GVT is executing all the social projects with a mission to improve the quality of life for communities near GMDC project sites through collaborative and innovative programs.

In Gujarat, the GMDC-GVT social activities are spread across eight districts namely Banaskantha, Bharuch, Bhavnagar, Chhota Udepur, Devbhumi Dwarka, Kachchh, Panchmahal, Surat. The trust CSR activities include skill-based development, quality education, drinking water and sanitation, climate action, cultural heritage preservation, and customized solutions to address specific local issues. The purpose is to bring positive change in the quality of life for rural communities. The upliftment of the rural communities is through innovative partnerships and programs, strategic collaborations, and stakeholder engagements. While GMDC-GVT is implementing various CSR projects, such as the Samarthya project, notebook distribution, financial assistance for girl students, and more, one of the key initiatives is the "Water Conservation Project."

1.2 Sujalam Sufalam Jala Sanchay Abhiyan and other Water Conservation Projects

Water scarcity remains a pressing issue in many regions of Gujarat, particularly in rural areas where conventional water management practices often fall short. Government of Gujarat has initiated the "Sujalam Sufalam Jala Sanchay Abhiyan (SSJSA)" to address water scarcity challenge by implementing effective water conservation measures, improving water storage infrastructure, and actively involving communities in managing water resources. In line with its mission to promote sustainable development, GMDC-GVT has contributed 40% of the public share required for the SSJSA. This substantial contribution is part of a collaborative effort with local communities to enhance the scheme's reach and effectiveness, maximizing its impact on water conservation and agricultural prosperity across the region. Besides, the collaboration in SSJSA, GMDC-GVT is independently implementing various other water conservation projects in the region. The projects are primarily focused on creating ponds, deepening check dams and ponds, to improve water retention and recharge groundwater levels.

The initiatives play a critical role in alleviating water scarcity, enhancing irrigation facilities, and ultimately boosting agricultural output, thereby directly supporting farmers' livelihoods.

Further, most of water conservation projects are community-driven and implemented at the Panchayat level. This decentralized approach ensures better monitoring at the ground level, allowing for more effective management and maintaining the quality of work. Local community involvement is essential in ensuring that the interventions are well-received, sustainable, and appropriate for the needs of the population. By investing in the development of water conservation facilities, GMDC-GVT seeks to strengthen community bonds, support local activities, and improve the overall quality of life in rural areas. The objectives of the water conservation projects are listed as:

a) Water Conservation: Implement water-saving techniques and infrastructure to conserve and manage water resources more efficiently, addressing water scarcity and supporting sustainable use.

b) Water Storage Facilities: Develop and enhance water storage facilities, including the deepening of check dams and ponds, to improve water retention and recharge groundwater levels for long-term availability.

c) Enhance Irrigation Potential in the Region: Increase the water retention capacity of local water bodies to provide better irrigation for adjoining agricultural land, enabling farmers to cultivate more crops, improve yields, and support rural livelihoods.

d) Promote Sustainable Agricultural Practices: With increased irrigation facilities to enable farmers to adopt sustainable agricultural practices, supporting long-term agricultural prosperity and contributing to food security.

e) Strengthen Community Engagement and Empowerment: Foster active community participation in water conservation efforts, educating residents on water management's importance. This approach empowers local communities by involving them in the development and maintenance of water resources, promoting a sense of ownership and responsibility.

To fulfil the above objectives, GMDC-GVT is implementing the following projects

(Table 1.1):

| No. | Village | Place | Work Done Amount | | Remarks |
|-----|----------|----------------|---------------------|------------|-------------------|
| | Name | | (Rupees) | | |
| 1 | Thordi | Jalum Well | Excavation work | 4,99,184/- | 12 Farmers; |
| | | Dam | has been carried | | For 60 acres of |
| | | | out to increase the | | land |
| | | | water storage | | irrigation/drinki |
| | | | capacity of the | | ng water for |
| | | | lake/dam, ensuring | | livestock |
| | | | enough water for | | |
| | | | farmers' | | |
| | | | wells/borewells | | |
| | | | and livestock | | |
| | | | drinking water. | | |
| 2 | Thordi | Big Lake | Excavation work to | 4,98,900/- | 5 Farmers; |
| | | | increase storage | | For 15–20 acres |
| | | | capacity, ensuring | | of land |
| | | | enough water for | | irrigation/drinki |
| | | | farmers' | | ng water for |
| | | | wells/borewells | | livestock |
| | | | and livestock | | |
| | | | drinking water. | | |
| 3 | Bhumbhli | Guyo Lake | Excavation work to | 4,99,397/- | 10 Farmers; |
| | | | increase water | | For 40 acres of |
| | | | storage capacity, | | land |
| | | | ensuring enough | | irrigation/drinki |
| | | | water for farmers' | | ng water for |
| | | | wells/borewells | | livestock |
| | | | and livestock | | |
| | | | drinking water. | | |
| 4 | Bhumbhli | Lake – 1, Lake | Excavation under | 1,50,300/- | 15 Farmers; |
| | | - 2 | the Sujalam | | For 50 acres of |
| | | | Sufalam Yojana; | | land |

Table 1. 1 GMDC Lignite Project- Water Harvesting Works at Bhavnagar

| | | | 40% local | | irrigation/drinki |
|---|------------|----------------|----------------------|------------|-------------------|
| | | | contribution for | | ng water for |
| | | | irrigation and | | livestock |
| | | | livestock drinking | | |
| | | | water. | | |
| 5 | Bhuteshwar | 1. Check Dam- | Excavation under | 2,06,017/- | 15 Farmers; |
| | | 1 (Bridged) | Sujalam Sufalam | | For 70 acres of |
| | | 2. Check Dam- | Yojana at three | | land |
| | | 2 (Behind No. | locations, ensuring | | irrigation/drinki |
| | | 3 Anganwadi) | irrigation water and | | ng water for |
| | | 3. Pond-1 | livestock drinking | | livestock |
| | | (Opposite | water. | | |
| | | Pataleswar | | | |
| | | Mahadev | | | |
| | | Temple) | | | |
| 6 | Rampar | Lake – 1 | Excavation under | 1,00,190/- | Drinking water |
| | | | Sujalam Sufalam | | for livestock |
| | | | Yojana to provide | | |
| | | | irrigation water for | | |
| | | | farmers and | | |
| | | | drinking water for | | |
| | | | livestock. | | |
| 7 | Thordi | A dam near the | Approval received | 5,00,000/- | 10 Farmers; |
| | | river on the | from higher | | For 40–45 acres |
| | | way to the | authorities. Work | | of land |
| | | farm of | was delayed due to | | irrigation/drinki |
| | | Nareshbhai | the rainy season. | | ng water for |
| | | Chanubhai | Scheduled to start | | livestock |
| | | | post-rains. | | |
| 8 | Bhumbhli | Dam/pond | Approval received | 5,00,000/- | 12 Farmers; |
| | | near the farm | from higher | | For 40 acres of |
| | | of Hirabhai | authorities. Work | | land |
| | | Makwana | was delayed due to | | irrigation/drinki |

| | | | the rainy season. | | ng water for |
|----|------------|-----------------|--------------------|------------|-------------------|
| | | | Scheduled to start | | livestock |
| | | | on December 24th. | | |
| 9 | Bhumbhli | A pond | Approval received | 5,00,000/- | 8–10 Farmers; |
| | | adjacent to the | from higher | | For 30–35 acres |
| | | Piplia bridge | authorities. Work | | of land |
| | | | was delayed due to | | irrigation/drinki |
| | | | the rainy season. | | ng water for |
| | | | Scheduled to start | | livestock |
| | | | on December 24th. | | |
| 10 | Bhuteshwar | Survey No. | Approval received | 5,00,000/- | 8 Farmers; |
| | | 127 Phadsar | from higher | | For 30 acres of |
| | | Lake | authorities. Work | | land |
| | | (Opposite | was delayed due to | | irrigation/drinki |
| | | Patleswar | the rainy season. | | ng water for |
| | | Mahadev | Scheduled to start | | livestock |
| | | Temple) | on December 24th. | | |

Source: GMDC-GVT

1.3 Scope of the Study

The scope of this impact assessment study focuses specifically on evaluating the effectiveness and impact of the SSJSA and related water conservation projects being implemented by GMDC-GVT in the villages of Bhavnagar district of Gujarat. It will evaluate the impact of water conservation interventions on water retention, groundwater recharge, irrigation facilities, and agricultural productivity in the select villages. The study will also examine the involvement of the local community in the development and maintenance of water resources, assessing their engagement in water conservation efforts. The assessment will be conducted in select villages within the Bhavnagar district, including those in the proximity of GMDC's operational areas. The scope of study also includes to assess the impact of the water conservation initiatives on the socio-economic conditions of the communities, particularly in terms of access to clean water, diverse livelihood, improved agricultural yields, and enhanced sustainable farming practices. Overall, the study aims to assess the success of GMDC-GVT's water conservation efforts in Bhavnagar district and provide valuable insights into their effectiveness in improving the long-term resilience of rural communities in the region.

Chapter 2 - Research Methodology

To accomplish the purpose of study, that is, to assess the impact of the SSJSA/Water Conservation Projects in Bhavnagar, we adopted a mixed-method approach combining both qualitative and quantitative research techniques to provide a comprehensive evaluation of the projects. The methodology is structured as follows:

2.1 Study Region

This study of impact assessment of water conservation projects is conducted in villages of the Bhavnagar district that surrounds the GMDC operational area. The district is in the southwestern part of the Saurashtra region of Gujarat, bordered by the Gulf of Cambay to the east, and neighbouring districts such as Ahmedabad, Rajkot, and Surendra Nagar. The district is a mix of coastal and arid conditions and is heavily reliant on agriculture. Maps of the study region is given below (Figure 2.1).



Figure 2. 1 Maps of the study region

The region, particularly its rural areas, faces challenges related to water scarcity, which directly affects agricultural productivity and the livelihoods of local communities. Further, these rural areas are home to several marginalized communities that rely on agriculture for their income, making them vulnerable to the impacts of climate change and water shortages.

2.2 Sampling Technique

The stratified random sampling method is employed to ensure that the study is representative of the affected populations. We divided the study area into distinct strata (groups), ensuring that each type of water conservation project (*e.g.*, check dams, ponds, lake deepening) is adequately represented in the sample. The respondents in the villages are selected using again

stratified random sampling method. The respondents are selected in a way to ensure the diversity in perspectives, including people from different socio-economic statuses and roles (e.g., farmers, and community leaders). This helps in improving the reliability and generalizability of the study findings.

2.3 Selection of Villages and Respondents

Villages: The research team included those villages in study that are being benefitted from the water conservation projects. This include villages of Thordi, Bhuteshwar, and Bhumbhli, where initiatives of check dams, ponds and lake-deepening have been executed.

Respondents

A total of 40 respondents were selected for the study using stratified random sampling from the identified villages. Respondents include a mix of local farmers, community leaders, and beneficiaries actively involved in or impacted by the GMDC-GVT water conservation projects. The selected villages and the number of respondents from the select villages are presented in Table 2.1.

| Sr. No | District | Villages | Number of |
|--------|-----------|------------|-------------|
| | | | Respondents |
| 1 | | Thordi | 27 |
| 2 | Bhavnagar | Bhuteshwar | 6 |
| 3 | | Bhumbhli | 7 |
| | | Total | 40 |

Table 2. 1 Village-wise distribution of the respondents of selected villages of Bhavnagar

Source: Primary Survey

2.4 Survey and Data Collection

The study is based on the primary data collected through survey. Survey and data collection is supported by GMDC-GVT officials. For the survey, the team made the site visits to the farmers' farms, and the constructed water conservation structures. The team also made visits to the villages to capture the community perspectives about water conservation projects. The survey helped in capturing the farmers' experiences, community experiences, and the tangible impacts of the projects on local water resources and agriculture. This approach helped to capture the

qualitative, quantitative, and observational data. The survey tools employed are the structured interviews, semi-structured interviews, and focused group discussions to gather comprehensive insights into the project's impact on the communities in Bhavnagar. Details about the survey and data collection is provided below. Source: Primary Survey

1. Farms Visits and Farmers' Survey

Farms visits (Figure 2.2 and 2.3) were conducted with farmers who are directly benefitted from the water conservation projects. During these visits, questionnaires were administered to farmers to gather qualitative, and quantitative data on various aspects of the farmers' agricultural practices, water usage, and socio-economic conditions. Key areas of data collection included:

- **Demographic and Household Information**: Basic details about the farmers' household structure, age, caste, gender, and land size.
- Water Access and Usage: Data on water sources available/used for drinking, irrigation, and livestock, along with any challenges faced in accessing water resources.
- **Irrigation**: Details on irrigation sources, irrigation equipment, and any support received from the SSJSA or other water conservation projects.
- Agricultural Practices and Crop Production: Information on types of crops grown, farming techniques (drip irrigation, flood irrigation), and changes in productivity attributed to improved water availability.
- **Income and Livelihoods**: Insights into the impact of water conservation on farmers' income levels, agricultural yields, and the overall sustainability of farming practices.

This survey data helped quantify the impact of the water conservation projects on individual farmers' productivity and economic well-being.



Figure 2. 2 Pictures taken during the Field Visits



Figure 2. 3 Pictures taken during the Field Visits

2. Focussed Group Discussions with the Village Communities

Focused Group Discussions (FGDs) (Figure 2.4, 2.5 and 2.6) are conducted with groups of community members (farmers, villagers) to gather qualitative insights. FGDs provide an indepth understanding of the community's collective experience and how they perceive the impact of the interventions. Detail about FGDs is presented in Table 2.2. These discussions helped the research team to explore:

- i. Community perceptions about the projects
- ii. Challenges faced during and after implementation

iii. Suggestions for improving the projects

| District | Village | Size of the Group for FGDs |
|-----------|------------|----------------------------------|
| Bhavnagar | Thordi | 7 |
| | Bhuteshwar | 8 |
| | Bhumbhli | 12 |

Table 2. 2 Total number of Conducted FGDs during the Field Survey

Source: Primary Survey



Figure 2. 4 Image of Focused Group Discussion



Figure 2. 5 Image of Focused Group Discussion



Figure 2. 6 Image of Focused Group Discussion

3. Semi-Structured Interviews (SSIs)

SSIs are conducted with key stakeholders such as:

a) Gram Panchayat representatives (Sarpanch)) (Figure 2.7)

b) GMDC-GVT project implementers (Figure 2.8)

These interviews provided a deeper understanding of the implementation process, community involvement, and the effectiveness of the interventions from the perspective of decision-makers.



Figure 2. 7 Semi-Structured Interview with Sarpanch



Figure 2. 8 Semi-Structured Interview with Sarpanch and Zonal Project Coordinator

4. Site Visits to Constructed Water Conservation Structures

Site visits (Figure 2.9 and 2.10) were conducted to assess the physical condition and functionality of the water conservation infrastructure developed under the water conservation projects/SSJSA. These visits provided observational data on the effectiveness and upkeep of the constructed facilities. Key observations and data points included:

- **Condition and Maintenance**: An evaluation of the current state of structures such as check dams, ponds, and trenches, as well as any visible maintenance efforts.
- Effectiveness in Water Retention: Observations on how well these structures are functioning in retaining water, recharging groundwater, and supporting local irrigation needs.

This combination of the survey data and on-site observations enabled a comprehensive assessment of the water conservation initiatives and their effectiveness in meeting local needs.



Figure 2. 9 Picture taken during Site Visits to Constructed Water Conservation Structures



Figure 2. 10 Picture taken during the Site Visit to Constructed Water Conservation Structures

2.5 Data Analysis Process

2.5.1 Quantitative Data Analysis

The quantitative data analysis is based on data gathered through structured questionnaires in the villages of Thordi, Bhuteshwar, and Bhumbhli, chosen for their reliance on agriculture and previous struggles with water scarcity. The statistical analysis captures socio-economic characteristics of respondent households, including age, social class, family size, land ownership, annual income, economic status, and access to government schemes. This comprehensive analysis sheds light on the studied population and helps assess the inclusiveness and equitable impact of the SSJSA water conservation initiatives.

2.5.2 Qualitative Data Analysis

A) Thematic Analysis

The qualitative data collected from FGDs, and SSIs is analysed using **a thematic analysis** approach. This allowed us for the identification of common themes, patterns, and insights related to the community's perception of the SSJSA/Water Conservation projects, their challenges, and suggestions for improvement.

Transcription and Coding

All FGDs and SSIs are transcribed as original to ensure an accurate representation of the community's views. The transcripts are then systematically coded to identify key themes and categories, including:

- **Perceived Benefits**: Respondents' views on the positive impacts of the SSJA projects on water availability, farming productivity, and socio-economic conditions.

- Challenges: Issues faced by the community in the implementation phase and any ongoing problems related to the maintenance of water conservation structures.

- **Suggestions for Improvement**: Recommendations from stakeholders on how to enhance the water conservation projects, increase community involvement, or improve project sustainability.

B) Cross-Analysis of Stakeholder Perspectives

The views of farmers, Gram Panchayat representatives, and GMDC-GVT officials are compared to identify any gaps in understanding or differing perspectives on the effectiveness of the water conservation initiatives. This cross-analysis provides a fuller picture of the challenges and successes of the SSJA projects from multiple stakeholders' viewpoints.

C) Narrative Analysis

A narrative approach is used to capture the stories shared by community members about their experiences with the SSJSA/water conservation projects. These narratives provided qualitative insights into the real-world implications of the water conservation efforts and the community's resilience in facing challenges. Figure 2.11 presents the complete data analysis process.



Figure 2. 11 Data Analysis Process

Chapter 3 - Results and Discussions

The Water Conservation Projects or SSJSA have been a transformative initiative aimed at addressing water scarcity and fostering sustainable rural development in state of Gujarat. This water conservation program, supported significantly by the GVT, focuses on enhancing water retention, recharging groundwater, and enabling multi-season agriculture in water-scarce regions. The initiative integrates infrastructural development, community engagement, and socio-economic upliftment.

This chapter presents a qualitative and quantitative analysis of the project outcomes, using evidence from three villages—Thordi, Bhuteshwar, and Bhumbhli—that participated in the water conservation program. The analysis based on the data collected highlights key achievements, challenges, and the way forward for maximizing the program's impact. The village-specific analysis of the program's outcomes provides a comprehensive overview of its broader impact on agriculture, livestock, community well-being, and environmental sustainability.

3.1 Insights from Quantitative Data Analysis

This section focuses on the quantitative assessment of water conservation projects in Gujarat's Bhavnagar district. The evaluation is based on data gathered through structured surveys conducted in the villages of Thordi, Bhuteshwar, and Bhumbhli, chosen for their reliance on agriculture and previous struggles with water scarcity. The statistical analysis captures socio-economic characteristics of respondent households, including age, social class, family size, land ownership, annual income, economic status, and access to government schemes. This comprehensive analysis sheds light on the studied population and helps assess the inclusiveness and equitable impact of the SSJSA water conservation initiatives.

Socio-Economic Characteristics of the Respondents;

Age:

The average age of respondents in the surveyed villages is 50 years, with the youngest being 24 years old and the oldest 70 years. Figure 3.1 provides a breakdown of respondents' ages by village. All the respondents are male respondents only.



Figure 3. 1 Age classification of the respondents

Caste:

Caste distribution is a critical social factor that influences community participation and inclusivity in rural development initiatives. From the study perspectives, it sheds light on the representation of various social groups in water conservation efforts. The analysis of castewise distribution across the villages of Bhumbhli, Bhuteshwar, and Thordi provides valuable insights into the reach and equity of the initiative.

Figure 3.2 illustrates the caste distribution of respondents across the three villages. The majority, 85%, belong to the OBC category, demonstrating the initiative's significant engagement with this group, while the remaining 15% fall under the General category. Notably, in Bhumbhli, all respondents are exclusively from the OBC category. These findings indicate a focused inclusion of OBC communities, reflecting the initiative's alignment with equitable development goals.



Figure 3. 2 Caste classification of the respondents' households

Family Size

The survey revealed that the respondents' average family size is five members, with the smallest family comprising one person and the largest consisting of eleven members (Figure 3.3). Among the households surveyed, 82.5% were nuclear families, while only 17.5% followed a joint family system. This diverse family size distribution reflects varying needs and demands for water resources. Larger families may require more substantial water supply solutions, while smaller families, may have different needs. Tailoring the SSJSA's water conservation and management strategies to account for these differences is crucial in maximizing the initiative's impact on households of all sizes.



Figure 3. 3 Family Size classification of the respondents' households

Landholding

Landholding size is a critical factor in rural livelihoods, particularly in regions where agriculture forms the primary economic activity. In the context of the **SSJA**, understanding the distribution of landholdings among respondents provides insights into their agricultural practices and water resource requirements. Farmers with larger landholdings may have different water needs compared to those with smaller plots, influencing how water conservation measures are implemented and utilized. Analyzing landholding patterns across the villages of Bhumbhli, Bhuteshwar, and Thordi helps effectively tailor the initiative to address these varying needs.

Figure 3.4 shows that the average land holding of the surveyed households is nine acre, while minimum land size is of 2.5 acre and maximum land size is 25 acre.



Figure 3. 4 Landholding classification of the respondents' households

This distribution highlighted the need for flexible water conservation strategies. In Bhumbhli, the relatively larger landholding sizes suggested a need for more extensive irrigation support, whereas in Bhuteshwar, with relatively smaller landholdings, might benefit from targeted micro-irrigation systems or community-level water conservation infrastructure.

Annual Income

Annual income is a key economic indicator that reflects the financial well-being of households and their capacity to invest in development initiatives. In the context of the SSJSA, understanding the income levels of participating families is vital for designing water conservation strategies that align with their economic capabilities. Income distribution also influences households' ability to adopt and maintain water management practices, particularly in resource-constrained rural settings. Analysing annual income across the surveyed villages provides valuable insights into the economic diversity of the respondents.





Figure 3. 5 Annual Income classification of the respondents' households

The average annual income of the surveyed households is ₹3,83,625, ranging from a minimum of ₹1,12,500 to a maximum of ₹11,25,000. A detailed representation of the respondents' annual income is shown in Figure 3.5. This variation in income distribution underscores the need for adaptable financial models within the SSJSA. Households with higher incomes, as seen in Bhuteshwar, may be better positioned to adopt advanced water conservation techniques, whereas those in lower-income brackets, like in Bhumbhli, might require subsidized support or simpler interventions. These insights help ensure that the initiative remains equitable and accessible, regardless of respondents' economic status, thereby fostering inclusive growth and sustainable water management practices.

Economic Status of Family

The economic activity within a household provides a critical lens for understanding its financial sustainability and overall capacity to engage in development projects like the SSJSA. Households are classified based on the number of economically active members, as this indicates their income-generating capacity. A greater number of economically active members suggests a higher potential for participating in and sustaining initiatives like water conservation. Figure 3.6 shows that, on average, each household has two economically active members. In Bhumbhli and Bhuteshwar villages, where the number of economically active members per household is higher, there is a greater potential for community involvement in water conservation projects.



Figure 3. 6 Economic status classification of the respondents' households

BPL Cardholders

The possession of a Below Poverty Line (BPL) card serves as an indicator of economic vulnerability within households. BPL cardholders are eligible for various government welfare schemes, which can significantly impact their ability to participate in and benefit from initiatives such as the SSJSA. Analyzing the distribution of BPL cardholders across the surveyed villages provides insight into the socio-economic status of these villages, highlighting the need for targeted support to ensure inclusive development.

Figure 3.7 shows that only 17% of the surveyed households have BPL cards, while the remaining 83% do not. The results indicate that while most households in the surveyed villages are not classified as below the poverty line, a small proportion still faces considerable economic difficulties. For the SSJSA initiative, special provisions may be needed for the BPL households to ensure their equitable participation and access to water conservation benefits.



Figure 3. 7 BPL Card classification of the respondents' households

3.2 Insights from Qualitative Data Analysis

In this section, we present the findings of the qualitative data analysis. Through a series of semi-structured interviews and FGDs, we explored the experiences, perceptions, and feedback of key stakeholders, including farmers, local community leaders, and project beneficiaries. The analysis provides an in-depth understanding of the SSJSA and related water conservation initiatives, capturing the diverse impacts observed at the community level. By examining the themes and patterns emerging from the data, this section delves into the unique socio-economic, agricultural, and environmental outcomes in each location, while also addressing the challenges faced and areas for improvement.

3.2.1 Village-Specific Analysis and Impact Assessment

1. Thordi Village

A. Infrastructure Development

The construction of two lakes in Thordi village marked a significant step in addressing water scarcity. These lakes have greatly enhanced the water retention capacity in the village by recharging nearby wells and providing a reliable source of water for multiple uses. Approximately 450 households benefited directly from this development, with each household gaining access to well that now retain water for nearly the entire year.

B. Water Availability

Before the intervention, water supplies lasted only 3–4 months after the monsoon season, forcing farmers to leave land barren for the rest of the year. Currently, water is available for almost the entire year, with a short dry spell of one month. This shift has dramatically increased the productivity of both land and labour.

C. Agricultural Transformation

The consistent availability of water has allowed farmers to transition from single-crop farming to multi-crop farming, enabling them to grow 2–3 crops simultaneously. Crops cultivated now include bajra (pearl millet), sorghum, cotton, wheat, groundnut, onions, pulses (such as urad and gram), and vegetables for household consumption.

Seasonal rains replenish the lakes, ensuring that water is available for both winter and summer crops, stabilizing agricultural output.

D. Socio-Economic Outcomes for Farmers

The improved irrigation facilities have led to higher agricultural yields, increasing food security for families. The ability to grow and sell multiple crops has boosted farmers' incomes and reduced their dependency on irregular monsoon rains. As a reason of this, migration for seasonal labour has reduced significantly, as villagers can now sustain their livelihoods through local agricultural activities.

Figure 3.8 presents the water conservation work at Thordi village.



Figure 3. 8 Image of the water conservation project

2. Bhuteshwar Village

A. Lake Construction and Water Retention

A lake was constructed in Bhuteshwar village to recharge nearby wells, which serve as a lifeline for agriculture. Before the intervention, wells dried up every year by February-March, leaving fields unproductive for most of the year. Post-intervention, water availability has been extended until April-May, adding 2–3 crucial months to the growing season.

B. Agricultural Expansion and Diversification

The additional water availability has enabled farmers to grow 3–4 crops simultaneously. Vegetables and pulses have been added to traditional crops like grains, diversifying income sources and improving household nutrition. The extended growing season has also increased overall agricultural output, enhancing economic resilience.

C. Livestock Development

Farmers now maintain larger livestock, supported by abundant water and locally grown fodder. As a result, milk production has risen significantly, creating additional income streams through dairy sales in local markets.

D. Social and Economic Benefits

Improved water availability has led to a noticeable reduction in migration, as families can now rely on farming and animal husbandry for sustenance. The increased agricultural and livestock productivity has provided villagers with a stable income, improving their overall quality of life.

3. Bhumbhli Village

A. Lake and Well Development

In Bhumbhli village, a large lake was constructed to recharge a well that irrigates approximately 100 bighas of farmland. This infrastructure has proven critical in addressing water shortages and ensuring reliable irrigation for both crops and livestock.

B. Water Availability and Agricultural Benefits

Previously, wells dried up by February-March, limiting farming activities. Now, water is available until April-May, significantly extending the farming season. With water availability, farmers cultivate a diverse range of crops, including grains, vegetables, and pulses, while also growing sufficient fodder for cattle.

C. Livestock and Dairy Production

The reliable water source has allowed the village to support around 10,000 buffaloes and 3,500 cows. Cattle benefit directly from the lake, using it for drinking and bathing, which improved their health and milk quality. Also, the self-sufficiency in fodder production has reduced external costs, saving farmers money and increasing profitability.

D. Economic Stability

As there is an increase in number of cattle in the village, with increased milk production, farmers earn additional income, contributing to household stability. With the change, the overall economic resilience of the village has improved, reducing dependency on external factors. Figure 3.9 presents the water conservation work at Bhumbhli village.



Figure 3. 9 Image of the water conservation project

3.2.2 Overall Impact Assessment across the villages

1. Program Awareness

From the FGDs, most respondents demonstrated a good understanding of the water conservation project's objectives and activities, largely due to active community engagement by GMDC-GVT. Villagers expressed high levels of satisfaction with the tangible improvements brought by the initiatives, including access to water and enhanced livelihoods.

2. Infrastructure Development

Thordi and Bhuteshwar Villages: Construction of lakes significantly increased groundwater recharge, enabling year-round water availability.

Bhumbhli Village: The large lake and accompanying well infrastructure have enhanced irrigation for over 100 bighas of farmland, addressing historical water shortages.

Excavated soil repurposing for roads and playgrounds is a creative use of resources, adding infrastructure value.

3. Agricultural and Economic Transformation

Agricultural Productivity:

- A shift from single to multi-crop farming in all villages has stabilized agricultural outputs, reducing dependency on monsoons.
- The introduction of high-value crops, such as pulses and vegetables, has diversified income sources and improved food security.

Economic Benefits:

- Increased agricultural yield has boosted household incomes.
- The program reduced seasonal migration as more families now rely on local farming.
- Temporary jobs during construction created short-term employment for laborers.

4. Livestock

Improved access to water has supported larger livestock herds, leading to enhanced milk production. Farmers reported increased profits from dairy sales, particularly in Bhumbhli village, which now sustains approximately 10,000 buffaloes and 3,500 cows.

5. Community Empowerment

- Communities actively participating in water resource management reported a stronger sense of ownership and accountability.
- The training provided to manage and maintain these projects has improved local governance over water resources.

6. Environmental and Social Impact

Environmental Benefits:

• Enhanced groundwater recharge and better soil moisture retention have ensured ecological sustainability.

Social Benefits:

- Reduction in migration has helped keep families together, improving social cohesion.
- Increased earnings have improved access to education and healthcare for many households.

3.3 Utilization of Excavated Soil from Pond or Lake Construction under Water Conservation Projects

The soil released during the excavation of ponds under water conservation projects is effectively utilized for various community and infrastructure development purposes. This thoughtful use not only maximizes the benefits of the project but also enhances its sustainability by addressing multiple local needs.

a) **Playground Development**: The excavated soil is used to prepare playgrounds, creating a suitable space for children to engage in outdoor activities and sports. This initiative also supports their preparation for physical fitness tests, fostering overall development and encouraging an active lifestyle among the youth.

b) Farm Road Construction: By utilizing the soil for farm road construction, the initiative ensures better connectivity to agricultural fields. This improved accessibility facilitates the transportation of produce, equipment, and supplies, thereby supporting farmers in their day-to-day activities and enhancing agricultural productivity.

c) Village Infrastructure: The soil serves as a resource for the construction and maintenance of village roads and small bridges. These infrastructural developments improve overall connectivity within the community, making travel easier and more efficient for villagers.

d) **Agricultural Usage**: Farmers can use the excavated soil based on their specific requirements. Whether for levelling uneven fields, filling depressions, or improving the fertility of their land, this use contributes to better land management and supports agricultural operations.

e) Village and Residential Construction: The soil is also made available for broader construction needs within the village. It plays a role in building or repairing homes, community structures, or any other essential infrastructure.

Figure 3.10 presents a holistic view of the excavated soil usage. Figure 3.11 is image of the playground developed using the excavated soil.



Figure 3. 10 The holistic usage of the excavated soil from water conservation projects



Figure 3. 11 Image of the playground developed using excavated soil

3.4 Awareness and Source of Awareness of SSJSA/Water Conservation Projects

3.4.1 Awareness

Awareness of water conservation initiatives, such as the SSJSA, is a key determinant of community engagement in these projects. The knowledge of such campaigns indicates the level of community outreach and awareness-building activities conducted in the region. Understanding this awareness can help in tailoring strategies to enhance participation and ensure the success of water conservation efforts.

During the survey, it finds that all the respondents across the surveyed villages—Bhumbhli, Bhuteshwar, and Thordi — are aware of the SSJA and other water conservation projects. This 100% awareness rate is an encouraging sign and highlights the effective dissemination of information about these initiatives in the surveyed areas.

The universal awareness of SSJSA suggested a strong foundation for engaging these communities in ongoing and future water conservation projects. However, ensuring that this awareness translates into active participation and tangible outcomes remains a crucial next step. Outreach programs should focus on equipping communities with the resources and knowledge needed to maximize the benefits of such initiatives, thereby promoting sustainable water resource management and agricultural development.

3.4.2 Sources of Awareness

Water conservation efforts, and the success of water conservation projects heavily relies on effective communication with the local community. Understanding how surveyed villagers became aware of water conservation initiatives provide insights into the most effective outreach channels. These findings highlight the role of local leaders, social networks, and public communication platforms in disseminating information.



Figure 3. 12 Sources of Awareness About SSJA Water Conservation Projects

Figure 3.17 showed that in Thordi village, the Sarpanch played a pivotal role in spreading awareness, with 96% respondents citing it as their primary source. Notifications in the Panchayat Office (93%) were also crucial in reaching the villagers. Social connections such as neighbours (48%) and relatives/friends (59%) contributed significantly, while radio/TV announcements (22%) had a smaller but noteworthy impact. A similar pattern emerged in Bhuteshwar, where the Sarpanch (83%) and Panchayat notifications (67%) were dominant, while neighbors, friends, and public broadcasts played secondary roles. In Bhumbhli, awareness efforts were equally distributed between Sarpanch (86%) and Panchayat notifications (86%), with social and mass media sources playing a supplementary role.

The data highlighted that local leadership and official communication channels were key drivers of awareness for water conservation projects. However, to engage a broader audience, there is potential to enhance the reach of mass media platforms, especially in Bhuteshwar and Bhumbhli. Strengthening these communication strategies can improve the impact of future conservation initiatives.

3.5 Impact Analysis from Perspectives of Beneficiaries

The implementation of water conservation initiatives, such as those under the SSJSA, has significantly impacted beneficiaries by improving water availability, agricultural productivity, and economic conditions. Key activities under the scheme, including the construction and renovation of ponds, rainwater harvesting, and micro-irrigation systems, have directly benefited farmers and households in the studied villages. To assess the initiatives' impact on various aspects of livelihoods, beneficiaries were surveyed on their perceptions. The responses are collected in a 5-Likert scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree), The responses indicated the respondents' level of agreement regarding the water conservation projects associated benefits. The analysis is presented village-wise.

3.5.1 Thordi Village

The beneficiaries in Thordi village were surveyed to evaluate the impact of the SSJA and other water conservation projects on various aspects of their lives. Their responses provide insights into improvements in resource availability, agricultural outcomes, and socio-economic benefits (Figure 3.13).

Resource Availability and Environmental Improvements

Majority of respondents (92 %) strongly agreed/ agreed that the availability of drinking water has improved substantially. A significant 85 % respondents endorsed that the irrigation conditions have improved with the commencement of the water conservation projects. These improvements were complemented by a rise in the groundwater table, as noted by 89 % respondents. However, the project's impact on vegetation growth showed a mixed response, with only 56% respondents delivered positive responses, suggesting room for improvement in this area.

Agricultural and Economic Benefits

The project's role in improving the agricultural and economic outcomes was widely acknowledged. A significant high percent of respondents agreed on the increase in farmer income (93%) and increase in agricultural produce (67%), demonstrating the project's effectiveness in boosting agricultural productivity. All the survey households experienced an increase in their livestock numbers, likely due to better fodder availability. The farmers also reported that they are benefited from the excavated soil that is dugged out during process of creation of or deepening of the water body like ponds and lakes.



Figure 3. 13 Impact Analysis from perspectives of the Beneficiaries: Thordi Village

Migration and Employment

The water conservation projects seems to have a limited impact on the migration in villages, as only 34 % respondents provided a positive response. Similarly, the projects' contribution to employment generation under MNREGA is limited, with only 15 % respondents reported a positive impact. The findings highlight the need for enhanced employment and migration-related interventions in Thordi village. Figure provides a glimpse of the impact analysis from perspectives of the beneficiaries of Thordi Village.

3.5.2 Bhuteshwar Village

The implementation of the SSJSA and water conservation initiatives in Bhuteshwar village demonstrated varying impacts on the community (Figure 3.14). While certain benefits were widely recognized, some aspects revealed moderate or limited success.

Resource Availability and Environmental Benefits

In Bhuteshwar, improvements in drinking water availability were noted, with 67% of respondents expressing satisfaction. Similar percent responses were observed regarding irrigation water availability. As per respondents there is a noticeable improvement in groundwater table due to water conservation projects. However, the respondents expressed a mix of experiences regarding the projects' impact on vegetation growth and fodder availability.

Agricultural and Economic Outcomes

The respondents highlighted significant gains in agriculture. The increase in agricultural produce was acknowledged by all of respondents. The farmers acknowledged that there is an increase in income due to improvement in irrigation conditions. Encouragingly, all the respondents agreed that the project contributed to an increase in livestock numbers, indicating a direct benefit to their livelihoods.

Migration and Employment

The project's role in controlling rural migration received limited acknowledgment, with only 17 % respondents reported positive impact. Similarly, its contribution to employment generation under MNREGA was insufficient. Regarding the benefits of excavated soil (building road, creation of playground etc.), 67 % respondents provided a positive

acknowledgement. Figure provides a glimpse of the impact analysis from perspectives of the beneficiaries of Bhuteshwar Village.



Figure 3. 14 Impact Analysis from perspectives of Beneficiaries - Bhuteshwar Village Source: Primary Survey

3.5.3 Bhumbhli Village

The outcomes of the SSJSA and related water conservation initiatives in Bhumbhli village highlight notable successes in water availability and agricultural benefits (Figure 3.15).

Resource Availability and Environmental Benefits

Respondents from Bhumbhli village reported noticeable improvements in drinking water and irrigation water availability. The respondents unanimously acknowledged the benefits of water conservation projects in the village. Positive feedback was also received regarding the increase in groundwater table. A majority 86 % of the respondents reported about the vegetation growth and fodder availability because of implementation of the water conservation projects.

Agricultural and Economic Outcomes

The initiatives demonstrated strong benefits for agriculture, with all the surveyed respondents reported an increase in agricultural produce. Similarly, farmer income was positively impacted

because of the water conservation projects. A major outcome of the projects was the increase in livestock numbers, where all the respondents agreed with this improvement. These findings indicate that the water conservation efforts directly enhanced farming and animal husbandry in the village.

Migration and Employment

The project's influence on controlling rural migration received mixed feedback, as only 29% of the respondents agreed to this impact. Similarly, the project's role in employment generation under MNREGA was perceived as limited. However, all the respondents from the village noted benefits from excavated soil that is dugged out from the water bodies. Overall, the project succeeded in improving water resources and agricultural outcomes. Figure provides a glimpse of the impact analysis from perspectives of the beneficiaries of Bhuteshwar Village.



Fig 3.15 Impact Analysis from perspectives of Beneficiaries - Bhumbhli Village

3.6 Identified Challenges

Soil Salinity

There are cases of soil salinity near the mining zones which adversely impacting the crop productivity.

Water Management System

In some cases, there is lack of community-led efforts to maintain the constructed infrastructure.

Employment Generation

A gap exists in the systematic generation of employment through water conservation projects.

Infrastructure Insufficiency

The constructed infrastructure has a limited capacity for water storage and the rainwater collection.

3.7 Recommendations to enhance the Benefits of Water Conservation Projects

Soil Salinity

GMDC-GVT should adapt measures to mitigate soil salinity problem.

Sustainable Water Management

Providing training in sustainable water management can enhance community-led local governance of water conservation and ensure the long-term sustainability of projects. The community-led maintenance of constructed infrastructure can ensure its long-term functionality and efficiency in retaining water.

Employment Generation/Economic Benefits

Structured employment programs linked to water conservation projects can help reduce migration and sustainably enhance rural livelihoods. Further, focused training on crop diversification and sustainable farming practices can further promote long-term livelihood security.

Community Engagement

Enhancing community participation in water resource management is essential to foster local ownership and accountability. To achieve this, workshops and awareness programs should be conducted to train villagers in maintaining and efficiently utilizing water conservation structures.

Monitoring and Feedback

Developing a structured monitoring framework is crucial to assess the long-term impacts on water availability, agricultural productivity, and socio-economic conditions. This requires regular feedback collection from project beneficiaries to refine and adapt interventions effectively.

Infrastructure Development

Enhancing the depth and capacity of existing lakes and check dams is essential to improve water retention and provide support during extended dry spells. Further, constructing new water conservation structures, particularly in underserved areas, can further strengthen water management efforts. A structured framework should be developed to ensure efficient use of conserved water and the productive utilization of excavated soil.

Chapter 4 - Summary of Findings

This chapter consolidates the key observations, impacts, and insights derived from the study assessing the water conservation projects implemented by GMDC-GVT as part of their CSR activities. The projects are implemented as independent projects or under the SSJSA in Bhavnagar district of Gujarat. By analysing the qualitative and quantitative data, the findings provide a comprehensive view of the initiative's successes, challenges, and areas requiring improvement. The goal is to highlight the transformative impact of these water conservation efforts while identifying gaps that need to be addressed to maximize their benefits.

4.1 Key Findings

1. Enhanced Water Availability

- Significant improvement in water availability for drinking and irrigation purposes across all surveyed villages.
- Groundwater recharge has notably increased, ensuring a more reliable water supply throughout the year.

2. Agricultural Productivity and Income Growth

- Transition from single-crop to multi-crop farming in all villages, increasing agricultural yields.
- Enhanced agricultural output has led to improved household incomes and food security.

3. Livestock Development

• Reliable water availability has supported the growth of livestock populations, with increased milk production contributing to additional income streams, particularly in Bhumbhli.

4. Community Engagement and Empowerment

• Active involvement of communities in implementing and managing water conservation infrastructure fostered a sense of ownership and responsibility.

• Awareness about the project's goals and benefits was universally high, with the Panchayat playing a key role in disseminating information.

5. Social and Economic Impacts

- Reduced seasonal migration as improved water availability allowed villagers to sustain livelihoods locally.
- Increased household incomes enabled better access to education and healthcare services.

6. Utilization of Excavated Soil

• Excavated soil from pond and lake deepening was effectively repurposed for community development such as playground construction, farm roads, and other village infrastructure.

4.2 Identified Challenges

Soil Salinity

There are cases of soil salinity near the mining zones which adversely impacting the crop productivity.

Water Management System

In some cases, there is lack of community-led efforts to maintain the constructed infrastructure.

Employment Generation

A gap exists in the systematic generation of employment through water conservation projects.

Infrastructure Insufficiency

The constructed infrastructure has a limited capacity for water storage and the rainwater collection.

4.3 **Recommendations**

- 1. Address Soil and Water Challenges: Mitigate salinity issues and improve infrastructure maintenance for long-term efficiency.
- 2. Enhance Agricultural Support: Promote high-value crops and sustainable farming practices through targeted training.

- 3. Utilize Excavated Soil Effectively: Continue using excavated soil for infrastructure and land improvement projects.
- 4. **Increase Community Engagement:** Strengthen local participation and provide training for sustainable resource management.
- 5. Address Social and Economic Gaps: Link projects with employment generation schemes and create local livelihood opportunities to curb migration.
- 6. **Expand and Strengthen Infrastructure:** Deepen and expand existing lakes and check dams; construct new ones in underserved areas.
- 7. **Improve Project Monitoring and Feedback Mechanisms:** Establish structured monitoring frameworks and incorporate beneficiary feedback to refine interventions.

The SSJA initiatives in the Bhavnagar district have achieved notable success in improving water availability, agricultural productivity, and community livelihoods. Addressing the identified challenges and implementing these recommendations will enhance the project's impact, ensuring sustainable development and long-term resilience for rural communities.

4.4 Limitations of the Study

While this impact assessment study provides valuable insights into the effectiveness of the SSJA and related water conservation projects in Bhavnagar district, several limitations may affect the scope and depth of the findings. These limitations are inherent to the research process and must be considered when interpreting the results. The study's constraints primarily relate to geographical boundaries, sample size, data accuracy, and time limitations, which could influence the generalizability and completeness of the conclusions drawn. Despite these challenges, the study still offers meaningful conclusions regarding the impact of water conservation initiatives in the region.

- 1. Geographical Limitation: The study is focused only on the Bhavnagar district of Gujarat, which may limit the generalizability of the findings to other regions where GMDC-GVT operates. While the findings provide valuable insights into the impact of the SSJA in Bhavnagar, they may not fully represent the outcomes in other districts or states.
- **2.** Sample Size and Representation: The study relies on surveys, FGDs, and SSIs with a sample of beneficiaries in Bhavnagar. The sample may not fully represent the entire

beneficiary population, which could lead to bias or incomplete data on the impact of water conservation interventions.

- **3.** Data Availability and Accuracy: The accuracy of the data collected is dependent on the availability of reliable records from the local authorities and the beneficiaries themselves. Any gaps in data or inconsistencies in reporting may affect the robustness of the study's conclusions.
- 4. Time Constraints: The study is limited by time constraints, which may prevent an indepth analysis of the long-term impacts of the water conservation initiatives. Given that sustainable water management and agricultural practices evolve over time, a more extensive study could provide better insights into the lasting effects of the interventions.
- **5.** Community Engagement Variability: The level of community engagement in water conservation projects may vary across different villages in Bhavnagar. As a result, the study may not fully capture the diverse experiences and outcomes across all affected communities.
- 6. External Factors: The impact of water conservation initiatives can also be influenced by external factors such as climate conditions, government policies, and market dynamics. These factors may not be fully accounted for in the study but can significantly affect the overall impact of the SSJSA.
- 7. Limited Scope of Socio-Economic Assessment: While the study aims to assess socioeconomic impacts such as agricultural productivity and water availability, the broader socio-economic changes in the region—such as changes in employment opportunities, education, and health—may not be fully captured within the scope of this study.
- 8. Self-Reported Data Bias: The reliance on self-reported data from beneficiaries may introduce bias, as respondents may overstate the positive impacts or downplay challenges faced during implementation. This may limit the objectivity of the findings.

Despite these limitations, the study provides valuable insights into the impact of GMDC-GVT's water conservation projects in Bhavnagar and contributes to understanding the effectiveness of water management interventions in rural areas.

APPENDIX 1: FGDs Questionnaires

Focused Group Discussion (FGD)

(डेन्द्रित कूथ **य**र्था (FGD))

Impact Assessment of Sujalam - Sufalam Jal Abhiyan (SSJA) / Water Conservation Projects

(સુજલામ - સુફલામ જલ અભિયાન (SSJA) / જળ સંરક્ષણ પ્રોજેક્ટ્સની અસરનું મૂલ્યાંકન)

Discussion 1: Awareness about the Different works undertaken by GMDC under the Sujalam - Sufalam Jal Abhiyan (SSJA)

(સુજવામ - સુફવામ જવ અભિયાન (SSJA) હેઠળ GMDC દ્વારા હાથ ધરવામાં આવેલા વિવિધ કાર્યો વિશે જાગૃતિ)

..... (Refer Questionnaire Section 2.2)

Follow-up 1: Different works undertaken by GMDC under the Sujalam - Sufalam Jal Abhiyan (SSJA)

(સુજવામ - સુફવામ જવ અભિયાન (SSJA) હેઠળ GMDC દ્વારા હાથ ધરવામાં આવેવા વિવિધ કામો)

...... (Refer Questionnaire Section 2.4)

Follow-up 2: Impact of these works on the society/individual/beneficiaries/region સમાજ/વ્યક્તિ/લાભાર્થીઓ/પ્રદેશ પર આ કાર્યોની અસર

- Specify positive impacts (હકારાત્મક અસરો સ્પષ્ટ કરો)

(Refer Questionnaire Section 3)

- Specify negative impacts (નકારાત્મક અસરો સ્પષ્ટ કરો)

Follow-up 3: Challenges faced during the implementation of the works assigned under the Sujalam - Sufalam Jal Abhiyan (SSJA)

(સુજલામ - સુફલામ જલ અભિયાન (SSJA) હેઠળ સોંપાયેલ કાર્યોના અમલીકરણ દરમિયાન પડકારોનો સામનો કરવો પડ્યો)

Follow-up 4: Suggestions for better implementation of the works under the Sujalam - Sufalam Jal Abhiyan (SSJA)

(સુજલામ - સુફલામ જલ અભિયાન (SSJA) હેઠળના કામોના વધુ સારા અમલીકરણ માટેના સૂચનો)

Discussion 2: Awareness about the Different works undertaken by GMDC under the other water conservation projects

(જીએમડીસી દ્વારા અન્ય જળ સંરક્ષણ પ્રોજેક્ટ્સ હેઠળ હાથ ધરવામાં આવેલા વિવિધ કાર્યો વિશે જાગૃતિ)

...... (Refer Questionnaire Section 2.2)

Follow-up 1: Different works undertaken by GMDC under the other water conservation projects

(જીએમડીસી દ્વારા અન્ય જળ સંરક્ષણ પ્રોજેક્ટો હેઠળ હાથ ધરવામાં આવેલા વિવિધ કામો)

...... (Refer Questionnaire Section 2.4)

Follow-up 2: Impact of these works on the society/individual/beneficiaries/region (સમાજ/વ્યક્તિ/લાભાર્થીઓ/પ્રદેશ પર આ કાર્યોની અસર)

- Specify positive impacts.....

(Refer Questionnaire Section 3)

- Specify negative impacts.....

Follow-up 3: Challenges faced during the implementation of the works assigned under water conservation projects

(જળ સંરક્ષણ યોજનાઓ હેઠળ સોંપવામાં આવેલ કાર્યોના અમલીકરણ દરમિયાન પડકારો)

Follow-up 4: Suggestions for better implementation of the works under the other water conservation projects

(અન્ય જળ સંરક્ષણ યોજનાઓ હેઠળના કામોના વધુ સારા અમલીકરણ માટે સૂયનો)

APPENDIX 2: Survey Questionnaires

Questionnaire for Impact Assessment of Sujalam - Sufalam Jal Abhiyan (SSJA) / Water Conservation Projects

(સુજલામ - સુફલામ જલ અભિયાન (SSJA) / જળ સંરક્ષણ પ્રોજેક્ટ્સની અસર મૂલ્યાંકન માટે

પ્રશ્નાવલી)

| | | | Date o | f interview: | |
|------------|--------------------|---------------------|-----------------|--------------|--|
| District (| જિલ્લો): | | | | |
| Block | | | | | |
| Name of | Village (ગામન્ | નું નામ) | | | |
| Village C | Code: | | | | |
| Househol | ld code: | | | | |
| I. H | OUSEHOLD | DETAILS (ધરગથ્થુ | વિગતો) | | |
| 1.1 N | ame (નામ): _ | | _ | | |
| 1.2 A | ge (ઉંમર): | | | | |
| 1.3 S | ex (જાતિ): | | | | |
| | i) Female (स्त्री) |) 🗆 ii) Ma | le (પુરુષ) 🛛 | | |
| 1.4 | Caste/Ethnic | group of the borrow | ver (વંશીય જૂથ) | | |
| SC | | ST | OBC | General | |

1.5 Religion of the borrower (\님붜)____

| Hindu | Muslim | Christian | Buddhist | Others (specify) |
|----------|-----------|------------|----------|------------------|
| (টিল্ট্) | (મુસ્લિમ) | (ખ્રિસ્તી) | (બૌક્ર) | |

1.6 Marital Status (বૈવાફિક સ્થિતિ) _____

| | Single | Married | Divorced | Widowed | | | | |
|----------------|---|--|---|---|--|--|--|--|
| | (સિંગલ) | (લગ્ન કર્યા) | (છૂટાછેડા લીધા) | (વિધવા) | | | | |
| 1.7 | Family size (કુટુંબનું કદ): | | | | | | | |
| | i. Number of Adults (વયસ્કોની સંખ્યા) | | | | | | | |
| 1.8.1 | Number of Children (બાળકોની સંખ્યા) | | | | | | | |
| 1.8.2 | Family Type (કૌટુંબિક પ્રકાર): | | | | | | | |
| | i. Joint | (સંયુક્ત) 🗆 ii. Nu | clear (અલગ) 🗆 ii | i. Single 🗆 | | | | |
| 1.9 | Head of the fan | nily (પરિવારના વડા) | : | | | | | |
| | i) Female (स्त्री) | ii) Male | ૯ (પુરુષ) □ | | | | | |
| 1.10 . | Economic status of your family (તમારા પરિવારની આર્થિક સ્થિતિ) | | | | | | | |
| | a) Economically dependent (આર્થિક રીતે નિર્ભર છે) (in number) | | | | | | | |
| | b) Economical | ly active (આર્થિક રીતે | સક્રિય) (in | n number) | | | | |
| 1 . 11. | Are you a hold | er of BPL card (શું ત | મે BPL કાર્ડ ધારક છો) _ | ? | | | | |
| | i. Yes (&l) | 🗆 ii. No | (ના) 🗆 | | | | | |
| 1.12 | You have MNR | EGA card? (શું તમ | ારી પાસે મનરેગા કાર્ડ છે? |)) | | | | |
| | i. Yes (&l) 🗆 | ii. No (에) 🗆 | | | | | | |
| II: | AWARENESS | (જાગૃતિ) | | | | | | |
| 2.1 | Do you know conservation p | about the Sujalam rojects (શું તમે સુજલ | - Sufalam Jal Abhiya ાામ - સુફલામ જલ અભિ | n (SSJA)/ other water ોયાન (SSJA)/ અન્ય જળ | | | | |
| | સંરક્ષણ પ્રોજેક્ટ્સ | ા વિશે જાણો છો?) | | | | | | |

i. Yes (\mathfrak{sl}) \Box ii. No (\mathfrak{oll}) \Box

2.2 If yes, how did you come to know about the water conservation projects? (Tick the options) જો હા, તો તમને જળ સંરક્ષણ પ્રોજેક્ટ્સ વિશે કેવી રીતે ખબર પડી? (વિકલ્પોને ટિક

કરો)

| (1) Through neighbors (पडोशीओ द्वारा) | (5) Through Radio and/or TV/Public Address | | | | |
|---------------------------------------|--|--|--|--|--|
| | System (રેડિયો અને/અથવા ટીવી/પબ્લિક | | | | |
| | એડ્રેસ સિસ્ટમ દ્રારા) | | | | |
| (2) Through relatives/friends | (6) Notification in Panchayat Office (પંચાયત | | | | |
| (સંબંધીઓ/મિત્રો દ્વારા) | કચેરીમાં સૂચના) | | | | |
| (3) Through Newspapers (સમાચાર પત્રો | (7) Other (specify) | | | | |
| દ્વારા) | | | | | |
| (4) Through Sarpanch (સરપંચ દ્રારા) | | | | | |

2.3 Are you aware of the key activities under the SSJA scheme/ other water conservation projects? (Tick the options below) શું તમે SSJA ચોજના/અન્ય જળ

સંરક્ષણ પ્રોજેક્ટ હેઠળની મુખ્ય પ્રવૃત્તિઓથી વાકેફ છો? (નીચેના વિકલ્પો પર ટિક કરો)

| Key Activities (Please Tick) મુખ્ય પ્રવૃત્તિઓ (કૃપા કરીને ટિક કરો) | | | | | | |
|--|--|--|--|--|--|--|
| 1) Renovation of ponds/Lakes | 2) Cleaning of ponds/ Deepening of ponds | | | | | |
| (તળાવો/તળાવોનું નવીનીકરણ) | (તળાવોની સફાઈ/તળાવ ઉંડા કરવા) | | | | | |
| 3) Construction of ponds/Lakes | 4) Construction of water tanks at | | | | | |
| (તળાવો/તળાવોનું બાંધકામ) | household level (ધરના સ્તરે પાણીની | | | | | |
| | ટાંકીઓનું બાંધકામ) | | | | | |
| 5) Construction of water tank at Panchayat | 6) Renovation of canals (नहेरोनुं | | | | | |
| Buildings, Schools, Hospitals etc. (પંચાયત | નવીનીકરણ) | | | | | |
| ઇમારતો, શાળાઓ, હેસ્પિટલો વગેરેમાં પાણીની | | | | | | |
| ટાંકીનું બાંધકામ.) | | | | | | |

| 7) Cleaning of Canals/Deepening of Canals | 8) Construction of Canals/ Trenches | | |
|--|---|--|--|
| (નહેરોની સફાઈ/નહેરોને ઉંડા કરવી) | (નહેરો/ખાઈઓનું બાંધકામ) | | |
| | | | |
| 9) Construction of Dugwells (Sગવેલનું | 10) Renovation/Deepening of Dugwells | | |
| | (ડગવેલનું નવીનીકરણ/ઊંડું કરવું) | | |
| બાધકામ) | | | |
| 11) Construction of check dams (रेष्ठेभनुं | 12) Adoption of Micro-irrigation System | | |
| | (સૂક્ષ્મ સિંચાઈ પદ્ધતિ અપનાવવી) | | |
| બાધકામ) | | | |
| 13) Afforestation (વનીકરણ) | 14) Availability of NARMADA water | | |
| | through Pumps (પંપ દ્વારા નર્મદાના પાણીની | | |
| | ઉપલબ્ધતા) | | |
| 15) Connectivity to canal/river water | 16) Rainwater harvesting (વરસાદી | | |
| (નહેર/નદીના પાણી સાથે જોડાણ) | પાણીનો સંગ્રહ) | | |
| 17) Contour Bundling (કોન્ટ્રર બંડલિંગ) | 18) Any other | | |

2.4 Details of the SSJA scheme/ other water conservation activities SSJA ચોજના/અન્ચ જળ સંરક્ષણ પ્રવૃત્તિઓની વિગતો

| | Activity (प्रवृत्ति) | Number/Length |
|---|---|----------------|
| | | (સંખ્યા/લંબાઈ) |
| 1 | Renovation of ponds/Lakes (તળાવો/તળાવોનું નવીનીકરણ) | |
| 2 | Cleaning of ponds/ Deepening of ponds (તળાવોની સફાઈ/તળાવ ઉંડા કરવા) | |
| 3 | Construction of ponds/Lakes (તળાવો/તળાવોનું બાંધકામ) | |
| 4 | Construction of water tanks at the household level (ધરના સ્તરે પાણીની ટાંકીઓનું બાંધકામ) | |

| 5 | Construction of water tanks at Panchayat Buildings, | |
|-----|--|--|
| | Schools, Hospitals, etc. પં(ચાયત ઇમારતો, શાળાઓ, | |
| | هاتها عطا مراكبية ستالط عذفاعتناط يناديوس | |
| | શાસ્વટલા વગરના વાલાળા ટાકાબાળુ બાવકાન). | |
| 6 | Renovation of canals (નહેરોનું નવીનીકરણ) | |
| 7 | Cleaning of Canals/Deepening of Canals (नहेरोनी | |
| | સફાઈ/નહેરોને ઉંડા કરવી) | |
| 8 | Construction of Canals/ Transhas (db2)/41624)dd | |
| 0 | Construction of Canals, Thenches (Methodo Sug | |
| | બાંધકામ) | |
| 9 | Construction of Dugwells (Sələdəri (ai ध्रिश्व) | |
| 1 | | |
| 10 | Renovation/Deepening of Dugwells (Səldkəj | |
| | નવીનીકરણ/ઊંડં કરવં) | |
| | | |
| 11 | Construction of check dams (ચેકડેમનું બાંધકામ) | |
| 12 | Adoption of Micro-irrigation System (સૂક્ષ્મ સિંચાઈ પદ્ધતિ | |
| | | |
| | અપનાવવા) | |
| 13 | Afforestation (वनीडरश) | |
| 1.4 | | |
| 14 | Availability of NARMADA water through Pumps (44 GR | |
| | નર્મદાના પાણીની ઉપલબ્ધતા) | |
| 15 | Connectivity to canal/river water (Number of formers | |
| 15 | bonofitted) (asized an unit) and solution and asi | |
| | benefitted) (ગરમ/ગટાળા વાલા સાથ જાડાણ (લાસ ચલલા | |
| | ખેડૂતોની સંખ્યા)) | |
| 16 | Contour Bundling (number of places) (มิศ.२ ผ่รได้วเ | |
| | contour bundling (number of phices) (orege storeter | |
| | (સ્થળોની સંખ્યા)) | |
| 17 | Any other: | |

III. IMPACT ON THE BENEFICIARIES (લાભાર્થીઓ પર અસર)

| Benefits લાભો | Strongly | Agree | Neutral | Disagree | Strongly |
|-----------------------------------|------------|--------|---------|----------|------------|
| | agree | (સંમત) | (તટસ્થ) | (અસંમત) | disagree |
| | (ભારપૂર્વક | | | | (ભારપૂર્વક |
| | સંમત) | | | | અસંમત) |
| a) Availability of drinking water | | | | | |
| (પીવાના પાણીની ઉપલબ્ધતા) | | | | | |
| b) Availability of irrigation | | | | | |
| water (સિંચાઈના પાણીની | | | | | |
| ઉપલબ્ધતા) | | | | | |
| c) Increase in Ground Water | | | | | |
| Table (ગ્રાઉન્ડ વોટર ટેબલમાં | | | | | |
| વધારો) | | | | | |
| d) Increase in vegetation | | | | | |
| (વનસ્પતિમાં વધારો) | | | | | |
| e) Availability of cattle fodder | | | | | |
| (પશુઓના ચારાની ઉપલબ્ધતા) | | | | | |
| f) Increase in the agricultural | | | | | |
| produce (કૃષિ પેદાશમાં વધારો) | | | | | |
| g) Increase in farmer income | | | | | |
| (ખેડૂતોની આવકમાં વધારો) | | | | | |
| h) Increase in livestock number | | | | | |
| at household (ધરમાં પશુધનની | | | | | |
| સંખ્યામાં વધારો) | | | | | |

| i) Control over the rural migration (ગ્રામીણ સ્થળાંતર પર | | | |
|--|--|--|--|
| નિયંત્રણ) | | | |
| j) Helped in the generation of | | | |
| employment under MNREGA | | | |
| (મનરેગા હેઠળ રોજગાર નિર્માણમાં | | | |
| મદદ કરી) | | | |
| k) Farmer benefitted from the | | | |
| soil that was excavated (for | | | |
| creation of water bodies) | | | |
| (ખેડુતને ખોદકામ કરવામાં | | | |
| આવેલી માટીનો ફાયદો થયો | | | |
| (જળના સ્ત્રોત બનાવવા માટે)) | | | |

- 4. If any Issues in the implementation of the SSJA scheme/ water conservation projects, please comment. (જો SSJA ચોજના/જળ સંરક્ષણ પ્રોજેક્ટ્સના અમલીકરણમાં કોઈ સમસ્યા હોય, તો કૃપા કરીને ટિપ્પણી કરો.)
- 5. Observations of the surveyor (સર્વેચરના અવલોકનો)

APPENDIX 3: Photographs of Project Work

1. Photographs taken during the Site Visits









(Source: Photographs Taken by Project Investigator)

2. Photographs of the Site Construction









(Source: Photographs Taken by Project Coordinator GMDC-GVT Bhavnagar)