Case Study Report: Promoting Environmental Awareness and Sustainable Waste Management in Alipur Village

1. INTRODUCTION

Environmental protection and sustainable waste management have become central concerns in the 21st century, especially in the context of climate change, pollution, resource depletion, and rising urban and rural populations. As the world grapples with these interconnected ecological challenges, there is growing recognition that environmental awareness and education must be rooted in local communities to inspire sustainable action. The effective management of waste, in particular, is one of the most visible and pressing environmental problems, especially in developing countries like India where rapid economic growth is accompanied by increased consumption, inadequate infrastructure, and limited awareness at the grassroots level.

Solid waste management encompasses the collection, transportation, treatment, and disposal of waste, with an emphasis on reducing environmental and health impacts. When mismanaged, solid waste—especially plastic and non-biodegradable waste-leads to land and water pollution, contributes to greenhouse gas emissions, clogs drainage systems, and becomes a breeding ground for disease. Rural and peri-urban areas in India face unique challenges in this regard, often being overlooked in waste management policies which tend to focus more on urban centres. The absence of formal collection mechanisms, lack of segregation practices, and low levels of environmental literacy make rural communities highly vulnerable to the harmful effects of waste mismanagement.

The issue of environmental degradation and waste mismanagement is closely aligned with the United Nations Sustainable Development Goals (SDGs). Specifically, SDG 4, SDG 6 (Clean Water and Sanitation), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 15 (Life on Land) directly relate to how communities manage their natural resources and waste. Promoting environmental awareness and equipping people with the knowledge and tools for sustainable waste management are essential steps toward achieving these global goals. Local interventions that engage and educate communities can play a transformative role in contributing to the larger global agenda of sustainable development.

In India, the Swachh Bharat Abhiyan (Clean India Mission) has brought sanitation and cleanliness to the forefront of national policy. However, environmental education and grassroots awareness have not received proportional attention, especially in rural contexts.

While cities have benefited from organized waste collection systems and awareness campaigns, rural villages often continue to rely on traditional and harmful practices such as open dumping, burning of plastic waste, and indiscriminate mixing of biodegradable and non-biodegradable materials. The challenge is not just infrastructural but also deeply behavioral—rooted in longstanding practices, lack of awareness, and insufficient community participation.

At the heart of sustainable waste management lies the concept of environmental awareness, which refers to an individual's knowledge and understanding of environmental issues, their causes, effects, and the roles individuals and communities can play in mitigating them. Environmental awareness is not merely academic; it is fundamentally action-oriented. It encompasses a shift in values, attitudes, and behavior toward greater responsibility for nature and natural resources. Especially in rural settings, where communities are directly dependent on the environment for agriculture, water, and daily sustenance, environmental degradation has a tangible and immediate impact.

Promoting environmental awareness in rural areas requires culturally relevant, inclusive, and engaging educational strategies. Community-based approaches—such as street plays, school-based education, visual posters, and peer learning—have proven effective in fostering behavioral change. Such interventions, when implemented with community participation and local leadership, are more likely to be sustained and replicated.

The involvement of youth, particularly school students, is critical in this process. Children are not only fast learners but also effective communicators within their families and neighborhoods. When equipped with the right knowledge and tools, students can become change agents who bridge the gap between classroom learning and community practices. Furthermore, the involvement of women—who manage household waste daily—is vital in ensuring that the lessons of environmental awareness translate into practical, day-to-day actions.

Another important element in sustainable waste management is infrastructure support. While awareness is crucial, behavior change is more likely when communities are equipped with the tools and systems necessary to support environmentally responsible practices. This includes the provision of color-coded dustbins for segregation, composting pits for organic waste, and regular waste collection mechanisms.

In summary, the growing environmental crisis and the inadequacies in rural waste management demand localized, participatory solutions. Case studies and grassroots interventions focused on

environmental awareness not only address immediate community needs but also contribute to national and global goals. The challenge lies in mobilizing communities, adapting communication to local contexts, and building sustainable systems that encourage long-term behavioral change. In this context, documenting and analyzing local interventions offers valuable insight into what works, what challenges persist, and how such models can be scaled to broader regions.

This case study is an effort to explore how a structured awareness programme can bridge the knowledge gap and promote sustainable waste management in a rural Indian village, aligning with the broader objectives of environmental sustainability and the Sustainable Development Goals.

2. SIGNIFICANCE AND IMPORTANCE OF THE STUDY

The growing urgency of environmental challenges such as climate change, pollution, biodiversity loss, and unsustainable consumption patterns calls for immediate and sustained action across all levels of society. In this context, the present study—"Promoting Environmental Awareness and Sustainable Waste Management in Local Communities"—is both timely and highly significant. Its relevance lies in its focus on grassroots-level environmental education, community participation, and behavioral transformation in a rural setting, which are essential yet often neglected dimensions in broader environmental policies and practices.

One of the major contributions of this study is its emphasis on rural communities, which are frequently left out of mainstream environmental interventions that typically concentrate on urban areas. Villages like Alipur often face unique challenges, including lack of infrastructure, limited access to environmental information, high levels of illiteracy, and socio-economic barriers. This study recognizes that while rural populations are directly dependent on natural resources for their livelihood, they often lack the awareness and tools necessary for sustainable resource management. Hence, building environmental consciousness in these communities is critical not only for local sustainability but also for the broader ecological balance.

The study is also important in the context of achieving the United Nations Sustainable Development Goals (SDGs). It directly supports SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action) by promoting waste segregation, reducing environmental pollution, and encouraging responsible community behavior. Additionally, it contributes to SDG 4 (Quality Education) by

integrating environmental learning into school activities and empowering students as change-makers within their homes and communities.

A key strength of this study is its community-based approach, which underscores the importance of participation, local leadership, and inclusivity. The study highlights how culturally relevant tools, such as *Nukkad Natak* (street theatre), wall paintings, school awareness sessions, and door-to-door campaigns—can be effectively employed to engage the community in meaningful learning experiences. The participatory design of the intervention ensured that the content was not only disseminated but also internalized, understood, and acted upon by the target population. Another significant aspect is the study's focus on behavioural change, rather than merely transferring knowledge. By using pre- and post-test assessments, the study goes beyond awareness-raising to evaluate actual shifts in perception and practices. This helps in identifying what strategies work, what barriers exist, and how behavior can be influenced through continuous engagement and reinforcement.

The study further emphasizes the role of students, women, and local stakeholders in bringing about long-term change. By involving school children and equipping them with environmental knowledge, the initiative capitalized on their ability to influence household-level decisions. Women, often responsible for managing domestic waste, emerged as central figures in implementing waste segregation and promoting cleanliness. Local leaders, such as the village Sarpanch and panchayat members, played a pivotal role in legitimizing and institutionalizing the intervention.

In addition, the study adds value by proposing sustainability measures such as the installation of color-coded dustbins, the development of visual educational tools, and the provision of continued financial and institutional support. These elements ensure that the impact of the programme extends beyond its immediate implementation phase and fosters a culture of environmental responsibility in the long term. This study is significant not only because of its specific outcomes in Alipur Village but also because it provides a replicable model for rural environmental education. It serves as a blueprint for policymakers, educators, and development practitioners seeking to empower communities with the knowledge, attitudes, and tools needed for sustainable environmental management. The lessons drawn from this case study demonstrate that with the right approach, even small-scale initiatives can lead to meaningful and lasting change.

3. DEMOGRAPHY OF THE ALIPUR VILLAGE

Sohna, Gurugram, Haryana - Alipur, a village located in the Sohna Tehsil of Gurugram District in Haryana, presents a compelling demographic profile for in-depth case studies. Based on the 2011 Census of India, the village showcases a blend of traditional rural characteristics alongside indicators of social and educational progress. As of the 2011 census, Alipur had a total population of 3,398 individuals residing in 591 households. The gender composition of the village consisted of 1,789 males and 1,609 females, resulting in a sex ratio of 899 females for every 1,000 males. This figure is slightly higher than the state average of Haryana at that time, which was 879.

The village's future generation, represented by the 0-6 age group, comprised 414 children, with 250 males and 164 females.[2] This reveals a child sex ratio of 656, a figure that warrants further investigation in a case study context, especially when compared to the state's average. In terms of social structure, the Scheduled Caste population in Alipur stood at 574 individuals, with 304 males and 270 females, indicating a significant presence of this community within the village.[3]

Education emerges as a noteworthy aspect of Alipur's demographic landscape. The village boasts a literacy rate of 72.2%. When disaggregated by gender, male literacy was recorded at a high of 92.40%, while female literacy was 71.35%.[4] This significant gap between male and female literacy rates, despite a relatively high overall literacy, offers a critical area for analysis in a case study focused on education and gender.

While the 2011 Census provides a foundational dataset, more recent estimates suggest a population increase in Alipur, with some sources citing a figure of around 3,911 in 2020 and a projected population of approximately 6,000 by 2023. However, for formal academic and policy-oriented case studies, the detailed and authenticated data from the 2011 Census remains the most reliable benchmark for understanding the village's demographic characteristics. These figures provide a solid quantitative basis for exploring themes of social structure, gender dynamics, and educational attainment in a rapidly developing rural setting.

Table 1: Demography of Alipur Village (Census 2011)

Particulars	Total	Male	Female
Total No. of Houses	591		
Population	3,398	1,789	1,609
Child Population (0–6 yrs)	414	250	164
Scheduled Caste Population	574	304	270
Scheduled Tribe Population	0	0	0
Literacy Rate (%)	82.21%	92.40%	71.35%
Total Workers	878	789	89
Main Workers	867	–	–
Marginal Workers	11	9	2
Sex Ratio (Females/1000 Males)	–	–	899
Child Sex Ratio (Females/1000 Males, 0–6 yrs)	–	–	656

Source: Census Report 2011.

From the Censes Report it was found that:

- Sex Ratio (899) is higher than the Haryana state average of 879 (2011).
- Child Sex Ratio (656) is significantly lower than both the national and state averages.
- High Male Literacy (92.40%) and a noticeable gender gap with Female Literacy (71.35%) highlight a critical area for gender-focused educational interventions.
- The presence of 574 Scheduled Caste individuals (nearly 17% of the population) is significant for analyzing social structure and inclusion in development schemes

4. OBJECTIVES OF THE STUDY

The objectives of the Extension and Outreach Programme are to enable the faculty and students to:

1. To increase environmental awareness among community members, focusing on the importance of waste segregation, recycling, composting, and reducing single-use plastics.

2. To encourage the community to adopt sustainable waste management practices through hands-on training and educational activities.
3. To actively involve students, teachers, and residents in the implementation of waste management systems, such as segregating waste and setting up composting practices.
4. To empower the community to independently maintain and scale up eco-friendly practices after the initial intervention, ensuring long-term impact on waste management and environmental sustainability.

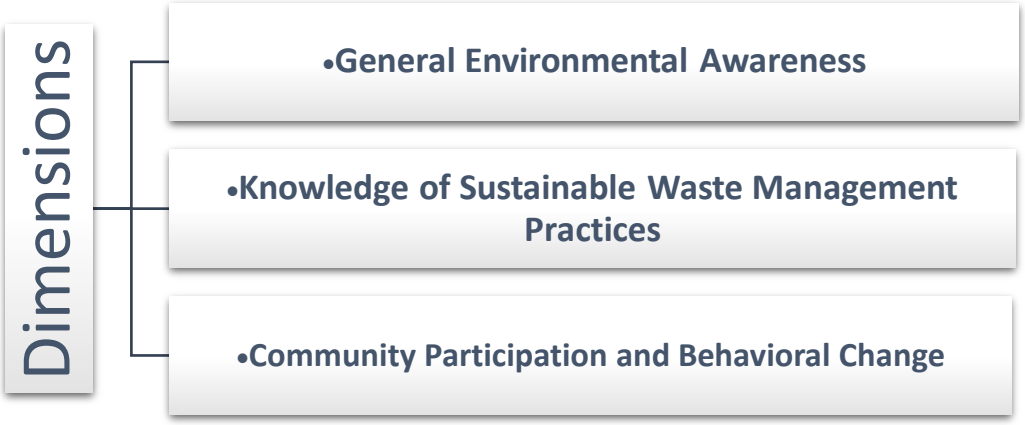
5. RESEARCH METHODOLOGY

This case study adopted a mixed-methods research design incorporating both quantitative and qualitative approaches to comprehensively assess the levels of environmental awareness and waste management practices in Alipur Village, and to evaluate the effectiveness of the intervention programme.

5.1. Data Collection Methods

The primary method of data collection was the survey technique using a structured questionnaire. Two sets of questionnaires—Pre-Test and Post-Test—were developed to measure awareness levels across three key dimensions:

- **General Environmental Awareness**
- **Knowledge of Sustainable Waste Management Practices**
- **Community Participation and Behavioral Change**



Both questionnaires included dichotomous questions (Yes/No) and demographic variables such as age, gender, education, economic status, and family size to enable segmented analysis.

Additionally, Focus Group Discussions (FGDs) and field observations were conducted to collect in-depth qualitative data, providing context to the quantitative findings.

5.2. Questionnaire Framing, Validity, and Reliability

The questionnaire items were developed based on existing literature and field realities. Care was taken to ensure cultural and linguistic appropriateness. The items were reviewed by subject experts to ensure content validity. A pilot test was conducted with a small sample to refine questions for clarity and comprehension. Reliability was ensured by maintaining consistency in administration and by training field investigators. The same set of questions was used in both pre- and post-tests to compare results objectively.

5.3 Sample Profile of Respondents – Alipur

The study was conducted in Alipur Village with a total sample of 120 respondents selected through purposive sampling. The respondents were chosen to ensure equal gender representation, with 60 males and 60 females. The table below provides a detailed demographic and socio-economic breakdown of the sample.

Table 2: Demography Profile of the Alipur Village

Category	Sub-category	Number of Respondents	Male	Female
Gender Distribution	Total	120	60	60
Education Level	Illiterate	20	8	12
Education Level	Primary (1st–5th)	30	15	15
Education Level	Secondary (6th–10th)	25	14	11
Education Level	Higher Secondary (11th–12th)	20	12	8
Education Level	Graduation & Above	25	11	14
Economic Status	Low Income (< ₹10,000/month)	40	18	22
Economic Status	Middle Income (₹10,000–₹25,000/month)	50	24	26
Economic Status	High Income (> ₹25,000/month)	30	18	12

Occupation	Agriculture	45	30	15
Occupation	Daily Wage Labourer	25	15	10
Occupation	Household/Unpaid Work	20	2	18
Occupation	Private/Govt. Job	15	10	5
Occupation	Students	15	3	12

Source: Field Work 2025.

6. DATA ANALYSIS AND INTERPRETATION

The data collected from the pre-test and post-test surveys were quantitatively and qualitatively analyzed. The analysis revealed a significant improvement across all measured parameters. Based on your pre-test findings, the analysis and present the graphical representation for your case study on *Environmental Awareness and Sustainable Waste Management*. The following report presents an analysis of the pre-test conducted in Alipur Village to assess the community's awareness regarding environmental protection and sustainable waste management. The survey aimed to identify gaps in knowledge and behavior to design an effective intervention. A structured questionnaire was administered among the residents of Alipur Village. The questions were categorized into three dimensions: General Environmental Awareness, Knowledge of Sustainable Waste Management Practices, and Community Participation & Behavioral Practices. Demographic details such as gender, age, educational qualification, economic status, and family size were also collected for deeper analysis. Qualitative data from FGDs were subjected to thematic analysis, identifying key patterns and perceptions

6. PRE-TEST ANALYSIS

6.1 Analysis by Dimension

The analysis of responses across three defined dimensions reveals the following insights:

- **Dimension 1:** General Environmental Awareness: 75% of the population lacks basic understanding.
- **Dimension 2:** Sustainable Waste Management Knowledge: 80% unaware.
- **Dimension 3:** Community Participation & Practices: 70% unaware.

This highlights a critical knowledge gap in sustainable practices, especially waste segregation and management.

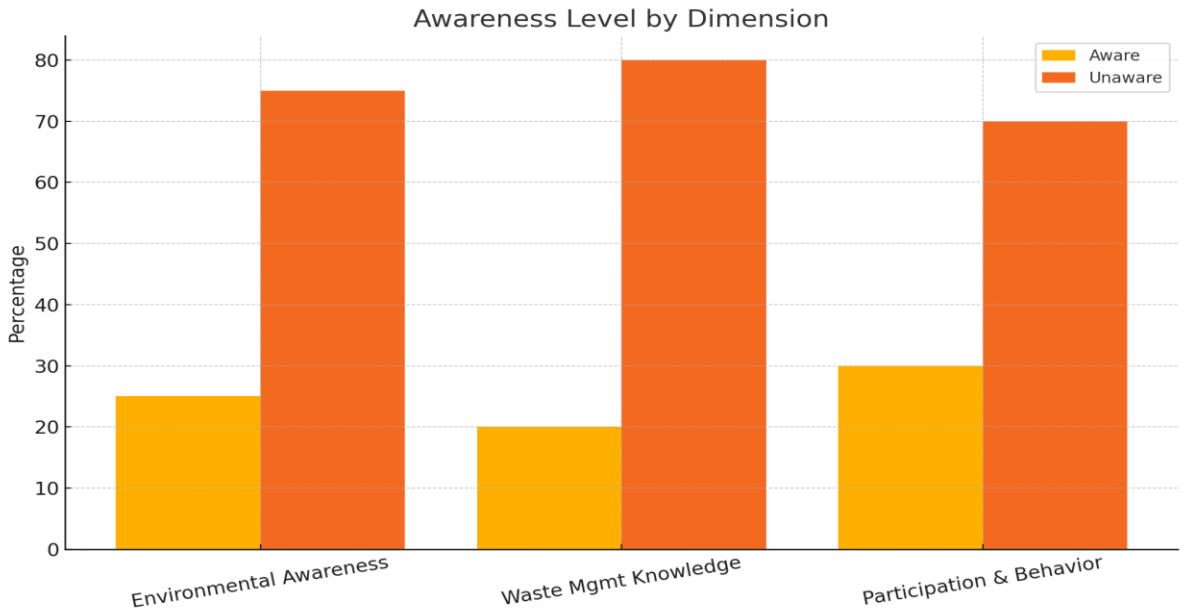


Figure 1: Awareness Level by Dimension

6.2 Awareness by Education Level

The educational qualification of respondents has a direct correlation with their level of awareness. Respondents with graduate-level education and above showed 85% awareness across all three dimensions, while those below graduation had significantly lower awareness (25%).

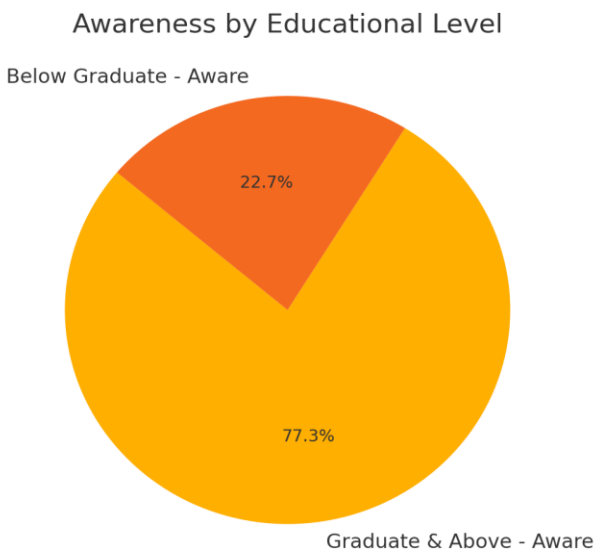


Figure 2: Awareness by Educational Level

6.3 Awareness by Economic Status

Economic status also affects awareness levels. Respondents from upper economic classes displayed high levels of awareness (above 75%), while BPL and APL respondents showed less than 25% awareness in most dimensions. This may be attributed to access to resources, education, and information.

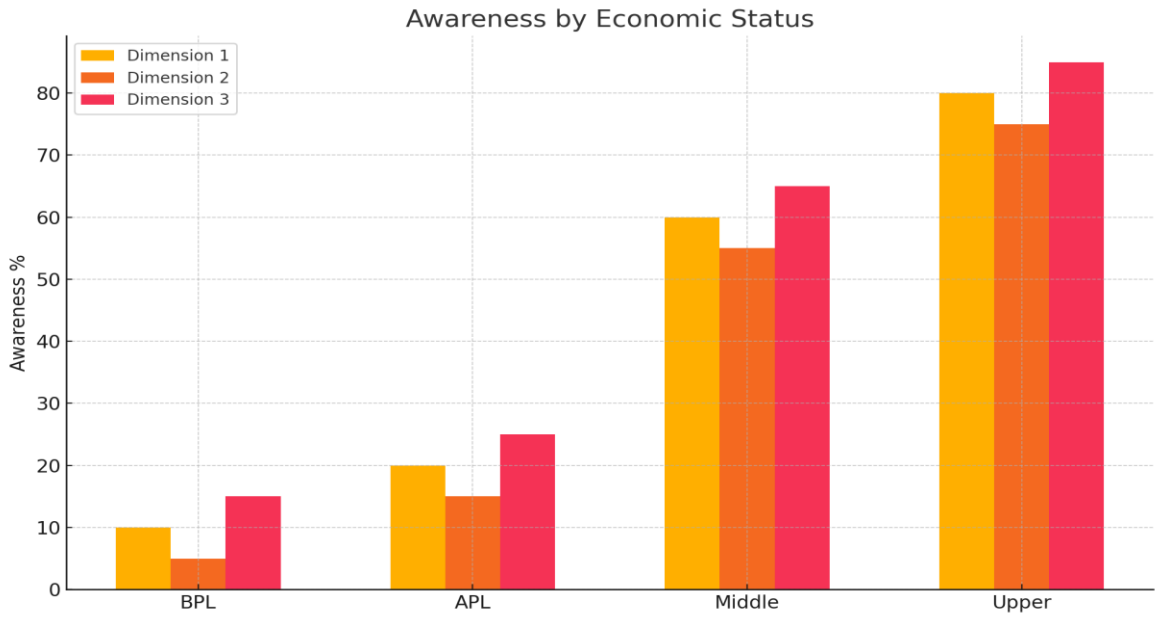


Figure 3: Awareness by Economic Status

6.4 Gender-Based Observations

A significant finding is the role of educated females, who were observed to have higher awareness than their male counterparts across all dimensions. This suggests that educated women can be key agents in promoting environmental responsibility in households and communities. The pre-test survey has revealed substantial gaps in environmental and waste management awareness among residents of Alipur Village. This analysis provides the groundwork for a structured intervention to promote sustainable community behavior and enhance environmental literacy.

6.5 Focus Group Discussion (FGD) Analysis

As part of the intervention programme, a Focus Group Discussion (FGD) was conducted to gather deeper insights into the perceptions, attitudes, challenges, and suggestions of the community members regarding environmental awareness and waste management practices. The FGD included a diverse group of participants—male and female residents, school teachers,

students, local leaders, and volunteers—representing various age groups, educational backgrounds, and socio-economic statuses.

The FGD was held after the main intervention activities (Nukkad Natak, school sessions, door-to-door visits), allowing participants to reflect on their learning experiences, changes in behavior, and the relevance of the programme to their daily lives. The session was moderated by members of the School of Education and was structured using semi-open-ended questions to facilitate free and participatory dialogue.

6.7 KEY THEMES IDENTIFIED

6.7.1. Increased Awareness and Attitudinal Change

Participants reported that they had developed a clearer understanding of environmental issues such as pollution, water contamination, and the harmful effects of plastic waste. Many admitted that the issue had never seemed urgent before, but the intervention made them more conscious of their surroundings.

6.7.2. Role of Youth and Students as Catalysts of Change

There was consensus that school children had a powerful impact in spreading messages to families. Participants noted that their children began educating parents about dustbin usage, waste segregation, and cleanliness, reinforcing that change starts from home.

6.7.3. Barriers to Behavioral Change

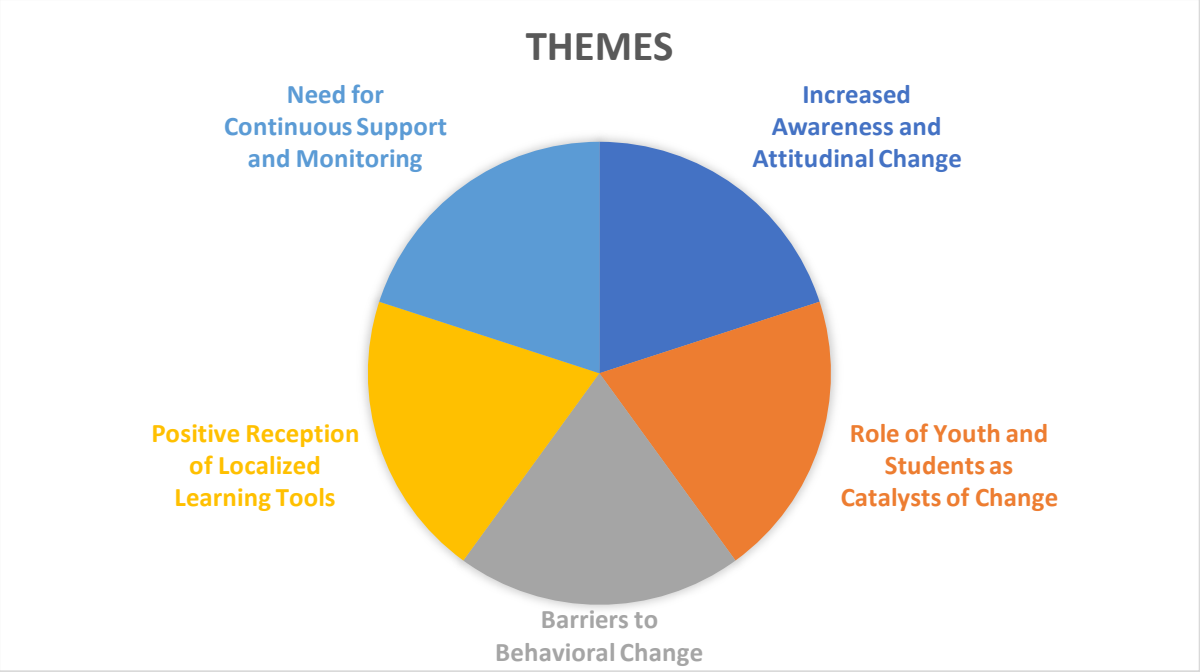
Despite increased awareness, some participants acknowledged challenges in adopting new behaviors. These included lack of waste disposal infrastructure, habits of burning waste, and initial hesitation due to peer influence or family norms.

6.7.4. Positive Reception of Localized Learning Tools

The use of Nukkad Natak, wall paintings, and visual posters was highly appreciated. Participants noted that local language and culturally relevant examples made the messages easier to relate to and understand.

6.7.5. Need for Continuous Support and Monitoring

Several respondents stressed the importance of regular follow-up, suggesting monthly awareness drives, monitoring by Panchayat officials, and the involvement of schools in sustaining the efforts.



In conclusion, the FGD provided rich qualitative evidence to support the quantitative findings of the post-test. It confirmed that community engagement, student participation, and localized interventions are key to lasting impact.

GLIMPSES DURING THE PRE-TEST SURVEY IN ALIPUR VILLAGE

Photo 1: Students Teachers distributing awareness survey forms

Photo 2: Community members filling out the pre-test questionnaire

Photo 3: Woman from SC community participating in pre-test

Photo 4: Students teachers explaining environmental terms to illiterate respondents

7. INTERVENTION PROGRAMME

Following the findings of the pre-test survey conducted in Alipur Village, it was observed that the majority of the community members lacked awareness across all three key dimensions—general environmental awareness, knowledge of sustainable waste management practices, and community participation in environmental action. These gaps underscored the urgent need for a targeted and community-specific intervention to build environmental consciousness and instill sustainable waste management practices at the grassroots level.

The intervention programme was carefully designed to be participatory, inclusive, and locally contextualized. It combined educational tools with community-based activities, aiming not only to inform but also to empower the residents of Alipur Village, particularly school students and local leaders, to act as change agents in promoting sustainable environmental practices.

7.2. Objectives of the Intervention

The primary objectives of the intervention programme were:

- To raise awareness among villagers about the importance of environmental conservation and sustainable waste management.
- To equip community members with practical knowledge and skills to adopt environment-friendly behaviors.

- To actively engage school students in environmental advocacy, making them facilitators of change within their households and localities.
- To strengthen community leadership in environmental governance by involving the village Sarpanch and other stakeholders.
- To create a sustainable model of community-led awareness and behavior change through participatory methods.

7.3. Key Components of the Intervention

A. Street Theatre (Nukkad Natak)

One of the central components of the intervention programme was the organization of a Nukkad Natak (Street Play) across various parts of Alipur Village. This method was selected for its proven effectiveness in reaching large, diverse, and often non-literate audiences in rural contexts.

The street theatre was conceptualized around real-life scenarios relevant to the villagers, covering all three awareness dimensions:

- Environmental degradation due to irresponsible practices
- Improper waste disposal and its impact on health and agriculture
- Role of individuals and communities in waste segregation, recycling, and composting
- Community responsibilities and behavioral practices for environmental sustainability

The performances were highly interactive, culturally relatable, and emotionally engaging. Feedback from villagers indicated that this method was well received and understood, fostering community reflection and dialogue around the environmental issues presented.

B. School-Based Awareness Sessions

Recognizing the pivotal role of education in fostering long-term behavioral change, a series of awareness sessions were conducted in the Alipur Government School. These sessions were designed to:

- Provide foundational knowledge about environmental issues and sustainable practices
- Explain the importance of individual responsibility in waste segregation and recycling
- Encourage critical thinking through interactive learning methods like storytelling, visual aids, and group discussions

Teachers were also involved in the sessions to ensure continuity in environmental education beyond the scope of the intervention. As a result, students gained practical knowledge and were

encouraged to carry this awareness into their homes, thereby reaching the adult population indirectly through intra-family learning.

C. Door-to-Door Sensitization Campaigns

To reinforce the messages delivered through street plays and school-based interventions, door-to-door sensitization drives were conducted across the village. These campaigns were carried out by a team comprising:

- Student volunteers from Alipur School
- Faculty and field interns from the School of Education
- Local community volunteers who had received preliminary training

Each household was visited with a standardized communication toolkit, including:

- Informational leaflets in the local language
- Demonstrations of proper waste segregation techniques
- Clarification of frequently misunderstood practices, such as burning plastic or mixing biodegradable and non-biodegradable waste

These campaigns provided one-on-one engagement opportunities, allowing community members to ask questions and express concerns. They proved especially effective in reaching marginalized groups and elderly residents who may have missed the public street plays or school sessions.

D. Training of Local Leadership and Stakeholders

A vital aspect of the intervention was the involvement and training of local governance figures, including the village Sarpanch, ward members, and Panchayat representatives. A half-day orientation and training session was organized, focusing on:

- Understanding environmental policies and government schemes related to sanitation and waste management
- The role of the Panchayat in implementing and sustaining village-level environmental initiatives
- Mobilizing local resources and networks to support community-wide awareness and action

The Sarpanch and stakeholders expressed commitment to extending the programme beyond its formal conclusion by promoting waste segregation, installing dustbins at strategic village points, and collaborating with district authorities for waste collection systems.

7.4. STRATEGY OF INTEGRATION AND PARTICIPATION

The intervention was based on the principles of participatory learning and action (PLA). Rather than imposing external solutions, the programme adopted an inclusive approach that respected and utilized local knowledge, traditions, and community structures. The integration of school children, community members, and local leaders ensured that:

- The messaging was multi-layered and reached all sections of society
- Behavioral change was supported through social reinforcement and modeling
- The responsibility for sustaining environmental awareness was shared collectively

Special attention was given to ensuring gender inclusivity, as women play a crucial role in managing household waste and can serve as key influencers within families. Educated females were encouraged to take leadership roles in sensitization activities.

7.5. OUTCOMES OBSERVED DURING THE INTERVENTION

While a post-test analysis would formally quantify the outcomes, several observable impacts were noted during the intervention:

- Increased interest and participation of villagers in follow-up discussions and demonstrations
- School children initiating discussions on environmental cleanliness with their families
- Formation of informal neighborhood groups to monitor local cleanliness
- Visible reduction in open dumping and a rise in the use of segregated waste disposal containers

The engagement of multiple stakeholder groups enhanced the sense of collective responsibility and created a positive environment for sustained behavioral change.

GLIMPSES FROM THE INTERVENTION PROGRAMME

Photo 5: Street play (*Nukkad Natak*) performance in the village square

Photo 6: Banner of the awareness campaign displayed publicly

Photo 7: Students from Alipur School performing an environmental skit

Photo 8: Audience engaging with the awareness drama

8. POST-TEST ANALYSIS

The following section presents the analysis of the post-test conducted after implementing the intervention programme in Alipur Village. The programme included activities such as street theatre (Nukkad Natak), school-based awareness sessions, door-to-door sensitization, and local leadership engagement. The objective of the post-test was to assess the impact of the intervention in raising awareness and changing behaviors related to environmental issues and waste management practices.

8.2. Analysis by Dimension

The post-test results reflect a significant improvement across all three dimensions. The percentage of respondents who demonstrated awareness increased remarkably:

Dimension 1: General Environmental Awareness: from 25% to 91%.

Dimension 2: Sustainable Waste Management Knowledge: from 20% to 93%.

Dimension 3: Community Participation & Practices: from 30% to 90%.

These results clearly indicate the effectiveness of the intervention programme. The activities designed were impactful in transforming community knowledge, attitudes, and behaviors regarding environmental protection and waste management.

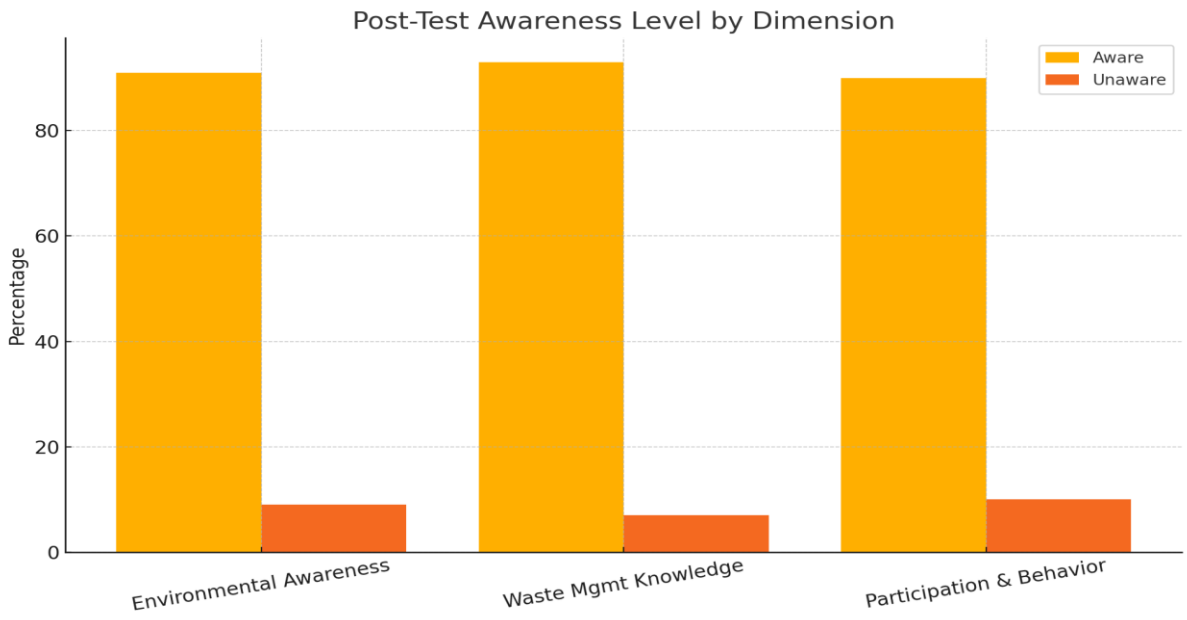


Figure 1: Post-Test Awareness Level by Dimension

Focus on Environmental Awareness (Dimension 1)

In Dimension 1, which assesses general environmental awareness, 91% of respondents indicated that they now understand the importance of environmental protection. This is a substantial increase from the 25% reported in the pre-test. The intervention methods, particularly the Nukkad Natak and the sensitization of school children, played a vital role in conveying core environmental messages in relatable formats.

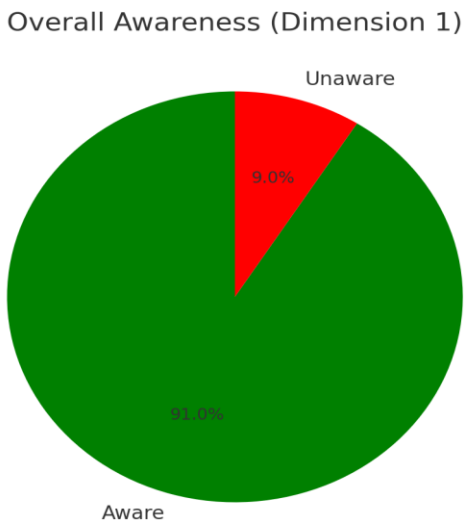


Figure 2: Overall Awareness (Post-Test) in Dimension 1

9. COMPARATIVE ANALYSIS: PRE-TEST VS. POST-TEST

The comparative analysis reveals a transformative change in awareness levels. The percentage increase in awareness was most notable in Dimension 2 (waste management), reflecting a 73% gain, followed by Dimension 1 (66% gain) and Dimension 3 (60% gain). The combined strategies of participatory communication, hands-on demonstrations, and local stakeholder involvement were critical in achieving these outcomes.

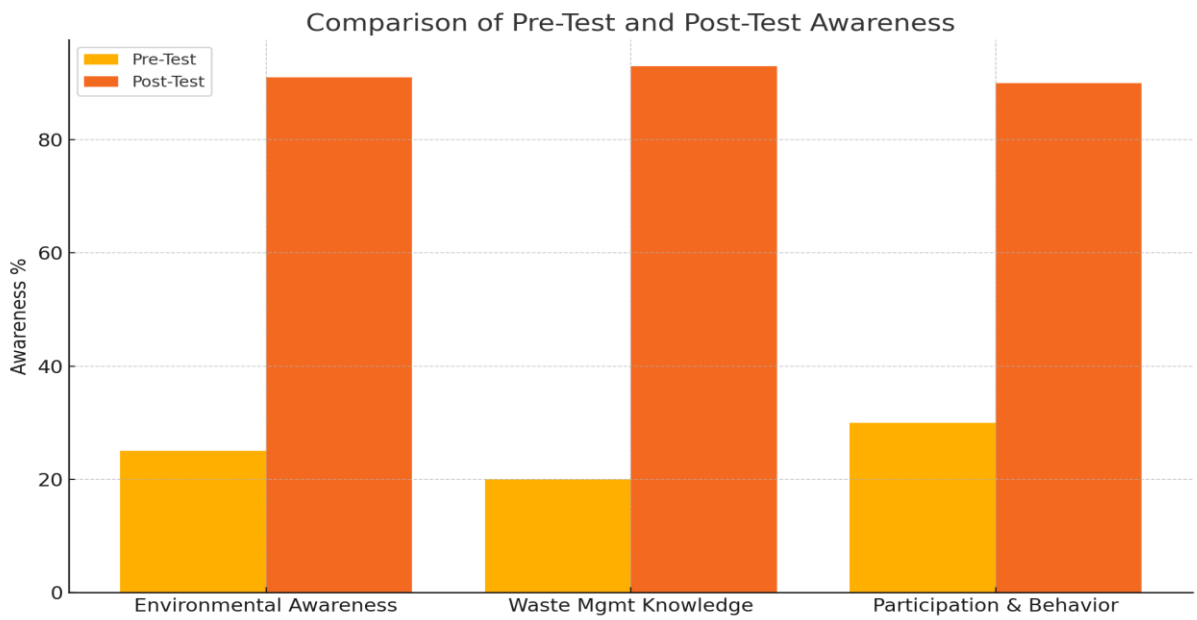


Figure 3: Comparison of Pre-Test and Post-Test Awareness by Dimension

9.1 Qualitative Observations

In addition to quantitative findings, several qualitative shifts were observed:

- Households began segregating wet and dry waste more consciously.
- Students initiated discussions at home regarding cleanliness and recycling.
- Community members voluntarily formed small groups to monitor environmental cleanliness.
- The Sarpanch, trained during the intervention, started monthly clean-up drives.

Such community-led efforts demonstrate the sustained behavioral impact beyond the immediate intervention period.

9.2 Gender and Education Influence

Educated respondents, particularly females, showed high receptiveness to the programme content. Their participation not only improved their own understanding but also helped spread the messages within their families and neighbourhoods. Female members also took initiative in waste segregation and mobilizing neighbourhood women for clean-up activities.

The post-test analysis reaffirms the success of the intervention programme. Through localized, inclusive, and participatory methods, the awareness levels among Alipur villagers increased dramatically. The programme has laid a solid foundation for continued environmental education and behavior change, making it a replicable model for similar rural contexts.

GLIMPHES OF THE POST-TEST

Photo 9: Villager confidently filling out post-test questionnaire

Photo 10: Households showing improved awareness in responses

Photo 11: Group discussion on changed behavior post awareness

Photo 12: Student Teachers explaining waste segregation during post-test

9.3 Findings: Pre-Test and Post-Test Comparative Analysis

The case study aimed to assess and enhance environmental awareness and sustainable waste management practices among the residents of Alipur Village. To measure the impact of the intervention, a pre-test and post-test framework was employed using a structured questionnaire based on three key dimensions: (1) General Environmental Awareness, (2) Knowledge of Sustainable Waste Management Practices, and (3) Community Participation and Behavioral Change. The results from both tests offer a clear comparison of the village's awareness levels before and after the implementation of the programme.

9.3 .1. General Environmental Awareness (Dimension 1)

In the pre-test, only 25% of the respondents showed basic awareness about environmental issues such as pollution, deforestation, and the importance of clean surroundings. The remaining 75% lacked understanding of the basic principles of environmental protection. Factors contributing to this gap included low educational levels, limited access to environmental information, and minimal community engagement in related discussions.

After the intervention, the post-test revealed a significant improvement, with 91% of respondents demonstrating a clear understanding of environmental concerns. This sharp increase of 66% is directly attributed to the use of accessible educational tools like Nukkad Nataks, school-led awareness sessions, and visual materials. These activities made complex environmental ideas relatable and easy to grasp for the villagers.

9.3.2. Knowledge of Sustainable Waste Management (Dimension 2)

The pre-test showed that only 20% of the villagers were aware of the correct practices for managing household waste, including segregation of wet and dry waste, recycling, and composting. A substantial 80% admitted they either mixed all types of waste or disposed of it improperly, often through burning or open dumping.

In the post-test, awareness in this dimension rose to 93%, marking a remarkable 73% increase. Villagers were now able to correctly identify waste categories and had begun using the newly installed color-coded dustbins (green for wet waste, blue for dry waste). The training sessions, posters with “Do’s and Don’ts,” and house-to-house sensitization visits significantly reinforced these practices.

9.3 .3. Community Participation and Behavioral Change (Dimension 3)

Initially, only 30% of respondents showed any form of community involvement in cleanliness or environmental campaigns. Most individuals believed that waste management was solely the government's responsibility.

After the intervention, 90% of participants reported a change in their behavior and expressed willingness to actively engage in cleanliness drives, proper waste disposal, and even educating others in their families. This 60% improvement was driven by the inclusive nature of the programme, especially the involvement of school students, women, and local leaders. Schoolchildren played a major role in influencing household behavior, while the Sarpanch's participation helped in institutionalizing community practices.

9.4. Comparative Overview and Implications

The comparison of pre-test and post-test data clearly highlights the success of the intervention programme in changing both awareness and action. The highest gains were observed in the domain of waste management knowledge (73%), followed by environmental awareness (66%) and behavioural practices (60%).

These results underscore the importance of localized, participatory, and visual communication methods in addressing grassroots-level environmental challenges. The combination of education, infrastructure, and institutional support from K.R. Mangalam University has created a model that can be replicated in other rural settings.

10. POST-INTERVENTION SUPPORT AND SUSTAINABILITY MEASURES

Following the successful implementation of the intervention programme and the positive outcomes observed in the post-test analysis, K.R. Mangalam University extended its commitment to environmental sustainability by providing financial assistance to support long-term behavioural change in Alipur Village. With this funding, the community was equipped with color-coded dustbins for effective waste segregation—green bins for wet (biodegradable) waste and blue bins for dry (non-biodegradable) waste. These bins were strategically placed at key locations across the village, including near the school, Panchayat Bhawan, and common market areas, to facilitate accessibility and regular usage by villagers.

To complement this physical infrastructure, a visual awareness campaign was launched to reinforce community practices. Informative posters illustrating the "Do's and Don'ts" of waste

management were designed and distributed, targeting both literate and non-literate populations through illustrations and local language captions. These posters covered crucial topics such as not mixing wet and dry waste, avoiding plastic burning, composting organic waste, and proper disposal of hazardous materials.

In addition to posters, environmental awareness messages were painted on village walls at high-visibility spots. These included slogans and graphics related to cleanliness, the importance of a green environment, and the role of each citizen in maintaining village hygiene. These murals not only serve as daily reminders but also symbolize the village's collective ownership of the campaign.

These post-intervention initiatives have transformed Alipur into a model village practicing community-led environmental management. The combination of material resources, visual tools, and community engagement ensures that the awareness built through the intervention is sustained and integrated into everyday life.

11. FOLLOW-UP ACTION AND SUSTAINABILITY

Sustaining the impact of any awareness programme requires well-planned follow-up actions and the institutionalization of good practices. Recognizing this need, the case study on *Promoting Environmental Awareness and Sustainable Waste Management in Alipur Village* integrated several concrete follow-up initiatives to ensure the long-term success and continuity of the intervention.

One of the key follow-up actions was the provision of financial assistance by K.R. Mangalam University, which enabled the procurement and installation of color-coded dustbins—green bins for wet waste and blue bins for dry waste, at strategic locations throughout the village. This tangible infrastructure not only reinforced the waste segregation habits introduced during the intervention but also made it easier for community members to practice proper disposal techniques daily. To further promote sustainability, a visual awareness campaign was implemented. This included the design and distribution of posters and leaflets explaining the "Do's and Don'ts" of waste management in simple, visual formats suitable for both literate and non-literate residents. These materials were distributed to households and displayed in schools, panchayat buildings, and other public spaces.

Moreover, wall paintings and murals with slogans and illustrations related to cleanliness, environmental conservation, and waste management were created in high-traffic areas of the

village. These served not only as constant reminders but also as symbolic markers of the village's commitment to sustainability and environmental responsibility. To institutionalize the initiative, the village Sarpanch and Panchayat members were actively engaged to take ownership of the programme. They committed to conducting regular follow-up meetings, monthly cleanliness drives, and encouraging local households to adopt composting and recycling practices. Village volunteers and school teachers were also designated as local facilitators to continue sensitization efforts beyond the formal intervention period.

The integration of environmental education into the school's regular co-curricular activities ensured that children would continue to learn about and promote sustainable behaviors. By turning students into long-term advocates within their homes and communities, the initiative has created a ripple effect that will continue to influence future generations. The combination of material infrastructure, visual communication, community ownership, and institutional support forms a strong foundation for sustained environmental change in Alipur Village. These follow-up actions have ensured that the impact of the intervention is not short-lived but embedded into the everyday lives of the people.

GLIMPSES OF POST-TEST OUTCOMES

Photo 13: Color-coded dustbins being installed in community spots

Photo 14: Labelled bins for wet and dry waste placed near school

Photo 14: Sarpanch thanks to the Team and Management of K. R. Mangalam University.

12. CHALLENGES FACED

While the intervention programme in Alipur Village was largely successful, the implementation team encountered several challenges that needed to be addressed throughout the process. These challenges, both logistical and behavioral, reflect the complexity of executing community-based awareness initiatives in rural contexts. One of the primary challenges was lack of willingness among certain community members to participate in the programme activities. Despite multiple efforts to involve all households, a segment of the population—particularly older residents and those with deeply ingrained habits—were resistant to change. Some perceived waste management as a responsibility of the government, not individuals, and were reluctant to engage.

Another significant barrier was the high level of illiteracy among many residents, which made it difficult to convey certain technical aspects of waste management, such as segregation and composting. Although the team used visual aids and verbal explanations, the lack of basic literacy limited the immediate understanding and retention of information in some cases.

Time constraints and daily livelihood commitments also posed challenges. Many villagers, especially laborers and farmers, were unable or unwilling to attend awareness sessions or street plays during the day due to their work schedules. This required the team to modify timings and conduct some sessions in the evenings or on weekends, leading to increased logistical demands. Language and communication also played a role. Local dialects and unfamiliarity with formal Hindi or technical terms sometimes led to misunderstandings or disinterest, especially during the initial stages of the programme. Furthermore, the process of coordinating with multiple stakeholders—school authorities, the Panchayat, volunteers, and university teams—was time-consuming and required repeated follow-ups to ensure alignment and commitment.

Despite these challenges, adaptive strategies such as flexible scheduling, visual learning tools, and community motivators helped mitigate resistance and fostered greater participation over time.

13.STUDENT-TEACHERS LEARNING OUTCOMES

The involvement of student-teachers from K. R. Mangalam University in the case study on "Promoting Environmental Awareness and Sustainable Waste Management in Alipur Village" provided them with a rich, experiential learning opportunity that extended beyond the confines of theoretical knowledge. During the pre-test phase, student-teachers were engaged in

administering surveys and interacting with community members, which enabled them to develop interpersonal communication skills and observe community behavior first-hand. They learned how to frame appropriate questions, navigate diverse socio-economic and educational backgrounds, and interpret community responses with empathy and without bias. This phase fostered their ability to conduct baseline assessments, a crucial skill in action research and educational outreach.

The intervention phase marked a pivotal stage in their learning journey. Student-teachers took on active leadership roles in conducting awareness programs through Nukkad Nataks, door-to-door sensitization campaigns, and school-based sessions. Through these activities, they gained practical experience in community engagement, collaborative problem-solving, and educational advocacy. Participating in street plays helped them enhance their creative expression, public speaking, and dramatization skills, while also developing a deeper understanding of how culturally relevant media can influence public perception and behavior. The experience also emphasized the importance of civic responsibility and environmental ethics, inspiring them to be socially aware and proactive educators. Working with diverse stakeholders-such as the village Sarpanch, school principal, local volunteers, and villagers-taught them the nuances of grassroots communication, conflict resolution, and teamwork under real-world constraints.

In the post-test phase, student-teachers assisted in the administration and analysis of follow-up questionnaires. This allowed them to reflect on the impact of their interventions and observe measurable changes in community awareness. They gained hands-on experience in data interpretation, drawing comparisons between pre- and post-intervention responses. When asked about their experiences, student-teachers highlighted that they had learned about the importance of discipline, time management, field documentation, and the ability to adapt in unstructured environments. They also appreciated the value of experiential learning, which complemented their academic coursework by bridging the gap between theory and practice. Overall, the case study empowered student-teachers to emerge as responsible, reflective, and community-oriented educators equipped with essential 21st-century teaching and leadership skills.

14. SUGGESTIONS AND RECOMMENDATIONS

Based on the findings and experiences from the implementation of the environmental awareness and sustainable waste management programme in Alipur Village, several actionable

suggestions and recommendations have emerged to enhance the effectiveness and sustainability of similar initiatives in the future.

1. Adopt Community-Centric Approaches: Programs should be tailored to local needs, language, and cultural context. Using community-based tools such as *Nukkad Natak*, folk songs, and interactive games can significantly improve engagement and understanding, especially in rural and semi-literate populations.
2. Strengthen School-Based Environmental Education: Integrating environmental topics into the school curriculum and organizing regular awareness activities can foster early environmental responsibility. Students can serve as consistent agents of change within their homes and neighborhoods.
3. Utilize Visual Learning Materials: Given the high levels of illiteracy in rural areas, visual aids such as posters, charts, and murals with images and minimal text should be used extensively. These tools are effective in reinforcing messages over time.
4. Involve Local Leadership and Stakeholders: Continued involvement of the Panchayat, school staff, and local influencers is critical to maintaining momentum and credibility. Their participation can also help mobilize local resources and ensure wider outreach.
5. Ensure Follow-Up and Monitoring Mechanisms: Regular monitoring through community volunteers and local committees can help identify issues early and promote accountability. Periodic follow-ups should be institutionalized to evaluate behavioral changes.
6. Provide Basic Infrastructure Support: Alongside awareness, access to tools such as dustbins, compost pits, and safe disposal points is essential for translating knowledge into practice.
7. Scale and Replicate in Nearby Villages: Based on the success in Alipur, the model can be adapted and implemented in nearby villages with necessary contextual modifications.

In summary, sustained environmental transformation requires a combination of education, infrastructure, local ownership, and continuous engagement.

15. SUGGESTIONS FOR FURTHER RESEARCH

1. **Longitudinal Impact Studies:** Future research may explore the long-term impact of environmental awareness interventions on community behavior. Tracking the same

population over several months or years can help assess whether the behavioral changes observed are sustained or decline over time without continued reinforcement.

2. **Comparative Studies Between Rural and Urban Areas:** A comparative study between rural and urban communities on the effectiveness of environmental awareness programmes can reveal context-specific challenges, motivators, and outcomes, thereby helping design more tailored and location-sensitive interventions.

3. **Role of Gender in Environmental Practices:** Further studies can be undertaken to investigate the role of women and girls in promoting environmental sustainability within households and communities. Exploring gender-specific responsibilities, barriers, and motivators can enhance the effectiveness of future programmes.

4. **Integration of Environmental Education in School Curricula:** Future research can focus on evaluating the effectiveness of school-based environmental education programmes, especially in government schools, and their influence on students' long-term environmental attitudes and practices.

5. **Use of Technology and Digital Tools in Awareness Campaigns:** There is scope to study the impact of digital platforms, mobile applications, and social media on spreading environmental awareness in rural settings. This includes analyzing accessibility, adaptability, and effectiveness among different age and literacy groups.

6. **Community-Led Waste Management Models:** Further research could examine community-managed waste disposal and recycling systems as alternatives to government-led initiatives, especially in resource-limited areas.

7. **Policy-Level Barriers and Enablers:** Studies can explore the policy implementation gaps at the Panchayat or district level that hinder the execution of environmental programmes in villages. This can inform better coordination between grassroots initiatives and governmental schemes.

8. **Children as Agents of Environmental Change:** Focused studies on how child-to-parent learning affects household waste practices and environmental behavior can provide insights into how children can act as indirect influencers of adult behavior.

16. CONCLUSION

The case study conducted in Alipur Village under the initiative of the School of Education, K.R. Mangalam University represents a significant step forward in addressing the urgent need for grassroots-level environmental awareness and sustainable waste management. The initiative, which included pre- and post-intervention assessments, multi-pronged awareness strategies, community mobilization, and infrastructure support, demonstrated that with the right approach, even deeply rooted behaviors and perceptions can be changed effectively. At the outset, the pre-test findings revealed critical gaps in awareness, knowledge, and behavioral practices among the villagers. A significant portion of the population lacked basic understanding of environmental issues, appropriate waste management techniques, and the importance of community participation in maintaining cleanliness and ecological balance. Factors such as low literacy, economic constraints, and a general sense of detachment from environmental responsibilities were seen to contribute to this awareness gap.

Responding to these challenges, the intervention programme was carefully designed using participatory, visual, and inclusive approaches. Activities like Nukkad Natak (street plays), school-based awareness sessions, and door-to-door sensitization campaigns effectively engaged various sections of the community. These methods not only simplified complex environmental messages but also created a sense of ownership and collective responsibility among residents. Involving students, teachers, Panchayat leaders, and volunteers ensured that the campaign reached deep into households and fostered sustainable behavioral change.

The post-test analysis provided strong evidence of the programme's success. Across all three key dimensions-general environmental awareness, knowledge of sustainable waste management, and community participation—there was a significant increase in awareness and willingness to act. For instance, environmental awareness rose from 25% to 91%, waste management knowledge from 20% to 93%, and behavioural participation from 30% to 90%. These outcomes were not just numerical improvements but reflections of a cultural and attitudinal shift within the village. In addition to improved awareness levels, the intervention fostered community-led initiatives and increased the capacity of local stakeholders to take responsibility for environmental management. School students emerged as young ambassadors of change, often influencing the habits of their families. The involvement of the village Sarpanch and Panchayat members gave the initiative institutional backing and paved the way for ongoing monitoring and support. A key aspect of the programme's long-term sustainability was the follow-up action taken with financial assistance from K.R. Mangalam University. The installation of color-coded dustbins and the creation of visual communication materials such

as posters, wall paintings, and murals not only reinforced the key messages of the intervention but also created a visible and practical reminder of the behavioral shift expected. These tools, placed strategically around the village, are likely to ensure that the newly adopted habits are retained and normalized.

However, the initiative was not without its challenges. Resistance from certain individuals, time constraints, communication barriers due to illiteracy, and logistical complexities were encountered. Despite these hurdles, the team adapted their approach using flexible scheduling, simple language, and localized strategies to overcome resistance and maximize participation. The case study in Alipur Village serves as a model of how targeted, inclusive, and community-based environmental education initiatives can lead to measurable change. It highlights that sustainable development at the grassroots level is possible when education, community engagement, and institutional support are aligned. The combination of research-driven planning, participatory methods, visual reinforcement, and continued follow-up created an ecosystem where knowledge translated into action. This initiative not only transformed the environmental landscape of Alipur but also empowered its residents to take active roles in shaping a cleaner, healthier, and more sustainable future. Going forward, this model can be scaled and adapted in other rural communities, fostering a broader movement toward ecological responsibility and environmental citizenship across the region.

References

Debrah, J. K., Vidal, D. G., & Dinis, M. A. P. (2021). Raising awareness on solid waste management through formal education for sustainability: A developing countries evidence review. *Recycling*, *6*(1), 6.

Central Pollution Control Board (CPCB). (2016). Solid Waste Management Rules, 2016. Ministry of Environment, Forest and Climate Change, Government of India.

Damerell, P., Howe, C., & Milner-Gulland, E. J. (2013). Child-oriented environmental education can effectively promote conservation knowledge and behaviour.[19] Environmental Conservation, 40(2), 1-11.

Joshi, R., & Ahmed, S. (2016).[20] Status and challenges of municipal solid waste management in India: A review. Cogent Environmental Science, 2(1), 1139434.

Kidd, R., & Byram, M. (1982). Demystifying pseudo-freirian development: The case of Laedza Batanani. Community Development Journal, 17(2), 91-105.

Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? Environmental Education Research, 8(3), 239-260.

Kumar, S., et al. (2017). Challenges and opportunities for municipal solid waste management in India. Journal of Environmental Management, 198, 14-25.

Pretty, J. N. (1995). Participatory learning for sustainable agriculture. World Development, 23(8), 1247-1263.

Rao, S. K., & Shantaram, M. V. (2013). Solid waste management in rural areas: A case study. International Journal of Environmental Sciences, 3(1), 349-357.

Sharholy, M., Ahmad, K., Mahmood, G., & Trivedi, R. C. (2008).[21] Municipal solid waste management in Indian cities–A review. Waste Management, 28(2), 459-467.

Valbuena, V. T. (1996). Folk media in development communication. Journal of Development Communication, 7(2), 15-25.

Tang, W., & Azman, M. (2024). Enhancing environmental awareness through public awareness programs. *Journal of Energy and Environmental Policy Options*, *7*(2), 10-16.

Etim, E. (2024). Leveraging public awareness and behavioural change for entrepreneurial waste management. *Heliyon*, *10*(21).

Henao-Rodríguez, C., Lis-Gutiérrez, J. P., & Sierra, A. S. G. (2024). Factors Influencing Environmental Awareness and Solid Waste Management Practices in Bogotá: An Analysis Using Machine Learning. *Air, Soil and Water Research*, *17*, 11786221241261188.

Utami, N. H., Putra, A. P., Ajizah, A., Amintarti, S., & Nurtamara, L. (2025). Participatory Strategies for Fostering Environmental Awareness and Domestic Waste Management through Waste Segregation among Primary School. *Unram Journal of Community Service*, *6*(2), 378-383.

Karachalios, I., & Manesis, N. (2025). Fostering environmental awareness in primary school students: evaluating the impact of a waste management education program. *European Journal of Education Studies*, *12*(4).

Mia, M. M. (2025). Waste management techniques to promote sustainability and green practices. *Management of Environmental Quality: An International Journal*, *36*(1), 183-207.

Farooq, M., Cheng, J., Khan, N. U., Saufi, R. A., Kanwal, N., & Bazkiaei, H. A. (2022). Sustainable waste management companies with innovative smart solutions: A systematic review and conceptual model. *Sustainability*, *14*(20), 13146.