## Community Perception and Participation in Watershed and Wasteland Management in Harekala Village, Dakshina Kannada, Karnataka, India

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Abstract - This study investigates community perception and participation in watershed and wasteland management in Harekala Village, Dakshina Kannada, Karnataka, India. Using a quantitative approach, data were collected from 141 respondents through a structured questionnaire. Structural equation modeling (SEM), independent sample t-test, and analysis of variance (ANOVA) were employed to examine the relationships between community perception, participation, trust in local authorities, gender, and education level. The results revealed that watershed management significantly enhances community participation, both directly and indirectly through trust in local authorities. By contrast, wasteland management showed no significant impact on participation, indicating potential challenges in program design or community engagement. Significant gender- and education-based differences in participation were observed, highlighting the need for gender-sensitive and educationally inclusive approaches. These findings underscore the critical role of trust, social factors, and perceptions in the success of environmental programs. Practical implications include improving communication transparency, strengthening community trust, and redesigning wasteland programs for better engagement. This study contributes to socio-ecological theory and offers insights into sustainable environmental management in rural India.

Keywords: Community Participation, Watershed Management, Wasteland Management, Trust in Local Authorities, **Environmental Management.** 

## I. INTRODUCTION

Watershed and wasteland management are important for protecting the environment and improving the quality of life, particularly in rural areas. These practices help conserve natural resources, restore degraded land, and enhance agricultural productivity. However, the success of these programs does not depend solely on technical interventions. Community involvement is essential for achieving effective and sustainable outcomes (Vasanta & Dhawan, 2021; Micabalo et al., 2024). In India, many watershed and wasteland development programs are implemented by government agencies and nongovernmental organizations (NGOs). However, public participation and perceptions of these programs vary widely. In many areas, low trust in local authorities and limited awareness hinder active community engagement. Additionally, gender and education level influence how

individuals perceive and participate in such initiatives (David et al., 2023; Raghavendra & Sheethal, 2024). Most existing research has focused on the technical aspects of watershed and wasteland development. In contrast, limited attention has been given to the role of social and emotional factors, particularly within the Indian context. Few studies have examined how gender, education, and trust in local leadership affect community perceptions and involvement (Shields et al., 2021; Mahlangabeza & Zwelakhe, 2021; Satsangi, 2020). Furthermore, very few studies have explored whether trust serves as a mediating factor between perceptions and participation.

Therefore, this study aims to investigate perceptions of safety, attitudes, participation, and trust in local authorities concerning watershed and wasteland management. It also examines whether gender and education levels influence these variables. Finally, the study assesses whether trust in local authorities mediates the relationship between perception and participation. The findings will provide valuable insights for government bodies and NGOs to design more effective and inclusive programs that are better supported by local communities.

#### II. REVIEW OF LITERATURE

A. Community Perception and Participation in Watershed and Wasteland Management

Community participation and perception are critical elements in ensuring the sustainability and success of watershed and wasteland management. Numerous studies have emphasized that when communities perceive management practices as beneficial, they are more inclined to actively engage in them (Ferreira et al., 2023). Such positive perceptions often result in enhanced local ownership and long-term commitment to conservation. Ferreira et al., (2023) demonstrated that applying community-based approaches to watershed ecosystems can lead to more sustainable outcomes. Likewise, Narendra et al., (2021) argued that involving local communities in planning and decision-making increases the legitimacy and acceptance of watershed programs. Participation is strengthened when communities believe their contributions are valued and when visible environmental improvements

result from their efforts (Tongdeenok, 2023). Mukuria *et al.*, (2020) highlighted that socioeconomic conditions and community understanding of ecological impacts shape the level of participation in watershed projects. Additionally, Muzdalifah *et al.*, (2021) confirmed that when institutions foster transparent and participatory processes, communities are more likely to engage and invest in the outcomes.

## B. Gender Differences in Participation and Perception

Gender plays a significant role in shaping the involvement of community members in watershed and wasteland management. Research suggests that men and women often perceive and engage in environmental issues differently because of their distinct social roles. Women, for instance, are frequently responsible for water collection and household resource management, yet thev underrepresented in decision-making forums (Tang & Adesina, 2022). Kaunang et al., (2023) observed that women's participation in community water management is lower than that of men, often due to social and cultural barriers. Empowering women through education and leadership training has shown promising results in boosting their engagement. Senbeta et al., (2024) also stressed the importance of including women in environmental governance and ensuring that their contributions are recognized and utilized effectively. Sumalatha et al., (2024) supported this by showing that integrating gender-sensitive educational initiatives can reduce disparities and foster more inclusive participation in watershed conservation activities. These findings underline the need for targeted strategies to address gender imbalances in environmental programs.

# C. Trust in Local Authorities and Its Impact on Participation

Trust in local authorities is a decisive factor influencing the level of community participation in environmental initiatives. Communities that perceive local authorities as trustworthy, competent, and responsive are more likely to support and engage in watershed and wasteland management efforts. Muzdalifah et al., (2021) argued that participatory governance models, where communities are involved from the planning to implementation stages, lead to stronger collaboration and better outcomes. Wahid et al., (2021) added that acknowledging local knowledge and incorporating it into formal management plans not only enhances trust but also ensures that strategies are more context-specific and effective. Furthermore, Memon et al., (as cited in Senbeta et al., 2024) suggested that initiatives led by community members themselves often achieve better environmental outcomes, especially when they are supported by authorities through consistent communication and transparent processes.

## D. Research Questions

1. What are the community's perceptions of and participation in watershed management activities?

- 2. What are the community's perceptions of and participation in wasteland management activities?
- 3. What is the level of trust that community members have in local authorities regarding watershed and wasteland management?
- 4. How do gender and education level influence community participation in watershed and wasteland management activities?

## E. Research Objectives

- 1. To measure the community's perceptions of and participation in watershed management activities.
- 2. To measure the community's perceptions of and participation in wasteland management activities.
- 3. To assess the level of trust that community members have in local authorities regarding watershed and wasteland management.
- 4. To determine whether gender and education level influence community participation in watershed and wasteland management activities.

## III. HYPOTHESES DEVELOPMENT

Community perceptions and participation are important for the success of watershed and wasteland management. Research indicates that when individuals possess a strong understanding and hold positive views of these environmental initiatives, their likelihood of participation increases (Ferreira et al., 2023; Mekuria et al., 2020). However, trust in local authorities plays a critical role; even when perceptions are positive, individuals may refrain from participating if they lack trust in those managing the projects (Muzdalifah et al., 2021). This trust functions as a mediating factor between perceptions of management efforts and the willingness to engage. Similarly, in the context of wasteland management, positive community perception fosters participation; yet, trust in local authorities remains key in transforming perception into action (Reddy et al., 2022; Vasanta & Dhawan, 2021). Gender and education also influence community perceptions. Women often have different levels of participation and perception compared to men due to social roles (Tang & Adesina, 2022; Kaunang et al., 2023). Education enhances understanding of environmental issues, which may result in more favorable perceptions and increased involvement among those with higher education levels (Senbeta et al.,2024; Sumalatha et al.,2024).

## A. Hypotheses

- 1. H1: Community perceptions of watershed management positively influence community participation in watershed management.
- 2. H2: Trust in local authorities mediates the relationship between community perceptions and participation in watershed management.

- 3. H3: Community perceptions of wasteland management positively influence community participation in wasteland management.
- 4. H4: Trust in local authorities mediates the relationship between community perceptions and participation in wasteland management.
- 5.H5: There is a significant difference in community participation in watershed management between males and females.
- 6. H6: There is a significant difference in community participation in wasteland management between males and females.
- 7. H7: There is a significant difference in community participation in watershed management between education levels.
- 8. H8: There is a significant difference in community participation in wasteland management between education levels.

#### IV. METHODOLOGY

This research was conducted to examine how residents of a village perceive and participate in watershed and wasteland management. It also explored how trust in local authoritiesalong with gender and education level-affects their perceptions and participation. The study followed a quantitative research design, using numerical data to understand patterns of behavior. The study was conducted in Harekala Village, located in the Dakshina Kannada district of Karnataka, India. This village lies near the Netravati River and features a recently completed dam and

bridge (Harekala-Adyar), finalized in 2023, which are directly linked to water and land management initiatives. Harekala was selected as the research site because residents are directly impacted by such development projects, making it a relevant context for understanding how these programs function in practice. This aligns with the study's aim to assess community perception, participation, and the role of trust, gender, and education.

Data were collected using a structured questionnaire consisting of straightforward questions on perceptions, participation in watershed and wasteland management, trust in local authorities, gender, and education level. The questionnaire was administered in both English and Kannada to ensure clarity and accessibility.

The survey targeted individuals aged 18 years and above; students under the age of 18 were excluded. A total of 141 respondents were selected using purposive sampling, ensuring fair representation of diverse groups within the village.

Data were analyzed using SMART PLS software (version 4.0) to conduct structural equation modeling (SEM) and examine the relationships among community perception, participation, and trust. Additionally, an independent samples t-test was used to determine whether significant differences existed between male and female participants in terms of perception and participation. A one-way ANOVA was applied to assess whether education level influenced individuals' views and involvement in these environmental activities.

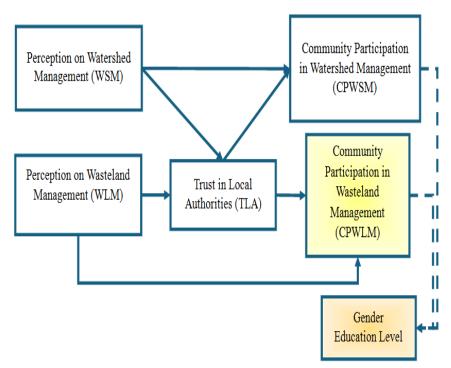


Fig.1 Proposed Conceptual Framework

V. RESULTS

TABLE I DEMOGRAPHIC PROFILE OF RESPONDENTS

Variable	Category	Frequency (n)	Percentage (%)
	Male	96	68.1%
Gender	Female	45	31.9%
	Total	141	100.0%
	18-28	34	24.1%
	28-38	36	25.5%
Age Group	38-48	32	22.7%
	48 and above	39	27.7%
	Total	141	100.0%
	SSLC and below	39	27.7%
	PUC/Diploma	53	37.6%
Educational	Graduation	38	27.0%
Qualification	Post Graduation and Above	11	7.8%
	Total	141	100.0%
	Employed full-time	24	17.0%
	Employed part-time	15	10.6%
Employment	Self-employed	54	38.3%
Status	Unemployed	29	20.6%
	Retired	19	13.5%
	Total	141	100.0%
	Less than 1 year	5	3.5%
	1-5 years	17	12.1%
Community Experience	6-10 years	26	18.4%
Experience	Over 10 years	93	66.0%
	Total	141	100.0%
	Very Safe	38	27.0%
	Safe	51	36.2%
Perceived	Neutral	30	21.3%
Safety	Unsafe	16	11.3%
	Very Unsafe	6	4.3%
	Total	141	100.0%

The study sample was predominantly male (68.1%), reflecting common gender participation trends in rural community engagement. In terms of age, the respondents were well distributed, with the largest group being 48 years and above (27.7%), indicating mature community involvement, while younger adults (18-28 years) also constituted a significant portion (24.1%). Regarding educational background, most participants had completed Pre-University Course (PUC)/diploma (37.6%) or had education below the Secondary School Leaving Certificate (SSLC) level (27.7%). This suggests moderate formal education levels among participants, which may influence their awareness and participation in watershed and wasteland management activities. In terms of employment, self-employment (38.3%) was the most common, aligning

with typical rural livelihoods such as farming and small businesses. This was followed by unemployment (20.6%) and full-time employment (17.0%), indicating a mixed economic base within the community. A strong majority (66%) had lived in the community for over ten years, suggesting deep-rooted community ties and the potential for higher civic engagement. This long-term residency may positively contribute to sustained participation in local environmental initiatives. Regarding perceived safety, most respondents felt safe (36.2%) or very safe (27.0%), indicating a generally secure environment conducive to active community involvement. However, the presence of respondents who felt unsafe (11.3%) or very unsafe (4.3%) highlights some local safety concerns that may hinder participation for certain individuals.

TABLE II INDEPENDENT SAMPLES T-TEST - GENDER AND COMMUNITY PARTICIPATION IN WATERSHED MANAGEMENT

Variable	Levene's Test for Equality of Variances (Sig.)	t- value	df	Sig. (2-tailed)	Mean Difference
CPWSM1	.669	3.517	139	.001	.571
CPWSM2	.097	3.297	139	.001	.574
CPWSM3	.080	3.032	139	.003	.510

An independent samples t-test was conducted to examine gender differences in community participation in watershed management. The results showed significant differences between males and females across all three variables. For CPWSM1, the result was statistically significant, t (139) = 3.52, p = .001. Similarly, CPWSM2 yielded a significant

result, t(139) = 3.30, p = .001, and CPWSM3 also showed a significant difference, t(139) = 3.03, p = .003. These findings indicate that gender significantly influences participation in watershed management.

TABLE III INDEPENDENT SAMPLES T-TEST - GENDER AND COMMUNITY PARTICIPATION IN WASTELAND MANAGEMENT

VariableLevene's Test for Equality of Variances (Sig.)t-valuedfSig. (2-tailed)Mean DifferenceCPWSM1.6693.517139.001.571

139

139

.001

.003

3.297

3.032

An independent samples t-test was conducted to assess gender differences in community participation in wasteland management. The results were statistically significant across all measured items. For CPWSM1, t(139) = 3.52, p = .001;

CPWSM2

CPWSM3

.097

.080

for CPWSM2, t (139) = 3.30, p = .001; and for CPWSM3, t (139) = 3.03, p = .003. These results suggest that male and female respondents differed significantly in their participation in wasteland management activities.

.574

.510

TABLE IV ANOVA - EDUCATION LEVEL AND COMMUNITY PARTICIPATION IN WATERSHED MANAGEMENT

Variable	Sum of Squares (Between)	df	Mean Square	F-value	Sig.
CPWSM1	9.489	3	3.163	3.847	.011
CPWSM2	8.764	3	2.921	3.074	.030
CPWSM3	7.018	3	2.339	2.635	.052

A one-way ANOVA was conducted to determine whether community participation in watershed management differed by educational level. The results showed a significant effect for CPWSM1, F (3, 137) = 3.85, p = .011, and for CPWSM2, F (3, 137) = 3.07, p = .030. However, CPWSM3

approached significance but did not meet the conventional threshold, F(3, 137) = 2.64, p = .052. These results indicate that education level significantly affects some aspects of participation in watershed management.

TABLE V ANOVA - EDUCATION LEVEL AND COMMUNITY PARTICIPATION IN WASTELAND MANAGEMENT

Variable	Sum of Squares (Between)	df	Mean Square	F-value	Sig.
CPWLM1	7.727	3	2.576	2.769	.044
CPWLM2	2.111	3	.704	0.932	.427
CPWLM3	8.488	3	2.829	2.717	.047
CPWLM4	17.457	3	5.819	7.015	.000

A one-way ANOVA was conducted to evaluate the influence of education level on community participation in wasteland management. The results showed significant differences for CPWLM1, F (3, 137) = 2.77, p = .044; CPWLM3, F (3, 137) = 2.72, p = .047; and CPWLM4, F (3, 137) = 7.02, p < .001. However, CPWLM2 was not

statistically significant, F(3, 137) = 0.93, p = .427. These results suggest that education level has varying influences on different dimensions of participation in wasteland management.

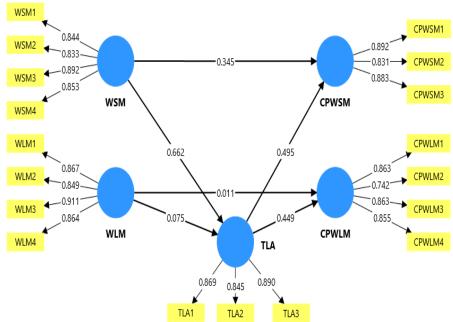


Fig 2 Structural Equation Modelling Using SMAR PLS

TABLE VI CONSTRUCT RELIABILITY AND VALIDITY (ITEM-WISE)

Construct	Item	Outer Loading	Cronbach's Alpha	Composite Reliability (CR)	AVE
	CPWLM1	0.863	0.852	0.900	0.693
CPWLM (Community	CPWLM2	0.742	0	0	0
Perception of Wasteland Management)	CPWLM3	0.863	0	0	0
	CPWLM4	0.855	0	0	0
	CPWSM1	0.892	0.838	0.903	0.755
CPWSM (Community Perception of Watershed Management)	CPWSM2	0.831	0	0	0
or watershed Management)	CPWSM3	0.883	0	0	0
	TLA1	0.869	0.837	0.902	0.754
TLA (Trust in Local Authorities)	TLA2	0.845	0	0	0
	TLA3	0.890	0	0	0
	WLM1	0.867	0.896	0.928	0.762
WLM (Wasteland Management	WLM2	0.849	0	0	0
Participation)	WLM3	0.911	0	0	0
	WLM4	0.864	0	0	0
	WSM1	0.844	0.878	0.916	0.732
WSM (Watershed Management	WSM2	0.833	0	0	0
Participation)	WSM3	0.892	0	0	0
	WSM4	0.853	0	0	0

## VI. CONSTRUCT RELIABILITY AND VALIDITY

Construct reliability and validity were evaluated using Smart PLS, following the threshold guidelines recommended by Hair *et al.*, (2022, 2024). The outer loadings for all items ranged from 0.742 to 0.911, exceeding the recommended cutoff of 0.70, and are thus shown in green in SmartPLS, indicating strong indicator reliability. Cronbach's alpha values for all constructs were above

0.837, and both composite reliability values exceeded 0.70-well above the acceptable threshold-highlighting high internal consistency (Raghavendra & Aparna, 2024). Furthermore, the average variance extracted (AVE) for all constructs was above 0.50 (ranging from 0.693 to 0.762), fulfilling the requirement for convergent validity. According to Smart PLS standards, these values were also marked green, confirming that each construct explained a sufficient

portion of the variance of its indicators. These results collectively establish the model's construct reliability and convergent validity, supporting the robustness of the measurement model based on the criteria set by Hair *et al.*, (2022, 2024).

Discriminant Validity Using HTMT and Fornell-Larcker Criterion Discriminant validity was assessed using both the heterotrait-monotrait (HTMT) ratio and the Fornell-Larcker criterion. Based on the recommendations of Henseler, Ringle, and Sarstedt (2015), HTMT values should ideally be below 0.90, with a more conservative threshold of 0.80. In

this study, the HTMT values ranged from 0.121 to 0.869, all below the 0.90 cut off, indicating that each construct was distinct from the others.

The Fornell-Larcker criterion (Fornell & Larcker, 1981) also confirmed discriminant validity, as the square root of each construct's AVE was greater than its highest correlation with any other construct. These results confirm that the measurement model demonstrates good discriminant validity, consistent with current best practices in PLS-SEM (Hair *et al.*,2022; Henseler *et al.*,2015; Ringle *et al.*,2023).

TABLE VII HYPOTHESES TESTING RESULTS FOR DIRECT AND MEDIATED EFFECTS ON COMMUNITY PARTICIPATION

	Original sample (O)	Standard deviation (STDEV)	T statistics	P values	Decision
WSM -> CPWSM	0.345	0.091	3.799	0.000	Supported
WLM -> CPWLM	0.011	0.087	0.130	0.896	Not Supported
WLM -> TLA -> CPWLM	0.034	0.031	1.078	0.281	Not Supported
WSM -> TLA -> CPWSM	0.327	0.065	5.065	0.000	Supported

The results in Table VII indicate that the direct effect of Watershed Management (WSM) on Community Participation in Watershed Management (CPWSM) is significant ( $t=3.799,\ p=.000$ ), as is the mediated effect through Trust in Local Authorities (TLA) ( $t=5.065,\ p=.000$ )

.000). However, the direct effect of Wasteland Management (WLM) on Community Participation in Wasteland Management (CPWLM) and the mediated effect through TLA were not significant (p > .05).

TABLE VIII SUMMARY OF STATISTICAL TESTS AND OUTCOMES FOR GENDER AND EDUCATION EFFECTS ON COMMUNITY PARTICIPATION WATERSHED AND WASTELAND MANAGEMENT

Нур.	Hypothesis Statement	Test Type	Sig. Value	Decision
Н5	There is a significant difference in Community Participation in Watershed Management between males and females.	Independent Samples t- test	CPWSM1: .001 CPWSM2: .001 CPWSM3: .003	Supported
Н6	There is a significant difference in Community Participation in Wasteland Management between males and females.	Independent Samples t- test	CPWSM1: .001 CPWSM2: .001 CPWSM3: .003	Supported
Н7	There is a significant difference in Community Participation in Watershed Management between education level.	ANOVA	CPWSM1: .011 CPWSM2: .030 CPWSM3: .052	Supported
Н8	There is a significant difference in Community Participation in Wasteland Management between education level.	ANOVA	CPWLM1: .044 CPWLM2: .427 CPWLM3: .047 CPWLM4: .000	Supported

According to Table VIII, there was a significant difference in community participation in watershed management between males and females across CPWSM1, CPWSM2, and CPWSM3 (p-values = .001, .001, and .003, respectively), supporting H5. Similarly, H6 was supported by significant gender differences in participation in wasteland management (p-values ranging from .001 to .003). For education level, H7 was supported by significant differences in watershed management participation (p = .011, .030, and .052), while H8 was supported by mixed significance across CPWLM variables, including a strong significance in CPWLM4 (p = .000).

## VII. DISCUSSION

A. Impact of Watershed Management and Trust on Community Participation

The study found that watershed management (WSM) significantly influenced community participation both directly and through the mediating role of trust in local authorities. This finding highlights the essential role of trust in enhancing community engagement. Shields *et al.*, (2021) also emphasized that trust in local institutions is critical for fostering participation in environmental initiatives. David *et al.*, (2023) and Vasanta and Dhawan (2021) further support

the idea that positive perceptions and trust in authorities boost active involvement in natural resource management. However, wasteland management (WLM) showed no significant impact on participation, indicating possible challenges in program implementation or community perception, which require further investigation.

## B. Gender Differences in Community Participation

Significant gender differences were observed in participation levels for both watershed and wasteland management. This aligns with the findings of Mahlangabeza and Zwelakhe (2021), who identified gender as a key factor influencing involvement in environmental conservation activities. Men and women often have different access to information, resources, and decision-making power, all of which affect their participation. Therefore, environmental programs must incorporate gender-sensitive approaches to ensure equitable and meaningful engagement of all community members.

## C. Influence of Education Level

Education level was found to significantly affect participation in watershed and wasteland management activities. This finding is consistent with that of Reciprico et al., (2023), who reported that higher education improves awareness and understanding of environmental issues and encourages active participation. Educated individuals tend to recognize the long-term benefits of sustainable management, thereby contributing more effectively to program success. This underscores the need for educational initiatives alongside management programs to enhance community involvement.

## D. Importance of Social Factors in Program Success

The results underscore that social and perceptual factors-trust, gender, and education-play vital roles in the success of environmental management. Trust in local authorities, in particular, acts as a strong mediator in watershed management, highlighting the importance of transparent and participatory governance in building community confidence (Mekuria *et al.*,2020; Reddy *et al.*,2022). Addressing gender disparities and promoting education are also crucial for designing inclusive, responsive, and sustainable programs.

#### E. Theoretical Implications

These results reinforce socio-ecological systems theories, which emphasize the interdependence of social factors and environmental outcomes.

## F. Practical Implications Based on the Findings

1. As trust strongly mediates participation in WSM, authorities must focus on building transparent and consistent communication channels with the community to sustain and increase trust. For example, regular public meetings and the transparent sharing of project progress can be effective.

- 2. Training local officials and representatives in trustbuilding and community engagement skills will enhance participation levels.
- 3. The non-significant effect of wasteland management on participation suggests the need to reassess these programs to make them more community-friendly and comprehensible. Awareness campaigns and community consultations should be intensified to improve perceptions and increase participation in wasteland projects.

## G. Areas for Further Research

The non-significant effect of wasteland management on participation indicates gaps that require deeper examination, possibly related to program design, communication, or cultural factors. Future research could explore other mediating variables such as social capital and institutional support to better understand community engagement pathways. Additionally, qualitative studies can help uncover specific gender-related barriers and motivations, aiding the development of targeted strategies.

#### VIII. CONCLUSION

This study highlights that community participation in watershed and wasteland management is shaped not only by technical interventions but also by social factors such as trust in local authorities, gender roles, and educational background. The findings revealed that watershed management (WSM) significantly promoted community participation, particularly when trust in local authorities was present. Trust played a mediating role in strengthening the link between positive perceptions and active involvement. This underscores the importance of transparent governance and consistent communication between authorities and community members. In contrast, wasteland management (WLM) did not show a significant direct impact on participation, indicating that current approaches may lack clarity, accessibility, or relevance to community needs. This calls for redesigned WLM programs that are more participatory, inclusive, and tailored to the local context. Furthermore, the study found significant differences in participation based on gender and education level. Women and individuals with lower education levels often participated less, likely due to barriers in accessing information, decision-making spaces, or empowerment. This suggests that future environmental initiatives should integrate gender-sensitive and educational outreach strategies to promote equitable and inclusive participation. In summary, sustainable success in watershed wasteland management requires more than just infrastructure-it demands community trust, inclusive practices, and culturally responsive planning. In India and similar settings, embedding these social dimensions into environmental policy and program design will foster stronger community ownership, leading to more effective and lasting outcomes.

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# Use of Artificial Intelligence (AI)-Assisted Technology for Manuscript Preparation

The author confirms that no AI-assisted technologies were used in the preparation or writing of the manuscript, and no images were altered using AI

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