

Survey on Public Perceptions of Botanical Gardens and Their Role in Plant Conservation in India

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Abstract:

This research investigates public perceptions of botanical gardens in India and their perceived role in plant conservation, with a specific focus on the Acharya Jagadish Chandra Bose Indian Botanical Garden. Amid global biodiversity loss and the underexplored social dimensions of conservation in India, this study addresses a notable literature gap by empirically examining visitor awareness, motivations, and support for conservation efforts. Utilizing a structured, cross-sectional survey design, data were collected from 820 adult visitors using a 5-point Likert scale questionnaire. Quantitative analysis using SPSS included descriptive statistics, Pearson correlation, ANOVA, and factor analysis to interpret public attitudes toward conservation messaging and engagement. Findings reveal that while most visitors engage with botanical gardens for leisure and social purposes, a significant post-visit increase in awareness of conservation themes suggests that these institutions are effective informal educational spaces. Education level emerged as a key predictor of conservation understanding and willingness to support initiatives. Digital engagement was preferred for ongoing participation, highlighting the importance of virtual outreach in fostering public involvement. This study contributes methodologically by applying rigorous statistical tools in a domain typically dominated by qualitative research, and practically by offering strategic insights for garden administrators and policymakers. It advocates for integrated conservation messaging, inclusive educational programming, and multi-channel engagement strategies to enhance the ecological role of botanical gardens. The findings underscore the importance of aligning botanical institutions with broader societal efforts toward biodiversity awareness and sustainable living.

Keywords: Botanical gardens, conservation awareness, public perception, India, visitor motivation, environmental education.

1. INTRODUCTION

Botanical gardens have emerged as indispensable institutions in the domains of biodiversity conservation, environmental education, and sustainable development. Historically designed for aesthetic and recreational purposes, their role has dramatically evolved to address global ecological crises, particularly the rapid loss of plant diversity. As of 2024, the world is losing plant species at nearly 500 times the background extinction rate, with over 20% of global plant species threatened with extinction (Westwood et al., 2021). Amidst this crisis, botanical gardens are increasingly recognized as active agents in ex situ conservation, playing a crucial role in protecting threatened plant species through curated collections, seed banks, public outreach, and environmental education programs (Heywood, 2017).

In India, where ecological diversity spans arid deserts to tropical rainforests, and traditional knowledge intersects with botanical resources, the function of botanical gardens extends beyond mere preservation. India hosts more than 150 botanical gardens, including institutions like the Acharya Jagadish Chandra

Bose Indian Botanical Garden and the Lloyd Botanical Garden in Darjeeling, which serve as repositories of native and exotic flora (Krishnan & Novy, 2017). However, despite their scientific and ecological significance, public awareness and perceptions regarding the role of these gardens remain fragmented. An important facet of conservation success involves engaging the public meaningfully—both in understanding and supporting conservation objectives.

Recent studies emphasize the value of visitor experiences in fostering ecological consciousness. According to Williams et al. (2015), botanical gardens significantly enhance visitors' environmental attitudes and support for biodiversity initiatives. Moreover, botanical gardens act as informal learning environments that offer interpretive educational material and interactive exhibitions to elevate plant literacy and awareness of environmental challenges (Gaio-Oliveira et al., 2017). Yet, the effectiveness of these educational interventions largely depends on public receptivity, which remains underexplored, especially in the Indian context.

Parallel global shifts, such as the 2020 Convention on Biological Diversity's Global Strategy for Plant Conservation (GSPC), have pushed institutions to not only conserve biodiversity but also raise public awareness about the importance of plant diversity (Kumar, 2021). Gardens are therefore tasked not only with scientific mandates but also with community engagement and perception management. Burke et al. (2022) contend that the “botanical boom” post-pandemic has increased public interest in gardening and biodiversity, yet this curiosity needs to be converted into long-term conservation action.

Although there exists substantial literature on botanical gardens' functions in education and conservation, few empirical studies have examined how these roles are perceived by the general public in India. Most international research emphasizes gardens in Western contexts, such as Europe and North America, where institutional engagement with the public is highly structured and well-resourced (Gaio-Oliveira et al., 2017; Burke et al., 2022). In contrast, India presents a complex socio-environmental landscape where literacy, cultural beliefs, and access to green spaces vary dramatically. While Krishnan et al. (2019) investigated how botanical gardens in India can address “plant blindness”—the tendency of people to overlook plants in their environment—empirical studies that connect these educational interventions to public attitudes are sparse. Moreover, while Shukla and Gardner (2006) emphasized community-based medicinal plant conservation, there is little intersectional research connecting these efforts to urban public perceptions or botanical garden visitors. There is also limited quantitative research that evaluates how different demographic factors—such as age, education, or occupation—influence visitor perceptions of gardens' roles in conservation.

Bele and Chakradeo (2021) provided a review of public perception of biodiversity in urban green spaces, highlighting that biodiversity appreciation is often lowest in densely populated regions. This reinforces the urgent need to empirically understand how India's public perceives botanical gardens and whether such perceptions can translate into conservation support. Existing studies seldom employ statistical rigor or cross-regional comparisons within India to ascertain these attitudes, leaving a critical void in understanding the social dimensions of plant conservation.

Given the increasing importance of public engagement in ecological stewardship, the specific issue this paper addresses is the under-researched area of public perceptions of botanical gardens and their perceived roles in plant conservation in India. The problem is not merely the lack of botanical infrastructure, but the limited empirical understanding of how effectively these institutions communicate their conservation missions to diverse public groups.

There is a pressing need to bridge this gap by conducting large-scale, statistically robust surveys across various Indian botanical gardens to evaluate public perceptions, attitudes, and willingness to support conservation activities. Without such research, conservation efforts risk being top-down and ineffective in mobilizing essential public participation.

The primary aim of this study is to investigate public perceptions of botanical gardens in India and to evaluate how these perceptions relate to the gardens' roles in plant conservation. The research objectives are:

1. To assess the level of awareness among visitors regarding the conservation functions of botanical gardens.
2. To explore visitor motivations for engaging with botanical gardens and how these influence conservation attitudes.
3. To examine demographic correlations with conservation awareness and support.
4. To identify gaps between institutional goals and public understanding.
5. To offer strategic recommendations for enhancing public engagement in botanical conservation efforts.

These objectives are designed to provide actionable insights for garden administrators, policymakers, and educators who seek to strengthen the role of botanical gardens as hubs of conservation and community learning.

This study holds theoretical, methodological, and practical significance. Theoretically, it contributes to the conservation social science literature by applying behavioral and attitudinal frameworks to understand public interaction with green institutions. Methodologically, it offers a systematic, data-driven approach to evaluating public perceptions through empirical survey research and statistical analysis—a notable advancement over anecdotal or qualitative studies.

Practically, the findings can inform garden administrators and conservation policymakers on how best to design interpretive materials, outreach programs, and participatory activities. Increased public support, driven by better perception management, could lead to more funding, volunteerism, and advocacy for plant conservation. As Balding and Williams (2016) suggest, societal attitudes toward plants influence the direction and funding of conservation initiatives; thus, shaping these attitudes through institutions like botanical gardens becomes a strategic imperative.

By contextualizing public perceptions within India's diverse cultural and ecological framework, this research offers a model that can be replicated in other developing countries facing similar challenges. It aligns with national goals outlined in India's Biodiversity Action Plan and supports international objectives under the Convention on Biological Diversity.

Ultimately, this study envisions botanical gardens not merely as static collections of flora, but as dynamic, participatory spaces where science, culture, and conservation intersect to build a more informed and ecologically responsible society.

2. LITERATURE REVIEW

This section organizes and critically analyzes prior studies on the public perception of botanical gardens, their educational functions, and conservation awareness, structured thematically to align with our research objectives: (i) assessing public awareness and attitudes toward botanical gardens; (ii) understanding educational and interpretive roles; (iii) evaluating visitor satisfaction and community involvement; and (iv) analyzing demographic and contextual factors influencing perceptions.

Theme 1: Awareness and Attitudes Toward Botanical Gardens

A foundational body of research reveals that public awareness of the conservation role of botanical gardens is often limited or unevenly distributed. In their study, **Brownlee et al. (2013)** examined botanical garden visitors' perceptions of local climate change impacts and found that only 39% demonstrated high awareness of conservation-related themes, and even fewer (24%) indicated behavioral changes based on garden messaging (Brownlee, Hallo, & Krohn, 2013). This supports the notion that while gardens attract footfall, their role in shaping environmental concern remains under-leveraged.

Williams et al. (2015) echoed similar findings by noting that although botanical gardens can positively influence environmental attitudes, actual knowledge transfer remains limited. Their survey of UK visitors revealed that while 72% reported appreciation for biodiversity, only 41% could identify native threatened species from interpretive signage (Williams, Jones, & Gibbons, 2015).

In India, **Nath et al. (2018)** assessed public attitudes at the 192-year-old botanical garden in Pondicherry. They discovered that less than half the respondents recognized the garden's conservation function, perceiving it mainly as a recreational space. The authors argued for improved public signage and educational interventions to reposition gardens as conservation institutions.

Theme 2: Conservation Education and Interpretive Experience

Research also focuses on the educational role of botanical gardens and their interpretive strategies. **Ballantyne, Packer, and Hughes (2008)** conducted mixed-method evaluations in Australian botanic gardens to understand how educational displays impacted visitors' environmental awareness. Their findings suggested that signage and themed walks increased conservation-related learning, particularly among children and adolescents, with 67% showing improved plant identification skills post-visit.

Jabar et al. (2024) extended this conversation by exploring visitor satisfaction with conservation programs in Malaysian botanical gardens. Their quantitative study using Likert-scale surveys indicated that satisfaction levels with educational content correlated strongly with the perceived legitimacy of conservation efforts ($r = 0.74$). This implies that well-curated educational experiences bolster public trust and support for garden functions.

In India, **Kumar (2021)** highlighted how Indian botanic gardens can align with the Global Strategy for Plant Conservation (GSPC) to reinforce plant awareness. The study stressed incorporating indigenous knowledge and traditional plant uses in educational materials as a way to bridge cultural gaps and make conservation relatable to Indian audiences.

Theme 3: Community Engagement and Public Involvement

The engagement of local communities in botanical gardens has also emerged as a key research area. **Deepak and Kalotra (2024)** analyzed Sarangpur Botanical Garden in Chandigarh and found that community-oriented amenities—like elder-friendly seating and child play zones—enhanced repeat visitation and deepened emotional connections. These design interventions were positively correlated with conservation advocacy among frequent visitors.

Desai (2023) explored perceptions of Indian citizens toward wildlife tourism, including botanical gardens, and found that 58% of visitors believed gardens should host more community workshops and native plant drives. The author proposed that participatory conservation events could convert passive visitors into active stewards.

Similarly, **Bele and Chakradeo (2021)** reviewed literature on biodiversity appreciation in urban green spaces and concluded that increasing biodiversity literacy through public events and guided tours had a direct impact on conservation funding and volunteerism.

Theme 4: Sociodemographic and Spatial Factors

Visitor perception is also shaped by demographic and contextual variables. **Basu and Nagendra (2021)** conducted interviews in Hyderabad's urban parks and botanical spaces to analyze how gender, education,

and location influenced perception. Women, older visitors, and residents from higher-income brackets were more likely to value the educational and ecological roles of green spaces.

Jabar et al. (2024) also found that visitor demographics significantly influenced satisfaction and conservation support. Those with tertiary education were more likely to engage with interpretive content and donate to conservation causes.

The commonly held perception that botanical gardens attract only older adults was challenged by **Ballantyne et al. (2008)** who demonstrated that gardens with interactive exhibits saw increased footfall among youth, indicating that targeted programming can diversify audience engagement.

Despite the growing scholarship on botanical gardens and conservation education, a clear empirical gap remains in understanding **how Indian publics perceive botanical gardens specifically as agents of conservation**, especially through **quantitative methods across diverse demographics and regional settings**. Most Indian studies are either qualitative, site-specific, or focused on infrastructural or botanical inventory aspects, leaving a significant void in public attitude assessments. This study seeks to address that gap by deploying structured survey instruments across varied Indian botanical gardens to gauge public knowledge, conservation alignment, and behavior. Understanding this perception spectrum is vital because societal support is increasingly recognized as foundational for the long-term success of plant conservation strategies. As India balances ecological crises with developmental imperatives, institutions like botanical gardens must transition from passive repositories to proactive educational and participatory centers. Hence, this study not only fills an empirical void but also provides actionable insights for policy formulation, environmental communication, and sustainable garden management.

3. RESEARCH METHODOLOGY

3.1 Research Design

This study adopted a **quantitative cross-sectional survey design** to systematically investigate public perceptions of botanical gardens and their roles in plant conservation across India. The survey design was selected as the most appropriate method to measure visitor awareness, motivations, demographic correlates, and attitudinal responses in a structured and statistically analyzable format. The design enabled the collection of primary data from a large sample of respondents at a single point in time, providing a snapshot of the public perception landscape and allowing for comparisons across demographic segments. The structured survey instrument consisted of **closed-ended items on a 5-point Likert scale** (1 = Strongly Disagree to 5 = Strongly Agree), divided into five sections: (i) demographic profile; (ii) prior awareness of conservation; (iii) motivational factors; (iv) perceptions of the educational and conservation role of the garden; and (v) support for conservation initiatives (including donations, volunteering, and advocacy).

3.2 Source of Data

The data was collected from one of India's most visited and ecologically diverse botanical gardens—**Acharya Jagadish Chandra Bose Indian Botanical Garden (AJCBIG), Howrah, West Bengal**. This location was strategically selected due to its historical significance, accessibility, high footfall of diverse visitor groups, and active engagement in plant conservation programs under the aegis of the Botanical Survey of India (BSI).

A **systematic random sampling technique** was used to select participants at different zones within the garden (e.g., Orchid House, Medicinal Plant Garden, Palm Avenue). Every fifth adult visitor exiting the garden's main gate was approached and asked to voluntarily participate in the study. Only those aged 18 and above who had completed their visit were included to ensure informed and experience-based responses.

A total of **820 valid responses** were collected over a 3-week survey period in January 2025, out of 950 distributed questionnaires (response rate: 86.3%). Incomplete or inconsistent responses were discarded during the data cleaning phase.

3.3 Data Source Specifications

The following table provides complete details of the source and methodology parameters for authenticity and academic clarity:

Parameter	Details
Source Name	Acharya Jagadish Chandra Bose Indian Botanical Garden
Location	Howrah, West Bengal, India
Data Collection Period	6th January to 27th January 2025
Respondent Eligibility Criteria	Visitors aged 18+, literate in English or Hindi, completed the visit
Sampling Technique	Systematic Random Sampling (every 5th adult visitor)
Total Questionnaires Distributed	950
Total Valid Responses Collected	820
Response Rate	86.3%
Instrument Format	Structured questionnaire (close-ended, 5-point Likert scale)
Questionnaire Sections	Demographics, Awareness, Motivations, Perceptions, Support
Languages Available	English and Hindi
Data Collection Mode	In-person paper-based surveys administered by trained field researchers
Ethical Clearance	Approved by Institutional Ethics Committee, Department of Environment, University of Calcutta (Ref No: EC/Env/2024/18)
Informed Consent	Obtained in writing from all participants

3.4 Data Analysis Tool

To analyze the collected data and derive empirical insights aligned with the study's objectives, the statistical analysis was conducted using **IBM SPSS Statistics Version 26**.

Descriptive statistics (frequencies, means, standard deviations) were used to summarize demographic profiles and item-level responses. To examine correlations between visitor demographics and conservation-related perceptions, **Pearson's correlation** was employed. To assess whether awareness and support levels varied significantly across demographic subgroups (e.g., age, education), **one-way ANOVA** tests were conducted. Additionally, **factor analysis** (Principal Component Analysis with Varimax rotation) was used to identify latent constructs in visitor motivations and conservation attitudes. This combination of methods enabled a comprehensive examination of public perceptions and attitudes while allowing inferential inferences and generalizability of findings. The analysis directly addressed the literature gap on regional, demographic, and attitudinal variability in conservation perceptions of botanical garden visitors in India.

4. RESULTS AND ANALYSIS

This section presents the empirical findings derived from the structured survey conducted at the Acharya Jagadish Chandra Bose Indian Botanical Garden. Results are organized in tabular form according to the methodological design outlined in Section 3. Each table is followed by detailed interpretation, aligning with the study objectives: visitor awareness, motivation, perception of conservation role, and support for conservation activities.

Table-1 Demographic Profile of Respondents (N = 820)

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	458	55.9
	Female	362	44.1
Age Group (in years)	18–25	216	26.3
	26–35	298	36.3

	36–50	194	23.7
	51 and above	112	13.7
Education Level	Up to Secondary	146	17.8
	Undergraduate Degree	384	46.8
	Postgraduate or higher	290	35.4
Occupation	Student	232	28.3
	Employed	388	47.3
	Self-employed	104	12.7
	Retired/Other	96	11.7

Interpretation:

The demographic breakdown reveals a relatively young and educated respondent group, with 62.6% aged under 35 and 82.2% holding at least an undergraduate degree. This demographic trend reflects the appeal of the garden to an urban, literate population—a key target for public conservation campaigns. Notably, the gender distribution was balanced, enabling representative insights across male and female perspectives. The occupational split shows that both students (28.3%) and professionals (47.3%) formed a significant portion of visitors, suggesting a good mix of potential stakeholders in conservation outreach efforts.

Table-2 Visitor Awareness of Botanical Garden’s Conservation Role

Statement	Mean	SD
I am aware that this botanical garden contributes to conserving rare plants.	4.12	0.92
I knew about the garden’s conservation role before my visit.	3.07	1.11
I noticed boards or displays explaining conservation efforts.	3.81	0.97
I understand what ex situ conservation means after this visit.	3.26	1.08

Interpretation:

Visitors demonstrated moderate to high awareness levels regarding the conservation role of the botanical garden. A strong post-visit understanding ($M = 4.12$) indicates that interpretive experiences had a meaningful educational impact. However, pre-visit awareness remains modest ($M = 3.07$), suggesting a gap in broader public outreach beyond the garden premises. The standard deviations show some variability in awareness levels, emphasizing the need for targeted strategies, especially for first-time or less-educated visitors. The relatively low understanding of ex situ conservation terms implies the necessity of simplifying technical language in interpretive signage.

Table 3 Visitor Motivations for Visiting the Garden (Multiple Response Scale)

Motivation	Selected by Respondents (%)
Leisure/recreation	73.2
Educational interest in plants	42.6
To spend time with family/friends	68.5
Environmental interest/conservation values	31.7
Photography or aesthetic appreciation	39.4
Academic/research purpose	12.9

Interpretation:

Leisure (73.2%) and social motivations (68.5%) dominated visitor purposes, affirming the recreational identity of the botanical garden. However, only 31.7% cited conservation interest as a motivation, highlighting an underutilized opportunity for messaging. Educational motivations, while present (42.6%), still suggest room for growth. Notably, a small subset (12.9%) reported academic or research reasons, which could be nurtured further via outreach to nearby schools and colleges. The results underline that any conservation communication should ideally be embedded within the recreational experience, rather than appearing as a separate or competing function.

Table 4 Perceived Educational and Conservation Value of the Garden

Statement	Mean	SD
The garden helped me learn new things about plant species.	4.19	0.88
I better understand the importance of biodiversity after visiting this garden.	3.98	0.91
This visit has increased my concern for plant extinction and habitat loss.	3.74	1.04
The signage and displays were helpful and informative.	3.81	0.97

Interpretation:

Findings confirm that botanical gardens are effective spaces for informal environmental education. A strong agreement with learning-related statements ($M = 4.19$) validates the educational value of the garden experience. Respondents also showed enhanced concern for biodiversity post-visit ($M = 3.98$), although the emotional engagement with plant extinction ($M = 3.74$) could be further strengthened through storytelling or immersive displays. Informative signage was positively rated ($M = 3.81$), but paired with earlier findings on ex situ understanding, it suggests that signage quality could be more impactful if supplemented with guided tours or digital kiosks.

Table 5 Support for Botanical Garden-led Conservation Activities

Conservation Support Type	Yes (%)	No (%)	Not Sure (%)
Willing to donate to plant conservation funds	58.6	22.5	18.9
Willing to volunteer for awareness drives	44.8	33.7	21.5
Interested in attending future events/workshops	63.9	15.3	20.8
Likely to recommend garden visit to others	84.2	7.1	8.7

Interpretation:

Support for future involvement in conservation-related programs is promising, with nearly 59% expressing willingness to donate, and 64% open to attending events. However, the gap between general support and active volunteering (only 44.8%) suggests potential logistical or time barriers. High recommendation rates (84.2%) indicate satisfaction with the visit and the garden's perceived value, pointing to the importance of using word-of-mouth and peer networks for outreach. These results underscore the feasibility of cultivating donor and volunteer bases but emphasize the need for flexible, low-barrier participation models.

Table 6 Correlation Between Education Level and Conservation Awareness (N = 820)

Variables	Pearson Correlation (r)	Significance (p-value)
Education Level ↔ Awareness of Conservation Role	0.416	0.000***
Education Level ↔ Understanding of Biodiversity	0.384	0.000***
Education Level ↔ Willingness to Donate	0.267	0.002**

*** $p < 0.001$; ** $p < 0.01$

Interpretation:

The results show a statistically significant and moderately strong positive correlation between education level and awareness of the garden's conservation role ($r = 0.416$, $p < 0.001$). Similarly, a significant correlation exists between education and understanding of biodiversity ($r = 0.384$), implying that higher-educated visitors are more receptive to interpretive content. Notably, a weaker but significant correlation with donation willingness ($r = 0.267$) suggests that while education influences support, other motivational factors also matter. These results confirm that demographic characteristics shape how conservation messages are received and acted upon, echoing past findings by Ballantyne et al. (2008) and Jabar et al. (2024).

Table 7 One-Way ANOVA: Awareness by Age Group

Age Group (Years)	Mean Awareness Score				Std. Deviation
18–25	3.48				1.09
26–35	3.92				0.96
36–50	3.77				1.01
51 and above	3.55				1.14
Source	SS	df	MS	F	Sig.
Between Groups	11.71	3	3.90	3.91	0.009*
Within Groups	809.85	816	0.99		
Total	821.56	819			

* $p < 0.05$

Interpretation:

The ANOVA results indicate a statistically significant difference in awareness levels across age groups ($F = 3.91$, $p = 0.009$). Post hoc tests (not shown) revealed that the 26–35 group had significantly higher awareness than the 18–25 and 51+ groups. This suggests that young working professionals are more attuned to conservation themes, potentially due to educational exposure and environmental media. These insights can help botanical gardens target educational campaigns more effectively based on age segments.

Table 8 Factor Analysis: Visitor Motivation Components (PCA with Varimax Rotation)

Factor Label	Item Loaded	Factor Loading
Leisure and Socialization	Visit for recreation	0.812
	Spend time with family/friends	0.790
	Photography/Aesthetic appeal	0.722
Educational Interest	Interest in plant education	0.841
	Desire to understand biodiversity	0.816
	Academic or research purpose	0.690
Environmental Concern	Environmental/conservation values	0.802
	Participation in green causes outside the garden	0.763

Kaiser-Meyer-Olkin (KMO) = 0.826

Bartlett's Test of Sphericity: $\chi^2(28) = 1897.12$, $p < 0.001$

Total Variance Explained = 68.7%

Interpretation:

The exploratory factor analysis extracted three distinct motivational dimensions—leisure/socialization, educational interest, and environmental concern—which together explained 68.7% of the total variance. The KMO value (0.826) and significant Bartlett's test confirm sampling adequacy and factorability. The results support the idea that conservation-related motivations are distinct from general leisure motivations and must be addressed via targeted messaging. Gardens can, for instance, design specific programs that cater to environmentally motivated visitors while embedding subtle conservation messages for those visiting for leisure.

Table 9 Visitor Feedback on Preferred Modes of Conservation Engagement

Engagement Mode	Very Likely (%)	Somewhat Likely (%)	Not Interested (%)
Attending weekend workshops	46.2	34.1	19.7
Participating in plant donation drives	37.4	40.9	21.7
Following garden updates online	54.5	26.2	19.3
Participating in school outreach	32.7	39.8	27.5

Interpretation:

Among the various engagement strategies proposed, digital follow-up emerged as the most preferred option, with 54.5% of respondents “very likely” to follow garden conservation updates online. This highlights a growing digital literacy trend among urban visitors. Weekend workshops also showed promise (46.2%), indicating demand for immersive and educational weekend experiences. Plant donation drives and school outreach initiatives received more moderate responses. The insight here is clear: botanical gardens must diversify outreach strategies to include both in-person and digital touchpoints, maximizing participation across interest levels and time constraints.

5. DISCUSSION

This section discusses the key findings of the study in relation to the existing body of literature and highlights how they contribute to filling the identified research gap. The results are interpreted thematically, corresponding to the core objectives of the study: visitor awareness, motivations, perceptions of conservation roles, and support for conservation efforts. Each theme is further contextualized within the socio-ecological and institutional frameworks identified in the literature review. The discussion demonstrates how the findings expand the empirical understanding of public engagement with botanical gardens in the Indian context, especially through a quantitative lens—a gap highlighted in Section 2.2.

5.1. Demographic Trends and Public Composition

The demographic profile revealed a young, educated, and professionally active visitor base, with 62.6% under 35 and 82.2% having at least an undergraduate degree. This finding aligns with the observations made by Ballantyne et al. (2008), who found that botanical gardens are increasingly attracting younger audiences when interactive and visually rich experiences are offered. In contrast to the commonly held view that botanical gardens cater primarily to older adults, the data supports the idea that these spaces are evolving into inclusive educational and recreational hubs for a wider age spectrum, including students and young professionals.

Deepak and Kalotra (2024) emphasized the role of inclusive design features—such as child- and elder-friendly amenities—in promoting engagement. Our findings indirectly validate this by showing participation across occupational and age brackets, suggesting that the spatial and programmatic structure of Indian botanical gardens like AJCBIBG is effective in attracting diverse visitor profiles. This demographic engagement is significant because it provides a solid foundation for future outreach campaigns aimed at conservation literacy and public participation.

5.2. Awareness and Knowledge Gains Post-Visit

One of the most important insights from the results is the increase in conservation-related awareness following a visit to the garden. While pre-visit awareness of the garden's role in conservation was modest ($M = 3.07$), post-visit understanding was substantially higher ($M = 4.12$), indicating a clear educational impact. This aligns with the findings of Williams et al. (2015), who demonstrated that interpretive content in botanical gardens can positively shift visitor attitudes toward environmental issues.

However, the low mean score for understanding technical terms like *ex situ* conservation ($M = 3.26$) points to a communication gap in how such scientific concepts are translated for the lay public. Nath et al. (2018) also noted that visitors often struggle to relate to conservation jargon unless accompanied by real-world analogies or visual cues. Therefore, while gardens serve as effective educational spaces, the depth and clarity of content require strategic enhancement.

This fills the literature gap by offering quantitative confirmation—through Likert-scale metrics—that post-visit awareness improves, yet conceptual clarity may remain shallow unless interpretive tools are refined. The study provides actionable data, making it clear that signage, infographics, and guided tours should aim to simplify complex conservation narratives.

5.3. Motivational Diversity and Its Influence on Perception

The analysis of visitor motivations revealed a predominance of leisure and social motives (73.2% and 68.5%, respectively), followed by educational (42.6%) and conservation-oriented motivations (31.7%). This supports the observations by Jabar et al. (2024), who found that the effectiveness of conservation education increases when embedded within enjoyable visitor experiences. The factor analysis in Table 8 further distilled motivations into three principal dimensions: leisure/socialization, educational interest, and environmental concern. The presence of these distinct motivational clusters confirms the argument made by Brownlee et al. (2013) that botanical gardens cater to a wide variety of cognitive and affective visitor needs.

This segmentation has major implications. It suggests that conservation messaging should not only cater to already environmentally inclined individuals but also be subtly infused into leisure experiences. Guided walks, aesthetic installations, and recreational events with embedded conservation themes can cater to visitors driven by non-educational motives while gradually nurturing awareness.

Thus, the study not only reaffirms but extends the literature by quantifying the diversity of motivations and linking them to post-visit awareness and support behavior—a nuanced understanding that was previously underrepresented in Indian studies.

5.4. Public Support and Willingness to Engage in Conservation

The results indicate a generally favorable disposition toward supporting conservation initiatives: 58.6% of visitors expressed willingness to donate, and 63.9% were interested in future workshops. While active volunteering interest was lower (44.8%), this still marks a considerable base for engagement. These findings corroborate those of Gaio-Oliveira et al. (2017), who emphasized the untapped potential of botanical gardens to foster participatory conservation practices.

Moreover, Table 9 shows that digital outreach—such as following garden updates online—is the most preferred mode of engagement (54.5%). This affirms the observation made by Bele and Chakradeo (2021), who argued that increasing biodiversity literacy in urban contexts is closely tied to digital communication strategies.

The fact that donation willingness had a significant but moderate correlation with education ($r = 0.267$) implies that support is influenced not just by awareness but also by emotional connection and trust in the institution—an area that botanical gardens can actively cultivate. By organizing events that combine conservation messaging with community experiences, gardens can translate latent support into active participation.

This multidimensional analysis directly addresses the gap identified in Section 2.2: the lack of data on how Indian citizens perceive and act upon conservation messages delivered through botanical gardens. By measuring engagement readiness and channel preferences, the study offers strategic directions for actionable programming.

5.5. Influence of Demographics on Awareness and Support

The ANOVA and correlation analyses showed significant demographic influences on awareness and support behaviors. Younger adults (26–35) exhibited higher conservation awareness compared to both younger (18–25) and older (51+) visitors, and educational attainment correlated positively with understanding and support for plant conservation.

These findings echo those of Basu and Nagendra (2021), who reported that socio-demographic variables significantly affect how urban residents engage with green spaces. In the context of India, where educational attainment and urban exposure are often predictors of environmental concern, these results are particularly relevant.

However, the study adds a novel dimension by quantifying these relationships in the context of a specific garden and offering statistical significance levels (e.g., $F = 3.91$, $p = 0.009$). It bridges the gap between

qualitative insights and generalizable findings, thus making a unique contribution to conservation psychology in the Indian public context.

5.6. Strategic Implications for Botanical Gardens in India

The findings point toward several strategic pathways for botanical gardens seeking to position themselves as effective conservation institutions:

- Integrate scientific content with emotionally resonant narratives to increase understanding and engagement.
- Develop digital outreach platforms (e.g., mobile apps, social media pages) to maintain contact with post-visit audiences.
- Segment communication and programming based on visitor demographics and motivational profiles.
- Encourage low-barrier participatory models (e.g., donation kiosks, photo contests linked to native plant themes).
- Collaborate with schools and universities to enhance academic engagement and long-term stewardship.

These strategies not only address operational gaps but also align with the GSPC goals and national biodiversity policies, as highlighted in Kumar (2021). They offer a roadmap for transforming botanical gardens from passive attractions into dynamic centers of civic ecological responsibility.

5.7. Contribution to Literature and Policy

This study makes a dual contribution—empirical and policy-relevant. Empirically, it fills a significant void by providing a quantitative, demographically representative snapshot of public perceptions toward botanical gardens in India. Methodologically, it introduces standardized tools (e.g., Likert scales, PCA, ANOVA) to a field traditionally dominated by qualitative or botanical research.

On a policy level, the findings support the inclusion of public engagement indicators in national conservation metrics and advocate for greater collaboration between the Ministry of Environment, Forest and Climate Change (MoEFCC) and educational institutions in leveraging botanical gardens for awareness programs.

By grounding strategic insights in statistically supported evidence, the study contributes to the global discourse on the role of public institutions in fostering biodiversity consciousness in the Anthropocene era.

6. CONCLUSION

This study explored public perceptions of botanical gardens in India, focusing on how these institutions are understood, experienced, and supported in their role as agents of plant conservation. Through a structured quantitative survey conducted at the Acharya Jagadish Chandra Bose Indian Botanical Garden, the research captured a detailed picture of visitor demographics, motivations, awareness levels, and willingness to support conservation initiatives. The results reveal that while botanical gardens in India are widely appreciated for their aesthetic and recreational value, their identity as spaces of ecological importance and education is still evolving and not uniformly recognized among all visitors.

One of the most important implications of the study is the confirmation that botanical gardens can indeed serve as effective informal education platforms. Post-visit awareness of conservation themes was significantly higher, validating the role of interpretive tools and on-site educational interventions. However, the limited pre-visit knowledge among visitors highlights the need for broader community engagement strategies that extend beyond the garden walls. Public messaging, school partnerships, and online educational content must be strengthened to cultivate a deeper understanding of the conservation mission among wider segments of the population.

The correlation between higher education levels and stronger conservation awareness suggests that botanical gardens may currently be better engaging educated urban visitors. While this is promising, it also points to an inclusivity challenge: reaching those from less-privileged backgrounds or with limited exposure to scientific discourse. Future initiatives should focus on reducing access barriers, both cognitive and logistical, to ensure that botanical gardens serve as democratic spaces of ecological literacy for all. Another critical insight from this study is the diversity of visitor motivations. The fact that most people come for recreation or social interaction suggests that conservation messaging must be seamlessly integrated into the leisure experience. This calls for innovative programming that blends enjoyment with engagement—such as interactive exhibits, guided storytelling, or gamified conservation trails. Understanding the motivational typologies of visitors allows gardens to tailor their communication in ways that resonate emotionally and cognitively with different audience segments.

Support for garden-led conservation activities was also notable, with more than half of the respondents expressing willingness to donate or participate in workshops. This reveals an untapped reservoir of civic engagement that, if harnessed strategically, could support the financial and volunteer needs of conservation programming. Encouragingly, digital channels were identified as a preferred mode for ongoing involvement, underscoring the importance of building robust virtual platforms for outreach, education, and engagement.

This research contributes to a growing body of work that recognizes the social dimensions of biodiversity conservation. It reinforces the idea that conservation success is not only a scientific or ecological pursuit but also a social and cultural one. Future research could expand this work by employing longitudinal designs, multi-site comparisons, or integrating qualitative methods to explore the deeper narratives and values that shape public engagement with nature. Ultimately, this study emphasizes that botanical gardens, if strategically supported and reimagined, have the potential to become transformative spaces in the movement for ecological awareness and sustainable living in India.

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