Assessing and Enhancing Community Perception and Knowledge About the Endemic Rameshwaram Ornamental Tarantula Through Conservation Education

R. Mohammed Shahidh[1*], M. Mohamed Ashik[2], C. Gunasekaran[1], B.A. Daniel[2]

[1]Conservation Biology Lab, Department of Zoology, Bharathiar University, Coimbatore 641046, Tamil Nadu, India.

[2]Living In Fine Environment (LIFE) Trust - India, 2/211 A, Kumutham Nagar, Vilankurichi Road, Coimbatore - 641035, Tamil Nadu, India.

***Corresponding Author**

DOI: https://doi.org/10.51244/IJRSI.2026.1303000180

Received: 22 March 2026; Accepted: 28 March 2026; Published: 13 April 2026

ABSTRACT

Conservation efforts are generally hindered by public misconceptions and negative perceptions toward spiders, especially for rare and endemic species. The critically endangered arboreal tarantula *Poecilotheria hanumavilasumica*, which is native to Rameswaram Island in India, is the focus of this study, which evaluates the effectiveness of conservation awareness initiatives conducted on the Island. Negative perceptions of the species usually arise from local people's fear, misconceptions, and misunderstandings of the facts. To address existing knowledge gaps and misconceptions, structured conservation awareness programmes were conducted across local communities, schools, and colleges at Rameswaram Island using both direct and indirect outreach methods. Through awareness-raising initiatives, 2,871 participants were directly reached, with additional indirect outreach achieved through the dissemination of educational materials and various community knowledge-sharing activities. To measure the efficacy of the awareness programmes, 402 school students aged 11–14 years who participated in a pre- and post-assessment survey were selected. The results showed a significant improvement in participants' knowledge after the awareness interventions, with mean scores increasing from 7.25 (SD = 2.02) in the pre-test to 10.64 (SD = 2.52) in the post-test. Statistical analysis revealed a significant difference between pre- and post-assessment scores ($t = 23.62$, $df = 401$, $p < 0.001$), indicating a strong positive impact of the educational programmes. These results demonstrate how effectively environmental education programmes help dispel myths and foster positive perceptions of endangered species like *Poecilotheria hanumavilasumica*.

Keywords: Conservation awareness; Environmental education; Spider perception; Pre–post assessment; *Poecilotheria hanumavilasumica*

INTRODUCTION

Biodiversity conservation increasingly recognises education and public awareness as crucial elements of successful conservation strategies. Conservation education programmes involving community stakeholders and educators have been recognised as effective approaches for improving public engagement in biodiversity conservation (Daniel & Marimuthu, 2012; Daniel, 2014). Conservation education programmes play an important role in promoting coexistence between humans and wildlife and improving public understanding of conservation issues (Daniel, 2012). Long-term conservation success ultimately depends on human attitudes, perceptions, behavioural intentions, and community support for threatened species and ecosystems, even as laws,

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue III March 2026

enforcement, and habitat protection remain essential (Washington et al., 2015b). As a result, awareness-raising efforts and education programmes are often promoted as ways to influence people's attitudes and behaviours towards biodiversity conservation.

Environmental education is usually associated with formal learning at educational institutions. Global frameworks, such as the 2030 Agenda for Sustainable Development and UNESCO's Education for Sustainable Development (ESD) for 2030, highlight the significance of both formal and informal education in promoting awareness of the environment and sustainable practices. SDG 4.7, which aims to ensure that all learners acquire knowledge and skills essential for promoting sustainable development, including environmental conservation, climate action, and biodiversity conservation.

It has been shown that awareness initiatives, especially non-formal education strategies such as community programmes and outreach projects, influence public opinion and promote environmentally friendly behaviour (Howe et al., 2012). But more knowledge may not be enough to change attitudes on its own. Changes in knowledge, attitudes, and behavioural intention are requirements for long-term behavioural outcomes in order for education programmes to significantly contribute to conservation success (Caro et al., 1994; Mehta & Heinen, 2001; Aipanjiguly et al., 2002). Therefore, to find out if educational efforts result in quantifiable conservation-relevant achievements, a systematic evaluation of awareness initiatives is required.

The present study focuses on *Poecilotheria hanumavilasumica*, which is a critically endangered arboreal, nocturnal tarantula endemic to India and Sri Lanka (Smith, 2004; Siliwal et al., 2008; Nanayakkara *et al*., 2015). Based on the field survey, this species was selected as the focal species to promote conservation through education and awareness programmes because of its limited distribution and the widespread fear and misconceptions that residents have about spiders.

To create awareness of the target species among a wide range of audiences, educational outreach programmes implemented in schools, colleges, and local communities are essential. By combining experiential, participative, and cognitive learning methods, these programmes foster reflective behaviour, interaction, and critical thinking, which in turn increases awareness and responsibility for conservation (Meadows, 2011). In order to assess these programmes' efficacy and improve outreach methods in the future, evaluation is crucial.

Pre- and post-assessment methods have become popular in recent years for assessing the success of conservation education programmes. These assessments provide concrete evidence of learning outcomes and changes in perception by comparing participants' knowledge and attitudes before and after awareness interventions. While attitudinal assessments provide information about participants' readiness to support conservation efforts and policies, improvements in post-assessment scores indicate improved awareness of species ecology, threats, and conservation significance (Howe et al., 2012; Aipanjiguly et al., 2002; Zjalic et al., 2024).

The present study evaluates the effectiveness of structured awareness programmes conducted among selected target groups using a questionnaire-based pre- and post-assessment framework. The programmes were designed to increase awareness, dispel myths, and develop positive attitudes toward conservation, especially with regard to the target species (*P. hanumavilasumica*). Pre- and post-assessment scores were compared to quantify changes in attitudes and knowledge levels.

In conservation awareness programmes, indirect reach is essential because information acquired by direct participants can be disseminated through social interactions and community networks. Diffusion theory explains how information spreads through social systems over time through communication channels (Rogers, 2003), whereas social learning theory suggests that people learn and transmit knowledge by watching and interacting with others (Bandura, 1977).

This study offers an in-depth evaluation of direct and indirect awareness programme outcomes and highlights the role of conservation education as a useful and quantifiable conservation intervention by incorporating assessments of knowledge improvement, attitudinal change, and behavioural intention.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue III March 2026

METHODOLOGY

Study Area and Target Groups

Since the Rameshwaram Ornamental Spider, the target species, is endemic to Rameswaram Island (9°25′–9°31′ N; 79°05′–79°31′ E), the study was carried out there. To reach a wide range of audience, including tourists and different groups of the community, both direct and indirect awareness programmes were conducted at schools, colleges, local villages, and Panchayat meetings. For the direct awareness programmes, school students aged 11 and 14 were chosen as participants for the assessment component of the study. Participation was completely voluntary, and the programme's objectives were clearly explained to all participants before the events. The study was carried out between April 2023 and November 2024.

Study Design

The conservation awareness programmes were implemented using both direct and indirect outreach methods across schools, institutions, and local communities on Rameswaram Island. To assess the efficacy of structured awareness programmes, the current study used a pre and post-test approach. This method is frequently used in studies on conservation education to evaluate how educational interventions influence knowledge, attitudes, and perceptions related to conservation (Dimitrov & Rumrill, 2003; Howe et al., 2012; Washington et al., 2015a).

Development of Species-Specific Educational Materials

A comprehensive set of species-specific teaching resources focused on *Poecilotheria hanumavilasumica* was developed to support outreach initiatives. These materials were designed to convey scientific facts interestingly and simply for various age groups. A species booklet, an informative brochure, a myths and scientific facts sheet, species stickers, and keychains with a species theme were all included in the teaching toolkit. In order to foster interest and coexistence with the species from a young age, spider masks were developed for young children to create an interactive learning experience. The fact that all the educational resources and the questionnaire for evaluation were developed in Tamil, the local language, was an essential aspect of this programme.

Awareness Programme Content

The awareness programme was organised and delivered through interactive sessions and displays. *Poecilotheria hanumavilasumica*'s biology and ecology, taxonomic status, endemic range, preference for arboreal habitat, and ecological significance were all covered in detail in the content. Its limited geographic range and Critically Endangered status, cause of population decline, were highlighted. The programme addressed common misconceptions and myths about tarantulas, particularly exaggerated fears about their aggressive nature and venomous toxicity. The goal of dispelling these myths was to reduce fear-based misconceptions against the species, which frequently serve as the cause of spider death caused by humans. Major risks to the species, such as habitat degradation, felling of trees, fear-based persecution, and illegal collection for the pet trade, were explained to the participants. The significance of awareness and responsible behaviour in species conservation was highlighted by the discussion regarding these risk factors in connection with human activities. The participants were informed about wildlife conservation laws and regulations, particularly the regulations of the Wildlife (Protection) Act, 1972, and the importance of legal protection for threatened species. The discussion was focused on how people might promote wildlife conservation by following the law and reporting illegal activity.

Direct Awareness Programmes and Outreach Activities

Direct awareness programmes were conducted in selected schools, colleges, local villages, and Panchayat meetings on Rameswaram Island to improve public understanding of biodiversity conservation, with a particular focus on the endemic species *Poecilotheria hanumavilasumica*. The objective of educational programmes in schools and colleges was to increase the students' awareness of the conservation status and ecological

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significance of the species. Interactive sessions, group discussions, and the distribution of educational materials were all part of these sessions. To encourage community members to participate in conservation efforts, similar education programmes were conducted for local villages and during Panchayat meetings. Participants were encouraged to share their perceptions and experiences, which helped address widespread misconceptions and promote positive attitudes toward the species.

A two-day workshop was arranged to provide students with a deeper knowledge of species ecology, conservation issues, and the importance of long-term species conservation, in addition to regular awareness activities. Interactive sessions, group discussions, and PowerPoint presentations were all part of the workshop. To encourage participation and reinforce objectives for learning, a quiz competition with a conservation theme was conducted at the end of the workshop. It is generally accepted that educational outreach and participatory learning approaches, such as interactive discussions, workshops, and community engagement activities, are effective ways to improve participants' environmental knowledge and foster positive conservation attitudes (Monroe et al., 2008; Jacobson et al., 2015; Ardoin et al., 2020).

Indirect Awareness Programmes and Outreach Activities

Wall Paintings

Wall paintings were created in selected schools located along the main roads on Rameswaram Island to reach a wider audience, in addition to school students and their parents. The locations were strategically chosen to maximise visibility to pedestrians and tourists. In order to ensure cultural importance and a deeper connection with the community, the paintings were intentionally created by local artists. Each wall painting included an illustration of the endemic species *Poecilotheria hanumavilasumica*, along with commonly reported myths and key conservation messages presented in the local Tamil language to improve understanding and public engagement.

Popular Articles

To spread knowledge about conservation and the significance of conserving the endemic tarantula species *Poecilotheria hanumavilasumica*, popular articles were written and disseminated in local media and outreach platforms. Beyond direct education initiatives, these components are intended to reach a wider audience.

Awareness Boards and Flex (Banners)

To reach a wide range of visitors and Island residents, awareness boards were installed at Rameswaram Island's main roads and at popular tourist spots. Pictures of the target species, *Poecilotheria hanumavilasumica*, were displayed on these boards along with key information regarding its ecological significance and the importance of its conservation. To maximise visibility during large public gatherings, large-format awareness banners were also put up throughout the Island's major festival events. This strategy fostered ongoing public awareness of the species and its protection by ensuring that conservation messages reached a wider audience, including locals, pilgrims, and tourists.

Pre - and Post-Assessment Survey

Both before and after the awareness session, participants' knowledge and attitudes were assessed using a structured questionnaire. Both knowledge-based and attitude-based questions were included in the survey.

Questions about species identification and ecological role, conservation status, threats and myths about the species, and legal protection measures were all part of the knowledge assessment. One mark was given for each right answer, and the total scores were transformed into percentage values for analysis. Likert-scale comments were used to assess participants' attitudes regarding spiders and wildlife, willingness to support conservation efforts, acceptability of coexisting with wildlife, and sense of responsibility for conserving this endemic spider. Since positive attitudes generally lead to behavioural change, attitude assessment is considered a critical

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue III March 2026

indicator of the effectiveness of conservation education (Caro et al., 1994; Mehta & Heinen, 2001). Additionally, questions about participants' desire to learn more about wildlife, willingness to engage in conservation activities, and readiness to raise awareness among friends and communities were used to measure their interest in conservation. These indicators provide insight into behavioural intention, which is a crucial requirement for long-term conservation effects (Howe et al., 2012).

Statistical Analysis

R statistical software was used to evaluate data from 402 participants who finished both pre- and post-assessments. A paired-samples t-test was used to assess differences between pre- and post-intervention scores, and descriptive statistics were used to summarise knowledge gain and attitudinal changes in accordance with standard methods in conservation education evaluation (Washington et al., 2015a). The Shapiro-Wilk test was used to determine whether the difference scores were normal. Cohen's d was used to determine the effect size.

RESULTS

Outreach Reach and Coverage (Direct & Indirect)

Through structured educational programmes conducted in colleges, schools, and local communities on Rameswaram Island, the conservation awareness programme directly reached 2,871 individuals. A range of species-specific educational materials was developed as part of the outreach to enhance conservation education retention and communication. A species-specific handbook, informative pamphlets, myth-and-fact sheets, stickers, keychains, and spider masks designed for younger participants included these materials. To ensure accessibility and enhanced understanding among local audiences, all educational materials and questionnaires were created in the local Tamil language.

To enhance student engagement, a two-day awareness workshop and quiz programme focused on tarantula conservation and the conservation of *Poecilotheria hanumavilasumica* was conducted in addition to regular awareness sessions. To enhance students' understanding of species ecology, conservation issues, and long-term biodiversity protection, the workshop includes active teaching tools, group discussions, and participatory learning activities.

To increase conservation awareness, a variety of indirect outreach initiatives have been implemented in addition to the direct engagement efforts. These included popular science articles produced in Tamil, awareness wall paintings in public areas and schools, informational boards placed along main roads and popular tourist spots, and large conservation banners displayed during the Island's major festivals. The effort's indirect reach was calculated to be roughly 1,53,000 individuals based on the anticipated visibility of outreach materials and information sharing within participant networks.

For instance, during one rescue incident reported through the Forest Department, a local resident contacted the team after encountering the species and reported that he had learned about the spider from his daughter, who had learned about it from her brother following a school awareness programme. Such observations indicate that conservation messages circulate across family and community networks beyond the directly involved participants during outreach initiatives. An estimated 1,55,871 people were reached by the programme's total direct and indirect outreach.

Pre & Post Assessments

To quantitatively evaluate the effectiveness of the intervention, 402 participants completed both pre- and post-programme assessments. Following the awareness programmes, participants' knowledge significantly improved, as shown in the distribution of knowledge scores showing a clear shift towards higher values in the post-assessment compared to the pre-assessment (*Figure 1*). The mean pre-test score was 7.25 (SD = 2.02), while the mean post-test score increased to 10.64 (SD = 2.52), representing an average improvement of 3.39 points (*Fig. 2* & *Table 1*). When expressed relative to the maximum possible score of 13, the mean score increased from 55.8% in the pre-test to 81.8% in the post-test, indicating a 26.04 percentage-point increase in knowledge.

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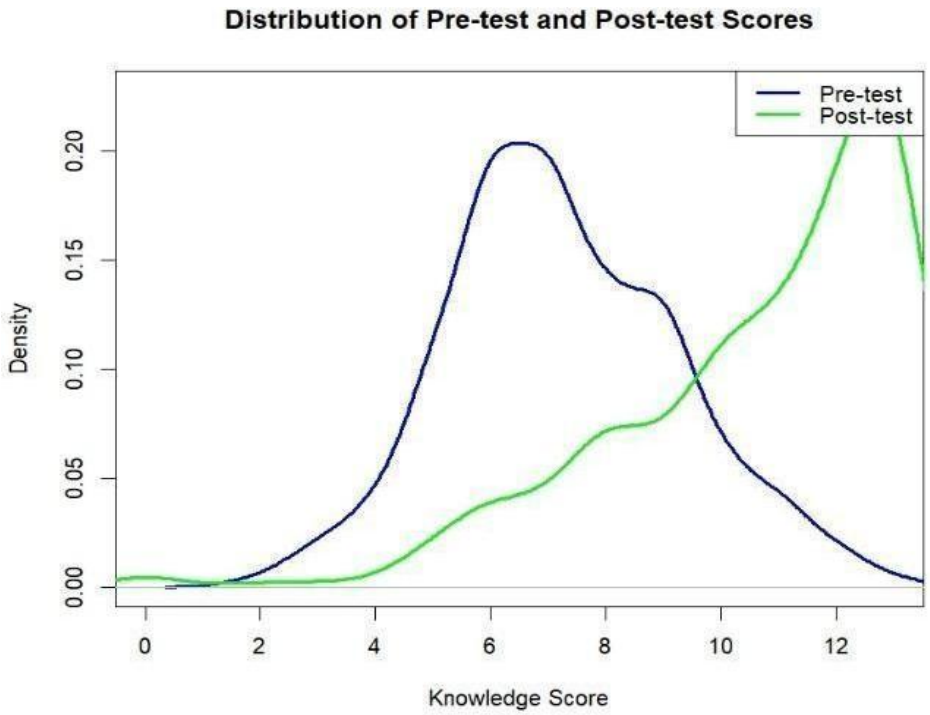

Figure 1: Density distribution of pre-test (blue) and post-test (green) knowledge scores showing an increase in participants' knowledge after the awareness programme.

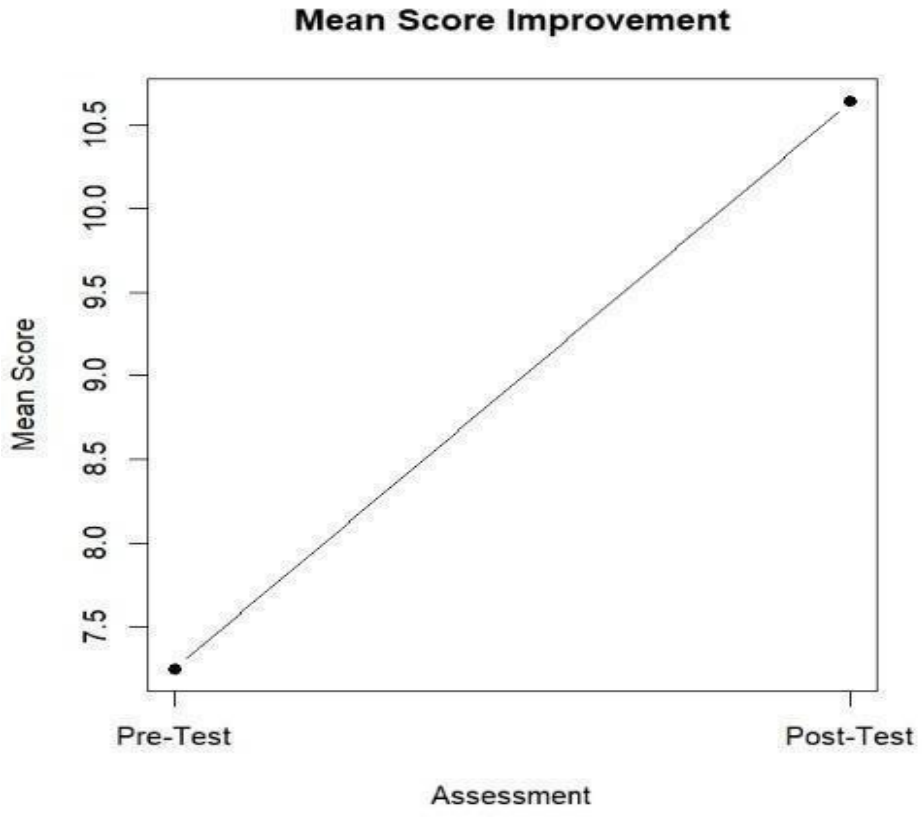

Figure 2: Mean score improvement between pre-test and post-test assessments, showing a substantial increase in participants' knowledge following the awareness intervention.

A paired-samples t-test (Table 1) revealed that this improvement was statistically highly significant, $t(401) = 23.62$, $p < .001$, with a 95% confidence interval for the mean difference ranging from 3.10 to 3.67. The effect

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size was very large (Cohen's d = 1.48), indicating a substantial positive impact of the awareness programme on participants' knowledge.

Table 1: A paired-samples t-test revealed that post-test scores (M = 10.64) were significantly higher than pre-test scores (M = 7.25), t(401) = 23.62, p < .001. The mean increase was 3.39 points (95% CI [3.10, 3.67]), representing a large effect (Cohen's d = 1.48).

Assessment	M	SD	t	df	p	Mean Difference	95% CI	Cohen's d
Pre-test	7.25	2.02						
Post-test	10.64	2.52	23.62	401	< .001	3.39	[3.10, 3.67]	1.48

Note. Maximum possible score = 13. Mean difference = Post − Pre. Cohen's d indicates a very large effect size.

DISCUSSION

The programme's primary goal was to raise awareness of *Poecilotheria hanumavilasumica*, a critically endangered tarantula. For species facing fear-based persecution and negative public attitudes, a greater awareness of the ecology, threats, and significance of conservation is especially important. It has been demonstrated that conservation education programmes influence people's perceptions of wildlife and promote conservation-focused behaviour in both communities and students (Ardoin et al., 2020).

The present study used a pre-test–post-test design to assess how effectively these awareness programmes improved participants' knowledge. The outcomes show that knowledge levels significantly improved after the educational intervention, proving the importance of structured awareness campaigns in raising awareness of the focal species conservation.

Only a small percentage of participants exhibited no change (5.47%) in scores, and a significant amount (85.57%) showed improved scores in the post-assessment. These results indicate that participants' knowledge was significantly improved by the awareness education session. Numerous conservation education studies have demonstrated similar increases in environmental knowledge after educational interventions (Howe et al., 2012; Washington et al., 2015b).

The use of interactive communication techniques like discussions, visual presentations, and species-specific educational materials may be responsible for the observed increase in post-test results. The use of structured education materials (booklets, pamphlets, myth-fact sheets, and visuals) and participatory learning methods has been recommended as an effective strategy for improving conservation awareness and community involvement and can greatly improve participants' environmental literacy and knowledge retention (Daniel & Marimuthu, 2012; Daniel, 2012 & 2014; Jacobson et al., 2015). All educational materials and surveys in the present study were developed in the regional Tamil language, which improved comprehension and was accessible to a larger audience.

By promoting active student participation, participatory events, including awareness sessions, workshops, and quizzes, further enhanced the educational and outreach effectiveness. According to Monroe et al. (2008), interactive learning techniques have been shown to increase knowledge retention and promote sustained interest in biodiversity conservation.

The findings reveal the importance of indirect outreach strategies for spreading conservation awareness to people who aren't directly involved. Although 2,871 people were reached through direct participation, the total outreach increased significantly when indirect strategies were taken into account, with an estimated reach of approximately 1,55,871 people. This shows how important passive communication techniques are in broadening the influence of conservation beyond regular classrooms. These methods are generally acknowledged to be successful in raising public awareness of conservation issues and enhancing awareness about endangered species (Meadows, 2011). Furthermore, evidence from community interactions, including a documented rescue incident reported by a local resident, provides practical support for knowledge diffusion through social and familial networks. In the present case, information on the species was shared within the family after a school awareness

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programme, demonstrating how conservation knowledge can naturally spread within communities. In areas like Rameswaram Island, where social interaction plays an important role in shaping perspectives, this kind of informal knowledge transfer is especially important. These results reveal that the long-term impact of conservation interventions can be significantly enhanced by combining direct teaching with indirect and community-mediated pathways, especially for lesser-known endemic species such as *Poecilotheria hanumavilasumica*.

Overall, the study's findings show that structured awareness programmes can greatly enhance people's understanding and perceptions of endangered species when they are supported by regionally specific educational resources and a variety of outreach strategies. Increasing public knowledge through these kinds of educational efforts can be crucial for fostering sustained support for Rameshwaram Ornamental Spider conservation.

The study proved that participants' knowledge and awareness of the focal species had improved as a result of the conservation education programme. Immediate changes after the intervention were successfully captured by using a pre-test–post-test design. Long-term behavioural changes and attitudes toward species conservation will be assessed in the future phases of the research, even though the current study primarily focuses on short-term knowledge enhancement. Long-term monitoring and follow-up evaluations are required to determine whether raised awareness results in continued conservation-oriented behaviour. These long-term methods will offer a more profound understanding of the long-term effects and general efficacy of conservation education initiatives.

CONCLUSION

The present study shows that structured awareness programmes can play an important role in improving people’s understanding of conservation issues. The comparison between pre-test and post-test results clearly indicates that participants gained better knowledge after attending the awareness sessions. Most of the participants showed improvement in their scores, suggesting that the programme was effective in communicating basic concepts related to the protection and conservation of the target species. The use of interactive presentations, discussions and species-specific educational materials helped participants understand the ecological importance of *Poecilotheria hanumavilasumica*. Preparing the educational materials and questionnaires in the local Tamil language also made the information easier to understand for the participants and increased their interest in the programme.

Apart from the direct awareness sessions, several indirect outreach activities such as wall paintings, awareness boards at public places, popular science articles and conservation banners displayed during festival gatherings also helped spread the conservation message to a wider audience, including residents and tourists. These activities increased the visibility of the species and highlighted the importance of public participation in spider conservation. Overall, the study indicates that combining educational programmes with community-based outreach and locally appropriate communication methods can be an effective approach for promoting conservation awareness and developing positive attitudes towards threatened species. Conducting similar programmes regularly in schools and communities may further help strengthen long-term conservation efforts.

ACKNOWLEDGEMENT

We gratefully acknowledge the financial support provided by the Ocean Park Conservation Foundation, Hong Kong (Project Code: OT02.2223). Thanks to the Department of Zoology, Bharathiar University, for extending moral support and encouragement. We also express our sincere thanks to the Tamil Nadu Forest Department for their support and cooperation throughout the study. We extend our gratitude to the stakeholders of Rameswaram Island and to Arulagam for their valuable support.

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